



# Water for Life

Sustainability Report 2021  
Metropolitan Waterworks Authority





# Water for Life

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Sustainability Report 2021  
**Metropolitan Waterworks Authority**



The Metropolitan Waterworks Authority (MWA) is one of state-owned enterprises with obligations to thoroughly provide the people with water utilities. It mainly covers the actions of procuring, producing, and distributing water that meets the standards of the World Health Organization (WHO). Most importantly, we have conducted its business with care for the quality of water used in the entire process. By this reason, our purposes are to provide all people with opportunities to consume clean and safe water supply thoroughly and adequately, as well as to uplift quality of life for everyone, which are in alignment with the Sustainable Development Goals (SDGs), Section 6, of the United Nations (UN).

Moreover, we have adopted innovations and technologies to improve our work processes on a continued basis, paralleling with establishing a Water Safety Plan (WSP) to promote strong confidence in the quality of our water supply as a Water for Life. From our point of view, it is not yet enough; we have formulated the improvement plan on waterworks infrastructure by initially replacing the aging pipes with new ones in various service areas to enhance the efficiency of water distribution systems in response to the diverse requirements of water users in a timely manner.

As we are the organization whereby business activities are frequently related to the natural water resources and local communities, we are required to strengthen relationships with the locals in communities nearby both the western and eastern watersheds to understand their needs and expectations, as well as to encourage them to conserve water resources together with us. It aims not only to increase the efficiency of our waterworks infrastructure for sustainability, it also creates an understanding of the value of water resources toward the livings on this planet as well. We greatly believe that if everyone is more aware of or deeply understands such environmental conservation principles, they are willing to deliver us more interests and contributions in water resources conservation reflecting our corporate image on **"MWA- Water for Life"**.



## Vision:



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

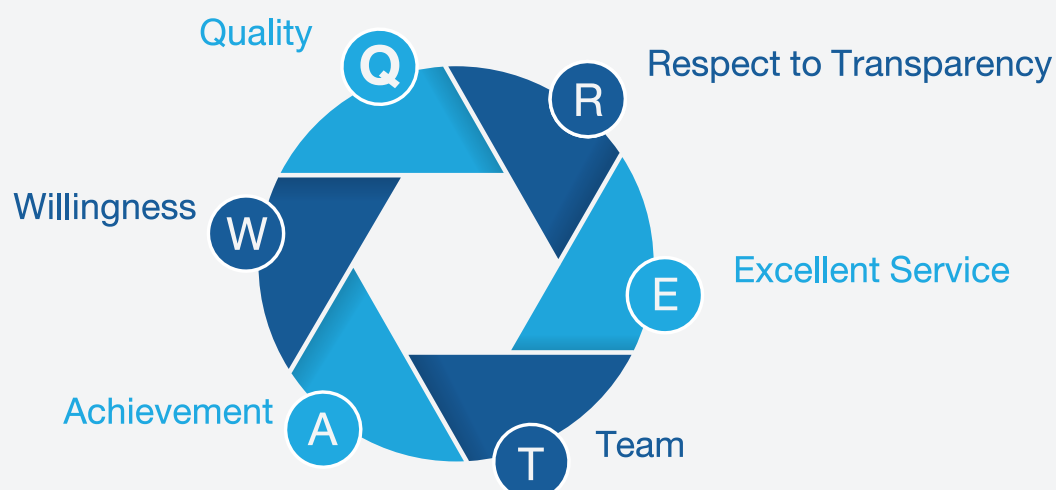


## Missions:

- 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 : Q WATER

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





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## Message from MWA Governor

For more than 54 years, MWA has consistently and reliably provided water supply for our service areas in accordance with our social and environmental policies with the goal to become a sustainable development organization.

In fiscal year 2021, Thailand was still preoccupied with COVID-19 pandemic management which directly affected our core missions, while Climate Change was a major challenge that caused dry spell as well as low raw-water quality. To cope with the aforementioned emergency situations, MWA has implemented Business Continuity Plan (BCP) to maintain water quality and continue to serve water users and private sectors without any interruption. We take pride in our commitment to provide safe and clean water throughout Bangkok and its suburbs.

We have adopted the 5th MWA Corporate Plan as a guidance to ensure that all operations are in alignment with government policies and organizational goals as a whole. This plan is also in line with the United Nations Sustainable Development Goals (SDGs) which provide a mechanism that reflects MWA's multifaceted collaboration with its stakeholders, generating synergy throughout the supply chain. This helps to strengthen relationships with our partners and create mutual benefits for all parties involved.

On behalf of MWA, I would like to thank all stakeholders for supporting our missions and for the unfaltering confidence in our potential to provide you with high-quality water. We strive to improve our services on a continued basis and to efficiently overcome any challenges and unprecedented complexity while upholding good corporate governance for the betterment of the lives of Thai citizens.

**Mr. Kawee Areekul**

Governor of the Metropolitan Waterworks Authority



## Sustainability Reporting and Materiality

In general, Metropolitan Waterworks Authority (MWA) has compiled sustainability reports to distribute information and communicate about its sustainability management guideline as well as its economic, social, and environmental performance to acknowledge our stakeholders.

Disclosure of this MWA Sustainability Report 2021 covers information on operations between October 1, 2020, to September 30, 2021. The contents are “in accordance with” the GRI Standard: Core option. It also covers the commitments that support the Sustainable Development Goals (SDGs) and other performances that are important to the organization.

## The Processes of MWA Materiality Assessment



### Step 1: Identify Materiality

MWA's materialities 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 is included holding the workshops of MNA in order to get feedback and opinions from all of 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 materiality from the previous year.



### Step 2: Prioritize Materiality

MWA has prioritized material sustainability issues of Fiscal Year 2021 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:

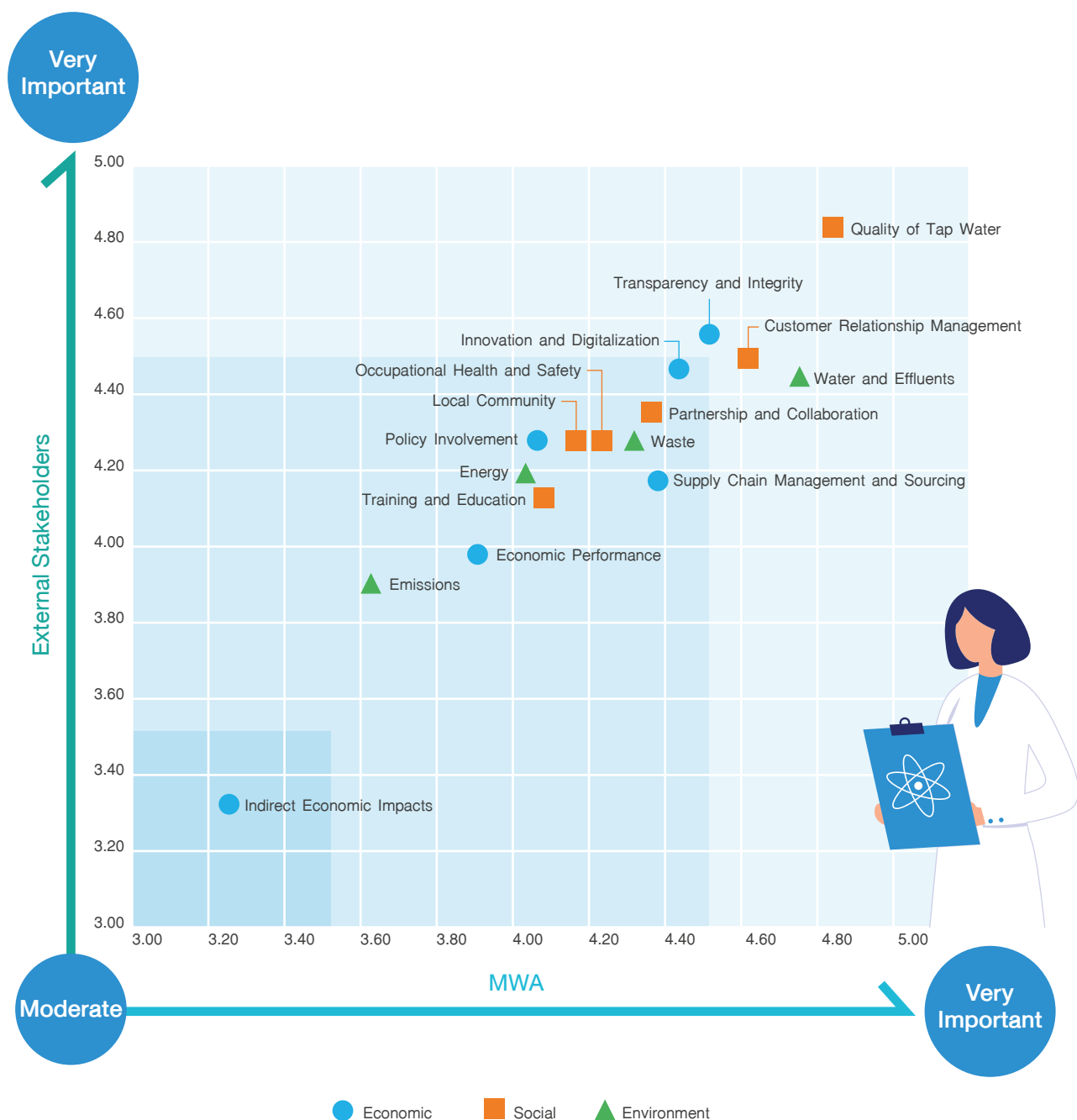
1. Importance level to MWA's operations, and
2. Importance level to stakeholders.



### 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 Sustainability issues for the Sub-committee on Corporate Governance and Corporate Social Responsibility to consider and present to the MWA Board of Directors for acknowledgment.

## The MWA Materiality Matrix 2021



## Lists of MWA Materiality 2021



### Economic

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



### Social

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



### Environment

- Water and Effluents
- Waste
- Energy
- Emissions

*Note: The additional information or content beyond the scope of this report and the Annual Report 2021 in digital form can be found at [www.mwa.co.th](http://www.mwa.co.th)*



### For more information, please contact

Corporate Social Responsibility Management Department  
Metropolitan Waterworks Authority (Head Office)  
400 Prachachuen Road, Thung Song Hong Subdistrict,  
Lak Si District, Bangkok 10210  
Phone: 0 2504 0123 ext. 1614-1615  
E-mail: [csr@mwa.co.th](mailto:csr@mwa.co.th)



# About **Metropolitan Waterworks Authority**



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## About Metropolitan Waterworks Authority

owned enterprise under supervision of the Ministry of Interior that was established on August 16, 1967. It operates business under the objectives stipulated in the Metropolitan Waterworks Authority Act, consisting of;

- 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.



โครงสร้างองค์กร

[https://www.mwa.co.th/ewt\\_news.php?id=1569](https://www.mwa.co.th/ewt_news.php?id=1569)

### Address

#### Metropolitan Waterworks Authority (Head Office)

400 Prachachuen Road, Thung Song Hong Subdistrict, Lak Si District,  
Bangkok 10210  
Phone: 0 2504 0123

### Service Areas

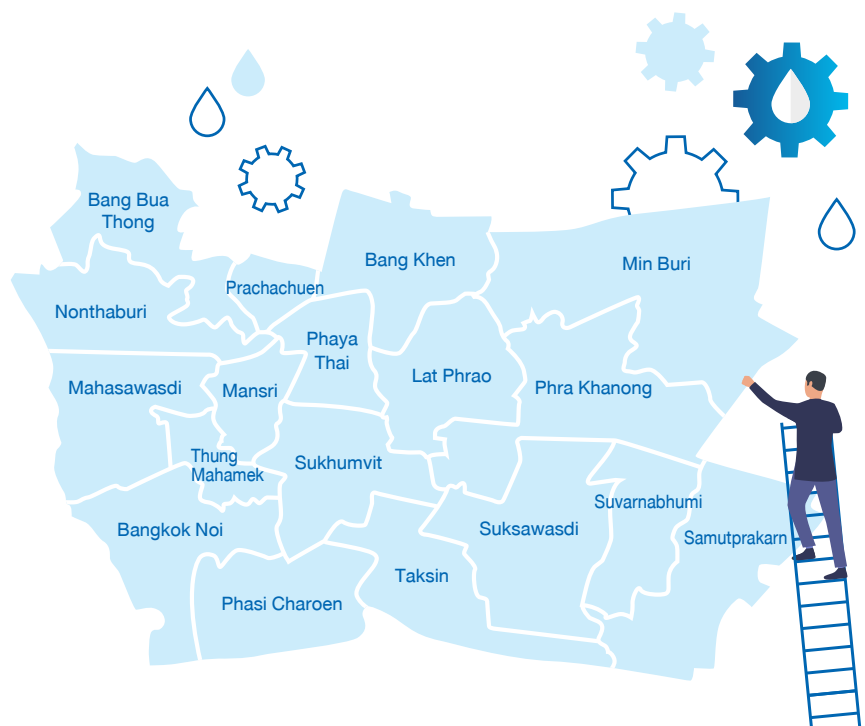
MWA's services cover the areas of Bangkok, Nonthaburi, and Samut Prakan under the responsibilities of all MWA 18 branches that are located in those provinces. While the four water treatment plants function to receive raw water from two sources- the Chao Phraya River and the Mae Klong River, to enter the water supply production processes; then distribute water supply for users.



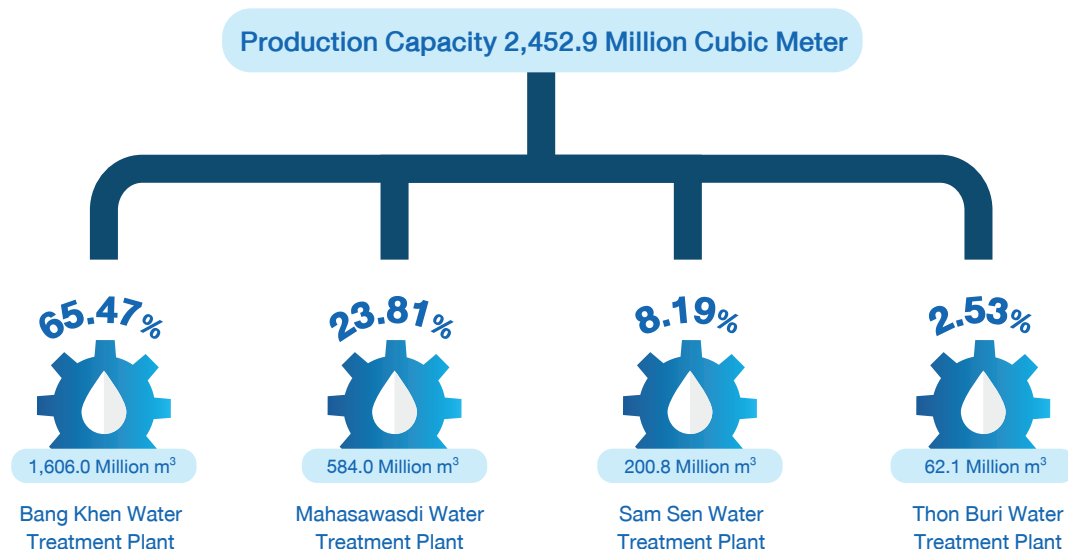
ข้อมูลเพิ่มเติมเกี่ยวกับ กปน.  
<https://www.mwa.co.th/>

### 18 MWA Branches

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



## Water Treatment Plants and Production Capacity Per Year



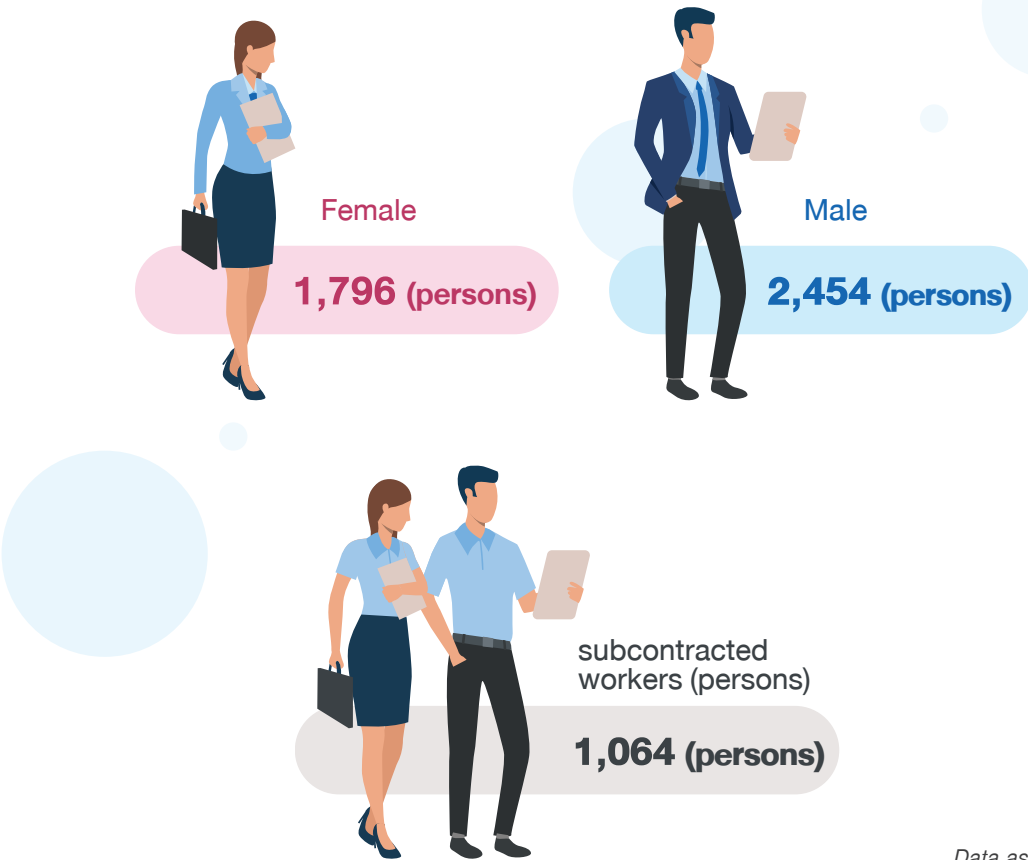
## Total Water Production and Distribution in the Fiscal Year 2019 – 2021

	Fiscal Year		
	2019	2020	2021
Total water produced (Million m <sup>3</sup> )	2,075.2	2,121.1	2,116.5
Bang Khen Water Treatment Plant	1,402.3	1,410.0	1,427.6
Sam Sen Water Treatment Plant	518.8	572.3	556.6
Thon Buri Water Treatment Plant	113.0	102.4	92.2
Mahasawasdi Water Treatment Plant	41.1	36.4	40.1
Total water distributer (Million m <sup>3</sup> )	1,467.4	1,458.3	1,416.2

## Major Operating Sites

- Headquarters
- Control buildings of Water Transmission and Distribution Systems
- 18 MWA Branches
- Training Center
- 4 Raw Water Pumping Stations
- 4 Water Transmission Stations
- 12 Water Distribution Stations
- 4 Water Treatment Plants (Bang Khen, Mahasawasdi, Sam Sen, Thonburi)
- 4 Laboratories at the Water Quality Department and the Water Treatment Plants
- Control Room of Water Treatment Plants
- Eastern Waterwork Canal and Western Waterwork Canal

## Total Employees



Data as of September 30, 2021



World Health Organization

6 CLEAN WATER AND SANITATION



## Products and Services

At present, MWA provides water supply and services in all urban areas which cover 3,195 square kilometers following the standards stipulated by the World Health Organization (WHO). These standards are used to ensure water quality from upstream sources for users to consume clean and safe tap water. It leads to a better quality of life according to the Sustainable Development Goals (SDGs), Section 6 of the United Nations (UN). Innovations and technologies have been used to continually improve operations, while the Water Safety Plan (WSP) has been established to ensure the quality of tap water that is safe to users. Moreover, we have replaced the aging pipelines in many areas as well as promoting community engagement in both western and eastern watersheds to conserve water resources. In this regard, the purpose of this framework is to increase the efficiency of the waterworks infrastructure toward sustainability.

## MWA Customers

Our customers are the groups of water consumers in the service areas, covering Bangkok, Nonthaburi, and Samutprakarn. They are divided into three groups categorized by their water consumption behaviors, needs and expectations, namely:

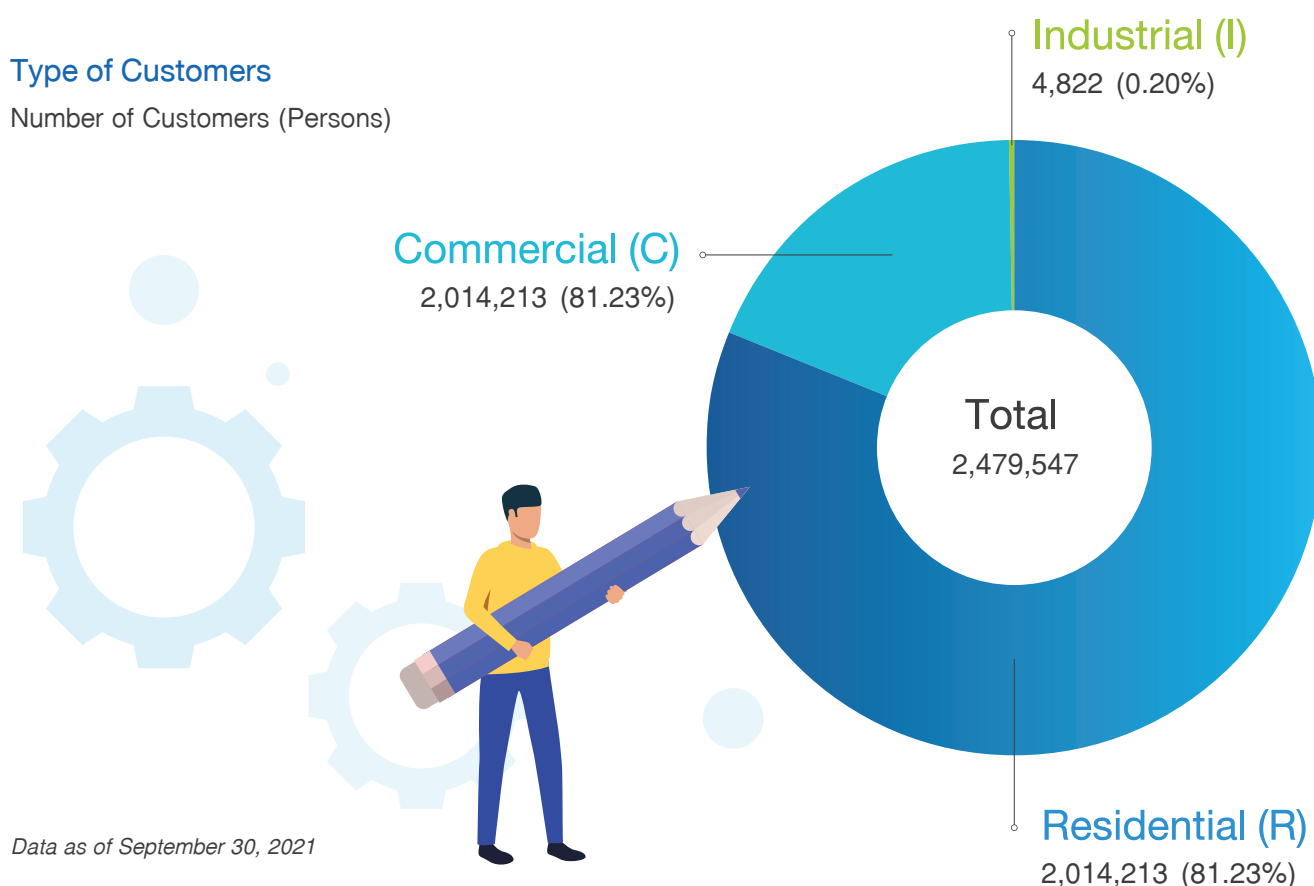
1. **Residential (R)** It is a group of customers who consume water within households or residence. Their water consumption behaviors are during a certain period, especially in the morning or evening.
2. **Commercial (C)** It is a group of customers who consume water for commercial or corporate purposes, with a wide range of usage depending on the type of business and its organization.
3. **Industrial (I)** It is a group of customers whose major purposes are for industrial use on a continuous basis at 24-hours a day.

In addition, the **Key Account** customers are defined for a purpose of Customer Relationship Management (CRM) and classified as customers with monthly average water consumption of 10,000 cubic meters (Customer Relationship Management or more. : CRM)

## Number of customers based on water consumption behaviors and needs for Fiscal Year 2021

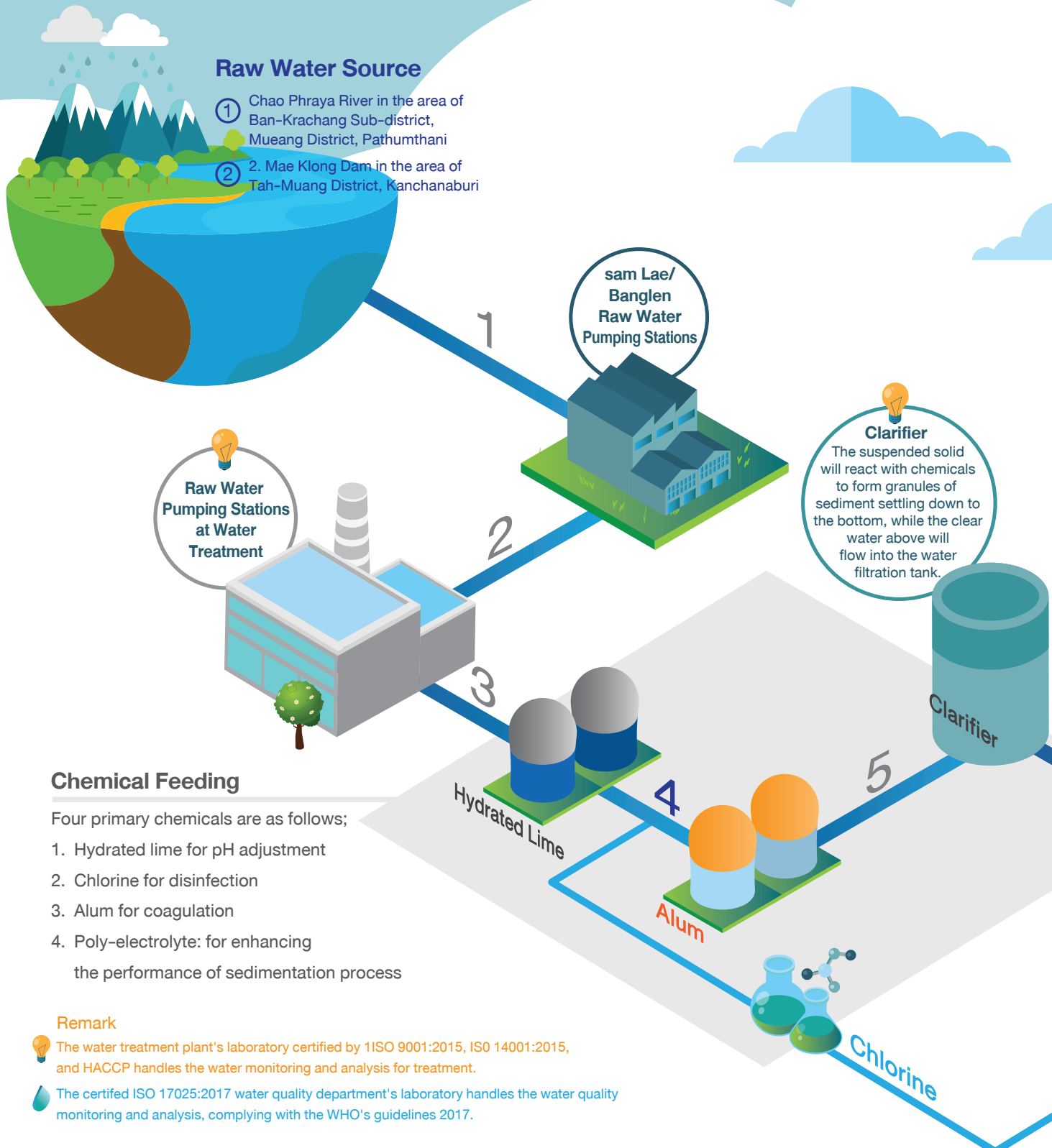
### Type of Customers

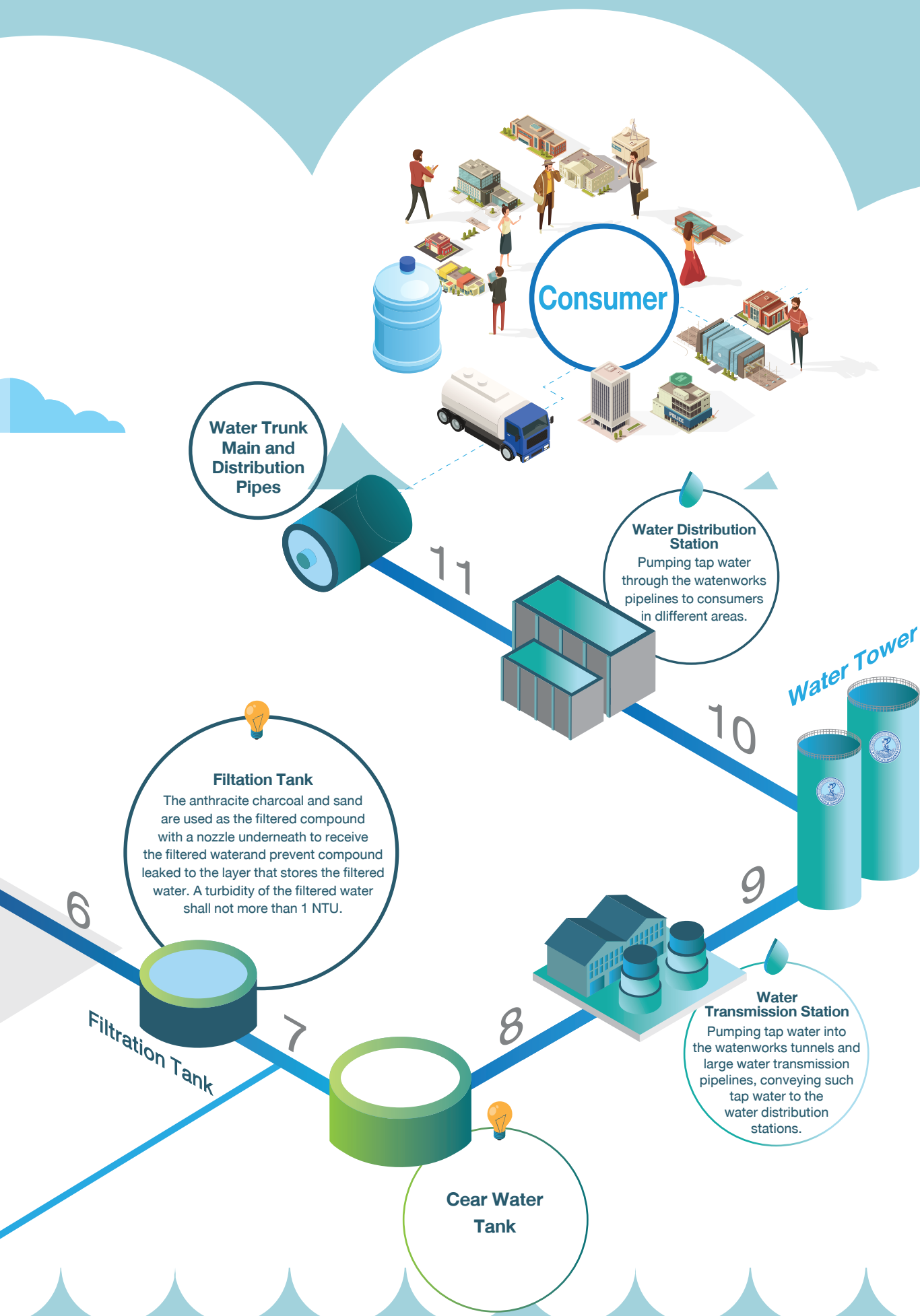
Number of Customers (Persons)





## Diagram of Water Treatment Processes





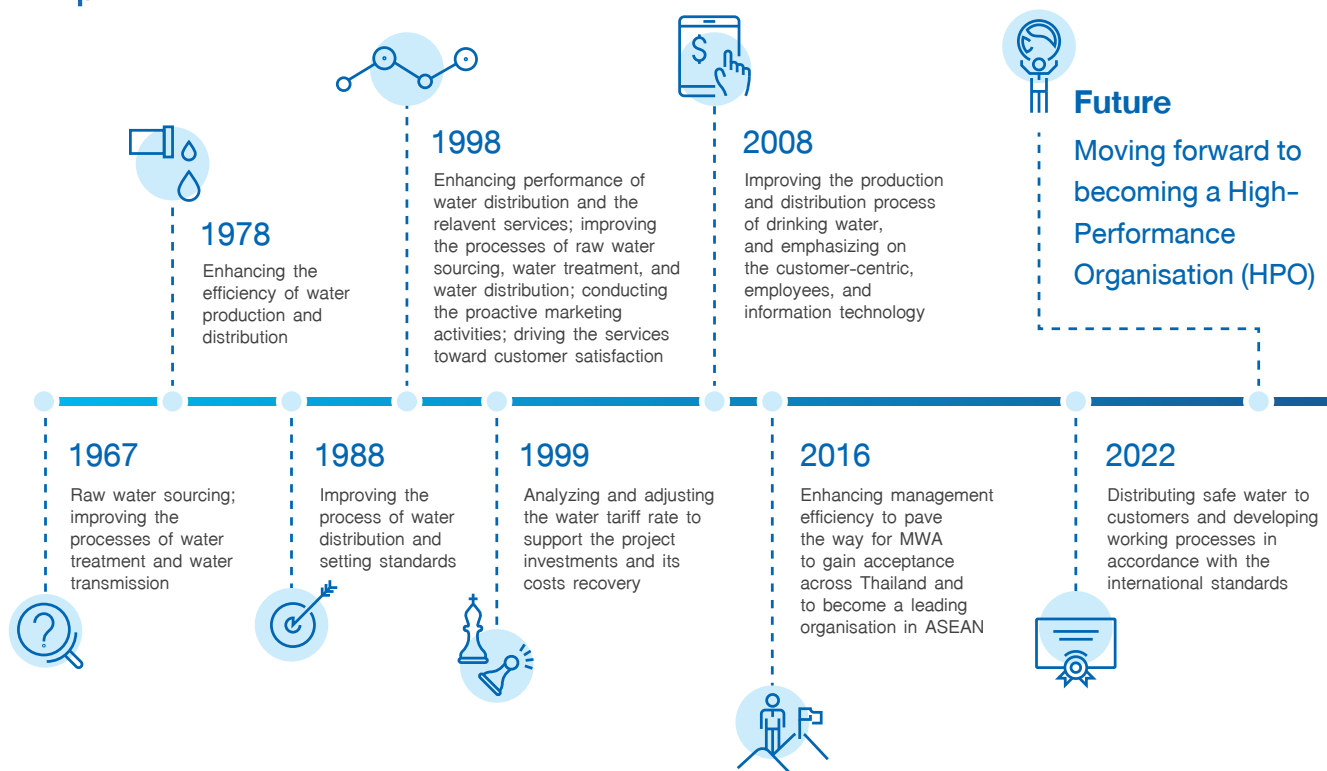


## MWA Policies and Plans Toward Sustainability (102-15, 102-16)

MWA operates its businesses under the framework of the Fifth MWA State Enterprise Plan (2020 - 2022) which has been continually developing until present. In Fiscal Year 2021, we have considered the relevant internal and external factors for a review of our operations to suit the current changing situations. To be more comprehensive, MWA has reviewed compliance with the Master Plan and the Contingency Plan under the National

Strategy due to the COVID-19 pandemic. This includes the Twelve National Economic and Social Development Plan, Development, Supervision, and Management of State Enterprises in Public Utilities Act and the State Enterprise Strategic Plan 2017 - 2021, with the extended period to the end of 2022 and integration of our operations into the Master Plan relevant to the matters of MWA in all aspects.

### Corporate Directions



After reviewing the Fifth MWA Enterprise Plan (2020 — 2022), apparently, our business directions still keep on track with commitments to become a High Performance Organization (HPO). We strongly focus on management that upholds good corporate governance, social responsibility, and integration of information technology throughout the organization. So, we adopt modern technology to improve our operations in order to respond to all MWA stakeholder needs with balance

based on the corporate visions as said “To be a High-Performance Waterworks Organization with excellence on good corporate governance and compliance with the international standards.” In conclusion, it consists of 4 strategies and 11 strategic objectives that are aligned with the relevant master plans. This is to ensure operations that are thoroughly consistent and able to achieve corporate goals.



## Indicators of Corporate Visions

Visions		Former Indicator	New Indicator		Goal
To become High Performance Organization	HPO Standard	Thailand Quality Award (TQC)	Resilience	Resilience and preparedness in responding to disasters and crisis	ISO 22301: Business Continuity Management
			Agility	Agility and work process development for becoming high performance organization	- Establishment of virtual branches - Customer Rate per employee
			Innovation	Well recognized Innovations/Researches	National/International Innovation Award
To provide waterworks services at international standards	Water Quality	Tap Water Quality at customers' places: Turbidity	Turbidity in Business As Usual (BAU) is less than 1.0 NTU Percentile at 95th percentile.		
	Water Distribution	Water Loss Rate	Real Loss Apparent Loss		
To uphold Good Governance	Corporate Governance	Transparencies and integrity scores	To maintain the scores of over 90 or being ranked in the top five leading organizations among the state-owned enterprise		

## Strategies and Strategic Objectives





## 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 an engagement of all executives to drive processes that 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.

