Measures to make Horikawa River Limpid

Implementation by Nagoya City

Sep. 9th 2017

Greenification & Public Works Bureau
River Planning Division

Waterworks and Sewerage Bureau
Sewerage Planning Division

Points of the Report

Topics in FY 2017

- Expansion of covering sand section
  (Habashita Bridge – Nisiki Bridge)

- Measures against stench
  at Shin-Horikawa River

- Construction of simple treatment sophistication facilities (Meijo Water treatment Center)

- Water circulation of Nakagawa Canal

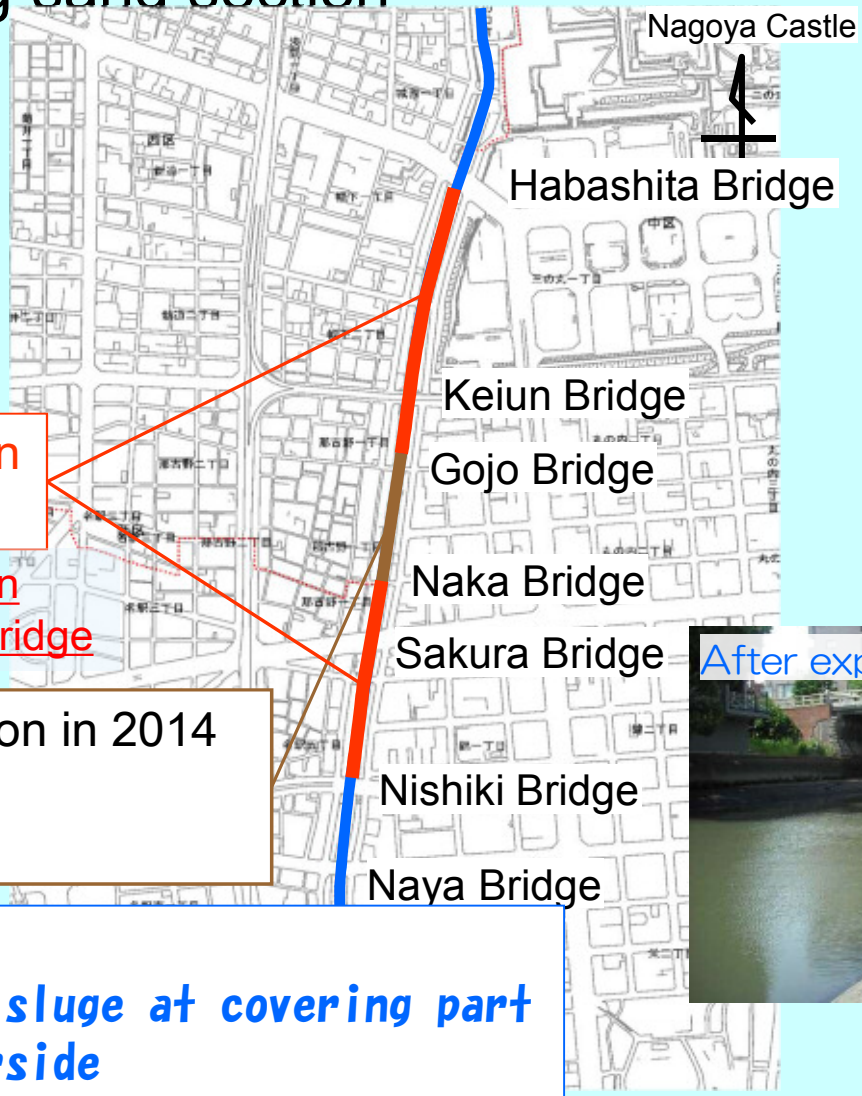
■Implementation to make Horikawa River Limpid in Gojo Bridge area

