



Sustainability Report 2022
Metropolitan Waterworks Authority







**QUALITY
WATER
FOR
QUALITY
LIVING**

Quality Water for Quality living

“Quality Water”

states the primary commitments in innovation to create value and enhance efficiency to reduce water loss and deliver good water quality for use and consumption.



- Standardize high-quality and high-safety, which is suitable for both use and consumption, meets international water quality standards, and responds to government policies while sustainably fulfilling the needs and expectations of every stakeholder.
- Manage water supply systems from the source to the destination in order to create value at an appropriate cost under the principles of good governance while using knowledge and digital technology to enhance work processes through innovation and development of high-quality products and services.
- Operate related businesses by providing comprehensive waterworks services to deliver value to customers beyond their expectations and consistently with their needs to create good customer impressions.

“Quality living”

demonstrates consistent growth by operating a comprehensive water supply business while promoting water resource security and building confidence extensively and equally in consumers to impress our value consumers to achieve good quality of life.



- Protect the public’s interest in having extensive and adequate access to high-quality, clean, and safe water supply according to international standards and reduce inequality through fair pricing.
- Support the national economy growth, national security, and sustainable Thai society while operating business ethically for the benefit of stakeholders, society, and the environment.



Vision

To become a High Performance Organization (HPO) that provides the people with water supply services with good governance, and meets the international standards.

Missions

To create sustainable growth to the organization.

To implement the Water Safety Plan (WPS) of World Health Organization (WHO) by integrating the whole work processes of raw water system-production-distribution to be stabilized.

To professionally enhance waterworks in response to the needs of all stakeholders

To uphold good quality of life for everyone to thoroughly consume clean and safe water.

MWA Value

“Commitments to self-development and work process development for excellent services with transparency and care for quality” or QWATER

Q

Quality

Care for quality

W

Willingness

Willingness to commitment

A

Achievement

Self-development

T

Team

Work process development

E

Excellent

Excellent Service

R

Respect

Respect to Transparency



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Message from MWA Governor



MWA will keep committed to developing water supply systems to ensure the public's access to clean and safe water

For over the past 55 years, Metropolitan Waterworks Authority (MWA) has taken pride in its commitment and dedication to continually developing modern waterworks and management systems to deliver good quality of life to the people in its responsible areas, namely Bangkok, Nonthaburi, and Samut Prakan to give them extensive and equitable access to high-quality water supply.

In the midst of various crises affecting the societies and economies of the world, MWA believes that “sustainability” is a key foundation for growth and forward development. Therefore, we adopted the United Nations’ Sustainable Development Goals as factors in setting our working objectives in order to drive the enterprise toward sustainable development with consideration to 3 basic dimensions: environmental (E), social (S), and governance (G).

E = Environmental means using natural resources effectively while supporting conservation and restoration of water resources and the environment through various organized projects and activities.

S = Social means managing the enterprise’s human resources fairly and equitably with consideration to the work environment and health of employees and operations, along with stakeholders across the entire supply chain.

G = Governance means operating business transparently with checks and balances to combat corruption through good governance while fairly safeguarding the interests of all stakeholders.

Lastly, in the name of Metropolitan Waterworks Authority, I would like to thank stakeholders from every sector for always supporting MWA’s work, and MWA will keep committed to developing water supply systems to ensure the public’s access to clean and safe water while caring for along with taking responsible for the communities, society, environment, and stakeholders in addition to contributing and to the push toward achieving sustainable development goals.



Mr. Manit Pan-em

Governor, Metropolitan Waterworks Authority



Sustainability Reporting and Materiality

The MWA's Sustainable Development Report of 2022 discloses information about the MWA's activities from 1 October 2021 to 30 September 2022. The guideline used in this report conforms to the specifications and principles of the GRI (Global Reporting Initiative) in the GRI Standards in accordance with the material topics and other activities that are significant to the enterprise.

In the 2022 fiscal year, the MWA reviewed the material topics of sustainability of the enterprise to dynamically keep up with changes in economic, social, and environmental contexts that impact work processes and the productivity and main services of the enterprise, not to mention

the needs and expectations of stakeholders. The material topics of sustainability remain the same from the 2020 fiscal year according to the work processes discussed as follows:

Steps for MWA Materiality Assessment

1

Identify
Material
Issues

2

Prioritize
Material
Issues

3

Review
Results of
Assessment



Step 1: Identify Material Issues

MWA's material issues are identified in accordance with the Fifth MWA Enterprise Plan, aligned with the framework of the Global Reporting Initiative (GRI) standards and the Sustainable Development Goals (SDGs). It includes holding the workshops in order to get feedback and opinions from all stakeholders which consist of:

- 1) External Stakeholders;
- 2) MWA Employees;
- 3) MWA Executives.

The purpose of the workshop is to gather those workshop results for further reviewing the material issues from the previous year.



Step 2: Prioritize Material Issues

MWA has prioritized material issues of Fiscal Year 2022 by reviewing the material issues from the previous year alongside external factors that may affect its business and stakeholders at a workshop so as to listen to the opinions of stakeholder groups. Two criteria for prioritization are:

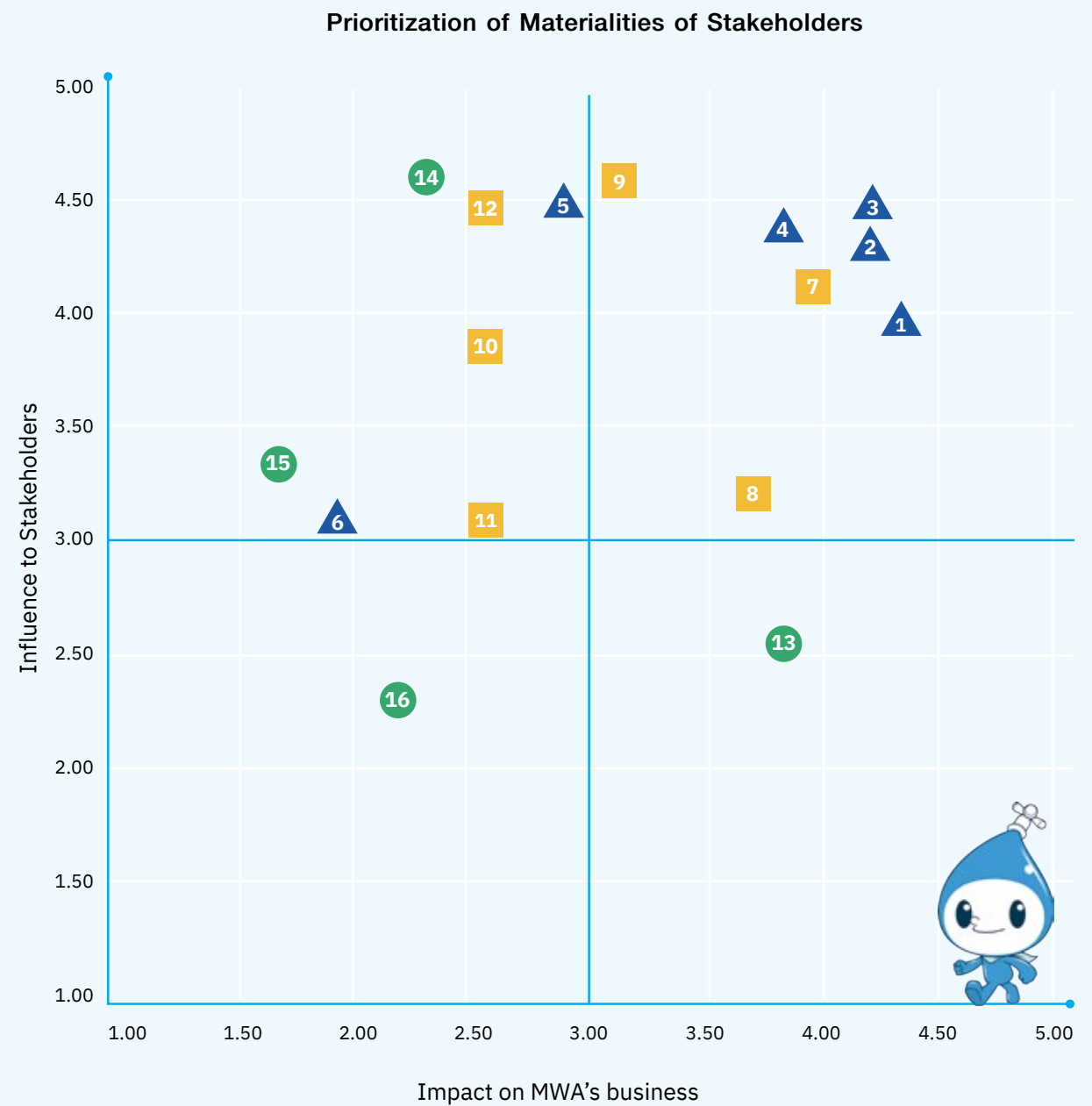
1. Importance level to MWA's operations;
2. Importance level to stakeholders.






Step 3: Review Results of Assessment

The panel in charge of preparing the MWA Sustainability Report has reviewed the comprehensiveness of the identification and prioritization of material issues for the Subcommittee on Corporate Governance and Corporate Social Responsibility to consider and present to the MWA Board of Directors for acknowledgment.

The MWA Materiality Matrix 2022



-  Economic
-  Social
-  Environmental

1. Supply Chain Management and Sourcing
2. Economic Performance
3. Innovation and Digitalization
4. Transparency and Integrity
5. Policy Involvement
6. Indirect Economic Impacts
7. Occupational Health and Safety
8. Training and Education
9. Quality of Tap Water
10. Local Community
11. Customer Relationship Management
12. Partnership and Collaboration
13. Water and Effluents
14. Energy
15. Emissions
16. Waste

Lists of MWA Materialities 2021

Economic

- Supply Chain Management and Sourcing
- Economic Performance
- Innovation and Digitalization
- Transparency and Integrity
- Policy Involvement
- Indirect Economic Impacts



Social

- Occupational Health and Safety
- Training and Education
- Quality of Tap Water
- Local Community
- Customer Relationship Management
- Partnership and Collaboration



Environment

- Water and Effluents
- Energy
- Emissions
- Waste



For more information, please contact:

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Metropolitan Waterworks Authority (Head Office)
400 Prachachuen Road, Thung Song Hong Subdistrict,
Lak Si District, Bangkok 10210

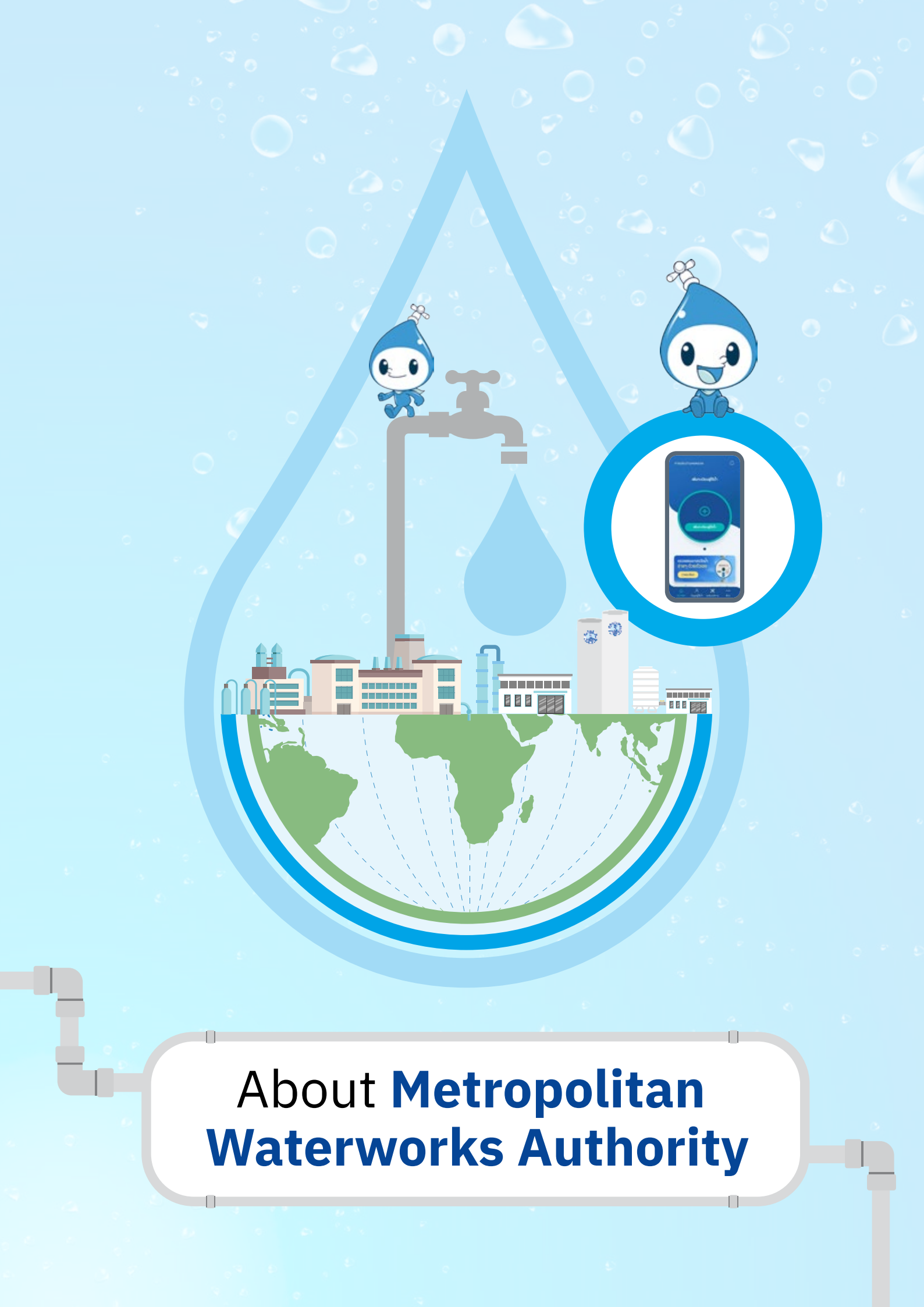


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About **Metropolitan
Waterworks Authority**

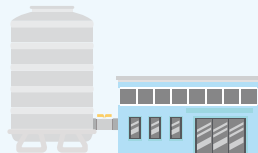


About Metropolitan Waterworks Authority

MWA is a state enterprise under the supervision of the Ministry of Interior that began its operation on 16 August 1967, according to the MWA Act, B.E. 2510 (1967) as follows:



Explore and procure raw water sources for tap water production.



Produce, deliver, and distribute water supply within the service areas covering Bangkok, Nonthaburi, and Samut Prakan.



Conduct other businesses related to or useful for waterwork, such as identifying pipe leaks inside households, installing water pipes in developed housing projects, and providing professional training in waterworks.

MWA has managed water supply based on the World Health Organization's water-quality standard. It has paid attention to water quality from upstream to downstream so as to comprehensively and adequately provide people with safe and clean water. MWA has integrated innovations and technologies to continuously improve waterworks. Water Safety Plan (WSP) has been drawn up to assure our water supply safety and quality by launching new water pipe replacement projects in various areas while promoting positive relations with communities on the western and eastern sides of the river basin as part of the effort to conserve water resources to enhance the effectiveness of basic water supply infrastructure for sustainability.



Remarks: For additional information about the organization's structure or contents beyond the scope of this report, you can read the Metropolitan Waterworks Authority's 2022 annual report.

Address

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Bangkok 10210
Phone: +66 2504 0123



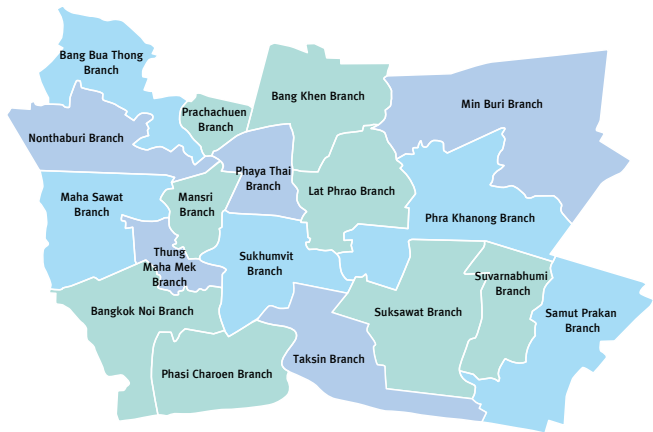
Service Areas

The water distribution areas of MWA have covered the Bangkok Metropolis, Nonthaburi, and Samut Prakan region or a total of 3,195 square kilometers. Raw water is obtained from 2 sources, i.e. the Chao Phraya River and Mae Klong River, for treatment, transmission, and distribution.

Currently, MWA has delivered tap water to all urban zones in the three provinces, giving their residents access to clean and safe tap water, which enhances their quality of life. MWA services are in line with the UN Sustainable Development Goal 6 (SDG 6) and the "Ease Sufferings, Nurture Happiness of People" policy of the Ministry of Interior, which supervises MWA.

18 Branches, 4 Water Treatment Plants in 3 Provinces in Every Service Area

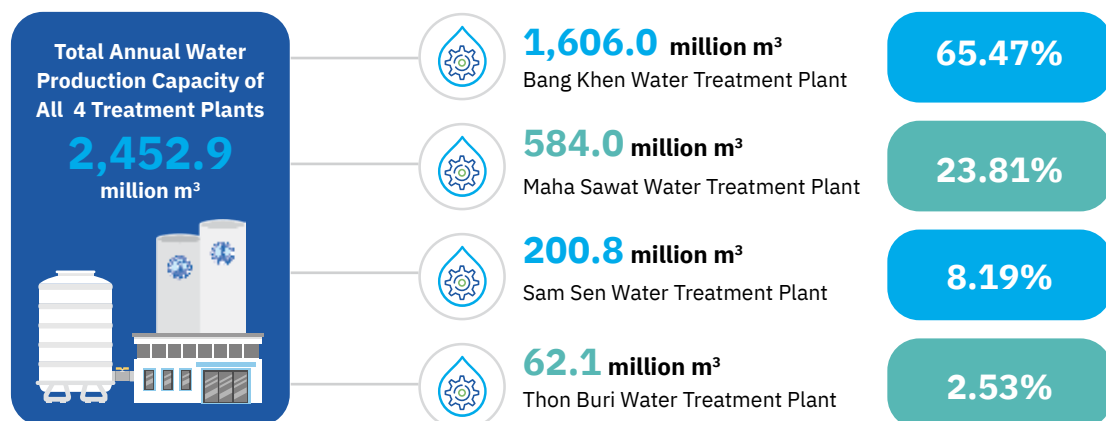
Regarding service provision, the MWA has 18 branch offices located in 3 different provinces and 4 water treatment plants in total.



Water Supply Branch Offices

1. Sukhumvit Branch
2. Phra Khanong Branch
3. Samut Prakan Branch
4. Mansri Branch
5. Phaya Thai Branch
6. Thung Maha Mek Branch
7. Lat Phrao Branch
8. Prachachuen Branch
9. Bang Khen Branch
10. Min Buri Branch
11. Suvarnabhumi Branch
12. Taksin Branch
13. Suksawat Branch
14. Bangkok Noi Branch
15. Phasi Charoen Branch
16. Nonthaburi Branch
17. Bang Bua Thong Branch
18. Maha Sawat Branch

Water Production and Distribution of All 4 Water Treatment Plants



Water Treatment Plants and Annual Water Production Capacity

Water Production Plant	Fiscal Year			
	2019	2020	2021	2022
Total Water Distribution	2,075.2	2,121.1	2,116.5	2,080.3
Bang Khen Water Treatment Plant	1,402.3	1,410.0	1,427.6	1,394.0
Maha Sawat Water Treatment Plant	518.8	572.3	40.1	560.0
Sam Sen Water Treatment Plant	113.0	102.4	556.6	86.4
Thon Buri Water Treatment Plant	41.1	36.4	92.2	39.9
Total Water Distribution	1,467.4	1,458.3	1,416.2	1,422.2

Major Operating Sites

1. Headquarters
2. Control Buildings of Water Transmission and Distribution Systems
3. 18 MWA Branches
4. Training Center
5. Water Pumping Stations
6. Transmission Stations
7. 4 Water Treatment Plants (Bang Khen, Maha Sawat, Sam Sen, Thon Buri)
8. The Water Quality Department and the Water Treatment Plants
9. Control Room of Water Treatment Plants
10. Eastern Waterwork Canal and Western Waterwork Canal

Personnel



1,798
female
employees

2,453
male
employees

1,020
contract
workers

Data as of 30 September 2022

Customers

In the 2022 fiscal year, the MWA reviewed the customer groups for the core business, i.e., provision of water supply services for the entire water life cycle of customers today and in the future, for the purpose of planning and setting goals and direction for effective marketing in line with customer's needs and expectations in the areas of innovation, products, services, and customer relationship management.

Current Customer

The current customers of MWA are water consumers in the areas under MWA's responsibility (Bangkok, Nonthaburi, and Samut Prakan) classified by water usage behaviors, business type or size (firmographics), and needs and expectations.



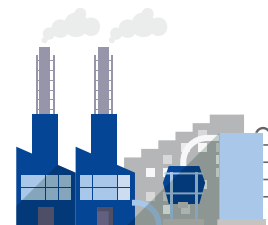
Residential (R)

refers to a group of customers who consume water within households or residences, with peak usage mostly occurring in the morning hours and evening hours.



Commercial (C)

refers to a group of customers who consume water for commercial or corporate purposes involving scheduled water uses according to the working hours of each business or corporation.

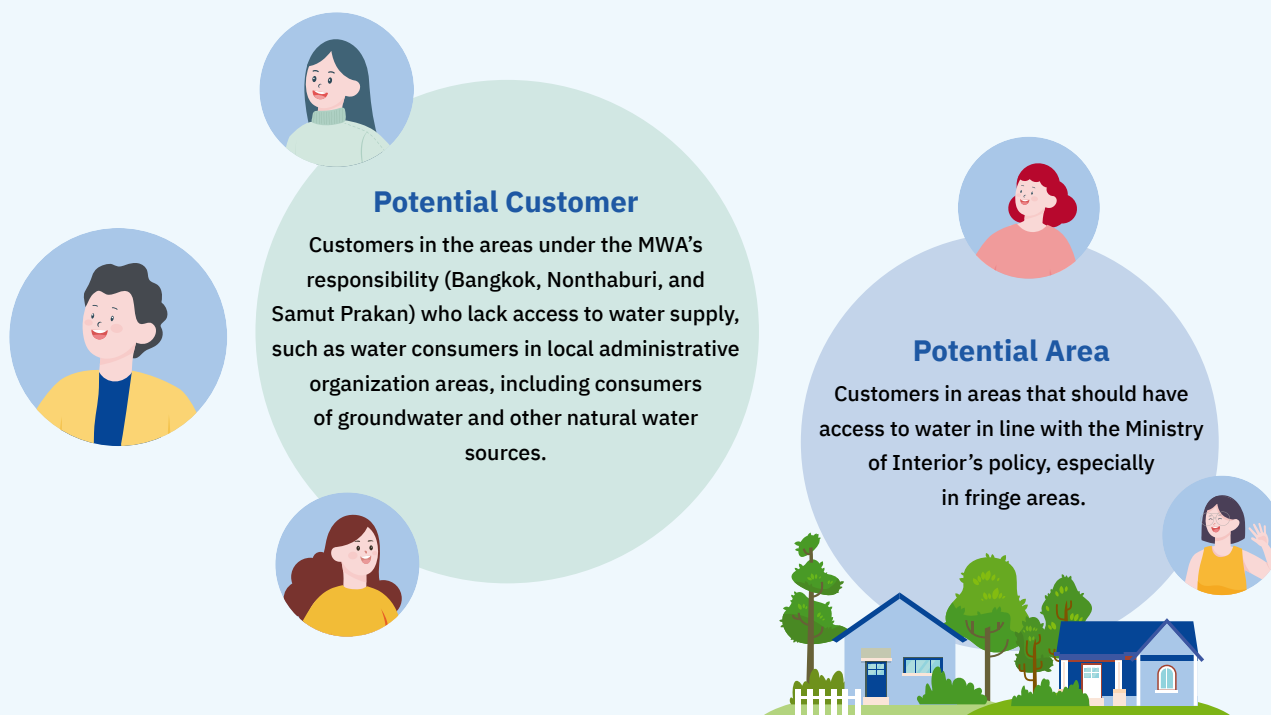


Industrial (I)

refers to a group of customers whose major purpose is for industrial use involving continuous usage, with some industries using water for 24 hours daily.

Potential Customers

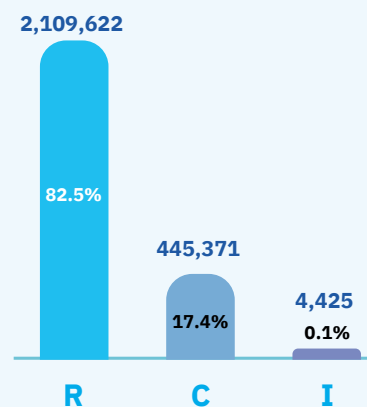
Analysis of strategic opportunities identified potential customers such as customers from pipe installations to expand water distribution areas and water sales to the people living in fringe areas in line with the government's policy to give the public equal chance to access clean water. For future market growth targets, customers can be divided into 2 groups as follows:



In addition, key accounts that are customers with a high average monthly water consumption of over 10,000 cubic meters per month have been identified for customer relationship management (CRM).

Number of Customers by Water Usage Behaviors, Business Type or Size, and Needs and Expectations for 2022

	2022 (Customers)	2021 (Customers)	Growth (Customers)	%Growth (Percent)
All Customers	2,558,418	2,517,486	40,932	▲ 1.63
R Customers	2,109,622	2,062,489	47,133	▲ 2.29
C Customers	444,371	450,332	4,961	▼ 1.32
I Customers	4,425	4,665	240	▼ 5.14



Data as of 30 September 2022

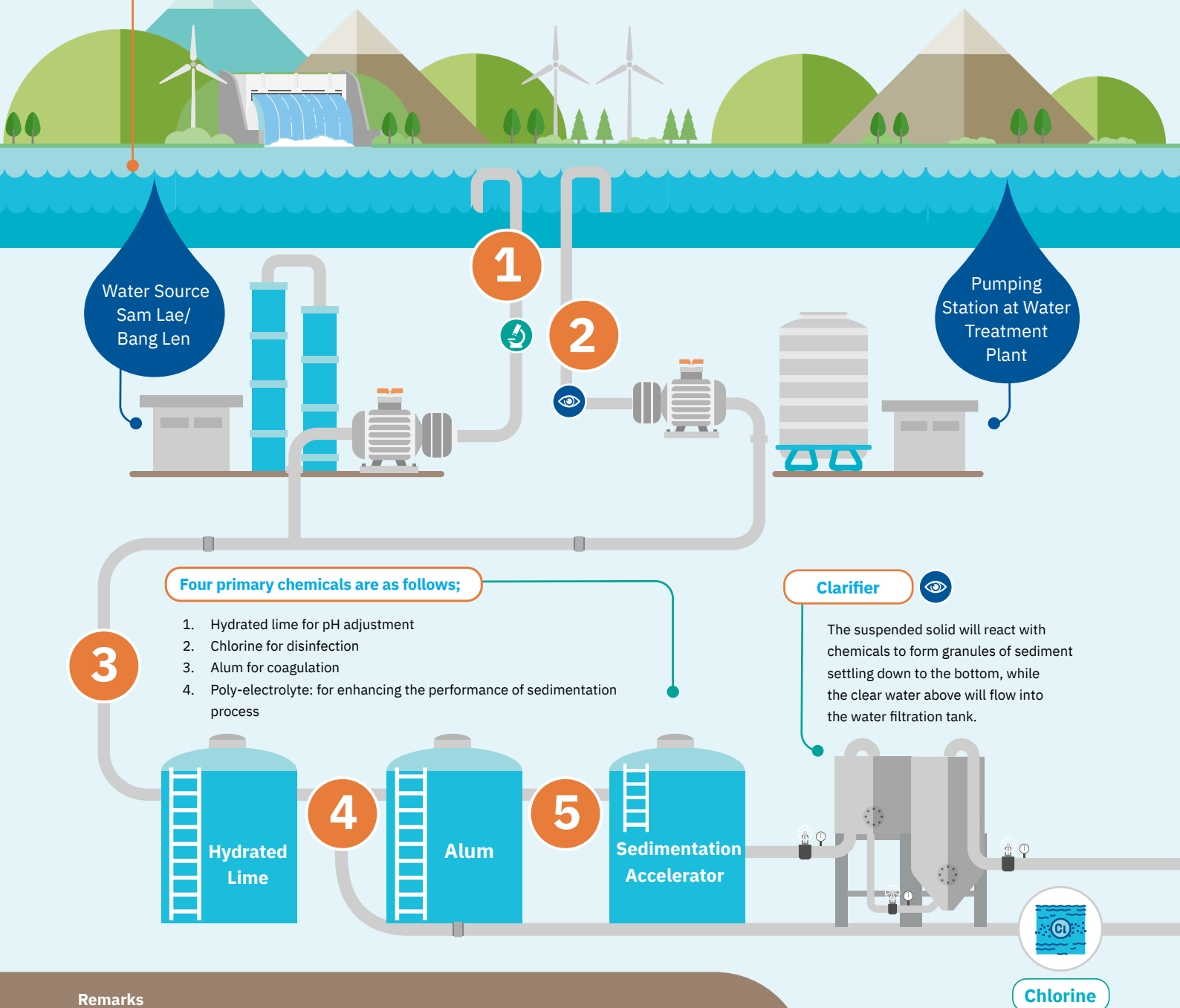


Diagram of Water Treatment Processes

Raw Water Source

1. Chao Phraya River in the area of Ban Krachaeng Sub district, Mueang Pathum Thani District, Pathum Thani

2. Mae Klong Dam in the area of Tha Muang District, Kanchanaburi



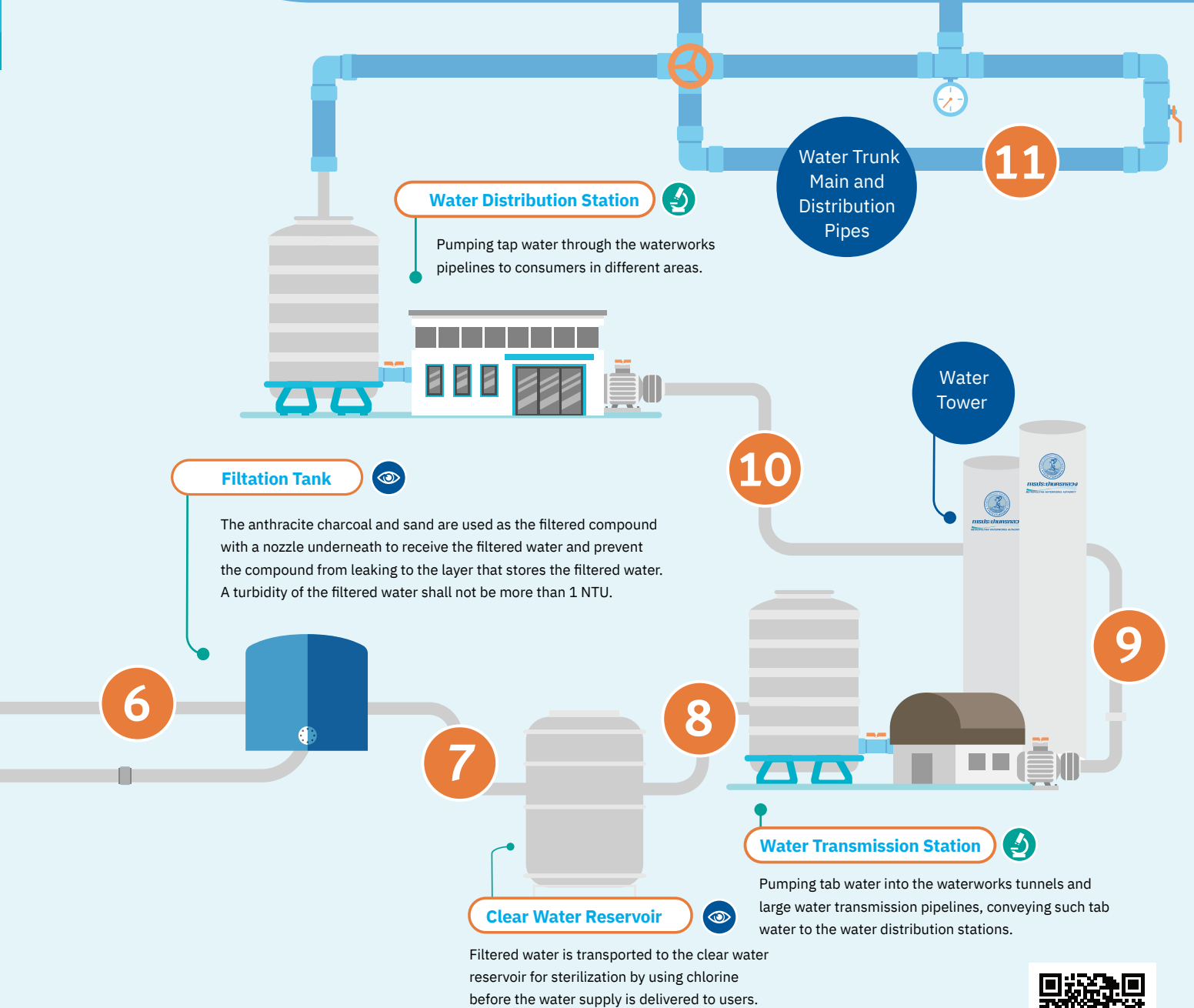
Remarks



The water treatment plant's laboratory certified by ISO 9001:2015, ISO 14001:2015, and HACCP handles the water monitoring and analysis for treatment.



The certified ISO 17025:2017 water quality department's laboratory handles the water quality monitoring and analysis, complying with the WHO's guidelines 2017.





MWA's Operating Direction and Policy

In 2022, the global economy experienced a downward turn with many countries entering into recession. The World Bank projected that growth in the global economy would fall to only 2.9% in 2022 from 5.7% in 2021 due to rising inflation in both developed and developing countries. In response, the central banks of each country had been issuing increasingly strict fiscal policies and raising interest rates, thereby contributing to higher loan costs. Furthermore, the war between Russia and Ukraine disrupted the supply chain and led sustained impacts to be felt by many countries, while the Coronavirus 2019 (COVID-19) situation was unrelenting.

Meanwhile, in 2023 it is expected that global economic growth would fall to only 2.7%, while the economic growth of countries in East Asia and the Pacific Region is projected to reach only 3.2% as a result of reduced growth in the Chinese economy stemming from strict COVID-19 control measures impacting industrial manufacturing and trade in China. Nevertheless, China's economy is expected to recover in 2023 with supporting factors contributing to regional economic reinvigoration, including a resolution to the

COVID-19 situation and a revival of tourism in Southeast Asia countries.

