

# Promotion of “Tama Waterworks Operation Plan 2017” Towards Resilient and Reliable Wide-Area Waterworks

M. Kakinuma\*

\*Bureau of Waterworks, Tokyo Metropolitan Government, 6-7 Midoricho, Tachikawa-city, Tokyo.

## INTRODUCTION

In order to operate and manage waterworks that supply safe and tasty water sustainably, and to improve the level of facilities so that they can supply water reliably in disasters, it is necessary to properly deal with the challenges, such as properly reinforcement of earthquake-resistance and renewals of waterworks systems. Since the 1970s, the Bureau of Waterworks, Tokyo Metropolitan Government has promoted the integration of water supply businesses of cities and towns in the Tama Area and has been operating the integrated waterworks as wide-area waterworks. In March 2017, we drew up “Tama Waterworks Operation Plan 2017” towards further evolution of Tama Waterworks. This plan aims to make full use of the advantages of wide-area waterworks by re-organizing distribution areas, rebuilding facilities and making a network of pipelines to reinforce the water supply in the Tama area. It is also a planned and strategic approach for facility improvement from wide-area perspective as a model wide-area operation that can contribute to domestic and overseas water utilities aiming for wide-area operations as well.

## BACKGROUND AND PURPOSE

### [History of Waterworks in the Tama Area]

- Tokyo Metropolis divided into the Ward Area (23 wards) and the Tama Area (30 municipalities).
- In the past, the Bureau of Waterworks, Tokyo Metropolitan Government only supplied water to the Ward Area, while other municipalities in the Tama Area managed their own waterworks.
- However, the Bureau of Waterworks has integrated some of those waterworks operated by the cities and towns in the Tama Area since 1972 to deal with the serious shortage of water resources since the 1960s and to correct disparities in terms of water supply services.
- The Bureau of Waterworks is currently managing waterworks in the Ward Areas and 26 municipalities in the Tama Area, while several others are still managed by individual municipalities.

### [Formulating the Tama Waterworks Operation Plan 2017]

- Because waterworks facilities were inherited from municipalities, there are still many small-scale facilities and distribution areas, making maintenance operations inefficient.
- This prevents taking full advantage of the economy of scale of wide-area waterworks, for example the back-up functions of transmission pipes are not adequate.
- Therefore, we formulated the **Tama Waterworks Operation Plan 2017** in order to solve these problems and further develop our wide-area waterworks.
- This plan includes measures to be taken in the 4 years until 2020, including restructuring distribution areas, rebuilding facilities, and networking pipelines.

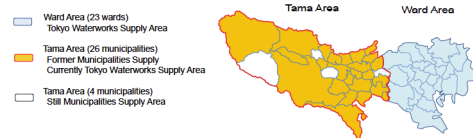


Figure 1. Tokyo Waterworks Water Supply Area

Table 1. Scale of Tokyo Waterworks

	Ward Area (23 wards)	Tama Area (26 municipalities)	Total
Service Area	About 627km <sup>2</sup>	About 612km <sup>2</sup>	About 1,239km <sup>2</sup>
Population served	About 9.4 million people	About 3.9 million people	About 13.3 million people
Diffusion	100%	100%	100%
Total length of Distribution Pipes	About 16,600km	About 10,500km	About 27,100km

(Current as of March 2017)

## PRIMARY POLICIES

### [Restructuring of Water Distribution Areas]

- Distribution areas are set within municipalities with little consideration of local features and energy efficiency.
  - There are also many small scale distribution areas.
- <Policy>
- Based on local features such as water sources, topography, differences in height and number of water supplies, we divided them into 4 areas, setting distribution areas that fit the local features without considering municipal borders (See the area diagram below).
  - This can promote water supply by gravity flow using differences in elevation, expand water distribution area, and reduce the number of divisions.

