

(3) Improvement of the combined sewer system

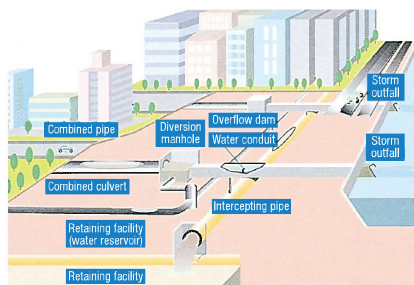
Centered in the urban area of the former 5 cities, about 21% of the area subject to the sewer system, or 3,422ha, is covered by the combined sewer system, in which rainwater and sewage are treated in the same sewer pipe. However, with this method, the volume of rainwater flowing into sewer pipes at one time increases in the event of heavy rain, and untreated sediment in the sewer pipes is discharged directly into the public water area.

Therefore, we have been promoting the renovation and renewal of sewer facilities for reducing the volume of discharged polluted water and for coping with the increased outflow of rainwater, as well as promoting the improvement with the branching sewer system meeting the geographical features of the area and with the rainwater reservoir system.

Further, we drew up the emergency improvement plan for the combined sewer system and have continuously been making efforts to carry out refinement projects in an efficient and effective manner.

• Improvement through the utilization of a rainwater reservoir system

The rainwater reservoir system temporarily retains heavily polluted initial rainwater in rainwater reservoirs, conveys the rainwater to water purification plants after the rain stops, and can reduce pollution in rivers, etc. We constructed the Kantake Rainwater Reservoir beneath the Media Dome and service began in autumn 1998. In addition, we started the services of rainwater reservoirs at Tobata Pump Station in FY2006, at Fujita Pump Station and Mojiko Pump Station in FY2012, and at Higashi-Nakashima Pump Station and Sakuramachi-Kitaminato Rainwater Storage Tube in FY2018.



The system can reduce the pollution load of water discharged from the combined sewer system by retaining heavily polluted initial rainwater temporarily in the rainwater reservoir.



Photograph of the storm outfall from the combined sewer system during a heavy rain storm (Itabitsu River)

Coverage area of the combined / branching sewer system (each ward)

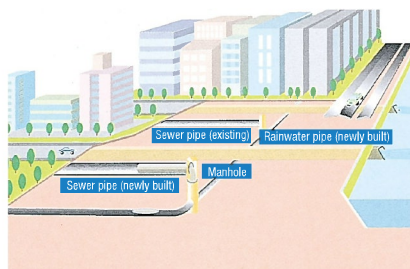
(As of the end of FY 2018)

Ward	Branching system	Combined system	Total
Moji	1,792	38	1,830
Kokurakita	1,588	890	2,478
Kokuraminami	3,290	45	3,335
Wakamatsu	1,913	170	2,083
Yahatahigashi	366	929	1,295
Yahatanishi	3,714	851	4,565
Tobata	316	499	815
Kitakyushu City	12,979	3,422	16,401

(Unit: ha)

• Improvement through the utilization of a branching sewer system

In the Bachi River basin, where a river restoration project is underway, the construction of a branching sewer system has been promoted since FY 1997 in coordination with the river project. Currently, we have been promoting the introduction of the branching sewer system in part of the basins of the Itabitsu River and the Murasaki River.



The system can separate and treat rainwater and sewage, which used to be treated in the same sewer pipe, respectively by newly installing the rainwater pipe, which will eliminate a concern that polluted water may flow into the public water area.

(4) Projects for preparation of pump stations

• Reconstruction of pump stations

It is necessary to reconstruct, renew or reinforce the pump stations due to the increase of rainwater outflow volume along with aging facilities and the progression of urbanization. The Fujita Pump Station in Yahatanishi Ward started its operation in 1963 in order to discharge rainwater around JR Kurosaki Station. However, heavy rains in recent years often caused flood damage, and therefore it has become necessary to reinforce the storm sewage pumps as soon as possible. Furthermore, since the facilities have become older, in addition to the renewal of the storm sewage pumps, a new storm sewage pump station was constructed inside Shiroyama Green Park adjacent to the existing site. And the service started in FY 2012 for the purpose of eliminating flood damage and improving the combined sewer system at the same time.

3 Effective use of sewer system resources

We look upon treated water and sludge generated in the sewage treatment as important "resources" and utilize the resources effectively, aiming for an earth-friendly sewer system.

1. Utilization of treated water

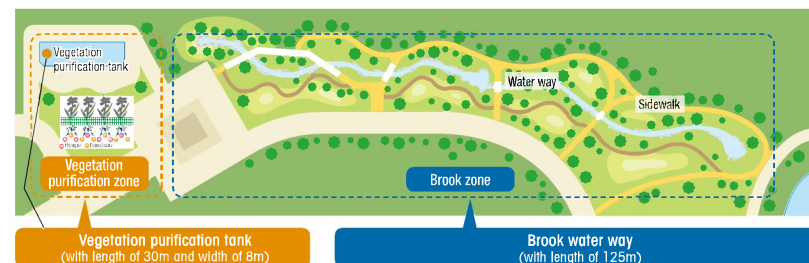
The total treatment capacity of the 5 sewage treatment plants in Kitakyushu City is 620,000m³ per day. The total volume of sewage accepted in these sewage treatment plants is 151.52 million m³ per year, of which the volume of secondary treated water is 149.27million m³ per year, or 410,000m³ per day on an average. The water purification plants in the city have been treating the sewage by using activated sludge, and have achieved excellent results. Treated water generated from the water purification plants has been voluntarily utilized as an important water resource.

Dokai Biopark (visible sewer system)

Purification of treated water made from sewage by the plant life ecosystem in the park.
The waterfront with various creatures serves as a relaxation place for citizens!

Treated water made from sewage conveyed from the Kogasaki Water Purification Plant is further purified in Dokai Biopark by the plant life ecosystem in the park. The re-purified treated water has created a waterfront where various creatures can live, and the information boards showing the water purification mechanism are installed for environmental education and the enlightenment of citizens. Furthermore, a waterfront with a freshwater system created at the inner part of the bay contributes to the preparation of a good living environment for wild birds, etc., and is also useful for the improvement of the environment in Dokai Bay. Moreover, Dokai Biopark is expected to enhance citizens' awareness about the sewer system through PR activities such as the "visible sewer system".

This is the first case in Kitakyushu City where treated sewage is recycled and reused as water for the environment, and there are few water purification facilities in Japan where treated water made from sewage is purified by the plant life ecosystem.



Vegetation purification zone

This is the zone where treated water made from sewage (secondary treated water) is purified by vegetation (advanced treatment). Nitrogen and phosphorous in the water are eliminated in this zone, making use of plants' mechanism to absorb nitrogen and phosphorous as they grow.



Brook zone

Water purified in the vegetation purification zone flows into the water way, creating the brook zone. Plants grown along the side of the brook zone further purify the water. In addition, the brook zone serves as a habitat for small creatures, such as dragonflies and waterfrogs, where citizens can observe and learn about the natural environment up close.