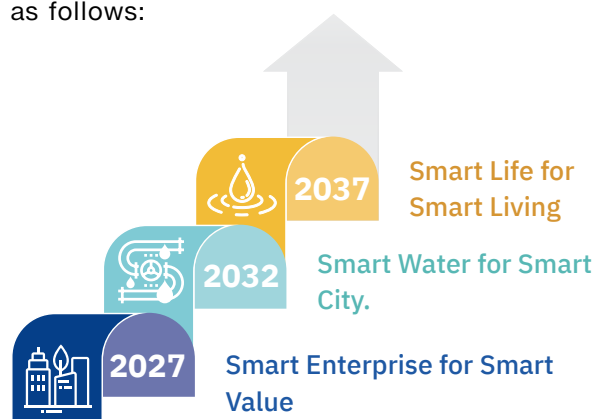
As for Thailand, the Bank of Thailand projected that the country's economy will experience a sustained growth of up to 3.3% and 3.8% in 2022 and 2023, respectively, in line with growth in tourism and private consumption. Tourism in particular will experience a substantial snapback from rapid resurgence in the number of foreign tourists and overall business revitalization, especially in the service sector, as well as from better distribution of income. However, the export sector will experience a loss of growth due to overall stagnation in the global economy. Even so, this will not impact the overall recovery, and Thailand's economy is anticipated to return to its pre-COVID-19 levels by early 2023. In any case, there are risk factors that need to be monitored such as rising energy prices on account of the ongoing war between Russia and Ukraine that is having an impact on private sector consumption and demand, along with the strained global financial situation and rapid downward spiral of the Chinese economy, which might hinder recovery. As for growth in the country's gross domestic product in manufacturing, the Office of the National Economic and Social Development Council hoped that in the 2nd quarter of 2022, agriculture would grow by 4.4% while 2.3% would be achieved by the non-agricultural sector, with growth coming from key manufacturing areas such as wholesale and retail and accommodations and food services. The key contributing factors for this are the service sector's renewed vigor following the relaxation of COVID-19 control measures and the implementation of the government's measures to continuously support tourism.



The Metropolitan Waterworks Authority projects in the 2023 fiscal year, the volume of water sold by the Metropolitan Waterworks Authority will increase from the 2022 fiscal year due to an upward trend of water sales since mid-2022 in line with the sustained recovery in international tourist numbers after the government's relaxation of travel restrictions and discontinuation of the Test & Go system in mid-2022. Accordingly, the Tourism Authority of Thailand believes the number of tourists traveling to Thailand will rise to 18-20 million people in 2023 from 8-10 million people in 2022, with favorable conditions stemming from the government's various measures to stimulate the economy and attract long-term foreign residents, which are contributing to growth in the real estate sector.

6th Metropolitan Waterworks Authority State Enterprise Roadmap

The MWA has divided its goals into 3 phases as follows:



1. Short-term Goals (2027)

Focus on driving the organization forward to become a smart enterprise for smart value through important activities like studying feasibility in procuring space to serve as secondary raw water sources and water price restructuring according to sub-segments and establishment of subsidiaries and launching of related comprehensive businesses, etc.

2. Medium-term Goals (2032)

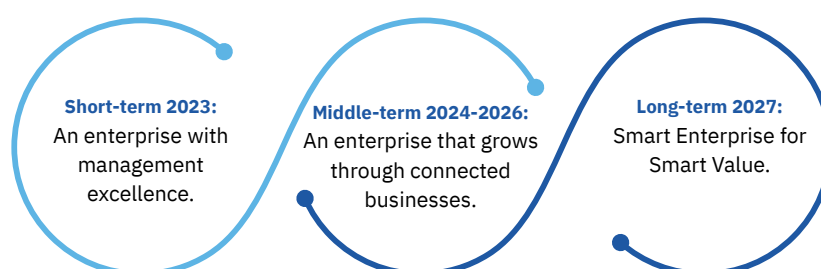
Focus on providing comprehensive water services to provide smart water for smart city through key activities such as integration of eastern and western water sources, establishment of a smart water network and comprehensive business expansion, etc.

3. Long-term Goals (2037)

Give priority to clean water/suitable water for good quality of life (smart life for smart living) through key activities such as reuse of cleaned water for utilization and consumption, overhauling the entire water supply system and restructuring the organization in the form of a holding company, etc.

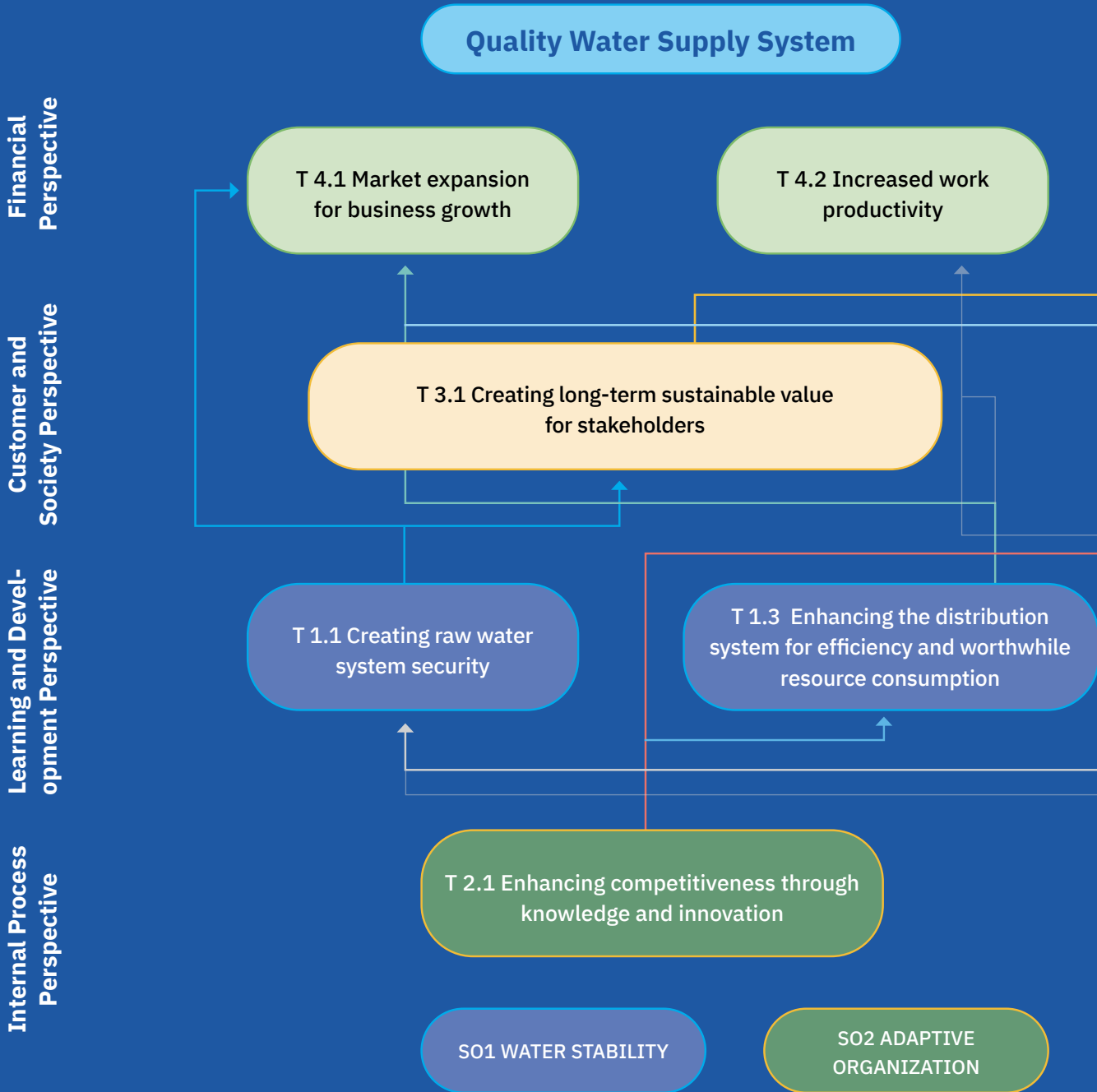
Strategic Positions

The 6th Metropolitan Waterworks Authority Enterprise Roadmap (2023-2027) specifies targets of success and indicators for each time period in clear phases. As such, strategic positions have been divided into 3 phases as follows:



These take into consideration 3 dimensions, namely 1) quality waterworks systems, 2) service excellence, and 3) sustainable management in order to ensure that the direction of the enterprise's future work is effective with challenging, clear, and verifiable indicators. As such, goals and indicators for strategic positions have been set according to timeframes, with indicators including becoming an enterprise with management excellence by 2023, being an enterprise that grows from connected businesses by 2024-2026 and being a smart enterprise for smart value by year 2027.

Policies and Future Work Plan



Main

CM DT

CM KM IM HCM DT

Support

KM IM CG CSR SM HCM

CG CSR SM



Enterprise Plan

One Stop Service Excellence

Sustainable Management

T 5.1 Expanding the market
for connected businesses

T 5.2 Expanding business
for one stop service

T 3.3 Upgrading stakeholder
and customer relations

T 3.2 Sustainability management with
corporate social responsibility

T 1.2 Enhancing high efficiency
production systems

T 2.2 Increasing process effectiveness
with stakeholders at the center

T 2.1 Increasing process effectiveness
with stakeholders at the center

SO3 SUSTAINABLE
PARTNERSHIP

SO4 HIGH FINANCIAL
PERFORMANCE

SO5 + (PLUS)

CG CSR SM HCM CM

CM IM

CM

DT KM IM

KM HCM CSR SM CG

CG CSR SM KM IM HCM DT



MWA Value Chain

MWA's core mission is to distribute quality tap water and provide services in response to customers' needs, with operations that are in compliance with guidelines, standards, and good corporate governance, of which they are divided into three main categories:



Management Process

It is related to executions that require the engagement of all executives to drive processes in order to meet requirements and targets. It also includes determination of the future direction, which focuses on creating growth and sustainability of the organization.



Core Process

It is a process that is vital and directly affects corporate achievement. It is a process that delivers value to customers and stakeholders, consisting of:

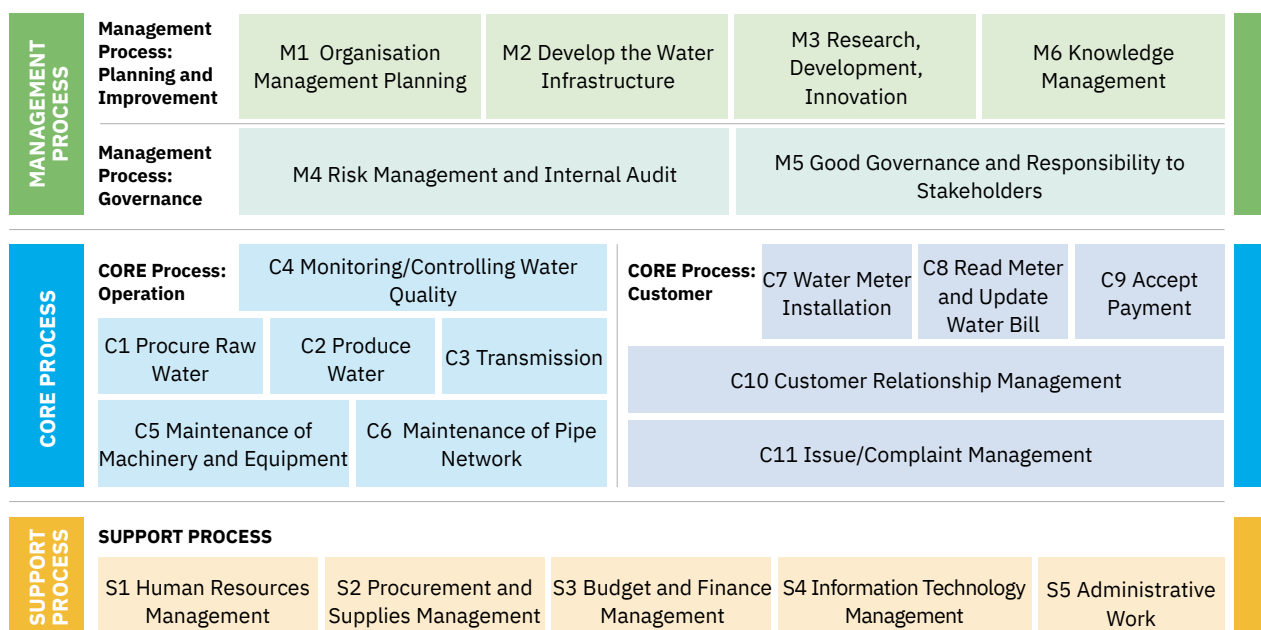
- **Operation:** It is a process relating to water production and distribution focusing on quality and efficiency.
- **Customer:** It is a process relating to customer service based on commitments.



Support Process

It is a process that supports and encourages the achievement of core processes which facilitate smooth corporate management, focusing on its efficiency and effectiveness. Hence, to deliver valuable products and services to customers and stakeholders sufficiently and thoroughly across all service areas as well as to support the sustainable socioeconomic development of the country, is our goal to accomplish.

Picture of MWA Work Process





MWA **Sustainable
Development** Policy



MWA Sustainable Development Policy

Criteria, Regulation, and Authority That MWA Deploys as a Framework for Economic, Social, and Environmental Development

As known, MWA is a state-owned enterprise under the supervision of the Ministry of Interior, which was established under the Metropolitan Waterworks Authority Act, B.E. 2510. Thus, our roles and duties are following the laws, regulations, and standards, which are summarized as follows:

Laws/Rules/Regulations	Details of Relevant Laws and Regulations
Occupational Health and Safety	<ul style="list-style-type: none"> Occupational Safety, Health and Workplace Environment Act, B.E. 2554 (2011) Ministerial Regulation on Assigning Safety Officers to the Work of Agency Personnel or Groups of Persons to Perform Safety Activities in the Place of Business, B.E. 2565 (2022). Ministerial Regulation on Specifying Health Inspection Standards for Employees Working with Risk Factors, B.E. 2563 (2020). Ministerial Regulation on Prescribing of Criteria and Method of Conducting Health Check-Up of Employees and Forwarding the Results of Health Check-Up to Labor Inspector, B.E. 2547 (2004) Notification of the State Enterprise Labor Relations Board on the Minimum Standards for Employment Unions, B.E. 2549 (2006) Notification of the Department of Labor Protection and Welfare on Determination of Personal Safety Equipment Standards, B.E. 2554 (2011) State Enterprise Labor Relations Act, B.E. 2543 (2000). Notification of the Department of Labor Protection and Welfare on warning signs, symbols of occupational safety, health and working environment and messages showing rights and duties of employers and employees, B.E. 2554 (2011) Labor Protection Act, B.E. 2541 (1998)
Certification or Registration for License to Operate	<ul style="list-style-type: none"> Metropolitan Waterworks Authority Act, B.E. 2510 (1967) Codes of Conduct Royal Decree on Criteria and Procedures for Good Country Administration (No. 2), B.E. 2562 (2019) World Health Organization (WHO) Electronic Transactions Act, B.E. 2544 (2001) Electronic Transactions Act (Amendment), B.E. 2562 (2019) Factory Act, B.E. 2535 (1992) Arms Control Act, B.E. 2530 (1987) Hazardous Substance Act (No. 3), B.E. 2551 (2008) Government Administration and Services through Digitalization Act, B.E. 2562 (2019)

Laws/Rules/Regulations	Details of Relevant Laws and Regulations
Industry Standards	<ul style="list-style-type: none"> • WHO's Guidelines for Drinking-water Quality, 4th Edition Incorporating the 1st Addendum • Good Manufacturing Practice: GMP • Hazard Analysis and Critical Control Points: HACCP • ISO 9001:2015 Quality Management System • ISO/IEC 17025:2005 Operating Noise Quality Assurance System • ISO/IEC 27001:2013 Information Security Management System • ISO/IEC 29110 Diagnosis and Recommendation System to Guide in Enhancing the Software Development • ISO 26000 Social Responsibility Guidance Standard • Notification of the Department of Health on Criteria for Drinking Water Quality, Department of Health, B.E. 2563, dated July 13, 2020. • Notification of the Department of Health on Recommendation Criteria for Drinking Water Quality for Surveillance, Department of Health, B.E. 2563, dated July 13, 2020. • Notification of the Metropolitan Waterworks Authority on the Criteria for Determining the Water Quality of the Metropolitan Waterworks
Environmental, Financial, and Product Management	<ul style="list-style-type: none"> • ISO 140001:2015 Environmental Management System • Budget Procedures Act, B.E. 2502 (1959) • Rule of the Office of the Prime Minister on Investment Budget of State Enterprises, B.E. 2550 (2007) • Rule of the Ministry of Finance on Accounting and Finance of State Enterprises, B.E. 2548 (2005) • State Fiscal Discipline Act, B.E. 2561 (2018) • WHO's Guidelines for Drinking-water Quality, 4th Edition Incorporating the First Addendum • Groundwater Resources Act (No. 3), B.E. 2546 (2003) • Facilitation of Government Authorization Act, B.E. 2558 (2015) • Public-Private Partnership Act, B.E. 2562 (2019) • Government Procurement and Supplies Management Act, B.E. 2560 (2017) • National Environmental Quality Promotion and Conservation Act, B.E. 2535 (1992) • Energy Conservation Promotion Act, B.E. 2535 (1992) • Ministerial Regulation prescribing rules, methods, and forms for collecting statistics and data, preparation of detailed records and a performance report of the wastewater treatment system, B.E. 2555 (2012) • Notification of the Ministry of Natural Resources and Environment on Determination of Wastewater from Factory, Industrial Estate, and Industrial Zone • Notification of the Ministry of Industry, Subject: Determination of Standards for Controlling Wastewater Discharge From Factory, B.E. 2560 (2017) • Notification of the Ministry of Industry on Disposal of Sewage or Disused Material, B.E. 2548
Others	<ul style="list-style-type: none"> • Government News and Information Act, B.E. 2540 (1997) • Computer Crime Act, B.E. 2550 (2007) • Personal Data Protection Act, B.E. 2562 (2019) • Cyber Security Act, B.E. 2562 (2019) • Criteria for assessing the work processes and management (enablers) of the state enterprise • Government shareholder policy guidelines (state of direction: SOD) on the state enterprise

In addition to the primary missions in the extensive treatment, transmission, and service provision of water supply to consumers in service areas, MWA is determined to operate according to sustainable development guidelines consistent with the Sufficiency Economy Philosophy and the Sustainable Development Goals that make up the direction framework for global development set by the World Health Organization and the action plans for driving the development of Thailand. We aim to do this by relying on the BGC economic model (2021-2027) and the MWA's Enterprise Roadmap by enhancing management effectiveness and basic water supply infrastructure from upstream to downstream in order to create value and support the government's policies while meeting the needs and expectations of stakeholders in a balanced way. We also want to build confidence through working according to good corporate governance principles with fairness, transparency, responsibility, and continuous innovation. Therefore, on 1 September 2020, the board of directors of the MWA announced the MWA Sustainable Development Policy to provide a guideline for the enterprise to operate as follows:

- 1 Strictly comply with related laws and specifications and respect international practice guidelines.
- 2 Keep in mind economic, social, and environmental balance and promote the development of the Bio-Circular-Green Economy (BCG Model) for every stakeholder in order to work to achieve sustainable growth for the organization.
- 3 Raise awareness about the value of water resources, energy conservation, and greenhouse gas emission reduction in the MWA's personnel and successfully communicate and disseminate this awareness to outside parties.
- 4 Raise awareness about the MWA Sustainable Development Policy in every stakeholder group and promote the adoption of sustainable practice guidelines in order to reduce impacts across the entire value chain.
- 5 Promote the continuous development of work innovations and technologies and develop the enterprise's personnel to possess sufficient skills to keep up with technological changes for the benefit of society and the environment.
- 6 Adhere to the principle of being a good citizen of society and use the MWA's expertise to improve the quality of life of important communities to achieve overall sustainability in the rest of society.
- 7 Disclose policies, management practice guidelines, work performance, and impacts from various activities that positively and negatively reflect the organization to stakeholders on the economic, social, and environmental dimensions, and do so transparently in order to promote understanding about the direction and corporate social responsibility processes of the enterprise with the aim of achieving sustainable development.

Accordingly, the executives, employees, and contract workers of MWA have the duty to support, push for, and take actions consistently with the enterprise's Sustainable Development Policy in order to lay the essential foundation for the sustainable development of the enterprise. MWA has also specified the MWA Good Governance Policy and MWA CSR Policy to provide the operating framework to be adopted by personnel in working with consideration to social and environmental policy and according to the principles of good governance and transparency. We have also announced the Stakeholder Management Policy to establish a standard for the equitable treatment of all stakeholders.



Scan QR Code
to view the MWA Good Governance Policy.



Scan QR Code
to view the Stakeholder Management Policy.



Scan QR Code
to view the MWA CSR Policy.



MWA's Stakeholders Engagement



MWA's Stakeholders Engagement

Identification of Stakeholders from Work Processes Across the Value Chain of MWA Identification of the Organization's Stakeholders

In 2022, MWA reviewed the organization's stakeholder identification process in line with the international guideline AA1000:2015 by thoroughly examining work processes across the value chain of the MWA. The stakeholder identification review revealed that the MWA remains to categorize stakeholders into 9 groups as follows:

STAKEHOLDERS



1. Policy agencies and government shareholders mean agencies responsible for governing and supervising state enterprises, including the Metropolitan Waterworks Authority, and various sub-committees appointed by the Metropolitan Waterworks Authority.



2. Task-based related agencies mean government agencies whose tasks are shared with us.



3. **Customers** – MWA classifies customers based on water products that cover the customer life cycle, including existing and future customers, as follows:

- **Existing customers** are water supply consumers in the MWA service areas under our responsibility (Bangkok, Nonthaburi, and Samut Prakan) divided by behavior, firmographics, and needs into 3 main groups as follows:
 - **Residential (R)** means customers who use water directly for utility and consumption purposes in residential areas, with peak usage mostly occurring in the morning hours and evening hours.
 - **Commercial (C)** means customers who use water commercially or in corporations with a scheduled water usage format according to the working hours of each business or corporation.
 - **Industrial (I)** means customers who use water industrially, such as in production involving continuous usage, with some industries using water for 24 hours daily.
- **Future Customers** are specified according to the government's policy in favor of giving the public equal access to clean water and specified according to strategic opportunities for selling water in fringe areas. Therefore, these customers are divided into 2 groups as follows:
 - **Potential Customers** mean customers in the areas under the MWA's responsibility (Bangkok, Nonthaburi, and Samut Prakan) who lack access to water supply, such as water consumers in local administrative organization (LAO) areas, including consumers of groundwater and other natural water sources.
 - **Potential Areas** mean customers in areas that should have access to water in line with the Ministry of Interior's policy, especially in fringe areas.



4. **Employees and workers**

- **Employees** refer to personnel working under permanent contract employment with MWA who perform their duties according to each job description.
- **Workers** refer to personnel working under temporary contract employment who perform their duties as prescribed in employment contracts and supervised by MWA, namely workers of private companies and agents.
 - **Subcontracted workers** refer to personnel hired by MWA through MWA's contractors on an annual basis. It is divided into 4 groups: 1) Administrative, 2) Mechanic, 3) Automotive, and 4) Other groups-workers and welders.
 - **Representatives** refer to personnel hired by MWA to provide service to water consumers under the rules and practices prescribed by MWA. Each contract renewal shall not be more than 3 years, namely 1) Billing and payment services, 2) Wiring binding, and 3) Flow Meter reading.



5. **Vendors/Contractors** mean agencies or juristic persons or persons who receive remunerations for preparing products, services, lease contracts, and personnel for the MWA.



6. **Alliances** mean agencies, organizations, or groups of people who agree to work with the MWA to achieve mutual objectives. Partners are sub-divided into 2 groups as follows:

- Business Alliances, for example, from payment processor appointment contracts.
- Academic Alliances, for example, agencies/persons that receive funding from the MWA to conduct research.



7. Community & Society

Community refers to

- Upstream community areas (East and West)
- Communities along the Waterworks Canal (west) located in Kanchanaburi, Ratchaburi, Nakhon Pathom, and Nonthaburi with a total distance of 107 kilometers, and communities along the Waterworks Canal (East) located in Pathum Thani, with a distance of approximately 30 kilometers.
- Communities around raw water pumping stations (all 10 stations).
- Communities in the service areas.
- Downstream Communities along the Mae Klong and the Chao Phraya Basins.

Society refers to the people who are not directly affected by the operations of MWA but those who live in the areas where there is potential for improving/promoting quality of life.

Remark: Key communities of MWA include the communities in areas around the water treatment plant (all 4 plants) which are defined as the following criteria-it shall be a community with an area adjacent to the operating area and most likely to be affected by the operations of MWA. And it shall be an area that has potential for improving quality of life by utilizing the expertise of MWA.



8. Media refers to a person who is a media professional, or a person or a group of persons, whether they are juristic persons or not, who operate the media. It acts as a medium for conveying communication content of all types to the public whether they are in the forms of print media, radio broadcasting, television, digital media, or any other forms of media that can convey such communication content to the public in general.





9. Activists/independent organizations/civil society/academics refer to individuals, groups of people, or non-profit organizations who have presented a variety of views toward society to improve quality of life. Such views may affect the directions or operations of MWA.







Engagement Channels and Stakeholder Expectations

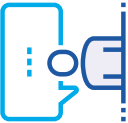
In order to understand and know about the needs and expectations of every group of stakeholders of the enterprise, MWA builds relationships with stakeholders through many channels below:

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Policy Agencies and Government Shareholders	<ul style="list-style-type: none"> Meetings 	<ul style="list-style-type: none"> More than once per year 	<ul style="list-style-type: none"> Presence of projects/plans that correspond to the 20-year National Strategies and master plans under the National Strategies (on reduction of daily water consumption per capita) 	<ul style="list-style-type: none"> Water and Effluents 	<ul style="list-style-type: none"> Water-saving efficiency project (water-saving labels)
	<ul style="list-style-type: none"> Platform for expressing opinions 	<ul style="list-style-type: none"> Once per year 	<ul style="list-style-type: none"> Work integration between agencies 	<ul style="list-style-type: none"> Partnership and Collaboration 	<ul style="list-style-type: none"> Involvement with policy agencies and government shareholders
	<ul style="list-style-type: none"> Participation in MWA's activities 	<ul style="list-style-type: none"> More than once per year 	<ul style="list-style-type: none"> Water loss reduction performance according to targets 	<ul style="list-style-type: none"> Policy Involvement 	<ul style="list-style-type: none"> Project to increase water pressure in low-pressure areas (VOS Pumping Station)
	<ul style="list-style-type: none"> Satisfaction surveys 	<ul style="list-style-type: none"> Once per year 	<ul style="list-style-type: none"> Needs/expectations for activities carried out at water distribution pumping stations to comply with enacted laws, acts, regulations, requirements, and announcements declared by each ministry 	<ul style="list-style-type: none"> Customer relationship management 	<ul style="list-style-type: none"> Project to increase water pressure in low-pressure areas (VOS Pumping Station)
			<ul style="list-style-type: none"> Financial reports (such as EBIDTA, public debt administration plans, and GFMIS-SOE data) to submit to the MWA's regulatory agencies in full and on time 	<ul style="list-style-type: none"> Economic performance 	<ul style="list-style-type: none"> Wastewater management
			<ul style="list-style-type: none"> Corporate environmental and social responsibility according to the 12th National Economic and Social Development Plan in Part 4, National Development Strategies 	<ul style="list-style-type: none"> Energy 	<ul style="list-style-type: none"> Water recycling
				<ul style="list-style-type: none"> Emissions 	<ul style="list-style-type: none"> Floating solar panel and solar rooftop projects
				<ul style="list-style-type: none"> Waste 	<ul style="list-style-type: none"> Energy conservation policy

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Mission-based Related Agencies	<ul style="list-style-type: none"> Meetings Participation in MWA's activities Satisfaction surveys 	<ul style="list-style-type: none"> 2-4 times/month Year-round Once per year 	<ul style="list-style-type: none"> Construction and water pipe installation plans that correspond to mission-based related agencies Problems related use of space for construction and water pipe installations Management of raw water sources in crisis to alleviate water quality impacts 	<ul style="list-style-type: none"> Partnership and Collaboration Innovation and Digitalization Water and Effluents 	<ul style="list-style-type: none"> Building and enhancing relationships with mission-based related agencies in order to reduce problems associated with water pipe constructions and installations Project to develop salinity predictions and simulation models for early water management
 Customer	<ul style="list-style-type: none"> Channels like Touch Point, <ul style="list-style-type: none"> MWA branch offices 1125 Call Center CRM activities (MWA Meets the People/ Top-Tier) consumer satisfaction surveys (surveys/in-depth interviews/focus groups), etc Social media such as Facebook/Twitter/ LINE@/Social Monitoring, etc. Applications such as MWA onMobile 	<ul style="list-style-type: none"> At all times 	<ul style="list-style-type: none"> Expectations for the MWA to create service efficiency-enhancing innovations Needs for adequate and consistent water volumes and pressure Adequate tap water flow to meet usage requirements Fast and orderly pipe repairs and installations without causing impacts Pipe installations to reach areas without tap water access High-quality tap water 	<ul style="list-style-type: none"> Innovation and Digitalization Indirect economic impacts Quality of Tap Water 	<ul style="list-style-type: none"> Development of valuable innovations Main water pipe pressure monitoring system project Booster pump project for low-pressure areas Project to raise construction standards according to engineering principles by using a camera intelligent alert system (CIA) 100% water coverage project Water Safety Plan

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Employees and Contract Workers	<ul style="list-style-type: none"> Progress performance announcements and opportunities for Q&A Enterprise engagement surveys 	<ul style="list-style-type: none"> Twice per year Once per year 	<ul style="list-style-type: none"> Clarity about career path development Management to increase knowledge and skills to ensure effective operation according to assigned strategies and tasks Improvements to welfare in terms of medical care and accommodation and food expenses Provision of a wide variety of additional channels/medical facilities for exercising medical treatment rights 	<ul style="list-style-type: none"> Training and education 	<ul style="list-style-type: none"> Projects to enhance employee potential Personnel performance evaluations Employee benefits and welfare
 Trade Partners	<ul style="list-style-type: none"> Platform for expressing opinions Satisfaction surveys 	<ul style="list-style-type: none"> Once per year Once per year 	<ul style="list-style-type: none"> Transparent procurement processes Needs on knowledge and understanding about construction before actual work 	<ul style="list-style-type: none"> Supply Chain Management and Sourcing 	<ul style="list-style-type: none"> Fair market competition policies and practice guidelines MWA contractor selection and evaluation process Joint trade partner training for potential development
 Allies	<ul style="list-style-type: none"> Satisfaction surveys 	<ul style="list-style-type: none"> Once per year 	<ul style="list-style-type: none"> Service satisfaction needs 	<ul style="list-style-type: none"> Partnership and Collaboration 	<ul style="list-style-type: none"> Coordination and collaboration with partners to enhance services

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Communities and Society	<ul style="list-style-type: none"> Platform for expressing opinions CSR activities Satisfaction surveys MWA Meets the People activities 	<ul style="list-style-type: none"> Once per year More than once per year Once per year 72 times per year. (18 MWA branch offices hold 4 activities per year per branch) 	<ul style="list-style-type: none"> Need for the MWA to give greater care to the community Need for the MWA to hear opinions and engage in various community activities in areas located along water supply canals and to share resources 	<ul style="list-style-type: none"> Local communities 	<ul style="list-style-type: none"> Project to participate in major community development activities
 Media	<ul style="list-style-type: none"> Performance announcements Opening ceremonies for important events Sponsorship and participation in media activities such as founding anniversary events Giving interviews and information to the media The MWA's social media News for the media unofficial Meetings with the media (individual outlets) Opinion surveys 	<ul style="list-style-type: none"> Once per year More than 6 times per year Year-round Year-round Year-round Weekly Year-round Once per year 	<ul style="list-style-type: none"> Accurate, fast, and timely access to news and information 	<ul style="list-style-type: none"> Transparency and integrity 	<ul style="list-style-type: none"> MWA Information Center

Stakeholders	Engagement Channels	Frequency	Stakeholder Needs/Expectations	MWA Material Issues	Response to Stakeholder Expectations
 Activists/ Independent Organizations/ Civil Societies/ Academics	<ul style="list-style-type: none"> The MWA's social media 	<ul style="list-style-type: none"> Year-round 	<ul style="list-style-type: none"> Access to accurate information from agencies 	<ul style="list-style-type: none"> Transparency and integrity 	<ul style="list-style-type: none"> MWA Information Center



2022 Stakeholder Management Plan

MWA has created a stakeholder management plan covering all work sections/departments in order to ensure effective stakeholder management while meeting the needs and expectations of stakeholders. Accordingly, the plan is being implemented under the MWA's Stakeholder Master Plan (for 2022-2027) covering 4 strategies as follows:

1. Enhancing engagement to promote good relations with stakeholders.

2. Developing innovations to increase product and service quality.

3. Managing water throughout the entire value chain for sustainable development.

4. Creating a society of sharing alongside responsible growth.



The implementation of this plan will lead to positive relations and greater satisfaction among our stakeholders.

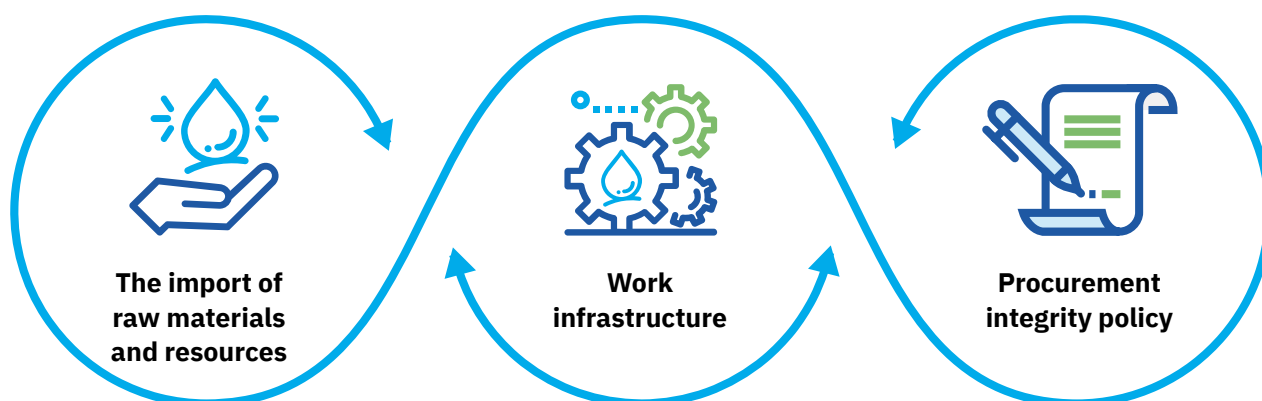


Scan the QR code to see our performance in the Stakeholder Engagement Promotion plan in 2022.