## MWA WORK PROCESS

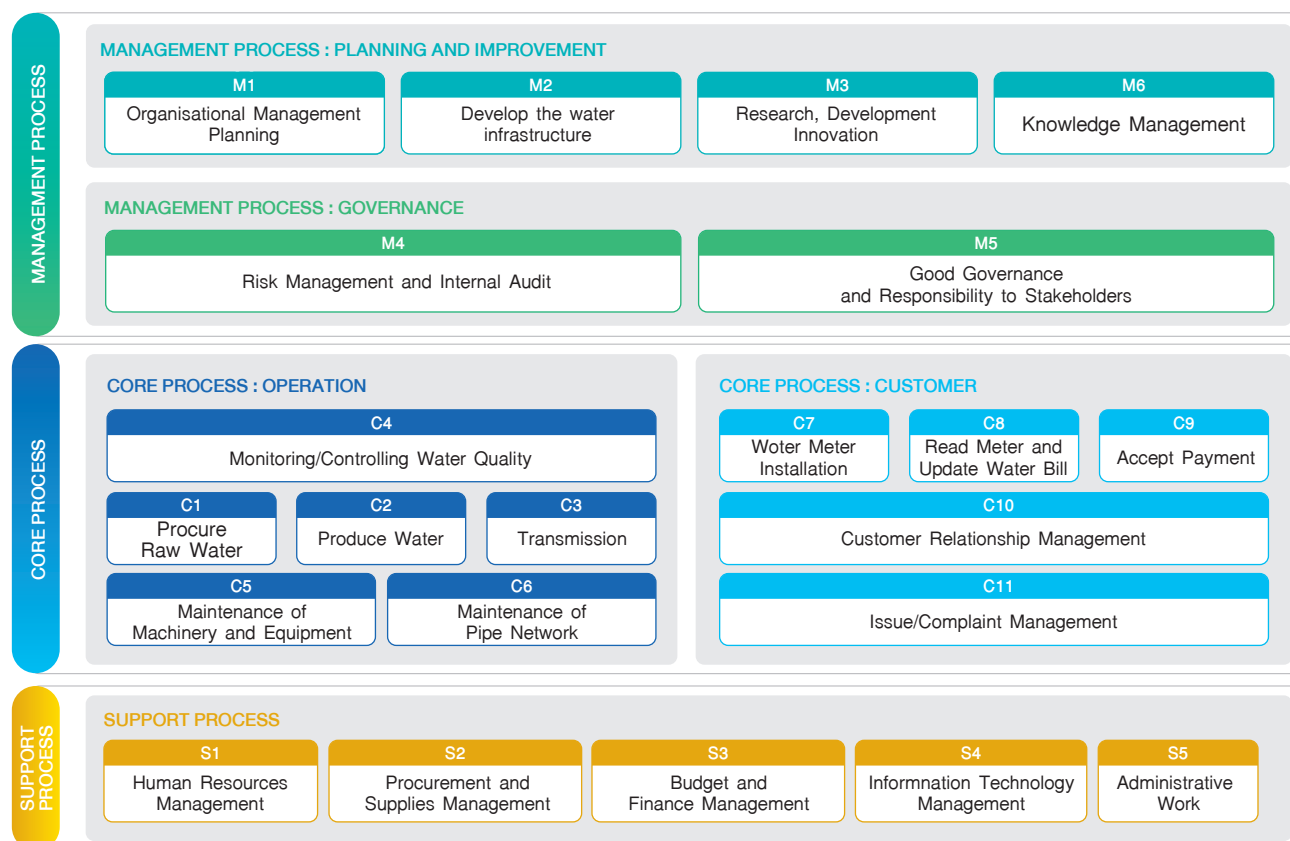


Figure 1: Picture of MWA Work Process

# MWA Sustainable Development Policy



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## MWA Sustainable Development Policy

### Criteria, regulation, and authority that MWA uses as a framework for economic, social and environmental development

As known, MWA is a state-owned enterprise under 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, of which they are summarized as follows:

Laws / Rules / Regulations	Details of Relevant Laws and Regulations
Occupational Health and Safety	<ul style="list-style-type: none"> <li>- Occupational Safety, Health and Workplace Environment Act, B.E. 2554 (2011)</li> <li>- State Enterprise Labor Relations Act, B.E. 2543 (2000)</li> <li>- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Workplace Environment, B.E. 2549 (2006)</li> <li>- 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)</li> <li>- Notification of the State Enterprise Labor Relations Board on the Minimum Standards for Employment Unions, B.E. 2549 (2006)</li> <li>- Notification of the Department of Labor Protection and Welfare on Determination of Personal Safety Equipment Standards, B.E. 2554 (2011)</li> <li>- 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)</li> <li>- Labor Protection Act, B.E. 2541 (1998)</li> </ul>
Certification or Registration for License to Operate	<ul style="list-style-type: none"> <li>- Metropolitan Waterworks Authority Act, B.E. 2510 (1967)</li> <li>- Codes of Conduct</li> <li>- Royal Decree on Criteria and Procedures for Good Country Administration (No. 2), B.E. 2562 (2019)</li> <li>- World Health Organization (WHO)</li> <li>- Electronic Transactions Act, B.E. 2544 (2001)</li> <li>- Electronic Transactions Act (Amendment), B.E. 2562 (2019)</li> <li>- Factory Act, B.E. 2535 (1992)</li> <li>- Arms Control Act, B.E. 2530 (1987)</li> <li>- Hazardous Substance Act (No. 3), B.E. 2551 (2008)</li> <li>- Government Administration and Services through Digitalization Act, B.E. 2562 (2019)</li> </ul>

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

## MWA Sustainable Development Policy

MWA realizes the importance of stakeholders from all sectors. Thus, MWA has adopted the guideline on corporate social and environmental responsibility following the criteria of ISO 26000. It consists of behavioral principles such as accountability, transparency, and ethical practice. In addition, respect for stakeholders' interests, the rule of law, compliance with international guidelines, and human rights, have been additionally integrated and applied as a sustainability framework for the entire value chain. As a result, policies related to social and environmental responsibility have been established for the Board of Directors, the Governor, the executives, and the employees of MWA to adhere performing their duties, as a sustainable practice. Details are described as follows:

1. To develop the waterworks services to be in line with the corporate core mission and social and environmental responsibility programs (both CSR in Process and CSR after Process) by performing their duties that are aligned with the seven core topics stipulated in the ISO 26000. Of which they consist of good governance, human rights, labor practices, environment, fair treatment, consumer issues, and community engagement and development. It requires emphasizing the stakeholders' engagement, taking into account the prevention of potential

impacts arising from the organization's operations, as well as determining the apparent goals.

2. To embed and create a sense of social responsibility for the employees at all levels to perform their duties with morals and ethics driving it to become a part of the corporate culture.
3. To build good relationships with stakeholders systematically under the AA1000 Stakeholder Engagement Standard (AA1000SES) so that it results in efficient management of material issues towards stakeholders that leads to achievement of corporate goals. This focuses on deploying the organization's expertise to meet the needs and expectations of stakeholders in each group.
4. To promote corporate sustainability and report sustainability performance based on the GRI (Global Reporting Initiative) standards, to enhance the corporate competence and increase the credibility of its reports to be internationally recognized.

Hence, the Metropolitan Waterworks Authority's personnel are required to adhere to the policies relating to social and environmental responsibility as a part of their operations. The goals are mainly to become a high-performance organization which operates its business based on the foundation of corporate development toward sustainability.



## MWA Good Governance Policy

To comply with corporate governance framework and international standards, MWA Board of Directors therefore pays attention in the corporate management which is in compliance with good corporate governance principles; with transparency, integrity, accountability, and without corruption, and moving forward to become a high-performance organization. This is to build confidence towards all stakeholders sustainably. In order to keep on this direction, MWA therefore has established a good corporate governance policy as guidelines for the Board of Directors, the Governor, the executives, and the employees, to follow. Of which it consists of;

1. MWA Board of Directors, the Governor, all executives and the employees, are required to perform their duties by strictly adhering to practices of good corporate governance, ethics and code of conduct, as well as to strictly comply with the relevant laws, regulations, rules, and ordinances.
2. MWA Board of Directors, the Governor and all executives, are required to perform their duties as good role models in compliance with good corporate governance principles and promote the engagement of all sectors within the organization by focusing on performing their duties with integrity, transparency, and accountability. It is required not to neglect or ignore when seeing any action considered fraud, as well as to impose severe penalties for those who commit corruption.
3. MWA Board of Directors, the Governor, and all executives, are required to promote stakeholders to engage in formulating measures, systems, or guidelines for surveillance or monitoring, and raising opinions towards work processes and services of MWA.
4. MWA Board of Directors, the Governor, and all executives, are required to formulate policies and guidelines for market competitions that are fair to all groups of stakeholders with transparency and equality.
5. MWA Board of Directors, the Governor, and all executives, are required to establish a risk management, internal control, and internal audit systems. The preventive measures for conflicts of interest and the connected transactions are required to be included appropriately and adequately.
6. MWA Board of Directors, the Governor, and all executives, are required to establish communication channels to receive complaints, comments or clues when discovering fraudulent behavior or contrary to the code of conduct or business ethics.
7. MWA Board of Directors, the Governor, and all executives, are required to prepare the information disclosure of both financial and non-financial performance in compliance with the international standards format.
8. MWA Board of Directors, the Governor, all executives, and the employees, are required to perform their duties with senses of social and environmental responsibilities, as well as to promote and support innovations development which creates balance, stability, and sustainability.
9. MWA Board of Directors, the Governor, and all executives, are required to establish the good corporate governance, performance monitoring, audit, evaluation, and reporting systems. Work processes development for all employees is required to be included. It is required to strictly adhere to operating its business in compliance with the good corporate governance policy to promote it as a sustainable corporate culture.

# MWA Stakeholder Engagement



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## MWA Stakeholder Engagement

Metropolitan Waterworks Authority (MWA) has reviewed its stakeholder engagement guidelines based on the international standards of AA1000:2015, to establish the stakeholder engagement plan and implement it according to the MWA Stakeholder Masterplan 2021-2022. This plan aims to improve and develop processes to strengthen relationships with all stakeholder groups as well as to define the entities in charge to drive the relevant plans at the departmental level. Moreover, this plan also includes identifying stakeholders based on the State Enterprise Assessment Model (SE-AM) and the MWA State Enterprise Plan. In fiscal year 2021, to be more comprehensive in planning, we have concisely reviewed stakeholder groups according to our work process throughout MWA's value chain. It is still classified into nine groups as the previous year. Details are described as follows:



### 1. Policy entities and government shareholders:

It refers to agencies that are responsible for overseeing state-owned enterprises, such as the Office of the National Economic and Social Development Council (NESDC), Ministry of Interior and Ministry of Finance (State Enterprise Policy Office (SEPO), etc.



### 2. Relevant authorities with shared missions:

refer to government agencies with common missions, such as the Department of Irrigation, the Department of Water Resources, and the Department of Highways, etc.



### 3. Vendors/Contractors:

refer to entities or juristic persons or individuals who are paid for preparing goods, providing services, leases, and labor outsourcing for MWA.



### 4. Alliances:

refer to entities or groups of individuals who agree to work with MWA, with the purpose to achieve the common goals divided into 2 subgroups: business alliances (payment agent: Counter Service, Department Stores, Metropolitan Electricity Authority, Commercial Banks) and Academic Alliances (Educational Institutions).



5. **Customers** refer to water consumers in the service areas, covering Bangkok, Nonthaburi, and Samut Prakan. They are divided into 3 groups as follows:

- **Residential (R)** is a group of customers who consume water for direct consumption in households or places of residence. Their water consumption behaviors are during a certain period, especially in the morning or evening.
- **Commercial (C)** is a group of customers who consume water for commercial or corporate purposes, with a wide range of usage depending on the type of business and its organization. And it is a group with water consumption of fewer than 10,000 m<sup>3</sup> and their water consumption behaviors are in the forms of continuous manners.
- **Industrial (I)** is a group of customers, whose major purposes are for industrial use on a continuous 24-hour a day basis. They are both Residential (R) and Commercial (C) customers with water consumption ranging from 10,000 m<sup>3</sup> per month and onward.



6. **Employees and workers**

- **Employees** refer to personnel under permanent contract employment with MWA who performs his duties according to each job description.
- **Workers** refer to personnel 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.





## 7. Community & Society

- Community refers to
    - 1) Upstream community areas (East and West)
    - 2) 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.
    - 3) Communities around raw water pumping stations (all 10 stations).
    - 4) Communities in the service areas.
    - 5) 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 is a community with an area adjacent to the operating area and most likely to be affected by the operations of MWA, or an area that has potential for improving the locals' quality of life by utilizing the expertise of MWA.*



**8. Mass 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 the 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 nonprofit 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.

Identifying Stakeholders in MWA VALUE CHAIN



Management Process

Planning and Improvement

- M1 Prepare Corporate Management Plan
- M2 Develop waterworks infrastructure
- M3 Discipline, Development & Innovation
- M6 Knowledge Management

Governance

- M4 Risk Management and Internal Audit
- M5 Governance and Accountability toward Stakeholders

Stakeholders

- Policy Agencies and Government Shareholder
- Mission Related Agencies
- Alliance (Academic)
- Policy Agencies and Government Shareholder
- Mission Related Agencies
- Customer
- Contractor
- Alliance
- Employee and Worker
- Media
- Community and Society
- Activis/Independent Organization/Civil Society/ Academist

Support Process

- S1 Human Resource Management
- S2 Procurement and Supplies Chain Management
- S3 Budget Management and Finance
- S4 Information Technology Management
- S5 Diredting

Stakeholders

- Policy Agencies and Government Shareholder
- Employee and worker
- Contractor
- Customer



Core Process	
<b>Operation</b> C4 Water Quality Monitoring and Control C1 Raw Water Management C2 Water Treatment C3 Water Distribution C5 Maintenance of Machine and Equipment C6 Maintenance of Waterworks Infrastructure	<b>Customer</b> C7 Flow Meter Installation C8 Flow Meter Reading and Water Bill C9 Water Bill Payment C10 Customer Relationships Management C11 Incidents/Complaint Management
Stakeholders	
<ul style="list-style-type: none"> <li>- Policy Agencies and Government Shareholder</li> <li>- Mission Related Agencies</li> <li>- Customer</li> <li>- Community and Society</li> <li>- Contractor</li> </ul>	<ul style="list-style-type: none"> <li>- Customer</li> </ul>



## Engagement Channels and Stakeholders' Expectations

To understand and meet the expectations of MWA's stakeholders, we have built relationships with stakeholders through various engagement channels as follows:

Stakeholders	Engagement Channels	Frequency	Stakeholders' Expectations
Policy-making authorities and shareholders from the government sector	- Holding meetings.	- More than once a year.	- Thoroughly expand service coverage of water supply to the people.
	- Holding a forum to listen to opinions.	- Once a year	- Personal Data Protection Act (PDPA)
	- Participating in activities held by MWA.	- More than once a year	
	- Conducting satisfaction survey.	- Once a year	- Water Supply Management Plan in crisis situations.
Relevant authorities with shared missions	- Holding meetings	- 2-4 times/month	Reducing complaints from entering the construction area for repair or pipe installation work
	- Participating in activities held by MWA.	- throughout the year	Problems arising from a cooperation between government agencies such as:
	- Conducting satisfaction survey	- Once a year	- Requests for permission to install flow meters from Bangkok Metropolitan Administration (BMA). - Entering the operating sites for repair work of pipelines. (Traffic surface/sidewalks). - Requests for permission to allow trucks to enter the operating site during rush hour. - Speed of execution relating to permission matters (BMA/Department of Highways)
Vendors/ Contractors	- Organizing a forum to listen to opinions.	- Once a year	- Transparency - Median price that is fair and reasonable.
	- Conducting satisfaction survey.	- Once a year	

MWA's material issues toward Sustainability	Responses
- Supply Chain Management and Sourcing	<ul style="list-style-type: none"> <li>- Project plans for expanding service coverage of water supply in other potential areas.</li> <li>- Project plans for thoroughly expanding service coverage of water supply to be adequate and stable.</li> </ul>
- Transparency and Integrity	<ul style="list-style-type: none"> <li>- Upholding corporate governance compliance on the disclosure of financial and non-financial information and information through the Annual Report and the Metropolitan Waterworks Authority's website under the Personal Data Protection Act, B.E. 2562 and the Cyber Security Act, B.E. 2562.</li> </ul>
- Water and Effluents	<ul style="list-style-type: none"> <li>- Handbook of Response Plan to Emergency in water production and distribution processes in case of raw water quality crisis.</li> <li>- Response Plans to water users in case of product that holds poor quality and is not safe for consumers according to the requirements of GMP/HACCP and product traceability systems.</li> </ul>
- Customer Relationship Management	<ul style="list-style-type: none"> <li>- Complaint Management Policy</li> <li>- 4<sup>th</sup> Strategy: Building collaboration for Corporate Sustainable Development Plan 2021 on Proactive Coordination.</li> </ul>
Partnership and Collaboration	<p>4<sup>th</sup> Strategy: Building Collaboration for Corporate Sustainable Development Plan 2021 on Engaging with policy-making authorities and government shareholders, relevant agencies with shared missions.</p>
- Supply Chain Management and Sourcing	<ul style="list-style-type: none"> <li>- Procurements are executed according to the Government Procurement and Supplies Management Act, B.E.2560, stating requirements for procurement according to the Procurement and Supplies Management Act and the guidelines of the Comptroller General's Department that are published on the website. The purpose of this guideline is to create transparency and accountability. For some entities, if a median price is prepared according to the procurement guidelines of MWA, those guidelines are needed for approval from the Governor of MWA in order to ensure that each work is implemented in the same direction.</li> <li>- MWA Internal audit process</li> </ul>

Stakeholders	Engagement Channels	Frequency	Stakeholders' Expectations
<b>Alliances</b> • <b>Business Alliance</b>  • <b>Academic Alliance</b>	Conducting satisfaction survey  - MOU between government agencies/ Research Institutions/ Academic Institutions/ Companies, to jointly conduct research and development on waterworks management and other relevant matters.  - Knowledge exchange through training or attending seminars, academic forums, Webinar, etc.  - Waterworks Professional Training Program for personnel of local administrative organizations.  - Financial support for the projects proposed by the external parties.	Once a year  - More than once a year  - At least 3 times a year  - Twice a year  - Twice a year	- Operations are in accordance with the specified plans. - An application of modern technology/ innovation to improve the working process: - Open Innovation such as the exchanges of knowledge, study and research, and skilled personnel.
<b>Customers</b>	- Touch point, for example, MWA Branches, Call Center (1125), CRM activities (MWA Meets Customers Project, Top-Tier Project), Customer Satisfaction Survey Project (Survey/ In-depth Interview/ Focus Group), etc. - Social Media, such as Facebook/ Twitter/ Line@/ Social Monitoring, etc. - Application platform, such as MWA onMobile	At all times	Tap water that is clear, clean, safe, and quality assurance (meets the standards of quality) alongside the water pressure that is constant, sufficient, and responsive to the needs of customers (high-pressure water supply). Notifications of key information that affects water consumption. - A release of public relations before suspending water supply services for pipe installation / pipe repair work. - Defining the exact and apparent schedules for solving any problems apparently. - In case of a crisis such as brackish water or drought. - Reconditioning road surface from pipe installation and maintenance work, and facilitating traffic flow during such operations. - Able to conduct all types of transactions and receive key information conveniently anywhere, anytime, without travelling to MWA branches.



MWA's material issues toward Sustainability	Responses
<ul style="list-style-type: none"> <li>- Partnership and Collaboration</li> <li>- Innovation and Digitalization</li> </ul>	<ul style="list-style-type: none"> <li>- Building/expanding scope of academic cooperation for the exchange of knowledge on innovation and technology.</li> <li>- Organizing PR campaigns to communicate and transfer the innovation development themes to employees and external parties who are interested, to submit proposals of innovative projects, as well as to be used as material issues in the selection criteria of ideas (idea) or outputs from training and competitions. The purpose of this action is to develop those projects into commercial and social innovations in response to the needs of customers and the general public.</li> </ul>
Quality of Tap Water	Water safety plan (WSP)
Customer Relationship Management	<ul style="list-style-type: none"> <li>- Organizing "MWA Meets Customers" events.</li> <li>- Developing an online service platform to upgrade services with continuity and safety (MWA onMobile Application).</li> </ul>
Customer Relationship Management	<ul style="list-style-type: none"> <li>- Developing an online service platform to upgrade services with continuity and safety (MWA onMobile Application).</li> </ul>

Stakeholders	Engagement Channels	Frequency	Stakeholders' Expectations
Employees and subcontracted workers	- Holding the meetings of performance statements with opportunity for employees to inquire.	- Twice a year	Applying guidelines on occupational health and safety at the workplace, to cover all operating areas of MWA.
	- Exploring employee engagement toward the organization.	- Once a year	improving/adding training courses for MWA personnel such as E-learning KM.
Communities and Society			- Establishing criteria for job promotion in a transparent and fair manner.
	- Holding a forum to listen to opinions.	- Once a year	Assuring safety of communities around water treatment plants/ Preparing response plan to the crisis that affects communities surrounding water treatment plants.
	- Organizing CSR activities.	- More than once a year	Good water quality and consistency of tap water
	- Conducting satisfaction survey.	- Once a year	Raw water shortage in case of the drought in the Mae Klong River basin.
	- Organizing "MWA meets Customers" events.	- 72 times a year (4 events will be organized by each branch a year, totaling 18 branches)	Collaborating with government agencies, local communities, and private organizations in matters related to MWA.
			Communicating necessary information to the locals to understand prior to the commencement of pipe installation work.
			Creating opportunities of occupations for the people in communities to handle their livings sustainably.

MWA's material issues toward Sustainability	Responses
Occupational Health and Safety	- Implementing policy on Safety Security Health and Environment : SSHE
Training and Education	<p>The Fifth MWA Enterprise Plan (2.3-1L, human resource development program to support effective implementations according to the strategy).</p> <p>HR Strategy Map</p> <p>Training Plan for Fiscal Year 2021</p>
Training and Education	Implementing Human Resources Development Programs to support growth along the career path.
Occupational Health and Safety	- Implementing policy on Safety Security Health and Environment : SSHE.
Quality of Tap Water	Water safety plan (WSP)
Water and Effluents	An efficient raw water system management plan
Partnership and Collaboration	<ul style="list-style-type: none"> <li>- Coordination and collaboration in the pipe installation work.</li> <li>- Coordination and collaboration with local communities in the field of environmental care, to preserve water sources: raw water sources and water supply canals for supplying raw water to enter water production process.</li> </ul>
Customer Relationship Management	<ul style="list-style-type: none"> <li>- Organizing "MWA Meets Customers" events.</li> <li>- Developing an online service platform to upgrade services with continuity and safety (MWA onMobile Application).</li> </ul>
Local communities	<p>Implementations of the following projects:</p> <p>"MWA Ruk Pa Ton Nam" project, the Water Resources Conservation Project (Integration of projects for sustainability)</p> <ul style="list-style-type: none"> <li>- Professional Plumber For People Project</li> <li>- School Plumbing System Project</li> </ul>

Stakeholders	Engagement Channels	Frequency	Stakeholders' Expectations
Media	- Holding press conference of corporate performance statement to the public.	- Once a year	- Needs of accurate and up-to-date information in timely manners.
	- Participating in opening ceremony of important events.	- More than 6 times a year	
	- Sponsoring and engaging in media's events, such as the Anniversary Celebration Day held by the media.	- Throughout the year	
	- Holding interview with media	- Throughout the year	
	- Updating information in MWA Social Media	- Throughout the year	
	- Arranging press release	- Weekly	
	- Holding informal meetings with media (by media)	- Throughout the year	
Activists/ Independent Organizations/ Civil Society/ Academists	- Conducting Satisfaction Survey	-Once a year	Reducing effluents throughout water production process.
	Updating information in MWA Social Media	Throughout the year	Response plan to the drought, such as relocating raw water stations for RD water production.
			Sludges generating from water production process are managed by an appropriate disposal method.

MWA's material issues toward Sustainability	Responses
Customer Relationship Management	Building relationship with media project
- Water and Effluents	Activities to support water resources conservation and reduce effluents.
Quality of Tap Water	Mitigative measures for the sufferings during the drought situation in 2021.
Waste	Management of sludge arising from water production process.

## Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/ needs toward the organization*	Output	Outcome
Stakeholders Strategy, Item 1: Upgrade communication process to build relationships with stakeholders.					
<b>Plan 1: Strengthen good governance and anti-corruption practices toward stakeholders</b> Entity in charge: Office of the Governor - Corporate Governance Department	<ul style="list-style-type: none"> <li>- Information: Providing information to the public.</li> <li>- Involvement: Holding the meetings with stakeholders</li> </ul>	9 groups	<ul style="list-style-type: none"> <li>- Interagency cooperation for sustainable growth.</li> <li>- Insufficient two-way communication.</li> <li>- Clear corporate values that are communicated thoroughly.</li> </ul>	<ul style="list-style-type: none"> <li>- The activity of "Stakeholders Sustainable: Build Relationships for Sustainability" was organized on February 24, 2021, to communicate important policies and plans of MEA.</li> </ul>	<ul style="list-style-type: none"> <li>- Satisfaction score toward our activity was at 4.30, an increase from fiscal year 2020 which was scored at 4.182.</li> </ul>
<b>Plan 2: Review the procurement process</b> Entity in charge: Administration Division - Procurement and Supplies Department	<ul style="list-style-type: none"> <li>- Information: Providing information to through MWA's website.</li> </ul>	Vendors/ Contractors	<ul style="list-style-type: none"> <li>- Procurement process that is transparent, fair, and accountable.</li> </ul>	<p>Procurement procedures were described in the intranet of Procurement and Supplies Department to comprehensively communicate with those involved; and the information of Electronic Government Procurement system (e-GP) was also published in MWA's website.</p> <p>Thus, third parties involved can check their current status through the e-GP system or contact through the given telephone numbers or e-mail openly.</p>	<ul style="list-style-type: none"> <li>- In fiscal year 2021, our satisfaction score from our vendors/contractors was at 4.31, a decrease from fiscal year 2020 which was scored at 4.42. The case of complaints regarding good governance was not found in fiscal year 2021. (FY 2020 = 0 case)</li> </ul>
<b>Plan 3: Internal and external communication process</b> Entity in charge: Office of the Governor - Corporate Communications Department	<ul style="list-style-type: none"> <li>- Information: Policy Statement event/ Press Release/ MWA's website/ MWA's Social Media/Meetings/ Public statement</li> </ul>	9 groups	<ul style="list-style-type: none"> <li>- Insufficient two-way communication.</li> <li>- Clear corporate values that are communicated thoroughly.</li> </ul>	<ul style="list-style-type: none"> <li>- Our key information was published through both internal and external communication channels according to the corporate communication plan by defining communication channels aligned with the behavior of target audiences in the right time, including Communication Process KPI and the person in charge for conveying those messages as well.</li> </ul>	<ul style="list-style-type: none"> <li>- The awareness of our PR campaigns from all nine groups of stakeholders was stood over 50%, as described below:               <ol style="list-style-type: none"> <li>1. 88.7% of target audiences from policy-making authorities and shareholders from the government sector recognized such information.</li> <li>2. 79.1% of target audiences from relevant authorities with shared missions recognized such information.</li> </ol> </li> </ul>

### Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/needs toward the organization*	Output	Outcome
					<p>3. 98.9% of target audiences from target media recognized such information.</p> <p>4. 82.1% of target audiences from target communities and society recognized such information.</p> <p>5. 86.0% of target audiences from our vendors/contractors recognized such information.</p> <p>6. 81.2% of target audiences from our alliances recognized such information.</p> <p>7. 89.0% of target audiences from activists, independent organizations, civil society, academists recognized such information.</p> <p>8. 90.6% of target audiences from our customers recognized such information.</p> <p>9. 98.1% of target audiences from our employees and subcontracted workers recognized such information.</p>
<b>Plan 4: Enhance communication's efficiency</b> Entity in charge: Office of the Governor - Corporate Communications Department		9 groups	- Insufficient two-way communication. - Clear corporate values that are communicated thoroughly.	- Our PR campaign was conducted according to the topics needed by our stakeholders through convenient communication channels such as television, radio, PR signage, and social media, to create a strong corporate image.	- The awareness of our PR campaigns from all nine groups of stakeholders was at an average of 88.2%.

### Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/needs toward the organization*	Output	Outcome
<b>Plan 5: Alliances Engagement</b> Entity in charge: Planning and Development Division - Business Development Department		Alliances	<ul style="list-style-type: none"> <li>- Inter-agency cooperation for sustainable growth.</li> <li>- Cooperation from external agencies arising from the government policies.</li> </ul>	<ul style="list-style-type: none"> <li>- Received more cooperation from our alliances in providing services, such as discussion about online bill payments, promotion campaigns for water bill payment, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- In fiscal year 2021, our satisfaction score from our alliances was at 4.15, an increase from fiscal year 2020 which was scored at 4.10.</li> </ul>
<b>Plan 6: Vendors/Contractors Engagement</b> Entity in charge: Western Service Area Division - MWA Branch-Bangkok Noi		Vendors/Contractors	<ul style="list-style-type: none"> <li>- Reducing complaints about traffic obstruction while operating repair and installation work.</li> <li>- Insufficient two-way communication.</li> </ul>	<ul style="list-style-type: none"> <li>- Held 49 meetings with our contractors to understand work processes in the matters of pipe installation work, flow meter installation service, and other related works.</li> </ul>	<ul style="list-style-type: none"> <li>- Contractors/Vendors understood MWA's work process, able to perform their duties correctly and reduce impacts or conflicts that occurred during operations.</li> </ul>
<b>Stakeholders Strategy, Item 2: Innovations Development as value-added for stakeholders</b>					
<b>Plan 1: Technology Promotion</b> <b>Plan for Responsible Water Consumption</b> Entity in charge: Office of the Governor - Waterworks Academic Development Department		9 groups	<ul style="list-style-type: none"> <li>- Changing environment that results in raw water quality to become deteriorated.</li> <li>- Innovations that respond to the needs or expectations.</li> </ul>	<ul style="list-style-type: none"> <li>- Grey Water Recycling System has been further developed along with the knowledge transfer of such technology to those involved.</li> </ul>	<ul style="list-style-type: none"> <li>- Grey Water Recycling System has been fully developed and installed in MWA's buildings.</li> </ul>
<b>Plan 2: Develop E-Tracking System, an execution for Stakeholders</b> Entity in charge: Information Technology Division - Technology Development and Support Department		Vendors/Contractors	<ul style="list-style-type: none"> <li>- Procurement process that is transparent, fair, and accountable.</li> <li>- Innovations that respond to the needs or expectations.</li> </ul>	<ul style="list-style-type: none"> <li>- Further development for E-tracking system, included (1) Information in the procurement announcement section (same information as displayed on the Internet) (2) News release section, (3) Registration, (4) Authentication (login), and (5) Tracking system for disbursement of vendors/contractors.</li> </ul>	<ul style="list-style-type: none"> <li>- Vendors/Contractors could access and track their procurement progress from our E-tracking system.</li> </ul>



## Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/needs toward the organization*	Output	Outcome
<b>Stakeholders Strategy, Item 3: Water management through MWA Value Chain for sustainability</b>					
<b>Plan 1: Water Efficiency Program for water- saving sanitary ware and equipment (MWA water-saving label)</b>		9 groups	<ul style="list-style-type: none"> <li>- Innovations that respond to the needs or expectations.</li> <li>- Interagency cooperation for sustainable growth.</li> </ul>	<ul style="list-style-type: none"> <li>- This program massively received attentions from manufacturers to bring their products to apply for accreditation of MWA water-saving label.</li> </ul>	<ul style="list-style-type: none"> <li>- 13 models of products have been accredited and received MWA water-saving label.</li> </ul>
Entity in charge: Office of the Governor - Corporate Social Responsibility Management Department					
<b>Plan 2: Internal PR campaigns on Water Efficiency Program (MWA water-saving labels)</b>		9 groups	<ul style="list-style-type: none"> <li>- Insufficient two-way communication.</li> </ul>	<ul style="list-style-type: none"> <li>- Information and press releases of such program were published through various internal communication channels such as video clips, TV spots, kiosks in front of the elevators at Headquarters, internal publications, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- An average of 19.76% of the target audiences held water-saving behavior.</li> </ul>
Entity in charge: Office of the Governor - Corporate Communication Department					
<b>Plan 3 External PR campaigns on Water Efficiency Program (MWA water-saving labels)</b>		9 groups	<ul style="list-style-type: none"> <li>- Insufficient two-way communication.</li> </ul>	<ul style="list-style-type: none"> <li>- Information and press release of such program were published through external communication channels, such as various social media and MWA's website, websites or Facebook Pages of those media, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- An average of 46.74% of the target audiences held water-saving behavior.</li> </ul>
Entity in charge: Office of the Governor - Corporate Communication Department					
<b>Stakeholders Strategy, Item 4: Create collaboration for sustainability</b>					
<b>1. Partnership and Collaboration Program</b>		<ul style="list-style-type: none"> <li>- Policy-making authorities and shareholders from the government sector</li> <li>- Relevant authorities with shared missions</li> </ul>	<ul style="list-style-type: none"> <li>- Interagency cooperation for sustainable growth.</li> <li>- Sustainable Water Management</li> <li>- Climate Change that causes irregularity of each season affecting the amount of water in the dams and the quality of raw water sources. It also</li> </ul>	<ul style="list-style-type: none"> <li>- Three meetings with relevant authorities with shared missions-the Royal Irrigation Department, were held to consider the guidelines for solving the problem of raw water in the Chao Phraya River Basin contaminated with salinity.</li> <li>- One meeting with the Office of National Water Resources to consider the guidelines for solving the problem of raw water in the Chao Phraya River Basin contaminated with salinity.</li> </ul>	<ul style="list-style-type: none"> <li>- In fiscal year 2021, our satisfaction score from the authorities with shared missions was at 4.04, an increase from fiscal year 2020 which was scored at 3.91</li> </ul>
<b>Plan 1: Engagement with policy-making authorities and shareholders from the government sector, relevant authorities with shared missions.</b>					

Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021				
Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/ needs toward the organization*	Output Outcome
Entity in charge: Planning and Development Division - Policy and Strategy Department			<p>includes the problems arising from the increased salinity in water body caused by the inflow of saltwater more often and existing longer, as well as the clogged filter ponds caused by algae. As a result, it affects our water production processes.</p> <p>- The government policy that encourages MWA to prepare an environmental care project together with mitigative measures to monitor the upstream, midstream, and downstream water resources and communities nearby.</p>	<p>- A workshop with discussion panels on the MWA Enterprise Plan, attended by our stakeholders and the Board of Directors.</p>
<b>Plan 2: Work Improvement Plan for proactive synergy</b> Entity in charge: - Maintenance Working Group of MWA Branches <b>2. Projects to upgrade the integration of policy and plan and create synergy among the government agencies</b> <b>Plan 1: Lift up proactive relationships</b> Entity in charge: Planning and Development Division - Policy and Strategy Department		<p>- Relevant authorities with shared missions</p> <p>- Relevant authorities with shared missions</p>	<p>- Reducing complaints about traffic obstruction while operating pipe repair and installation work.</p> <p>- Interagency cooperation for sustainable growth.</p> <p>- Sustainable Water Management</p> <p>- Climate Change that causes irregularity of each season affecting the amount of water in the dams and the quality of raw water sources. It also includes the problems arising</p>	<p>- Person in charge acting as a coordinator among external agencies has been designated and also assigned to resolve complaints as well as to respond to those complainants.</p> <p>- Various work manuals for MWA branches have been updated.</p> <p>Two meeting with relevant authorities with shared missions- the Royal Irrigation Department to consider the guidelines to resolve the problem of raw water in the Chao Phraya Basin contaminated with salinity, were held.</p> <p>Four meetings with the Office of National Water Resources were held.</p> <p>- 100% of complaints were responded and resolved.</p> <p>In fiscal year 2021, our satisfaction score from the relevant authorities with shared missions was at 4.04, an increase from fiscal year 2020 which was scored at 3.91.</p>

## Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/ needs toward the organization*	Output	Outcome
			<p>from the increased salinity in water body caused by the inflow of saltwater more often and existing longer, as well as the clogged filter ponds caused by algae. As a result, it affects our water production processes.</p> <ul style="list-style-type: none"> <li>- The government policy that encourages MWA to prepare an environmental care project together with mitigative measures to monitor the upstream, midstream, and downstream water resources and communities nearby.</li> </ul>		
<b>Plan 2: Collaboration at the management and operational levels in order to upgrade the services</b> Entities in charge: MWA Branches		<ul style="list-style-type: none"> <li>- Relevant authorities with shared missions</li> </ul>		<ul style="list-style-type: none"> <li>- Formal meetings and visits with the executives of district offices and the sub-district administrative organizations were held on a regular basis every month.</li> </ul>	<p>In fiscal year 2021, our satisfaction score from the relevant authorities with shared missions was at 4.04, an increase from fiscal year 2020 which was scored at 3.91.</p>
<b>Stakeholders Strategy, Item 4: Create collaboration for sustainability</b>					
<b>Plan 1: Engagement Programs for Key Community Development</b> Entity in charge: Office of the Governor - Corporate Social Responsibility Management Department		Communalities and Society	<ul style="list-style-type: none"> <li>- The government policy that encourages MWA to prepare an environmental care project together with mitigative measures to monitor the upstream, midstream, and downstream water resources and communities nearby.</li> </ul>	<ul style="list-style-type: none"> <li>- A database of key communities around the four water treatment plants and areas along the eastern and western water canal have been established. It also includes key community visits to build networking relationships.</li> </ul>	<ul style="list-style-type: none"> <li>- The overall satisfaction score of all projects was at 4.79.</li> </ul>

## Performance resulting from the implementation of stakeholders' engagement plan in fiscal year 2021

Plan/Initiative	Engagement's pattern and frequency	Stakeholders' groups	Material issues arising from stakeholders' expectations/ needs toward the organization*	Output	Outcome
<b>Plan 2: Engagement Programs for community development surrounding the four water treatment plants (Key communities in fiscal year 63 - 65)</b>  Entity in charge: Office of the Governor - Corporate Social Responsibility Department, and Water Production and Distribution - Water Treatment Plan		Communalities and Society	<ul style="list-style-type: none"> <li>- The government policy that encourages MWA to prepare an environmental care project together with mitigative measures to monitor the upstream, midstream, and downstream water resources and communities nearby.</li> </ul>	<ul style="list-style-type: none"> <li>- Training course for basic plumbers has been organized through online platform during 14-16 September, 2021. The trained participants have been assigned to notify details and locations where the leaked pipes are found. This also includes providing assistance to the community or neighbors to repair and maintain the water supply systems.</li> <li>- Various volunteer activities and support for health safety, such as disinfectants and spraying equipment have been organized to prevent the spread of the COVID-19. This also includes donating bottled drinking water to the communities surrounding our water treatments plants.</li> </ul>	<ul style="list-style-type: none"> <li>- The overall satisfaction score of all projects was at 4.73.</li> </ul>
<b>Plan 3: Engagement Programs for community development- The upstream communities along both western and eastern waterworks canals (Key communities in fiscal year 2021)</b>  Entity in charge: Office of the Governor - Corporate Social Responsibility Management Department		Communalities and Society	<ul style="list-style-type: none"> <li>- The government policy that encourages MWA to prepare an environmental care project together with mitigative measures to monitor the upstream, midstream, and downstream water resources and communities nearby.</li> </ul>	<ul style="list-style-type: none"> <li>- Public hearings with the locals in key communities have been organized to determine the needed activities which can be summarized as follows:               <ul style="list-style-type: none"> <li>- School Plumbing System Project (To develop plumbing systems for four schools per year)</li> <li>- MWA Ruk Pa Ton Nam Project, a project to conserve the upstream water sources (to build dikes, to reforest, and to develop school/community)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- The overall satisfaction score of School Plumbing System Project was at 4.94.</li> <li>- The overall satisfaction score of MWA Ruk Pa Ton Nam Project was at 5.00.</li> </ul>

# Economic Performance



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## Corporate Management

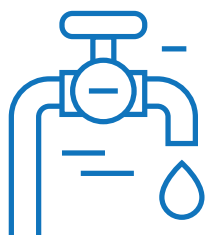
### Enterprise Risk Management

The Metropolitan Waterworks Authority (MWA) has realized the importance of enterprise risk management by implementing it under the International COSO-ERM principles and the Enablers on Core Business, which are integrated into operations at all levels, covering various aspects. These actions are summarized as follows:



- **Quantity and Quality of Raw Water**

In 2021, Thailand has inevitably encountered the droughts in many areas, affecting the agricultural sector and water consumption. However, the areas under the responsibilities of MWA which are Bangkok, Nonthaburi, and Samut Prakan, are managed efficiently with prompt actions. Moreover, the Water Crisis Prevention Center continually monitors the situation and works closely together with the relevant public and private agencies, to plan and manage it until the crisis ends. In the long run, MWA has prepared a project to expand the production capacity of water treatment plants and increase the capacity of water storage tanks as well. This aims to respond to the increasing demands in the future and for the resilience and agility of MWA's operations when confronting various crises that may arise. In addition, MWA has continually monitored the Key Risk Indicators (KRI) in terms of water quality and quantity for the executives to use as information to monitor the quality of water supply and use for decision-making for administration in timely manners.