◆Expansion of covering sand section

Scheduled construction section
Lentgh：1,100m

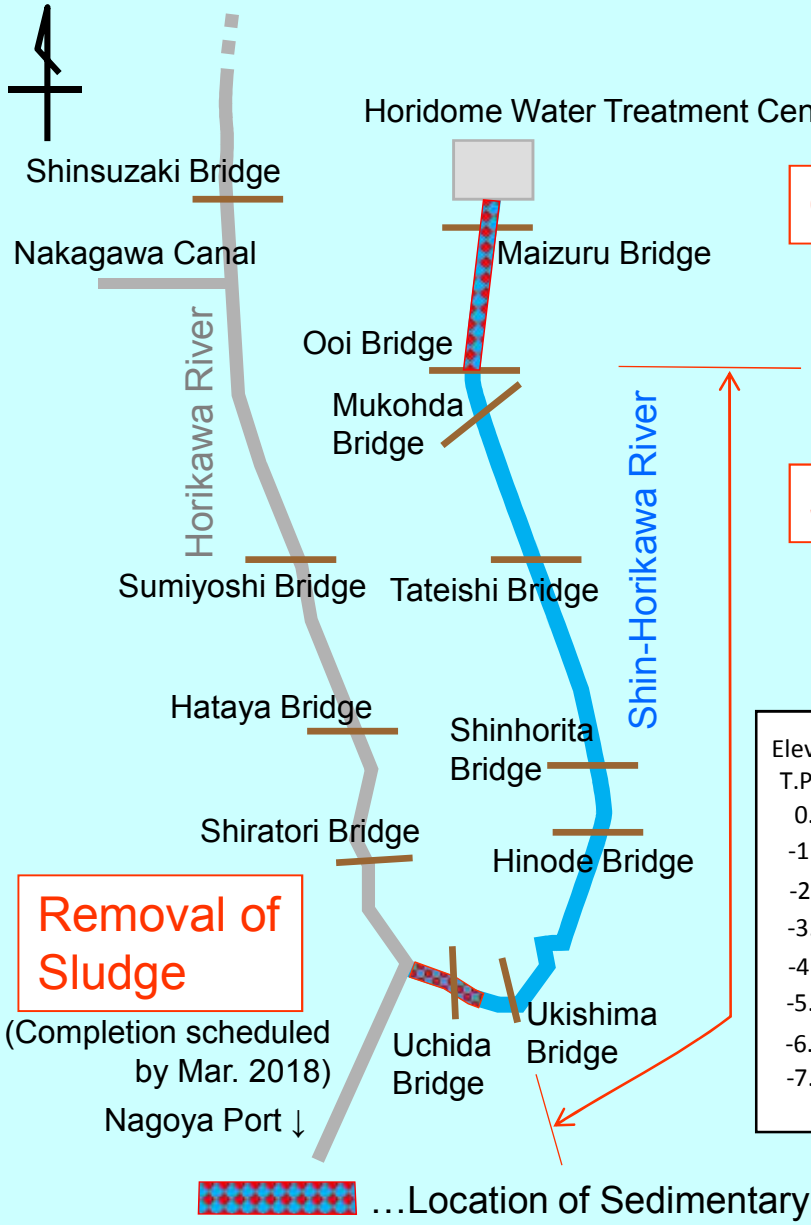
Expansion of covering sand section
from Habashita Bridge to Nishiki Bridge

Clarification experiments section in 2014
（Gojo Bridge～Naka Bridge）
Length：300m



Check point
- ***Restraint of hoisting of sluge at covering part***
- ***Transparency of the waterside***
- ***State of living things***

Measures against Smell of Shin-Horikawa River

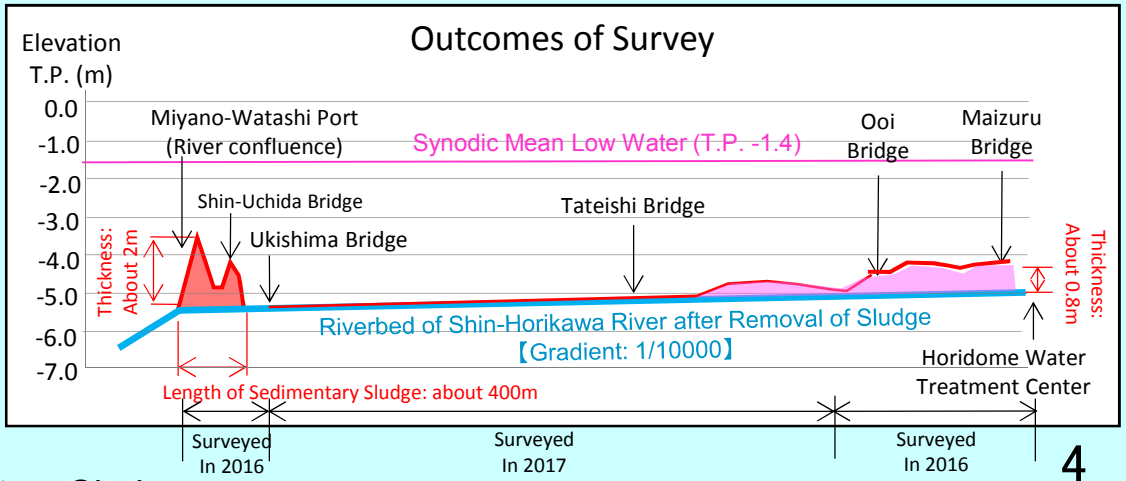


Considering of Measures

- Considering of effective countermeasures based on water quality survey and precise survey