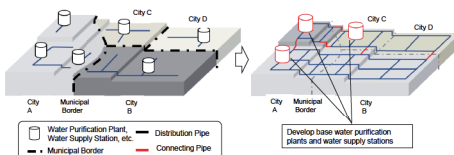


Figure 2. Distribution Area Restructuring (Conceptual Diagram)

### [Rebuilding Water Purification Plants, Water Supply Stations]

- Many of these water facilities were built when still operated by municipalities, so they are small-scale, scattered, and facility management is inefficient.
- Most of them were built in the 1970s, so the timing for renewal all comes at once.

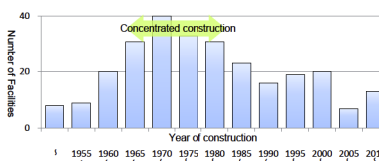


Figure 3. When facilities were built

<Policy>

- Build water purification plants and water supply stations based on water distribution area, and demolish or integrate existing facilities.
- Use asset management program to standardize their renewal period while extending the life of facilities.

### [Networking Transmission Pipes]

- If transmission pipes stop functioning in a disaster or accident and water cannot be sent to water supply stations.
- Most of water supply stations receive water from one transmission pipe, so they cannot always transmit water when there is a disaster.

<Policy>

- Build the Tama South-North Trunk Line (φ2,000 mm, approximately 15.6 km long) to develop a wide-area transmission pipe network.
- Develop a duplexed transmission pipe network to improve the reliability of water supply in a disaster or accident.

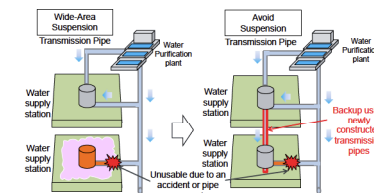


Figure 4. Duplexing of Transmission Pipes (Conceptual Diagram)

4 areas based on local features and main facility construction

Promote reconstruction of waterworks facilities fitting local features of 4 areas.

#### 1) Tama River Upstream Area (Mountainous Area)

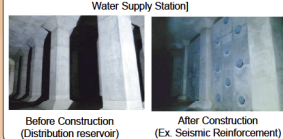
[Renewal of Ogouchi Water Purification Plant (Introduction of membrane filtration facilities)]



Some water purification plants faced problems with water treatment because they were newly brought under management of the Tokyo Waterworks. We will introduce membrane filtration to those water purification plants to stabilize water treatment.

#### 4) Tama River Right Bank Area (Rolling Hills Area)

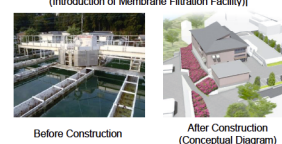
[Seismic Reinforcement of Otune, Sanda, and Hijirigaoka Water Supply Station]



The construction of facilities in this area preceded one in other area, but in order to further improve the reliability of the water supply, we will conduct seismic reinforcement construction on water supply stations.

#### 2) Tama River Left Bank West Area (Sloped Urban Area)

[Renewal of Chigase No. 1 & No. 2 Water Purification Plant (Introduction of Membrane Filtration Facility)]



For facilities with unstable water treatment or that have inadequate distribution reservoir capacity or are aging, we will introduce membrane filtration to stabilize water treatment and renew them.

#### 3) Tama River Left Bank East Area (Flat Urban Area)

[Construction of Tama North Water Supply Station]



Facilities have aged, the capacity of distribution reservoir is inadequate, and the water distribution area is not the proper scale. We will build and renew large-scale water purification plants and water supply stations to expand the distribution area.



Figure 5. 4 areas divided by local features and main facility construction

## CONCLUSIONS

- In order to achieve our fundamental mission to reliably provide safe, tasty, high quality water to the Tama Area, we will further enhance and reinforce waterworks systems based on the Tama Waterworks Operation Plan 2017.
- Our advanced initiatives towards wide-area networking, including rebuilding of facilities with an emphasis on efficiency, should serve as a useful example for water utilities engaged in wide-area networking in Japan and abroad.