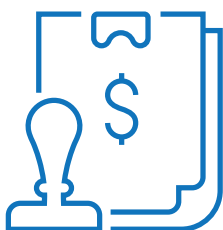
- **Stability in production, transmission and distribution systems of water supply**

MWA has implemented the Ninth Master Plan on Waterworks Systems Improvement to increase the stability of water production and distribution systems covering both the eastern and western watersheds areas. It requires enhancing efficiency of water production and waterworks infrastructure systems to support the upcoming urbanization in the future. The purpose of this plan is to create sustainability and stability of the entire system, covering raw water sourcing, water production, water transmission, and distribution systems, to ensure stability and timely response to various situations and crises that may unprecedentedly occur in the future. Moreover, MWA has established the Business Continuity Plan (BCP) for key processes covering the entire system including customer service. Also, preparedness for the response plan to emergency and business continuity plan has been included. We have worked together with the relevant internal and external agencies to prepare our employees to deal with the emergent incidents that may occur. This aims to ensure that our water supply services are constantly provided with continuity for customers, even though we are in the tough situation of crisis.



- **Safety: Upgrade and sustain water supply quality to meet international standards**

MWA has implemented the water safety plan (WSP) continuously and concretely and it has been defined as a part of the strategic objectives (CORE-SO) under the Fifth Metropolitan Waterworks Authority's Enterprise Plan (2020 — 2022). In addition, we have received the collaboration from the World Health Organization (WHO) to assess performance of the water safety plan and provide training on water management. Also, the identification of hazards and dangers that may affect water quality in every system, is included. This is to ensure that the quality and safety of our water supplied to customers meet the standard, as well as to provide everyone with opportunities to access safe and clean drinking water thoroughly.



- **Finance**

MWA truly understands that the financial system, especially in terms of budget disbursement, is very crucial for all of our entities; we, therefore, have attached great importance to the investment budget disbursement alongside the Value-for-Money Analysis of the proposed project. The purpose is to prioritize the investment to be aligned with our annual action plan, measures, and related government policies. Also, we have integrated the information systems to the SAP system, such as the "Capital Budget System or CBS", "CBS Revise Subsystem", and "Capital Management System or CMS", to monitor and expedite the investment budget disbursement to be more efficient.



- **Information technology**

Currently, we are living in an era where technology undeniably becomes more crucial to ways of living, especially in the epidemic situation of the Coronavirus Disease 2019 (COVID-19), MWA, therefore has implemented IT Security measures to ensure that our information technology system is secure, stable, and always available in all situations. Also, preventive measures for IT network's intrusions and attacks from malicious people have been prepared and conducted systematically to accommodate the Personal Data Protection Act, B.E. 2562 (2019). In addition, review and improvement of the Business Continuity Plan for IT systems including drills under ISO 27001:2013 standards have been conducted on an annual basis in order to create preparedness of the response plan to adverse situations.



- **Efficiency Improvement for reducing water loss**

With our commitments to deliver safe and clean water to the people adequately and thoroughly under the principles of responsible water consumption, MWA, therefore has drawn the risk management plan on water loss to enhance efficiency of water distribution systems. It requires hiring third parties to explore the places where leakages in our water distribution systems are found and needed for repairs. Moreover, to proceed pipe installation work efficiently and thoroughly, we have adopted the Camera Intelligence Alert technology to monitor and control such works to be in line with the designated standards. This is to completely create sustainability toward water distribution systems any further. Meanwhile, we have initiated a project to replace the new flow meters so as to ensure its accuracy that suits the actual individual water consumption.



## Internal Control

MWA's Internal Control System complies with Guidelines on Internal Control Standards and Criteria for Government Agencies, B.E. 2561 (2018) of the Ministry of Finance's. It is in alignment with the International Standards of The Committee of Sponsoring Organization Treadway Commission: COSO 2013.

MWA has established an internal control system according to the structure and the mission covering the key work process of the organization adequately and appropriately in every step of its operations. It is in line with the Metropolitan Waterworks Authority's Enterprise Plan, Good Corporate Governance Policy, MWA Code of Ethics, and principles under the Governance Risk and Compliance (GRC) framework. Moreover, we have implemented other internal control activities that are aligned with the five criteria prescribed by the Ministry of Finance, consisting of:

### 1. Control environment

MWA has determined the MWA Code of Ethics as a part of the Good Corporate Governance Policy. It also covers Job Analysis, Job Specifications, whereas the Audit Committee performs duties in reviewing the efficiency and effectiveness of internal control, risk management, and good corporate governance processes.

### 2. Risk assessment

All executives are required to engage in identifying and assessing risks. The risk management method is also determined to reduce and control the overall risk exposure into a level of the risk appetite as well as to analyze the appropriate alternatives to manage the risk factors by comparing costs and gainable benefits.

### 3. Control activities

MWA has determined good corporate governance policy as the operating framework. This requires to formulate the risk management policy to control the enterprise risks to be in line with the organization's objectives. Also, it includes determining the guidelines and reporting methods regarding internal control for all entities to follow.

### 4. Information and communication

Internal and external communication channels have been integrated into information systems to support implementations of various policies to be more efficient.

Moreover, it also minimizes work processes and increases the opportunities for employees to raise opinions or suggestions to further improve operations of the organization.

### 5. Performance evaluation

The Ongoing Monitoring of individual performance is required to constantly conduct on a regular basis. It also includes a separate evaluation through control self-assessment or CSA at least once a year. Results of performance evaluation including improvement guidelines/plans, for internal control are required to report to the executives and the regulators for acknowledgement.

According to the performance in fiscal year 2021, the audit office has reviewed the performance of MWA's internal control; the results of the overall audit rating is good, and high/very high potential risks are not found. In fiscal year 2022, MWA continues to focus on integrating internal control systems into the important work processes. It requires all entities to conduct activities of internal control covering all work processes that are important to the organization. While control self-assessment is required to be completed within the second quarter of every year. This enables all entities to assess their own risks, establish internal control systems, and prepare additional activities in timely manners, as well as to support the organization to achieve its goals as designated in the enterprise plan.





### Internal audit

Internal audit refers to a system that provides assurance and consulting services fairly and independently. While the Audit Office performs its duty as an independent entity under the supervision of the Audit Committee, which is responsible for assessing and reviewing the efficiency and the effectiveness of work processes to create value-added. It also performs its duty to drive the achievement to meet the organization's objectives and supports the Audit Committee to perform duties, whereby roles and responsibilities have been apparently stipulated in the Audit Office Charter.

In addition, we have formulated the policy to promote team-work skills, as well as to integrate auditing work into work processes that are important to the organization, to create quality work, to enhance the roles of advisors so as to improve efficiency and effectiveness of internal control, risk management, and corporate governance.

### Auditing and reporting

The Audit Office has prepared the 5-year long-term audit plan alongside an annual audit plan based on the Risk-Based Audit, which focuses on the risks that are material to the organization in alignment with the fifth MWA Enterprise Plan (2020-2022). It has covered all of MWA's operations according to the Enablers on internal audit. Furthermore, it also includes an application of digital technology and data analytics techniques to support operations.

In fiscal year 2021, all audit operations have been fully completed as stipulated in the annual audit plan. This includes providing consulting services to the executives and the audited entities. The audit results have been reported to the executives of the audited entities, the Governor, the Audit Committee, the MWA Board of Directors, and the regulatory entities, with the monitoring of the performance according to the recommendations on a quarterly basis.

Regarding the operations of the Audit Office, there are no restrictions on expressing opinions, and there is no any contrary between the audited entities and the audit office that has not yet been resolved.

### Sustaining the quality of audit work

In general, the audit office is required to arrange an audit quality evaluation after completing its duty. The audited entities are required to review the quality of such audit work according to the chain of command. While the audit office is required to be reviewed by the Audit Committee and senior executives under the guidelines approved by the Audit Committee.

In fiscal year 2021, EY Corporate Services Company Limited, an independent external agency, has performed the audit quality evaluation. The results from such evaluation have been submitted to the audit office to analyze and further improve the efficiency of internal control systems. Moreover, it is required to continually arrange the competency development of internal auditors by encouraging them to attend at least forty hours of internal and external training per year, as well as to support them in obtaining the international profession certificates of internal audit or other related professions such as the certificates of CIA and CISA, consecutively from fiscal year 2020.



**Auditor's Fee:** The Office of the Auditor General of Thailand was the auditor of the Metropolitan Waterworks Authority for fiscal year 2021 with an audit fee of 2.50 million baht.

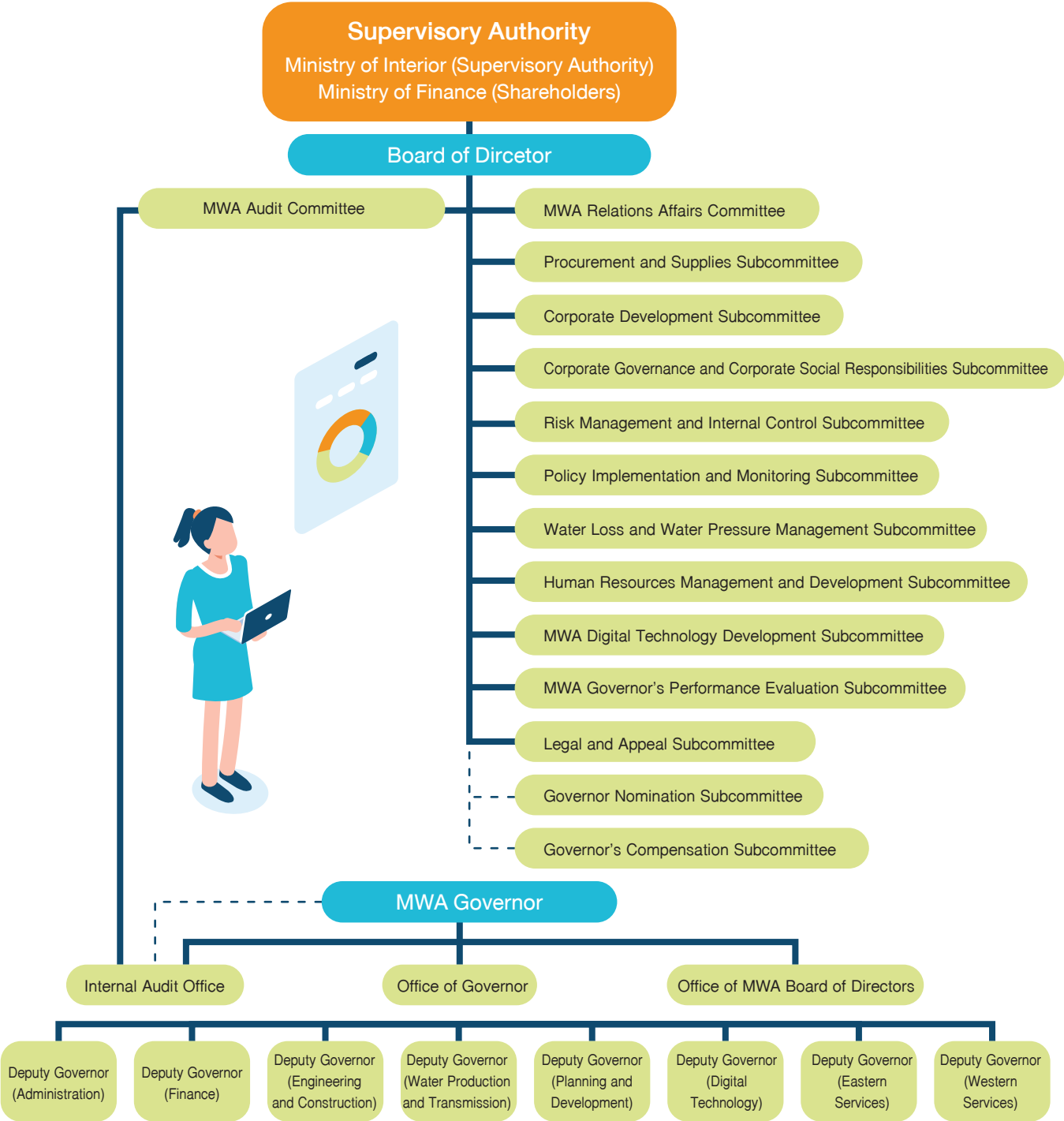
# Transparency and Integrity

## 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 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 respects to the rights of all stakeholders.

## Structure, roles and duties of the Board of Directors

### MWA Good Corporate Governance Structure



The structure of the MWA Board of Directors consists of the Chairman of the Board and other Directors, which are not less than nine (9) persons but not more than thirteen (13) persons, and the MWA Governor is a Director by position. The Board of Directors holds the authority to appoint various committees and sub-committees to scrutinize the work in each aspect in terms of both economic, social, and environmental. In this regard, the qualified experts and executives of MWA are appointed as committee members, sub-committee members, and secretary to support, scrutinize, and report corporate performance in various matters.

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, holding qualifications and experiences that suits the MWA business, holding 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:
  - Core expertise- finance, accounting, legal, and information technology.
  - Specialization according to the requirements of state enterprises- engineering (civil/ water resources/ environment (sanitation), and others), business administration/economics, human resources management, corporate management, project management, and innovation.

## Board Skills Matrix

### ① Core expertise



Finance



Accounting



Legal



Information technology

### ② Specialization according to the requirements of state enterprises



Engineering (civil/ water resources/ environment (sanitation) and others)



Business administration/ economics



Human resources management



Corporate management



Project management



Innovation



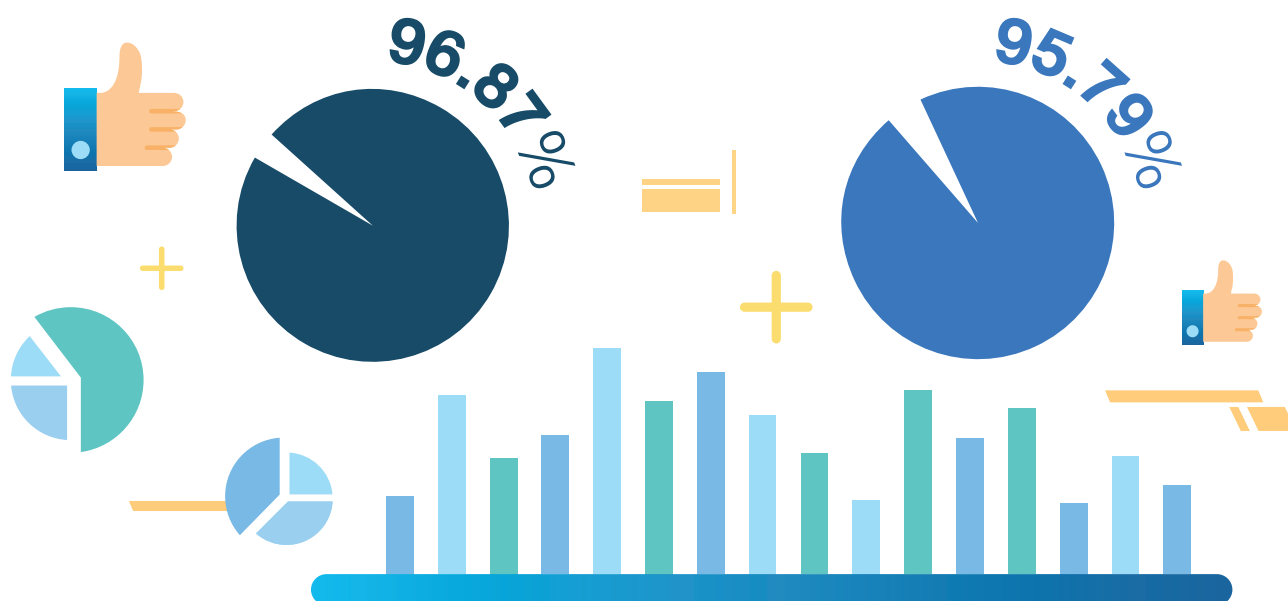
- At least one representative who is a full-time civil servant from the Ministry of Finance, is appointed as the MWA Board member, to maintain the government's interests as a state enterprise shareholder.
- One representative who is a full-time civil servant from the Ministry of Interior (MOI) and is not holding a position in the regulatory entity of MWA, is appointed as the MWA Board member, to integrate the MOI policies to MWA.
- 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.

MWA is required to hold Performance Evaluation of the Board members at least 1 time per annum. This guideline is following the Good Corporate Governance Principles for the State Enterprise, stipulating that the State Enterprise is required to conduct Performance Evaluation of the Entire Board and its individual members, to support the Board in reviewing their performance, material issues, and obstacles during the past years, as well as to increase the effectiveness of their works.

In fiscal year 2021, MWA Board of Directors has agreed and approved two practical formats of Performance Evaluation- 1) for individual Board member (self-assessment), and 2) for the entire Board (Board Evaluation). After jointly reviewing the results from performance evaluation in fiscal year 2021, performance improvement guidelines for the Board in various aspects have been formulated. This also includes establishing the Corporate Governance Enhancement Plan 2022 for the Board, to intend to improve performance to be more effective.

## Results from the MWA Board's Performance Evaluation in fiscal year 2021

1. As a result of Self-Assessment for individual Board member, the average score was 4.84 (out of a full score of 5), representing 96.87%, which means, at the average, the performance of individual Board member was excellent.
2. As a result of the Board Evaluation, the average score was 4.79 (out of a full score of 5), representing 95.79%, which means the performance of the entire Board was excellent.



In this regard, the critical missions of the Board have been reviewed. It also includes the performance evaluation framework for the state enterprise on good governance and directorship according to the new evaluation criteria which has been introduced in fiscal year 2021, together with issues that have affected the scores to be low. The purpose of this review is to analyze the performance and prepare a plan to enhance the good corporate governance guidelines of the MWA Board for fiscal year 2022.

To drive the organization to excellence, the Board members have been encouraged to improve themselves through the related training/seminars, such as the Director Certification Program (DCP), the Corporate

Governance Program for the Board of Directors and Top Executives of State Enterprises and Public Organizations (PDI), and other appropriate courses. It also includes business visits regarding the waterworks management systems and other related systems, holding particular meetings for MWA's Independent Directors, and on-site observations. Furthermore, the orientation program is held for the newly appointed Directors by describing the overall MWA operations in summary as well as preparing the handbook for Directors and other important documents that are relevant to the organization. Information necessary for performing Directors' duties is also included, to enhance efficiency and effectiveness of all Directors.

## Roles and responsibilities of the MWA Board of Directors

- **To define the organization's direction:** The Board of Directors together with all Executives are required to jointly consider determining the visions, missions, strategic plans, and goals as well as approving the preparation/review of the MWA State Enterprise Plan, annual action plan, and budget. Also, the remarks and suggestions are required to propose at the meeting to provide an apparent operational framework for the organization. This enables the Executives to translate policies into practices and define goals for employees at all levels. Moreover, the monitoring of performance is also included, to ensure compliance with the specified plans.
  - **Corporate Management Systems:** The Board of Directors is required to govern and monitor corporate performance to ensure that MWA has implemented sufficient and appropriate corporate management systems. The critical systems are detailed as follows:
    - 1) **Internal audit system**
    - 2) **Information and digitalization management system**
    - 3) **Human resources management and development system**
    - 4) **Risk management and internal control system**

MWA's Board of Directors is required to consider approving the annual action plan for the aforementioned systems before commencement date of operations in the following fiscal year. The monitoring of performance is also required to be held at least on a quarterly basis. Moreover, the remarks and suggestions are required to be raised at the meetings, to enhance the standards and adequacy of the work systems.
  - **Policy formulation for corporate management:** The Board of Directors is required to formulate corporate management policy and govern the organization to operate its business in compliance with the law, related regulations, and the operating policies as stipulated.
  - **Enhancing the efficiency of good governance:** The Board of Directors is required to formulate the good corporate governance policy and prepare its handbook, including long-term good corporate governance action plans and annual action plans.
- It also includes approving those plans and relevant matters before commencement date of operations in the following fiscal year.
- **Accountability towards the roles of the government sector:** The Board of Directors is required to monitor the corporate performance and ensure that MWA reports its performance in accordance with policies and guidelines on good corporate governance, wholly and systematically covering the material issues, to the Ministry of Interior, which is the Ministry in charge, and the Ministry of Finance, which is a shareholder. It also includes reporting on financial and non-financial performance and reporting on compliance with good corporate governance practices, laws, rules, and regulations that are related to MWA.
  - **Roles for fair market competition:** The Board of Directors is required to formulate policies and guidelines on fair market competition wholly and systematically, namely guidelines for responsibility toward competitors and creditors, promoting fair competition, and comprehensive financial management that covers a transparent and fair financing approach. It also includes the financial and accounting management methods that are aligned with recognized standards, establishment of communication channels for receiving complaints and its compensation, actions against anti-corruption and bribery, and procurement systems that fair and non-discriminatory to contractors and vendors.
  - **Shareholders' rights management:** The Board of Directors is required to formulate policy and guidelines for preventing conflicts of interest, the use of inside information, and the connected transactions, which are parts of the MWA Code of Ethics for the Board of Directors, Executives, and employees, and it is required to be in line with the principles of good corporate governance. All employees are required to report a self-certification on a regular basis within October of every fiscal year. While the appointment and transfer for a new position during fiscal year are required to be reported within one month from the appointing date. The newly onboarding employees are also required to proceed the reporting processes

within one month from the commencement date of probationary work. However, in the case of other subcontracted workers, they are required to report only the prevention of conflicts of interest and the use of inside information.

- **Roles towards stakeholders:** The Board of Directors is required to formulate policies and prepare operating handbooks. It also includes the key community development plan, a long-term master plan, and an annual action plan, to demonstrate accountability towards stakeholders, communities, and the environment. Furthermore, MWA's Board of Directors is required to consider and approve the long-term and annual action plan on social and environmental responsibilities as well as monitoring such performance at least on a quarterly basis.
- **Innovation and sustainability:** The Board of Directors is required to formulate policy and prepare operating handbooks on innovation. Moreover, the long-term innovation plan and the annual innovation plan are required to be considered and approved before commencement date of operations in the following fiscal year. The policy, operating handbooks, and the MWA sustainable development report, are required to be prepared in orderly and systematic manners.
- **Disclosure of information:** The Board of Directors is required to govern the executives to disclose financial and non-financial information through the annual report and MWA's website.
- **Monitoring of performance:** The Board of Directors is required to govern the executives and monitor their performance on financial and non-financial matters at the Board's meeting on a monthly basis, along with expressing the remarks or suggestions to increase the efficiency and effectiveness of operations to meet the goals as defined.
- **Operations relating to top executive, senior executives, and employees**
  - 1) A Nomination Committee is required to be established in order to consider the criteria and methods to nominate qualified persons for the position of the MWA Governor.

- 2) MWA Governor is required to determine a senior executive structure, scope of work, and appropriate qualifications for senior executive positions.
- 3) Succession plan is required to be established for the positions of the Governor, senior executives, and key positions of MWA.
- 4) The executives and employees are required to be promoted and encouraged to attend training and competency development programs to further improve themselves as beneficial to operations.
- 5) Performance evaluation is required to be conducted for the Governor and senior executives by determining criteria, indicators, weighting factors, and apparent goals at the beginning of fiscal year. The monitoring of performance is required to conduct on a semi-annual basis and its results are required to be integrated into the incentive program.
- 6) The MWA Governor is required to govern the executives to implement human resource management that is in line with the missions and objectives of the organization. Employment retention of competent employees is also included.

#### Appointment of the Committee and Sub-committees:

The purpose is to govern and scrutinize the works before presenting them to the MWA's Board of Directors. However, the Chairman of the Board shall not hold a position as a Chairman or a member of the Sub-committee to ensure that they genuinely perform their duties independently.



MWA's roles and duties of various sub-committees

<https://www.mwa.co.th/download/anti-cor/01-2563.pdf>



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## Compensation for MWA's Committee

Compensation for MWA's Committee are categorized into three types



As a state enterprise under 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 any 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 of twice the amount of a 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 one time per month, but not more than fifteen times per year, when it is reasonable.
- 2) In case of specific Sub-committee meeting, other Committee's members or working groups who are appointed by law or regulations which are the central criterion, or the Cabinet resolution, or the State Enterprise Board, MWA's Committee's members, and other Committee's members who attend the meeting and are not a 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's members. But it is not more than two different Committees, and each Committee is paid for only once a month.

MWA is required to pay bonuses to Committee's members after submitting the net profits allocated as state revenues to the Ministry of Finance. The bonus allocation is in according to the evaluation results and the limit under the criteria approved by the Cabinet resolution dated on 2 July 2013, which have 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 on 17 June 2013.



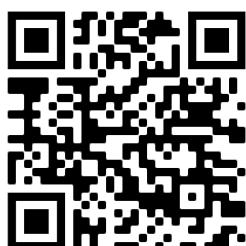
## MWA Good Governance and Code of Ethics



MWA's Board of Directors has been continually implementing a good governance policy with apparent goals since 2006. It is in alignment with principles and guidelines on good corporate governance for state enterprises and the Stock Exchange of Thailand. The purpose is to drive the organization to achieve the vision "To become a high-performance organization that provides waterworks services with good governance to meet international standards". Thus, the good governance handbook has been prepared and it is used as a guideline to focus on the organization's operations with transparency, integrity, accountability, and without corruption. It is also consistent with improvement guidelines and in accordance with the Fifth Metropolitan Waterworks Authority's Enterprise Plan (2020–2022), in response to the 20-year National Strategy (2018-2037), the Twelve Economic Development Plan and National Society (2017-2021), the National Strategic Plan on Prevention and Suppression of Corruption, Phase 3 (2017-2021), and the Strategic

Plan of the Ministry of Interior (2017–2021). Furthermore, this includes the government's policy that promotes the administration of state affairs with good governance, the prevention and suppression against corruption, and misconduct in the government sector. However, this is to ensure that the material issues are appropriate and more aligned with the current situation and international standards in accordance with the United Nations Convention Against Corruption 2003. Meanwhile, the details of good corporate governance and anti-corruption policies have been integrated into such handbooks as well.

MWA has applied the aforementioned handbook as a guideline for the MWA's Board of Directors, Sub-committees, Executives, and all employees. As a result, the Sub-committee on Corporate Governance (CG) and Corporate Social Responsibility (CSR) together with the Board of Directors have had a resolution to review the contents of such handbooks.



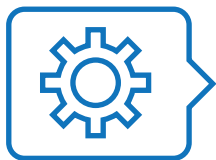
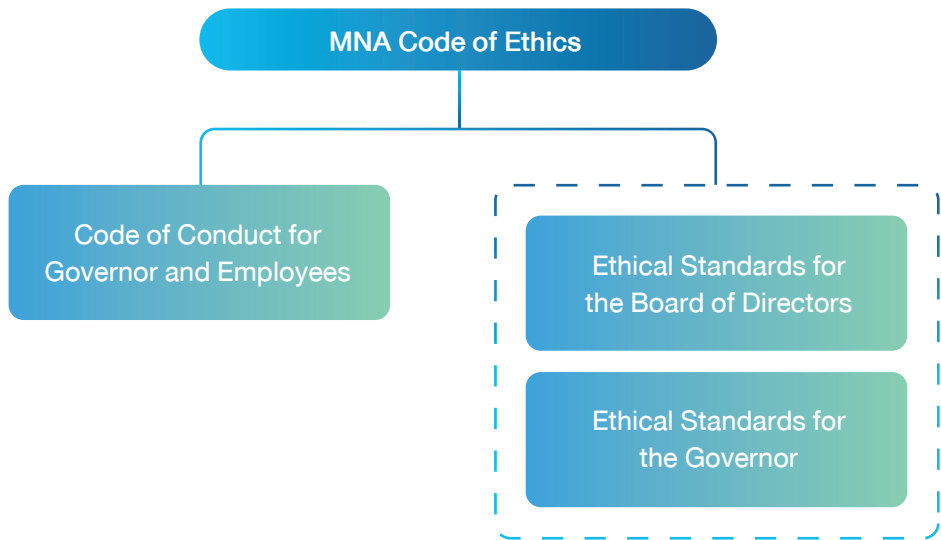
MWA Good Governance Handbook

[https://www.mwa.co.th/download/gov08/01\\_cg/cgmanualbook\\_2564.pdf](https://www.mwa.co.th/download/gov08/01_cg/cgmanualbook_2564.pdf)

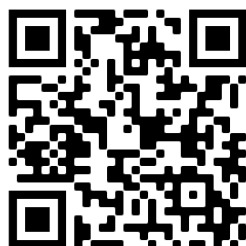
MWA Code of Ethics



MWA code of ethics has been established for employees at all levels to comply with rules and regulations and it is used as work standards that supports and promotes the corporate image to be recognized internationally. This allows the Sub-committees, Governors, Executives, and employees at all levels to strictly comply with such practices under the framework of morality and ethics with the following components:



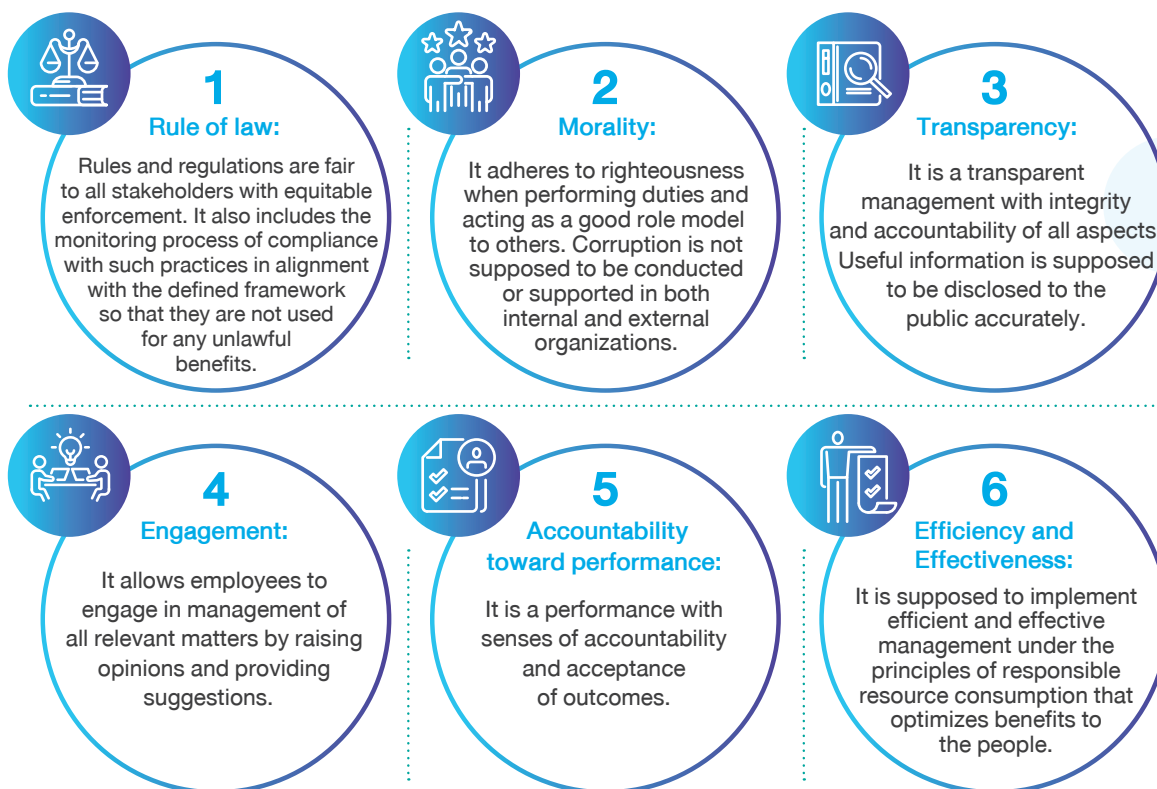
The Constitution of the Kingdom of Thailand, BE 2550 (2007), Section 279, has stipulated that a Code of Ethics is required to be established in order to set ethical standards for persons holding political positions, government officials, or state officials, by providing mechanisms and systems to effectively enforce. It also includes determining the punishment procedure according to the severity of the act to comply with the intent of the said constitutional provisions. MWA Board of Directors has established the Code of Ethics under the Metropolitan Waterworks Authority Regulation No. 133 regarding the Code of Ethics for Governor and Employees of Metropolitan Waterworks Authority, B.E. 2552, dated on 28 December 2009, and it is required to publish to the public.



MWA Good Governance Handbook  
[https://www.mwa.co.th/download/gov08/01\\_cg/cgmanualbook\\_2564.pdf](https://www.mwa.co.th/download/gov08/01_cg/cgmanualbook_2564.pdf)

## MWA Good Governance Practices

Compliance with good governance principles is one of the crucial practices for MWA; therefore, management guidelines and its practices have been established, with the purposes to become a high-performance organization and to build confidence to all stakeholders in a sustainable manner, consisting of;



## MWA's operations on governance

- MWA's Board of Directors has formulated key policies for management under the good corporate governance principles together with corporate social and environmental responsibility (CSR) practices. So, the Corporate Governance (CG) and Social Responsibility (CSR) Sub-committee has formulated strategies, goals, and action plans on good corporate governance and social responsibility practices, that are fair to all groups of stakeholders.
- MWA remains committed and aware of the value of prevention and action against corruption in concrete manners through various key operations. For example, the Committees, Sub-committees, and high-level Executives have expressed their intentions of "Metropolitan Waterworks Authority is an organization with transparency, integrity, and accountability, without corruption" and this intent has been communicated to all employees in the organization. Furthermore, the good corporate governance policy regarding the No Gifts Policy, B.E. 2021, has been formulated, and also, the Adminis-

trative Governance Council has been established to encourage employees to protect the interests of the organization, to be free from internal and external interference powers. However, the MWA Anti-Corruption Operation Center (MWA ACOC) has been established to conduct prevention and suppression of corruption and misconduct program within the organization according to the national strategy in response to the government's policies on promotion of the administration of state affairs with good governance, in order to create a network to drive policies and measures. We have implemented this center together with the Anti-Corruption Operations Center of the Ministry of Interior (ACOC MOI) which is located at the Corporate Governance Department, 6th Floor, MWA Headquarters Building. In this regard, complaint channels regarding corruption and misconduct can be accessed through telephone, fax, internet, intranet, complaint box, QR code, and so forth.

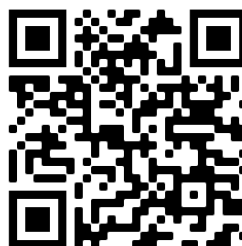
## Anti-Corruption

To promote morality, ethical standards, codes of ethics, and anti-corruption practices, MWA, therefore has defined these matters as a part of the corporate strategies according to the Fifth MWA Enterprise Plan (2020 — 2022) for fiscal year 2021, aspect 3; promote good relationships with stakeholders and adhere to good corporate governance for sustainability. Of which the Strategic Objective (SO): SO-5 is to develop good relationship-cooperation with stakeholders through good corporate governance practices in alignment with the Strategy 3.2; tighten relationships with stakeholders to create sustainability through good corporate governance practices. In this regard, these matters have been already included in the MWA action plan for fiscal year 2021.