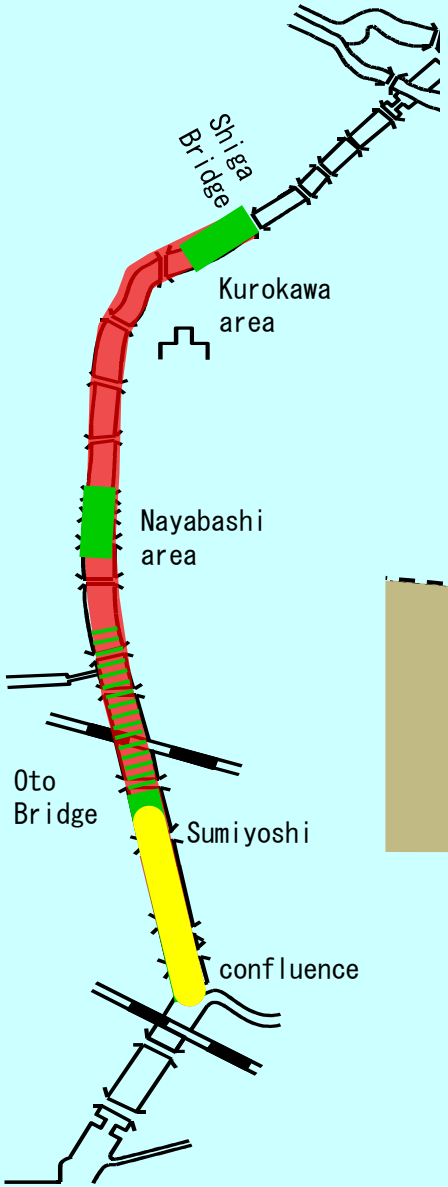
Survey Work

- Surveying to identify the shape of riverbed
  (Upstream and downstream zone was surveyed in 2016)



Improvement of water quality

◆Removal of sludge

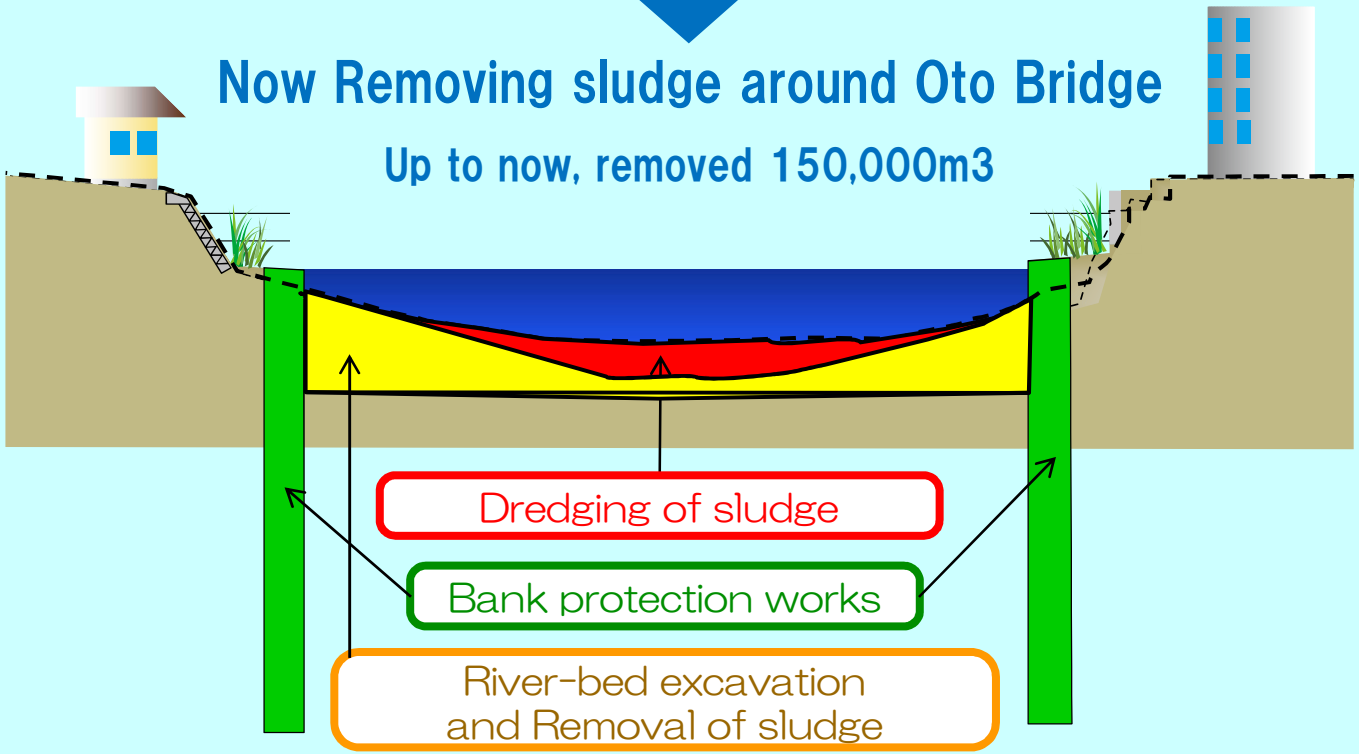


•Removal of sludge on water route from Shiga Bridge to Shin-Horikawa River confluence（1994～2007）

•Removal of sludge and river bed excavation at the same time implemented from downstream

Now Removing sludge around Oto Bridge

Up to now, removed 150,000m3



Making Additional water sources

◆Use of shallow ground water in the upstream area

★：Installed by Mar. 2018
(Upstream of Kinjo Bridge)