Governance and Economic Performance

Supply Chain Management and Sourcing



Business activity management processes start with importing raw materials and resources and then work infrastructure and related technologies to ensure that the enterprise successfully and effectively delivers products and services to consumers according to their quality and time specifications. This also includes guidelines in the procurement and purchases of raw materials and services to appropriately and fairly respond to business activities in line with the Metropolitan Waterworks Authority's Announcement on the "Policies and Practices for Fair Market Competition" issued on 25 August 2021 (The Metropolitan Waterworks Authority's Good Corporate Governance Manual), the MWA's Work Ethics in Clause 1.3 Trade Partner Responsibility (The Metropolitan Waterworks Authority's Ethical Work Manual) and the work ethics of the MWA's executives and the MWA's employees and contract workers. Accordingly, we give priority to compliance with trade competition laws and consider the principles of good governance in the role of a state enterprise in order to ensure fair market competition to set strict and clear guidelines for adherence by the MWA's personnel.

The MWA operates the business on the basis of equity, equality, and fairness. As such, we strictly follow trade competition laws and strive to take action to prevent injustices, monopolies, and trade barriers, including price manipulations (bid rigging), and we follow the MWA's Anti-Corruption Policy by "not giving, accepting, nor paying dishonest benefits to trade partners and/or creditors".

The MWA's executives and employees are prohibited from bidding or making contracts as a vendor or contractor in the MWA's purchases or hiring activities, nor to sub-contract work from such vendors or contractors, whether in their own names or on behalf of companies, partnerships or other juristic persons in which they or their spouses are managing directors, managers or in other similar positions. Moreover, we have established channels for stakeholders, competitors, and creditors to file complaints and set in place a process for related legal compensation.

The MWA's work ethics refer to the good practice guidelines in the main missions and associated businesses of the enterprise under the framework of ethics and integrity, which give equal importance to all groups of stakeholders, and the promotion of the good image and safeguarding of the interests of the MWA. The MWA has specified its work ethics concerning trade partner and/or creditor responsibility as follows:

- 1 **Strictly follow agreed terms without violating the rights** of trade partners and/or creditors.
- 2 **Protect the interest of stakeholders.**
For example, in cases where it is impossible to follow an agreement term, swiftly notify the trade partner and/or creditor in advance to jointly seek timely solutions.
- 3 **Promote fairness and equality** in every trade partner and/or creditor through transparency and verifiability.
- 4 **Follow the MWA's Anti-Corruption Policy** by "not giving, accepting, nor paying dishonest benefits to trade partners and/or creditors."

The MWA has contract partners registered as juristic persons pursuant to civil and commercial laws that operate in Thailand according to the following information:

Table Showing the Procurement Value of Products and Services (Unit: Million THB) ^(GRI 204-1)

Fiscal year	2022	2021	2020
In the country			
Projects	869,987,096.29	3,703,536,799.10	498,835,504.76
Work outside of projects (purchases, hirings)	11,057,781,749.19	9,985,697,774.41	9,875,415,180.56
Total	11,927,768,845.48	13,689,234,573.51	10,374,250,685.32
Abroad			
Projects	-	-	-
Work outside of projects (purchases, hirings)	-	-	-
Total	11,927,768,845.48	13,689,234,573.51	10,374,250,685.32
Total procurement value of products and services in the country and abroad	11,927,768,845.48	13,689,234,573.51	10,374,250,685.32

Guidelines for Contractor's Selection and Evaluation

We have established procurement standards with a systematic process to select contractors and evaluate their performance. This is to ensure efficiency and effectiveness toward all actions as defined. Moreover, we have applied various rules and regulations into the practice so as to develop the organization in all aspects, alongside operating its business based on good corporate governance principles. As processes of water production and distribution require contractors to complete the construction of various projects. Therefore, contractors' selection and evaluation are considered one of our core missions under MWA's regulations on registration and evaluation of contractor's performance to obtain contractors who hold quality and potential to operate construction works of various projects to be completed within the specified time and with orderliness. The purpose of this action is to control the quality of construction work in various projects to achieve the objectives as defined and create satisfaction for users to consume water that meets quality and is sufficient for consumption, and does not create negative impacts on the people and communities. The details of these processes are described below:

The Details of Contractor's Selection and Evaluation

- 1 Contractors submit application forms for registration of contractors.
- 2 MWA selects the contractors.
- 3 MWA proceeds registration of contractors and categorizes them by types of work as defined by MWA.
- 4 Contractors who have already registered and have been completely qualified will be invited to submit the proposal for bidding on each project.
- 5 The successful contractor commences the construction work.
- 6 MWA proceeds registration of contractors and categorizes them by types of work as defined by MWA. MWA will evaluate contractors during the project construction work and after the project completion. The results will be used to rank those contractors whether to be promoted or demoted with penalty.



Joint Trade Partner Potential Development

The MWA believes that providing knowledge, improving the capabilities, and expanding the production and service capacities of trade partners is essential in supporting the effective delivery of tap water and services to the MWA's consumers according to quality standards. As such, we communicate with and train our contractors and hold work studies and meetings with our trade partners in addition to conducting annual trade partner evaluations in order to provide recommendations and improve the quality of raw materials and deliveries consistently with the MWA's needs, and we monitor, verify and assess our trade partners to achieve sustainable mutual business development.



Performance in the 2022 Fiscal Year

Western/Eastern Services	
Waterworks Branch Offices	Organize training sessions/seminars in various areas for trade partners such as on the MWA's work procedures.
Water Meter Department	Hold joint meetings with trade partners to communicate management plans and hold joint meetings with the water meter management sections of waterworks branch offices in order to communicate the working guidelines of the Water Meter Department in the 2023 fiscal year, thereby providing trade partners and water meter management sections of waterworks branch offices with understanding about management plans and implementation guidelines. Increase stakeholder satisfaction in the 2023 fiscal year.
Engineering	
Project Management Department	Provide training courses in the “development of water pipe installation standards for executives, engineers, foremen, and plumbers” for the personnel of trade partners to allow them to acknowledge the policies of the MWA in addition to having knowledge and understanding about the purpose of construction and steps in various construction activities according to contract terms and conditions from the beginning of construction until contract termination, including construction work safety and complaint handling.
Water Treatment and Transmission System and Civil Work Construction Department	Provide training/meetings for trade partners to ensure understanding about contract objectives and various work procedures, such as construction of water treatment systems, water transmission systems, raw water systems, electrical and mechanical systems, and civil works. The Water Treatment and Transmission System and Civil Work Construction Department is responsible for building good relations to ensure that work in the construction of water treatment, water transmission, raw water, and electrical and mechanical systems along with various civil construction projects are carried out correctly according to contract specifications and work plans.



Economic Performance



Total Revenue:
18,490.38
million THB



Net Profit:
4,110.40
million THB



Government
Remittance:
2,172.75
million THB



Social
Investments:
41.42
million THB



The 2022 fiscal year was another challenging year for us amidst the ongoing COVID-19 pandemic, which started in 2019 and has been continuing up to the present. Although the situation has become less severe following greater rates of vaccination and the people's lifestyle changes that enabled normal coexistence with COVID-19 (New Normal), both of which contributed to economic resurgence, the situation still has not returned to pre-pandemic levels. Furthermore, in the first half of 2022 when the overall Thai economy gradually recovered, the new Omicron variant outbreak in December 2021 led the government to deploy strict pandemic control measures once again, thus causing widespread impact on the Thai economy. Those affected included private sector investments, the real estate sector, and tourism. Moreover, the global

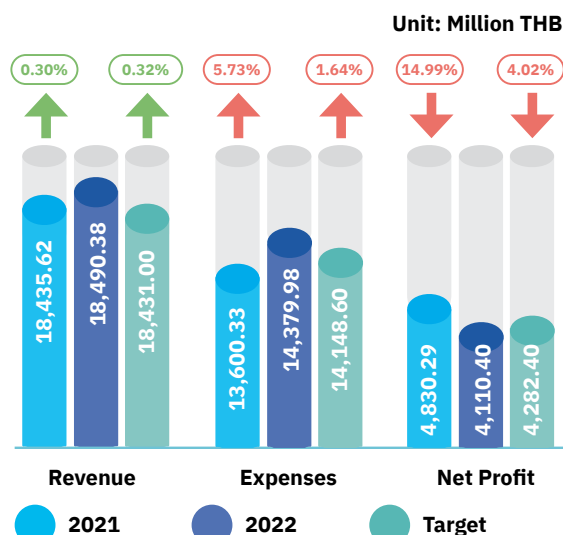
economy showed signs of slowing down as a product of inflation and the prolonged war between Russia and Ukraine, which has been ongoing since February 2022. These situations contributed to a decrease in water fee revenues, which are the MWA's primary source of income, and the business sector water revenues were particularly affected. Nevertheless, in the second half of the year, the Thai economy showed signs of improving after the government eased various measures and fully reopened the country as of 1 July 2022 in line with the resolving pandemic situation. Consequently, tourism-related businesses experienced improvements and water revenues began to rise little by little from among hotels, malls, airports, and retail businesses.

Meanwhile, for the people who suffered from COVID-19, the MWA implemented measures to provide assistance in continuation from 2021 to help provide relief to the suffering of the people by granting fee exemptions for late water bill payments for payments made through payment service providers and charitable contributions in the form of money and drinking water to field hospitals, quarantine centers, temples, and other places. In addition, we promoted the use of technology to offer convenience to the public in paying water bills and receiving services through the MWA onMobile application and e-service website in order to minimize trips to contact MWA branches and reduce expenses and risks of contracting COVID-19.

In view of all the aforementioned factors, the MWA recognizes the impacts that the enterprise must encounter. As such, we operate with a business continuity system and continuously seek opportunities to expand connected businesses to enable the enterprise to withstand changing situations brought about by internal and external factors while still being able to promote the good quality of life for the people by delivering high-quality, clean and safe water supply alongside maintaining the enterprise's financial stability and managing investment and utilization of available resources for maximum effectiveness to achieve continued growth and sustainability for the enterprise.

Financial Analysis Report

The overall performance in 2022 showed that the MWA continued to receive impacts from COVID-19, while the Thai economy is still in its recovery stage, and the global economy is showing a downward trend due to inflation caused by rising energy prices. All of these factors caused MWA to have a net profit of 4,110.40 million baht, which was below our target by 172.00 million baht or 4.02%, and 724.89 million baht or 14.99% less than the previous year.



Revenue exceeded the target by 59.38 million baht or 0.32%. This largely was due to interest revenue and other revenues. Meanwhile, water and service revenues were below their targets. When compared to the previous year, they increased by 54.76 million baht or 0.30%, largely due to other revenues and increased water connections and revenues from private pipe installations. On the other hand, water revenues fell from the previous year due to reduced water sales.

Expenses exceeded their target by 231.38 million baht or 1.64%. This was largely due to the cost of raw water and electricity. When compared to the previous year, they increased by 779.65 million baht or 5.73%, largely due to the raw water price increase on the eastern side being charged by the Royal Irrigation Department since January 2022. In addition, chemical and electrical costs rose due to an upward adjustment of the FT cost and an increase in depreciation and amortization due to depreciation in pipe prices following the government's policy to expedite pipe replacements to reduce water loss, although other operating expenses decreased.



MWA innovation department performs its duties as an entity responsible for overseeing the operations of overall innovation aligning with the Promotion of Innovative Thinking and Innovation Management Policy. It is the policy to promote innovation development and adopt innovation to enhance the efficiency of the work process in response to the needs and expectations of customers and all groups of stakeholders. In addition, it also includes creating a community network for exchanging knowledge and experiences, to allow MWA to move toward becoming an innovation organization with sustainable growth. In overview, this policy leads to the formulation of innovation development guidelines.

Innovation Theme Toward Sustainability

We determine the innovation theme arising from the internal factors-policy analysis, business direction, and indicators within the organization. It also includes analyzing other factors related to the organization and external factors, such as the voice of customers and stakeholders. All information from both factors is required to be scrutinized and analyzed to determine an innovation theme that improves our working performance within the organization. Moreover, it covers the creation/development of innovative products and services, and innovations that improve or create new work processes to respond to the needs of customers and stakeholders. However, the innovation theme is required to be

approved by the MWA Board of Directors before communicating those messages to employees and third parties, to invite those interested in this project to submit their innovative initiative proposals. Also, it is used as criteria in selecting ideas or workpieces deriving from training and contests, such as innovation achievements from various course training and enterprise innovation competitions in 2022 and so forth, for further development into commercial and social innovations. Hence, it can be claimed that the innovation themes are important in determining the direction of our corporate innovation in response to the needs of customers and market demands.

Six Innovation Themes for MWA include:



1. Smart Water System

The goals of innovation development include:

- To improve the stability and efficiency of water treatment systems.
- To efficiently manage water loss.
- To control water quality to be efficient.

2. Resilient Water Supply

The goals of innovation development include:

- To manage water resources in a sustainable manner.
- To enhance a personnel's competence to anticipate the upcoming changes.

3. Seamless Service Experience

The goals of innovation development include:

- To increase the satisfaction levels and reduce complaints from customers.
- To upgrade the offline services into the virtual branch for enhancing its efficiency.

4. Urban Water Cooperation

The goals of innovation development include:

- To raise awareness of responsible water consumption.
- To enhance efficiencies of water consumption and effluent management.

5. Data-driven Organization

The goals of innovation development include:

- Data-driven Production Management.
- Data-driven Corporate Management.

6. Business Redesign

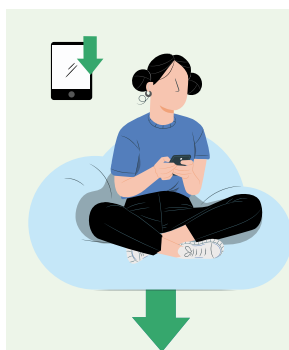
The goals of innovation development include:

- To develop new business and service models.
- To improve regulations and work processes in the organization.

The aforementioned innovation themes show that we have focused on Environmental, Social, and Economic performance through the integration of innovations towards sustainability whether it is a responsible water consumption program by developing an innovation of efficient effluent management or by developing new business and service models into virtual office platform in response to the needs of customers and the market which has been completely transformed into a digital age. Furthermore, we also support the application of digital technology to develop outstanding innovations, such as the Internet of Things (IoT), big data analysis by AI, sensor technology, robotics technology, digital platform technology, and satellite technology. In 2022, we implemented forty-six projects out of seventy-seven projects, representing 40%.

Innovations for the Better Customer Service and Performance

Upgrading Services with MWA onMobile



In 2022, up to **1,414,113** people who downloaded the MWA onMobile application

The customer satisfaction score for use of MWA onMobile is **4.43** (out of 5)

The MWA onMobile application provides online services with a focus on one-stop service that is accessible at any place and any time as follows:

- Payment of water supply bills via smartphone.
- Checking information about areas with low to no water flow, tap water quality, and past water usage.
- Requesting new water connections.
- Requesting water storage tank washing and damaged water pipe repair services.
- Points collection through MWA points.
- e-billing service application to meet customer needs/expectations and keep up with digital technological innovations.



The MWA has developed and revamped its work processes covering information services, service requests, transactions and hearing of customers' recommendations in addition to solving problems and complaints in a suitable manner to keep up with changes in situation, such as the COVID-19 pandemic, in order to continually improve services for greater effectiveness.

We continuously developed the MWA onMobile application, leading to higher service satisfaction in MWA onMobile. We will continue to develop this application in 2023 in order to hear customers' VOC about payments and notifications.

Development of MWA onMobile in the 2021-2022 Fiscal Years

2021	2022
<ul style="list-style-type: none">• Launching of a new MWA onMobile version.• Alert notifications about water bills before shutting off water supply.• Water bill and fee payments at 10/20% (to follow the Virtual Branch policy).	<ul style="list-style-type: none">• Added convenience in connecting to bank applications by replacing username/password login with a PIN code login system.• Added another payment channel via ShopeePay.

The MWA onMobile application received the Ombudsman Award for the enterprise's valuable contributions to social development in 2022 by winning the 2nd place award for being an outstanding enterprise in providing innovations to serve the people (Self-Initiative Award), which was organized by the Office of the Ombudsman. Additionally, we also received the Loet Rat Award in 2022 for public sector service excellence in service development from the Office of the Public Sector Development Commission (OPDC), which is an award aimed at praising, boosting morale in, and encouraging model agencies that have an effective management system while creating conceptual, process or inventive innovations focused on delivering digital



technology to serve the people. Accordingly, we have developed a service system or service channels for the people that are distinguished and modern to ensure that the people can have service convenience and comfort along with speed and accuracy with fewer problems with congestion and burdensome problems, and we are ready to continually implement digital technologies to meet the people's needs while creating the greatest benefits in service of the people.

Booster Pump Project

This is a project aimed at solving problems in areas with low water pressure to meet customers' needs on the issue of strong water flow. This project was implemented and developed from our project to enhance water sales capabilities in the fringe areas of the MWA. The project's implementation began in 2020 to seriously solve low-pressure problems, and in the 2022 fiscal year, we fully implemented the booster pump project by installing booster pumps in 29 locations to deliver sufficient water pressure to meet usage requirements and reduce complaints about lack of flow or low flow to enhance customer satisfaction about water pressure and increase our ability to identify leaks. The project was well-received by our customers (through fewer complaints).

Camera Intelligence Alert (CIA) System

- Reduce water loss
- Enhance tap water service effectiveness
- Prevent tap water contamination
- Reduce the risk of pipe leaks caused
- Ensure up-to-standard work control at all times
- Help provide detection and alerts about sub-standard pipe construction



The MWA plans to increase the quantity of water pipe renovations and installations to replace old, worn out, and expired water pipes by up to 1,000 kilometers per year under the "MWA Change for Better" project. This project aims to reduce water loss while enhancing tap water service effectiveness in the enterprise's water distribution system. Therefore, in order to ensure that water pipe renovation work accomplishes its objectives, construction foremen are required to inspect and control water pipe installations according to engineering standards and principles in addition to controlling work to follow safe tap water principles in order to prevent tap water contamination during pipe construction and installation to deliver

high-quality water service and reduce risk of pipe leaks caused by pressure build-up from contamination by sedimentary solids along pipe installation lines in order to ensure tap water service continuity.

However, because the personnel/work foremen of MWA branch offices are limited, our foremen are unable to always control work and inspect construction at any particular point all the time. This made it necessary to develop a tool to help assist our work foremen to be able to thoroughly inspect and control work and to ensure up-to-standard work control at all times at every pipe installation or construction site. The adoption of a camera intelligence alert (CIA) system allows work foremen to monitor construction work at any place and time. Moreover, we have begun to use an AI system to develop a process to analyze data in order to detect the closing and opening of pipe

lids. We do this by relying on Big Data processes to develop AI for deep learning analysis from photographs of water pipe construction work in order to create mathematical models by using convolutional neural network (CNN) to help provide detection and alerts about sub-standard pipe construction work resulting from failure to close water pipe lids according to safe water standards in addition to detection of sedimentary rock and cement contamination along pipe installation lines as another major step to raise the construction control standards of the enterprise.

To maintain our working standards today, the MWA requires pipe installation contractors to use CIA to control their pipe construction and installation work.

- **Loet Rat Award 2022: A Public Sector Award in Service Innovations**

Anti-salinity Tool

ANSAT was created through the invention and development of the internal personnel of the enterprise. They used knowledge obtained from lesson extraction about the change in water quality crisis and knowledge from Big Data analysis from our “Data Scientist Bootcamp” for development along with real-time data from the MWA’s detection system and information from external stakeholder agencies to achieve joint data management to solve water salinity problems covering the following:

- Salinity prediction data from NECTEC.
- Water level prediction data from the Hydrographic Department of the Royal Thai Navy.
- Dam water quantity and runoff water quantity data and water management plans from the Royal Irrigation Department.
- Meteorological data on precipitation, soil moisture, and dam water quantities and levels from the Hydro Informatics Institute.



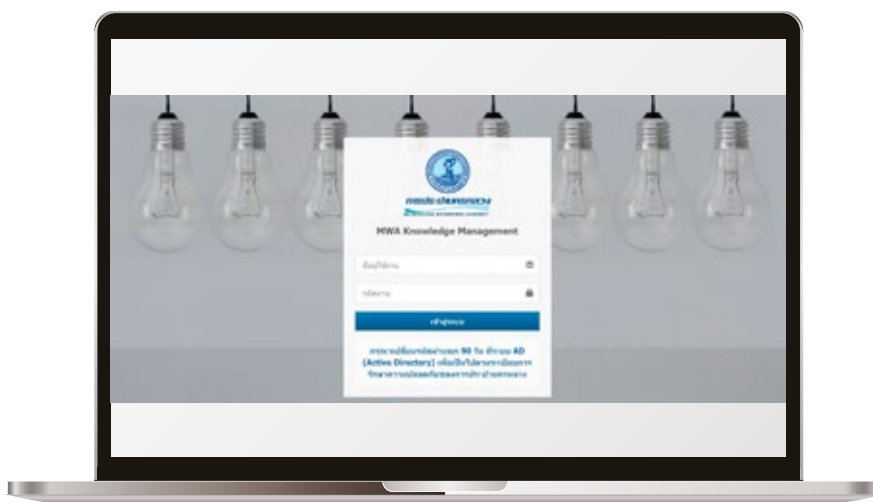
ANSAT has the capability to automatically predict water salinity levels in the Chao Phraya River by 1-3 days in advance. Our prediction results can be used to develop plans for managing the pumping of raw water with suitable salinity values ahead of water treatment processes. We call this the Water Hammer Flow Operation. This operation has allowed the MWA to have faster early prediction of water salinity and has contributed to reduction in both cost and complaints. Accordingly, the MWA provides warning information to water connections 24 hours in advance via the Salt Board that shows via online channels water quality information for when water is brackish or high in salinity.

Awards: ANSAT and Water Hammer Flow Operation

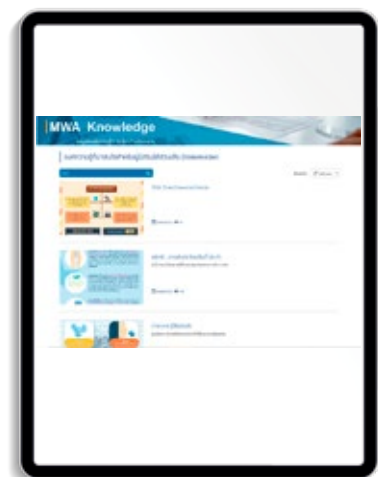
1. 1st Place Award in Services and Solutions from the Enterprise Asia Organization at the International Innovation Awards Competition (IIA 2020)
2. “Thailand Kaizen Award 2021” in the Genba Kaizen category
3. State-Owned Enterprise Award 2021 in “Creativity and Innovation Excellence”
4. Loet Rat Award 2022 for Public Sector Service Excellence in Service Information Integration
5. Salt Board Loet Rat Award 2021 for Public Sector Service Excellence in the Salt Board Service Innovation



Creating a Knowledge-Based Society with Stakeholders



The development of innovations requires the internal knowledge of the enterprise as a starting point. Therefore, the MWA encourages employees to exchange knowledge between the MWA's employees and external agencies, such as the Government Pharmaceutical Organization (GPO), Thailand Science, Research and Innovation Office (TSRI), Thai Health Promotion Foundation (Thai Health), the Government Savings Bank, and international water supply agencies, etc. At the same time, the MWA has a KM portal system that functions as a knowledge management system for use in gathering knowledge and information across the entire value chain that can share knowledge to various media for viewing by stakeholders such as the KM Stakeholder Site Facebook page and Nam Kok Magazine, etc. The knowledge that we share includes useful information and good practices along with beneficial knowledge about collaborative work with the MWA such as (not so) secret information about how to register to become an MWA contractor, fabric covering standards for water pipe lids during construction, and the MWA's online service and payment channels, etc.





Enterprise Management

Risk Management

The Metropolitan Waterworks Authority (MWA) emphasizes managing the enterprise's risk in order to ensure effective and efficient work. As such, the MWA manages risks and internal control according to international principles (COSO) and operates according to the criteria for evaluating the operations and management (enablers) of state enterprises in line with good governance principles and the enterprise's strategies. The enterprise's performance in different areas is summarized as follows:



Raw Water Quantity and Quality

Thailand keeps experiencing droughts and irregular precipitation continuing from the previous year that are impacting the agricultural sector and the quality and quantity of water for usage and consumption by the people. However, the areas of Bangkok, Nonthaburi, and Samut Prakan under the responsibility of the MWA have effective and timely water management that minimizes impacts on water users. The Water Crisis Solution Directorate has consistently surveilled and monitored the situation and coordinated close collaboration with related public and private sector agencies. In the long-term, the MWA has created a project to expand the production capacities of water treatment plants and maintain and increase the storage capacities of clear water reservoirs in addition to improving water supply canals to reduce impacts from potential crises in order to ensure readiness to meet increased water usage requirements in the future. On the other hand, toward the end of the rainy season, there was above-average precipitation and inclination for increasing numbers of storms forming, which can create the risk of flooding and water quality impacts. Therefore, the MWA has created key risk indicators (KR) to continuously monitor water quality and quantity. In the year 2022, the MWA has added the indicators of financial and service risks in order to deal with situations in a timely manner and reduce potential impacts, in addition to providing information for executives for managing water resources in the most beneficial manner while delivering high-quality water supply according to the criteria and recommendations of the World Health Organization comprehensively to water consumers in line with the MWA's missions.



Stability in the Production, Transmission, and Distribution of Water Supply

In order to reduce risk and impacts on the stability of the production, transmission and distribution system of water supply on the eastern and the western sides, the MWA has created preventive and monitoring measures covering pipe installations, increasing effectiveness in identifying pipe leaks and enhancing water pipe network systems for greater security and robustness, including expansion of water treatment plant capacity to support the water usage requirements of future urban growth.



Stakeholder Responsibility

The MWA has renovated its infrastructure and equipment in the chemical supply buildings in all 4 water treatment plants in order to reduce impacts on the communities around water treatment plants and to increase the intensity of the effort to prevent chlorine gas leaks from the available internal control systems. Accordingly, we have installed emergency shut-off valves and reviewed and held drills of emergency chlorine leak plans with the involvement of the communities and stakeholders around water treatment plants in collaboration with the MWA's internal agencies and external public and private agencies in order to promote engagement and raise awareness and understanding about the roles of the MWA's employees during each incident and to build good relations between the MWA and external agencies and surrounding communities.



Finances

Since investment capital is a major factor in driving the nation's macroeconomy, the MWA pays attention to investment spending in every step of the investment budget management system in order to accommodate activities according to its regular missions and strategies in the most cost-effective and thorough manner. We also consider measures and government policies that can affect the spending of our investment budgets to ensure that the MWA's budget management meets its objectives. As such, the MWA has developed information technology to support and expedite the tracking of budget spending through, for example, the Capital Budget System (CBS), the "CBS Revise System", and the "Capital Management System (CMs)", which have been developed to connect to the SAP system and to be able to track problems and obstacles as well as swiftly present solution guidelines for the capital budget management system of the MWA. All of this is to support and promote more effective monitoring and expediting of capital budget spending.



Information Technology

In an effort to ensure that the public is served effectively and swiftly, the MWA has established the "Command Center" as the center for "control, command, and monitoring" in one single location. Our purpose in doing this is to reduce communication time, enhance problem cause analysis, and enable the organization to focus on services without concern. We also have measures in place to prevent network intrusions and attacks by malicious actors. Furthermore, the MWA has made preparations to accommodate the Personal Data Protection Act, B.E. 2562 (2019), reviewed and modified its Business Continuity Plan (BCP) in IT, and carried out drills to continually meet standards every year and to ensure readiness for dealing with undesirable situations.



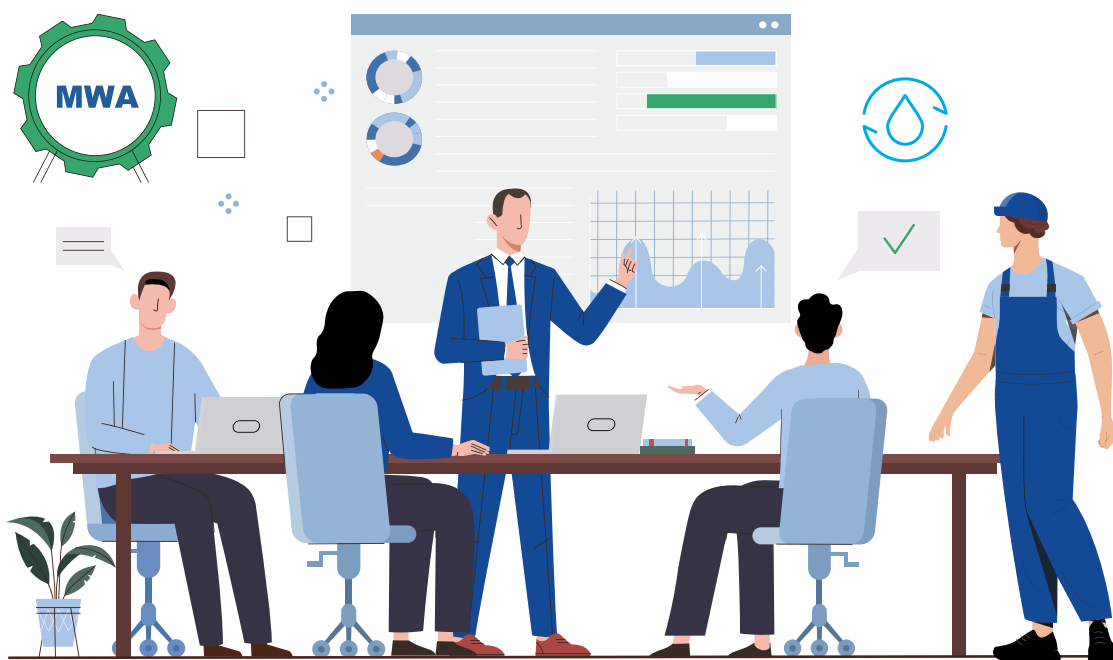
Improving Water Loss Reduction Effectiveness

The MWA has hired people to survey for leaks and repair pipe leaks in its water pipe systems covering the MWA's areas of responsibility and has adopted Camera Intelligence Alert (CIA) technology to monitor the construction and installation of distribution pipes in the field. This ensures standard and effective inspection and control of water pipe system according to water safety plans (WSP) in addition to promoting overall sustainability in the tap water distribution system. Moreover, we have handed out employment contracts for local water loss management projects (Performance-Based Contracts: PBC) to reduce water loss according to set objectives.



Business Continuity Management

The MWA concerns flexible work management to ensure that we can deal with potential future disasters, emergencies, and crises in a timely manner and in line with the organization's strategic objectives. Accordingly, in 2022, the MWA was certified for its business continuity management system (BCMS) according to the ISO 22301 standard, whose scope covers raw water management, tap water production, transmission-distribution processes, service processes, and associated support activities. This ensures that the MWA has the required level of preparedness to deal with potential situations and the capability to effectively and efficiently resolve problems that occur and in a timely manner, in addition to building the confidence that the MWA can operate and deliver high-quality tap water services to water consumers even if the enterprise faces various crises.



Internal Control

The MWA recognizes the importance of having in place an internal control system to build public confidence in our operations, financial and non-financial reports, and operations in compliance with laws, regulations, and requirements. Accordingly, we operate according to the requirements of the Ministry of Finance on the Standards and Operational Criteria for Internal Control in Government Agencies, B.E. 2561 (2018), and in line with the internal control framework of COSO 2013, which contain 5 components as follows:

1. Control Environment – The MWA strives to create an atmosphere and culture that supports the enterprise's risk management by having created a policy to integrate good corporate governance, risk management, and control of operations according to criteria (GRC) for personnel on every level to follow. This is to support personnel in having correct knowledge and understanding and to follow set principles and guidelines effectively in line with international standards and good practices.

2. Risk Assessment – We integrate internal control work with the MWA's critical processes by having an internal control system in place at every control point and establishing systematic risk management guidelines for executives on every level to participate in risk identification and assessment with consideration to strategic risks and other risk factors in the work systems of each connected process, in addition to analysis of risk factors from key value drivers in order to build confidence in success according to the MWA's enterprise plan.

3. Control Activities – We have specified control activities for every step of our work processes, and we evaluate the effectiveness of

the existing control system to ensure that the enterprise can achieve its objectives. Additionally, we require our agencies to assess their own internal control at least once annually in order to evaluate the suitability and sufficiency of control activities and we have made changes to match with situation changes.

4. Information and Communication – The MWA has information systems in place to support risk management by integrating internal control efforts with knowledge management. Accordingly, we store risk control knowledge for control points in the KM Portal information system to communicate, exchange, and transfer related knowledge to personnel to ensure their understanding and caution in operating activities in support of the enterprise.

5. Monitoring Activities – The MWA reports internal control activities to related committees and sub-committees on a quarterly basis and submits the MWA's internal control assessment reports to the Permanent Secretary of the Ministry of Interior in full and according to specified timeframes. In 2022, the Audit Office reviewed the MWA's internal control performance, created ratings, and found that overall audit results were good without very high/high risk issues.

In 2023, the MWA carried on raising awareness about internal control in its operations by relying on knowledge as a foundation by adding impact assessment criteria in the area of agency-level risk assessments in order to ensure that all related agencies successfully identify and assess risks covering all dimensions. Moreover, we support the dissemination of risk control knowledge in control points in full to accommodate changes and ensure continuous operation in support of the MWA's strategic objectives.

Internal Audit

Internal audit is a work activity aimed at providing assurance and consulting services that are both fair and independent to add value and improve work processes in support of the enterprise's objectives. In the assessment and improvement of the effectiveness of risk management, internal control, and good governance processes, roles and responsibilities have been clearly provided in the charter of the Audit Office, with a review/improvement taking place at least once annually. Furthermore, we have created policies in support of teamwork while emphasizing knowledge exchanges through integration of audit work in key processes and creation of high-quality audit results and delivery of value and strategic recommendations to the enterprise, not to mention proactive consulting to enhance operational processes according to the evaluation criteria of the 7 enablers.