In addition, the anti-corruption policy has been formulated for the Board of Directors, Sub-committees, Executives, employees, and subcontracted workers of MWA, to follow, as well as establishing relevant policies, such as morality and transparency policy and enforcement of measures according to the No Gift Policy, B.E. 2021. Moreover, whistleblowing policy and complainant protection policy have been included.

The Committee, Sub-committees, Executives, and all employees of MWA have signed on the Declaration of Intent every year to show commitments to the administration and operations with integrity toward the public and all groups of stakeholders.

The performance in fiscal year 2021 was set to receive a score of more than 90 from the integrity and transparency assessment for public sector (ITA) or ranked in the top 6 of state enterprises. This year, we received a score of 93.93 from ITA, or it was ranked at level A.



Declaration of Intent on  
Anti-Corruption  
[https://www.mwa.co.th/  
download/anticor/thai64.pdf](https://www.mwa.co.th/download/anticor/thai64.pdf)

## Processes for Risk Assessment on Corruption

In fiscal year 2017, MWA has signed a memorandum of understanding (MOU) on the Anti-Corruption Coalition of Public Sector together with the Office of Public Sector Anti-Corruption Commission (PACC), to facilitate in applying for permission from government agencies, with an action against all forms of bribery. As a result, MWA has conducted an enterprise risk assessment regarding corruption on an annual basis.

In fiscal year 2021, the following actions were taken:

1. Workshop on the enterprise risk assessment regarding corruption was organized for executives at the department director level, or equivalent, and up, accounted for 120 people. The survey results from the post-workshop showed that their comprehension level stood at 90.00%.
2. An enterprise risk management plan regarding corruption was prepared under the topic of "Construction Work Control" for the Engineering and Construction Division through the approval by the MWA Action Against Corruption and Ethics Promotion Committee.
3. The Engineering and Construction Division took steps to comply with the enterprise risk management plan regarding corruption.
4. The results of performance according to the enterprise risk management plan regarding corruption was 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).

The Enterprise Risk Management Plan regarding corruption for fiscal year 2018-2021

FY 2018: Applied for permission to install waterworks systems

FY 2019: Disbursement Process (equipment/pipe disbursement)

FY 2020: Replacement of flow meter or equipment in a disbursement process

FY 2021: Construction work control

## Administrative Governance Council

MWA is the first state enterprise to establish an “Administrative Governance Council” to strengthen corporate and ethical values as well as to encourage employees to realize the value of morals, virtues, and corporate governance when performing duties. The council is a mechanism for preventing corruption and conflicts of interest in the organization, rooted by the Leadership and Role Model on Governance Program (CG My Idol). The establishment of this council has been accommodated by the MWA Regulation No. 138 regarding MWA Administrative Governance Council, B.E.2559. One hundred and one members have been elected to perform roles and duties in communicating good governance practices; listening to information, problems, and receiving suggestions, as well as proposing employees’ opinions to the executives through the council, to create concrete good governance within the organization and it has been consecutively implemented for the fifth year.



## Collaboration and Partnership with the organizations that support anti-corruption matters

To strictly comply with the Anti-Corruption Policy, MWA has jointly collaborated with external agencies as network partnership, such as the Foundation for a Clean and Transparent Thailand (FACT), Moral Organizations, and so forth. In addition, a memorandum of understanding between MWA and the Office of Public Sector Anti-Corruption Commission (PACC), has been signed, to facilitate in applying for permission from government agencies, with an action against all forms of bribery. Moreover, MWA has joined the integrity and transparency assessment for public sector (ITA) program, organized by the Office of National Anti-Corruption Commission (NACC).





## Communication and Awareness of Anti-Corruption

Anti-corruption practices have been communicated to all employees to learn and understand on a regular basis throughout the year.

In fiscal year 2021, actions were taken as follows;

- Training regarding anti-corruption practices was organized for executives, employees, and subcontractor's workers, such as training under the topics of "Sufficiency Economy Philosophy and Anti-Corruption", "Dharma against cheating by Phra Maha Sompong and Phra Ajarn Dr. Somphong, lecturing under the topic of "Ethical Practices toward Sustainable Success".
- Communication with employees through internal communication platforms-Circular announcement, Poster, MWA Radio channel (CG Mee Dee), in the Executive's meetings (Policy level), Nam Kok Journal, CG Digest Journal, Facebook Page: MWA CG Club, MWA Administrative Governance Council, MWA Corporate Governance on YouTube channel, various line groups, CG Activities, and more.
- Communication with external stakeholders through various media, such as Nam Kok Journal, Facebook, YouTube, and Stakeholder Day Event.

In this regard, the Board of Directors has placed importance on good corporate governance, codes of ethics, and anti-corruption practices by participating in activities such as:

- MWA's Board of Directors has held a signing ceremony to declare the intent of "MWA is an organization with transparency, integrity, accountability, and without corruption", to express its intent to govern and manage the organization with integrity.
- The Chairman of the MWA Board has introduced the policies for business practices in compliance with the good governance principles adhering to operate its business with integrity, morals, and code of ethics to build confidence among stakeholders in the "Stakeholder Day" event.
- MWA's Director has presided over the opening of the training course under the topic of "Ethical Practice for Sustainable Success" for employees to appropriately apply ethical guidelines and codes of ethics to perform their duties.
- The Chairman of the Board together with the Committee of MWA have presented ideas on corporate management with integrity through various media, such as intranets, posters, Facebook pages, MWA CG Club, circulars, and so forth.



## Transparency Award in Fiscal Year 2021

### Master Moral Organization Award

- In fiscal year 2019, MWA has received a Master Moral Organization Award from the Morals Promotion project for communities, organizations, districts, and provinces (award was announced in 2021) under the first National Moral Promotion Master Plan (2016-2021), organized by the National Moral Promotion Commission, Department of Religious Affairs, the Ministry of Culture. The evaluation criteria for moral organizations have been divided into three levels, whereby MWA has achieved the highest assessment criteria at level 3, and has been selected as one of the eight organizations under supervision of the Ministry of Interior to be a role model organization in terms of moral or a successful moral organization in terms of both development and changes in people's behaviors that reflects morality, happy workplace, quality organization, empirical morality, with knowledge and ability that can be transferred, and as a source of learning for other organizations.



### Morality

- MWA received a score of 93.93, or level A from the Integrity and Transparency Assessment (ITA) of the public sector for fiscal year 2021.

## Overview of Performance on Anti-Corruption in Fiscal Year 2021

General Data	Unit	Fiscal Year 2021
Total number of MWA entities	units	67
Number of entities that have been assessed for corruption risk	units	4
Percentage of the entities that have been assessed for corruption risk	%	5.97
Board of Directors, Executives, and Employees who have been trained on Anti-Corruption Policy and Process		
Total members of Board of Directors	persons	15
Percentage of total Board of Directors	%	100
Total number of Executives (Division Head and above)	persons	426
Percentage of total Executives	%	29.52
Total number of Employees (not including subcontracted workers)	persons	355
Percentage of total employees	%	12.64
Board of Directors, Executives, and Employees who have been aware of Anti-Corruption Policy and Process		
Total members of Board of Directors	persons	15
Percentage of total Board of Directors	%	100
Total number of Executives (Division Head and above)	persons	1,443
Percentage of total Executives	%	100
Total number of Employees (not including subcontracted workers)	persons	2,807
Percentage of total employees	%	100
Total number of suppliers and contractors a	persons	203
Percentage of total suppliers and contractors	%	100
Case (s) of Corruption caused by employees, suppliers and contractors. <sup>b</sup>	case	1
Number of corruption-related legal disputes against the organization or its employees   If in case of the organization, it was happened during the reporting period	case	0

a. refers to supplier or contractor who entered into a contract with the PEA with a contract value of more than 500,000 baht for a period of three consecutive years.

b. Two complaints were from the MWA Anti-Corruption Operation Center (originally there were three complaints, but one case was terminated according to the resolution of the MWA Anti-Corruption Operation Center's meeting). Another one was from other complaints' channels through the entity of the complainant. It was a complaint from fiscal year 2020 and a penalty was ordered to dismiss that employee who performed a serious misconduct on duties, relying on/allowing others to exercise their powers over his duties whether it was direct or indirect action for benefit of oneself or others according to the 115th Articles of Association of MWA on Human Resources Management, B.E. 2543 (2000).

## Conflict of Interest Management

MWA's Board of Directors has focused on the conflict of interest arising from the people who are involved in the organization's operations. Thus, rules and guidelines regarding conflicts of interest have been stipulated in corporate management guidelines and good governance practices. It states that the Board of Directors, Executives, and all employees, are supposed to disclose information to prevent the individual conflict of interests between employees and the interests of MWA in both direct or indirect manners. Moreover, the Notification of the Board of Directors, Re: Conflict of interest prevention policy and practice, use of inside information, the connected transactions, have been prepared. The actions of the following cases have been considered conflicts of interest.

1. Use of inside information to seek benefits for oneself or others.
2. Being a contracting party or holding a stake in a contract made with MWA, or operating a business that competes with MWA and causes the personal interests to be contrary to, or inconsistent with MWA's interests or affects the personal discretion to decide on performing work with MWA.
3. Holding positions of managing director, manager, key shareholder, advisor, representative, employee, or worker in a private business under the supervision, control, or audit of MWA, that causes the personal interests to be contrary to, or inconsistent with MWA's interests or affects the personal discretion to decide on performing work with MWA, unless being appointed by MWA in writing.

The provisions under paragraph one are supposed to apply to the spouse of the worker. It shall be deemed that the spouse's actions are that worker's actions.

In this regard, MWA has established rules and procedures to report conflicts of interest, use of inside

information, and the connected transactions according to the MWA Order, No. 522/2564, dated on 29 September 2021. In addition, reporting such matters by other workers according to the MWA Order, No. 523/2564, dated 29 September 2021, has been already included in those rules and procedures.

Conflicts of interest written in the prescribed forms are required to report to the hierarchy superiors at the end of every fiscal year. And if there are actions that are considered conflicts of interest during fiscal year, it is supposed to be reported to supervisors every time. The Audit Office is responsible for summarizing the conflict-of-interest reports of the entire organization and details are as follows:

In fiscal year 2021, the conflicts of interest reporters consisted of fifteen members of the MWA Committee, fifty-two persons of other workers designated by MWA, and four thousand two hundred and fifty-one (4,251) employees. All of them were held non-conflict of interest with MWA.

For connected transactions that may cause conflicts of interest and may lead to the transfer of interests of the organization, it is supposed to conduct a stakeholder audit in the procurement process of MWA in both direct and indirect manners. The audit is supposed to be conducted with those who submit bids, whether they are natural persons, other juristic persons, and the persons from the central market. Moreover, the relationships in terms of management and joint venture or both are supposed to be audited.

In fiscal year 2021, the Audit Office conducted a review of the relationships between contracting parties and MWA's employees in the procurement process and no conflicts of interest or connected transactions were found.

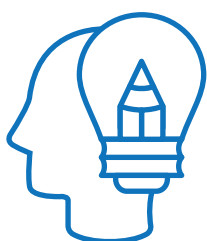
*note:*

\* Other workers designated by MWA refers to the sub-committees of the MWA, totaling 52 persons.



## Innovation and Digitalization

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 for determining 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 initiatives proposals. Also, it is used as criteria in selecting ideas or workpiece deriving from training and contest, such as innovative workpiece from activities of the “Journey to Innovation”, the MWA Innovation Contest, and the MWA Virtual Hackathon 2021, and so forth, for a further development into the commercial and social innovations. Hence, it can be claimed that the innovation themes are important in determining the directions 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 sustainable manners.
  - 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 of 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.

From the aforementioned innovation themes, it shows that we have focused on the 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 the 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 2021, we implemented fifty-one projects out of seventy-seven projects, representing 66%.

## Innovations for the better customer service and performance

In 2021, the innovation theme on the Seamless Service Experience has been developed to create more convenience for the customers to access MWA diverse services, such as:

### ● Speak On Me

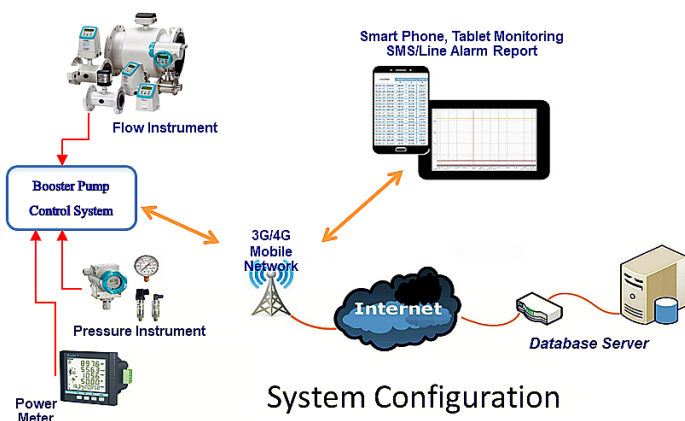
It is an innovation that enables the customers who require to apply for our new services, to directly inquire with MWA officials via the Microsoft Team application. This is used together with the CIS and the Google Street View applications, to identify the service locations. Moreover, this feature also encourages the social distancing in alignment with the preventive measures during the COVID-19 pandemic, to reduce the risks on customers' health, and enable them to conveniently experience the seamless services anywhere.

Turn Crisis into Opportunity



Have you ever used these programs?

- Booster Pump Project:** It is a project that solves the problems of low water pressure for the customers affected by this issue. It originates from the project to increase the efficiency of water distribution systems in our service areas connecting to other provinces which has been implemented in 2020. The purpose of this project is to solve the problems of low water pressure in serious manners. For fiscal year 2021, we have implemented the project in alignment with an action plan to install two booster pumps whereby its system and data processing are controlled through the Internet platform. As a result, we have received good feedback from customers (the number of complaints has decreased), causing us to install more booster pumps in seventeen problematic areas. Moreover, we have planned to continually expand the scope of this project to enhance the efficiency of the water pressure in response to the customers'



needs across service areas. We have already included this project in the MWA Action Plan 2022. Also, we have implemented the innovation projects under the Innovation Development Plan by adopting technology to implement the projects in accordance with the Innovation Development Themes on the “Smart Water System”, to develop the water treatment systems and reduce water loss. This project consists of the followings:



การติดตั้ง Pressure Booster Pump

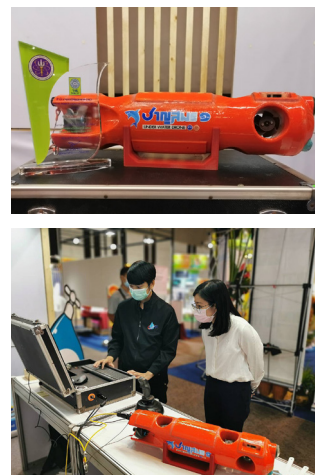


- The Waree Kunchorn:** the robotic explorer of raw water canals: The robot has been developed for the purpose to measure the depth of raw water canals and inspect its water quality. This enables us to measure turbidity and its electrical conductivity of the water, controlled by remote control devices in both forms of manual and autonomous depending on the specified locations on the map. Thus, this robot is classified as a type of unmanned marine vehicle, with the ability to explore raw water canals more conveniently and quickly. Moreover, it can reach the areas which are difficult to access alongside function to preliminarily measure the water quality apart from our existing water quality analysis laboratories. In overview, it is beneficial to our waterworks system management and maintenance work for raw water canals.





● **The research project:** The purpose of this project is to develop the unmanned underwater vehicles (UUV) that hold the ability to investigate the breakage or leakage of main pipes. Its propulsion structure is placed inside a cylinder, equipped with a Signal Processing robot's frontal imaging system. It is used for exploring and inspecting water pipes ranging from 800 millimeters with its inlet size of 150 millimeters. Meanwhile, it can explore pipes at a distance of 600 meters with a life period of 4 hours. For air and water resistance ability, it is able to withstand the average water pressure of 0.8 bar at a water flow velocity of not more than 2 meters per second. Besides those mentioned abilities; it is able to inspect and assess damages inside the pipes for allowing us to prepare temporary or permanent maintenance work, as well as to explore main pipes underneath the waterworks canals or main pipes in other areas with high rate of water loss or in areas where are difficult to access.



## Creating a community network for exchanging knowledge and experiences with stakeholders

Innovation development requires knowledge-based skills within the organization as preliminary data. Thus, we have encouraged our employees to exchange knowledge and experiences among their colleagues and external agencies- the Metropolitan Electricity Authority, the Royal Irrigation Department, the Hydrographic Department, and waterworks agencies in foreign countries. Meanwhile, we have laid down a KM Portal system, a knowledge management information system, used for collecting knowledge bodies throughout the value chain. This can be shared to others through various media where stakeholders can conveniently access, such as the Facebook Page and the YouTube Channel managed by the Knowledge Management Division, Website of the MWA Waterworks Institute of Thailand, KM Stakeholder Site, Tap Water Journal, and more. This includes valuable tips for waterworks, good practices in various matters, things to know while working with MWA, such as secret (but not secrets) to proceed the registration for contractors, the standards for the canvas of pipe's cover during the period of construction, channels for receiving MWA services, and online payment services for water bills.

As the COVID-19 pandemic still exists, we therefore have engaged in sharing knowledge on the application of technology so that the people can apply it as the alternative occupation channel to generate more personal income and reduce the burden on the household

expenses. We have implemented this project by holding a free-of-charge training on “Basic IoT Technology (for Waterworks)” to 50 persons affected by the COVID-19 pandemic. The course outlines consist of an introduction to the Internet of Things (IoT), fundamental electrical circuits and electronic devices, learning about computer programs, by lecturers and demonstration through online platforms, such as developing a small intelligent watering system and more.



## Lesson learned from the case of the 1,200 mm water pipe, ruptured on the parallel roads along the Southern Kanchanaphisek Ring Expressway

MWA has held a seminar under the topic of **“In the case of a 1,200 mm water pipe rupture”**, with the purpose of sharing the experience and seeking the best practice of such situation. Mr. Kavee Areekul, Governor of the Metropolitan Waterworks Authority (MWA) has chaired the seminar whereas the MWA executives, the relevant entities, and Knowledge Facilitator (KM FA) from various departments, have attended this activity. The major purpose is to discuss, brainstorm, and collect relevant information to create a knowledge body and develop best practice for the further troubleshooting of such cases. Moreover, it also aims to develop and modify methods/operation procedures including business continuity management (BCP) of the organization as well.

During the seminar, the MWA governor has addressed the problems and management guidelines after being notified of a water pipe rupture. In which MWA has received good cooperation from all entities, especially a great support on alleviating the suffering for those affected by the suspension of water supply service,

laying down water diversion system, supplying the water supply mobile units and the water dispensing points as well as temporarily laying the by-pass water pipes. At the time, although we have faced many problems and obstacles, we have completed it successfully, causing the situation to be back to normal.

In addition, the discussion also includes other important issues, such as:

- Sequences of operations, management guidelines, and job assignments
- Public relations and community relations
- Engineering techniques and pipe repair procedures in such case
- Mitigation measures for those suffering from such cases and inter-agency integration.
- Water quality control and building confidence toward tap water quality
- Business Continuity Management Plan (BCM).





## E-Meeting—an Environmentally-friendly Technology

The purpose of the e-Meeting system development project is to support various meetings arrangement within the organization through an online platform. This program helps us reduce the use of papers and time-consuming in organizing each meeting. It also facilitates the processes of preparing the meeting agenda, creating a meeting schedule, and attaching e-documents required by the meeting participants of both before, during, and after the meetings, alongside a feature for searching or recording each meeting in forms of statistics.

We have applied this technology in response to corporate strategies both in terms of the reduction of internal processes, the digitization policy that drives the organization to become a green organization, reduction of energy consumption and waste, and increase in efficiency of resource consumption. Moreover, it is designed under the concept of user-friendly that can be used on computer devices of all platforms and it supports devices of various sizes- smartphones, tablets, notebooks, and PCs, to facilitate more convenience and flexibility for the meetings' organizer and participants.

In terms of management process, this program facilitates the executives to conveniently and quickly monitor employee's performance at the meetings in alignment with the corporate policy that drives the executives to pilot the application of the e-Meeting system. This action is to demonstrate a leadership role and to affirm the system's efficiency in the matters of reduction in paper-use. Conclusively, it has raised awareness of responsible resource consumption to all employees with empirical evidence. Thus, we are proud to say that the e-Meeting system is one of the efficient environmental programs valuable for every entity of MWA.

From the day we launched the e-Meeting system in fiscal year 2019, there were 629 meetings held through this platform. As a result, the paper-use was reduced by about 3,399,214 sheets, or representing about 6,800 reams, or approximately amounting to 748,000 baht in total, resulting in the organization to reduce the operating cost (office supplies).

## Camera Intelligence Alert – CIA

In order to optimize the efficiency of MWA products and services, we have reviewed the improvement and maintenance plan for waterworks infrastructure to be more efficient under the “MWA Change For Better” project. This focuses on replacement of deteriorating and aging pipes by 1,000 kilometers per year. The purpose is to reduce the amount of water loss and enhance the efficiency of water distribution systems. Thus, in order to complete these missions successfully, construction supervisors are required to concisely inspect and control the waterworks system installation work in response to the engineering standards. It is also in alignment with the Water Safety Plan (WSP) to prevent contamination during construction and to ensure the water quality before distributing it to consumers. In the matters of risk management, it helps reduce the potential risk of pipe breakage and leakage due to the pressure arising from solids contaminated in the sand layer along the pipelines. Conclusively, all actions are to create continuity of the water supply services in sustainable manners.

However, as our limitations on personnel/supervisors of MWA branches, they are unable to control the work nor inspect any defects of construction works at all times. Thus, we have adopted the digital tools to support those supervisors to perform the inspections and work controls of all construction thoroughly, to meet the required standards. To comply with such guidelines, CCTV technology is introduced to help control the work, to allow supervisors to monitor construction works anywhere and anytime. Moreover, AI technology is also introduced to the operations, with a purpose to develop a process of data analysis to detect the status of the pipe's covers. It requires the Big Data system to create the AI for data analysis in the forms of deep learning from photos taken from the pipe installation construction sites, to create a mathematical model by applying the Convolutional Neural Network-CNN method. This system also integrates a notification feature for the problematic construction site that does not meet the standards as stipulated in the water safety standards, such as the status of uncovered-pipe for newly installed pipes, and more. It also includes the inspection for stones and cement fragments contaminated in the sand layer along the pipelines. Conclusively, this action is another crucial step that can help us raise the construction control standards for waterworks infrastructure.

## Supply Chain Management and Sourcing

Business activities in the value chain are considered crucial factors for considering corporate management structure in Today's business, which is supposed to be in alignment with the nature of activities conducted by relevant stakeholders. The purpose is not only to create excellent economic performance but it is to create well-being for everyone in terms of both social and environmental as a whole.

To produce quality products and deliver valuable services for customers, firstly, we require procuring raw materials or resources to be inputted to the production process. Therefore, efficient processes to explore and procure these inputs are taken as one of key factors in the initial production stage of every organization. Moreover, we are required to establish the procurement structure and guidelines to implement together with the application of technology to produce the products to meet the required standards and deliver the remarkable services that are in line with commitments given to customers.

Not only the matters as mentioned above, Metropolitan Waterworks Authority (MWA) has placed great importance on corporate governance compliance. Thus, we have established MWA Code of Ethics for all employees to follow. In our context, Code of Ethics simply refers to good practices for operating businesses to be in alignment with core missions and other related businesses. It requires to conduct business under the frameworks of morality and ethics that give the great importance of equality toward all groups of stakeholders, alongside promoting a good corporate image and maintaining the interests of MWA with best efforts.

Furthermore, we have established MWA Code of Ethics on accountability toward suppliers and/or creditors as follows:

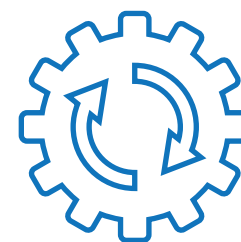
1. MWA is required to strictly abide by the terms and conditions as agreed and not to violate the rights of suppliers and/or creditors.
2. MWA is required to protect the interests of stakeholders, for example, in the case of failure to comply with the terms of the agreement, it requires to notify suppliers and/or creditors in advance to jointly find a solution immediately.
3. MWA is required to promote fairness and equality with all suppliers and/or creditors with transparency, integrity, and accountability.
4. MWA is required to comply with MWA Anti-Corruption Policy by "not accepting, not paying dishonest benefits to suppliers and/or creditors".

Our contracted parties have registered as juristic persons under the Civil and Commercial Code and they conduct businesses in the country with the following details:

### Payment for project work and non-project work

Unit: Baht

	2021	2020	2019	2018	2017
<b>Local</b>					
Project work	3,703,536,799.10	3,703,536,799.10	3,703,536,799.10	3,703,536,799.10	3,703,536,799.10
Non-project work (Purchase, Outsource)	9,985,697,774.41	9,985,697,774.41	9,985,697,774.41	9,985,697,774.41	9,985,697,774.41
<b>Sub Total</b>	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51
<b>International</b>					
Project work	-	-	-	-	-
Non-project work (Purchase, Outsource)	-	-	-	-	-
<b>Sub Total</b>	-	-	-	-	-
<b>Grand Total</b>	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51	13,689,234,573.51



Guidelines for Contractor’s Selection and Evaluation

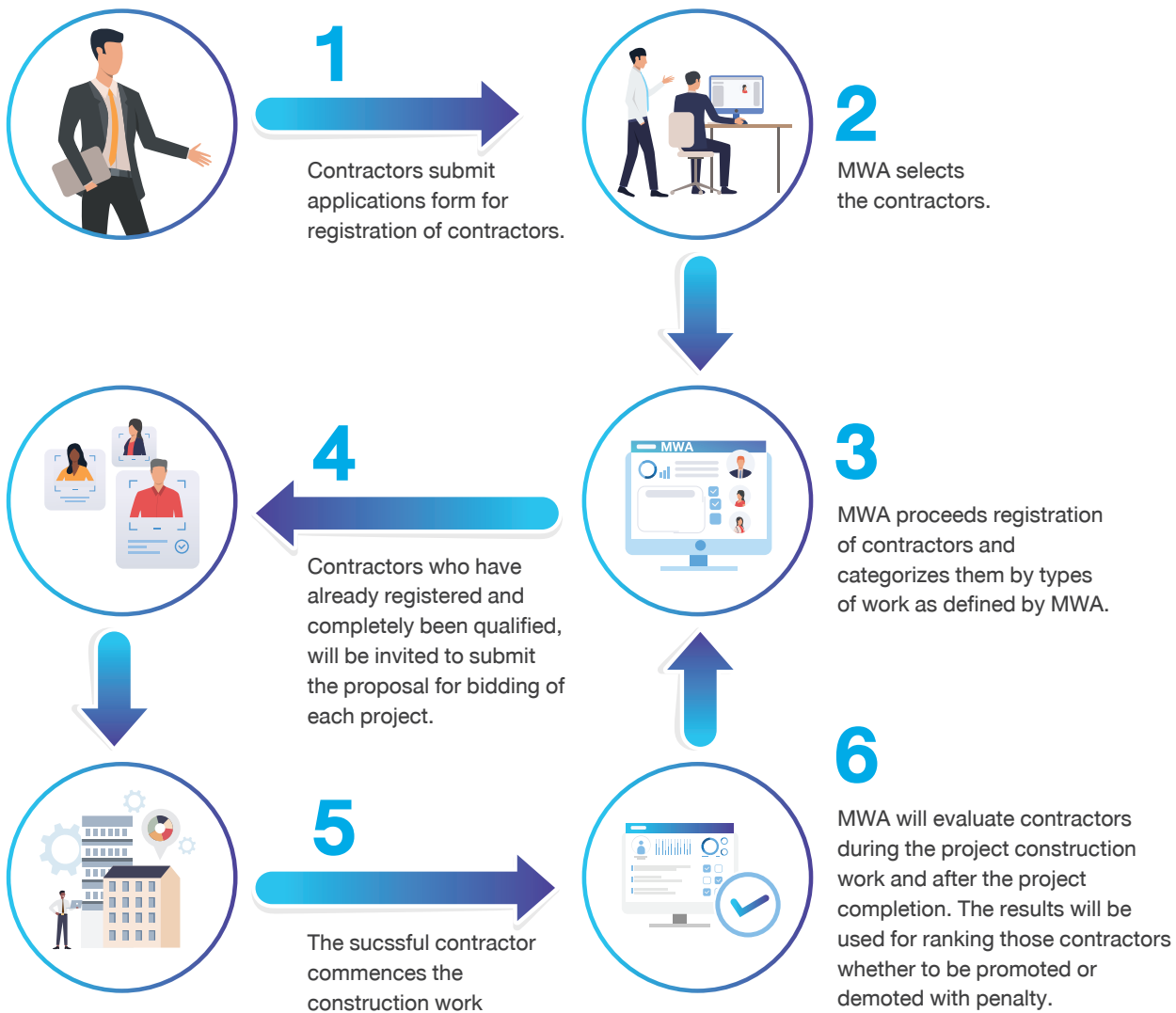
We have established procurement standards with a systematic process to select contractors and evaluate their performance. This is to ensure efficiency and effectiveness toward all actions as defined. Moreover, we have applied various rules and regulations into the practice so as to develop the organization 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 potentials 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 toward the people and communities.

The details of these processes are described below:





## Advantages of Contractor' Selection and Evaluation

**1** To ensure that contractors are qualified and effective to operate construction work to be completed under agreements and within the specified time.

**2** To control quality of construction work in response to MWA standards.

**3** To minimize complaints on the problems of traffic congestion caused by construction work and its delay.

## Types of work that contractors are required to proceed registration with MWA:

**1** Four categories of constructions for main pipe system, include:



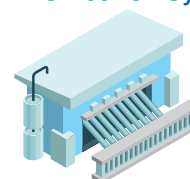
**1. Four categories of constructions for main pipe system, include:**

- 1.1** The open cut method is to lay water pipes by digging trenches along the ground, footpaths, roads, and laying water pipes within the excavated trenches.
- 1.2** The pipe jacking method is a trenchless method of installing pipes by applying a force which pushes the pipe through the ground while controlled excavation takes place at the ground surface.
- 1.3** The horizontal directional drill (HDD) is a trenchless construction method used to install pipes underground without disturbing the ground surface. The drill is launched from one end of the designed bore path and retrieved at the other end.
- 1.4** The slip lining method involves the insertion of a new liner pipe into the existing pipe.

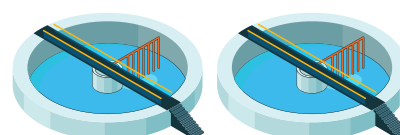
**3** Civil Construction Work



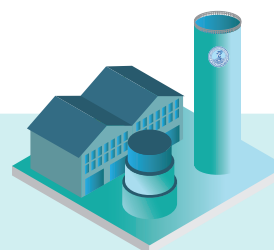
**4** Construction Work for Water Distribution System



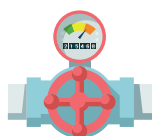
**5** Construction Work for Water Production System



**6** Construction Work for Water Pumping Station and Storage Tank



**2** Four categories of water distribution pipelines construction, include:



**2. Four categories of water distribution pipelines construction, include:**

- 2.1** Open Cut Method
- 2.2** Slip Lining Method
- 2.3** Horizontal Directional Drill (HDD) Method)
- 2.4** The Cured-in-Place-Pipe (CIPP) is a trenchless rehabilitation method by inserting a new pipe into the existing pipe by the pressure of water or air or by pulling the pipe to the proper position inside the existing pipe and curing with hot steam or UV rays.

## Policy Involvement

As Metropolitan Waterworks Authority (MWA) is one of the State-Owned Enterprises under supervision of the Ministry of Interior, we are required to get involved with Policy Formulation regarding waterworks. This covers the whole process from sharing opinions to jointly establish the required plans, as well as making decisions in material issues relevant to operations and implementing the plans to be effective and successful. Particularly, we are required to focus on the direction of water resource management and water distribution of the country.

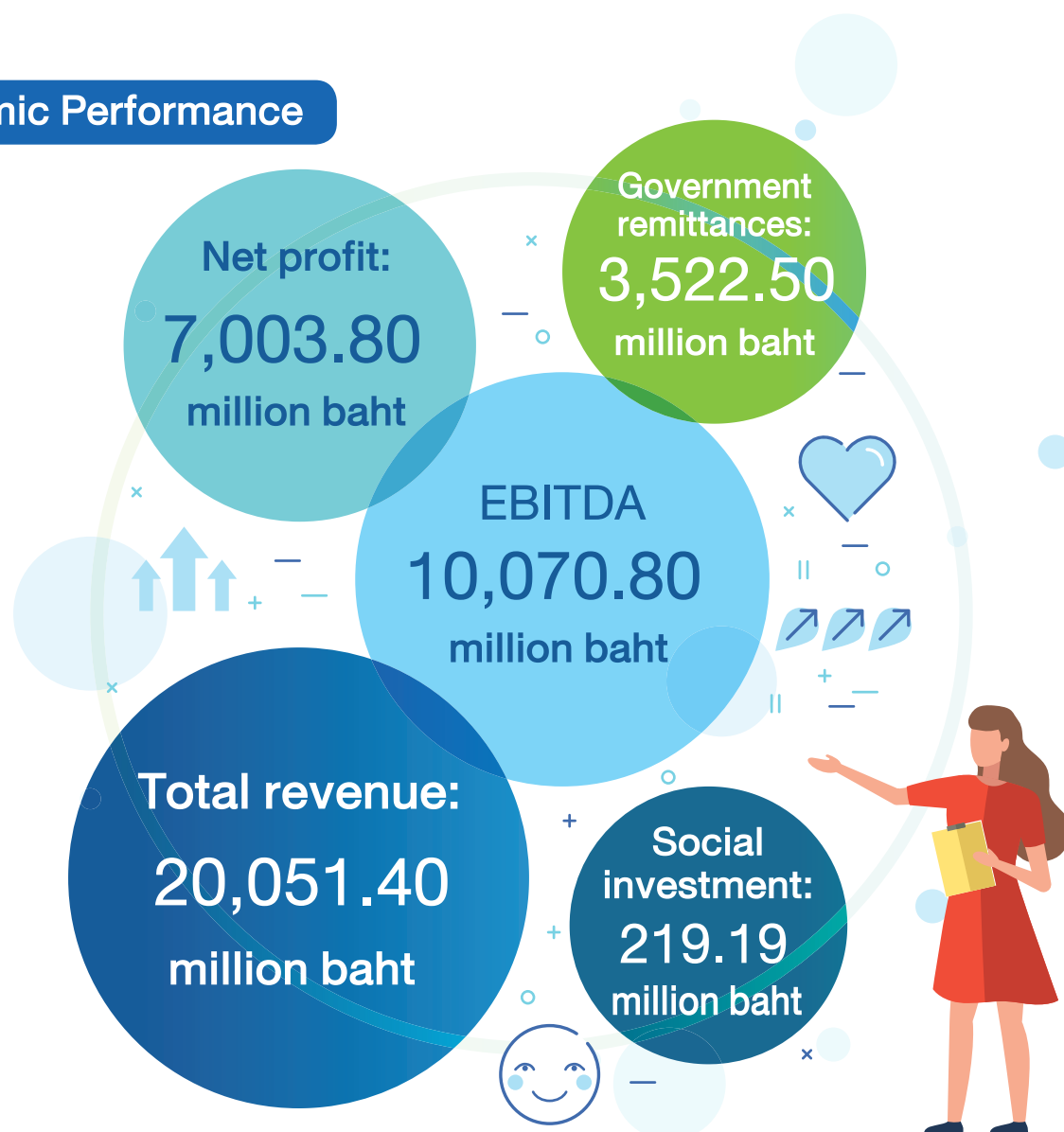
It also requires preparing the MWA Action Plans/Projects alongside stakeholders' engagement. Thus, we have organized the workshops for panel discussions to listen to their voices towards the results of reviewing the Fifth MWA Enterprise Plan, on July 20, 2021, and July 30, 2021, for the MWA Board of Directors. In overview and conclusively, the outcomes from this involvement have resulted in operational directions and action plans moving forward to sustainable long-term success in alignment with Thailand National Strategy.



Not only the matters mentioned above, we have also visited external agencies with shared missions to discuss the material issues, exchange the 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, Ministry of Interior, the Office of National Economic and Social Development Council, the Office of State Enterprise Policy, the Provincial Waterworks Authority, the Office of National Water

Resources, the Royal Irrigation Department, and the Thai Waterworks 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.

## Economic Performance



### Factors that affect financial statement and performance

From the epidemic situation of the Coronavirus Disease 2019 (COVID-19) across all countries throughout the world including Thailand since 2019, the Thai government fully endeavored to recover this situation by releasing numerous preventive measures to control the spreading not to be worse. Seemingly, such an epidemic situation became subsequently improved in a certain period of time.

Later, at the end of 2020, Thailand unavoidably confronted the tough situation again due to the new wave of COVID-19 that continued its spreading crossing the year to 2021. This intensely affected socioeconomic conditions including certain businesses. Furthermore, to comply with preventive measures released by the government, numerous establishments, particularly in Bangkok and its suburbs, were required to temporarily shut down.

Although, our core business is a basic utility necessary for economy and everyone's living, but the year 2021 is considered a challenging and tough year of Metropolitan

Waterworks Authority (MWA), to accordingly conduct its business as planned,

Not surprisingly, changes in ways of living and the public water consumption behavior resulted in our core revenue to decrease, especially, revenue from the group of commercial customers due to the reasons as mentioned above. Moreover, the temporary shutdowns of numerous establishments in the urban areas were the major cause of their employments to be suspended or terminated affecting their decision-makings to relocate themselves to their hometowns.