Seko Bridge
0.01m³/s

Tsujie Bridge
0.01m³/s

Kizune Bridge
0.01m³/s

Sanage Bridge
0.01m³/s

Shiga Bridge
0.01m³/s

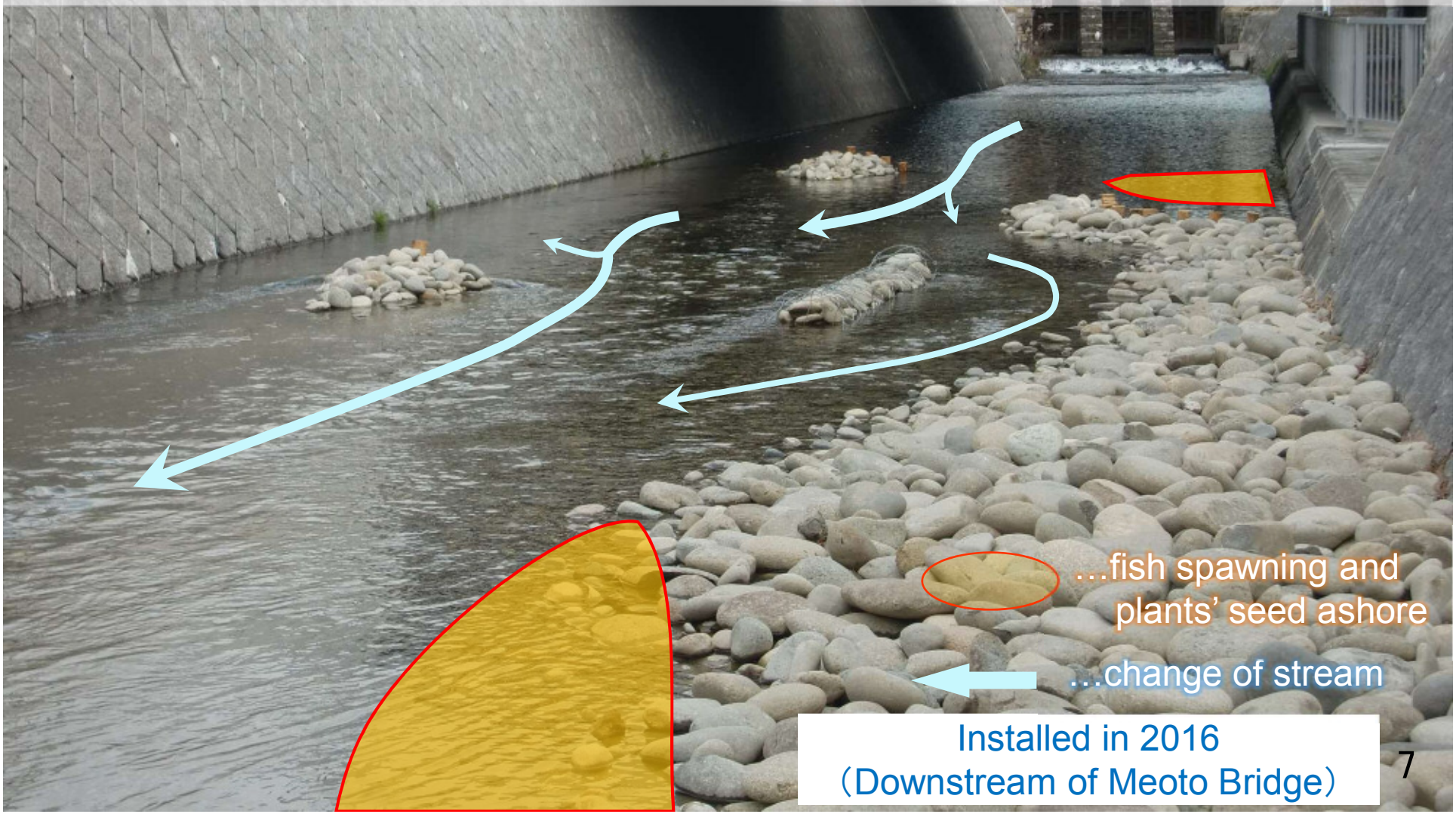
Shimizu wakuwaku
0.0005m³/s

Nakatsuchi Bridge
0.01m³/s

Improvement of water quality

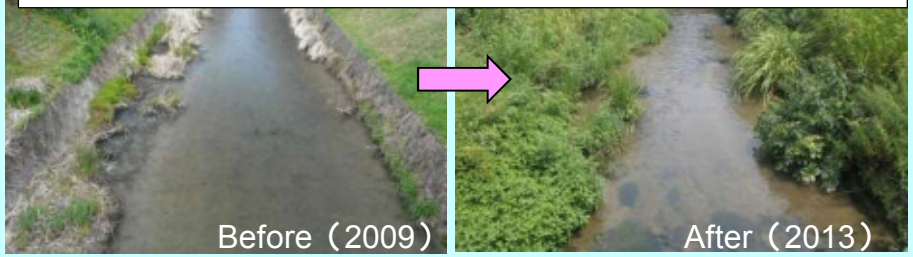
◆Making shallows and deeps

Setting wooden piles and ripraps generates variable stream on the river for enforcing river's self-purification function and creating habitats with growth of plants.