Audit Performance and Reporting

We have created a 5-year long-term audit plan (2022-2026) and the annual audit plan for 2022 based on risks (risk-based audit) by focusing on the critical risks of the enterprise and consistency with the vision, goals, and enterprise plan of the MWA. As part of this effort, we have adopted data analytic technology and techniques to support our activities. In 2022, we were able to fully perform our work according to the annual audit plan and gave recommendations to executives and audit recipient agencies in order to promote improvements in effectiveness and efficiency and add value to the enterprise. Furthermore, we report audit results to the executives of audit recipient agencies, the Governor of the Audit Committee, the board of directors of the MWA and supervisory agencies, with quarterly follow-ups on work results according to recommendations. In the work of the Audit Office, there were no limitations in the expression of opinions, nor unresolved conflicts between the audit recipient agencies and the Audit Office.



Maintaining the Work Quality of the Internal Auditor

The internal auditor adheres to the practice guidelines in the Internal Audit Manual consistently with international standards for internal auditing professions and assesses quality after completing the auditing of audit recipient agencies. The Audit Office is also evaluated by the board of directors of the Audit Committee and high-ranking executives at least once annually and evaluated for audit work quality by independent external experts every 5 years to allow evaluation results and recommendations to be used as feedback for making improvements and increasing work effectiveness. In addition, we have set in place plans for recruitment, development, and retention of internal audit personnel who are knowledgeable and competent and we provide support to assist the internal auditor to self-improve to become a certified internal auditor (CA) or to hold other related professional certificates, and we encourage our auditors to receive in-house and external training sessions by at least 40 hours per person each year.

Auditor's Fee: The Office of the Auditor General of Thailand was the auditor of the Metropolitan Waterworks Authority for fiscal year 2022 with an audit fee of 2.50 million baht.

Transparency and Integrity

Corporate Governance

To create sustainable business values, MWA's Board of Directors has attached great importance to good corporate governance principles by governing and monitoring the performance of the executives to achieve missions, objectives, and goals efficiently. Moreover, this requires it to be in response to government policies and to conduct its business ethically, apparently,



and transparently, along with the environmental and social responsibilities, upholding respect for the rights of all stakeholders.

Legal and Regulatory Compliance (Compliance Unit)

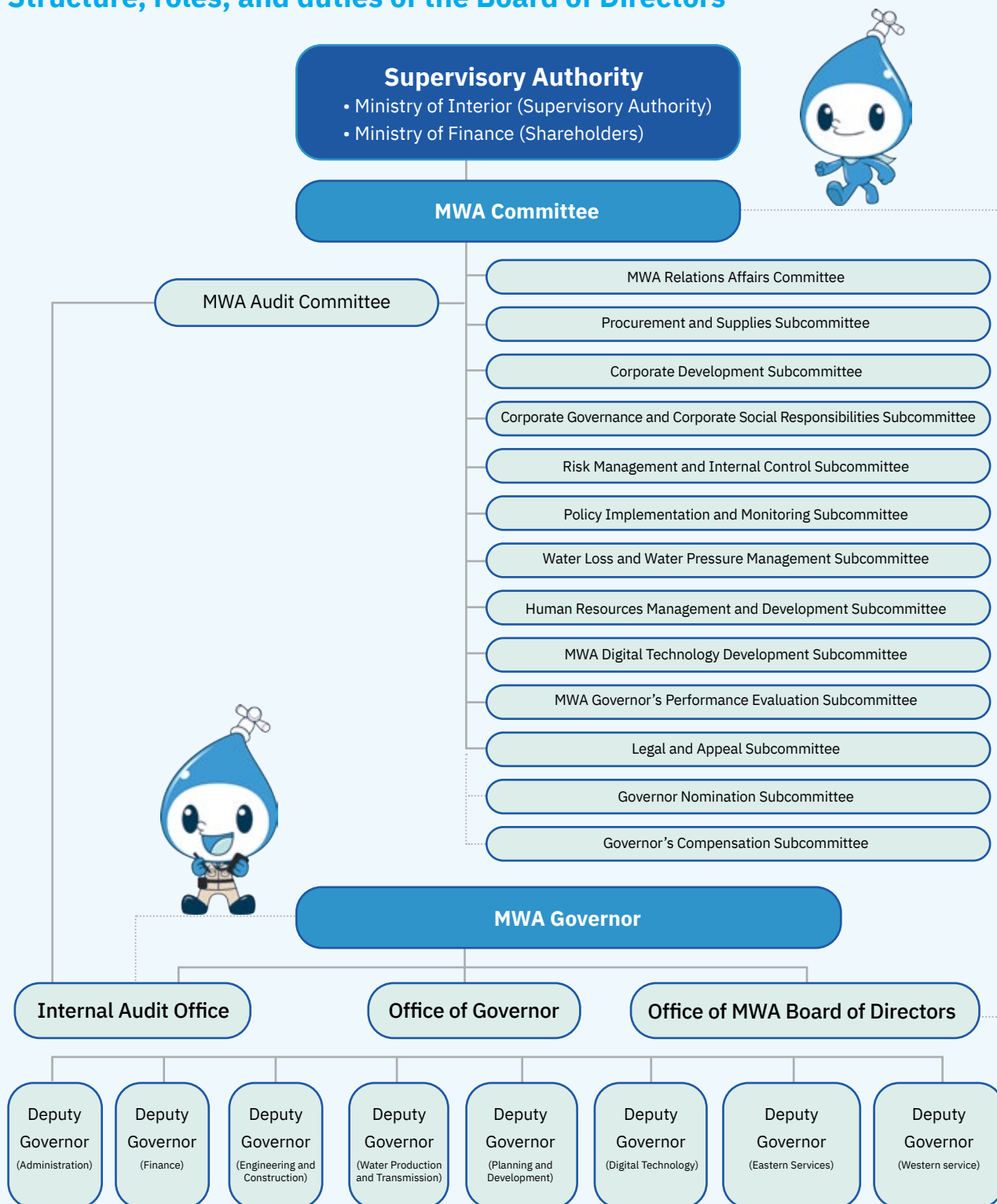
The MWA provides oversight to ensure compliance with laws and regulations in the form of the "Compliance Unit, which has the Deputy Governor (Administration) serving as a chairman. The Assistant Governor (Internal Audit Office) is the committee's advisor, and executives on the deputy governor level from every section make up the rest of the committee, with the Director of the Legal Department serving as the secretary responsible for making compliance reports to the Governor according to the MWA's requirements.

The Committee has responsibilities and powers in supervising and monitoring the performance of the MWA according to laws and regulations and in proposing recommendations, working guidelines and operating requirements. The Legal Department, as the secretary, works together with various other agencies to compile and create a database of laws and regulations related to the operations of the MWA to create work processes for performance reporting according to laws and regulations. Agencies responsible for processes (1st Line of Defense) provide assessment and reporting of performance, while the Legal Department (2nd Line of Defense)

audit and prepare reports to present to the board of directors in order to set working guidelines or performance requirements in compliance with laws and regulations.

In the 2022 fiscal year, the Compliance Unit played a role in supervising and monitoring the operations of the MWA according to laws, regulations, and requirements and in making considerations in expressing opinions about problems arising from compliance to laws, regulations, and requirements and making practice guideline recommendations to related agencies for further action according to the law. The Compliance Unit also engaged in other important activities consistently with the enterprise's policy such as reviewing the Code of Ethics of the Governor and employees of the MWA, reviewing authorization of the list of laws, regulations, and requirements related to business continuity and making considerations to authorize risk and opportunity assessment results and assessments of compliance to laws, regulations, and requirements.

Structure, roles, and duties of the Board of Directors ⁽²⁻⁹⁾



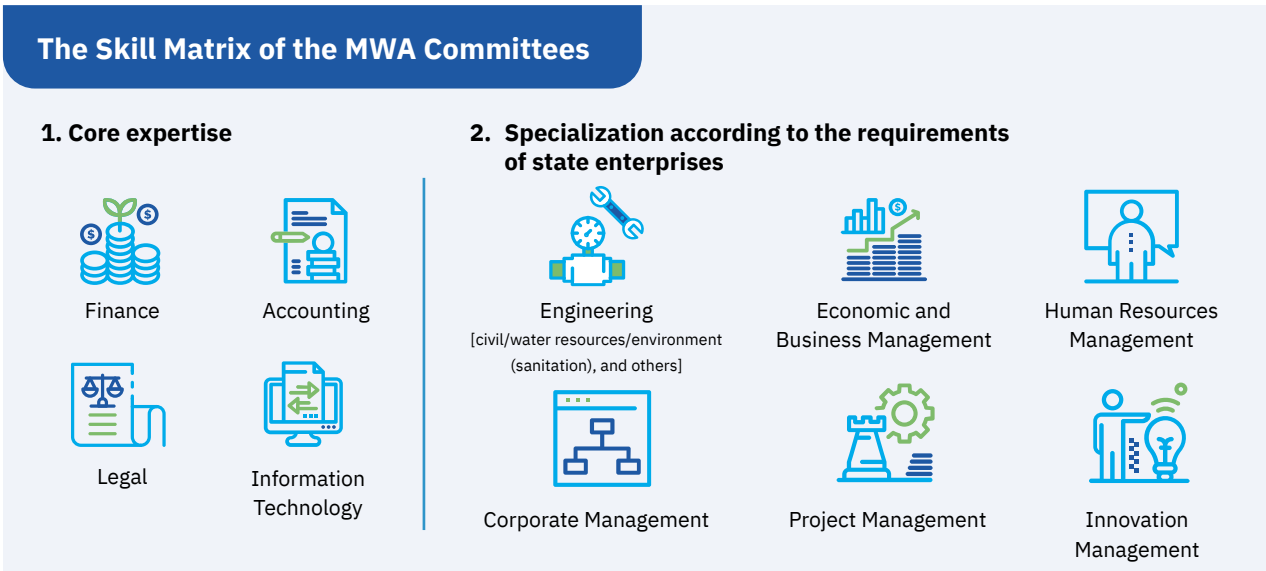
The Standard Qualifications of State Enterprise Directors and Employees Act, B.E. 2518 (1975), states that the board of directors of the state enterprise will consist of a chairman of the board and at least 9 other directors without exceeding 13 directors and that governors will be directors by virtue of their position. Accordingly, the board of directors of the MWA has the authority to appoint committees and sub-committees to assist in screening work in different areas, whether economic, social, or environmental

in nature. Furthermore, senior persons and executives of the MWA have been appointed to serve as directors, sub-committee directors, or secretaries to support, screen, and report on various performance areas. (For details about the various sub-committees, see the 2022 Annual Report).

MWA Board of Directors Selection Process ⁽²⁻¹⁰⁾

The MWA Board of Directors is appointed by the Cabinet.

- Each Director is required to be qualified and hold no prohibited characteristics as prescribed in the Metropolitan Waterworks Authority Act, B.E. 2510 (1967) and the Standard Qualification Act for State Enterprise Directors and Officials, B.E. 2518 (1975). This also includes other related laws, for example, holding a Thai nationality, age of not more than 65 years old, having qualifications and experiences that suit the MWA business, and having sufficient and skillful knowledge in waterworks, engineering, economics, law, political science, or business administration.
- The Chairman of the Board and other Directors are required to hold a three-year office term, except that the replacement can only hold office for the remaining term of the person he or she replaces, and the Governor is required to be under the employment contract. However, the retired Chairman of the Board and Directors may be reappointed.
- To be aligned with the corporate mission and strategic plan, the Skill Matrix Method is required to apply for consideration of nomination and appointment of the Committees, consisting of:



- At least one-third of other directors, who are not directors by position, are appointed and selected from the list of the Director's Pool prepared by the Ministry of Finance.
- At least one-third of other directors, who are not directors by position, are nominated by qualified persons who hold experience in the business sector.
- At least one-third of total directors are independent directors to comply with the principles and guidelines of good corporate governance for state enterprises.



Roles and Responsibilities of the MWA's Board of Directors

- Specify the enterprise's direction.
- Oversee activities in accordance with work plans comprising of the following:
 - 1) Digital action plan;
 - 2) Internal audit plan;
 - 3) Human capital management plan;
 - 4) Knowledge management plan.
- Specify enterprise management policies.
- Perform the roles assigned by the government.
- Promote good corporate governance.
- Oversee ethical conduct.
- Perform roles for fair marketing.
- Support the rights and equality of shareholders.
- Oversee stakeholder policies and management guidelines.
- Risk management and internal control.
- Oversee sustainability and innovation management policies and guidelines.
- Information disclosures: Oversee to ensure that the Metropolitan Waterworks Authority discloses financial and non-financial data and information through annual reports and the MWA's website as follows:

Information Disclosed in the MWA's Annual Reports	Information Disclosed on the MWA's Website
<p>At least the following:</p> <ol style="list-style-type: none"> 1) Organization structure/shareholder structure 2) History of the MWA's board of directors 3) Background information of executives 4) Financial analysis reports, performance, and significant changes 5) Auditor-certified financial statements 6) Report of the board of director's responsibilities/the Audit Committee's responsibilities concerning financial statements 7) Key business risks 8) Remuneration policy and pay information of the board of directors 9) Remuneration policy and pay information of high-ranking executives 10) Number of meetings attended by the board of directors and sub-committees by individual directors 11) Good corporate governance activities 12) Corporate social and environmental responsibility activities 13) Policies and performance in the management of connected transactions 14) Nature of business, business plans, and strategies 	<p>At least the following:</p> <ol style="list-style-type: none"> 1) Policy direction of the MWA 2) Good corporate governance policy 3) Activities in line with government policies 4) Important work plans 5) Significant investment information 6) Procurement 7) Important financial and non-financial performance 8) Annual reports

- Performance monitoring.
- Activities related to the highest-ranking executives and high-ranking executives:
 - 1) Establishment of the Metropolitan Waterworks Authority (MWA) Governor's Remuneration Committee to evaluate the criteria and methods for recruiting suitably qualified persons to serve as the Governor of the MWA.
 - 2) Supervise and ensure that the MWA has a suitable structure for high-ranking executives, work scope and qualifications for high-ranking executives.
 - 3) Assess the performance of the Governor and high-ranking executives with clearly specified criteria, indicators, weights, and goals from the start of each year
- and performance evaluation taking place every 6 months, and connect evaluation results with an incentive system.
- 4) Ensure the existence of a succession plan for high-ranking executives and key positions of the MWA.
- 5) Encourage and support Management and employees to receive training and development to gain useful work knowledge and experience.
- 6) Supervise to ensure that the Governor manages human resources consistently with the missions and objectives of the state enterprise while retaining competent state enterprise employees.
- Appointment of the board of directors and sub-committees.

Performance Assessment and Skill and Knowledge Development (2-17, 2-18)

The MWA requires an assessment to be conducted on the MWA's board of directors once per year in line with the good corporate governance principles for the state enterprise, by which a performance evaluation of the entire board of directors of the state enterprise and individual directors has to take place at least once annually every year in order to allow the board of directors to review work performance and issues and obstacles encountered in the past year and to enhance the board of director's work performance. In the 2022 fiscal year, the MWA's board of directors completed evaluation forms and approved 3 types of evaluation forms as follows: the director self-assessment form, the board evaluation form, and the MWA director's cross-evaluation form. After completing the evaluations, evaluation results were brought together for mutual consideration in order

to seek ways to improve the different work activities of the board of directors and create plans to enhance the corporate governance effectiveness of the MWA's board of directors in the 2023 fiscal year to improve performance effectiveness.

Board Performance Evaluation Results for the 2022 Fiscal Year (5 points total)



Individual MWA Director Self-Evaluation Results

4.67 Excellent

MWA Board Performance Evaluation

4.61 Excellent

Cross-Evaluation Results for MWA Directors

4.81 Excellent

1. Individual MWA Director Self-Evaluation: The mean evaluation score was 4.67 points out of 5 points total or 93.39%. This means that, on average, the work performance of the individual directors of the MWA was excellent.
2. MWA Board Performance Evaluation: The mean evaluation score was 4.61 out of 5 points total or 92.19%. This means that, on average, the work performance of the entire MWA board was excellent.
3. Cross-Evaluation of MWA Directors: The mean evaluation score was 4.81 out of 5 points total or 96.15%. This means that, on average, the work effectiveness of the MWA's individual board members as evaluated by other directors was excellent.

Accordingly, the MWA considered the key missions of the board of directors and the performance framework of the state enterprise on the issues of good corporate governance and corporate leadership as stated in the enterprise's evaluation criteria and brought issues that received evaluation scores below 90% for analysis and creation of plans to enhance the corporate governance effectiveness of the MWA's board of directors in the 2023 fiscal year.

The MWA has a policy to support the board of directors to receive development and gain knowledge and experience through training/seminars in related courses in order to promote the performance of duties in a manner that benefits the structured and continuous oversight of the strategic work of the MWA. This includes the Director Certification Program (DCP), Corporate Governance Program for the Boards of Directors and High-Ranking Executives of State Enterprises and Public Organizations Program (PDI), and other appropriate programs, and we also provide conduct work studies about other water supply business

management activities and other work systems, held special meetings attended by only the independent directors of the MWA's board of directors, organized visits to the MWA's actual work sites, etc.

Furthermore, newly appointed directors have to undergo an orientation program that provides narration and summary of the overall operation of the MWA along with a director's manual, important documents about the enterprise and necessary information for maximizing the effectiveness and efficiency of the performance of directors.

Compensation for MWA's Committee (2-19)



Compensation of MWA's Committee
are categorized into three types:

1. Monthly compensation
2. Meeting attendance fee
3. Annual bonus

As a state enterprise under the supervision of the Ministry of Interior, the Committee holds the right to receive compensation according to criteria approved by the Cabinet. Compensation is paid during the period that the Committee's members are still in term of office, if in the case of retirement/out of office, no compensation is paid to those Committee's members. However, each Committee's member holds the right to receive a compensation of not more than 10,000 baht per month, paid in proportion to the length of their tenure. The Chairman of the Board holds the right to receive compensation twice the amount of monthly compensation paid to each member of the Committee or 20,000 baht per month.

The payment of meeting allowance for the Committee's members is in accordance with the criteria for payment of monthly compensation and meeting allowance for State Enterprise Committee and other Committee's members in Sub-committees, Sub-committees, or other working groups in accordance with the Cabinet resolution dated on 24 April 2019. The Committee's member holds the right to receive a meeting allowance of not more than 20,000 baht per month, and the Chairman of the meeting holds the right

to receive at a rate of 25% of the meeting allowance paid to each member of the Committee as a surplus.

1) In the case of MWA's Committee meetings, the meeting allowance is paid once a month. In this regard, it shall consider paying more than once per month, but not more than fifteen times per year, when it is reasonable.

2) In case of a specific Sub-committee meeting, other Committee members or working groups who are appointed by law or regulations which are the central criterion, or the Cabinet resolution, the State Enterprise Board, MWA's Committee members, and other Committee members who attend the meeting and are not the member of MWA's Committee, hold the right to receive an equal meeting allowance at the rate

of 0.5 times of the amount paid to the MWA Committee members. But it is not more than two different Committees, and each Committee is paid only once a month.

MWA is required to pay bonuses to Committee members after submitting the net profits allocated as state revenues to the Ministry of Finance. The bonus allocation is according to the evaluation results and the limit under the criteria approved by the Cabinet resolution dated 2 July 2013, which has approved the improvement of the incentive program in the monetary compensation in accordance with the state enterprise performance evaluation system, according to the meeting resolution of the State Enterprise Policy Committee Meeting No. 4/2013, dated 17 June 2013.

Anti-Corruption

The MWA gives importance to stresses on operating while adhering to the principles of good governance in order to create sustainable business value by supervising, monitoring, and overseeing the management of the Management Department to achieve the MWA's missions, objectives, and goals in an effective manner that corresponds to the government's policies while being ethical, open, and transparent. We also operate in a responsible manner to society and the environment and respect the rights of all stakeholders through our management under the supervision of the MWA's board of directors, supervising sub-committees, policy steering committees, the Anti-Corruption and Ethics Promotion Committee of the Metropolitan Waterworks Authority (ACOC MWA), and the Corporate Governance Department, which is the agency in charge. Accordingly, we have 5 steps to support good people as follows:

1. Study concepts related to corporate governance in line with international standards and create the MWA's Good Corporate Governance Manual to establish a practical framework for the operations of the board of directors of the MWA, sub-committees, executives, and employees on every level.



2. Require every work process of the MWA to take place transparently in a verifiable manner without corruption through procedures that the MWA's board of directors, sub-committees, executives, and employees jointly declared in the motto of a "transparent, verifiable, and effective MWA without corruption."

3. Promote an atmosphere that reinforces positive work attitudes to ensure that personnel exhibit desirable behaviors according to set ethical and moral guidelines such as by organizing projects to praise employees who conduct themselves consistently with corporate governance principles and who are volunteer-minded and by supporting activities that demonstrate responsibility to society and stakeholders through various projects.

4. **Require monitoring and performance reports** to executives, sub-committees, and the board of directors regularly every month in order to obtain various observations and recommendations or solution guidelines for problems and obstacles related to activities according to work plans.

5. **Use feedback information from work or recommendations** to make work improvements in each following fiscal year.



In addition, the MWA encourages employees to engage in promoting and supporting awareness by developing consciousness about anti-corruption through the establishment of the **MWA Corporate Governance Council**, whose members comprise representatives from every agency, with the objective of supporting personnel to gain consciousness about using morals, ethics, integrity, and governance as the core foundation in their work and to mutually contribute to raising awareness and conscience through communication, monitoring and observation missions in order to prevent corruption in the enterprise. This is a way to create opportunities for them to participate in a structured manner in various missions.

We have created an **Anti-Corruption Policy** for practice by the board of directors of the MWA, sub-committees, executives, employees, and

contract workers of the MWA, and we have also created related policies such as a fairness and transparency policy; a no-gift policy; policies and practice guidelines on the prevention of conflicts of interest, use of internal information and connected transactions; and reporting, anti-corruption and whistleblower protection policies, etc. **A key objective of the 2022 fiscal year was for the integrity and transparency assessment (ITA) score to exceed 90 points or for the enterprise to be ranked as one of the top 5 of the country's state enterprises. Accordingly, the MWA's ITA score was 98.23, or on the level of AA.**



Scan QR code

Anti-corruption Policy



Scan QR code

Good Governance Policy



Scan QR code

Conflict of Interest Prevention Policy and Practice Guidelines

Management of Conflicts of Interest in the Enterprise

The MWA gives importance to conflict-of-interest prevention and has issued the Board of Directors of the Metropolitan Waterworks Authority's Announcement on the Policies and Guidelines for Prevention of Conflicts of Interest, Use of Internal Information and Connected Transactions and issued orders, criteria, and work procedures about reporting of conflicts of interest, use of internal information, and connected transactions in order to have the board of directors, Governor, executives and employees along with other contract workers such as sub-committees, directors, consultants, and work committees established by the board of directors of the MWA that are not members of the board of directors of the MWA, the Governor or employees of the MWA to use as clear criteria and practice guidelines in order to raise awareness about conflict-of-interest prevention, which is the duty and responsibility that everyone must understand and practice. Moreover, we have instructed the Internal Audit Office to summarize reports on conflicts of interest, use of internal information, and connected transactions that take place throughout the year to report to the Governor in order to present to the board of directors of the MWA.

In addition to setting clear policies and practice guidelines, the MWA communicates and raises awareness through short video clips to promote easy understanding about various issues through multiple channels, and we review knowledge and understanding through Q&A activities at the end of each lesson.

In the 2022 fiscal year, the MWA's contract workers, including the board of directors of the MWA (including the Governor), the MWA's employees, and other contract workers, submitted a conflict-of-interest report for 4,330 people total, of whom 4,330 people had no conflicts of interest.

Accordingly, the MWA's procurement process involves verification of the direct and indirect interests of bidders who are ordinary people and bidders who are other juristic persons through a review of management and capital relationships or overlaps between management and capital relationships. The MWA is committed and strictly adheres to the Government Procurement and Supplies Management Act, B.E. 2560 (2017), and the

Ministry of Finance Regulation on Government Procurement and Supplies Management, B.E. 2560 (2017), and other related laws and requirements.



Risk and Corruption Likelihood Risks Criteria Used (205-1)

The MWA creates a corruption risk management plan every year. In the 2022 fiscal year, we took the following actions:

1. We held an online workshop entitled "Corruption Risk Assessment" for 92 executives on the department level and above in order to promote knowledge and understanding about management principles and assessment of corruption risks in addition to having participants train in creating corruption risk management plans for their own agencies. The average pre-test score of the activity was 60%, while the post-test score was 80%.

2. We created an enterprise corruption risk management plan. In the 2022 fiscal year, the Office of Public Sector Anti-Corruption Commission (PACC) required state enterprise agencies to assess corruption risk in 1 procurement project with the highest monetary amount by following these 3 corruption risk assessment steps:



Step 1

Specify corruption risk assessment criteria.



Step 2

Assess corruption risk.



Step 3

Create corruption risk management plan.

The MWA has chosen a procurement project with the highest monetary value from the water treatment work line. The name of the project was the Maha Sawat Water Treatment Plant Capacity Expansion Construction Project to a size of 800,000 cubic meters per day, along with associated work in the contract number GE-MS5/6-9, which had a budget of 6,955,000,000 baht. The project's procurement method was e-bidding and had an operation duration of 1,200 days after the date of receipt of a notification for work commencement from the MWA. The risk evaluation results of the project found no risk for corruption, because the MWA has standards in place to control corruption risk and there are observers from anti-corruption organizations attending meetings and observing in every process, thus leading to no complaints or corruption in the project. Moreover, in order to ensure that employees perform procurement work correctly and congruently across the entire organization and in line with regulations and the law, the MWA provided channels for personnel of the MWA to search and exchange information about procurement

and related information via the KM Portal enterprise knowledge management system, which is a technology used to promote correct knowledge and understanding about procurement.

3. The results of performance according to the enterprise risk management plan regarding corruption were reported to the MOI Action Against Corruption and Ethics Promotion Committee in order to further present it to the Office of Public Sector Anti-Corruption Commission (PACC).

Enterprise Corruption Risk Management Plan for Fiscal Years 2018-2022

- 2018: Water supply connection requests.
- 2019: Supply requisitioning process (equipment/ pipe requisitioning)
- 2020: Meter and equipment replacement during meter and equipment requisitioning.
- 2021: Construction work supervision.
- 2022: Procurement project with the highest value in water treatment named the Maha Sawat Water Treatment Plant Capacity Expansion Construction Project to a size of 800,000 cubic meters per day, along with associated work in the contract number GE-MS5/6-9.

Communication and Education about Anti-Corruption (205-2)

The MWA prepares public relations media to raise awareness and consciousness in various ways such as the following:

- 1) Public relations media preparation with lesson extraction from training.
- 2) Preparation and dissemination of public relations media via communications channels, such as circular notices, intranet, internet, Facebook: MWA CG Club, and various other activities, such as the following:



- Preparation of public relations media and knowledge and understanding test questions on "Policies and Practice Guidelines for Prevention of Conflict of Interest, Use of Internal Information and Conflict of Interest".
- Preparation of public relations media entitled "Conflicts of Personal Interest and Collective Interest (Conflict of Interest)" and instruction for the MWA's personnel to participate in knowledge and understanding testing activities.
- "CG Chuan Share" activity where people are invited to make comments after watching the short film GTH On Air via the "MWA CG Club" Facebook page.
- Preparation of public relations media entitled "Know to See to See Dharma".
- Preparation of public relations media in the video clip format entitled "Policies and Practice Guidelines for Preventing Conflicts of Interest, Use of Internal Information, and Connected Transactions" and on the desirable behaviors according to the MWA's good governance manual. There were 48 episodes in total.

In addition, we communicate and promote stakeholder engagement in anti-corruption through various activities, such as the ones below:

- “Yaowachon Khon Di, Khon Keng” Project – The “Good Citizens” public relations media series was created to promote the virtues of being a good citizen in 10 schools that participated in the project. The average learning evaluation score after communication was 87.81% and the average project satisfaction score was 4.57% (out of 5 points total).
- Participation in Party Organizations or Projects That Support Anti-Corruption – The Good Governance Council attended the International Anti-Corruption Day event on 9 December 2021. The event was organized by the Office of National Anti-Corruption Commission in collaboration with the Office of Public Sector Anti-Corruption Commission, the Anti-Corruption Organization of Thailand (ACT), and network members under the concept “Zero Tolerance: Thai People Do Not Put up with Corruption: No Corrupt Acts. No Tolerance. No Idleness. Thai People Together Against Corruption.”
- The members of the Good Governance Council attended the activity “The Water Works Authority Meets the People” with different waterworks branch offices to raise awareness about the council and to gather opinions about the MWA’s activities.

In the 2022 fiscal year, the MWA also provided training about anti-corruption within the organization to employees and contract workers as follows:

1. We organized anti-corruption training for employees and contract workers regularly throughout the entire year, for example:

- Training topic “Corruption-Free Good Governance Principles”;
- Training topic “Anti-Corruption through Sufficiency Economy Philosophy”;
- Training topic “Work Ethics and Integrity”;
- Training topic “State Enterprise Code of Conduct and Good Practices”;

- Training topic “Service Mindedness in Buddhism’s Style”.

2. We provided knowledge training in good governance to employees through various courses:

- Lecture topic “Governance and Ethical Standards” for new employees;
- Lecture topic “Governance” in the course “Level 5 Employee Development”.

Additionally, the MWA organized a training course in risk management and the risk management framework (COSO ERM 2017) for the Risk Management and Internal Control Sub-committee.

The Anti-Corruption Operations Center of the Metropolitan Waterworks Authority (ACOC MWA)

The MWA has established the Anti-Corruption Operations Center of the Metropolitan Waterworks Authority (ACOC MWA) with the powers to perform duties in the 2 following areas: 1) Integrity and ethics promotion and 2) Anti-corruption. The ACOC MWA has channels for receiving complaints about corruption and misconduct by the MWA’s personnel.



For any encounters with corruption or misconduct, a complaint can be filed according to the Whistleblowing Policy, which will protect informants and conceal their personal information to build confidence that no impacts will occur to informants. Accordingly, reports can be filed via the ACOC MWA's complaint channels or the Damrongtham Center. There are 8 complaint channels as follows:



Arrive and make contact in person at the Corporate Governance Department.



Send a letter to the ACOC MWA at the Corporate Governance Department, MWA Head Office, 6th Floor, No. 400, Prachachuen Road, Thung Song Hong Sub district, Lak Si District, Bangkok 10210.



Telephone:
0 2504 0123 to 2518



Fax: 0 2500 2518



Email: anticor@mwa.co.th



Justice Box,
Information Center,
MWA Head Office, 1st Floor.

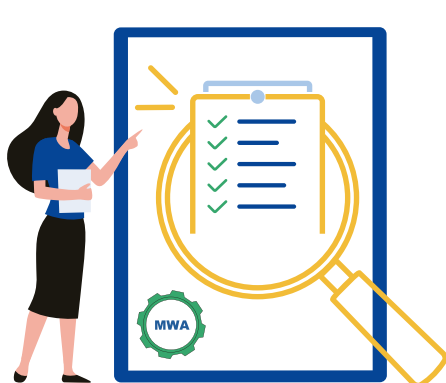


Internal personnel can file complaints via the internal complaint intranet system of the MWA at http://intra.mwa.co.th/m_complain.php.



For the general public:
<http://www.mwa.co.th/complain.php>,
or scan the QR code to access the complaint system.

Overview of Anti-Corruption Performance in the 2022 Fiscal Year



67

All enterprise agencies



1

Agency that received corruption risk assessment



1.49%

Number of agencies that received corruption risk assessment

Remarks: The MWA has operated according to the guideline of the Office of Public Sector Anti-Corruption Commission, which required the state enterprise to assess corruption risk in one procurement project with the highest monetary value in the 2022 fiscal year.

The Board of Directors (BOD), Executives, and Employees of the MWA Who Received Training in the Anti-Corruption Policy and Processes		
Item	Unit	Total
Members of the MWA's Board of Directors	People	15
Members of the MWA's Board of Directors who received training	People	15
Percentage of members of the MWA's Board of Directors who received training	Percent	100
Number of Executives (section supervisor or equivalent and above)	People	1,466
Number of Executives (section supervisor or equivalent and above) who received training (6-10)	People	1,033
Percentage of Executives who received training	Percent	70.46
Number of employees (excluding contract workers)	People	2,785
Number of employees who received training (excluding contract workers) (1-5)	People	1,075
Percentage of employees who received training	Percent	38.60

The Board of Directors (BOD), Executives, Employees, and Trade Partners of the MWA Who Received Communication Media in the Anti-Corruption Policy and Processes		
Item	Unit	Total
Number of members of the MWA's Board of Directors who received communication	People	15
Percentage of members of the MWA's Board of Directors who received communication	Percent	100
Number of Executives (section supervisor or equivalent and above) who received communication	People	1,466
Percentage of Executives (section supervisor or equivalent and above) who received communication	Percent	100
Number of employees (excluding contract workers) who received communication	People	2,785
Percentage of employees who received communication	Percent	100
Number of trade partners (suppliers and contractors) ^a	People	174
Number of trade partners (suppliers and contractors) who received communication	People	90 ^b
Percentage of trade partners (suppliers and contractors) who received communication	Percent	26.43



Corruption Incidents (If any by employees and trade partners): ⁽²⁰⁵⁻³⁾

0 incidents

No. of Legal Cases Related to Corruption in the Enterprise or Employees during the Reporting Cycle: ⁽²⁰⁵⁻³⁾

0 case

- Trade partners who made contracts with the MWA valuing five hundred thousand baht and up for 3 consecutive years.
- The number of trade partners who attended the training course on the "Development of Water Pipe Construction Standards for Executives/Engineers" that was organized by the Engineering Section and the Human Resources Development Department to communicate policies and mechanisms for preventing/combating corruption in organizations was 46 people, while 44 trade partners attended the discussion about the MWA's enterprise plan of 2022.