Meanwhile, the epidemic situation of COVID-19 also caused various property developers to slow down their investments of new projects, directly resulting in negative impacts toward the number of new water users and revenue from the service of flow meter installations to be decreased. However, as we are the organization conducting its businesses with social responsibility, we prepared mitigative measures to help those troubled with

this tough situation to reduce burdens of their households' expenses, as well as to provide the customers with convenient services and safe water during such difficult times, such as discounts on water bills, exemption of service suspension, and exemption of fees for the overdue bill paid only through payment agents.

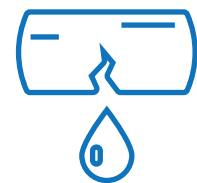
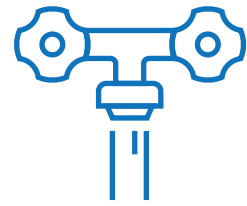
To maintain our economic performance in sustainable manners, it requires focusing on improving water distribution systems and managing water loss on a continued basis. We have expedited the rehabilitation of damaged and leaked water pipes, to reduce the rate of water loss and maintained the high-pressure water-flow for the people to sufficiently consume water with quality. Moreover, we have still maintained a water pressure level in our distribution systems to serve the existing customers while the demands for water consumption have decreased during the epidemic situation. So, this action causes an increase in operating costs for water loss management. In addition, the epidemic situation also causes the investment budgets disbursement failing to meet the target, particularly, for the waterworks construction projects that have been affected by the government's preventive measures to suspend construction works in the high potential risk areas. The labor shortage and restrictions to enter certain construction areas during the epidemic situation also cause the project schedule to be delayed.

To respond to this changing condition, we have actively prepared measures to cope with such a situation. The purpose is to increase efficiency of our operations to generate income on a continued basis, which require enhancing the potentials of other relevant businesses, paralleling with the application of existing customer database, experiences, and expertise of the organization. Moreover, we have collaborated with the Provincial Waterworks Authority (PEA) to expand the scope of water supply services in the potential areas connecting to other provinces (of which they are not under the responsibility of MWA), to promote good quality of life, and to provide those people with opportunities to consume clean and safe water under the same standards of MWA.

All actions are taken not only to distribute safe water for customers, but we strive to upgrade the quality and scope of our services with digital service platforms in the form of virtual branches. Furthermore, we have jointly collaborated with the other state enterprises to integrate utility systems with digital technology to develop the speedy and modern services platforms in response to the new era's ways of living, as well as to promote the application of innovation and technology in operating processes with continuity.

Meanwhile, we have adjusted our corporate management structure to be more resilient, with preparedness to respond to some certain unexpected disasters and emergencies. Also, the organization is required to enhance its potentials by adapting the work processes with agility while running its businesses. This action has boosted our employees' capabilities to work under the situations of unusual situations, such as in the period that the employees are unable to work at the office during a severe epidemic situation and more. Moreover, it helps improve competency of individual employee to fully perform his duty with skills sufficient for coping with the problems arising from technological transformation, ready to actively drive the organization through innovations development.

However, we strive to continually enhance the efficiency and stability of our production and distribution systems in sustainable manners through investments in alignment with the Master Plan of Waterworks Improvement Project. Importantly, it is necessary for us to surveil the impacts arising from climate change that affect the quality of raw water, paralleling with other obstacles caused by the events of flooding, drought, and high sea level. Therefore, to systematically manage the risks on raw water quality, the water crisis management center is required to be established, performing its duty as a central entity to coordinate with relevant agencies, such as the Royal



Irrigation Department, the Meteorological Department, and the Office of National Water Resources. It also includes implementing the water safety plan, to ensure the quality of water distributing to the customers to meet MWA's standards.

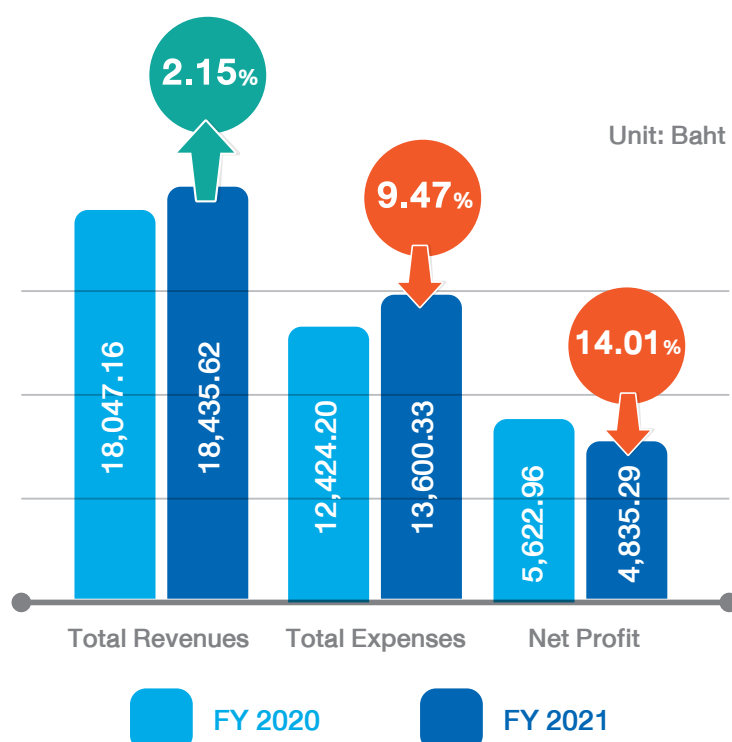
In terms of finance, we have recognized the importance of expediting investment budgets disbursement for various projects, to efficiently create an infrastructure system that drives the country's overall economy. Thus, we have adjusted the action plans by focusing more on synergy among relevant entities to expedite disbursement. Moreover, it also requires managing investment and utilizing the existing assets to be optimal, alongside maintaining the organization's liquidity to be sufficient and balanced, as well as procuring sources of funds that are appropriate and aligned with the investment plan.

As we have confronted the effects and factors caused by volatility in terms of economic, social, and environmental, as well as technology transformation, we are required to adjust our operational strategies and action plans to be consistent in all dimensions to cope with such unforeseen circumstances. Moreover, it is very necessary for us to comprehensively manage the risks so as to mitigate the severity of those impacts and to continually stabilize our entire system. Wholly, It is for our customers to consume safe and clean water that meets the standards. Overwhelmingly, the Metropolitan Waterworks Authority has still stood, no matter how challenging the situations are, we still remain committed to becoming a high-performance organization that operates water business with the steady and sustainable growth based on a balance in all aspects.

### Financial Position Analysis

As Thailand was intensely affected by the COVID-19 pandemic and the continued spreading throughout the country, it resulted in the entire economy to slow down. Although, we have realized such impacts and endeavored to concisely cope with those tough situations, the obstacles still remained to exist unavoidably.

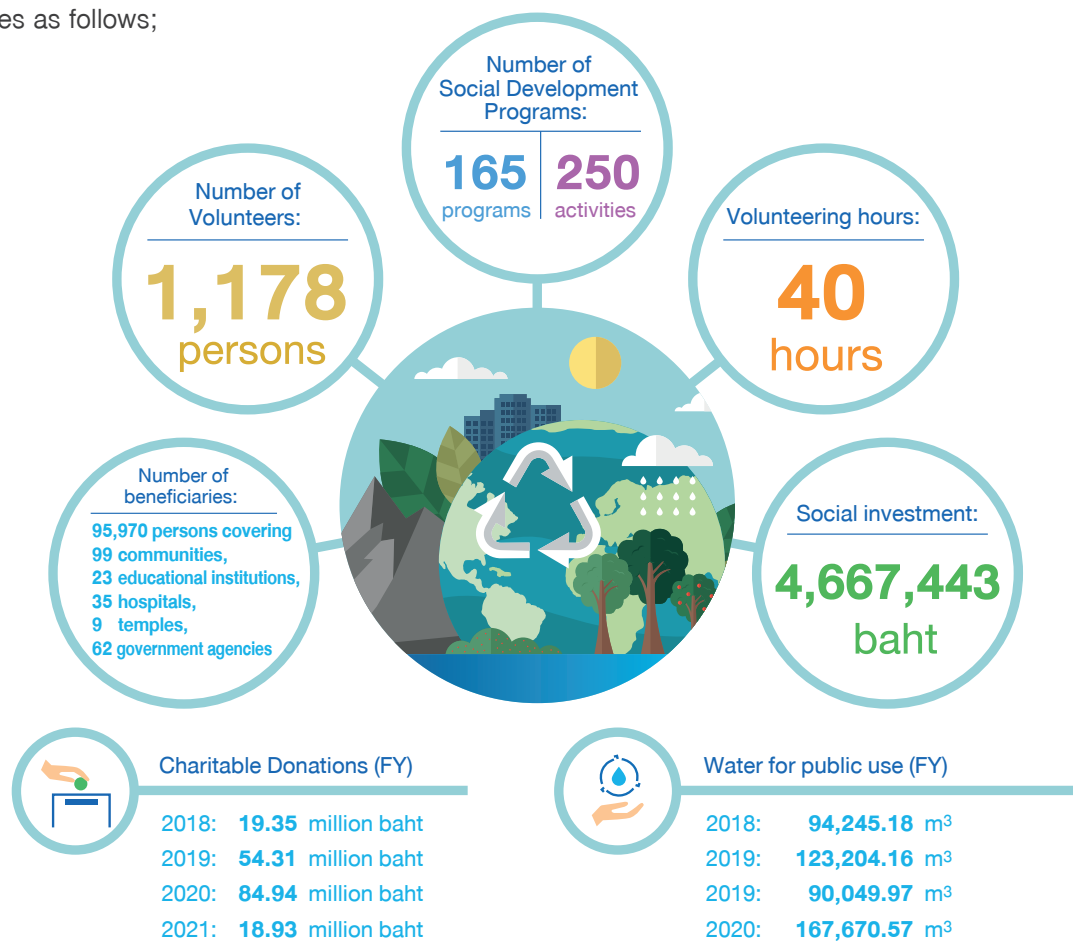
In fiscal year 2021, our overall performance slightly fell, gaining a net profit of 4,835.29 million baht which was lower than the previous year amounting to 787.67 million baht or 14.01%.





## Indirect Economic Impacts: Sustainable growth along society and communities

Metropolitan Waterworks Authority (MWA) greatly strives to operate its water businesses for the people to consume clean and safe tap water, alongside improving the locals' well-being, embedding our employees with corporate culture on socioeconomic developments through the upstream to downstream communities' engagement. It also includes improving and supporting the infrastructure that drive sustainable socioeconomic growth through the executions of social responsibility activities as follows;



*\*Water for public use refers to water publicly distributed to the people, water used for firefighting, water from public taps, and others.*

*\*Water for public use refers to water publicly distributed to the people, water used for firefighting, water from public taps, and others.*

- Data showing the number of bottled drinking waters (PAPA) donated to the public.

Fiscal Year	350 cc bottle (baht)	600 cc bottle (baht)	1,500 cc bottle (baht)	Total Amount (baht)
2018	3,188,976.00	972,900.00	157,734.00	4,319,610.00
2019	2,305,842.00	886,680.00	43,562.00	3,236,084.00
2020	1,516,662.00	776,790.00	136,160.00	2,429,612.00
2021	1,476,915.84	1,088,238.48	244,975.62	2,810,129.94

## Opportunities to thoroughly and equitably access to clean and safe water through the project to expand the service areas covering entire urban communities

The project is executed in the areas that are not commercially cost-effective by laying down a proactive water supply system, and it has been operating since 2006 until the present. The purpose of this project is to prepare for future services and to keep pace with the rapid growth of the urban communities, so as to provide the locals who live in the entire service areas with the equitable opportunities to thoroughly consume clean and safe water. Moreover, it also includes uplifting the locals' quality of life in a sustainable manner as well as responding to government policies on minimizing social inequality and increasingly creating opportunities for everyone to thoroughly access public services that are good, equitable, and fair.

From the executions of this project, it is not only to thoroughly provide the locals with equitable opportunities to consume clean and safe water, it also helps them to

reduce the household's costs of living from procuring water from other sources (Artesian water, bottled water), as well as to improve their well-being to the betterment. Moreover, it is also considered one of the proactive approaches to strengthen relationships with the communities and to 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.



VDO: project to expand the service areas covering urban communities

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
<b>Total</b>	<b>2,268.00</b>	<b>2,558.37</b>	<b>4,222.39</b>	<b>60,616</b>	<b>190,509.1</b>	<b>9,654,290.8</b>

\* An 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 of other sources consumption is amounted to 162.05 baht/month/household (Source: the results from satisfaction survey through the people who live along the routes of water distribution pipelines beneficial from the project in fiscal year 2013.

# Social Performance







## Tap Water Quality (Social Standards)

### 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. Thus, 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:

**Protect:** To prevent an occurrence of contamination in raw water sources.

**Remove:** To reduce and remove contaminants from water.

**Prevent:** To prevent a recurrence of contamination.

The process for preparing the MWA Safe Water Plan consists of formulating policies, establishing a working group for preparing details of the waterworks systems,

hazard identification, and risk assessment. All significant issues related to high-potential risks are taken into consideration to improve and develop the comprehensive control measures and remedial guidelines by applying the results from the impact assessment on health and safety of MWA's services at 100%. Moreover, it also includes preparing waterworks system improvement/upgrading plans, and procedures for verification and review of the MWA Safe Water Plan.

The following details are examples of significant risk management in the waterworks systems:

- **Raw water system:** 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:** MWA has adopted the GHP HACCP system to 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, we have established measures on chemical use in production process as well. Thus, all of these actions are to ensure that our water supply is produced sufficient to the fluctuated demands at all times.

- **Water transmission and distribution systems:** 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 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 water distribution system, and to inspect water leakage in 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, 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 the external agencies to verify the quality of tap water as well. Furthermore, 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 its 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 processes improvements are required to be conducted as soon as possible. However, if 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.

In fiscal year 2021, we have realized that the complaints from customers related to tap water quality through MWA call center are about cloudy/smelly water (not the odor of chlorine), amounting to 2,038 cases.

However, MWA did not find any disputes or complaints related to deficiencies in safety and sanitation from our services that were severe and sufficient to be guilty by law.



**Table showing the average daily monitoring of water quality  
for fiscal year 2019 – 2021**

Key parameters of tap water quality monitoring	Fiscal year			Criteria
	2019	2020	2021	
Nephelometric Turbidity Units (NTU)	0.23	0.19	0.30	Less than 1.0 NTU
PH Value	7.19	7.37	7.35	6.50 – 8.50
Residual Independent Chlorine (mg/L)	0.55	0.79	0.78	0.20 – 2.00 mg/L
Number of samples (cases)	3,196	3,138	2,702	

**Results of MWA water quality monitoring in every process,  
compared with the set criteria.**

**For fiscal Year 2021 (October 2020 – September 2021)**

	Water quality standards of surface water sources, category 3 <sup>A</sup>		Criteria for Determining Water Quality of the Metropolitan Waterworks Authority, B.E. 2560, based on the recommendations of the World Health Organization (WHO).					
	Raw water Eastern watershed	Raw water Western watershed	Water Treatment Plants				Water Distribution Stations	Along water pipeline
			Bangkhen	Mahasawasdi	Samsen	Thonburi		
Number of samples	12	12	12	12	12	12	12	2,702
The number of samples that did not meet the criteria (One sample may not meet the criteria in more than one area.) <sup>A</sup>	12	5	1	-	1	1	1	99

**Source:** Monthly water quality monitoring report, Water Quality Monitoring Division, the Water Quality Department.

**Remarks:**

- A. 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.
- B. Descriptions of non-conforming parameters
  - 1) Raw water from the eastern watershed: Three samples of dissolved oxygen (DO), two samples of BOD, three samples of DO and BOD, two samples of DO and Fecal Coliform Bacteria, one sample of BOD and Fecal Coliform Bacteria, one sample of DO and Coliform Bacteria and Fecal Coliform Bacteria.
  - 2) Raw water from the western watershed: One sample of DO and 4 samples of BOD.
  - 3) Bangkhen Water Treatment Plant: One sample of chloride, Samsen Water Treatment Plant: One sample of chloride, and Thonburi Water Treatment Plant: One sample of chloride.
  - 4) Water distribution station: One sample of chloride.
  - 5) Along water pipeline: One sample of turbidity, ninety-seven samples of chloride, and one sample of E. coli bacteria.

## Mitigative Measures during the drought in 2021

The drought situation occurring in 2021 has affected the tap water serving in the areas of the eastern watershed of the Chao Phraya River to change in taste (Brackish) at certain times, especially in a period of the high tide of seawater. But it is still clean and safe for consumption in response to the standards of the World Health Organization (WHO). Thus, MWA has established the “Water Crisis Resolution Center” in December 2020 alongside preparing long-term measures to create service stability. From collaboration with relevant agencies—especially, the Office of National Water Resources and the Royal Irrigation Department, to jointly manage and optimize the efficiency of water management, it has caused us to surveil and manage raw water situation from the Chao Phraya River in the area of the Samlae raw water pumping station, Muang district, Pathum Thani, with conciseness. This action aims to avoid pumping raw water that contains high salinity into the waterworks canal as much as possible.

In addition, MWA has implemented the Water Hammer of Chao Phraya River Flow Operation, a method to dilute the salinity of the water body from the Chao Phraya River, by working together with the Royal Irrigation Department and the Drainage and Sewerage Department, Bangkok Metropolitan Administration (BMA) in January and February 2021. The purpose of this operation is to push the saltwater to be far away from the Samlae raw water pumping station as much as possible. As a result, we are able to use raw water from the eastern watershed in production systems of Bangkok, Samsen, and Thonburi Water Treatment Plants, and continue its distribution services for customers.

Apart from such monitoring practices and water quality management measures, MWA has established a total of 19 free drinking water dispensers. This project aims to mitigate those who are in trouble with clean water, especially, the groups that hold potential health risk, they are required to avoid consumption at certain times. These groups include the elderly, patients with kidney disease, heart disease, high blood pressure, diabetes, young children, and small pets. Moreover, we have established communication channels for water users by accessing MWA’s website at <http://twqonline.mwa.co.th>, the MWA onMobile application, and various MWA’s social media so that water users can monitor the daily situation of MWA services.

### 19 locations of free drinking water dispensers

- Suvarnabhumi Waterworks Branch, Minburi Waterworks Branch, Samut Prakan Waterworks Branch, Bangkok Waterworks Branch, Sukhumvit Waterworks Branch, Phra Khanong Waterworks Branch, Phayathai Waterworks Branch, Maensri Waterworks Branch, Ladprao Waterworks Branch, Prachachuen Waterworks Branch, Thung Maha Mek Waterworks Branch, Nonthaburi Waterworks Branch, Bangkok Noi Waterworks Branch, and service areas at Soi Samakkhi 30 Community. They are open daily from 8:00 AM – 8:00 PM.
- Flow Meter Department-MWA Headquarter, Khlong Toei Water Distribution Station, Samrong Water Distribution Station, Bang Phli Water Distribution Station, and Minburi Water Distribution Station. They are Open for service on official working days from 8:30 a.m. – 4:30 p.m.

การประปานครหลวง  
กปน. ยืนยัน  
จะผลิตน้ำประปา  
สะอาด ปลอดภัย  
-- ให้บริการประชาชน ในพื้นที่ --  
กรุงเทพฯ นนทบุรี และสมุทรปราการ  
ตลอดหน้าแล้งปี 64 นี้

กปน. ให้บริการน้ำดื่มเพื่อบรรเทาความเดือดร้อนของประชาชน สามารถนำภาชนะมารับน้ำประปาดื่มได้ ฟรี ที่

- สำนักงานประปาสาขาสุวรรณภูมิ สาขาเนินบุรี สาขาสมุทรปราการ สาขาบางเขน สาขาสุขุมวิท สาขาโพธิ์ทอง สาขาปทุมธานี สาขาลาดพร้าว สาขาประเวศน์ สาขาทุ่งมหาเมฆ สาขานนทบุรี สาขาบางกอกน้อย และชุมชนซอยสามัคคี 30
- สำนักงานใหญ่ กปน. ฝ่ายมาตรวัดน้ำ สถานีสูบน้ำคลองเตย สถานีสูบน้ำสำโรง สถานีสูบน้ำบางพลี และสถานีสูบน้ำดิบประเวศน์

ทุกวัน ระหว่างเวลา 08.00 - 20.00 น.  
ในวันและเวลาดำเนินการ ระหว่างเวลา 08.30 - 16.30 น.

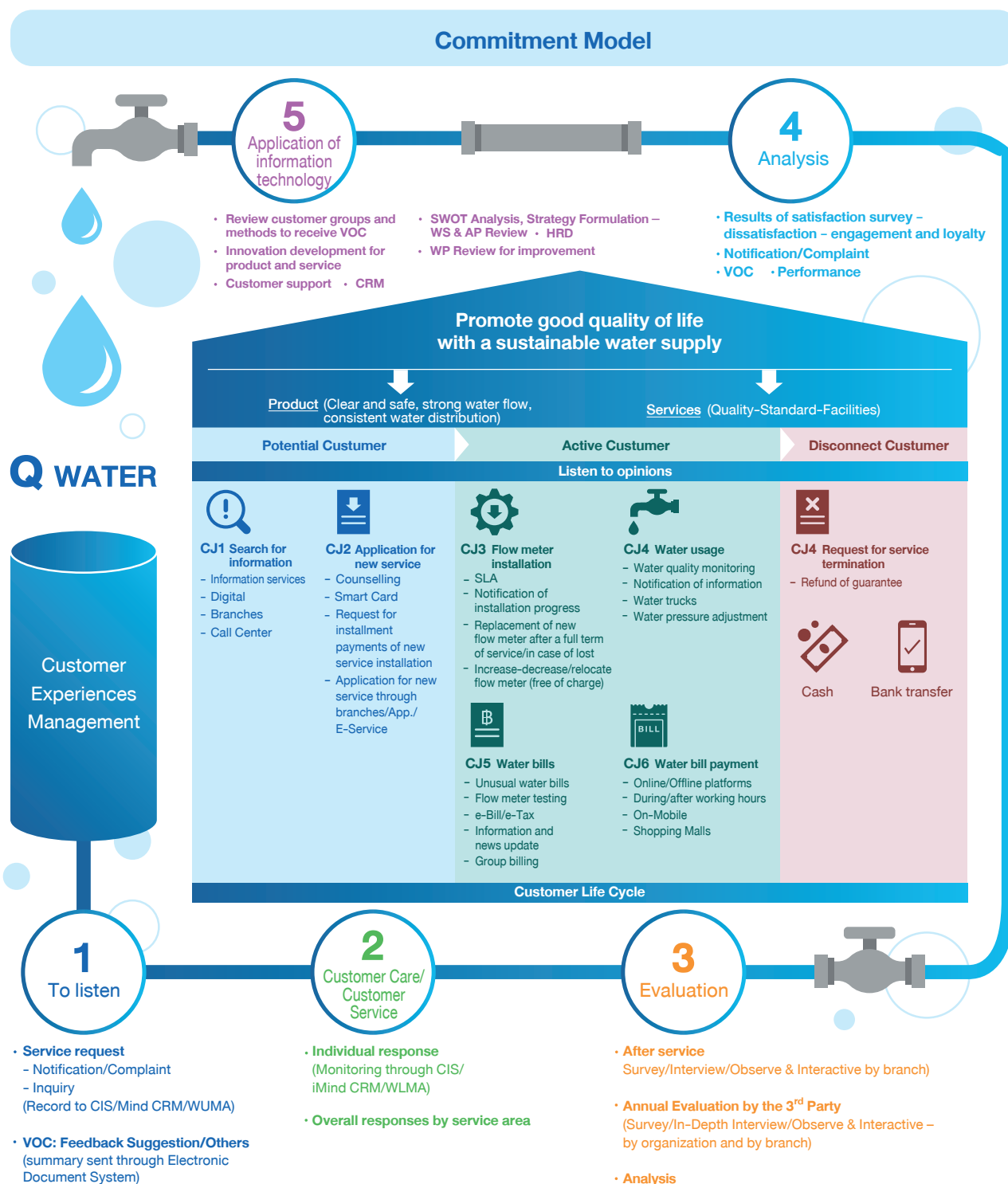
สอบถามข้อมูลเพิ่มเติมได้ที่ : 1125 ตลอด 24 ชั่วโมง

ขอความร่วมมือผู้ให้บริการ สวมหน้ากากอนามัย/หน้ากากผ้าตลอดเวลา เว้นระยะห่างทางสังคม  
ล้างมือด้วยเจลแอลกอฮอล์ก่อนใช้บริการ -- ยืนยันน้ำประปาสะอาดปลอดภัย Covid-19 --

MWA CALL CENTER 1125 | [www.mwa.co.th](http://www.mwa.co.th) | [f](#) [t](#) [i](#) [y](#) [g](#) [+](#) [@MWAThailand](#)

## Customer Relationship Management

To comprehensively respond to the needs and expectations of customers, Metropolitan Waterworks Authority (MWA) has established communication channels to listen to the voice of customers (VOC). The data from those channels are used for customer relationship management in terms of both water quality that is clean, safe, and sufficient to the demands, serving customers with a consistent water flow pressure, and services that meet the standards-convenience, speed, and easy access, for every aspect of a customer's life cycle.





To upgrade services and lay down an operating framework that drives customer satisfaction and success in term of economic performance, MWA therefore has established the Fifth Metropolitan Waterworks Authority Plan (2020-2022) on Customer and Marketing Strategy 2021-2022, 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 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 2021-2022 including the other related action plans, which cover the following three core strategies; the 1st aspect- to develop waterworks stability and its security, the 2<sup>nd</sup> aspect- to enhance potential of the organization to excellence,

and the 3rd aspect - to promote good relationships with stakeholders and uphold good governance for sustainability. This action plan consists of the following seven projects, namely 1) Water Coverage: It is a project to support MWA's services that cover potential areas thoroughly, adequately, and consistently (Water Coverage at 100%), 2) Booster Pump: It is a project to support sale of water supply in potential areas in connecting provinces, 3) Pressure pump: It is a project implementing in the areas, troubled with low water pressure, 4) Auto Flushing Valve, 5) Digital service development, 6) Strengthening relationships with customers, and 7) Services upgrade to excellence. In conclusion, we believe that these seven projects are about to drive the organization to achieve the goals in terms of both excellent services through customer satisfaction, full water coverage thoroughly across our service areas, and an increase in recurring income of the organization in sustainable manners.



### Customer Satisfaction Survey for MWA's Services

Normally, we conduct the customer satisfaction survey toward the quality of MWA overall services on a regular basis to understand and anticipate the needs, expectations, concerns, and attitudes of each group of customers. The purpose of this survey is to improve our work process and procedure as well as to define directions, guidelines or processes, to build relationships with each group of customers as appropriate.

In fiscal year 2021, the results from customer satisfaction survey toward the quality of MWA overall services showed that most of our customers satisfied with MWA's services with an average score of 4.590, increased by 0.019 from the results in fiscal year 2020, in which an average satisfaction score was at 4.571.

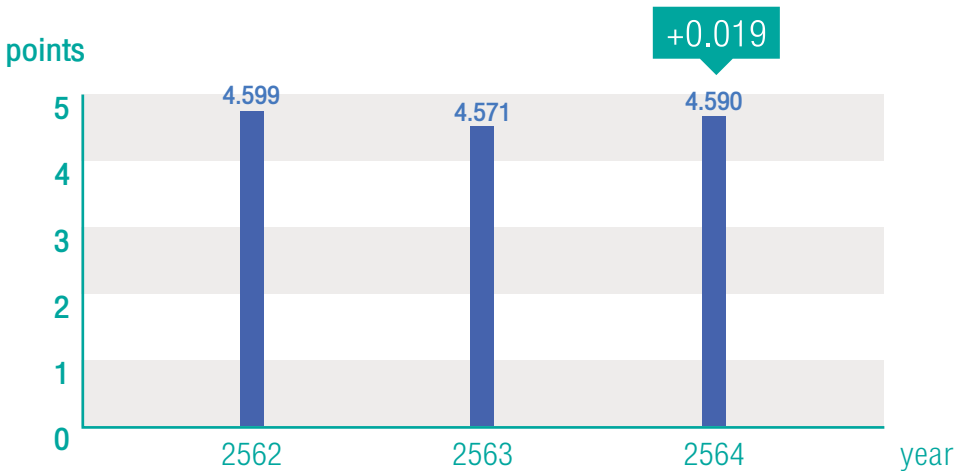
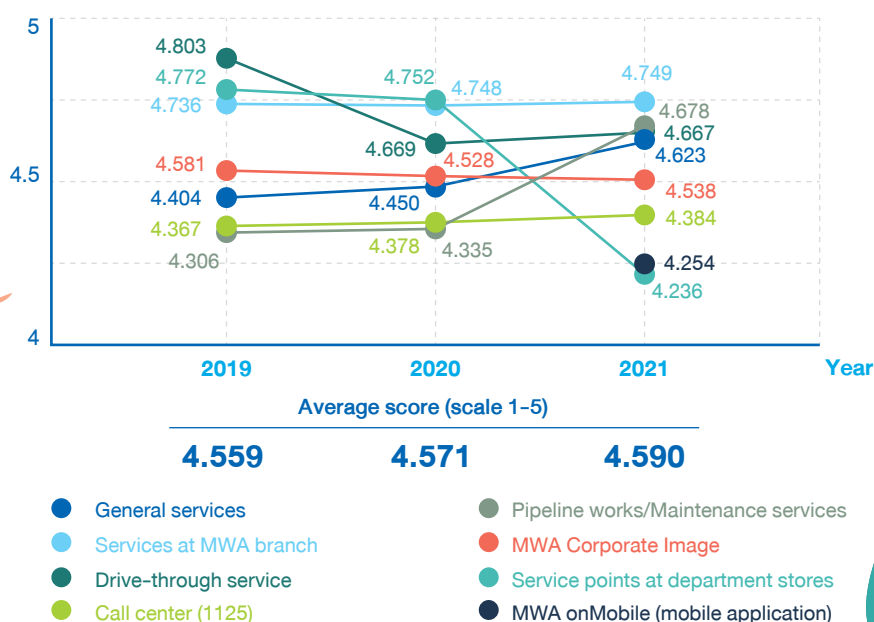


Table of average scores from customer satisfaction survey toward MWA services during 2019-2021



## Building Relationship with Customers

To efficiently improve our services to excellence, we therefore have established the guidelines to tighten relationships with all groups of customers, to ensure that MWA's services truly respond to the needs/expectations of all groups of customers.

### MWA Meets Customers Project

This project aims to promote good ties and proactively deliver services to Residential Group (R) or households that have used MWA water for consumption. The eighteen MWA branches have proactively conducted the activities through MWA mobile service units in various communities, covering services related to waterworks. This project also includes conducting customer satisfaction surveys, and community engagement programs in various forms, such as providing training on plumbing work and cleaning water tanks, providing mobile medical care units, and inspecting the quality of tap water by scientists. Not only conducting those activities, MWA has conducted a communication campaign to promote mutual understanding and to jointly prepare plans for communities affected by pipe installations/repair to minimize such conflicts and listen to opinions from the locals of those communities.

In fiscal year 2021, MWA organized thirty-six events, including activities to promote the MWA onMobile application, Line ID: @MWATHAILAND, and services of e-Bill, e-Tax Invoice, and e-Receipt. The purpose of these activities was to promote those online services among the water users and support a social distancing measure during the COVID-19 pandemic. Meanwhile, we also explored customer satisfaction, with the purpose to upgrade MWA's services, as well as to organize a campaign to raise the public awareness for transparency and anti-corruption as well.





- Results from customer satisfaction survey toward the MWA Meets Customers Project in 2021 (highest score is 5 points)

- Satisfaction toward this project (Residential customers) was scored at **4.66**.

- Satisfaction toward this project (Community leaders) was scored at **4.81**.

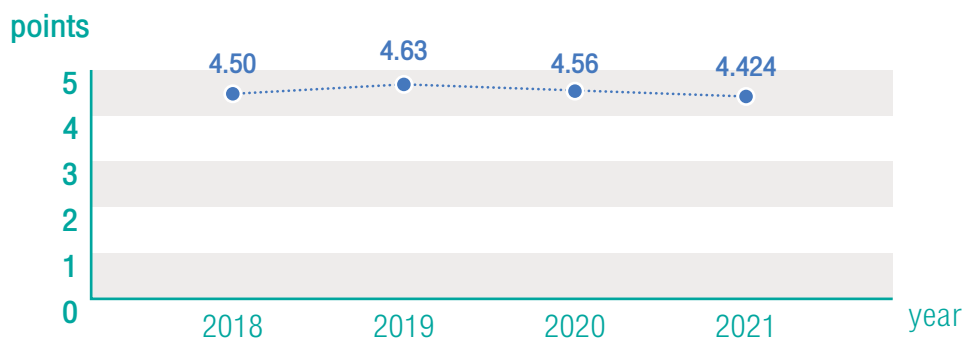


### MWA Top-Tier Project

MWA has launched this project in the fiscal year 2017, which originates from the Best Care Service and Key Account Project. We have implemented this project by arranging direct visits to commercial (C) or industrial (I) groups of customers who have consumed our water ranging from 10,000 m<sup>3</sup>/month and onward. The purpose of this project is to recommend our services and listen to their opinions with an aim to upgrade MWA's services that respond to the expectations and needs of the target customers, which are speedy, appropriate, and accurate according to their actual requirements. Moreover, it also includes the activities to tighten relationships and build engagement among the customers of MWA Top-Tier project and our staff by upgrading their current relationships (as our trade partner) into the stronger relationships as MWA partnership. As a result, it brings MWA a sustainable customer engagement.



- Results from customer satisfaction survey toward the MWA Top-Tier Project during fiscal year 2018-21 (highest score is 5 points)





## Upgrading services to excellence with GECC standards

Accreditation of Government Easy Contact Center (GECC) is one of the government policies for all ministries, departments, and provincial authorities, including the related state-owned enterprises to implement it. This policy aims all of those government agencies to establish the Government Easy Contact Center or GECC, to provide an advice, facilitation, and effective services to the public in alignment with the Licensing Facilitation Act, B.E. 2558 (2015). By the purpose of this establishment, it also includes building confidence and reliability toward the people who require a public service from government agencies. This certification validity is for 3 years from the date of certification.

Currently, all of eighteen MWA branches have been accredited for the GECC standards. As a result, MWA is one of the government agencies with fully- accredited public service entities (MWA branches). We strive to provide excellent services with quality development and service improvement that are constant in every aspect, as well as to continuously improve our customer service process to be speedier and more efficient in alignment with our customer-centric principles.



Video “GECC  
Convenient Civic  
Center”

**2019**  
(Accreditation Period:  
2019 – 2021)



**GECC Standards-Progressive level**  
Phasi Charoen branch

**2020**  
(Accreditation Period:  
2020 – 2022)



**GECC Standards-Progressive level**  
Bang Bua Thong, Prachachuen,  
Minburi, Maensri, Samutprakarn,  
and Suvarnabhumi branches



**GECC standards-Basic level**  
Taksin, Suksawat, Thung Mahamek,  
Nonthaburi, Bangkok Noi, Bang Khen,  
Phayathai, Mahasawadi, Ladprao,  
Sukhumvit, and Phra Khanong branches

## Complaint Management Policy

In order to deal with diverse requirements of both customers and all groups of stakeholders, 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 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  
Management Policy

### Complaint channels include:

1. Telephone through a call center at 1125 and direct lines to all MWA branches.
2. Online services through the MWA onMobile application, MWA social media: Facebook, Twitter, Line OA: @MWAThailand, www.mwa.co.th, E-mail: mwa1125@mwa.co.th, Web Chat.



3. Direct contact through the eighteen MWA branches, one stop service centers at four department stores.
4. Postal to Metropolitan Waterworks Authority  
400 Prachachuen Road, Thungsonghong, Laksi, Bangkok. 10210

## Online services development for sustainable services

**information**

**ระบบรักษาความปลอดภัย**  
ปลอดภัยด้วยระบบลายนิ้วมือ/ใบหน้า และรหัสผ่าน

**Customize Menu**  
สามารถปรับเมนู  
บนหน้าจอให้แสดงเมนูหรือรายการ  
เฉพาะส่วนที่ผู้ใช้งานใช้เป็นประจำ  
ได้ตามความต้องการ

**เพิ่มรายการ**

- คุณภาพน้ำ
- เช็กยอดค่าน้ำ
- ประกาศน้ำไม่ไหล

**ระบบการแจ้งเตือน**  
ไม่พลาดทุกความเคลื่อนไหวด้วย  
Push Notification

**แสดงรายละเอียดข้อมูล**  
ค่าน้ำประปา ข้อมูลผลต่างๆ  
ของค่าน้ำประปาในแต่ละเดือน

**การชำระเงินค่าน้ำ**  
จะอยู่ที่ไหนก็จ่ายค่าน้ำได้ง่ายๆ  
บนแอปพลิเคชัน

**แจ้งขอรับบริการและคำร้อง**  
จะปัญหาเล็กหรือใหญ่ ก็เป็นเรื่องง่าย  
แค่ปลายนิ้ว... เหมือนยกสาขามาไว้  
ในมือถือ

**ติดต่อสาขา**  
โทรเข้ามาสายเลขโทรศัพท์ของสำนักงาน  
ประจำสาขา ได้อย่างง่ายดาย  
และรวดเร็ว

**เพิ่ม เปลี่ยน ลบ  
แก้ไขข้อมูลการลงทะเบียน**

To support government policies and serve the customers in sustainable manners, we have strived to develop the online service platforms to create convenience and security toward users during the COVID-19 pandemic. Thus, in fiscal year 2021, MWA digital technology department has developed a number of digital service platforms such as e-Bill, e-Payment, e-Tax Invoice & e-Receipt, and MWA onMobile application, to respond to the needs of customers and the current socioeconomic changes.