Improvement of water quality

Installed in 2010
(Meoto Bridge～Kurokawa No.1 Bridge)



Installed in 2012
(Downstream of Kurokawa No.2 Bridge)

Installed in 2013
(Upstream of Kurokawa No.2 Bridge)

Installed in 2015
(Downstream of Ruriko Bridge)

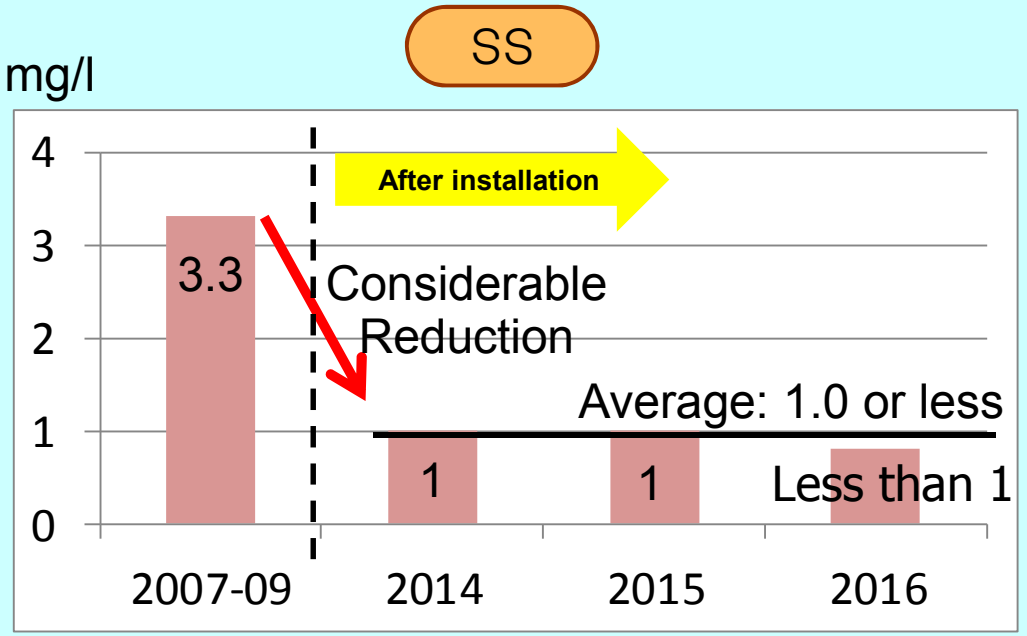
Some of the creatures seen in the upstream of Horikawa River


Japanese mitten crab

◆Improvement
- Variety and amount of fish have increased.
- Benthos have increased.
- Plants have grow up more.

Removal and reduction of inflow pollutants

- Advanced water treatment
  at the Meijo Water Treatment Center (since May 2010)



Minute Suspended Solids (SS) in treated water are removed more by the filtration devices.

Removal and reduction of inflow of pollutants

◆Control of combined sewer overflow (Installation of advanced primary treatment facility)

Install advanced primary treatment facilities at maintained area by combined sewer system in order to improve water quality of primary treatment to be carried out in rainy weather.

◆Meijo Water Treatment Center

- Started construction in 2017
- Scheduled to start operation in 2019

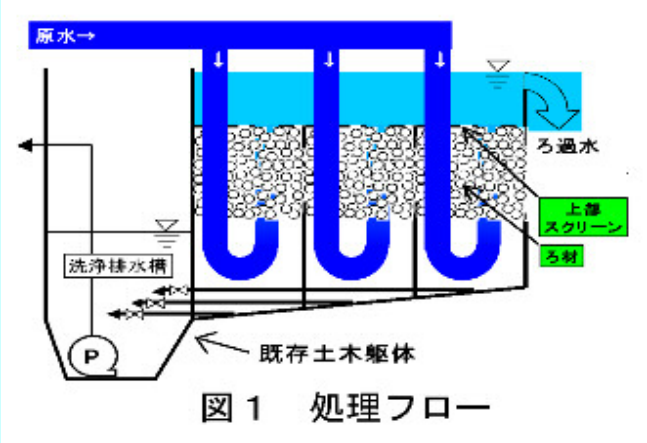


図１　処理フロー

Fig.1 Process flow in Temma-cho Water Treatment Center

写真１　特殊ろ材

Pic.1 Special filter material

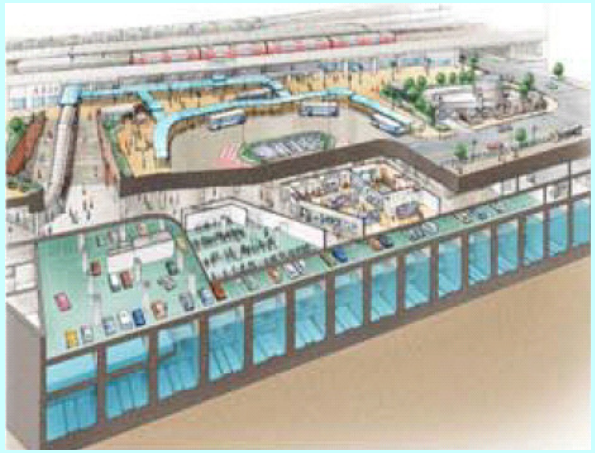
Removal and reduction of inflow of pollutants

◆Control of combined sewer overflow

（rainwater storage facility）

Construct rainwater storage facilities to reduce pollution load for Horikawa River in rainy weather by storing high polluted first flush rainwater temporarily.