Survey Results on Perceived Governance and Transparency by Stakeholders (5 points total)



Policy agencies

4.63



Mission-based Agencies

3.60



Media

3.69



Community and Society

4.11



Trade Partners

4.05



Allies

4.22



Activists

2.63



Customers

3.05



Employees and Contract Workers

3.85

Total Average

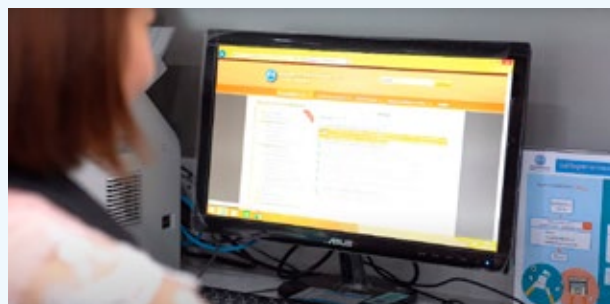
3.76

MWA Government Contact Center

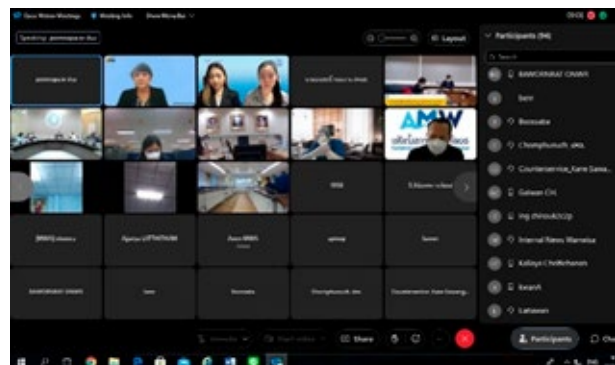
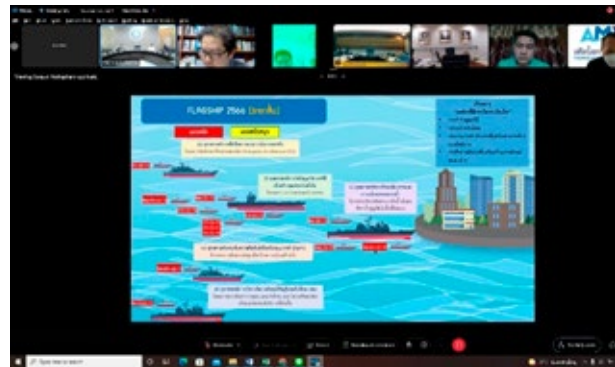
The MWA is a state enterprise that provides water supply services to the people and operates according to the vision of “Quality Water for Quality Living”. With the determination and willingness to perform various activities with good governance, the MWA Official Information Center has adopted the aforementioned guidelines as principles to serve the public with emphasis on providing transparent information services to the point that it won the Distinguished Official Information Center Award for the 4th consecutive year from 2019 to 2022.

The physical location of the Official Information Center is the 1st floor of the MWA Head Office Building. It is staffed permanently by center personnel who are responsible for providing information and responding to inquiries made by the public about services. The center also has an information display cabinet according to the Official Information Act, B.E. 2540 (1997), along with computer devices for the convenience of the public seeking services, who can search for the information that they want.

Additionally, an electronic information center provides another channel to aid the public in conveniently accessing news and information while reducing their travel time. It is an effort to respond



to the digital lifestyle, and the information center is accessible via the MWA's website www.mwa.co.th or the website www.oic.go.th. On the front page of the MWA's electronic information center, information up-to-date information is shown completely and correctly according to the Official Information Act, B.E. 2540 (1997) and in compliance with Section 7 and Section 9, by which the public has 24-hour access to the aforementioned information.



The MWA has been involved with the public sector in creating water supply policies from the very beginning by expressing opinions, taking part in policy setting, and planning decisions and operations according to the direction of water resource management and the MWA's work plans/projects, and we gave stakeholders the opportunity to contribute through discussions about the MWA's 6th Enterprise Plan (2023-2027) and various master plans on 24 May 2022 and 23 May 2022 for the MWA's board of directors. Accordingly, this participation ensures that the operational direction and action plans of the MWA move toward long-term success in line with the direction of the country.

Not only the matters mentioned above, we have also visited external agencies with shared missions to discuss material issues, exchange ideas, and listen to opinions towards our policies, as well as to get involved with various working groups from the government sector. The regulatory

agencies and relevant authorities with shared missions are required to engage in our processes of formulating policies and operational directions, such as the Office of Policy and Planning, the Ministry of Interior, the Office of the National Economic and Social Development Council, State Enterprise Policy Office, the Provincial Water Works Authority, the Office of National Water Resources, the Royal Irrigation Department, and the Thai Water Works Association (TWWA). The purpose of this action is to create engagement and build relationships among interagencies which requires it to be conducted on a regular basis and more than one time in the forms of both formal meetings and informal visits at a specified time as mutually agreed by both parties. Moreover, certain entities from MWA are required to attend those meetings on a weekly basis to jointly engage in the formulation of policies and action plans at the strategic and operational levels to create efficient synergy platforms among all of us.

Indirect Economic Impacts



Extensive, Adequate, and Secure Water Supply Service Expansion Project



**Reduce household expenses
in procuring water from other sources.**



**Proactively develop
community relationships.**



**Reduce land
subsidence problems.**

The MWA is committed to operating business by producing and delivering clean and safe tap water services to the consumer alongside the development of a good quality of life in society. We instill a culture within our enterprise that promotes participation in community and social development and improve and support infrastructure projects that drive sustainable social development in addition to supporting the public in having extensive and equitable access to clean water. Therefore, our project to expand service scope to fully cover urban communities or the Extensive, Adequate, and Secure Water Supply Service Expansion Project is a project meant to provide service in non-commercially viable areas by proactively installing water supply systems. This project has been ongoing since 2006 and continues up to the present with the aim of making preparations for future service and keeping up with the leaping growth and development of urban communities to give people in every locality equitable access to clean and safe water supply while sustainably improving the quality of life of the people and responding to the government's policy to reduce social inequality and increase access to government services to ensure that

every member of the public has equal, extensive, and fair access to good services. The executions of this project not only thoroughly provide the locals with equitable opportunities to consume clean and safe water, but also help them to reduce the household's costs of living by procuring water from other sources (artesian water, bottled water), as well as improve their well-being for the betterment. Moreover, it is also considered one of the proactive approaches to strengthen relationships with the communities and reduce the problems of land subsidence. So, if this action has covered the entire service areas and all households in communities have turned their decisions to receive water supply service from us, by our expertise and long-term experiences, we strongly believe that it can reduce the problems of land subsidence by 9 centimeters in the upcoming 20 years.



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View more information about the project.



Fiscal Year	Total number of routes along water distribution pipelines	Distance (kilometers)	Total Investment Budget (million baht)	Total number of direct beneficiaries (by households)	Total number of direct beneficiaries (by persons)*	Total household expenses saved from procuring water of other sources (baht) **
2006-2007	170.00	210.00	314.00	10,045.00	32,144.00	1,627,792.25
2008	111.00	124.00	141.00	3,700.00	11,840.00	599,585.00
2009	93.00	118.00	193.00	3,540.00	11,328.00	573,657.00
2010	127.00	201.00	276.00	5,950.00	19,040.00	964,197.50
2011	189.00	230.00	331.00	6,930.00	22,176.00	1,123,006.50
2012	419.00	344.00	674.00	8,315.00	26,608.00	1,347,445.75
2013	55.00	70.00	153.00	2,284.00	7,308.80	370,122.20
2014	96.00	138.00	250.00	2,610.00	8,352.00	422,950.50
2015	186.00	178.83	320.33	4,160.00	13,312.00	674,128.00
2016	238.00	273.44	389.27	4,886.00	15,635.20	791,776.30
2017	113.00	157.87	296.16	2,367.00	7,574.40	383,572.35
2018	162.00	198.03	422.24	1,620.00	5,184.00	262,521.00
2019	123.00	116.93	78.245	1,679.00	5,372.80	272,081.95
2020	88.00	108.53	206.09	1,040.00	3,328.00	168,532.00
2021	98.00	89.74	178.05	1,490.00	4,633.90	241,454.50
2022	50.00	30.57	22.66	1,585.00	4,929.35	256,849.25
Total	2,318	2,588.94	4,245.05	62,201.00	195,438.45	9,911,140.05

* The average number of residents per household in Thailand is 3.11 persons. (Source: the results from the Household Socio-Economic Survey 2020 by the National Statistical Office of Thailand, Ministry of Digital Economy and Society.

** Total household expenses saved from procuring water from other sources amount to 162.05 baht/month/household

Source: the results from the Household Socio-Economic Survey 2013 by the National Statistical Office of Thailand, Ministry of Digital Economy and Society.



MWA

S
E
G

Social Performance



Occupational Health and Safety Management of Metropolitan Waterworks Authority (MWA) has been operated under the designated laws such as the Occupational Safety, Health and Work Environment Act, B.E. 2554 (2011), the Ministerial Regulation stipulating standards for the Occupational Safety, Health and Work Environment, and Notification of the State Enterprise Relations Committee, Re: Minimum Standards of Employment Conditions in State-Owned Enterprises, B.E. 2549

(2006). It has been adopted as a framework for establishing the MWA Safety, Security, Health and Environment (SSHE) Policy, enforced on 30 June 2021. Our SSHE policy covers all entities, including employees and subcontracted workers at all levels. It aims to support operations in terms of social and environmental responsibilities in water production and distribution processes and its services, which are our core processes in the value chain, and other related operations.



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Safety, Security, Health and Environment: SSHE) Policy

The MWA has established the processes that create and promote the systematic SSHE management (SSHE Model). It has been implemented under the MWA Action Plans on HR Strategy Item: Safety, Security, Health and Environment Management, approved by the HRC, of both short-term plans (attachment 2) and long-term plans. MWA Safety Committee performs its duties in driving the plans and it comprises of the representatives from SSHE Division, the Corporate Welfare and Relation Affair Department, acting as the central authority for laying down the Corporate SSHE Management systems.

The Safety Committee (SC)

The MWA has appointed occupational health personnel as professional safety officers in all 21 places of business and has even appointed a Safety Committee (SC) composed of employees who completed training on various levels until they received certificates from the Safety and Health at Work Promotion Association (Thailand) in order to appoint executive level safety officers and supervisory level safety officers through proposal to the Governor for appointment. Accordingly, the Occupational Health, Safety and Environment Committee and the Safety Committee work together to set policies, supervise, and drive actions related to health standards and safety, occupational health and environmental standards in every area that might impact employees and communities, in addition to preparing employees such as by holding firefighting drills and disease prevention drills and improving the landscape, promoting exercise for health, and organizing annual health check-ups, etc. ent that may affect employees and the community. as well as preparing employees, such as firefighting drills Prevention of disease outbreaks Landscaping Exercise for health Annual health check, etc.

Hygiene, Safety, Welfare, Occupational Health and Work Environment Committee of the MWA



Governor	Chairman
Deputy Governor (Administration)	Director
Chairman of the Occupational Safety, Health and Environment Committee No. 1-21	Director
Assistant Governor (Human Resources)	Director
MWA Expert Level 9 under the Deputy Governor (Administration)	Director
MWA Expert Level 9 under the Governor	Director
Director, Social Responsibility Management Department	Director
Chairman, MWA State Enterprise Labor Union	Director
Director, Welfare and Corporate Relations Department	Director
Director, Safety, Welfare and Occupational Health Division	Director and Secretary

Occupational Safety, Health and Environment Committee (OSHE Committees No. 1-21)



Professional Safety Officer (Director and Secretary)
(Occupational health personnel appointed to become the professional safety officers by the Governor)







Directors representing the employer (supervisory level employees)

- Division director employees or above (Executive level safety officers)
- Section supervisor employees or equivalent (work supervisor safety officers)

Directors representing employees (Employees Level 1-5)

Note: * The Safety Committee shall be appointed in accordance with the Ministerial Regulations on an annual basis. Each enterprise consists of representatives of the employers (executive level) and employees (operational level). The meetings on Safety shall be held on a monthly basis, to discuss matters relating to safety. It also includes defining the communication channels for communicating the policies to employees/subcontracted workers in each entity, as well as organizing activities that create understanding and awareness regarding the safety and environment in the workplace.

6-step to develop and promote SSHE

-  **1** To prepare the Short-term and Long-term Safety Management Plans, then propose to the Safety Committee for approval.
-  **2** To review/establish the SSHE Policy.
-  **3** To prepare the SSHE Action Plan for each Safety Committee, including Safety Handbook and Safety indicators.
-  **4** To communicate/implement the plan as well as to organize a contest of MWA Outstanding Entity on the safety.
-  **5** To monitor and evaluate performance.
-  **6** To summarize and analyze SSHE performance and its safety indicators, then present to MWA Governor for acknowledgement on an annual basis.

Incident Investigation Process for the Work-Related Risk

The MWA's entity in charge performs duties in investigating safety according to the designated procedure. If a potential risk on safety is found, it is required to prepare a corrective report with a definite timeframe to complete. Also, a progress summary report is required to be presented in the monthly meeting. The Safety Committee is required to supervise all operations according to the procedures in reporting unsafe incidents. If one of the employees witnesses an unsafe incident, it is required to report in accordance with the designated procedures, along with the accident reporting process. Each MWA entity is required to prepare a report on work-related hazards and illnesses (Form 001). Moreover, the Safety Division, the Corporate Welfare and Relation Affairs Department is also required to collect those data and

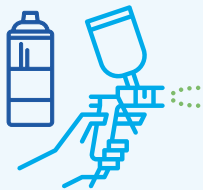


investigate the incidents before presenting it to the Meeting of the Safety Committee to determine the workmen's compensation.

Work-Related Risk and Hazard Management

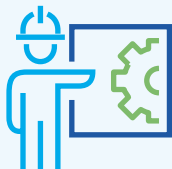


Currently, the MWA conducts an assessment of work-related risks and hazards, but it does not cover all entities. Initially, the preparation of the Master Plan on the Occupational Health and Safety Management Standard Systems (ISO 45001:2018) has been piloted at the Maha Sawat Water Treatment Plant and the Bang Khen Water Treatment Plant. On 26 August 2022, the Maha Sawat Water Treatment Plant became certified for its occupational health and safety management system (ISO45001) by ISO (MASCI). Such a system consists of the Hazard Identification, Risk and Opportunities Assessment according to the nature of routine and non-routine operations. It also includes a risk management plan for occupational health and safety management in alignment with the principle of Hierarchy of Controls to prevent and minimize the risks at the workplace.



Elimination:

Substitution with materials, processes, guidelines or equipment with a lower degree of hazards, for example, originally, the MWA used paints containing hazardous chemicals (Toluene) to spray the flow meters. Later, it switched to a new generation of watercolors that did not contain harmful chemicals (Toluene).



Engineering controls:

Such as the installation of neutralization vaporizers to prevent chlorine gas leakage.



Warnings:

Such as the installation of chlorine gas leakage detectors/fire alarms and hazard warning signages according to the nature of each job.

Safety Training for Employees and Subcontracted Workers

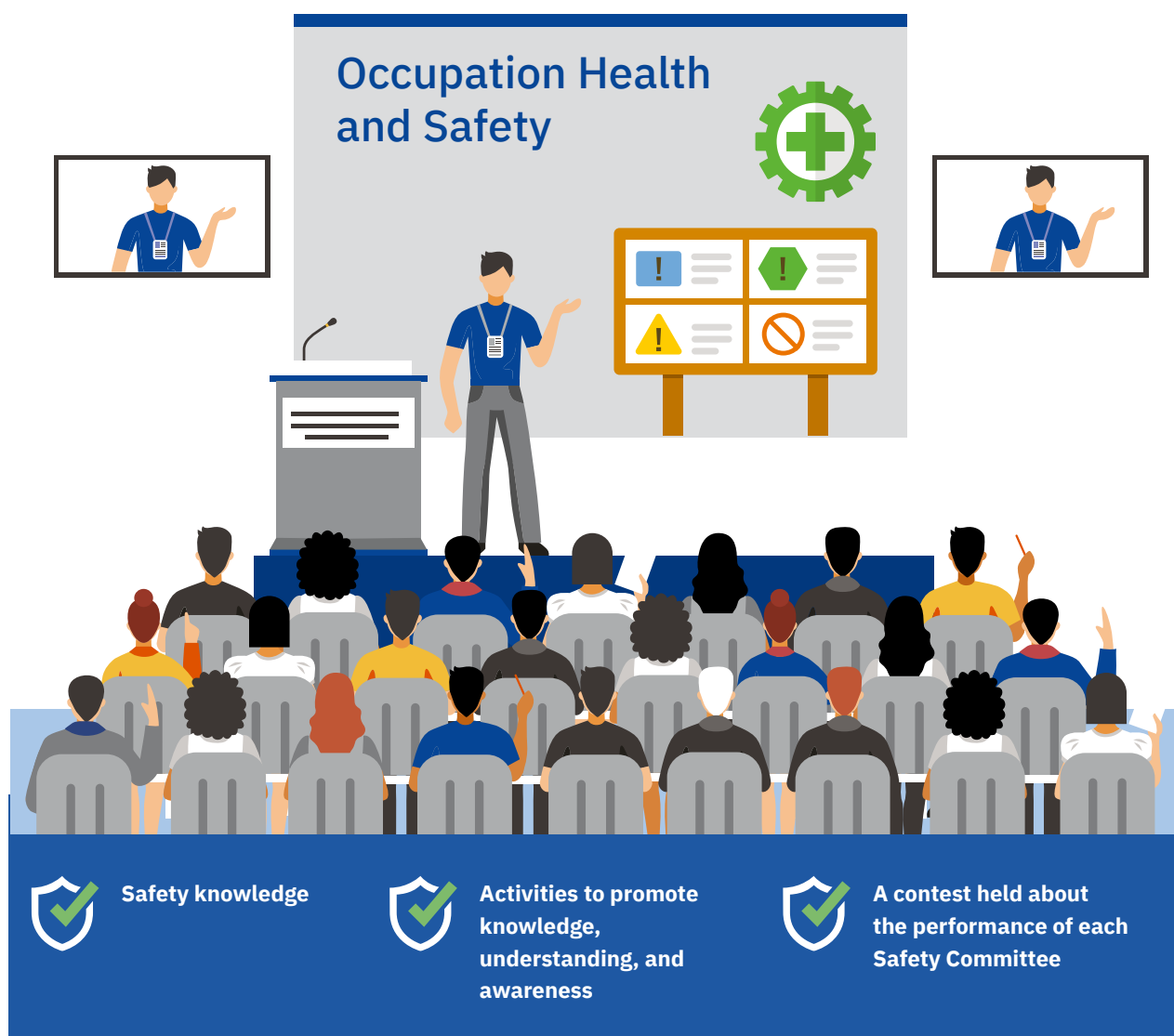
The MWA provides safety training through various courses in line with the specifications of the law and provides safety and occupational health training for employees on each level and related parties and other training in special operations such as work in confined spaces, work involving electricity and work involving the use of a forklift, etc. Training is provided to related employees and contract workers before the start of work with knowledge measurement before and after training. In the 2022 fiscal year, we provided the following training:

Safety Training for Occupational Health and Work Environment



- **Safety Officer (Supervisor level):** The participants were section heads or equivalent. The training was scheduled 2 times with 93 participants in total.
- **Safety Officer (Executive level):** The participants were the division directors or equivalent. The training was scheduled one time with 38 participants in total.
- **Roles and Responsibilities of the Safety Committee:** The participants were members of the Safety Committee. The training was scheduled 2 times with 89 participants in total.
- **Safety at the workplace relating to the electrical works and the rescuing methods for electrical hazard victims:** The participants were employees who were members of the Occupational Safety, Health and Environment Committee and employees related to electrical work. The training was scheduled 2 times with 98 participants total.
- **Fire Evacuation Drills:** The participants were employees and contract workers from all MWA entities. The training was held once a year, and in the 2022 fiscal year (2021 Calendar Year), there were 3,007 participants.
- **Primary Fire Extinguishing:** The participants were employees in every place of business of the MWA. The training was scheduled 5 times with 268 participants in total.
- **Occupational Health, Safety and Environment for the general employees and new employees in accordance with the Occupational Safety, Health and Environment Act, B.E. 2554 (2011):** The participants were new employees who had not yet been trained. The training was scheduled 15 times with 753 participants in total.
- **Basic First Aid and Resuscitation:** The participants were members of the Safety Committee and employees on every level. The training was scheduled 2 times per year with 94 participants in total.
- **Leaders, supervisors, rescuers, and workers in confined spaces:** The participants were workers who worked in confined spaces. The training was scheduled 2 times with 58 participants in total.
- **Crane Controller-high tower cranes, cars, boats, cranes, trucks with cranes (mobile):** The participants were workers involved in related work activities. The training was scheduled 2 times with 33 participants in total.
- **Overhead Crane Controllers-high-gantry cranes, and other stationary cranes:** The participants were workers involved in related work activities. The training was scheduled 3 times with 105 participants in total.
- **Use of forklifts, inspection, and maintenance for safety at the workplace:** The participants were workers involved in related work activities. The training was scheduled 2 times with 49 participants in total.







Communication and Development of Understanding about Occupational Safety, Welfare, Occupational Health, and Environment



In addition to providing safety knowledge through various training courses in accordance with the law, each Safety Committee (21 committees total) also held activities to promote knowledge, understanding, and awareness in employees and contract workers extensively about safety and how to create a good work environment with a contest held about the performance of each Safety Committee (21 committees total) as a tool to encourage efforts to continually drive safety, welfare, occupational health and environmental

policies. Accordingly, a competition evaluation sub-committee evaluated the committees according to 2 competition criteria, i.e. documents and on-site evaluations, and the competing agencies were divided into 2 types, namely factories and offices. On 16 August 2022, the Governor of the MWA gave 12 shield honor awards to entities with Safety Committees that excelled in occupational safety, health and environment in 2022.

Statistics Table Showing Work-Related Injuries and Deaths during Fiscal Year 2019-2022

	Fiscal Year			
	2019	2020	2021	2022
Target: Injury Frequency Rate (I.F.R.) ¹ , not over	0.39	0.24	0.20	0.20
Result: Injury Frequency Rate (I.F.R.)	0.30	0.15	0.15	0.30
Target: Injury Severity Rate (I.S.R.), not over	3.18	3.18	1.50	1.50
Result: Injury Severity Rate (I.S.R.)	0.15	0.59	2.65	0.45
<div>    Recordable work-related injuries    </div>				
Number of work-related injuries (up to 3 days off) (case)	2	0	0	2
Number of work-related injuries (more than 3 days off) (case)	0	1	1	0
High-consequence work-related injuries ²	0	0	0	0
Number of work-related deaths	0	0	0	0

Note: 1. Data collection process refers to the collection of work hours from the HR systems resulting from taking leave, working overtime, and shifting operations, applying the American National Standards Institute for calculating the I.F.R. and I.S.R. In the fiscal year 2022, there were 6,652,891.1 work hours, with a reference of 1,000,000 work hours. However, The MWA does not currently collect data on work-related injury statistics from the subcontracted workers. By the fiscal year 2023, it is required to continue to collect such statistical data.

2. High-consequence work-related injuries refer to the number of workers who have been injured at the workplace and required to take more than six months off, but do not include work-related deaths (as defined in accordance with the requirements of GRI 403-9: Work-related injuries).

Statistical data on injuries and deaths from work activities showed that in the 2022 fiscal year, there were 2 employees who experienced work-related hazards, and there were 3 days of pause from work in total. Thus, the statistics on the injury frequency rate (I.F.R.) exceeded the target value. Nevertheless, the injury severity rate continued to meet the target. Accident details are summarized as follows:

- 1st Injury: The 4th Technician of the 2nd Motor Section of the Motor Maintenance Division of the Electrical System Maintenance Department (2nd Occupational Safety, Health and Environment Committee), experienced an accident on 17 February 2022 while performing a repair on the EEC speed adjuster, when a slip ring had become detached and fell into the speed adjuster. The employee used a hand to rotate the drum unit located outside to search for the object. As a result, his fingers became stuck at the drum in the EEC, leading to the nail of his left index finger becoming detached, leading to a 3-day absence from work. The incident was

caused by a failure to observe procedures, by which he had not disassembled the device before performing the repair. For prevention, machinery must be inspected before the start of its operation, and employees are given training on the proper work procedure.

- 2nd Injury: A Level 8 MWA Expert under the Assistant Governor (Business) (1st Occupational Safety, Health and Environment Committee) encountered an accident by which he fell from tripping over a seat, leading to his left arm hitting the floor. The incident occurred on 27 May 2023 and caused his arm to become swollen and disfigured and for him to become immobile. The incident did not cause a work absence, but it was caused by improper storage of electrical cables. The prevention guideline is to inspect work areas and, for example, properly put away electrical cables before starting work and to train employees to inspect their work areas before work commencement.

Even though, The MWA provides an annual medical health check-up based on risk factors for employees and subcontracted workers to prevent and minimize occupational health impacts and new employees whose works are exposed to risk factors, to undergo the medical health check-ups before the commencement date of work (Baseline) as required by law. However, the MWA still does not collect data on such work-related illnesses due to the lack of personnel with expertise in occupational medicine. In the 2022 fiscal year, the MWA signed a memorandum of understanding for cooperation in occupational health and safety with Nopparat Rajathanee Hospital with the purpose of providing the MWA with a system to manage and administrate health check-ups according to the risk factors for the nature of each work and to comply with laws governing risk factor-based health check-ups for employees. The memorandum was signed on 30 September 2022 and it is expected that the MWA will be able to start collecting statistics on work-related illnesses by 2025.



Health Support

The MWA launched various health promotion projects and provided care for the mental health of employees such as through the “Mobile Stress-Relief Service Vehicle” Project to boost employee mental health and by holding the lecture under the title “Simple Stress-Relief Methods during COVID-19”, etc. Moreover, the MWA provides treatment and medical services along with disease diagnosis and consultation services for employees and their families, including retirees, spouses of retirees, and outsourced contract workers covering medical, dental, pharmaceutical, and clinical pathological care. In cases where illness symptoms are beyond the capacity of management, employees are also referred to or recommended to receive treatment at other hospitals with better capabilities.

Moreover, the Medical Service Division analyzes the annual health check-up results of employees to create projects to correct health problems. For example, health knowledge training was provided to employees about diabetes and easy stress relief during COVID-19 (New Normal) along with heart disease screening in working age and elderly people and measures and practice guidelines for dealing with COVID-19, which has become an endemic disease, etc.



Training and Education: Human Resources Development



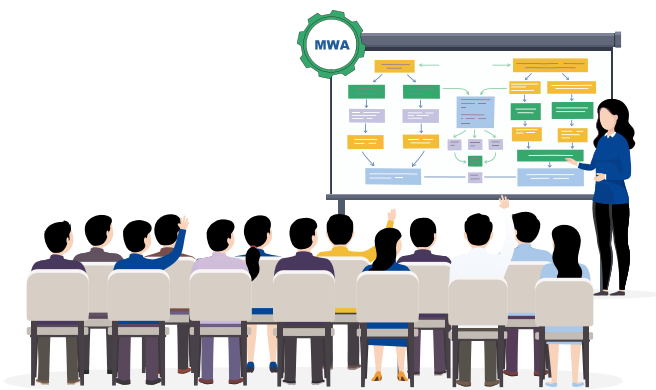
In order to prepare personnel to have capabilities and multiple skills to support changes and keep up with rapid changes in the internal and external environments of the enterprise, the MWA has created the HR Strategy Map to serve as a guideline for developing capabilities and driving human resources management (HRM) and human resources development (HRD), which form the major factors for driving the enterprise toward its objectives and promoting the sustainable growth of the enterprise in the future.

Personnel Development Project to Support Effective Strategy Implementation

In the 2022 fiscal year, the MWA reviewed the input factors for specifying the level of learning and personnel development in order to strive toward excellence in work processes, services, and secure financial status in addition to driving implementation in line with the enterprise's major strategies such as in water loss management, safe tap water plans, and digital technologies and innovations. The following are our key performance results:

Personnel Development in Response to the Enterprise's Vision and Strategies

- **Water Loss Management Knowledge Development and Enhancement Plan:** We have 7 courses, namely courses in the electronic water meters that the MWA uses today, information technology for electronic meters and water loss, pipe installation and construction control, use of the MLMA 2.0 system for pipe system maintenance and civil works and system utilization and pipe renovation route selection through the use of asset management.



- Personnel Digital Competency Development and Enhancement Plan:** We have 13 courses, namely courses in digital service laws, Data Science Plus Bootcamp, Business Analyst Bootcamp, water connection system utilization (CS), along with public learning courses to which the MWA sends employees to receive development, such as AR Application and Business Development, Practical Data Science and Machine Learning with Rapidminer Turbo Prep and Auto Model and enterprise transition process development for a digital government, etc.
- Safe Tap Water Knowledge Development and Enhancement Plan:** We have 4 courses, namely courses in water quality and water situation evaluation techniques for use in the management of water resources and water treatment systems, knowledge about high-



salinity and brackish water, water quality evaluation techniques and use of analysis results in water treatment systems.

- Personnel Innovation Competency Enhancement Plan:** We have 4 courses. They are courses to develop and enhance the capabilities in using creative thinking and innovation management in employees in Classes 1-3, and an innovator incubation project with specified effectiveness measurement based on the outcomes or value for personnel development (RO) under personnel development plans for operational excellence, for which there is 1 course per work plan for a total of 4 courses, namely a water pipe construction and installation control course, Data Science Plus Bootcamp, the innovator incubation project and a course on water quality and situation evaluation techniques for use of results in managing water resources and water treatment systems. We also have 5 additional courses based on other personnel development plans for a total of 9 courses.



Percentage of training participants who implemented their acquired knowledge in work after training

= 96.59%

(Target: ≥80%)

Leadership Development Model

We created guidelines and a model for leadership development in executives (leadership development model) that suits executives at each level. The learning is administered via an e-learning system combined with virtual training and a focus on action learning. The evaluation results on knowledge, understanding, and skills in using various management and human resource development tools in executives who participated showed that 100 percent of the participants had knowledge and skills in the use of HR management tools beyond their specified requirements, while their mean satisfaction score for training according to the Leadership Development Model for the 2022 fiscal year was 4.60 points.



Percentage of executives from the level of Section Supervisor and above who gained knowledge, understanding, and skills on how to use service and human development tools

= **82.4%**
(Target: ≥80%)

Development of Personnel Providing Service to Water Consumers to Create Good Customer Experience

In order to develop service knowledge and skills and deliver good customer experience in our own employees and outsourced employees who deliver services directly to water users (at touch points) in order to raise customer service satisfaction, the MWA has created 4 training courses for service provider personnel in a virtual classroom format. These courses are: 1) the “Service Techniques for Customers with Problems and Professional Complaint Handling” course; 2) the “Development of Market Strategies through Customer Insights” course; 3) the “Pipe Leak Surveyor Professional Standards” course; and 4) the “Pipe Installation and Construction Standard Development” course, in addition to a course for operators responsible for providing direct services to water consumers.

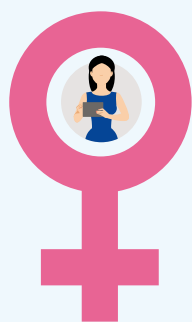


Percentage of training participants who implemented acquired knowledge in work after training

= **80%** (Target: ≥80%)



Table Summarizing the Average Number of Training Hours for Employees Classified by Genders and Position Levels in Fiscal Year 2022

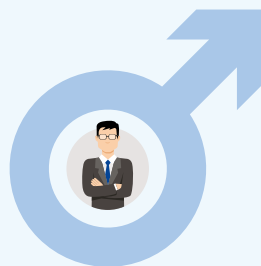


Total number of Employees

1,799 Persons

Average Training
Hours/Person

43.99



Total number of Employees

2,459 Persons

Average Training
Hours/Person

46.26

Average Training Hours ⁽⁴⁰⁴⁻¹⁾						
Position Level	Total Number of Employees			Average Training Hours/Person		
	Male	Female	Total	Male	Female	Total Average
10	6	5	11	3.75	2.47	4.53
9	20	13	33	6.86	6.32	9.99
8	45	48	93	15.31	14.90	18.13
7	216	261	477	26.75	24.34	27.85
6	403	452	855	32.17	29.96	32.83
5	777	655	1432	36.50	35.32	36.74
4	642	199	841	31.37	29.40	32.12
3	184	94	278	23.56	23.29	26.99
2	165	72	237	16.92	12.44	18.90
1	1	-	1	0.62	-	0.62
Total	2,459	1,799	4,258	46.26	43.99	53.20

Scholarship Program as Human Resources Development

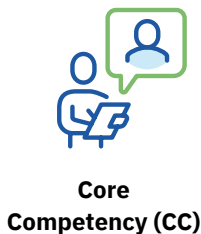
In fiscal year 2022, the MWA has provided employees in the organization with scholarships according to the human resource development plan. There are two employees continuing their studies at the master's degree level in important faculties that are beneficial to MEA operations, namely:

- 1) Master of Engineering Program, Kasetsart University.
- 2) Master of Business Administration Program, King Mongkut's University of Technology Thonburi.

Furthermore, the MWA has supported and given one employee the opportunity to take leave from work to pursue further education on the doctorate level as part of a project to develop high-quality graduates in science and technology of Mahidol University and the National Science and Technology Development Agency (NSTDA) in order to expand the person's knowledge and capabilities and later make use of acquired academic knowledge in developing the enterprise.

Performance Evaluation

The MWA has conducted employees' performance evaluation in various aspects. Those results are used for review and analysis in the preparation of competency development plans to enhance their potential and the organization. It is divided into 3 categories as follows:



Results from MWA Performance Evaluation in Fiscal Year 2022

Percentage of total employees evaluated by Core Competency: CC 1st/2022

Position Level	Gender				Total Employee	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	446	49.50	455	50.50	901	100.00
Level 6-10: holding an equivalent position	236	42.83	315	57.17	551	100.00
Level 1-5	1,741	63.84	986	36.16	2,727	100.00
Total	2,423	57.98	1,756	42.02	4,179	100.00

Remarks: The number of employees used in the calculation is from data as of 1 January 2022.

Percentage of total employees evaluated by Functional Competency:

FC (Functional Competency: FC) 1st/2022 No. 1/2022

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	446	49.50	455	50.50	901	100.00
Level 6-10: holding an equivalent position	236	42.83	315	57.17	551	100.00
Level 1-5	1,741	63.84	986	36.16	2,727	100.00
Total	2,423	57.98	1,756	42.02	4,179	100.00

Remarks: The number of employees used in the calculation is from data as of 1 January 2022, which is why it is not consistent with data in Disclosure 102-7.

Percentage of total employees evaluated by Core Competency: CC 2nd/2565

Position Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	447	49.45	457	50.55	904	100.00
Level 6-10: holding an equivalent position	234	42.78	313	57.22	547	100.00
Level 1-5	1,781	63.36	1,030	36.64	2,811	100.00
Total	2,462	57.77	1,800	42.23	4,262	100.00

Remarks:

1. The number of employees used in calculation is from data as of 1 June 2022.
2. The MWA performs a core competency (CC) evaluation twice annually and performs functional competency (FC) evaluation once annually.

Percentage of total employees evaluated by Leadership Competency: LC in fiscal year 2022

Level	Gender				Total	
	Male		Female			
	Persons	%	Persons	%	Persons	%
Level 6-10: holding a management position	409	48.29	438	51.71	847	100.00
Level 6-10: holding an equivalent position	217	41.89	301	58.11	518	100.00
Total	626	45.86	739	54.14	1,365	100.00

Overall Employee Performance Results in 2022 That Correspond to or Exceed Expectations



Item	2020	2021	% Higher - Lower	2022	% Higher - Lower
CC No. 2/2022	99.79	99.69	-0.10	99.29	-0.40
FC No. 1/2022	98.10	97.98	-0.12	98.56	0.58
LC for 2022 Fiscal Year	99.68	99.79	0.11	99.05	-0.74

Remark: In 2022, the MWA used the 360-degree LC system to replace the existing LC evaluation.