MWA onMobile is one of our online service platforms that allows users to access the online news, to check the current status of our operations in service areas, and to monitor quality of tap water on a real-time basis. This online platform also integrates a knowledge tank regarding water supply and contact details of MWA branches. So called, it is a mobile application that fully gathers the following MWA services;

- Bill payment, verification of the data, and the history of water usage.
- Request for new water supply services (Only in Bangkok, Nonthaburi, Samutprakarn)
- Request for new electricity supply service (Only in the service areas of MWA)
- Notification service for the areas troubled with soft water pressure or non-flowing water supply.
- Registration for e-Invoice, e-Tax Invoices, and e-Receipts.
- Report a complaint and follow-up.
- Other MWA services.

In fiscal year 2021, the topic regarding MWA onMobile application was added to customer satisfaction survey. The results showed that requests for new water supply services received the highest score at 4.892, followed by the search engine regarding the procedures to request for new water supply services and replacement service of new flow meters which received scores at 4.868 and 4.803, respectively.

## Partnership and Collaboration

### Partnership and collaboration for efficient operations

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;

#### Partnership and collaboration for waterworks infrastructure construction

Water pipeline work requires spaces under responsibilities of other government agencies to lay water pipeline networks from water distribution plants to customers' places. Thus, we require the permission for such operations in the service areas. MWA has coordinated with other agencies to ensure its works can be done simultaneously with their road/footpath improvement projects.

- **Ministry of Interior:** Bangkok Metropolitan Administration (BMA), Nonthaburi, Samutprakarn, Local Administration Organizations-Provincial Administrative Organization, Municipality, Subdistrict Administrative Organization, Metropolitan Electricity Authority.
- **Ministry of Transport:** Highways Department, 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:** Department of Irrigation

#### Partnership and collaboration with local communities in the matters of preserving and maintaining water sources: Raw water sources and waterworks canals to deliver raw water to the water treatment plants.

- **Ministry of Interior:** Pathum Thani, Kanchanaburi, Nakhon Pathom.
- **Ministry of Agriculture and Cooperatives:** Department of Irrigation, Office of National Water Resources.
- **Electricity Generating Authority of Thailand (EGAT):** By participating in the "Forum to Meet Customers-Upstream, Midstream, Downstream", to integrate collaboration and tighten relationships among the relevant authorities with shared missions.





### Partnership and collaboration in academics, technology, and standardization.

- World Health Organization (WHO) in terms of the Water Safety Plan (WPS).
- Ministry of Public Health, Department of Health in terms of academics on Health, Water Quality, Water Safety Plan.
- Ministry of Industry, Office of Industrial Product Standards In terms of waterworks engineering standards and its equipment.
- Ministry of Defense, Royal Thai Navy, Hydrographic Department in terms of Sea Level and Tidal Data.
- Asian Waterworks Utilities Network of Human Resource Development (A1-HRD), Japan.
- Water Quality Asian Cooperation Network (WaQu AC-Net), Japan.
- International Water Association (IWA)
- American Water Works Association (AWWA)
- Thai Waterworks Association

### Partnership and collaboration in Governance and Anti-corruption

- Networks of Foundation for a Clean and Transparent Thailand (FACT)
- Memorandum of Cooperation on Anti-Corruption between the Office of the National Anti-Corruption Commission, the State Enterprise Policy Office, and 55 state-owned enterprises agencies, dated on May 28, 2014.

### Sustainability Disclosure Community: SDC

We have participated in the Sustainability Disclosure Community network, established by the Thaipat Institute. This community aims to provide members with a knowledge body whereby members can exchange experiences in sustainability disclosure among themselves. The purposes are to maintain leadership roles of Thai organizations, to disclose sustainability data to the public both regionally and internationally, as well as to enhance the organization's sustainability disclosure for developing sustainability in the long-run.



## Collaboration with Wastewater Management Authority for Integration of the Sustainable Water Supply and Wastewater Management

MWA and Wastewater Management Authority have jointly agreed and signed a Memorandum of Cooperation for integration of the Sustainable Water Supply and Wastewater Management, to manage water resources throughout the entire system in sustainable manners, especially, to provide services of water supply that thoroughly cover service areas with the efficient wastewater management under the cooperative framework in 3 aspects, covering Corporate Social Responsibility (CSR), Knowledge and Skills Development in academics, technology, or other aspects as appropriate, and State Enterprises Assessment Model (SE-AM). The purpose of this cooperative framework is to improve the quality of life and to provide excellent services to the people, along with social and environmental care programs. As a result, it leads the organization to move toward sustainable development that responds to needs of water users as well as to strengthen relationships with all groups of stakeholders.



*MOU Signing Ceremony between MWA and Wastewater Management Authority for the integration of the Sustainable Water Supply and Wastewater Management, dated on March 24, 2021.*



Photo: MOU signing ceremony between MWA and Wastewater Management Authority for the integration of the Sustainable Water Supply and Wastewater Management

## Collaboration with Provincial Electricity Authority (PEA) to support reduction of energy consumption within the organization.

MWA and PEA have jointly agreed and signed a Memorandum of Cooperation for Digital Energy Management project (Digital Platform), with the purposes to study the feasibility and to establish the guidelines for the energy management within the organization by digital platform. After implementing this project, a number of modern technologies have been adopted to energy consumption management to be effective and appropriate to the context of MWA. Moreover, it also encourages investment in energy efficiency management, electricity generation from renewable energy such as the floating solar power generation systems, solar rooftop systems, and other relevant innovations, to effectively reduce energy consumption and energy costs for the enterprises and the country.



## Surveillance Project-Season 2 (Krobkrua Ta Sapparod-Season 2)

As water supply service providers under responsibilities of MWA, the Nonthaburi and Samutprakarn branches have recognized the importance and needs to manage water resources to be sufficient for the public consumption. Therefore, they have initiated a project to encourage the subcontracted workers of both entities and the general public to inspect and observe the potential areas where they may encounter problems of the water leakage from water distribution systems. If such cases are found, it is required to inform the responsible entity of MWA through the communication channels as designated. After receiving such notification, the problems arising from that water leakage are investigated and resolved. In conclusion, the purpose of this project is to reduce the amount of water loss caused by leakage of water distribution systems, as well as to conserve the water resources and promote responsible water consumption.

## Signed a Memorandum of Cooperation with the Excellent Center for Construction Works in conjunction with the SCG, the Office of Vocational Education Commission and Four Business Alliances.

MWA and the Office of Vocational Education Commission (OVEC) have mutually agreed to provide academic collaboration in the management of bilateral vocational education, the higher vocational certificate

programs (HVC), in the Industry Category, majoring in Construction Works- the Living Solution Expert by MWA. In order to receive successful results from this project, it requires proper preparations of course outlines and vocational training plans for students. Moreover, speakers with waterworks expertise are also provided to give lectures and advice to students, as well as to encourage those trained students to take internships at their workplaces. The purpose of this project is to improve individual learning skills from a real-life experience, aligning with and responding to the demands of the labor market.

## Memorandum of Cooperation for the use of Water-Saving sanitary ware or equipment accredited by MWA Water-Saving Standards (MWA Water-Saving Label) between MWA and Land and House Public Company Limited.

MWA and Land and House Public Company Limited have together initiated an idea to conserve water resources to be sufficient for consumption in a sustainable manner. To implement project, Land and House PCL has therefore adopted sanitary ware or equipment accredited by MWA water-saving standard, to install in 3 residential projects: the INDY 2 Ramkhamhaeng 2, the INIZIO 4 Pinklao-Outer Ring, and the Villagio Srinakarin. The purpose of this project is to raise awareness of responsible water consumption and water-saving efficiency, as well as to encourage innovations development that save water consumption, which is beneficial to consumers.



## Occupational Health and Safety

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, B.E. 2549 (2006), and Notification of the State Enterprise Relations Committee, Re: Minimum Standards of Employment Conditions in State-Owned Enterprises (No. 3), B.E. 2555 (2012). It has adopted as a framework for establishing MWA Safety, Security, Health and Environment (SSHE) Policy, enforced on June 30, 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. Thus, all MWA entities shall comply with laws and policies as follows;

1

Safety, Security, Health and Environment (SSHE) shall be considered the first responsibility of all employees and subcontracted workers.

2

All government agencies shall strictly comply with laws, requirements, safety handbook, and standards related to SSHE.

3

To encourage serious improvement and development of the working environment to be safe, with protection against hazards, and to reduce potential risks that may cause the work-related accidents and illnesses, as well as to monitor, evaluate, and review work processes on a regular basis.

4

To continuously conserve the environment based on the principles of responsible resources and energy consumption, as well as to prevent pollution caused by operations that create negative impacts toward the environment.

5

To allocate resources required by operations of SSHE to be sufficient in order to ensure the continuous and sustainable operations.

6

To conduct Publicity Campaign to promote and provide advice to employees and subcontracted workers at all levels, including stakeholders, to create an understanding of the operations, as well as to raise awareness and sense of responsibility of everyone to be engaged in providing comments, suggestions, or reports of unsafe incidents that occur or may occur to support the SSHE management.

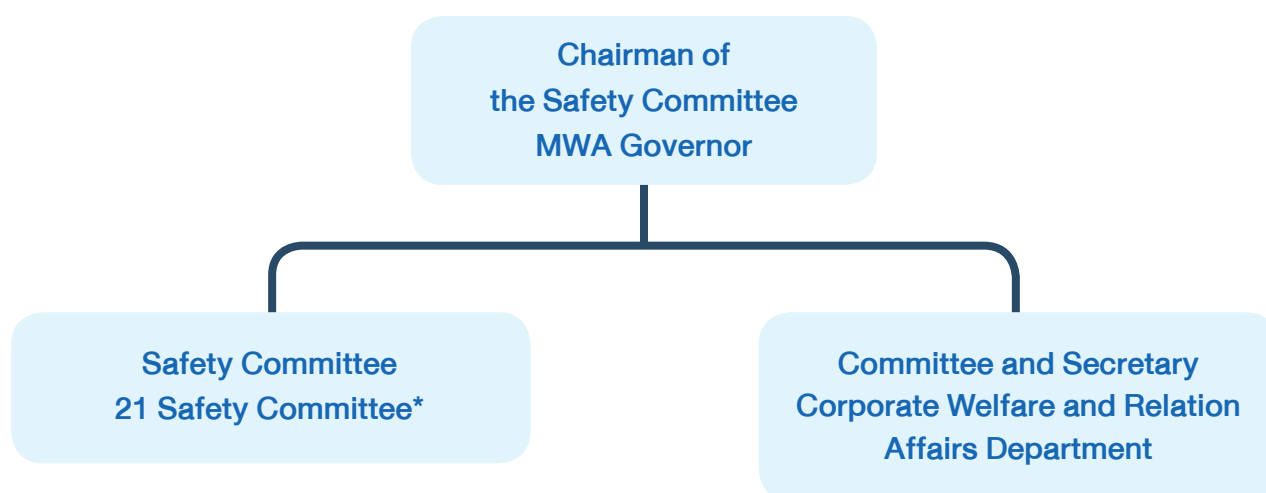


MWA has established the processes that create and promote the systematic SSHE management (SSHE Model). It has been implemented under the MWA Action Plans on HR Strategy Item 23: Safety, Security, Health and Environment Management, approved by the HRC, of both short-term plans (attachment 2) and long-term plans. MWA Safety Committee performs their duties in driving the plans and it consists of the representatives from SSHE Division, the Corporate Welfare and Relation Affairs Department, acting as the central authority for laying down the Corporate SSHE Management systems.

In addition, MWA employs SSHE officers as permanent employees, positioning as the professional safety officers for all 21 entities. It also includes the SSHE working group appointed by MWA, who are the trained

employees at various levels with certificates from the Safety and Health at Work Promotion Association (Thailand) under the Patronage. Its duty is to appoint the Safety Officers at executive and supervisor levels by proposing potential candidates to MWA Governor for consideration and the Safety Committee for approval. Moreover, SSHE officers also perform their duties in jointly formulating the regulatory policies and driving its operations regarding health standards and other standards relating to SSHE that may affect employees and communities. It also includes conducting preparedness of officers, such as preparing for fire evacuation drills, prevention of disease outbreaks, landscape improvement, exercise for health, and annual health check-up, etc.







### The Safety Committee



**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 the 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 to organize activities that create the understanding and awareness regarding the safety and environment at 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** | Monitor and evaluate performance.
- 
**6** | Summarize and analyze SSHE performance and its safety indicators, then present to MWA Governor for acknowledgement on an annual basis.

MWA's entity in charge performs duties in investigating the safety according to the designated procedure. If a potential risk on safety is found, it is required to prepare a corrective report with the definite time frame to complete. Also, a progress summary report is required to present in the monthly meeting. The Safety Committee is required to supervise all operations according to the procedures in reporting the 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, 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 Mahasawasdi Water Treatment Plant and the Bangkhen Water Treatment Plant. 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 the lower degree of hazards, for example, MWA has used the paints containing hazardous chemicals (Toluene) to spray the flow meters. Later, it has switched to a new generation of watercolors that do 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 the hazard warning signages according to the nature of each job.

## Safety training for employees and subcontracted workers

To enhance knowledge on safety at the workplace for employees and to comply with laws regarding safety, MWA has therefore provided employees with various courses of safety training as required by laws from the commencement date of employment according to the Occupational Safety and Health Act, B.E. 2554 (2011). Moreover, when it is necessary to perform specific tasks, such as working in confined spaces, tasks relating to electricity and forklifts, etc., safety training relating to aforementioned tasks is required to be organized for employees and subcontracted workers before the commencement date of its operations. It also includes conducting the tests before and after the training.

### 1. Safety Officer (Supervisor level)

The participants were section heads or equivalent. It was scheduled 4 times per year, with 60 persons each, totaling 240 participants.

### 2. Safety Officer (Executive level)

The participants were the Division Directors or equivalent. It was scheduled 4 times per year, with 60 persons each, totaling 240 participants.

### 3. The Safety Committee

The participants were members of the Safety Committee. It was scheduled 2 times per year, with 60 persons each, totaling 120 participants.

### 4. Fire Evacuation Drills

The participants were everyone from MWA entities. Training was held once a year on a regular basis.

### 5. Basic First Aid and Resuscitation

The participants were members of the Safety Committee and the general employees who were interested in this course. It was scheduled 2 times per year, with 60 persons each.

### 6. 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 employees at level 1-5, who had not yet been trained. It was scheduled 10 times per year, with 60 persons each, totaling 600 participants.

## Statistics table showing work-related injuries and deaths during fiscal year 2018–2021

	Fiscal year			
	2018	2019	2020	2021
<b>Target: Injury Frequency Rate (I.F.R.) A, not over</b>	0.40	0.39	0.24	0.20
<b>Result: Injury Frequency Rate (I.F.R.)</b>	0.14	0.30	0.15	0.15
<b>Target: Injury Severity Rate (I.S.R.) A, not over</b>	3.18	3.18	3.18	1.50
<b>Result: Injury Severity Rate (I.S.R.)</b>	0	0.15	0.59	2.65
<b>Recordable work-related injuries</b>				
- Number of work-related injuries (up to 3 days off) (case)	1	2	0	0
- Number of work-related injuries (more than 3 days off) (case)	0	0	1	1
<b>High-consequence work-related injuries<sup>b</sup></b>	0	0	0	0
<b>Number of work-related deaths</b>	0	0	0	0

- a. Data collection process refers to the collection of hours-worked from the HR systems resulting from taking leave, working overtime, and shifts operations, applying the American National Standards Institute for calculating the I.F.R. and I.S.R. In fiscal year 2021, there were 6,804,612 hours-worked, with a reference of 1,000,000 hours-worked. However, MWA does not currently collect the data of work-related injury statistics from the subcontracted workers. By fiscal year 2022, it is required to continue to collect such statistical data.
- b. 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).

According to the statistics table showing work-related injuries and deaths, it was found that in fiscal year 2021, a number of work-related injuries was 1 case, with a sick leave for 18 days (4– 6, 8 – 10, 12 – 14, 16 – 18, 20 – 22 and 24 – 26 July, 2021). That accident occurred on July 1<sup>st</sup>, 2021 around 06.30 a.m. at the sediment measurement tank, phase 1–2, the Mahasawasdi Water Treatment Plant while that worker was carrying out regular sediment measurements. Such an accident was caused by the snake, leading that worker to jump from that sediment tank with a height of 3.5 meters. Thereafter, it was found that the right ankle was sprained and then was admitted to the Thonburi 2 Hospital. After the diagnosis of a fractured right heel bone by the doctor, that worker was required to wear a splint and use a crutch to assist walking, including the diagnosis for surgery. To comply with our preventive and corrective measures, we assigned the Plant Service Division to carry out the installation of a ladder on the wall of that sediment tank.

Even though, 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 commencement date of work (Baseline) as required by law. But MWA still does not collect data of such work-related illnesses due to the lack of personnel with expertise in occupational medicine.

Thus, in fiscal year 2021, MWA has contracted with the Nopparat Ratchathani Hospital to investigate all MWA entities by Walkthrough Survey, to determine the list of medical health check-ups based on risk factors that cover the nature of work as required by law. In fiscal year 2022, MWA plans to continue the further operations as well as to consider signing a Memorandum of Cooperation (MOC) between MWA and the Nopparat Ratchathani Hospital to conduct the analysis and prepare the follow-up method on the health check-ups based on risk factors, as well as to collect such data to use as statistics of work-related illnesses any further.

## Health Support

MWA Health Promotion Projects have been initiated through the principles of Happy Workplace, such as activities of Happy body-exercise for well-being, Happy Relax-relieve stress, and business visits to various agencies, etc. This project also includes organizing a relaxing massage program for employees to reduce the office syndrome, preparing budget allocation to MWA clubs for procuring fitness equipment (fitness Room), or organizing annual sporting events.

MWA Medical Services Department has also taken the annual health check-up results of employees to analyze. The purpose is to create projects to address health problems, such as providing training on cardiovascular disease prevention and food sanitation care. It also includes collaboration with the Lak Si District Office to inspect the cleanliness of MWA canteen and the random food contaminant inspection on an annual basis.

Medical allowances are also available to employees, covering their spouses and families. In case of being admitted to the public hospitals, it is required to disburse in accordance with regulations. But if receiving the medical treatment in case of outpatients in the private hospitals, it is required to pay not more than 3,600 baht per year. Such benefits do not cover the subcontracted workers because they are eligible from Social Security instead. Moreover, MWA also provides medical examinations, nursing care, diagnosis, counseling, advice to the retired employees' families and spouses, and MWA subcontracted workers in both dentistry, pharmaceutical, and clinical pathology. In the event that such illness cannot be treated by our provided services, conducting the patient referral or receiving treatment in another hospital with a higher performance, are highly recommended.



## Supportive and Preventive Measures for COVID-19 pandemic

MWA has continually implemented measures to monitor and prevent the spread of the coronavirus disease 2019 (COVID-19), such as procuring the body temperature monitoring equipment and arranging the screening spots for those entering the building covering various office areas. If the visitors' temperature of more than 37.3 degrees Celsius is found, they are not allowed to enter the buildings and the office areas. Moreover, we have implemented a social distancing measure by requiring our personnel to work at their residences (Work from Home) and adjusting the work hours to be more flexible, so as to reduce congestion in the work area. In fiscal year 2021, MEA has issued an announcement regarding the control and surveillance measures of the COVID-19 pandemic (No. 6) which defines additional measures and guidelines in alignment with the new wave of COVID-19 pandemic.

During that difficult period, MWA has prepared an action plan for implementing those measures which consist of 3 parts as follows:

**Part 1: Employee Screening;** it is a screening process of employees/subcontractors/other visitors before entering the buildings. Our entity in charge has set up the screening spots outside the buildings or the spots with ventilation, and conducted screening process by using the body temperature monitoring equipment for everyone before entering the buildings.

### Proactive COVID-19 Screening Service

- In Fiscal Year 2021, MWA, in collaboration with the Public Health Service Centers- 53 Thung Song Hong, have conducted two proactive screening tests for COVID-19 by applying the RT-PCR method. If the infected cases are found, we are responsible for bringing them to receive a medical treatment by Hospital program at the hospitals arranged by us.

**Part 2: Employee Survey;** we have conducted a survey for employees with abnormal symptoms. If such cases are found, it requires to report to the Safety Committee according to the procedures set out in measures.

**Part 3: COVID-19 Patients Survey;** we have conducted a survey for the infected cases within the organization. If such cases are found, whether they are infected patients, employees with close contact to the COVID-19 patients, or those who are undergoing disease investigation criteria, it requires to report to our COVID-19 investigation team to proceed the further steps.



## Mitigative measures for those affected by COVID-19 crisis

If our employees or subcontracted workers are infected by COVID-19 and are still in the waiting list for medical treatment, and those who have not yet received preliminary medications nor consultation from a doctor to alleviate the symptoms of an initial illness, MEA has prepared a medical team consisting of part-time doctors, hospitals under the contract with MWA, and MWA Medical Service Division to provide assistance as follows:

1. MWA Part-time doctors provides assistance in giving consultation and advice to the infected patients by prescribing medicines to alleviate the symptoms of primary disease or providing the Telemedicine service to inquire about the patient's symptoms and fully provide assistance with consultation/advice to the patients who have requested.
2. Preliminary medicines kit for infected patients: It consists of the medicines for antipyretic, cough relief, phlegm-dissolving, nasal decongestants,

and Andrographis paniculate. If the Safety Committee is in need to request disbursement of the medicines and medical supplies for the infected patients to relieve the symptoms of initial illness, they are able to proceed it at the Medical Service Division prior to those patients are being admitted to the hospital under the Hospitel program. This action helps slow down or relieve symptoms for the patients initially and reduce the risk arising from the change in symptoms that are going worse. The Safety Committee of each entity can request for a disbursement of the said list of medicines in accordance with the prescription form as defined, and the lists of these disbursements are also systematically recorded.

For patients who need urgent medication, an assistance on a case-by-case basis is provided by delivering medicines to those patients at homes. In which the MEA Senior Citizen Association supports the cost of delivery.

## Remedies Program for those affected by the COVID-19 epidemic

MEA has implemented measures for compensation and remedy for subcontracted workers who provide services on behalf of MWA or agents, such as agents of meter reading, water bill collection, and wire binding. The purpose of this measure is to alleviate the suffering from the MWA's order to temporarily suspend providing services. To provide assistance to those service subcontracted workers in orderly and efficient manners by the virtue of Section 31 of the Metropolitan Waterworks Act, B.E. 2510, the Governor of the Metropolitan Waterworks Authority, therefore, has established a Working Group to assist those affected by the epidemic of the Coronavirus Disease 2019 (COVID-19) continually from fiscal year 2020 through the project "We fight COVID-19 together".



In fiscal year 2021, we have provided the assistance as follows:

- To provide insurance against COVID-19 for service subcontracted workers who provide services on behalf of MWA or agents, such as agents of flow meter reading, water bill collection, and wire binding, amounting to 480 persons in total.
- To provide additional financial aids to subcontracted service workers who have been affected by the MWA's order to suspend providing services for 14 days, with the compensation of 5,000 baht per person, totaling 1,801,500 baht.



## Mitigative Measures for those affected by the coronavirus disease 2019 (COVID-19) epidemic

MEA has appointed a Working Group to implement mitigative measures for those affected by the Coronavirus Disease 2019 (COVID-19) Outbreak. The purpose of this action is to alleviate the burden of the household expenses of those who live in Bangkok, Nonthaburi, and Samut Prakan, which are the service areas of the Metropolitan Waterworks Authority, covering 2.4 million households or more than 12 million people according to the policy of the Ministry of Interior. In which this policy emphasizes the importance of “increasing income, reducing household expenses”.

In fiscal year 2021, we have implemented mitigative measures as follows;

1. Measures to reduce water tariff rate only for residential and small businesses groups of customers (excluding government agencies and state enterprises) at the rate of 10 percent from February to March, May to June, and August to September, 2021.
2. Measure to provide free of charge for water service fee to the state welfare card holders from October 2021 to September 2022, under the conditions that the total amount (VAT included) is not exceeding 100 baht per 1 service connection per month.

**การประปานครหลวง**

**ลดค่าน้ำ 10% บ้านที่อยู่อาศัย-กิจการขนาดเล็ก**  
สำหรับใบแจ้งค่าน้ำประจำเดือนกุมภาพันธ์ และ มีนาคม 2564  
ช่วยเหลือรายจ่ายประชาชนบรรเทาผลกระทบจาก COVID-19

เฉพาะพื้นที่กรุงเทพมหานคร นนทบุรี และสมุทรปราการ

บ้านที่อยู่อาศัย 100 ลิตร บ้าน คอนโด หอพัก บ้านเช่าอาคาร ฯลฯ  
กิจการขนาดเล็ก 100 ลิตร ร้านค้า ร้านอาหาร หรือโรงแรมขนาดเล็ก ฯลฯ  
(ไม่รวมส่วนราชการและรัฐวิสาหกิจ)  
ที่มีขนาดครัวเรือนไม่เกิน 3/4 ไร่ หรือ 6 ไร่

**การประปานครหลวง**  
แนะนำวิธี  
ดูส่วนลดค่าน้ำ 10%

เพื่อบรรเทาความเดือดร้อน  
จากสถานการณ์ COVID-19

- 1 ลดค่าน้ำสำหรับใบแจ้งค่าน้ำประจำเดือน ส.ค. - ก.ย. 64
- 2 ค่าน้ำประจำครัวเรือน
- 3 ส่วนลด 10% จากค่าน้ำที่แท้จริง

หมายเหตุ  
ส่วนลดค่าน้ำจะแสดงในใบแจ้งค่าน้ำ  
(ใบแจ้งค่าน้ำจะแสดงส่วนลด 10%)  
ที่มีขนาดครัวเรือนไม่เกิน 3/4 ไร่ หรือ 6 ไร่

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Moreover, to alleviate the sufferings in the livelihood, MEA also has implemented the project under the title “MWA Happy Cabinet to raise encouragement of all to fight against COVID-19” at all 18 branches. These happy cabinets have contained instant food and PAPA bottled drinking water, operated from July to September 2021. The purpose of this action is to help those in needs and provide our employees and the general public with opportunities to donate necessary stuff, dry food or the bottled drinking water. Those who are interested in donation, they can directly refill those survival stuff in our Happy Cabinet at their convenient places and times, to pass on their empathies and help those people to overcome this tough situation together. In addition, we also have sponsored the “COVID HOME CARE” project to help the infected patients with low symptoms who need only medication and stay at the nursing homes in the project. It also includes sponsoring the bottled drinking water to the affected communities, hospitals, field hospitals, and COVID-19 vaccination service centers.



Summary of the overview of social activities to alleviate those affected by the Covid-19 crisis in fiscal year 2021

## Local Communities: Participation in Development of Communities and Society

Not only running a business but 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.



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 MWA, as well as organizing activities that tighten relationships with the communities in a sustainable and unified way.

In fiscal year 2021, MWA conducted the local community programs, with the purpose to be engaged in the community development and to inquire about the needs and expectations of 12 communities such as the Bang Nang Li Yai School, Amphawa, Samut Songkhram, the Prasertth Mosque Islamic Community, Pakkred, Nonthaburi, the Wat Samlae Children's Care Center, Muang, Pathum Thani and the communities nearby the Samsen Water Treatment Plant, Bangkok, etc.



## “MWA Rak Pa Ton Nam Project” (Integration of Sustainability Projects)

This project has 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 from various agencies such as the Department of Forestry, the Department of National Parks, Wildlife and Plant Conservation, the National Water Resource 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 for increasing 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.



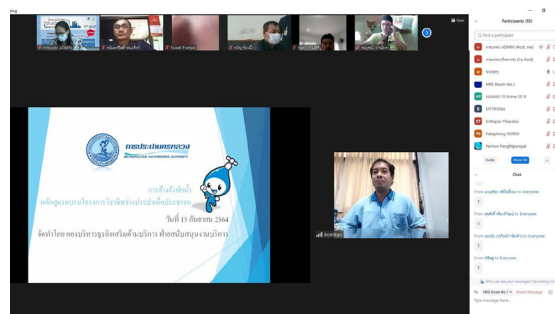
Thus, the community member has gained the social benefits that enable better community development with good outcomes. It is also beneficial for maintaining hydration, restoring the quality of forest, and preserving water in the forest to the long-lasting during the dry season, to reduce severity and alleviate damage to the communities located 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 2021

- From March 27 to April 2, 2021, MWA conducted the community development programs by installing the solar cell systems for the underground water supply and four 8000-liter water tanks. Moreover, plumbing systems and electricity systems at the Ban Pang Gom School, Song Kwae, Nan, were improved.

## Plumber Vocational Program for the People

According to MWA Community Development Program under the Corporate Social Responsibility policy, it aims to implement and create better communities. We have therefore initiated the Plumber Vocational Program for the people, to provide them with training on basic plumbing work to participants. This project encourages the establishment of plumbers' networks to share and exchange knowledge and experiences together with 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 have 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 a sustainable success.



### Performance in fiscal year 2021

- Training for Plumber Vocational Program for the People, on the basic plumbing work through online platform- Zoom Meeting, was organized during 14-16 September 2021, with 67 participants in total.
- CSR activities under the program of “Plumbing for the People”, was organized by allowing the trained participants to notify details and locations where the water leakages from plumbing systems were found. It also included providing social assistance to the communities or neighbors in maintaining the plumbing systems. Details and photos relating to such operations were required to submit to MWA so as to keep in our CSR portfolio.



### School Plumbing System Project

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 needs 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, for 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 Samutprakarn.

However, water is considered a limited natural resource while its consumption demand becomes 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 well-being of those locals. We have implemented this project with a well-recognized and high-performance system, combining with our expertise to manage such waterworks systems into standards. We focus only in the communities that lack opportunities to consume clean and safe water, to create better sanitation and well-being of those locals. It has started from providing and improving the school's plumbing systems, developing groundwater supply systems, establishing





a water purifier system, water pumping system, and water pipeline system. It also includes providing water tanks with height for reserving rainwater and groundwater, providing the prefabricated gutters, or organizing other activities beneficial for the schools in areas of the Mae Klong Basin.

### Performance in fiscal year 2021

We implemented this program to improve quality of life for those who lived around the western areas of waterworks canals. It started from improving the plumbing systems and its equipment, and sanitary wares within the schools nearby. There were four schools participated in this project as follows:

1. Wat Hin Dad School: Moo 3, Tumbol Hin Dad, Thong Pha Phum, Kanchanaburi.
2. Wat Sawang Arom School: Moo 6, Tumbol Narapirom, Bang Lane, Nakhon Pathom.
3. Phra Mor Phisai School: Moo 8, Tumbol Narapirom, Bang Lane, Nakhon Pathom.
4. Wat Bang Nang Li Yai School: Moo 3, Tumbol Suan Luang, Amphawa Samut Songkhram.

### **Ruam Jai Rak Nam Project**

As known, one of MWA core missions is to explore and procure raw water from the natural water sources (Mae Klong and Chao Phraya basins), to produce the quality water supply that is appropriate for consumption. We serve water supply to the people who live in Bangkok, Nonthaburi and Samutprakarn. While water is considered a limited natural resource, demands of water consumption become 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, Tumbol Ban Krachaeng, Muang, Pathum Thani. This station functions to receive raw water from the Chao Phraya basin, an important raw water source of MWA, which consists of Klong Ban Phrao, Khlong Orm, and Khlong Bang Luang Chiang Rak (it is called Khlong No.3 by MWA).

In the past, the Klong 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 drained 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 into good quality. This project focuses on the communities, students, and youth, in order to gain knowledge and understanding of environmental cares and to build their potentials to transfer such knowledge to families. As a result, this project has created an awareness of environmental conservation in sustainable manners, beneficial for the surrounding environment, especially on both sides of the Klong 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 Poon, Bang Phut, Suan Prik Thai, Ban Mai, Ban Krachang, Bang Kradi, and the people. As a result, we have received not only a stronger relationship among interagencies, but it has created the engagement in community development, to restore water bodies to good quality and to improve well-being of those people as well.

### Performance in fiscal year 2021

We conducted social programs to improve the well-being of students in schools located in Muang Pathum Thani, Pathum Thani, an area of the eastern side of waterworks canals. We implemented this project by constructing the grease traps and improving the existing grease traps for two participating schools as follows;

- (1) Wat Dao Ruaeng School
- (2) Wat Sadet Community School



### **Stakeholder Day: Stakeholder Engagement Program**

The activity of Stakeholder Day has been held to support stakeholders' engagement. The key objective of this event is to communicate and enhance the understanding of MWA key roadmaps that respond to the needs and expectations of all stakeholders. Another objective of holding this event is to listen to opinions and exchange experiences among participants or stakeholders of all sectors. However, we intend to use those voices as a guideline to integrate and improve our work process and services to be better. It is also used for driving the missions to ensure the security of the public water utilities toward sustainability.

In fiscal year 2021, we have organized the Stakeholder Day event under the concept of tightening relationships towards sustainability for the third consecutive year in the forms of both on-site and online activities, to minimize the overcrowding of participants during the COVID-19 pandemic. This event consists of MWA Exhibition, an honorable speech by the Deputy Minister of the Interior (Mr.Nipon Boonyamane), and the dialogues on "Driving future organizations towards corporate sustainable development" by MWA Governor and MWA Deputy Governor (Plan and Development).

Moreover, we have conducted the satisfaction survey of stakeholders toward MWA's operations and organized discussion panel sessions to receive opinions/suggestions from those participants.

There were 459 stakeholders participating in forms of both on-site and online activities.



In fiscal year  
**2019**

the results of a satisfaction  
survey toward MWA's  
operations were scored at

**4.58**

In fiscal year  
**2020**

the results of a satisfaction  
survey toward MWA's  
operations were scored at

**4.18**

In fiscal year  
**2021**

the results of a satisfaction  
survey toward MWA's  
operations were scored at

**4.30**



## Training and Education



### Human Resources Development

Metropolitan Waterworks Authority (MWA) is one of the organizations that holds the belief in the value of diverse people alongside striving to become a High Performance Organization with sustainable growth in terms of both environmental, social, and governance. We therefore, strongly focus on human resources development to enhance our employees' competencies to become proficient in various fields and to hold the abilities to apply creative thinking concepts and modern technology to develop a more efficient work process. So, this guideline is considered one of our support processes to drive the organization to continually and smoothly succeed for sustainable growth in the near future.

### Competency Development Programs for Employees

In fiscal year 2021, to implement the aforementioned guidelines to support the smooth management and operations and to arrange preparedness of all employees to cope with the situations caused by the transformation into Thailand 4.0 era, we are required to conduct competency development programs through training to enhance their potential with multi-skills and willingness to fully contribute their best efforts upon their own duties. It also includes the abilities to adopt digital technology and self-development learning skills to drive the organization to success in alignment with goals, visions, missions, and values as defined under the intent of becoming a High Performance Organization (HPO). Therefore, we have conducted training programs for employees and executives at all levels in accordance with the Annual Training Plan for fiscal year 2021, HP Strategies Map, the Fifth MWA Enterprise Plan (2.3-1L, Competency Development Program to support the efficient implementations of the Strategies).

## Training Course

### All professional training courses

#### 1. Development Course on Effluent Management

- 1) Fundamentals course for Water Loss Reduction and Basic Detection of Leaked Pipes
- 2) AutoCAD” Course for “Drafting with AutoCAD (Advance) for those who hold basic AutoCAD background”
- 3) Course on “Application of EPANET Level 1”
- 4) Course on “Application of EPANET Level 2”
- 5) Course on “Applications of the system and the selection of pipeline improvement with Asset Management.”
- 6) Course on “Selection the appropriate Flow Meter” according to its specifications.
- 7) Course on effective use of flow meters

#### 2. Development Course on Water Safety Plan

- 1) Course on “Water Quality Analysis/Assessment and the principle of applying the results of the analysis to use in the water production system.”
- 2) Course on “Smart manufacturing : Smart manufacturing process”
- 3) Course on “Human Resources Development according to the Water Safety Plan”

#### 3. Course on Development of Water Supply Engineer

- 1) Advanced Course on Construction Work Control of Water Pipeline Installations
- 2) Course on “Project Management”
- 3) Course on “Development of water pipeline construction standards for engineers”
- 4) Course on “Liquid Penetrant Testing (PT) Level II”
- 5) Course on “Internet of Things (IoT) Technology in Manufacturing Industry”
- 6) Course on “Energy Conservation for motors of water pump and fan”
- 7) Course on the Application of Internet of Things (IoT) for energy conservation and management in factories and controlled buildings.”
- 8) Course on “Application of Alternative Energy and Renewable Energy in factories and controlled buildings”
- 9) Course on “Electricity Generation System by Solar Cells”

## Training Course

**Programs/Courses for arranging preparedness of employees with competency development to respond to the changes in the organization.**

### 1. Course on Skills Development for Digitalization

- 1) "Workshop Training Program for Policy Formulation on Information Security"
- 2) Course on "Data Scientist (e-learning)"
- 3) Business Intelligence Analyst Bootcamp (Class# 3)
- 4) Workshop on "MWA Analytic Camp"
- 5) Advanced Course on Applications of Microsoft Excel Program
- 6) Course on "Professional Presentation Techniques with Microsoft PowerPoint"
- 7) Course on "Infographic for effective communication"










### 2. Courses for Personnel Competency Enhancement on Innovations

- 1) "Competencies Enhancement Program for Creative Thinking and Innovation Management."
- 2) "Leadership Transformation Program" course
- 3) "Journey to Innovation Program" under the Corporate Culture Development Program on Innovators
- 4) Course on Development of Innovation Roadmap
- 5) Course on "In-sight and In-depth Advanced Strategic Planning for Future Success"
- 6) Course on "Portfolio View of Risk & Correlation Map"

### 3. CSR Promotion Course in Organizational Procedures and Engagement in Key Communities Development

- 1) Course on ISO 26000: Standards for Social Responsibility Guidelines and Human Rights Curriculum
- 2) Course on CSR Engagement
- 3) Course on Stakeholder Engagement for Corporate Sustainable Development

Table summarizing the average number of training hours for employees classified by genders and position levels in fiscal year 2021

Position Level	Total number of Employees			Average Training Hours/Person		
			Total			Average Training Hours
10 and upward	8	6	14	6	7	8
9	22	14	36	9	10	11
8	48	51	99	16	17	19
7	219	277	496	23	24	26
6	363	419	782	27	27	28
5	560	533	1,093	25	24	25
4	494	148	642	21	18	22
3	236	150	386	18	19	21
2	98	23	121	10	9	13
1	16	-	16	2	-	2
<div>  Male 2,064 Person </div> <div>  Female 1,621 Person </div> <div>  Total 3,685 Person </div> <div>  Male 40 Hours </div> <div>  Female 39 Hours </div> <div>  Total 41 Hours </div>						

## Scholarship Program as Human Resources Development



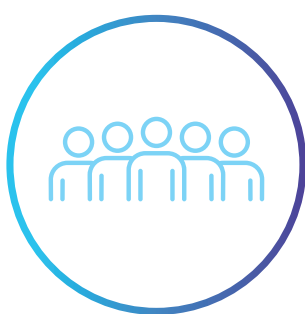
In fiscal year 2021, MWA has provided employees in the organization with scholarships according to the human resource development plan. There are four employees continuing their studies at the master's degree level in important faculties that are beneficial to MEA operations, namely:

- 1) Master of Engineering Program, Kasetsart University
- 2) Master of Business Administration Program, Sukhothai Thammathirat University
- 3) Master of Business Administration Program, Kasetsart University
- 4) Master of Business Administration Program, National Institute of Development Administration (NIDA)

In addition, MWA has provided employees with the opportunity to take leave for continuing their studies at the Master and Doctorate Degree levels both in Thailand and overseas to enhance their knowledge and potential to further develop the organization. In fiscal year 2021, one employee has taken leave for further study at the Master's degree level (overseas) in the Faculty of Engineering. University of Sheffield, England.