Ozone Stormwater Reservoir for pollution control



Started operation in 2006
(12,000m^3)

Horikawa Ugan Rain-water Resevoir for pollution control

Started operation in 2010
(13,000m^3)

Horikawa Sagan Rain-water Resevoir for pollution control

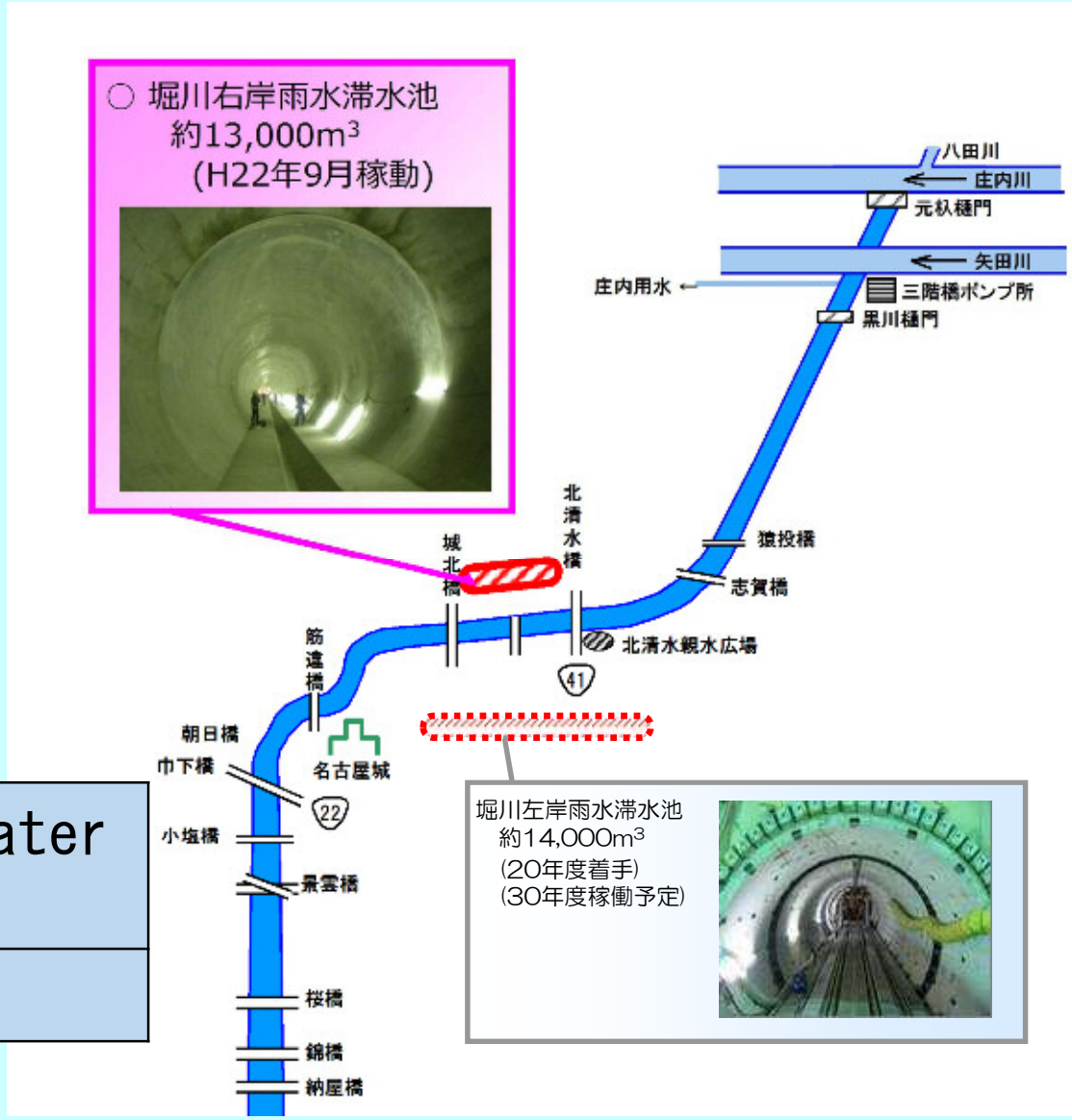
Scheduled to start operation in 2018
(14,000m^3)