Career development



Leadership competency



**Essential skills
for new employees**



Future skill



**Functional competencies
according to each work position**



Power skills of the 21st century

Furthermore, the MWA has developed personnel according to career paths (career development) covering knowledge and essential skills for new employees (onboarding) to development of functional competencies according to each work position and other essential knowledge for work, not to mention development to prepare employees for promotions and leadership competency development and development of knowledge in important areas based on the context of the enterprise in response to changes and impacts resulting from the internal and external factors of the enterprise, such as digital skills, knowledge and innovation management, change management, essential future skills and power skills of the 21st century, namely communication skills, teamwork skills, etc. Then there is also development aimed at enhancing capabilities and preparing personnel who pass screening and evaluation to participate in a successor and talent management fast track project, which contributes to further development in addition to career path development in the normal track, and lastly, development to prepare

employees for retirement from the enterprise, which is counted as development along the learning path consistent with each employee's journey in order to create positive experiences for employees and promote bonding with the enterprise.

Accordingly, the MWA supports the creation of individual development plans (IDPs) in terms of both development to close the competency gap based on competency evaluations and IDP development to support fast track development for successors and talents, not to mention IDP development for learning and growth by making use of a pilot project known as the e-Learning All Access Project and a blended learning format covering classroom training and non-classroom training with support for supervisors to participate in planning and developing personnel under their supervision, e.g. in work training, work assignments and work rotation, along with appointment of employees to work committees to ensure maximum developmental effectiveness according to the 70-20-10 Learning Model.

Table Showing Welfare for the Employees of MWA



Welfare	
1	Water bill allowance
2	Financial support for employees' children
3	Financial support for maternity
4	Financial support for deceased employee (funeral expenses)
5	Financial support for hosting funeral (religious expenses)
6	Financial support in the case of disaster
7	Educational support for employees' children (tuition fees)
8	Scholarships and training for employees
9	MWA Scholarships for subcontracted workers' children
10	Foundation Scholarships for subcontracted workers' children
11	Welfare Home Loan by the Government Housing Bank (GHB)
12	Welfare Home Loan by the Krungthai Bank (KTB)
13	Compensation
14	Medical treatment allowance in MWA contracted hospitals
15	Medical treatment allowance in other hospitals (not MWA contracted hospitals)
16	Air-conditioned buses for employees
17	Annual health check-ups
18	Free uniforms for subcontracted workers
19	Free accommodations for the shifts of subcontracted workers who work in water treatment plants

In addition, the MWA labor union has been established to protect the welfare and benefits of employees and as an intermediary in monitoring employment conditions and employee's welfare. It also includes performing duty in receiving complaints and giving advice to employees as well. Currently, there are union members representing 50 percent of the total employees.

Welfare	
20	Souvenir awards to subcontracted workers who have turned 25 years old
21	Awarding of honors with souvenirs to retirees
22	Giving alms in the form of the Buddhist monks' robes
23	Pension fund/provident fund
24	Compensation in case of termination of employment or dismissal without guilt
25	Compensation for meritorious performance
26	Compensation in cash in the case of not exercising the right to take an annual leave
27	Leaves
Remunerations and Other Benefits	
28	Overtime
29	Meal allowance for normal workers
30	Extra pay for shift workers
31	Incentive
32	Chartered traveling allowance
33	Compensation for using MWA pooled cars
34	Extra pay for specific professional fields
35	Bonuses [Other benefits: payments to employees when the enterprise achieves performance according to criteria in the state enterprise performance evaluation system and after gaining payment approval from the State Enterprise Policy Office (SEPO)]

As the MWA has equally valued employees, we, therefore, support the welfare for mothers and children including their families. We provide employees with the right to take parental leave after their maternity leave to ensure the safety of mothers and provide children with the right to receive the care of parents from birth appropriately in line with the Children's Rights and Business Principles of UNICEF.

Preparations before the Retirement

For retiring employees, the MWA also has plans/activities for employees retiring in the 2022 fiscal year as follows:



Pre-retirement

- We have organized training for retirees to apparently recognize the incomes that are going to be received after their retirements, to understand the terms of withholding tax, to define the payment dates of those incomes, to remain the deposits in the provident fund, to understand the process to request payments from the provident fund by installments, and to consider selecting payout interval of each type of income to minimize the burdens of personal income tax expenses.

Post-retirement

- Payments of the provident fund, pension, compensation for employment preferences, and compensation in case of not exercising the right to take an annual leave as requested by the retirees.
- Providing advice on filing personal income tax (PND 90, 91) for the incomes received from retirement.

In order to ensure that the MEA is able to pay all retirees on retirement days and for those who are members of the MWA Employee Pension Fund, the following actions are required to be taken;

- 1) To make payments to the MWA's employee pension fund with an amount equaling to 10 percent of the basic salary on the last day of every month, as prescribed by the MWA's regulations on the Employee's Pension, B.E. 2543 (2000).
- 2) To conduct an estimation of the employee's benefits obligated to pay in the future. This is to ensure that the MWA is able to pay employees adequately on the date of retirement according to the 19th Accounting Standards.

Percentage of salary receiving from the employee or employer



Provident Fund for MWA's employees

- Percentage of salary receiving from the employee: 3-5% (on voluntary basis)
- Percentage of salary receiving from the employer: 9-11% (on employment period)



Pension Fund for MWA's employees

- Percentage of salary receiving from the employee: 0% (Employees are not required to contribute to the Pension Fund).
- Percentage of salary receiving from the employer: 10% (on equal basis)

Number of New Employees, Retired Employees, Resigned Employees, and Terminated Employees by Other Reasons

(Data as of 30 September 2022)



1. Number of new employees by age and gender (persons)

Age	FY 2020			FY 2021			FY 2022		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
21-30 years old	32	39	71	-	-	-	14	3	17
31-40 years old	37	22	59	-	-	-	19	28	47
41-50 years old	7	3	10	-	-	-	15	13	28
More than 51 years old	-	-	-	-	-	-	-	-	1
Total	140			-			90		

Note: In fiscal year 2021, there is no new staff due to the epidemic situation of the Coronavirus Disease 2019 (COVID-19). The employment of new employees has been postponed.

2. Number of retired employees, resigned employees, and terminated employees by age and gender (persons)

Age	Reasons for Employment Termination	FY 2020			FY 2021			FY 2022		
		Male	Female	Total	Male	Female	Total	Male	Female	Total
21-30 years old	Resigned	2	-	2	6	2	8	1	2	3
	Deceased	-	-	-	1	-	1	-	-	-
31-40 years old	Resigned	4	4	8	3	2	5	11	3	14
	Dismissed due to the actions of guilty	-	-	-	1	-	1	3	-	3
	Terminated due to the actions of guilty	-	-	-	-	-	-	-	-	-
41-50 years old	Resigned	-	2	2	-	-	-	2	-	2
	Deceased	-	-	-	-	-	-	3	-	3
	Terminated without guilty	-	-	-	-	-	-	-	-	-
	Dismissed due to the actions of guilty	-	-	-	-	1	1	1	-	1
	Terminated due to the actions of guilty	-	-	-	-	1	1	-	-	-
More than 51 years old	Resigned	3	1	4	1	1	2	2	-	2
	Deceased	-	-	-	7	-	7	2	-	2
	Terminated without guilty	1	-	1	-	-	-	2	1	3
	Dismissed due to the actions of guilty	1	-	1	-	-	-	-	-	-
	Retired	30	33	63	30	33	63	22	37	59
Total		41	40	81	49	40	89	49	43	92



Human Rights Activities of the MWA

In addition to operating while keeping in mind the rights of its personnel, the MWA also values and respects human rights by having set the following practice guidelines:

1. Give equal rights while adhering to the principles of equality and justice in human resource management covering recruitment, development, promotions, and benefit allocations and fair consideration of remunerations based on work performance according to the frameworks of related laws, requirements, regulations and orders, such as the State Enterprise Labor Relations Act, and never discriminate on the basis of ethnicity, sex, religion or other barriers.

2. Give personnel the opportunity to express opinions and access news and information in addition to promoting their right and freedom of congregation and assembly without interference, such as in relation to the MWA's state enterprise union membership and MWA Governance Council.

3. Provide amenities to support work operations and encourage employees to learn continuously to develop their competence alongside good quality of life.

4. Support and oversee contractors and trade partners to treat their workers according to labor laws without support for forced labor, illegal migrant workers, and child labor.

5. Give consumers equal rights to access services.

6. Give opportunities to stakeholders to have the right to access and receive information transparently and fairly along with wide-ranging channels for inquiries and complaints, such as 1125 Call Center, social media, and the Damrongtham Center of the Ministry of Interior.

7. Give importance to protecting personal data by announcing the personal data protection policy.

8. Provide support to disabled persons in accordance with the law such as in obtaining employment and having facilities for selling products and conveniences for disabled persons.

9. Announce policies that demonstrate value for human rights, such as a social and environmental responsibility policy by following a management system covering the 7 topics of the ISO 26000 international standard, sustainable development policy, good corporate governance policy, stakeholder policy and guideline and safety, welfare, occupational health and environmental policy, etc.



Tap Water Quality



To produce safe water that meets the quality, Metropolitan Waterworks Authority (MWA) therefore has considered all water production and distribution systems as crucial factors whether they are processes relating to raw water source management, water treatment, water pipe installation, water distribution, and customer service. The MWA has adopted the principles of the Water Safety Plan (WSP) based on the World Health Organization (WHO) to the entire water production and distribution processes since 2012, along with the various quality management systems such as GHP HACCP, ISO:9001, ISO 14001, etc.



WSP is considered a risk management plan that controls the tap water quality as a whole from a process of raw water catchments to water distribution for customers. It comprises of three basic principles as follows:



To prevent an occurrence
of contamination
in raw water sources.

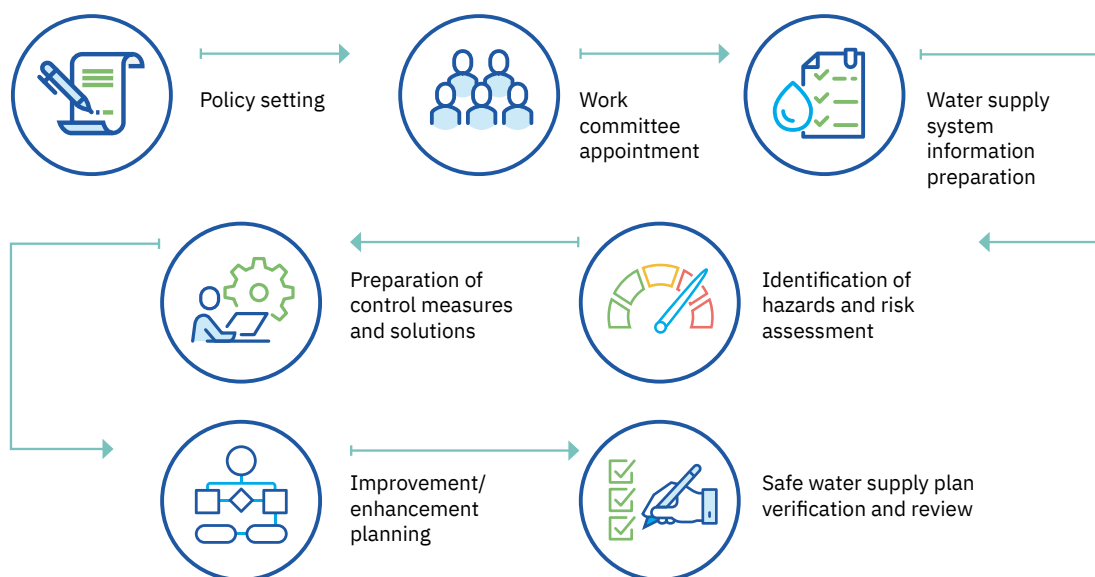


To reduce and
remove contaminants
from water.



To prevent
a recurrence
of contamination.

Steps in the MWA's Safe Water Supply Planning



The steps in the preparation of the MWA's safe water supply plan consist of policy setting, work committee appointment, water supply system information preparation, identification of hazards and risk assessment, preparation of control measures and solutions, improvement/enhancement planning, and safe water supply plan verification and review. The following are examples of critical risk management in the water supply system:

- **Raw water system:** the MWA has reduced contamination arising from the excretion of animals in raw water sources by constructing a protective fence around the waterworks canals. Moreover, to reduce the severity caused by seawater contaminated in raw water, we have adopted a management system that avoids pumping raw water into the waterworks canals during a period that contains high salinity.
- **Water production system:** the MWA has adopted the GHP HACCP system for water production processes to ensure the continuity of producing quality and safe water for customers. This system also includes real-time monitoring to control water quality (such as turbidity and residual chlorine values in tap water) in the entire system—sedimentation, filtration, and disinfection to be efficient. Additionally, we have established corrective measures in case the water quality does not reach the required criteria and maintenance measures to ensure the availability

and stability of tools, machines, and equipment. Not only those measures as aforementioned, but we have also established measures on chemical use in production process as well. Thus, all of these actions are to ensure that our water supply is produced sufficiently to the fluctuated demands at all times.

- **Water transmission and distribution systems:** the MWA has established measures to maintain the clear water tank in good conditions—free from sediment and biofilm. This measure requires cleaning the clear water tank at least every 5 years. In order to meet MWA's quality requirements, we have established a quality monitoring measure to control the independent chlorine remaining in the water distribution system by installing a chlorine supply system at water distribution stations to reduce the risk arising from water contaminated with germs. Not just those measures, there are measures to prevent corrosion of the main water pipes, to monitor the water pressure in the water distribution system, and to inspect water leakage in the water pipeline system as well.

In conclusion, MWA distribution and maintenance systems are operated beyond our standards to reduce the risk of water contaminated with germs. Additionally, a real-time monitoring system is adopted to ensure water quality to reach the MWA standards before further distributing water supply to water users.

Water Quality Monitoring

To ensure safe tap water for everyone, the MWA therefore has conducted water quality monitoring in every process of the entire system, starting from the quality of raw water received from both eastern and western watersheds and the water quality used in water production processes of every plant. This action also covers all water distribution stations and water pipeline systems in all service areas. In order to monitor the quality of tap water in its distribution system, we have coordinated with external agencies to verify the quality of tap water as well. Furthermore, the MWA has released water quality data from automatic monitoring system and lab tests via its website so that water users can check water-quality data anytime.

For the monitoring guidelines of raw water quality, we have assessed its quality by comparing the results with the water quality standards of surface water sources, category 3, according to the Notification of the Eight National Environment Board, B.E. 2537. Regarding the water quality from production plants, distribution stations, and pipeline systems, we have assessed by comparing



the results with the Criteria for Determining the Tap Water Quality of the Metropolitan Waterworks Authority, B.E. 2560, based on recommendations from the World Health Organization (WHO). If water quality doesn't meet the MWA standard criteria, work process improvements are required to be conducted as soon as possible. However, if the chloride level soars above proper limits due to seawater intrusion into the Chao Phraya River, MWA's conventional water treatment system cannot solve the issue. The system is not capable of eliminating chloride or salinity.

As for data for complaints about water supply quality problems through the MWA Call Center in the 2022 fiscal year, it was found that 1,884 customers complained about turbid/odorous water (non-chlorine smell).



Table showing the average daily monitoring of water quality for fiscal year 2020-2022

Key parameters of tap water quality monitoring	Fiscal year			Criteria
	2020	2021	2022	
Nephelometric Turbidity Units (NTU)	0.19	0.30	0.33	Less than 1.0 NTU
pH Value	7.37	7.35	7.24	6.50-8.50
Residual Independent Chlorine (mg/L)	0.79	0.78	0.71	0.20-2.00 mg/L
Number of samples (cases)	3,138	2,702	3,504	

Results of MWA water quality monitoring in every process, compared with the set criteria for fiscal Year 2021 (October 2021-September 2022)

Quantity	Water Quality Standards of Surface Water Sources, Category 3 ^a		Criteria for Determining Water Quality					
	Raw Water		Water Treatment Plants				Water Distribution Stations	Along Water Pipeline
	Eastern Watershed	Western Watershed	Ban Khen	Maha Sawat	Sam Sen	Thon Buri		
Number of samples	12	12	12	12	12	12	120	3,504
The number of samples that did not meet the criteria (One sample may not meet the criteria in more than one area.) ^b	11	1	0	0	0	0	2	75

Source: Water Quality Monitoring Division, Water Quality Department

Remarks:

- Water quality standards of surface water sources, category 3 according to the Eight Notification of the National Environment Board, B.E. 2537 issued under the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535, re: Determination of water quality of surface water sources.
- Descriptions of non-conforming parameters
 - Raw water on the eastern side: dissolved oxygen (DO) from 9 samples, dissolved oxygen (DO) and BOD from 1 sample and dissolved oxygen (DO) and fecal coliform bacteria from 1 sample.
 - Raw water on the western side: BOD from 1 sample.
 - Water distribution stations: turbidity from 2 samples.
 - Water distribution pipes: turbidity from 74 samples and E. coli from 1 sample.



According to the table on the results of MWA water quality monitoring in every process compared with the set criteria for the 2022 fiscal year, the non-compliant samples that were found in the eastern and western raw water sources were compared with the standard water quality of surface water Type 3 according to an announcement made by the National Environmental Board, and the details about the non-compliant parameters were stated in the remarks. The cause for non-compliance was the fact that the raw water from the Chao Phraya River and Mae Klong River used for water treatment was contaminated by communities and agricultural areas located near the rivers, thus making it necessary to pre-treat the raw water before producing water supply. Accordingly, the water supply of the water treatment plant met the water supply quality specifications of the MWA, and the WSP principle was used in the water treatment process.

As for the water supply at water distribution stations and water distribution pipes, the non-compliant samples were compared with the MWA's water quality specifications, and the non-compliant parameters included turbidity, which the MWA had set quality specifications to 1 NTU and was lower than the specifications of the World Health Organization of 4 NTU. Accordingly, the turbidity parameter had no health effects but affected how appealing water is for use or consumption by consumers. Meanwhile, the E. coli parameter had 1 sample that was contaminated. At the site of this sample, the chlorine level was low, thus enabling contamination. Accordingly, the MWA had already supplied supplementary chlorine at the end of the water pumping distribution station pipeline to raise the level of chlorine at the end of the line according to the WSP principle.



Local Communities



Not only running a business but the MWA also focuses on community engagement and social development by visiting the local communities, in order to create a community network that tightens relationships with those local people and to allow them to engage in exchanging opinions and suggestions. This engagement aims to gather locals' information and know their needs and expectations, as well as to jointly determine activities to carry out together, to strengthen relationships. Especially in the target communities, we have conducted these activities throughout the year by starting at the beginning of each fiscal year to collect data, explore the target communities, and monitor the performance from the previous year.

The MWA has implemented Community Engagement Programs covering the areas of relevant communities through a variety of activities to improve the quality of life of those people and promote the community's multi-dimensional progress in the matters of water and natural resources conservation. It also includes improving plumbing systems in communities, training on plumbing matters, which are the core competency and expertise of the MWA, as well as organizing activities that tighten relationships with the communities in a sustainable and unified way.



In fiscal year 2022, the MWA conducted the local community programs, with the purpose of being engaged in the community development and inquiring about the needs and expectations of 16 communities such as:

- Communities along the western bank of the canal in Kamphaeng Saen District, Nakhon Pathom Province.
- Communities along the left bank of the canal in Pathum Thani Province.
- Communities around the Provincial Electricity Authority at Niwet 2, Lak Si District, Bangkok.
- Communities in the vicinity of Thon Buri Water Treatment Plant, Bangkok, etc.



Plumber Vocational Program for the People



The Plumber Vocational Program for the People aimed to disseminate knowledge about the main capabilities and expertise of the enterprise to the general public to provide them with training on basic plumbing work for participants. This project encourages the establishment of plumbers' networks to share and exchange knowledge and experiences together with the MWA's officials. As a result, it has created occupational opportunities for the participants. Moreover, it has raised public awareness for social assistance and water resource conservation as well. We implemented this project in fiscal year 2014 and have received fruitful outcomes with full support and positive feedback from the participants. Therefore, we agree that this project is required to continue for sustainable success.

Performance in fiscal year 2022 The Plumber Vocational Program organized training classes as follows:

1. Primary Course, Class 1/2022

from 21-24 December 2021

at the 2nd floor of the 30th Anniversary Building,
MWA Central Training Center

Trainees:

28 people



Males:

27 people



female

1 people

2. Primary Course, Class 2/2022

from 21-24 June 2022

at the 2nd floor of the 30th Anniversary Building,
MWA Central Training Center

Trainees:

26 people



Males:

18 people



female

8 people

Then the trainees participated in the MWA for the People CSR activity by visiting local areas to repair the water supply system for a temple/school on 1 occasion at Chim Phli School, Chim Phli Sub-district, Taling Chan District, Bangkok, which is within the service area of the Department of Health Service Support. In total, 15 trainees participated in the activity. In addition to providing knowledge and skills to the general public, the MWA also trained employees who were due to retire in years 2022-2024 to allow them to learn technical skills and how to maintain water pipe systems and sanitary ware and how to repair indoor plumbing systems in order to allow them to take care of themselves and their families. The MWA also organized the Plumber Vocational Program training classes for employees and employees who were due to retire. It was an effort to provide them an opportunity to develop skills and vocations for society. In total, 28 trainees participated in the activity. Accordingly, in the 2023 fiscal year, the MWA had a guideline to build upon the project in collaboration with prisons and detention centers to provide plumbing vocational training to well-behaving inmates in order to help prepare inmates who participated in the project for reintegration into society and for them to be able to look after themselves without burdening their families or causing social problems, and, importantly, without reoffending as they start their new lives as good members of society.



Ruam Jai Rak Nam Project

As known, one of the MWA's core missions is to explore and procure raw water from the natural water sources (Mae Klong and Chao Phraya basins), to produce the quality of water supply that is appropriate for consumption. We serve water supply to the people who live in Bangkok, Nonthaburi, and Samut Prakan. While water is considered a limited natural resource, demands of water consumption are increasing due to today's socioeconomic growth. This prosperity causes environmental problems and pollution affecting raw water resources. It is because we care for the quality of life of everyone, especially youth who are about to drive future growth of the country, and the people who live in areas around the raw water pumping stations, located next to the Wat Samlae, Ban Krachaeng Sub-district, Mueang Pathum Thani District, Pathum Thani Province. This station functions to receive raw water from the Chao Phraya basin, an important raw water source of the MWA, which consists of Khlong Ban Phrao, Khlong Om, and Khlong Bang Luang Chiang Rak (it is called Khlong No. 3 by the MWA). In the past, Khlong No. 3 was abundant in nature, in which the water from the canal could be consumed by the people and used for agriculture. But for years, urbanization massively increased in this area, including the rapid growth of agriculture and industrial plants. This factor caused an encroachment along the canal, and after that, this canal became shallower, with crowded hyacinths. It caused

the non-circulated water, including wastewater generated by communities and agricultural activities, to drain into the canal that caused water to finally deteriorate.

From the aforementioned causes, it is essential to ensure the quality of water supply. We therefore have started the "Ruam Jai Rak Nam" project to promote and raise public awareness of water resource conservation together, as well as to restore the deteriorating water bodies to good quality. This project focuses on the communities, students, and youth, in order to gain knowledge and understanding of environmental care and to build their potential to transfer such knowledge to families. As a result, this project has created an awareness of environmental conservation in a sustainable manner, beneficial for the surrounding environment, especially on both sides of Khlong No. 3. Moreover, it leads to the synergy arising from collaboration from both government and private sectors, such as the Department of Irrigation, Pathum Thani Province, eight Local Administrative Organizations, namely Ban Klang, Chiang Rak, Bang Phun, Bang Phut, Suan Phrik Thai, Ban Mai, Ban Krachaeng, Bang Kadi, and the people. As a result, we have not only received a stronger relationship among interagencies, but it has created engagement in community development, to restore water bodies to good quality and to improve the well-being of those people as well.



Performance in fiscal year 2022

The MWA carried out projects to help schools in Pathum Thani Province on the eastern bank of the canal by constructing grease traps in 2 locations as follows:

- (1) Khlong Ban Phrao School, Ban Pathum Sub-district, Sam Khok District, Pathum Thani Province.
- (2) Wat Weluwan School, Bang Phut Sub-district, Mueang Pathum Thani District, Pathum Thani Province.

The MWA delivered grease traps to the 2 aforementioned schools and provided training about grease traps to the communities surrounding the schools on 22 September 2022.

School Plumbing System Project

The MWA always cares for people and communities. We strive to become an organization that delivers well-being to everyone in terms of waterworks. We also understand the need to access clean and safe water, which is considered a fundamental utility for everyone, especially for the locals who live around the upstream areas. Thus, we have established community development programs through CSR activities to create opportunities to access clean and safe water that is thoroughly sufficient for consumption, as well as to minimize inequality of people and to increase the social interests, of those locals aligning with the current government policy. As we are a state-owned enterprise responsible for producing safe and clean water that meets the standard, one of our core missions is to explore and procure raw water, which is mainly from the natural water sources (Mae Klong and Chao Phraya Basins), to use in its production process. At present, we distribute water supply to more than two million households, covering both Bangkok, Nonthaburi, and Samut Prakan.

However, water is considered a limited natural resource, while its consumption demand is increasing due to today's socioeconomic growth. This prosperity

causes environmental problems and pollution affecting raw water resources. To express

concerns to the locals who live in those disadvantaged communities to equitably and thoroughly access clean and safe water and to raise awareness of responsible water consumption of all, we therefore have initiated the “School Plumbing System” project to encourage the well-being of those locals. We have implemented this project with a well-recognized and high-performance system, combining our expertise to manage such waterworks systems into standards. We focus only on the communities that lack opportunities to consume clean and safe water, to create better sanitation and the well-being of those locals. It started from providing and improving the school's plumbing systems, developing groundwater supply systems, and establishing a water purifier system, water pumping system, and water pipeline system. It also includes providing water reservoirs with height for reserving rainwater and groundwater, providing prefabricated gutters, or organizing other activities beneficial for the schools in areas of the Mae Klong Basin.



Performance in fiscal year 2022

The MWA operated a project to assist schools located in the Pa Sak River Basin (Lop Buri Province) and the canal along the western side by renovating water supply systems inside schools along with various accessories and sanitary ware for 4 schools as follows:

- (1) Lop Buri Kindergarten School, Thale Chup Son Sub-district, Mueang Lop Buri District, Lop Buri Province.
- (2) Luang Prakop Nitisan and Than Phu Ying Thawin Border Police Learning Center, Chalaie Sub-district, Thong Pha Phum District, Kanchanaburi Province.
- (3) Ban Dong Khong School, Village No. 7, Hin Dat Sub-district, Thong Pha Phum District, Kanchanaburi Province.
- (4) Wat Krang Thong Rat Burana School, Thung Thong Sub-district, Tha Muang District, Kanchanaburi Province.

MWA Rak Pa Ton Nam Project



Activities of reforestation, vetiver plantation, and forest restoration



Constructing check dams



Engaging in community development and tightening relationships



Expanding networks of natural resources and environment conservation



Creating networks of MWA volunteers



Improving the quality of life for students and the local people

This project originated from the “MWA Headwater Forest Conservation in the Footsteps of HM King Bhumibol Adulyadej the Great (King Rama IX) Project (2017-2019) at Ton Nam Nan Forest, Nan. The project has been conducted through the cooperation of various agencies such as the Department of Forestry, the Department of National Parks, Wildlife and Plant Conservation, the National Water Resources Committee, the Electricity Generating Authority of Thailand (EGAT), and other related government agencies. The objective of this project is to carry out the activities of reforestation, vetiver plantation, and forest restoration to increase the green areas. Furthermore, it consists of constructing check dams in the upstream zones of forest to slow down the runoff, engaging in community development, and tightening relationships with those communities for expanding networks of natural resources and

environment conservation. Such a project has covered the lowlands along the Ping, Wang, Yom, Nan, and Mae Klong rivers, to create networks of MWA volunteers. As a result of this project, it has improved the quality of life for students and the local people of those communities.

Thus, the community member has gained the social benefits that enable better community development with good outcomes. It is also beneficial for maintaining hydration, restoring the quality of forest, and preserving water in the forest to the long-lasting during the dry season, to reduce severity and alleviate damage to the communities along the forests and hills from the flow of runoff during the rainy season. In conclusion, it contributes to the rehabilitation of numerous species of natural wildlife and its ecology with a balance in sustainable manners.





Performance in fiscal year 2022

This is the third year for the “MWA Watershed Forest Conservation Project” (project integration for sustainability). The project’s performance is as follows:

1. Community Quality of Life Improvement Activities

Water supply systems were established in 3 locations as follows:

- Ban Siao School, Yom Sub-district, Tha Wang Pha District, Nan Province. The project installed a water supply system that uses solar energy, which is clean energy, and installed water pumps and four water storage reservoirs with a capacity of 6,000 liters, in addition to renovating the school’s pipe system. This successfully resolved problems and suffering from lack of water supply for use and significantly reduced the expenses and electrical bills of the school while sustainably promoting a better quality of life.
- Ban Siao Community, Yom Sub-district, Tha Wang Pha District, Nan Province. The project installed a water supply system that uses solar energy, which is clean energy, installed water pumps, and renovated the water transmission

pipes to the community water storage reservoir. This successfully resolved problems and suffering from lack of water for use and significantly reduced the community’s expenses and electrical bills while sustainably promoting a better quality of life. This part of the project received financial support from PTT Public Company Limited in the amount of 120,000 baht.

- Ban Huai Hat Community, Village No. 7, Uan Sub-district, Pua District, Nan Province. The project installed a water supply system for the community along with 4 new water storage reservoirs with a capacity of 6,000 liters and poured the foundation as well as renovated the community water transmission pipe system to ensure that the community has enough water to use year-round.

2. Reforestation Activity:







A tree-planting activity was organized in the vicinity of a watershed forest at Village No. 7, Huai Hat Sub-district, Uan Sub-district, Pua District, Nan Province. In total, 50 people, comprising the executives and volunteers of the MWA and community leaders and villagers, participated in the activity.







Customer Relationship Management

In order to meet customers' needs and expectations appropriately and effectively while delivering service value through the promotion of good quality of living and sustainable water availability, the MWA has created a customer listening process in order to obtain customer and market knowledge in terms of customer classification, target customer identification, and customer group information preparation to allow related agencies or people to make effective further use thereof, for example, as input factors for creation enterprise plans and related master plans or for developing innovative products and services, improving work systems and processes and internal and external communications of the enterprise, etc.

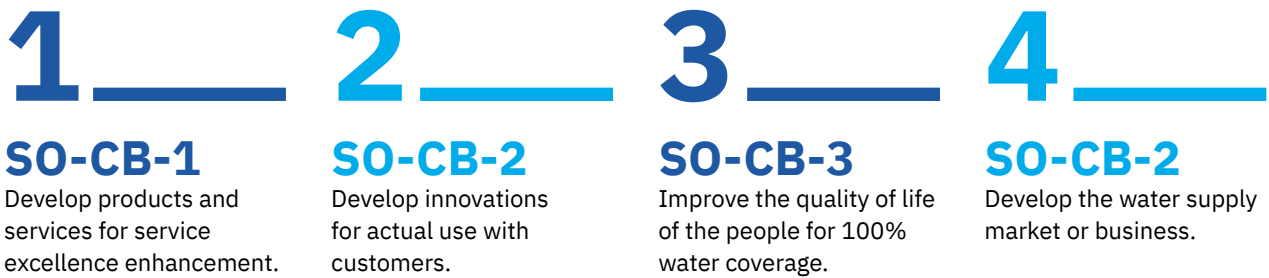
Figure Showing Customer Listening Process

Voice of Customer Management Process

Guidelines 	Duration 	Input 	Procedure 	Output 	Agency/Person in Charge 
Empathize & Care	October-November	<ul style="list-style-type: none"> Customers throughout the customer life cycle stages (CLS) and customer journey (CJ&TP) VOC related to listening channels Enterprise policy direction 	1 Specify and review customer listening channels.	Customer listening channels (covering offline and online channels)	Customer Information Management Section
	October-November	<ul style="list-style-type: none"> Customer opinion channels Guideline effectiveness 	2 Create/review manual and propose for approval and communication.	Approved VOC management manual (stored in the Infoma Webform and KM Portal systems)	Customer Information Management Section
	Year-round	VOC Management Manual	3 Listen to the voice of customers.	VOC from various channels	Related persons according to designated channels
	Year-round	VOC from various channels on the issues of 1) service requests; 2) complaints; 3) incident reports; and 4) inquiries	4 Take actions according to complaints/work requests.	Customers receive service according to complaints/work requests.	Branches and other related agencies
	Monthly	VOC from various channels on the issues of 1) service requests; 2) complaints; 3) incident reports; 4) inquiries; 5) opinions; and 6) satisfaction	5 Gather, summarize, analyze, and manage VOC on the branch level.	Monthly VOC reports and information record in the system (Sending to Customer Information Management Section)	Branches
	Quarterly	<ul style="list-style-type: none"> Monthly VOC report VOC data analytics Annual survey report (3rd quarter) 	6 Summarize overall VOC issues and report to executives and related agencies and monitor result reporting.	Quarterly VOC report (Sending to executives/ agency responsible for corrections/ improvements/agency responsible for creating enterprise plans and master plans)	Customer Information Management Section

Guidelines 	Duration 	Input 	Procedure 	Output 	Agency/Person in Charge 
Define	Annually (January-February)	<ul style="list-style-type: none"> Quarterly VOC report VOC data analytics 	<p>7</p> <p>Summarize needs and expectations and order them by importance.</p>	Summarize key requirements according to customer expectations and customer groups.	Customer Information Management Section and Market Planning Section
	Annually (January-February)	<ul style="list-style-type: none"> Key requirement report Information in marketing and products and services Paired customer groups 	<p>8</p> <p>Review customer groups and target customers and prepare customer group information report and propose for approval.</p>	Approved customer segment profile (CSP).	Customer Information Management Section and Market Planning Section
Deploy	Annually (January-February)	Approved CSP report	<p>9</p> <p>Disseminate customer group information for further use.</p>	<ul style="list-style-type: none"> Preparation/review of state enterprise plans and other related master plans (CM, DT, KM&INNO, HR, SM, CG, CSR, Loss, Infrastructure) Design/review of related processes Customer relationship management and support Internal enterprise communication (Store in the Informa Webform and KM Portal systems) Customer satisfaction evaluation 	Customer Information Management Section and Market Planning Section
Assess	July-September	<p>Process Indicators:</p> <ul style="list-style-type: none"> Customer satisfaction score per listening channel Customer group perception surveys and employee listening channels Timeliness of CSP delivery Overall satisfaction score by customer group 	<p>10</p> <p>Evaluate the effectiveness of guidelines and collect knowledge to lead to improvements/development/innovations.</p>	<ul style="list-style-type: none"> Guideline effectiveness review results Knowledge/improvement results/development/innovations, with results stored in the digital system 	Customer Information Management Section and Market Planning Section

To upgrade services and lay down an operating framework that drives customer satisfaction and success in terms of economic performance, the MWA therefore has established the Fifth Metropolitan Waterworks Authority Plan (2020-2022) and the Customer and Marketing Strategy (1st Reviewed Version) for the Fiscal Years 2022-2027, which undergoes the process of data analysis in terms of both customer and product, focusing on a study and learning about needs and expectations in all groups of customers. This strategy also covers the analysis of the environment in the workplace and the competitiveness of market and product by applying diverse analysis tools. All of those parameters are used for strategic analysis in alignment with our corporate policies and strategies. Thus, all of those actions lead us to prepare the Customer and Marketing Action Plans 2022-2024, including the other related action plans, which cover the following four core strategies;



Accordingly, these consist of 10 projects as follows:

1. Booster pump project.
2. Auto flushing valve installation project.
3. Study project in sold water management and water loss management by use of smart meters.
4. Big data analytics (water loss) project.
5. Customer relationship enhancement project.
6. Service excellence enhancement project.
7. Legal training related to digital services project.
8. Camera intelligent alert (CIA) project to enhance construction standards according to engineering principles.
9. 100% water coverage project.
10. Water supply service scope expansion project in capable fringe areas.