## Performance Evaluation

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 potentials and the organization. Its is divided into 3 categories as follows:



Core Competency: CC



Functional Competency: FC



Leadership Competency: LC

## Results from MWA Performance Evaluation in fiscal year 2021

### Percentage of total employees evaluated by Core Competency: CC

Position Level	Gender				Total employees	
	Male		Female			
	persons	%	persons	%	persons	%
Level: 6 -10: holding a management position	441	49.49	450	50.51	891	100.00
Level: 6 - 10: holding an equivalent position	233	42.36	317	57.64	550	100.00
Level: 1 - 5	1,780	63.41	1,027	36.59	2,807	100.00
Total	2,454	57.77	1,794	42.23	4,248	100.00

### Percentage of total employees evaluated by Functional Competency: FC

Position Level	Gender				Total employees	
	Male		Female			
	persons	%	persons	%	persons	%
Level: 6 - 10: holding a management position	444	49.66	450	50.34	894	100.00
Level: 6 - 10: holding an equivalent position	218	41.44	308	58.56	526	100.00
Level: 1 - 5	1,802	63.45	1,038	36.55	2,840	100.00
Total	2,464	57.84	1,796	42.16	4,260	100.00

### Percentage of total employees evaluated by Leadership Competency: LC

Position Level	Gender				Total employees	
	Male		Female			
	persons	%	persons	%	persons	%
Level: 6 - 10: holding a management position	442	49.50	451	50.50	893	100.00
Level: 6 - 10: holding an equivalent position	15	35.71	27	64.29	42	100.00
Total	457	48.88	478	51.12	935	100.00

Note: The total employees calculated in each table is the number of employees at different periods according to the evaluation cycle of the organization. Tables of FC, LC are data as of January 1, 2021 and Table of CC is data as of June 1, 2021. Therefore, the calculated number of total employees does not correspond to the data shown in such tables.



## Results of Overall Performance Evaluation in Fiscal Year 2021

Category of Performance Evaluation	FY 2019	FY 2020	% (high – low)	FY 2021	% (high – low)
CC	99.64	99.79	0.15	99.69	-0.10
FC	97.07	98.10	1.03	97.98	-0.12
LC	98.92	99.68	0.76	99.79	0.11

Furthermore, we also have prepared a project to develop a human resources development plan to support growth of the employees along their own career paths. Of which it provides our employees with the opportunities to grow according to their potentials and preparedness in sustainable manners.

## Employee's Benefits and Welfare

As the aforementioned in the previous chapter, MWA values employees at all levels, considered one of success keys that drives for the organization to move forward steadily. Therefore, we have formulated an Employee Care Policy with comprehensive benefits and welfare so that they can work happily and together grow along with the organization in sustainable manners.

Table showing information on welfare of MEA employees

MWA welfares	
1	Annual bonus
2	Water bill allowance
3	Over Time (OT) allowance
4	Meal allowance for OT workers
5	Extra pay for shift workers
6	Incentive
7	Chartered traveling allowance
8	Compensation for using MWA pooled cars
9	Financial support for employees' child
10	Financial support for maternity
11	Financial support for deceased employee (Funeral expense)
12	Financial support for hosting funeral (Religious expenses)
13	Financial support in the case of disaster
14	Educational support for employees' child (Tuition fee)
15	MWA Scholarships for subcontracted workers' child
16	Foundation Scholarships for subcontracted workers' child
17	Welfare Home Loan by the Government Housing Bank (GHB)



### MWA welfares

- 18 Welfare Home Loan by the Krungthai Bank (KTB)
- 19 Compensation
- 20 Compensation in case of termination of employment or dismissal without guilt
- 21 Medical treatment allowance in MWA contracted hospitals
- 22 Medical treatment allowance in other hospitals (not MWA contracted hospitals)
- 23 Air-conditioned buses for employees
- 24 Annual Health Check-up
- 25 Free uniform for subcontracted workers
- 26 Free accommodations for the shift subcontracted workers who work in water treatment plants
- 27 Awarding a souvenir to a subcontracted worker who has turned 25 years old.
- 28 Awarding of honors with souvenirs to retirees
- 29 Awarding honorary certificates to those who are valuable to MWA.
- 30 Giving alms of the Buddhist monk's robe
- 31 Extra pay for specific professional fields
- 32 Retirement funds consist of;
  - Pension Fund / Provident Fund
  - Compensation for employment preference
  - Compensation in cash in the case of not exercising the rights to take an annual leave.



In addition, 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.

As 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.

Table showing data on a number of employees who take maternity leave and a number of employees who return to work after maternity leave during fiscal year 2018 – 2021

Type of Leave/ Fiscal Year	Number of employees who took leave	Number of employees who returned to work after maternity leave within the reporting period	Number of employees who took leaves with the due in the next fiscal year	Rate of Return to Work after the due of leaves. (%)	Retention of employees who returned to work after taking leave (%)	Remarks
<b>1. Maternity leave (Female)</b>						
FY 2018	63	38	25	100	100	
FY 2019	53	44	9	100	100	
FY 2020	50	38	12	100	98	One employee resigned on 16 September, 2020.
FY 2021	41	33	8	100	100	
<b>2. Parental leave after maternity leave (Female)</b>						
FY 2018	-	-	-	-	-	
FY 2019	2	-	2	100	100	
FY 2020	3	2	1	100	100	
FY 2021	6	5	1	100	100	
<b>3. Parental leave (Male)</b>						
FY 2018	54	51	3	100	100	
FY 2019	38	35	3	100	100	
FY 2020	55	51	4	100	98.18	One employee resigned on 1 September, 2020.
FY 2021	32	30	2	100	93.75	Two employees resigned on 1 August, 2021, and 1 January, 2022.

## Preparations before the Retirement

To honor the value of all retirees, MWA has prepared the retirement plan and relevant activities in terms of both physical and mental for all retirees to live their lives happily after their retirements. In fiscal year 2021, we have conducted the activities for retirees 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 leave 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 fiscal year 2021, due to the COVID-19 epidemic situation that has still remained existing. To comply with preventive measures released by the government, we have considered not organizing on-site activities for pre-retirement. We, therefore, have provided the retirees with an online training through video clips, so as to allow

them to study on their own. Moreover, it also includes establishing a Line Group so that they can inquire directly to the staff which has been well received by retirees.

In order to ensure that 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 estimation of the employee's benefits obligated to pay in the future. This is to ensure that MWA is able to pay employees adequately on the date of retirements according to the 19<sup>th</sup> 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.

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

Age	FY 2019			FY 2020			FY 2021		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
21-30 years old	48	38	86	32	39	71	-	-	-
31-40 years old	15	12	27	37	22	59	-	-	-
41-50 years old	1	2	3	7	3	10	-	-	-
More than 51 years old	-	-	-	-	-	-	-	-	-
<b>Total</b>	<b>116</b>			<b>140</b>			<b>-</b>		

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 2019			FY 2020			FY 2021			Total
		Male	Female	Total	Male	Female	Total	Male	Female	Total	
21-30 years old	Resigned	5	4	9	2	-	2	6	2	8	19
	Deceased	-	-	-	-	-	-	1	-	1	1
31-40 years old	Resigned	7	5	12	4	4	8	3	2	5	25
	Terminated due to the guilty.	1	-	1	-	-	-	1	-	1	2
	Dismissed due to the actions of guilty	2	-	2	-	-	-	-	-	-	2
41-50 years old	Resigned	2	1	3	-	2	2	-	-	-	5
	Terminated without guilty	-	1	1	-	-	-	-	-	-	1
	Terminated due to the actions of guilty	-	-	-	-	-	-	-	1	1	1
	Dismissed due to the actions of guilty	-	-	-	-	-	-	-	1	1	1
More than 51 years old	Resigned	1	1	2	3	1	4	1	1	2	8
	Deceased	-	-	-	-	-	-	7	-	7	7
	Terminated without guilty	1	-	1	1	-	1	-	-	-	2
	Dismissed due to the actions of guilty	-	-	-	1	-	1	-	-	-	1
	Retired	37	44	81	30	33	63	30	33	63	207
<b>Total</b>		<b>56</b>	<b>56</b>	<b>112</b>	<b>41</b>	<b>40</b>	<b>81</b>	<b>49</b>	<b>40</b>	<b>89</b>	<b>282</b>

Note: Age calculation as of September 30, 2021

# Environmental Performance



1 2 5





## Environmental Performance

### Water and Effluents

#### Water Resources Management for Producing Water Supply

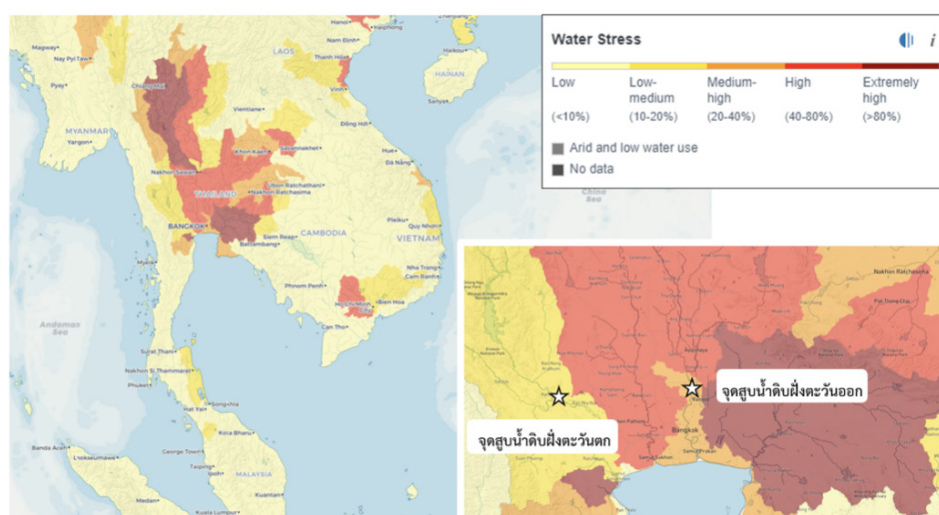
In general, Metropolitan Waterworks Authority (MWA) procures raw water from 2 main water sources- the eastern watershed to receive raw water from the Chao Phraya River (the Bhumibol Dam, the Sirikit Dam, the Kwae Noi Bamrung Dan Dam, and the Pa Sak Chonlasit Dam). Approximately 1,738,889 megaliters of raw water used for water production processes in fiscal year 2021 (Oct 20–Sep 21). Another source is from the western watershed to receive raw water from the Mae Klong River (Srinakarin Dam and Vajiralongkorn Dam). In fiscal year 2021 (Oct 2021–Sept 21), approximately 582,455 megaliters of raw water were used for water production processes.

Raw water source	Watershed source	The amount of raw water used for producing water supply (Million cubic meters)				As a percentage of usable water
		2018	2019	2020	2021	
<b>Chao Phraya River</b>	Bhumibol Dam, Sirikit Dam, Kwae Noi Bamrung Dan Dam, and Pa Sak Chonlasit Dam.	1,610	1,697	1,709	1,738,889 megaliters	9
<b>Mae Klong River</b>	Srinakarin Dam and Vachiralongkorn Dam.	532	555	593	582,455 megaliters	4

During the dry season in the eastern watershed between November 2020 and April 2021, we received raw water of approximately 900,000 megaliters allocated by the Department of Irrigation, but only 877,564 megaliters of that raw water was used for our water production processes. In regard to the western watershed, it received raw water from the Mae Klong River (Srinakarin Dam and Vachiralongkorn Dam) during the dry season

between January 2021 to June 2021. We received approximately 360,000 megaliters of raw water allocated by the Department of Irrigation. But only 286,416 megaliters of that raw water were used.

The eastern source of raw water is located in the moderate to high water stress areas. While the western source of raw water (the Mae Klong River) is located in the low to medium water stress areas.

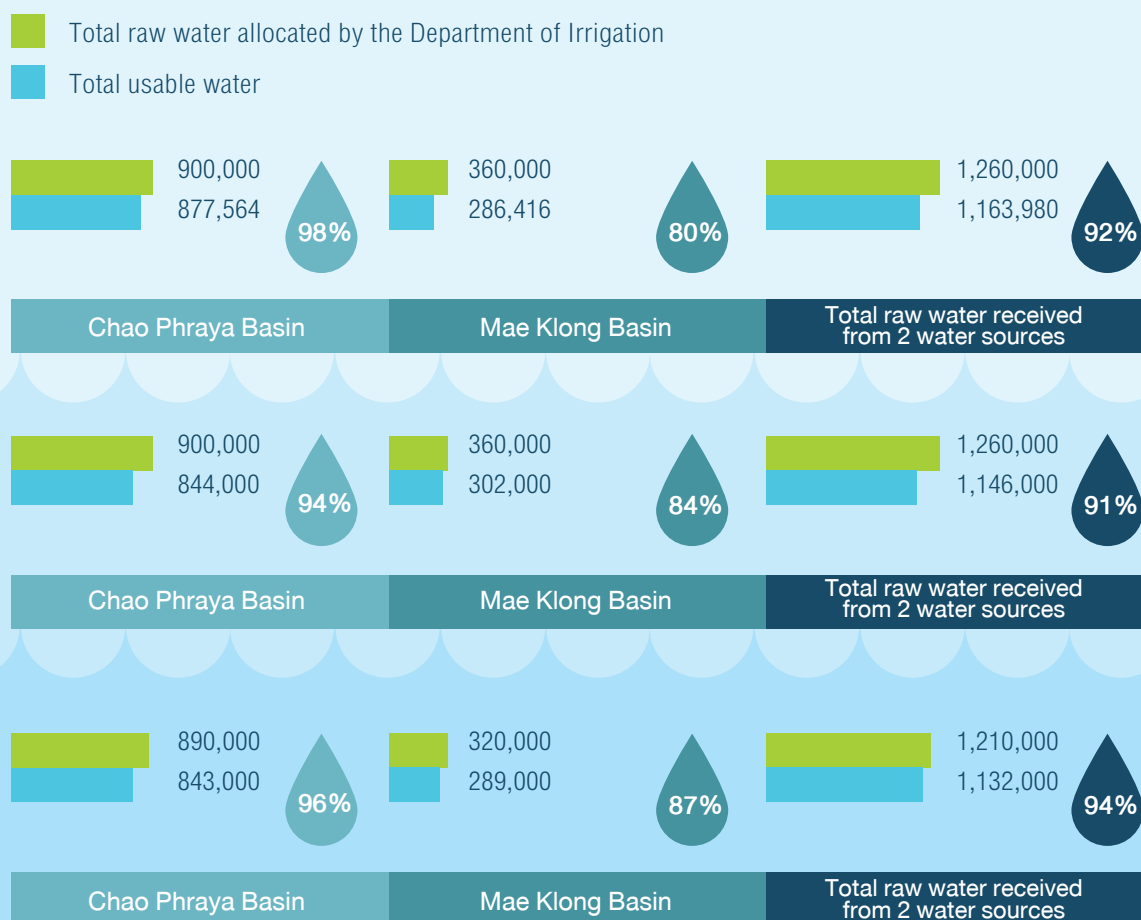


Reference: <https://www.wri.org/applications/aqueduct/water-risk-atlas/>

MWA emphasizes the importance of water resources towards the agricultural, industrial, and household sectors; we therefore have established guidelines for effective management of raw water that is used in MWA water production processes. Moreover, this guideline has integrated to the shared missions of relevant agencies that perform their duties in allocating raw water to produce water supply systematically. Thus, we work closely with the Office of National Water Resources and the Department of Irrigation to conduct the response plan to the unexpected situations. This action also includes monitoring the situation of salinity density in the Chao Phraya River together with the Department of Irrigation during the dry

season. Meanwhile, we estimate the amount of raw water needed for producing water supply in advance for each dry season based on a number of factors, such as the public water consumption, water consumption trends from different sectors, and its water production plans that are adjusted over time, and so forth. Afterward, this projection of raw water needed in that dry season is required to submit to the Department of Irrigation by October of each year to apply such information as a guideline to formulate the National Drainage Plan. This guideline also includes preparing the Cultivation Plans along each river basin that suit the amount of raw water available after the end of the rainy season.

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



**Remarks:**

- The 6-month dry season in the western watershed (Mae Klong River) is defined from the period of January to June of each year.
- The 6-month dry season in the eastern watershed is defined from the period of November of that year to April of the following year.

Table showing total raw water that MWA uses for producing water supply in fiscal year 2019–2021

Raw water source	Watershed source	Total Raw Water (Unit: Megaliter)		
		2019	2020	2021
Chao Phraya River	Bhumibol Dam, Sirikit Dam, Kwae Noi Bamrung Dan Dam, and Pa Sak Chonlasit Dam	1,722,077	1,694,761	1,738,889
Mae Klong River	rinakaran Dam and Vachiralongkorn Dam	558,109	559,728	582,455

Remark: Raw water from both sources is freshwater, with a Total Dissolved Solids (TDS) of less than 1,000 mg/l. TDS average values through the year of both the western and eastern water sources are 481 and 134 mg/l respectively.

## 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<sup>3</sup> framework for effluent generated by our operations. In general, effluent has been generated from two main sources as follows:

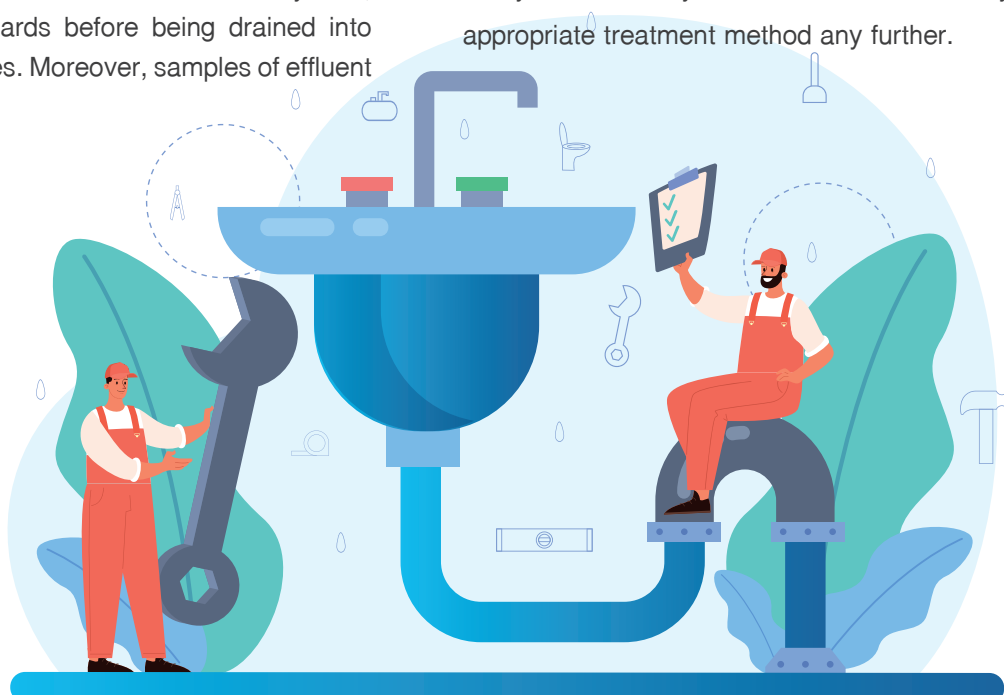
### 1. Effluent generated by water treatment processes:

Most of them are generated by the processes of sedimentation and water filtration. 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 test are required to report to relevant regulators on an ongoing basis.

### 2. Effluent generated by activities within office buildings:

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

Water Treatment Plant	Total Effluent (Fiscal Year)			Source to receive effluent	Types of effluent	Meet the standards or not
	2019	2020	2021			
1. Bangkhen	29,061	40,538	32,812	Khlong Bang Talat	Freshwater	yes
2. Samsen	6,596	10,856	10,319	Klong Samsen	Freshwater	yes
3. Thonburi	4,411	2,938	715	Khlong Bang Khun Non	Freshwater	yes
4. Maha Sawasdi	8,313	8,138	3,334	Khlong Plai Bang	Freshwater	yes

### 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, in page....
3. Relevant laws regarding wastewater and effluent management include:
  - Notification of Ministry of Natural Resources and Environment, re: Establishing standards for controlling drainage from industrial factories, Industrial Estates, and Industrial Zones, enacted on March 29, 2016.
  - Notification of Ministry of Industry, re: Establishing standards for controlling industrial drainage, B.E. 2560 (2017), enacted on May 30, 2017.
  - Ministerial Regulations, re: Establishing guidelines, methods of data and statistics collection, detailed records, and performance reports of wastewater treatment systems, B.E. 2555 (2012), enacted on April 3, 2012.

## Reuse of Effluent generated by water production processes of the Maha Sawasdi Water Treatment Plant

We realize the importance of being responsible for our water resources, the Maha Sawasdi Water Treatment Plant therefore has formulated the method to reuse effluent generated by water production process (Reuse), with turbidity in the normal standard. The amount of recycled effluent for fiscal year 2021 is shown in table below.

Table showing total recycled effluent for fiscal year 2019-2021 of the Maha Sawasdi Water Treatment Plant (Unit: Megaliters)

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	529	528	561	502	438	5,556




## Water Loss Management

As MWA produces and provides clean, safe water supply to serve those residing in Bangkok, Nonthaburi, and Samutprakarn, alongside conducting its businesses under responsible water consumption principles, so 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 proceed, 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.

In 2021, we have implemented the Water Loss Management Plan 2021-2023 aligned with the Fifth MWA Enterprise Plan, to manage water distribution

processes to be more efficient and reduce 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) Meter Deviation Reduction Strategy (Flow Meter), 2) 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 water loss rate in each service area.

### Performance in fiscal year 2018 - 2021



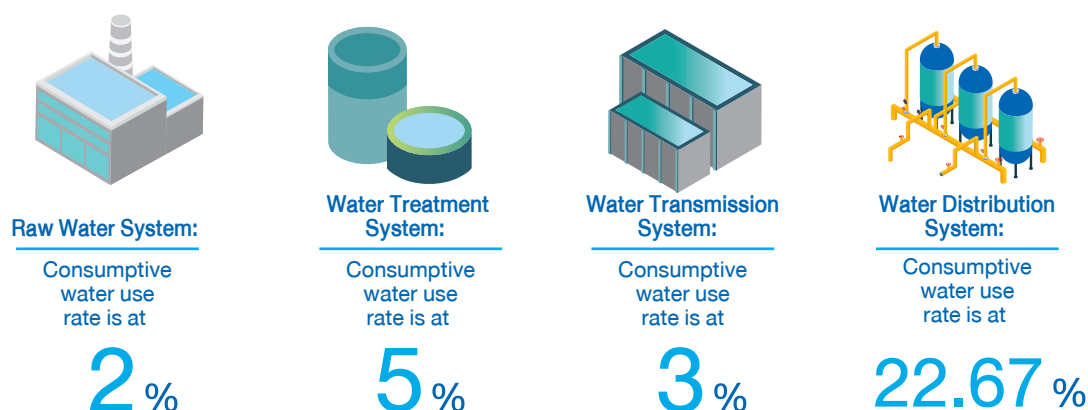
Fiscal Year	Total Water Supply, produced (megaliter)	Cumulative Water Loss Rate (%)	Performance of the damaged water pipeline system improvement (km).
2018	1,997,100	29.83	407.110
2019	2,075,200	29.29	784.558
2020	2,121,100	31.25	1,002.424
2021	2,116,500	33.09	1,130.722

## Eco-Efficiency

Furthermore, we have conducted studies and assessments of Eco-Efficiency since 2018 which have been continuing to the present (fiscal year 2021). The preparedness of knowledge development for our employees has been taken into consideration. It also includes establishing guidelines for measuring and assessing the Eco-Efficiency as defined. The results in forms of clear figures compared with standards are required to report to the responsible entities, to formulate the action plans in improving our Eco-Efficiency programs in a concrete way. Our calculations have been conducted by applying values of water loss rate defined in the design criteria, the accuracy of meter, and the economic level of leakage, to compare with the base-year values of fiscal year 2019. All parameters are used to assess the consumptive water use in each



system and used for the Eco-Efficiency calculations. Meanwhile, it is used as a standard value which excludes the amounts of indirect water consumption, by the reason that it is a very small amount compared to the amount of direct water consumption. Details are summarized as follows:



From such data, reverse calculations are applied to determine the amount of consumptive water use in each system based on the amount of water supply sold by 1 cubic meter, which excludes the amount of indirect water consumption as the reason aforementioned above.

We have calculated the Eco-Efficiency by determining that the amount of water footprint (Blue Water only) is the environmental impact. While the amount of water supply sold is the economic value of products and services, calculated by the following equation;

$$\text{Eco-Efficiency} = \frac{\text{Amount of Water Supply sold}}{\text{Amount of Water footprint}}$$

Water footprint assessment has been conducted in accordance with ISO14040: Environmental Management Water Footprint – Principles, Requirements, and Guidelines which focus on the amount of the Consumptive Water Use (CWU) in water supply production processes to meet the quality and standards defined in MWA Water Quality criteria, to the consumers (Cradle-to-Gate). The values of Eco-Efficiency during fiscal year 2016 – 2021 are shown in the following table.

### Consumptive Water Use Analysis for Fiscal Year 2016–2021

Description	Total Water Supply (cubic meters)					
	2016	2017	2018	2019	2020	2021
<b>1. Total direct water consumption*</b>						
Raw Water System	24,740,748	25,530,890	23,134,872	27,145,915	26,634,018	25,425,926
Water Treatment System	86,950,175	95,560,927	77,379,690	121,634,942	94,952,310	130,089,252
Water Transmission System	59,129,566	44,417,995	45,642,848	54,602,511	54,319,636	53,976,643
Water Distribution System	599,693,664	655,006,236	595,026,375	606,554,677	662,044,694	698,777,388
Total amount of direct water consumption.	730,514,153	820,516,048	741,183,786	809,938,045	837,590,658	908,269,209
<b>2. Total indirect water consumption**</b>						
	2,560,643	2,898,937	2,411,657	2,772,617	2,597,666	3,287,187
<b>3. Grand total water consumption</b>						
	733,074,796	823,414,985	743,595,442	812,710,662	840,188,324	911,556,396



Description	Total Water Supply (cubic meters)					
	2016	2017	2018	2019	2020	2021
4. Water supply sold	1,406,250,581	1,408,557,257	1,401,386,867	1,467,405,904	1,458,244,679	1,416,131,181
5. Eco-Efficiency values (5) =(4)/(3)	1.918291	1.710629	1.884609	1.805570	1.735616	1.55353
6. Factors	Value of Eco-Efficiency as base-year data (average values during fiscal year 2016-2018) is 1.833052			0.98500	0.94684	0.847510637
7. Water Loss Rate (%)	28.47	31.75	29.83	29.29	31.25	33.09

According to the analysis, we strongly believe that the Eco-Efficiency can be further improved to a higher performance. To improve the efficiency of water production systems to reduce the amount of water consumptive use, it highly depends on the external factors, especially in water production systems that require water consumptive use for sediment drainage and backwashing processes. Moreover, it also depends primarily on the quality of raw water as well.

For water transmission and water distribution systems, the amount of water consumptive use is mainly due to leakage of water pipeline systems. But it is a factor that we are able to control by implementing maintenance and repair works to increase its efficiency in a concrete way. Thus, guidelines and activities for improving the Eco-Efficiency have been established at an early stage, focusing on reducing water loss rates in water distribution systems as priority. Moreover, it also includes collecting and studying additional information in terms of the amount of water consumptive use in water treatment plants. The purpose of this study is to analyze and prepare a plan to improve the Eco-Efficiency of waterworks infrastructure systems in the following phases. In overview, we expect that we are able to reduce water consumptive use in the entire systems-both raw water systems, water treatment systems, water transmission systems, and water distribution systems as a whole.

## Activities to support water resource conservation and water loss reduction

### Ta Sapparod Project: Reduces Water Loss

Recognizing value of “water” is crucial and necessary for daily consumption as seen on higher demands of public water consumption and water loss arising from leakage of water pipeline systems. For those reasons, in fiscal year 2021, MWA together with BMA have initiated the “Ta Sapparod Project: Reduce Water Loss” project to integrate the cooperation in every aspect for water loss management. This project consists of organizing the academic training on how to spot leaked pipes and how to spot a water leakage in the sewerage and drainage systems for BMA’s officers and subcontracted workers of all 50 districts. Moreover, it also includes establishing direct communication channels to notify such incidents among two organizations in timely manners. As a result, it has enabled us to conduct maintenance works that reduce damages faster and more efficiently. Not only succeeding in those physical operations, it has reduced the impacts towards the public and water loss



creating senses in terms of environmental responsibility with efficient water resources consumption. In conclusion, throughout the project, more than 10,000 people have reported the incidents of water pipelines’ leakage, resulting in a reduction in water loss up to 60,189.68 cubic meters.

In order for all sectors to jointly conserve water resources and environment in sustainable manners and to implement such guidelines to cover all of MWA's service areas, in fiscal year 2021, we therefore, have continued the “Ta Sapparod Family (Season 2)” project, with the purpose for all people who reside in Bangkok, Nonthaburi, and Samutprakarn, to engage in monitoring and reporting incidents of the leaked water pipeline systems through the MWA onMobile application. MWA has implemented this activity for a period of one year from October 1st, 2021 to September 30th, 2022.



Ta Sapparod Project:  
Reduces Water Loss



### “Water-Saving Label” Project

MWA has initiated the “Water-Saving Label” project, with the purpose to promote and encourage manufacturers/Importers or innovation developers to apply for water-saving programs, which raises public awareness of responsible water consumption in Thailand. We have implemented this project by studying the standard criteria of water-saving to accredit water-saving sanitary wares and equipment. Moreover, it also includes the standardization to rate performance of water-saving sanitary wares and equipment. From such study, we have established a Water-Saving Label to rate water-saving performance at 3 levels, namely Number 3, Number 4, and Number 5. This accreditation allows consumers to alternate decisions in purchasing products that meet their requirements and are appropriate for actual use. Details are described as follows;

- Number 5 means “Excellent” performance in water-saving
- Number 4 means “Very Good” performance in water-saving.
- Number 3 means “Good” performance in water-saving.

MWA has given the water-saving labels to manufacturers/importers since fiscal year 2018–2021. The number of accredited products with the MWA's water-saving label is totally 36 models of products. Details are as follows;

- In fiscal year 2018, 8 models of products have been accredited.
- In fiscal year 2019, 5 models of products have been accredited.
- In fiscal year 2020. 10 models of products have been accredited.
- In fiscal year 2021, 13 models of products have been accredited.

In fiscal year 2021, we have established a water-saving standard handbook to rate water-saving performance of water-saving sanitary ware and equipment, in the category of water tank for flush toilets. Moreover, we have submitted an application for registration of those standards on May 18, 2021, and have invited both new and existing manufacturers to apply for the MWA's water-saving label to accredit their own products. As a result, six manufacturers, totaling 13 models of products have applied



<https://web.mwa.co.th/main.php?filename=CSRindex>  
More information about water-saving labels, entitled “Water Saving Label Project”

for MWA water-saving label and have been accredited. Moreover, we have organized PR campaigns to promote such programs to the government agencies, the private sector, and the general public, to jointly conserve water resources. This campaign is not only to promote water-saving programs, we have introduced the efficient water consumption methods in various manners and have promoted the replacement of water-saving sanitary ware and equipment accredited by MWA, through various online media as well.



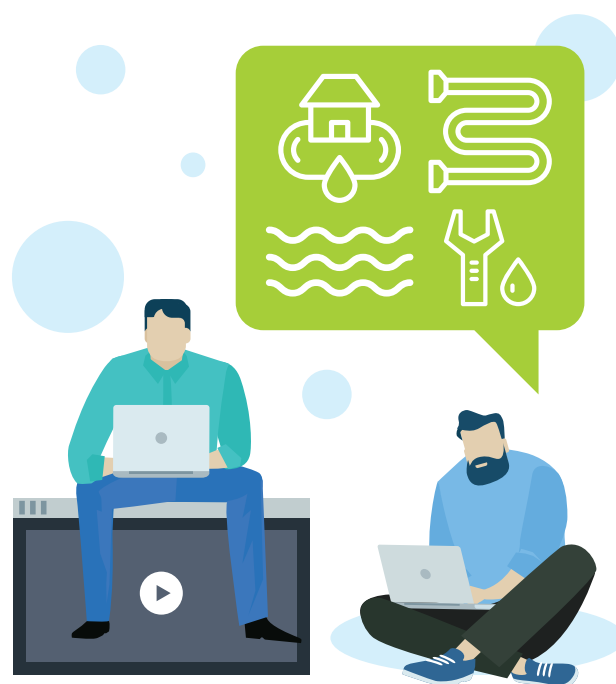
However, we have continued our PR campaigns to raise the public awareness of efficient water consumption with all sectors, as well as to encourage the use of water-saving sanitary ware and equipment accredited by MWA through the “Boworn” Project (Home, Temple, School), the activity that has been implemented in the fourth consecutive year. In fiscal year 2021, we have collaborated with the ten pilot agencies to install water-saving faucets in the buildings of three pilot agencies, namely;

- Office of the Prime Minister: After installing water-saving faucets, water consumption was reduced by 58.54%.
- Din Daeng Housing Authority: After installing water-saving faucets, water consumption was reduced by 35%.
- Wat Prayurawongsawas Woraviharn: After installing water-saving faucets, water consumption was reduced by 46.67%.



## Gray Water Recycling System

To enhance water consumption efficiency by innovations, we have formulated the Technology Promotion Plan to promote and support responsible water consumption by selecting and upgrading the outputs from the Gray Water Inventions project to the high-performance and friendly-use equipment. From such guidelines, we have collaborated with the Expert Center of Innovative Industrial Robotics and Automation (INNOROBOT), the Thailand Institute of Scientific and Technological Research (TISTR), which has held experiences in developing the Grey Water treatment and disinfection systems. This project requires experts to design and develop the Gray Water Recycling System to filter water from the wash basin to isolate particles or nutrients of contaminated bacteria, then disinfect with chlorine-containing or bromine-based disinfectants, to use for flushing toilets. Such innovative equipment has proven that the amount of water consumption has been reduced. This encourages water users to be aware of water conservation and to continue best efforts for reusing water. Thus, in fiscal year 2021, we have installed the Grey Water Recycling System in the restrooms of headquarters' buildings and MWA branches. As a result, it has saved 111,972.92 liters of water.





## Effluents and Waste



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 Ministry of Industry on The Disposal of Sewage or Disused Materials, B.E. 2545 (2005), enacted on December 27, 2005, stipulating in the Gazette, page 14, volume 123, special section 11, dated January 25, 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 generated by water production processes mainly arise 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, the large quantities of sludge still remain in the system. Once that sludge has been examined in the laboratory, there is no contaminants that significantly affects the environment. Thus, 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
	2018	2019	2020	2021		
1. Bangkhen	47,280	50,083	62,026	55,557	Title Deed No. 44655, Nongsue, Pathum Thani, Ms. Sonthaya Chaichana, by landfill method.	yes
2. Samsen	5,648	4,909	3,154	3,904	Title Deed No. 42562, Phra Samut Chedi, Samut Prakan	yes
3. Thonburi	1,556	1,764	1,394	1,691	Title Deed No. 22749, Nongkhaem, Bangkok, Mrs. Napasanan Sathavorn	yes
4. Maha Sawasdi	16,597	17,913	18,452	20,494	Stored inside the plant	yes

## Management guidelines for solid waste generated by activities within office buildings

We have implemented the solid waste management plan in alignment with government policy by placing four types of trash bins with different colors at MWA's headquarters, MWA's branches, and the four water treatment plants: Green is for organic waste, Blue is for general waste, Yellow is for recycling waste, and Red is for hazardous waste. Moreover, we have organized internal PR campaigns to recommend the appropriate methods of solid waste sorting for employees, subcontracted workers, and cleaners.

Solid waste separated at the source are collected by the entity of Bangkok Metropolitan Administration (BMA), a responsible entity for waste collection, on a weekly basis. While waste disposals are executed on a monthly basis, aligned with a waste sorting management system of BMA. Furthermore, the disused papers are required to be collected and stored in MWA's central warehouse for further sale.