Removal and reduction of inflow of pollutants

◆Horikawa Ugan Rain-water Resevoir for pollution control

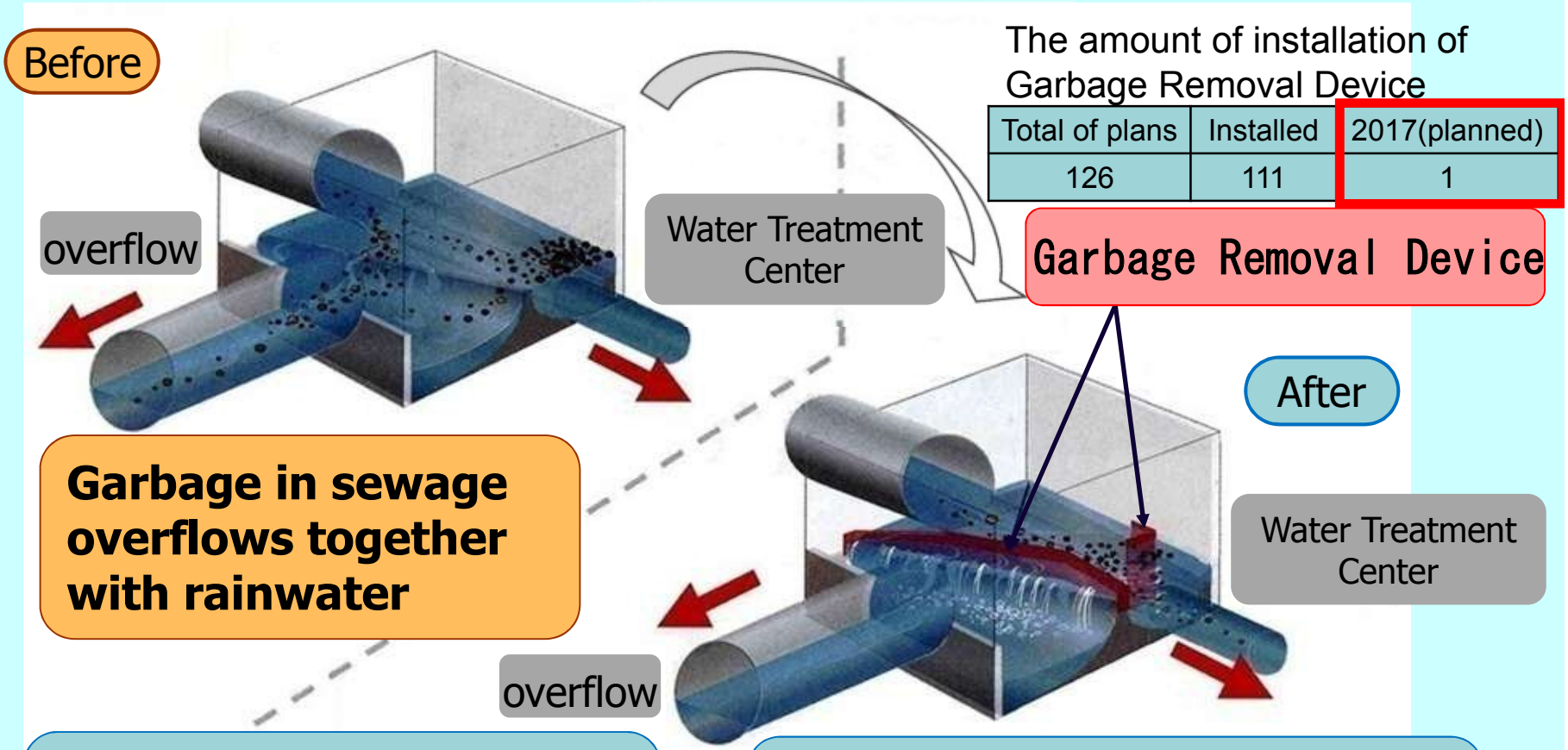
- Started operation in September 2010
- About 13,000㎥