These projects will sustainably increase satisfaction while expanding services for greater coverage and revenues for the enterprise.



Customer Service Satisfaction Survey Results of the 2022 Fiscal Year

The MWA has continuously surveyed the satisfaction of customers for the MWA's services overall in order to understand the needs, expectations, and attitudes of all customer groups and then to develop and improve product and service quality along with work processes in addition to setting the direction to build relationships with all of the MWA's customers.



Customer Satisfaction Average Score of

4.615 (out of 5)

An **increase of 0.025**

When compared to the 2021 fiscal year

In the 2022 fiscal year, the results of the overall customer satisfaction in the enterprise as compiled by a third-party surveyor found that the MWA has continually improved service quality for the past several years and that the customers' mean satisfaction score was 4.615 (out of 5 points) or increased by 0.025 when compared to the 2021 fiscal year, when the overall mean satisfaction score was 4.590.

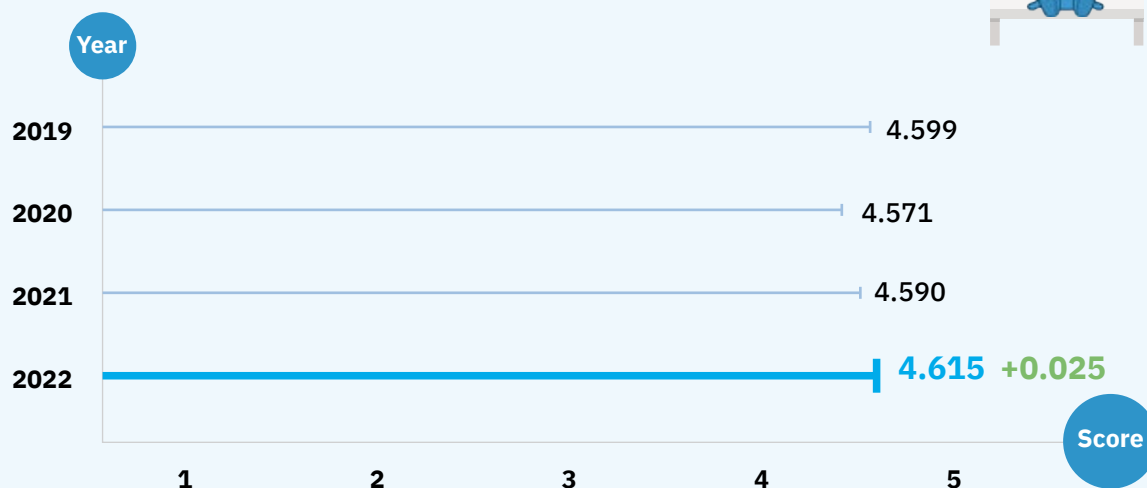


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Overall customer satisfaction survey results



Overall Customer Satisfaction in the Enterprise



Projects/Activities to Enhance Customer Relationships

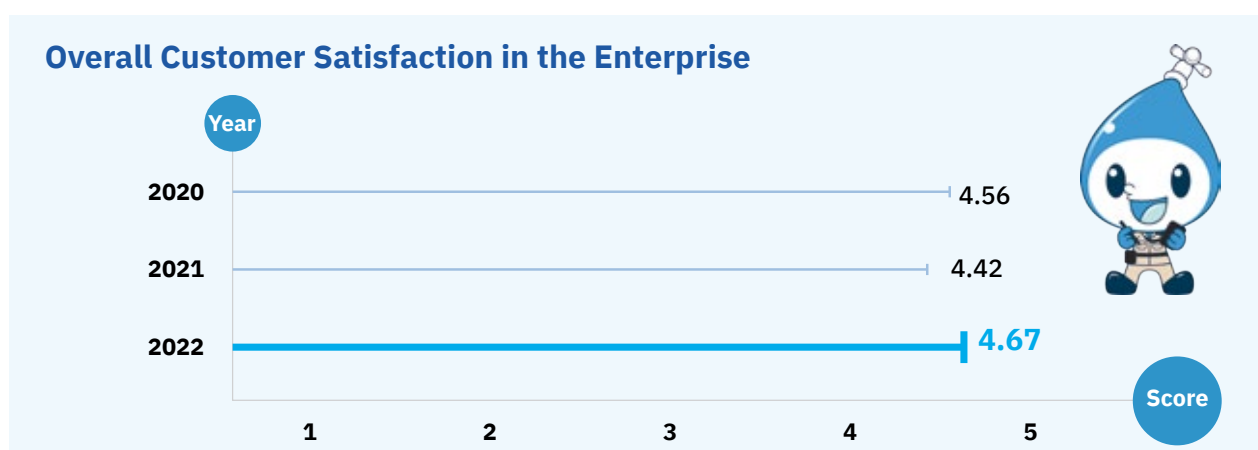
In addition to taking action according to the action plans under the Customer and Marketing Strategy to deliver satisfaction and meet the expectations of customers, the MWA also continuously and proactively operated projects and activities in order to build good relationships with various customer groups as follows:

MWA Top-Tier Activity

MWA Top-Tier is a project for looking after key accounts (customers that are sensitive to the MWA's products and services). This project was established to provide ongoing customer relationship management with the MWA's key accounts by using target group recommendations to develop services to ensure that customers receive services that correspond to their needs and expectations, in addition to being accurate, precise, and fast. It is a way to enhance customer relationships through continually visiting and promoting good relations with customers through various services such as early notifications about suspension of water supply in all cases, water delivery vehicle services in cases of supply suspension, water quality information, and notification service for activities that might affect customers.



Customer Satisfaction Survey Results for MWA Top-Tier Activities



Remarks: MWA Top-Tier Project Customers refer to



1. Key accounts whose average monthly water consumption is at least 10,000 cubic meters that affect branch revenues (as calculated based on the average water consumption for the past 12 months of the previous fiscal year).
2. Sensitive accounts that affect the MWA's products and services, whose monthly average water consumption is below 10,000 cubic meters that require close care and attention in order to prevent complaints and dissatisfaction that might affect the enterprise's image without regard to water consumption, i.e. hospitals, dialysis centers, ice factories, etc.

MWA Meets the People Activities



All 18 MWA branch offices hold these activities at least 4 times per branch in order to build positive relations with R (residential) customers and hear their comments about water supply needs in order to continuously improve services in addition to providing assistance and problem corrections. The activities included water supply services and basic water pipe inspections and repairs. In the 2022 fiscal year, activities were organized a total of 72 times.

Customer Satisfaction Survey Results on MWA Meets the People For the Fiscal Years 2021-2022 (5 points total)

	Fiscal Year 2021	Fiscal Year 2022
Residents 	4.66	4.68
Community Leaders 	4.81	4.78



Government Easy Contact Center (GECC): Enhancing Service for the Best Interest of the People

The MWA enhanced services for convenience, speed, and accessibility by striving to develop quality water supply services with cleanliness and safety for the best interest of the people. In doing so, MWA branch offices applied for the certification of government easy contact centers (GECC) that have been continuously providing convenient and effective services to the people. The standard certification period is up to 3 years from the certification year.



In 2022, the MWA applied for the certification of 5 government easy contact centers (GECC) (6 branches), of which all 5 have been certified according to government easy contact center service standards. They are divided as follows:



Advanced Level (Silver): 4 centers as follows:

- Sukhumvit and Phra Khanong MWA Branch Office (1 center)
- Lat Phrao, Bang Len and Phasi Charoen MWA Branch Offices

Primary Level (Blue): 1 center as follows:

- Maha Sawat MWA Branch Office

The MWA is ready to serve as an agency that performs its duties in providing recommendations and conveniences to the public who make contact to swiftly and easily receive water supply services. In 2023, the MWA will apply for standard certification for 12 branches whose validity is expiring in order to consistently enhance and maintain service standards.



Complaint Management Policy

In order to deal with diverse requirements of both customers and all groups of stakeholders, the MWA has therefore formulated a policy to manage complaints from those who have been affected by our operations in terms of water works (product). This policy also covers all activities conducted by our subcontracted workers and contractors who work on behalf of the MWA in terms of service. As above reasons, this policy also provides complainants with opportunities to receive quick responses that are reasonably fair and effective. Moreover, to comply with our good corporate governance policy, we have managed and treated all complaints with transparency, integrity, fairness, and equality. For enforcement of the PDPA, an emerging Act to protect individual personal data, we have established measures to confidentially maintain and protect personal data of all parties involved, along with measures to protect the complainants in good faith, including witnesses involved with all complaints proceedings to be effective. Meanwhile, the information obtained from such complaints is used for conducting strategic analysis to improve our operations, with an aim to provide our customers with clean and safe tap water as well as to deliver excellent and consistent services.

Complaint channels include:

- **Telephone** through a call center at 1125 and direct lines to all MWA branches.
- **Online services** through the MWA onMobile application, MWA social media: Facebook, Twitter, LINE OA: @MWAThailand, Website: www.mwa.co.th.
- E-mail: mwa1125@mwa.co.th, Web Chat.
- Direct contact through the eighteen MWA branches, one stop service centers at four department stores.
- Postal to Metropolitan Waterworks Authority 400 Prachachuen Road, Thung Song Hong, Lak Si, Bangkok 10210.





Business Cooperation and Coordination



Cooperation for Effective Operation

Apart from driving an organization that requires the cooperation of personnel at all levels within the organization, it is also important to build partnerships and collaboration with external agencies to ensure continuous and efficient work processes. Thus, we work together with other agencies, and details are described as follows;

- **Coordination and Cooperation in Enterprise Operational Capability Enhancement and Standard Specification**

Pipe Installations/Permission Requests for Pipe Installations

The MWA uses areas belonging to other agencies to install water pipes to distribute water from treatment plants to residential households. Thus, we coordinated efforts to request permission to install water pipes in local areas and cooperation in carrying out construction together at the same time as road and footpath renovation construction projects carried out by other agencies.



- **Ministry of Interior:** Bangkok Metropolitan Administration (BMA), Nonthaburi, Samut Prakan, Local Administration Organizations (Provincial Administrative Organization, Municipality, Subdistrict Administrative Organization), Metropolitan Electricity Authority



- **Ministry of Transport:** Department of Highways, Department of Rural Road, Marine Department, State Railway of Thailand, Mass Rapid Transit Authority of Thailand, Airports of Thailand Public Company Limited, Expressway Authority of Thailand



- **Ministry of Agriculture and Cooperatives:** Royal Irrigation Department

Academic, Technological, and Standard Specification Cooperation

- **World Health Organization (WHO)**
Water safety plan
- **Ministry of Public Health, Department of Health**
Academic affairs related to health, water quality, and the water safety plan
- **Ministry of Industry, Thai Industrial Standards Institute**
Pipe and pipe accessory engineering standards
- **Ministry of Defense, the Royal Thai Navy, Hydrographic Department**
Sea level and tidal data
- **Asian Waterworks Utilities Network of Human Resource Development A1-HRD, Japan**
- **Water Quality Asian Cooperation Network (WaQuAC-Net), Japan**
- **International Water Association (IWA)**
- **American Water Works Association (AWWA)**
- **Thai Water Works Association**

Coordination and Cooperation with Partners to Enhance Services

In order to enhance services for speed, the MWA has made joint contracts with banks and payment processors such as Counter Service, 7-11, Big C, Lotus's, and CenPay in order to provide additional channels and conveniences to customers in paying water bills. In addition, we cooperated with department stores in operating government easy contact centers at Central Plaza Westgate, Central Chaengwattana, and The Mall Lifestore Ngamwongwan and Bangkok Express Service at The Mall Bang Khae in receiving water bill payments and water supply service complaints.





Environmental Performance

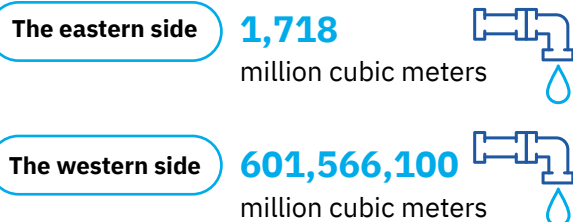
Water Management for Tap Water Production

The Metropolitan Water Works Authority (MWA) recognizes the importance of water resources to the agricultural, industrial, and household sectors. Therefore, we have created effective raw water management guidelines for use in tap water production in collaboration with agencies responsible for overseeing water issues in a systematic manner in order to allocate raw water for tap water production. We closely coordinate with the Office of National Water Resources and the Royal Irrigation Department during the dry season. While doing so, the MWA assesses the quantity of raw water needed for the production of tap water in advance for the dry season each year by making predictions based on multiple factors such as the water usage behaviors of the population, water usage trends in various sectors and production plans that are updated at different time periods, etc. Next, we send the estimated figure of raw water required for use during

the dry season to the Royal Irrigation Department by October of each year in order to use the information as a guideline for setting the overall water drainage plans of the country and cultivation plans in each river basis suitably according to the amount of water capital available at the end of the rainy season.









The MWA obtains raw water from 2 main sources for tap water production. For the eastern side, raw water is sourced from the Chao Phraya River (Bhumibol Dam, Sirikit Dam, Khwae Noi Bamrung Daen Dam, and Pa Sak Chonlasit Dam), while raw water for the western side is obtained from the Mae Klong River (Srinakarin Dam and Vajiralongkorn Dam). In the 2022 fiscal year, the MWA used raw water by a total of 1,722,572 megaliters on the eastern side (1,718 million cubic meters) and 601,567 megaliters (601,566,100 million cubic meters) on the western side. The raw water collection point on the eastern side is located in an area with a moderate to high level of water stress, while the raw water collection point on the western side is located in an area with a low to moderate level of water stress. The raw water from both sources is freshwater with total dissolved solids (TDS) below 1,000 mg/l, with the total annual average value on the eastern side and western side at 225 and 136 mg/l, respectively.

In the 2022 fiscal year, the MWA used raw water by a total of



Quantity of Raw Water Used by the MWA for Water Production in the Fiscal Years 2019-2022

The amount of raw water used for producing water supply (Million cubic meters)

Raw water source:	Chao Phraya River	Mae Klong River	Watershed source:
Year 2019	 1,722,077	 558,109	Bhumibol Dam, Sirikit Dam, Kwae Noi Bamrung Daen Dam, and Pa Sak Chonlasit Dam. Srinakarin Dam and Vajiralongkorn Dam.
Year 2020	 1,694,761	 559,728	
Year 2021	 1,738,889	 582,455	
Year 2022	 1,722,572	 601,567	

Remark: Data as of 30 September 2022















Figure Showing the Raw Water Collection Points of the MWA Compared with the Water-Stressed Area Map
Reference: <https://www.wri.org/applications/aqueduct/water-risk-atlas/>

The raw water the MWA uses to produce tap water is allocated under the “Irrigation Zone Water Management and Dry Season Crop Cultivation Plan” of the Royal Irrigation Department, which is a plan that was evaluated based on the volume of usable water and water already allocated for various water use activities in the river basins. For the dry season, the Chao Phraya River Basin has 6 months lasting from January to June.

The amount of raw water that the MWA is allocated in the 2021/2022 dry season in the Chao Phraya River basin was 900,000 megaliters (900 million cubic meters) or 11.62 percent of the total usable water volume as of 1 November 2021 [The total volume of usable water was 7,744,000 megaliters (7,744 million cubic meters.)]. Meanwhile, for the Mae Klong River Basin, the MWA was allocated 360,000 mega liters of water (360 million cubic meters) or 3.49 percent of the total volume of usable water as of 1 November 2021 [The total volume of usable water was 10,313,000 mega liters (10,313 million cubic meters.)].

Table showing total raw water allocated by the Royal Irrigation Department and total usable water received from the Chao Phraya Basin and the Mae Klong Basin during the dry season in fiscal year 2019-2021

	Chao Phraya Basin		Mae Klong Basin		Amount of Water Allocated as a Percentage of Total Water Available for Use	
2019	 890,000 843,000		 320,000 289,000		 1,210,000 1,132,000	
2020	 900,000 840,000		 360,000 302,000		 1,260,000 1,146,000	
2021	 900,000 877,564		 360,000 286,416		 1,260,000 1,163,980	
2022	 900,000 859,541		 360,000 300,626		 1,260,000 1,160,167	



Allocated raw water
by the Royal Irrigation Department



Allocated raw water

Unit: Megaliter

Remark: Data as of 30 September 2022

**Amount of Water
Allocated
as a Percentage
of Total Water
Available for Use**

Chao Phraya Basin
11.62%

Mae Klong Basin
3.49%

Total raw water received
from 2 water sources
6.98%



Table Showing Raw Water Used for Production and Tap Water Produced for Distribution by Location Water Treatment Plants

Water Treatment Plant	Amount of Raw Water and Water Produced for Distribution (2022 Fiscal Year) Unit: Megaliter		
	Raw Water	Water Produced for Distribution	Difference between Raw Water and Water Produced for Distribution
1. Bang Khen	1,553,973	1,444,522	109,451
2. Sam Sen	101,143	86,480	14,663
3. Thon Buri	47,704	39,871	7,833
4. Maha Sawat	601,566	572,464	29,102

Remark: Data as of 30 September 2022



Effluent Management

To respond to sustainable goals of the organization, we therefore have established guidelines for effluent management in response to standards and in compliance with laws. These guidelines are used as a control framework for effluent generated by our operations. In general, effluent has been generated from two main sources as follows:



1. Effluent generated by water treatment processes: Most of them are generated by the processes of sedimentation and water filtration. The MWA collects and treats all effluent in the sediment removal system to meet the standards before being drained into public water sources. Moreover, samples of effluent are collected according to frequency of drainage as required by law. The results from the laboratory are reported to relevant regulators on an ongoing basis.

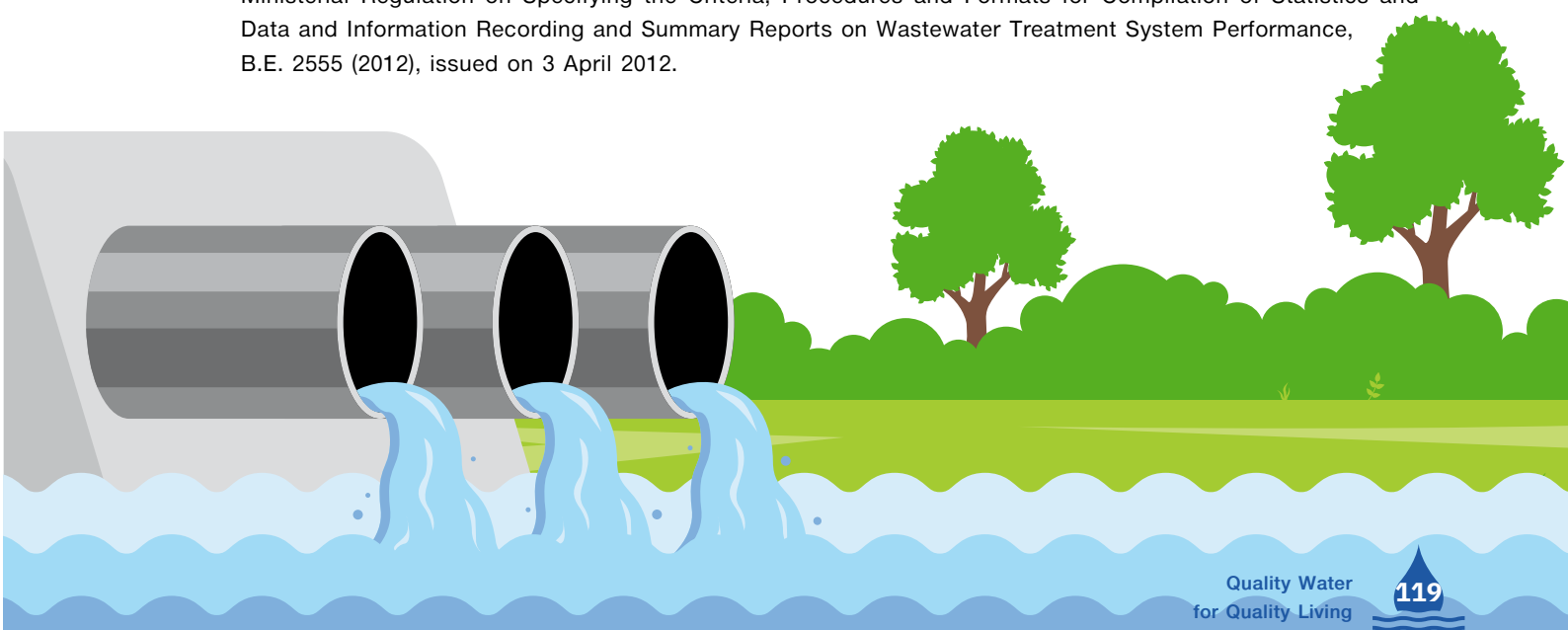


2. Effluent generated by activities within office buildings: The MWA collects and treats effluent in central effluent treatment systems or on-site effluent treatment systems to meet the standards as required. Effluent that may be contaminated with hazardous substances arising from the Water Quality Analysis Laboratory is collected and treated by the appropriate treatment method any further.

Total Effluent from the Four Water Treatment Plants (Unit: Megaliters)							
Water Treatment Plant	Total Effluent (Fiscal Year)				Source to Receive Effluent ²	Types of Effluent	Results of Effluent Quality Analysis
	2019	2020	2021	2022			
1. Bang Khen	29,061	40,538	32,812	30,577	Khlong Bang Talat	Fresh water ¹	Not up to standards
2. Sam Sen	6,596	10,856	10,319	10,901	Khlong Sam Sen	Fresh water	Up to standards
3. Thon Buri	4,411	2,938	715	943	Khlong Bang Khun Non	Fresh water	Up to standards
4. Maha Sawat	8,313	8,138	3,334	3,648	Khlong Plai Bang	Fresh water	Up to standards
Total	50,943	65,033	49,744	46,069			

Remarks:

1. Freshwater refers to water with a TDS value of less than 1,000 mg/l.
2. Source to receive effluent is a whole freshwater source and it can be defined as the water stress area. as shown in the photo on page 116.
3. As for the quality of wastewater released by the Bang Khen Water Treatment Plant, most of the water is up to standards, except in May 2022 when the value of suspended solids exceeded the standard value (153 mg/l from the standard value of 50 mg/l). Accordingly, the Bang Khen Water Treatment Plant put in place corrective measures through construction to improve the sediment removal system (by constructing an additional thickener and filter press) to ensure that the quality of wastewater meets all standard requirements.
4. The laws related to the MWA's wastewater and discarded water are as follows:
 - Ministry of Natural Resources and Environment Announcement on Setting Control Standards for Wastewater from Industrial Factories, Industrial Estates and Industrial Zones issued on 29 March 2016.
 - Ministry of Industry Announcement on Setting Control Standards for Wastewater from Factories issued on 30 May 2017.
 - Ministerial Regulation on Specifying the Criteria, Procedures and Formats for Compilation of Statistics and Data and Information Recording and Summary Reports on Wastewater Treatment System Performance, B.E. 2555 (2012), issued on 3 April 2012.





Reuse of Effluent Generated by Water Production Processes

We realize the importance of being responsible for our water resources. The Maha Sawat Water Treatment Plant therefore has formulated a method for reusing effluent generated by the water production process (Reuse: filtration reservoir cleaning) with turbidity in the normal standard. The amount of recycled effluent for fiscal year 2021 is shown in the table below.



**Table Showing Total Recycled Effluent for Fiscal Year 2019-2022
of the Maha Sawat Water Treatment Plant (Unit: Megaliter)**

Fiscal Year	Month												Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
2019	484	463	545	504	389	468	480	516	482	562	551	472	5,916
2020	430	420	475	444	397	497	504	569	493	466	497	455	5,647
2021	214	458	438	450	443	490	511	523	528	561	502	438	5,556
2022	556	464	446	430	424	504	478	478	538	526	557	532	5,932

Water Loss Management

Performance in Fiscal Year 2018 - 2022				
Fiscal Year	Amount of Water Produced for Distribution (Megaliters)	Cumulative Rate of Water Loss (%)		Result of Damaged or Dilapidated Water Supply Pipe Renovation Work (km.)
		Target	Performance	
2018	1,997,100	28.75	29.83	407.110
2019	2,075,200	29.29	29.29	784.558
2020	2,121,100	27.29	31.25	1,002.424
2021	2,116,500	30.20	33.09	1,130.722
2022	2,080,300	30.50	31.64	1,210.368

As the MWA produces and provides clean, safe water supply to serve those residing in Bangkok, Nonthaburi, and Samut Prakan, alongside conducting its businesses under responsible water consumption principles, we focus on reducing water loss in the entire water distribution processes from water pumping stations to water distribution process for customers. Reducing water loss has been considered an important issue that we have been striving to continue to enhance the performance in controlling water distribution systems and to reduce water loss rate, as well as to support water consumption in responsible and sustainable manners.

The MWA implemented the Water Loss Management Plan for the 2021-2023 fiscal years in alignment with the Fifth MWA Enterprise Plan, to manage water distribution processes more efficiently

and reduce the water loss rate which covers Apparent Losses (caused by inefficient management) and Real Losses (caused by leakage of water pipeline systems). This plan consists of three core strategies: 1) the Meter Deviation Reduction Strategy (Flow Meter), 2) the Water Loss Reduction Strategy in the District Metering Area (DMA) and main pipeline systems, and 3) the Damaged/Decadent Pipeline Improvement Strategy. The purposes of these strategies are to prevent damage that may occur and reduce the number of water pipeline leakages, and to optimize efficiency for our operations. However, to comply with these guidelines, we have conducted a review of the target areas to execute operations based on our three core strategies, aligned with the goal of reducing the water loss rate in each service area.



Projects/Activities in Support of Water Conservation and Water Loss Reduction

“Water Conservation Label” Project

The MWA created the “Water Conservation Label” project to support and encourage manufacturers/businesses in developing innovations and equipment to conserve water while delivering satisfaction without losing any product effectiveness. As part of the project, they were to apply for registration to receive a certification label from the Trademark Office, Department of Intellectual Property under the name “Water Conservation Efficiency Label”. These labels divide water conservation efficiency into 3 levels, namely Level 3, Level 4, and Level 5. For the 2022 fiscal year, the MWA created a standard to divide the efficiency levels of water conservation equipment for 3 products, namely 1) faucets for hand-face wash basins, 2) water faucets for kitchen sinks, and 3) shower faucets. So far, 4 manufacturing/importer companies have already been certified for water conservation efficiency for a total of 51 product models, divided into 39 hand-face wash basins, and 12 shower faucets.

Moreover, we have established cooperation with real estate developers in the “Water Conservation Homes” project by signing a memorandum of understanding to support use of equipment that conserve water or equipment bearing a Water

Conservation Efficiency Label (water conservation label) of the MWA in 10 developed housing projects, namely 3 projects by Land & House Public Company Limited and 7 projects by AP (Thailand) Public Company Limited, and the project results will be expanded to other real estate development projects and real estate developers in the future.



The Water Conservation Label Project is an integration of collaboration between the public sector and the private sector in order to raise awareness about how to use water in a conscious manner, and it encourages entrepreneurs to create new innovations to purchase a wide range of water-conserving equipment to meet consumer needs, and the project results can be expanded broadly from families to communities, society, and the rest of the nation in every sector.



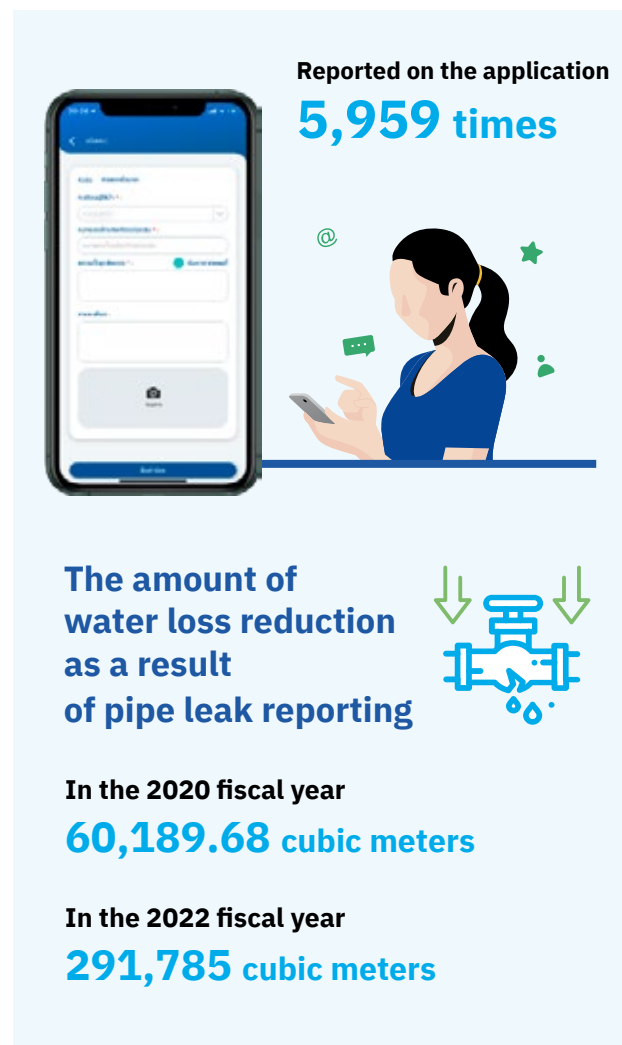


Water Loss Reduction Pineapple Eye Project

The Pineapple Eye Project is a project aimed at enhancing efficiency in reducing water losses due to water pipe leakage in service areas. As part of the project, people who encounter pipe leaks are to report information to the MWA via the MWA onMobile application to allow the MWA to more swiftly and effectively repair water pipes in order to reduce water loss, thereby mitigating impacts on the population while minimizing water wastage. In the 2020 fiscal year, the MWA launched the project under the name “Pineapple Eyes Help Reduce Water Loss” in collaboration with the Bangkok Metropolitan Administration in order to integrate water loss reduction collaboration by providing training and knowledge to the Bangkok Metropolitan Administration’s employees and contract workers about how to spot pipe leaks and how to detect leaking water pipes inside drainage pipes in 50 districts, in addition to creating a channel for timely reporting of news and information about leaking water pipes directly between the MWA and BMA in order to allow every sector to work together to sustainably conserve water and the environment and have these activities cover all service areas of the MWA.

In the 2021 fiscal year, the “Pineapple Eye Family (Season 2)” project was launched to let every member of the public in Bangkok, Nonthaburi, and Samut Prakan to participate in monitoring and reporting broken and leaking water pipes via the MWA onMobile application. The project commenced in the 2022 fiscal year, and

information was reported on the application 5,959 times. As a result, 291,785 cubic meters of water was prevented from being wasted.



Energy and Emissions



Energy

In the 2022 fiscal year, the MWA used a total of 454,516.44 MWh of electricity, divided into electricity used in water treatment and distribution and electricity used in administrative and support agencies as follows:

Energy Consumption and Air Pollution Emissions and Amount of Electricity Consumption and Carbon Dioxide Emissions by the MWA in the Fiscal Years 2019-2022						
Fiscal Year	Water Treatment and Distribution (MWh)	Co2 Emissions (tCo ₂)	Administrative and Support Agencies (MWh)	Co ₂ Emissions (tCo ₂)	Total Electricity Consumption (MWh)	Total Co ₂ Emissions (tCo ₂)
2022	435,451.76	217,682.34	19,064.68	9,530.43	454,516.44	227,212.77
2021	430,761.76	250,746.42	13,431.26	7,818.34	444,193.02	258,564.76
2020	426,237.77	248,113.00	12,697.90	7,391.45	438,935.67	255,504.45
2019	422,525.91	245,952.33	12,261.63	7,137.50	434,787.54	253,089.83

Remarks:

1. The electrical units from October 2021 to September 2022 from the SAP system have already been verified by the State Audit Office of the Kingdom of Thailand
2. Water treatment and distribution means the raw water systems, water treatment systems (filtration plans and transmission-distribution pumping from filtration plants), and pumping and distribution systems. Administrative and support agencies mean agencies supporting water treatment and distribution processes such as the Water Quality Department, Water Resources, and Environment Department, Electrical Maintenance Department, Water Transmission and Distribution Control Department, etc. and MWA branch offices.
3. The emissions factor for 2019 to 2021 was 0.5821, while the emissions factor for 2022 was 0.4999 with reference to the greenhouse gas emissions, value for assessing the enterprise's carbon footprint by the Thailand Greenhouse Gas Management Organization (Public Organization).
4. The MWA has not compiled energy data in Scope 1 and Scope 3 in a tangible manner. In any case, in the 2023 fiscal year, the MWA specified an action plan in a project to reduce greenhouse gas emissions (CO₂) under the social responsibility master plan in order to create a system/mechanism for monitoring greenhouse gas emissions and reducing the greenhouse gas emissions of the enterprise.

Air Pollution

Energy Conservation Measures

The MWA emphasize operating with consideration to the environment and climate change and recognizes the significance of energy conservation. Thus, we have created the enterprise's Energy Conservation Policy in order to provide guidelines for energy management and have adopted an energy management system in our agencies in order to effectively and efficiently manage energy consumption in line with the Energy Conservation Promotion Act, B.E. 2535 (1992) (B.E. 2550 [2007] Amendment), with consideration to the energy management operation of the MWA's controlled factories and controlled buildings under the driving and supervision of the MWA's Energy Management Work Committee.