### Types of solid waste generated in fiscal year 2021 (Kilograms)

#### Non-Hazardous Waste



General Waste :  
69,436.75



Organic Waste :  
58,129.95



Recycling Waste :  
47,187.53

#### Hazardous Waste



Hazardous Solid Waste :  
1,561.98

Others 2,401

#### Total quantity

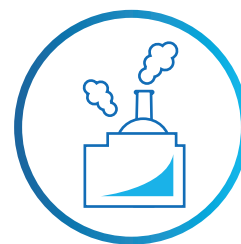
**178,717.21**

*Remark: Due to the pandemic of COVID-19 in fiscal year 2021, the data shown above was not incomplete and collected only from MWA Branches and Water Treatment Plant.*

## Energy and Emissions

In general, the Metropolitan Waterworks Authority (MWA) uses electricity as a major source of energy.

In Fiscal Year 2021, the electricity consumption was 444,193.02 MWh, which was used for operating water production and distribution systems including related administrative and support activities.



### Total Electricity Consumption and Carbon Dioxide Emissions In Fiscal Year 2019 – 2021 (MWh)

Fiscal Year	Consumed By Water Production and distribution processes (MWh)	Total Co <sub>2</sub> Emissions (tCo <sub>2</sub> )	Consumed By Administrative and Support Entities (MWh)	Total Co <sub>2</sub> Emissions (tCo <sub>2</sub> )	Total Electricity Consumption (MWh)	Total Co <sub>2</sub> Emissions (tCo <sub>2</sub> )
2019	422,525.91	245,952.33	12,261.63	7,137.50	434,787.54	253,089.83
2020	426,237.77	248,113.00	12,697.90	7,391.45	438,935.67	255,504.45
2021	430,761.76	250,746.42	13,431.26	7,818.34	444,193.02	258,564.76

#### Remarks:

1. Units of electricity consumed for October 2020 - September 2021 from the SAP system approved by the State Audit Office of the Kingdom of Thailand.
2. It refers to the emission factor (0.5821) of electricity consumption from the Greenhouse Gas Management Organization (Public Organization).
3. The processes of water production and distribution include raw water pumping systems, water treatment systems, and water distribution systems.

However, our fuel consumption has arisen from the use of transportation services of various entities within the organization. The fuel consumption in fiscal year 2021 is shown in the table below.

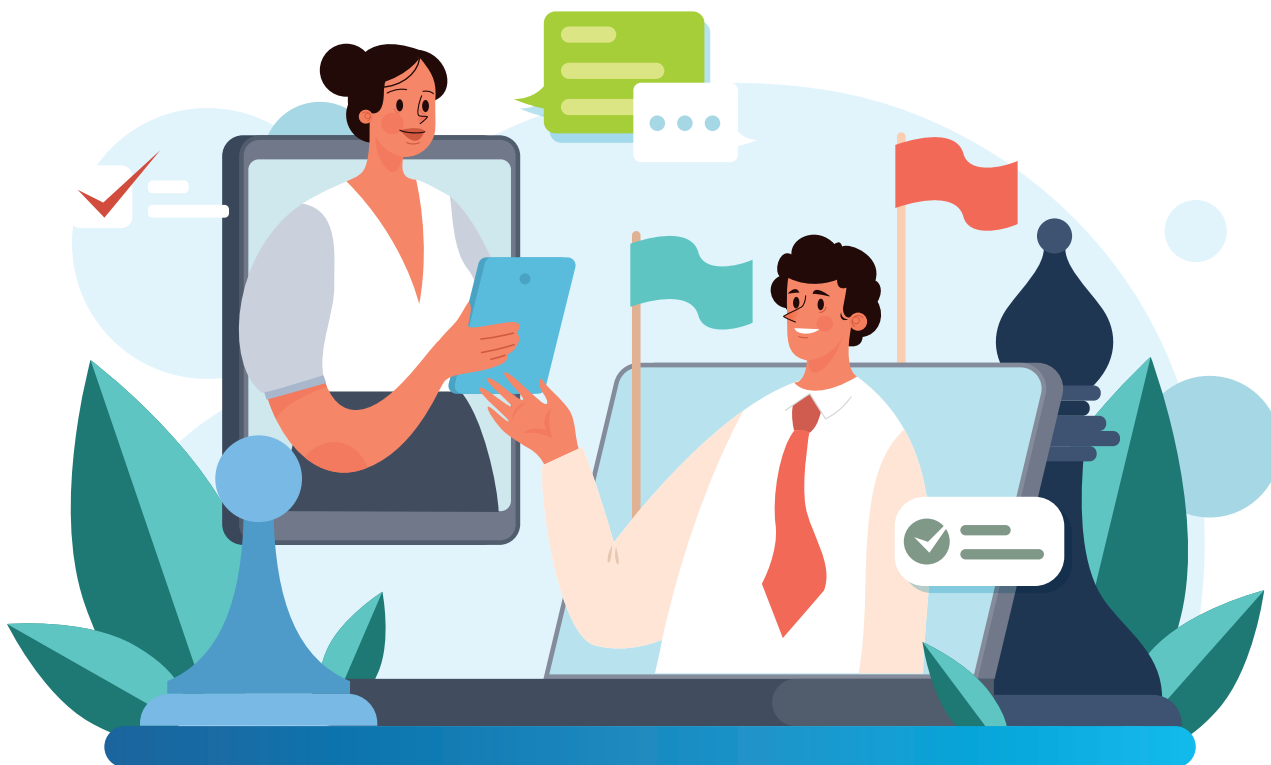
### Fuel consumption by type

Type of Fuel	Fiscal Year				
	2017	2018	2019	2020	2021
Benzene (liters)	309,344.24	315,314.90	319,464.92	324,965.77	344,486.41
Diesel (liters)	447,022.61	423,928.55	395,934.70	374,322.04	339,526.60
Total (liters)	756,366.85	739,243.45	715,399.62	699,287.81	684,013.01





## Energy Conservation Measures



Environmental responsibility is considered one of our missions. Thus, we are aware of energy conservation and continually conduct measures relating to energy conservation. We have executed the energy management programs under the Energy Conservation Promotion Act, B.E. 2535 (Amendment, B.E. 2550). And we have applied the energy management systems to operations of all entities to manage energy for efficiency. Meanwhile, we have implemented measures with the control plants and the control buildings of MWA, which have been driven and governed by the Energy Management Working Group and the In-House Energy Management Auditors.

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 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, 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, the 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 MWA in fiscal year 2021, resulted in reduction of energy consumption by 177.7669 MWh. While the Carbon Dioxide emission was reduced by 103.4781 tons of carbon dioxide (tCO<sub>2</sub>).

## Energy Conservation Measures for Control Plant/Control Building in Fiscal Year 2021

Control Plant/ Control Building		Measures	Performance		Total CO <sub>2</sub> emissions reduced (tCo <sub>2</sub> )	
			MWh	Baht		
Headquarters' Building		1. On-Off measures by turning on the air conditioner during 08.00-16.00 hrs. 2. Measures to reduce the use of elevators no. 1 and 2, in operation only during 06.00-17.00 hrs.	175.0440	73,651.27	101.8931	
Production and Distribution of Water Supply						
Control Plants	Bangkhen Water Treatment Plant	1. Turbine Motor and Scraper Motor Replacement measures, with speed control, totaling 12 tanks 2. Measures to replace the Sluice Gate, totaling 5 ponds	0.9900 0.0417	3,125,452 130,997	0.5763 0.0243	
	Samsen Water Treatment Plant	Replacing Impeller of Dispenser-HLP No.2, Pumping Station No.2 at the Samsen Water Treatment Plant No.1	0.0975	334,528	0.0568	
	Thonburi Water Treatment Plant	Temperature reduction of water before entering condenser to increase the performance of the modular air conditioning system	0.0018	6,307	0.0010	
	Maha Sawasdi Water Treatment Plant	1. Scheduling the parallel operations of the water distribution pumps to reduce energy consumption in case of the increased demands at the water distribution stations, the Maha Sawasdi Water Treatment Plant	0.7198 0.0036	3,011,487 12,537	0.4190 0.0021	
	Control Buildings	Samlae Raw Water Pumping Plant	1. Air conditioner cleaning measures 2. Replacing the fluorescent lamps powered by electricity with the LED lamps powered by solar cells	0.0022 0.0020	7,840 6,971	0.0013 0.0011
		Bang Sue Raw Water Pumping Plant	Turn off the air conditioners in the Switchgear room no. 1-2 and Switchgear room no. 3-4 from 01.00 a.m. - 05.00 a.m.	0.0046	16,234	0.0027

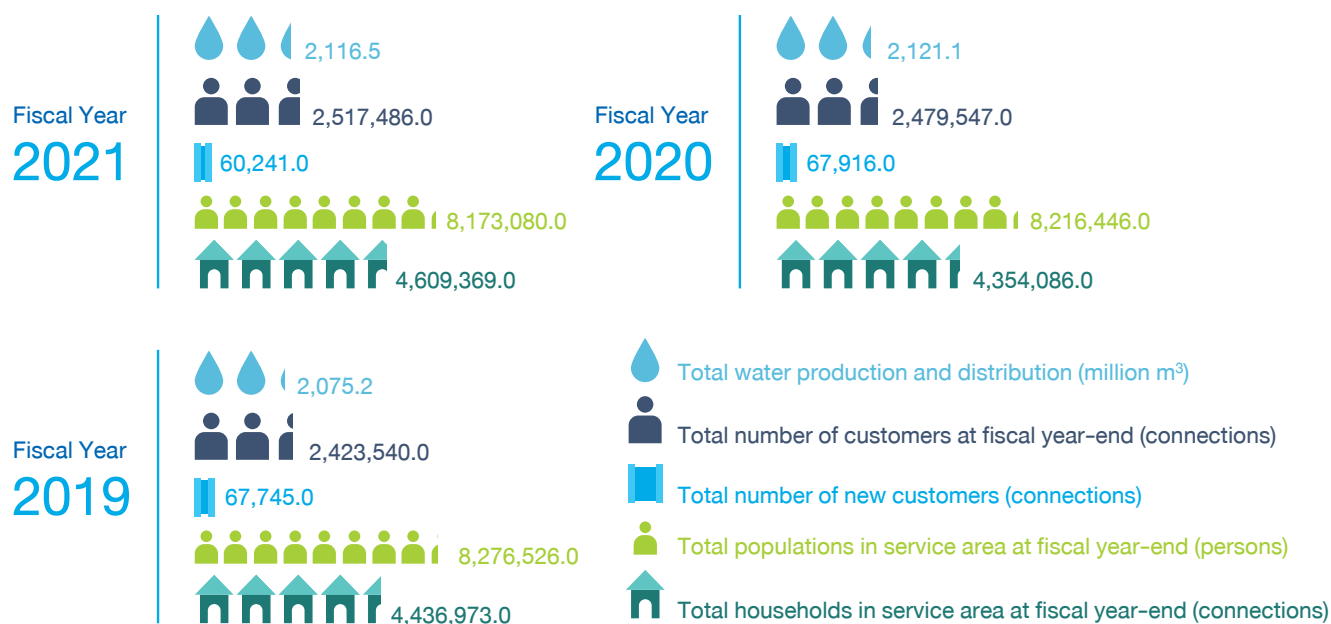
Control Plant/ Control Building		Measures	Performance		Total CO <sub>2</sub> emissions reduced (tCo <sub>2</sub> )
			MWh	Baht	
Production and Distribution of Water Supply					
Control Buildings	Tha Phra Water Distribution Station	Replacement of High-performance air conditioners.	0.0045	16,032	0.0026
	Petchkasem Water Distribution Station	Power factor adjustments	0.0194	68,016	0.0113
	Lumpini Water Distribution Station	Implementing energy conservation measures at the station	0.1758	615,531	0.1023
	Khlong Toei Water Distribution Station	Removing the existing lamps around the clear water tanks and the fence in front of the station and replaced with the LED lamps	0.0017	6,119	0.0010
	Ladprao Water Distribution Station	Energy savings by the Bypass system	0.6084	2,135,484	0.3541
	Lat Krabang Water Distribution Station	Reducing power consumption by adjusting the Operate of the water pumps	0.0090	31,500	0.0052
	Samrong Water Distribution Station	Replacing the existing lamps installed at the back of the water tank with the LED lamps	0.0026	8,594	0.0015
	Bang Phli Water Distribution Station	Turn off the unnecessary outdoor lighting.	0.0151	50,169	0.0088
	Minburi Water Distribution Station	Energy-saving measures for reducing electricity consumption by reducing the use of air conditioners during the pump idle periods	0.0131	45,804	0.0076
	Rat Burana Water Distribution Station	Replacing the T8 (36w) fluorescent lamps with the 18w LED lamps	0.0047	16,610	0.0028
		Total Saving/Reduction	177.7669	9,719,863	103.4781

# Appendix

## Key Data and Statistics

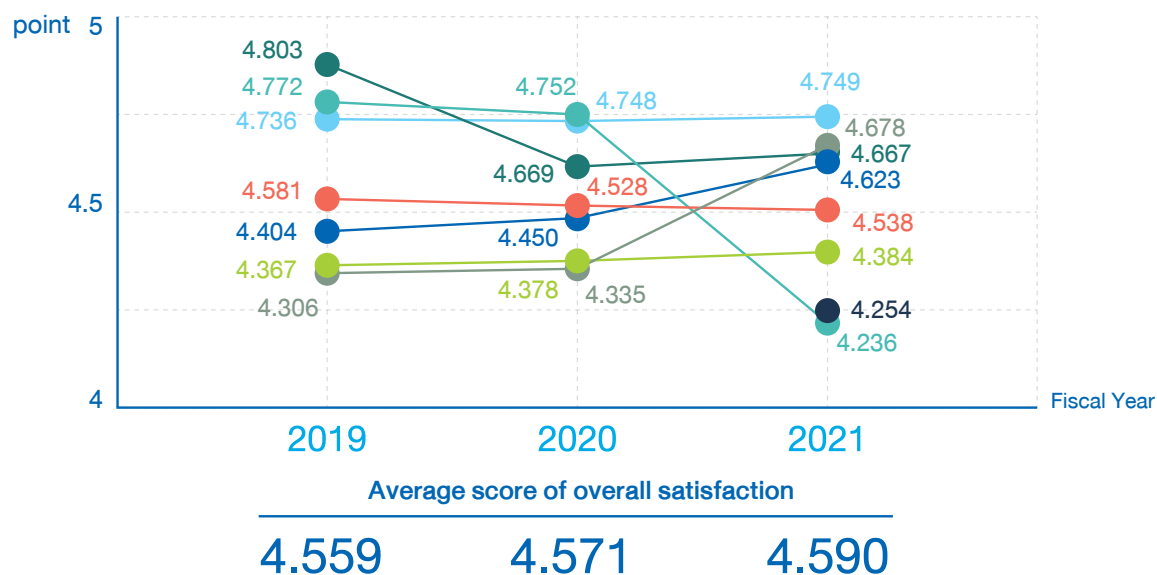


## Key Performance on Marketing



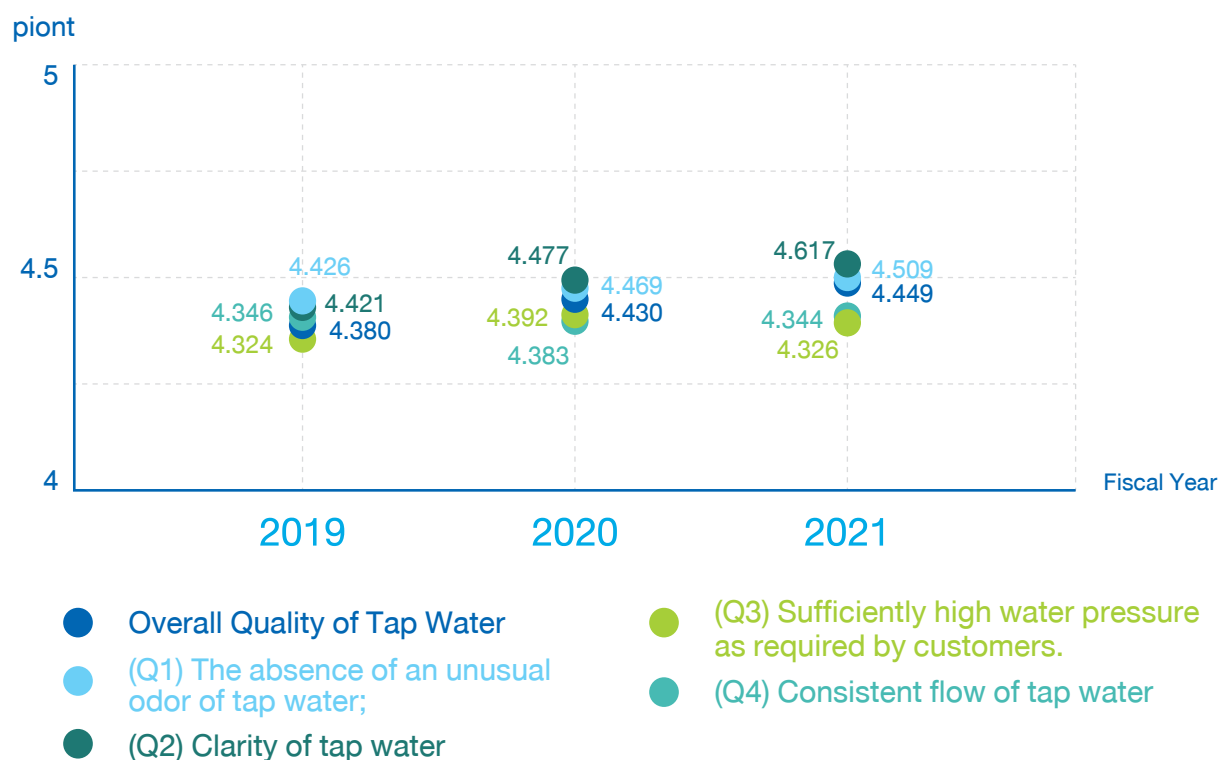
## Key Performance on Customer Services

## Customers' satisfaction toward the Quality of MWA Service



- General services
- Onsite 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)



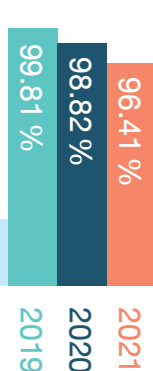
### Key Performance on Product (Tap Water)



Quality of Tap Water-  
Physical



Quality of Tap Water-  
Chemical



Quality of Tap Water-  
Bacterial Pathogens





## Data and Statistics

Financial Data	Fiscal Year		
	2019	2020	2021
<b>Total Assets (million baht)</b>	<b>79,365.8</b>	<b>81,337.9</b>	<b>84,158.8</b>
Current assets	20,751.8	13,653.8	10,356.4
Non-Current assets	58,614.0	67,684.1	73,802.4
<b>Total Liabilities (million baht)</b>	<b>15,742.2</b>	<b>15,055.4</b>	<b>16,761.1</b>
Current liabilities	4,059.6	3,105.6	4,369.1
Non-Current liabilities	11,682.6	11,949.8	12,392.0
<b>Equity (million baht)</b>	<b>63,623.6</b>	<b>66,282.5</b>	<b>67,397.7</b>
<b>Total Revenues (million baht)</b>	<b>20,051.4</b>	<b>18,045.0</b>	<b>18,435.6</b>
Operating revenues	19,548.9	17,559.8	18,061.1
Water charges and monthly meter fees	18,334.2	16,548.9	16,895.4
New connections	385.9	247.9	278.5
Other operating revenues	828.8	763.0	887.2
Non-Operating revenues	502.5	485.2	374.5
<b>Total Expenses (million baht)</b>	<b>13,047.6</b>	<b>12,422.0</b>	<b>13,600.3</b>
Operating expenses	13,012.8	12,390.6	13,574.7
Direct operating expenses	8,173.6	7,536.1	8,339.3
Depreciation and Amortization	4,808.4	4,829.0	5,210.6
Financial costs-Interest expenses and bank fee	30.8	25.5	24.8
Non-Operating expenses	34.8	31.4	25.6
Other expenses	36.7	33.6	25.6
(Profit) or Loss on Foreign Exchange Rate	(1.9)	(2.2)	-
<b>Net Profit (million baht)</b>	<b>7,003.8</b>	<b>5,623.0</b>	<b>4,835.3</b>
Rate of Return on Total Assets (%)	8.82	6.91	5.75
Rate of Return on Equity (%)	11.01	8.48	7.17
Net Profit Margin (%)	35.83	32.02	26.77
Assets Turnover (times)	0.25	0.22	0.21
Current Ratio (times)	5.11	4.40	2.37
Ration of Liabilities on Total Assets (times)	0.20	0.19	0.20
Debt Equity Ratio (times)	0.25	0.23	0.25
Cost per Unit Sold (baht)	8.67	8.33	9.48

General Data	Fiscal Year				
	2017	2018	2019	2020	2021
<b>Total water production (million m<sup>3</sup>)</b>	<b>2,063.8</b>	<b>1,997.1</b>	<b>2,075.2</b>	<b>2,121.1</b>	<b>2,116.5</b>
Bangkhen Water Treatment Plant	1,404.5	1,334.4	1,402.3	1,410.0	1,427.6
Samsen Water Treatment Plant	120.7	116.4	113.0	102.4	92.2
Thonburi Water Treatment Plant	40.5	37.4	41.1	36.4	40.1
Mahasawasdi Water Treatment Plant	498.1	508.9	518.8	572.3	556.6
<b>Total water consumption (million m<sup>3</sup>)</b>	<b>1,408.6</b>	<b>1,401.4</b>	<b>1,467.4</b>	<b>1,458.3</b>	<b>1,416.2</b>
Residential	656.8	651.5	675.7	694.3	705.8
Commercial-business, state enterprise and government agencies, and others	723.4	719.6	753.2	717.8	643.2
Public consumption and others	28.4	30.3	38.5	46.2	67.2
<b>Percentage of water consumption (%)</b>	<b>68.3</b>	<b>70.2</b>	<b>70.7</b>	<b>68.8</b>	<b>66.9</b>
<b>Number of customers at fiscal year-end (connections)</b>	<b>2,328,598.0</b>	<b>2,375,490.0</b>	<b>2,423,540.0</b>	<b>2,479,547.0</b>	<b>2,517,486.0</b>
Residential	1,878,888.0	1,921,897.0	1,957,391.0	2,010,824.0	2,062,299.0
Commercial-business, state enterprise and government agencies, and others	449,710.0	453,593.0	466,149.0	468,723.0	455,187.0
<b>Small Users (connections)</b>	<b>2,292,106.0</b>	<b>2,338,779.0</b>	<b>2,386,832.0</b>	<b>2,443,405.0</b>	<b>2,482,886.0</b>
Meter diameter ½ ins.	1,421,764.0	1,459,347.0	1,510,537.0	1,571,405.0	1,613,975.0
Meter diameter ¾ ins.	802,913.0	811,431.0	807,907.0	803,240.0	798,621.0
Meter diameter 1 ins.	67,429.0	68,001.0	68,388.0	68,760.0	70,290.0
<b>Large Users (connections)</b>	<b>36,492.0</b>	<b>36,711.0</b>	<b>36,708.0</b>	<b>36,142.0</b>	<b>34,600.0</b>
Meter diameter 1½ ins.	15,058.0	15,610.0	16,078.0	16,169.0	15,366.0
Meter diameter 2 ins.	13,972.0	13,672.0	13,243.0	12,814.0	12,405.0
Meter diameter over 2 ins.	7,462.0	7,429.0	7,387.0	7,159.0	6,829.0
<b>Number of New Customers (connections)</b>	<b>65,327.0</b>	<b>65,653.0</b>	<b>67,745.0</b>	<b>67,916.0</b>	<b>60,241.0</b>
<b>Average Water Consumption per customer per month (m<sup>3</sup>)</b>	<b>49.8</b>	<b>48.6</b>	<b>49.6</b>	<b>48.0</b>	<b>45.0</b>
Residential	29.4	28.6	29.0	29.2	30.1
Commercial-business, state enterprise and government agencies, and others	134.5	132.6	136.1	127.7	116.4
<b>Average Water Tariff per m<sup>3</sup> (baht)</b>	<b>12.0</b>	<b>12.0</b>	<b>12.0</b>	<b>10.9</b>	<b>11.3</b>
Residential	10.0	10.0	10.0	9.0	9.4
Commercial-business, state enterprise and government agencies, and others	13.8	13.8	13.8	12.9	13.4
<b>Total Number of Personnel at fiscal year-end (persons)</b>	<b>5,403.0</b>	<b>5,365.0</b>	<b>5,378.0</b>	<b>5,384.0</b>	<b>5,314.0</b>
Total number of employees	4,385.0	4,310.0	4,303.0	4,339.0	4,250.0
Total number of subcontracted workers	1,018.0	1,055.0	1,075.0	1,045.0	1,064.0
<b>Ratio of Customers to One Employee (connection)</b>	<b>431.0</b>	<b>442.8</b>	<b>450.6</b>	<b>460.5</b>	<b>473.7</b>
<b>Total Populations in Service Area at Fiscal Year-End (persons)</b>	<b>8,222,916.0</b>	<b>8,249,551.0</b>	<b>8,276,526.0</b>	<b>8,216,446.0</b>	<b>8,173,080.0</b>
<b>Total Households in Service Area at Fiscal Year-End (persons)</b>	<b>4,210,444.0</b>	<b>4,323,941.0</b>	<b>4,436,973.0</b>	<b>4,354,086.0</b>	<b>4,609,369.0</b>

## Total number of employees by departments, levels, and gender

Department	Level: 6 – 10				Level: 6 – 10				Level: 1 – 5				Total Employees			
	Holding executive positions				Holding equivalent positions											
	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	16	55	71	23 : 77	22	79	101	22 : 78	34	70	104	33 : 67	72	204	276	26 : 74
Dep.Gov. (Admin.)	18	42	60	30 : 70	19	37	56	34 : 66	62	94	156	40 : 60	99	173	272	36 : 64
Dep.Gov. (Fin.)	7	46	53	13 : 87	1	40	41	2 : 98	16	53	69	23 : 77	24	139	163	15 : 85
Dep.Gov. (Eng. & Con)	91	28	119	76 : 24	23	18	41	56 : 44	130	66	196	66 : 34	244	112	356	69 : 31
Dep.Gov. (Prod. & Trans)	123	37	160	77 : 23	83	23	106	78 : 22	497	91	588	85 : 15	703	151	854	82 : 18
Dep.Gov. (Plan. & Dev)	6	18	24	25 : 75	13	31	44	30 : 70	11	24	35	31 : 69	30	73	103	29 : 71
Dep.Gov. (IT)	13	22	35	37 : 63	12	11	23	52 : 48	35	28	63	56 : 44	60	61	121	50 : 50
Dep.Gov. (Eastern Serv.)	95	110	205	46 : 54	24	36	60	40 : 60	574	334	908	63 : 37	693	480	1,173	59 : 41
Dep.Gov. (Western Serv.)	72	92	164	44 : 56	37	43	80	46 : 54	420	268	688	61 : 39	529	403	932	57 : 43
Total	441	450	891	49 : 51	234	318	552	42 : 58	1,779	1,028	2,807	63 : 37	2,454	1,796	4,250	58 : 42

## Key Performance in Production and Distribution of Tap Water



	Fiscal Year			
	2018	2019	2020	2021
<b>Quality of Tap Water</b>				
Total number of samples from water distribution system used for water quality analysis	3,040	3,196	3,138	2,702
E. coli	3	1	2	1
Target Value	Zero E. coli			
Turbidity (unit: NTU)	0.40	0.23	0.19	0.30
Target Value	Less than 1.0			
pH	7.21	7.19	7.37	7.35
Target Value	6.5 – 8.5			
Free Residual Chlorine (unit: mg/L)	0.50	0.55	0.79	0.78
Target Value	More than 0.2			
Quality of Tap Water- Physical	100	100	99.97	99.96
Target Value	100	100	100	100
Quality of Tap Water- Chemical	100	99.81	98.82	96.41
Target Value	100	100	100	100
Quality of Tap Water- Bacterial Pathogens	99.90	99.97	99.94	99.96
Target Value	99.97	99.97	99.97	99.97

## Total electricity consumption and total carbon dioxide (Co<sub>2</sub>) emissions by water production and distribution processes and the administrative and support entity in fiscal year 2021

Water Production and Distribution Processes		Total Electricity Consumption (MWh)													
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )													
Raw Water System	Samlae	Total Electricity Consumption (MWh)	1,065.39	1,065.39	1,355.53	1,057.79	1,290.03	1,257.57	1,248.15	1,140.12	1,236.57	1,295.02	1,278.92	914.80	14,205.27
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	620.16	620.16	789.05	615.74	750.93	732.03	726.55	663.67	719.81	753.83	744.46	532.51	8,268.89
	Bangsue	Total Electricity Consumption (MWh)	704.97	663.95	713.50	497.27	422.28	453.31	512.33	684.30	677.29	707.33	708.32	684.35	7,429.18
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	410.36	386.48	415.33	289.46	245.81	263.87	298.23	398.33	394.25	411.74	412.31	398.36	4,324.53
	Bangkhen	Total Electricity Consumption (MWh)	18,387.75	18,034.68	19,364.76	18,774.88	17,492.57	19,812.33	18,183.68	18,491.38	18,007.70	17,781.84	17,776.85	17,196.18	219,304.60
Production System		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	10,703.51	10,497.99	11,272.23	10,928.86	10,182.42	11,532.76	10,584.72	10,763.83	10,482.28	10,350.81	10,347.90	10,009.90	127,657.21
	Mahasawasdi	Total Electricity Consumption (MWh)	6,748.43	6,713.70	6,061.08	6,521.02	5,959.05	6,702.14	6,714.00	7,610.00	7,481.72	7,895.38	7,964.00	7,695.00	84,065.53
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	3,928.26	3,908.05	3,528.16	3,795.88	3,468.76	3,901.32	3,908.22	4,429.78	4,355.11	4,595.90	4,635.84	4,479.26	48,934.54
	Samsen	Total Electricity Consumption (MWh)	1,701.53	1,600.06	1,634.70	1,516.54	1,478.00	1,482.31	1,483.33	1,582.99	1,535.73	1,706.00	1,559.52	1,605.00	18,885.71
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	990.46	931.40	951.56	882.78	860.34	862.85	863.45	921.46	893.95	993.06	907.80	934.27	10,993.37
Distribution System	Thonburi	Total Electricity Consumption (MWh)	412.86	405.07	425.87	344.76	304.07	366.01	373.82	447.11	431.10	433.83	422.20	428.29	4,794.98
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	240.33	235.79	247.90	200.68	177.00	213.05	217.60	260.26	250.94	252.53	245.76	249.31	2,791.16
	Samrong	Total Electricity Consumption (MWh)	1,000.00	976.00	864.00	793.00	732.00	789.00	730.00	755.03	663.00	659.04	590.00	530.00	9,081.07
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	240.33	235.79	247.90	200.68	177.00	213.05	217.60	260.26	250.94	252.53	245.76	249.31	2,791.16
	Khlongboei	Total Electricity Consumption (MWh)	489.14	428.12	376.11	362.11	333.10	444.10	394.12	438.12	450.12	430.20	428.12	386.16	4,959.52
Bangplee		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	284.73	249.21	218.93	210.78	193.90	258.51	229.42	255.03	262.01	250.42	249.21	224.78	2,886.94
		Total Electricity Consumption (MWh)	707.00	754.00	772.00	882.06	941.00	1,025.00	879.00	1,229.00	879.00	578.16	941.00	871.00	10,458.22
		Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	411.54	438.90	449.38	513.45	547.76	596.65	511.67	715.40	511.67	336.55	547.76	507.01	6,087.73


Water Production and Distribution Processes		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun.	Jul	Aug	Sep	Total
Distribution System	Total Electricity Consumption (MWh)	36,070.08	35,449.77	36,401.41	35,742.24	33,537.78	37,337.53	35,182.36	37,171.95	36,007.07	36,325.81	36,471.07	35,064.71	430,761.76
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	20,996.39	20,635.31	21,189.26	20,805.56	19,522.34	21,734.17	20,479.65	21,637.79	20,959.71	21,145.25	21,229.81	20,411.16	250,746.42
	Total Electricity Consumption (MWh)	397.00	404.00	437.00	405.00	345.00	412.00	381.08	402.06	412.05	404.11	442.00	479.02	4,920.32
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	231.09	235.17	254.38	235.75	200.82	239.83	221.83	234.04	239.85	235.23	257.29	278.84	2,864.12
	Total Electricity Consumption (MWh)	677.13	673.00	643.01	646.01	601.00	666.00	616.00	636.02	622.00	660.00	595.09	520.09	7,555.34
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	394.16	391.75	374.29	376.04	349.84	387.68	358.57	370.22	362.07	384.19	346.40	302.74	4,397.97
	Total Electricity Consumption (MWh)	631.34	594.34	605.33	608.38	542.36	609.33	556.35	558.34	556.33	517.33	520.40	516.34	6,816.16
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	367.50	345.96	352.36	354.14	315.71	354.69	323.85	325.01	323.84	301.14	302.93	300.56	3,967.69
	Total Electricity Consumption (MWh)	616.00	614.00	623.00	627.00	576.00	635.00	603.00	633.00	629.00	660.00	631.00	566.00	7,413.00
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	358.57	357.41	362.65	364.98	335.29	369.63	351.01	368.47	366.14	384.19	367.31	329.47	4,315.11
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)	370.45	351.32	389.44	408.37	361.32	447.31	413.42	424.49	385.46	417.56	398.56	400.45	4,768.13
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	215.64	204.50	226.69	237.71	210.32	260.38	240.65	247.10	224.38	243.06	232.00	233.10	2,775.53
	Total Electricity Consumption (MWh)	1,277.07	1,269.06	1,360.07	1,544.04	1,429.00	1,440.00	1,353.07	1,353.00	1,260.00	1,264.01	1,248.08	1,361.00	16,158.40
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	743.38	738.72	791.70	898.78	831.82	838.22	787.62	787.58	733.45	735.78	726.51	792.24	9,405.80
	Total Electricity Consumption (MWh)	884.02	903.09	776.01	754.01	731.00	796.12	741.01	787.00	780.00	916.00	967.03	911.03	9,946.32
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	514.59	525.69	451.71		425.52	463.42	431.34	458.11	454.04	533.20	562.91	530.31	5,789.76
	Total Electricity Consumption (MWh)	1,014.62	955.79	1,003.29	950.18	963.91	978.12	1,237.18	1,233.63	1,270.08	1,322.32	1,144.57	1,357.55	13,431.26
	Total Co <sub>2</sub> Emission (tCo <sub>2</sub> )	590.61	556.37	584.01	553.10	561.09	569.36	720.16	718.10	739.32	769.72	666.26	790.23	7,818.34

## GRI Content Index (Core)






GRI Standard	Disclosure	Page	SDGs	External Assurance	Note
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<b>GRI 102 : General Disclosure 2016</b>					
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	102-5 Ownership and legal form	14			
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	102-35 Remuneration policies	60			
	102-36 Process for determining remuneration	60			
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## GRI Content Index (Core)

GRI Standard	Disclosure		Page	SDGs	External Assurance	Note
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	102-42	Identifying and selecting stakeholders	29-33			
	102-43	Approach to stakeholders engagement	34-41			
	102-44	Key topics and concerns raised	34-41			
	Reporting Practice					
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## GRI Content Index (Core)

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GRI 306 : Waste 2020	306-3	Waste generated	135-136			
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## GRI Content Index (Core)

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# LRQA Independent Assurance Statement

## Relating to METROPOLITAN WATERWORKS AUTHORITY's Sustainability Report for the FY 2020/21

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 (Thailand) Limited was commissioned by METROPOLITAN WATERWORKS AUTHORITY ("MWA") to provide independent assurance on its Sustainability Report FY 2020/21 for the period from 1 October 2020 to 30 September 2021 ("the report") using ISAE 3000 assurance criteria to a limited level of assurance for the GRI specific standard disclosures listed below and materiality level of the professional judgement of the verifier is applied.

Our assurance engagement covered MWA's operations and activities in Thailand only and specifically the following requirements:

- Evaluating the reliability of data and information for only the selected environmental and social indicators listed below:
  - GRI 303-3 Water withdrawal
  - GRI 303-4 Water Discharge
  - GRI 416-1 Assessment of the health and safety impacts of product and service categories
  - GRI 416-2 Incidents of non-compliance concerning the health and safety impacts of products and services
  - 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

Our assurance engagement excluded the data and information of MWA's operations and activities outside Thailand, as well as 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 reliable performance data and information as no errors or omissions were detected

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 using ISAE 3000. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- 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.
- Sampling of evidence during remote verification to sample performance data and information for only the selected indicators to confirm its reliability.

### Observations

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

- Responsiveness: MWA has commitment to focus on efficient production of water quality. We believe that MWA's future reports should update health and safety impact assessment criteria for products and services (For example: piping system install, repair and maintenance) to determine the level of significance impacts and disclose further assessment for improve such impact.
- Reliability: Water reuse and water recycle data of water treatment facilities are properly defined. However, we believe that MWA's future reports should seek external assurance for disclose data and information on the water management efficiencies for example water consumption.

### 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 works undertaken by LRQA for METROPOLITAN WATERWORKS AUTHORITY and as such does not compromise our independence or impartiality.

*Kamiga S.*

Kamiga Sukkeaw  
LRQA Lead Verifier

Dated: 19 July 2022

On behalf of LRQA (Thailand) Limited  
22nd Floor, Sirinrat Building, 3388/78 Rama IV Road  
Klongton, Klongtoey, Bangkok 10110 Thailand

LRQA reference: BGK00000799

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**Satisfaction Questionnaire**  
to the Sustainability Report  
of the MWA  
for the fiscal year 2021

# Water for Life





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## **Metropolitan Waterworks Authority**

Head Office : 400 Prachachuen Road, Tungsonghong,  
Laksi, Bangkok 10210

Tel : +66 (0) 2504-0123 Fax : +66 (0) 2503 9490

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Corporate Social Responsibility Management  
Metropolitan Waterworks Authority  
E-mail : [csr@mwa.co.th](mailto:csr@mwa.co.th)

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**MWA Call Center : 1125**



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