Moreover, we have constantly conducted the monitoring and analysis of data on electricity consumed by the water production and distribution processes. In fiscal year 2018, total electricity consumption has increased due to the increased distribution of water supply. As known, electricity is our major energy source that drives the water



In the 2022 fiscal year,
the MWA decreased energy consumption by 6,961.25 megawatt-hours (MWh)



Decreased carbon dioxide emissions by 3,479.93 tons of carbon dioxide (tCO₂)

production and distribution processes from the raw water pumping systems to the water production and distribution systems, which varies according to the amount of water supply distributed, water pressure, and water level in the waterworks canals or clear water tanks. To manage energy conservation and energy efficiency, the MWA has implemented measures under the Energy Conservation Promotion Act, B.E.2535, at MWA's headquarters' buildings, including the four water treatment plants, the ten water distribution stations, and the two raw water pumping plants. Of which those seventeen entities are classified as a control plant/control building. In conclusion, energy conservation measures are required to be implemented as defined by the Energy Management Working Group of each entity on an annual basis.

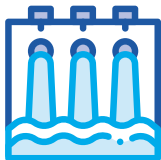
Conclusively, the implementation of energy conservation measures in the control plant/control building of the MWA in fiscal year 2022 resulted in the reduction of energy consumption by 6,961.25 MWh, while the Carbon Dioxide emission was reduced by 3,479.93 tons of carbon dioxide (tCO₂).

Energy Conservation Measures for Controlled Factories/Buildings, Fiscal Year 2022

Controlled Factories/ Buildings			Savings		Total CO ₂ Reduction (tCO ₂)
			MWh	THB	
Controlled Factories	Bang Khen Water Treatment Plant	1. On-peak water pump operational changes at the water distribution pumping plant during 1 on-peak period (07 a.m.-11 a.m.)	385.44	1,422,274.00	192.68
		2. Sluice gate installation changes in 40 reservoirs	161.14	594,603.00	80.55
	Sam Sen Water Treatment Plant	1. Replacement of water distribution pumping stations P04A, P04B, and P04C at Sam Sen Water Treatment Plant 4	74.52	253,376.00	37.25
	Thon Buri Water Treatment Plant	1. Enhanced effectiveness in temperature reduction before condenser entry to enhance the segregated air conditioning system.	52.96	188,008.00	26.47
	Maha Sawat Water Treatment Plant	1. Scheduling for parallel water pump operations at Maha Sawat Water Transmission Pumping Station	3,554.12	13,751,186.00	1,776.70
		2. Water filtration substance improvements.	1.59	6,150.00	0.79
Control Buildings	Head Office Building	1. Air conditioning operating hours have been set to 8 a.m. to 4 p.m. with an off hour during lunch breaks.	170.1075	814,172.66	85.04
		2. Cooling Tower No. 3 renovation	11.19007	53,558.19	5.59
	Sam Lae Raw Water Pumping Station	1. Air conditioner cleaning	0.84	2,933.00	0.42
		2. Water supply canal level control via opening and shutting water gates	1,202.26	4,183,859.00	601.01
	Bang Sue Raw Water Pumping Station	Change from operating with 6 high bay LED bulbs to 2 bulbs	3.50	10,535.00	1.75
	Tha Phra Water Pumping Distribution Station	Operation of 3 water pumps at low speed during off-peak hours instead of running 2 water pumps at high speed	223.26	897,505.20	111.61
	Phet Kasem Water Pumping Distribution Station	Reduction in air conditioner operating hours	117.13	477,896.00	58.55

Controlled Factories/ Buildings		Measures	Savings		Total CO ₂ Reduction (tCO ₂)
			MWh	THB	
Control Buildings	Lumphini Water Pumping Distribution Station	Control and reduction in lighting operating hours at the station	2.88	11,476.33	1.44
	Khlong Toei Water Pumping Station	Lightbulb replacements around clear water storage tanks and around the fences at the back of the station with LED bulbs	30.37	127,925.78	15.18
	Lat Phrao Water Pumping Distribution Stations	Water pump operation with consideration to the overall sec. value each day to obtain the lowest sec. value	628.89	2,565,875.35	314.38
		Maintaining water levels to affect total head hump during on-peak hours from 6 p.m. to 10 p.m.	36.50	148,920.00	18.25
	Lat Krabang Water Pumping Distribution Station	Air conditioner replacements for greater efficiency	30.52	123,013.00	15.26
	Samrong Water Pumping	Sub-station lighting replacements with LED bulbs	7.88	36,975.96	3.94
	Bang Phli Water Pumping Distribution Station	Shutting off lighting in the building at the switch gear room	32.38	134,040.61	16.19
	Min Buri Water Pumping Distribution Station	Street lamp replacements from 250 W HPS bulbs to 50 W LED bulbs	9.64	39,323.73	4.82
	Rat Burana Water Pumping Distribution Station	Alternating switching on and off of air conditioners inside the switch gear room	224.12	885,566.00	112.04
Total			6,961.25	25,861,441.96	3,479.93

The Metropolitan Waterworks Authority has classified waste generated within the organization into 2 types, namely;



1. Effluent generated by water production processes: It is a soil sludge generated by water production processes, managed as required by law (Notification of the Ministry of Industry on The Disposal of Sewage or Disused Materials, B.E. 2545 (2005), enacted on 27 December 2005, stipulating in the Gazette, page 14, volume 123, special section 11, dated 25 January 2006).



2. Solid waste generated by activities within office buildings: It is a solid waste that occurs in MWA headquarters and its branches. This includes the four water treatment plants, managed in accordance with government policy.

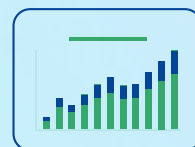
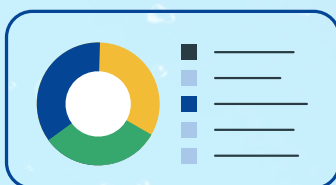
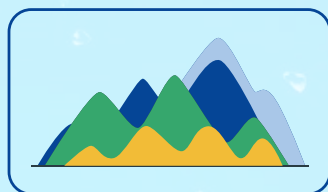
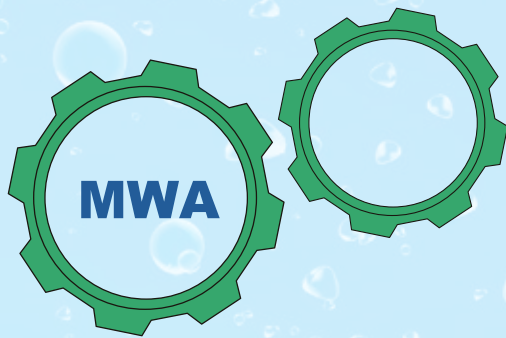
Management guidelines for effluent generated by water production processes

In general, effluent is generated by water production processes mainly arising from the processes of sludge drainage and pond flushing after being treated with a sludge removal system. Due to certain limitations of our effluent treatment systems by both natural and machinery methods, large quantities of sludge still remain in the system.

Once that sludge has been examined in the laboratory, there are no contaminants that significantly affect the environment. Thus, the MWA has hired contractors to collect those waste and proceed its disposal with landfill methods as required by laws.

Total sludge generated by water production processes

Water Treatment Plant	Total Sludge				Waste Disposal Site	Meet the standards
	2019	2020	2021	2022		
1. Bang Khen	50,083	62,026	55,557	74,370	Title Deed No. 44655, Nong Suea, Pathum Thani, Ms. Sonthaya Chaichana, by landfill method	yes
2. Sam Sen	4,909	3,154	3,904	6,934	Title Deed No. 42562, Phra Samut Chedi, Samut Prakan	yes
3. Thon Buri	1,764	1,394	1,691	2,315	Title Deed No. 22749, Nong Khaem, Bangkok, Mrs. Napasanan Sathavorn	yes
4. Maha Sawat	17,913	18,452	20,494	6,935	Stored inside the plant	yes



Appendix: MWA Data and Statistics

Key Performance on Marketing

Fiscal Year **2020**

2,121.1	1,458.3
2,479,547	67,916
8,216,446	4,354,086

Fiscal Year **2021**

2,116.5	1,416.2
2,517,486	60,241
8,173,080	4,609,369

Fiscal Year **2022**

2,080.3	1,422.2
2,558,418	62,379
8,151,075	4,688,136



Total water production
(million m³)



Total water distribution
(million m³)



Total number of
customers at fiscal
year-end (connections)



Total number of new
customers (connections)



Total populations in
service area at fiscal
year-end (persons)

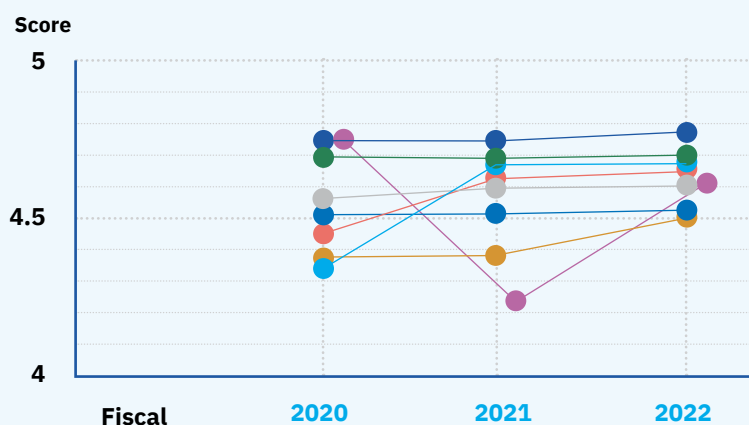


Total households in
service area at fiscal
year-end (connections)

Key Performance on Customer Services



General services



Fiscal Year		
2020	2021	2022
4.450	4.623	4.653
4.748	4.749	4.767
4.669	4.667	4.709
4.378	4.384	4.494
4.335	4.678	4.685
4.528	4.538	4.577
4.752	4.236	4.646
4.571	4.590	4.615

Average score
of overall
satisfaction

4.571

4.591

4.615

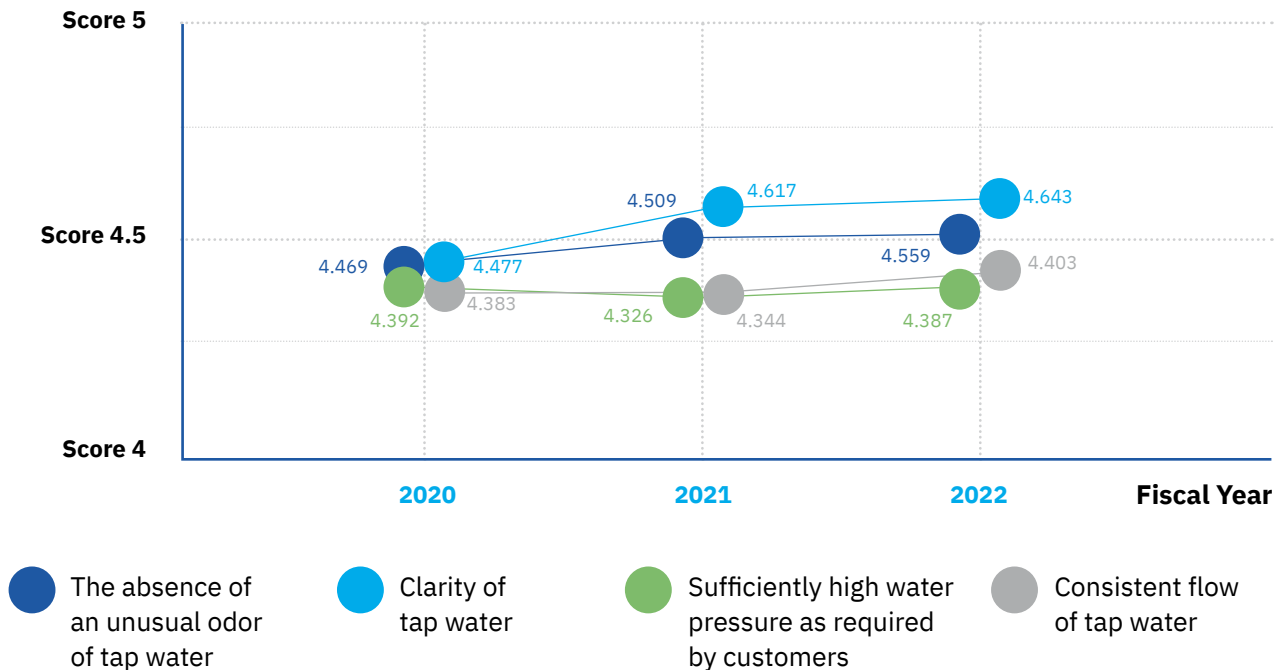
- General services
- On-site service (MWA branches)
- Bill payment by drive-through service

- Call Center: 1125
- Pipe installation work/Pipe maintenance work
- MWA Corporate Image

- Counter Service at the department stores
- MWA onMobile

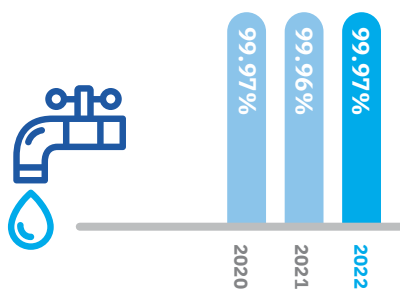


Customers' satisfaction toward the quality of product (tap water)

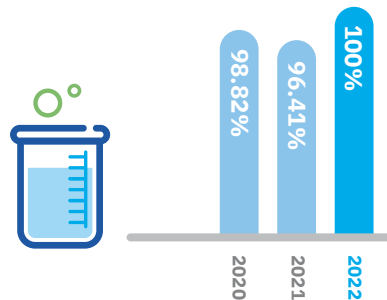


Key Performance on Product (Tap Water)

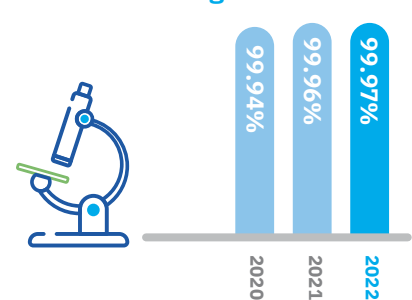
Quality of Tap Water:
Physical



Quality of Tap Water:
Chemical



Quality of Tap Water:
Bacterial Pathogens



Key Performance in Production and Distribution of Tap Water

	Fiscal Year (million m ³)			
	2019	2020	2021	2022
Total number of samples from water distribution system used for water quality analysis	3,196	3,138	2,702	3,504
E. coli	1	2	1	1
Target Value	Zero E. coli			
Turbidity (unit: NTU)	0.23	0.19	0.30	0.33
Target Value	Zero E. coli			
pH	7.19	7.37	7.35	7.24
Target Value	6.5-8.5			
Free Residual Chlorine (unit: mg/L)	0.55	0.79	0.78	0.71
Target Value	More than 0.2			
Quality of Tap Water: Physical	100	99.97	99.96	99.97
Target Value	100	100	100	100
Quality of Tap Water: Chemical	99.81	98.82	96.41	100
Target Value	100	100	100	100
Quality of Tap Water: Bacterial Pathogens	99.97	99.94	99.96	99.97
Target Value	99.97	99.97	99.97	99.97



Data and Statistics

Financial Data

	2020	2021	2022
Total Assets (million baht)	81,337.9	84,158.8	87,211.4
Current assets	13,653.8	10,356.4	11,431.1
Non-current assets	67,684.1	73,802.4	75,780.3
Total Liabilities (million baht)	15,055.4	16,761.1	17,683.0
Current liabilities	3,105.6	4,369.1	5,303.4
Non-current liabilities	11,949.8	12,392.0	12,379.6
Equity (million baht)	66,282.5	67,397.7	69,528.4
Total Revenues (million baht)	18,045.0	18,435.6	18,490.4
Operating revenues	17,559.8	18,061.1	18,067.4
Water charges and monthly meter fees	16,548.9	16,895.4	16,837.8
New connections	247.9	278.5	308.9
Other operating revenues	763.0	887.2	920.7
Non-operating revenues	485.2	374.5	423.0
Total Expenses (million baht)	12,422.0	13,600.3	14,380.0
Operating expenses	12,390.6	13,574.7	14,375.3
Direct operating expenses	7,536.1	8,339.3	8,840.2
Depreciation and Amortization	4,829.0	5,210.6	5,515.3
Financial costs–Interest expenses and bank fee	25.5	24.8	19.8
Non-operating expenses	31.4	25.6	4.7
Other expenses	33.6	25.6	4.7
(Profit) Loss on foreign exchange rate	(2.2)	-	-
Net Profit (million baht)	5,623.0	4,835.3	4,110.4

	2020	2021	2022
Rate of Return on Total Assets (%)	6.91	5.75	4.71
Rate of Return on Equity (%)	8.48	7.17	5.91
Net Profit Margin (%)	32.02	26.77	22.75
Assets Turnover (times)	0.22	0.21	0.21
Current Ratio (times)	4.40	2.37	2.16
Ration of Liabilities on Total Assets (times)	0.19	0.20	0.20
Debt Equity Ratio (times)	0.23	0.25	0.25
Cost per Unit Sold (baht)	8.33	9.48	10.07

General Data

	Fiscal Year		
	2020	2021	2022
Total water production (million m³)	2,121.1	2,116.5	2,080.3
Bang Khen Water Treatment Plant	1,410.0	1,427.6	1,394.0
Sam Sen Water Treatment Plant	102.4	92.2	86.4
Thon Buri Water Treatment Plant	36.4	40.1	39.9
Maha Sawat Water Treatment Plant	572.3	556.6	560.0
Total Water Consumption (million m³)	2,121.1	2,116.5	2,080.3
Total Water Distribution	1,458.3	1,416.2	1,422.2
Residential	694.3	705.8	695.6
Commercial–business, state enterprise, government agencies, and others	717.8	643.2	640.5
Public consumption and others	46.2	67.2	86.1
Percentage of Water Consumption (%)	68.8	66.9	68.4
Number of Customers at Fiscal Year-End (connections)	2,479,547	2,517,486	2,558,418

	Fiscal Year		
	2020	2021	2022
Residential	2,010,824	2,062,299	2,109,493
Commercial–business, state enterprise, government agencies, and others	468,723	455,187	448,925
Small Users (connections)	2,443,405	2,482,886	2,523,957
Meter diameter ½ inch	1,571,405	1,613,975	1,658,198
Meter diameter ¾ inch	803,240	798,621	795,051
Meter diameter 1 inch	68,760	70,290	70,708
Large Users (connections)	36,142	34,600	34,461
Meter diameter 1½ inch	16,169	15,366	15,596
Meter diameter 2 inch	12,814	12,405	12,235
Meter diameter over 2 inch	7,159	6,829	6,630
Number of New Customers (connections)	67,916	60,241	62,379
Average Water Consumption per Customer per Month (m³)	47.98	44.99	43.86
Residential	29.16	30.09	27.78
Commercial–business, state enterprise, government agencies, and others	127.67	116.38	118.05
Average Water Tariff per m³ (baht)	10.93	11.31	11.69
Residential	8.96	9.40	9.85
Commercial–business, state enterprise, government agencies, and others	12.85	13.42	13.69
Total Number of Personnel (persons)	5,384	5,314	5,272
Total number of employees	4,339	4,250	4,252
Total number of subcontracted workers	1,045	1,064	1,020
Ratio of Customers to One Employee (connection)	461	474	485
Total Populations in Service Area at FiscalYear-End (persons)	8,216,446	8,173,080	8,151,075
Total Households in Service Area at Fiscal Year-End (persons)	4,354,086	4,609,369	4,688,136

Total Number of Employees by Departments, Levels, and Gender

Personnel type																
Department	Level: 6-10 Holding executive positions				Level: 6-10 Holding equivalent positions				Level: 1-5				Total Employees			
	Male	Female	Total	Proportion M : F	Male	Female	Total	Proportion M : F	Male	Female	Total	Proportion M : F	Male	Female	Total	Proportion M : F
Governor	10	38	48	21 : 79	13	49	62	21 : 79	15	33	48	31 : 69	38	120	158	24 : 76
Dep.Gov. (Admin.)	18	51	69	26 : 74	18	55	73	25 : 75	70	100	170	41 : 59	106	206	312	34 : 66
Dep.Gov. (Fin.)	7	46	53	13 : 87	1	40	41	2 : 98	17	52	69	25 : 75	25	138	163	15 : 85
Dep.Gov. (Eng. & Con)	86	32	118	73 : 27	26	13	39	67 : 33	133	66	199	67 : 33	245	114	356	69 : 31
Dep.Gov. (Prod. & Trans)	101	36	137	74 : 26	69	20	89	78 : 22	377	84	461	82 : 18	547	140	687	80 : 20
Dep.Gov. (Plan. & Dev)	13	21	34	38 : 62	19	49	68	28 : 72	19	32	51	37 : 63	51	102	153	33 : 67
Dep.Gov. (IT)	15	21	36	42 : 58	13	10	23	57 : 43	33	27	60	55 : 45	61	58	119	51 : 49
Dep.Gov. (Eastern Serv.)	97	117	214	45 : 55	33	40	73	45 : 55	566	356	922	61 : 39	696	513	1,209	58 : 48
Dep.Gov. (Western Serv.)	94	93	187	50 : 50	55	47	102	54 : 46	535	270	405	66 : 34	684	410	1,094	63 : 37
Total	441	455	896	49 : 51	247	323	570	43 : 57	1,765	1,020	2,785	63 : 37	2,453	1,798	4,251	58 : 42

Total Electricity Consumption and Total Carbon Dioxide (Co₂) Emissions in Fiscal Year 2022

		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total
Water Production and Distribution Processes	Total Electricity Consumption (MWh)	36,306.93	34,977.54	36,203.26	37,132.42	33,473.10	37,738.60	36,788.73	37,602.98	36,681.69	36,255.40	37,821.63	34,513.70	435,772.58
	Total Co ₂ Emissions (tCo ₂)	18,149.83	17,485.27	18,098.01	18,562.50	16,733.20	18,865.53	18,390.69	18,797.73	18,337.18	18,124.07	18,907.03	17,253.40	217,842.71
Raw Water System														
East Side	Total Electricity Consumption (MWh)	816.09	287.95	118.45	1,008.94	1,277.44	1,295.46	1,474.56	1,210.31	1,234.16	1,328.43	1,175.18	824.43	12,062.62
	Total Co ₂ Emissions (tCo ₂)	407.96	143.95	59.21	504.37	638.59	647.60	737.13	605.03	616.95	664.08	587.47	412.13	6,030.11
Western Side	Total Electricity Consumption (MWh)	9.58	10.04	10.51	8.93	10.98	9.45	13.00	12.07	9.28	11.92	10.82	10.53	127.23
	Total Co ₂ Emissions (tCo ₂)	4.79	5.02	5.25	4.46	5.49	4.72	6.50	6.03	4.64	5.96	5.41	5.26	63.60
Production System														
Bang Khen	Total Electricity Consumption (MWh)	18,010.73	18,127.98	18,785.28	18,194.15	16,547.99	18,495.08	17,759.81	18,347.63	17,740.53	18,044.37	17,879.75	16,903.11	215,034.34
	Total Co ₂ Emissions (tCo ₂)	9,003.57	9,062.18	9,390.76	9,095.26	8,272.34	9,245.69	8,878.13	9,171.98	8,868.49	9,020.38	8,938.09	8,449.87	107,495.67
Maha Sawat	Total Electricity Consumption (MWh)	7,819.08	7,022.08	7,142.71	7,569.05	6,649.05	8,007.05	7,691.06	8,130.06	7,981.06	7,893.06	7,305.42	6,814.70	90,107.58
	Total Co ₂ Emissions (tCo ₂)	3,908.76	3,510.34	3,570.64	3,783.77	3,323.86	4,002.72	3,844.76	4,064.22	3,989.73	3,945.74	3,651.98	3,406.67	45,044.78
Sam Sen	Total Electricity Consumption (MWh)	1,486.46	1,521.47	1,661.13	1,643.12	1,482.11	1,290.43	1,561.12	1,475.13	1,374.58	1,499.62	1,493.62	1,422.42	17,927.69
	Total Co ₂ Emissions (tCo ₂)	743.08	760.58	830.40	821.39	740.91	645.09	780.40	737.42	687.15	749.66	746.66	711.07	8,962.05
Thon Buri	Total Electricity Consumption (MWh)	1,119.30	1,058.36	1,105.92	1,067.61	986.60	1,116.31	1,012.79	1,088.55	1,085.26	1,077.47	1,121.48	1,025.94	12,877.41
	Total Co ₂ Emissions (tCo ₂)	559.54	529.07	552.85	533.70	493.20	558.04	506.29	544.16	542.52	538.63	560.63	512.87	6,437.42
Distribution System														
Sam Rong	Total Electricity Consumption (MWh)	623.00	561.07	575.00	649.00	617.00	737.00	704.00	708.07	706.00	778.08	789.64	624.36	8,072.22
	Total Co ₂ Emissions (tCo ₂)	311.44	280.48	287.44	324.44	308.44	368.43	351.93	353.96	352.93	388.96	394.74	312.12	4,035.30
Khlong Toei	Total Electricity Consumption (MWh)	353.12	395.12	539.11	431.11	323.11	404.11	561.20	816.11	385.12	5.12	773.68	523.65	5,510.54
	Total Co ₂ Emissions (tCo ₂)	176.52	197.52	269.50	215.51	161.52	202.01	280.54	407.97	192.52	2.56	386.76	261.77	2,754.72
Bang Pli	Total Electricity Consumption (MWh)	925.00	1,004.00	940.00	970.09	813.00	979.00	922.00	975.00	964.00	898.00	819.18	962.95	11,172.23
	Total Co ₂ Emissions (tCo ₂)	462.41	501.90	469.91	484.95	406.42	489.40	460.91	487.40	481.90	448.91	409.51	481.38	5,585.00
Lat Krabang	Total Electricity Consumption (MWh)	507.00	502.00	532.00	496.00	416.00	461.00	453.05	445.00	354.07	427.50	740.49	460.57	5,794.67
	Total Co ₂ Emissions (tCo ₂)	253.45	250.95	265.95	247.95	207.96	230.45	226.48	222.46	177.00	213.71	370.17	230.24	2,896.76

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Total
Min Buri	Total Electricity Consumption (MWh)	555.11	545.00	536.10	569.00	614.03	569.00	578.13	564.31	562.00	577.82	591.33	6,769.84
	Total Co ₂ Emissions (tCo ₂)	277.50	272.45	267.99	284.44	306.96	284.44	289.01	282.10	280.95	288.85	295.61	3,384.24
Prachanukun	Total Electricity Consumption (MWh)	0.12	0.12	0.12	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	1.43
	Total Co ₂ Emissions (tCo ₂)	0.06	0.06	0.06	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.71
Lumphini	Total Electricity Consumption (MWh)	543.38	488.45	482.33	568.74	568.32	419.35	38.45	525.35	17.67	1,087.32	478.37	5,712.74
	Total Co ₂ Emissions (tCo ₂)	271.64	244.18	241.12	284.31	284.10	209.63	19.22	262.62	8.83	543.55	239.13	2,855.80
Lat Phrao	Total Electricity Consumption (MWh)	631.00	616.00	586.00	593.00	603.00	572.00	581.00	577.00	590.00	573.00	536.00	6,997.00
	Total Co ₂ Emissions (tCo ₂)	315.44	307.94	292.94	296.44	301.44	285.94	290.44	288.44	294.94	286.44	267.95	3,497.80
Phahonyothin	Total Electricity Consumption (MWh)	2.14	2.12	2.03	2.08	2.48	2.46	2.39	2.36	2.55	2.57	2.30	27.32
	Total Co ₂ Emissions (tCo ₂)	1.07	1.06	1.01	1.04	1.24	1.23	1.19	1.18	1.28	1.28	1.15	13.66
Tha Phra	Total Electricity Consumption (MWh)	449.53	447.64	535.44	580.45	444.41	430.65	428.70	410.49	394.44	358.36	381.59	5,308.16
	Total Co ₂ Emissions (tCo ₂)	224.72	223.78	267.67	290.17	222.16	215.28	214.31	205.20	197.18	179.14	190.76	2,653.55
Rat Burana	Total Electricity Consumption (MWh)	1,490.15	1,417.12	1,606.00	1,689.00	1,671.16	1,627.47	1,704.10	1,732.01	1,695.21	1,736.03	1,585.32	19,398.56
	Total Co ₂ Emissions (tCo ₂)	744.93	708.42	802.84	844.33	835.41	813.57	851.88	865.83	847.43	867.84	792.50	9,697.34
Phet Kasem	Total Electricity Consumption (MWh)	966.14	971.02	1,045.14	1,092.03	1,040.13	1,015.10	1,062.17	1,036.00	1,021.02	1,377.16	1,366.03	12,870.97
	Total Co ₂ Emissions (tCo ₂)	482.98	485.41	522.47	545.90	519.96	507.45	530.98	517.90	510.41	688.44	682.88	6,434.20
Administration and Support Entity (Including the services entity that supports the work of water production and distribution, and all MWA branches)	Total Electricity Consumption (MWh)	1,557.03	1,243.75	1,640.81	1,292.22	1,356.68	1,799.37	1,559.75	1,894.20	1,720.87	1,685.05	1,774.16	19,064.68
	Total Co ₂ Emissions (tCo ₂)	778.36	621.75	820.24	645.98	678.21	899.51	779.72	946.91	860.26	842.36	886.90	9,530.43
All units in MWA	Total Electricity Consumption (MWh)	37,863.95	36,221.29	37,844.07	38,424.64	39,095.28	38,588.11	39,162.73	38,575.89	37,876.27	39,506.69	36,287.86	454,837.26
	Total Co ₂ Emissions (tCo ₂)	18,928.19	18,107.02	18,918.25	19,208.48	19,543.73	19,290.19	19,577.45	19,284.09	18,984.34	19,749.39	18,140.30	227,373.15



GRI CONTENT INDEX

Statement of use	The Metropolitan Waterworks Authority (MWA) of Thailand has reported in accordance with GRI Standards for the period 1 October 2021 to 30 September 2022
GRI 1 used	GRI : Foundation 2021
Applicable GRI Sector Standard (s)	

GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTER	REASON	EXPLANATION
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GRI 416: Customer Health and Safety 2016	416-1 Assessment of the health and safety impacts of product and service categories	95-96			
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Non-GRI Topics					
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GRI 3: Material Topics 2021	3-3 Management of material Topics	104-111			
Policy Involvement					
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LRQA Independent Assurance Statement

Relating to Metropolitan Waterworks Authority's Sustainability Report for the fiscal year 2022

This Assurance Statement has been prepared for Metropolitan Waterworks Authority in accordance with our contract but is intended for the readers of this Report.

Terms of engagement

LRQA was commissioned by Metropolitan Waterworks Authority (MWA) to provide independent assurance on its Sustainability Report 2022 ("the report") against the assurance criteria below to a limited level of assurance and at the materiality of the professional judgement using LRQA's verification procedure. LRQA's verification procedure is based on current best practice, is in accordance with ISAE 3000 and uses the following principles of - inclusivity, materiality, responsiveness and reliability of performance data.

Our assurance engagement covered MWA's operations and services in Bangkok, Samutprakarn, and Nonthaburi provinces in Thailand and specifically the following requirements:

- Confirming that the report is in accordance with: GRI Standards (2021)
- Evaluating the accuracy and reliability of MWA's performance data and information for only the selected GRI indicators listed below:
 - Economics: GRI 205-1 Operations assessed for risks related to corruption, GRI 205-2 Communication and training about anti-corruption policies and procedures, GRI 205-3 Confirmed incidents of corruption and actions taken.
 - Environmental: GRI 303-1 Interactions with water as a shared resource, GRI 303-2 Management of water discharge-related impacts, GRI 303-3 Water withdrawal, GRI 303-4 Water discharge.

Our assurance engagement excluded the data and information of MWA's suppliers, contractors and any third parties mentioned in the report.

LRQA's responsibility is only to MWA. LRQA disclaims any liability or responsibility to others as explained in the end footnote. MWA's responsibility is for collecting, aggregating, analysing and presenting all the data and information within the report and for maintaining effective internal controls over the systems from which the report is derived. Ultimately, the report has been approved by, and remains the responsibility of MWA.

LRQA's Opinion

Based on LRQA's approach nothing has come to our attention that would cause us to believe that MWA has not, in all material respects:

- Met the requirements above
- Disclosed accurate and reliable performance data and information as no errors or omissions were detected in the selected GRI indicators listed above
- Covered all the issues that are important to the stakeholders and readers of this report.

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of the professional judgement of the verifier.

Note: The extent of evidence-gathering for a limited assurance engagement is less than for a reasonable assurance engagement. Limited assurance engagements focus on aggregated data rather than physically checking source data at sites. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

LRQA's approach

LRQA's assurance engagements are carried out in accordance with our verification procedure. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- Assessing MWA's approach to stakeholder engagement to confirm that issues raised by stakeholders were captured correctly. We did this through interviews with responsible personnel and reviewing documents and associated records.
- Reviewing MWA's process for identifying and determining material issues to confirm that the right issues were included in their Report. We did this by benchmarking reports written by MWA and its peers to ensure that sector specific issues were included for comparability. We also tested the filters used in determining material issues to



evaluate whether MWA makes informed business decisions that may create opportunities that contribute towards sustainable development.

- Auditing MWA's data management systems to confirm that there were no significant errors, omissions or mis-statements in the report. We did this by reviewing the effectiveness of data handling procedures, instructions and systems, including those for internal verification. We also spoke with those key people responsible for compiling the data and drafting the report.
- Visiting Mahasawasdi water treatment facility to validate site data and information as sampled for the selected GRI indicator.

Observations

Further observations and findings, made during the assurance engagement, are:

- Stakeholder inclusivity: We are not aware of any key stakeholder groups that have been excluded from MWA's stakeholder engagement process. The content of MWA's Sustainability Report reflects the views and expectations of these stakeholders.
- Materiality: MWA has established criteria for determining which issue is material and that these criteria are not biased to the company's management and reflect the operations and relevance.
- Responsiveness: MWA has processes in place to respond to various groups of stakeholders. There was a corporate CSR department to engage and respond to local communities' concerns and expectations, including various on-line channels to receive and respond to complaints and 24-hour call centre. The existing communication and engagement processes are sufficient and responsive.
- Reliability: Data management systems were well established. We believe that MWA should carry out periodic internal quality control checks on its data and information collection and calculation processes to prevent errors being identified at the corporate level.

LRQA's standards, competence and independence

LRQA ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent. This verification is the only work undertaken by LRQA for MWA and as such does not compromise our independence or impartiality.

Wiriya Rattanasuwan
LRQA Lead Verifier

Dated: 13th September 2023

On behalf of LRQA (Thailand) Limited,
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LRQA reference: BGK00001/003

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Satisfaction Survey
on the Sustainability Report
of the MWA
Fiscal Year 2022



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