Cumulative stored water volume in 2016
About 730,000㎥



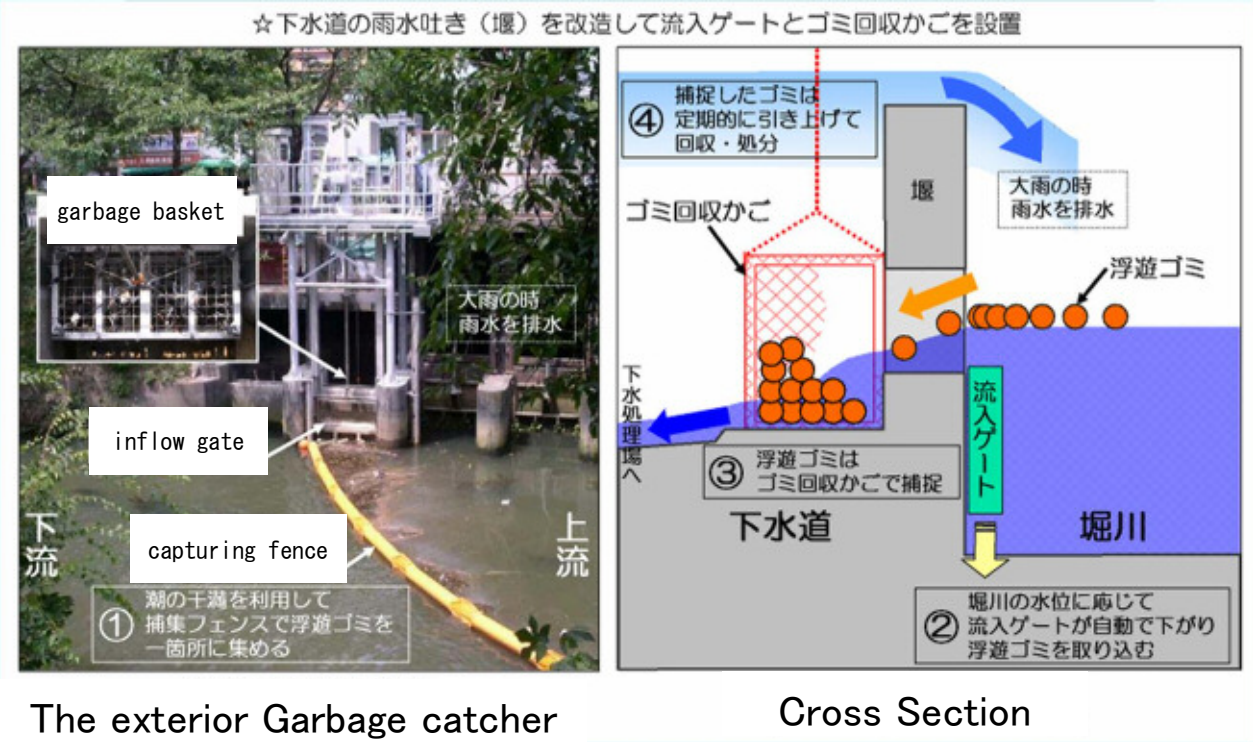
■Removal and reduction of inflow of pollutants

◆Improvement of combined sewer system （Installation of Garbage Removal Device ）



■Removal and reduction of inflow of pollutants

◆Garbage catcher (Near Johoku Bridge) since 2006



The exterior Garbage catcher　　Cross Section

Result of collection in 2013	0．8 t
Result of collection in 2014	0．7 t
Result of collection in 2015	1．4 t
Result of collection in 2016	1．3 t

The slack of fence was solved in March, 2015.

Additional Water Resource

◆Utilization of Reclaimed Wastewater (Excluding Winter)

Conducting reclaimed wastewater treated by membrane filtration at the Moriyama Water Treatment Center

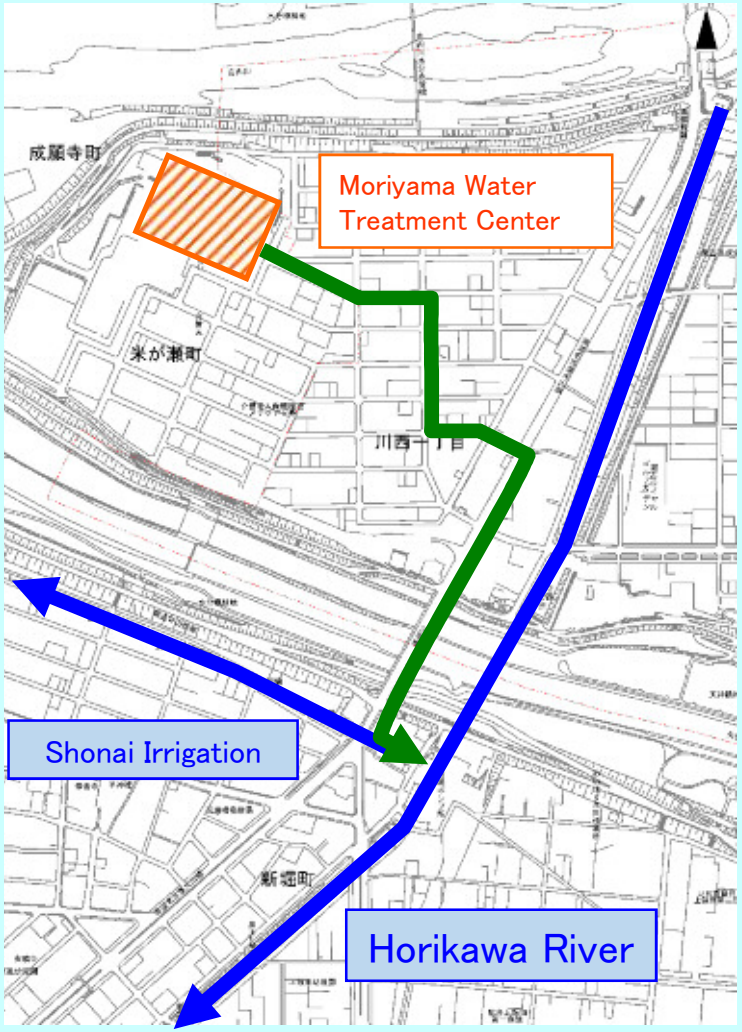
Water Supply: Up to 4,000m^3/day(0.046m^3/s)

Flat membrane unit aerobic tank (400sheets × 12units)

Upper stage embrane case (200 cartridges inside)

Lower stage membrane case (200 cartridges inside)

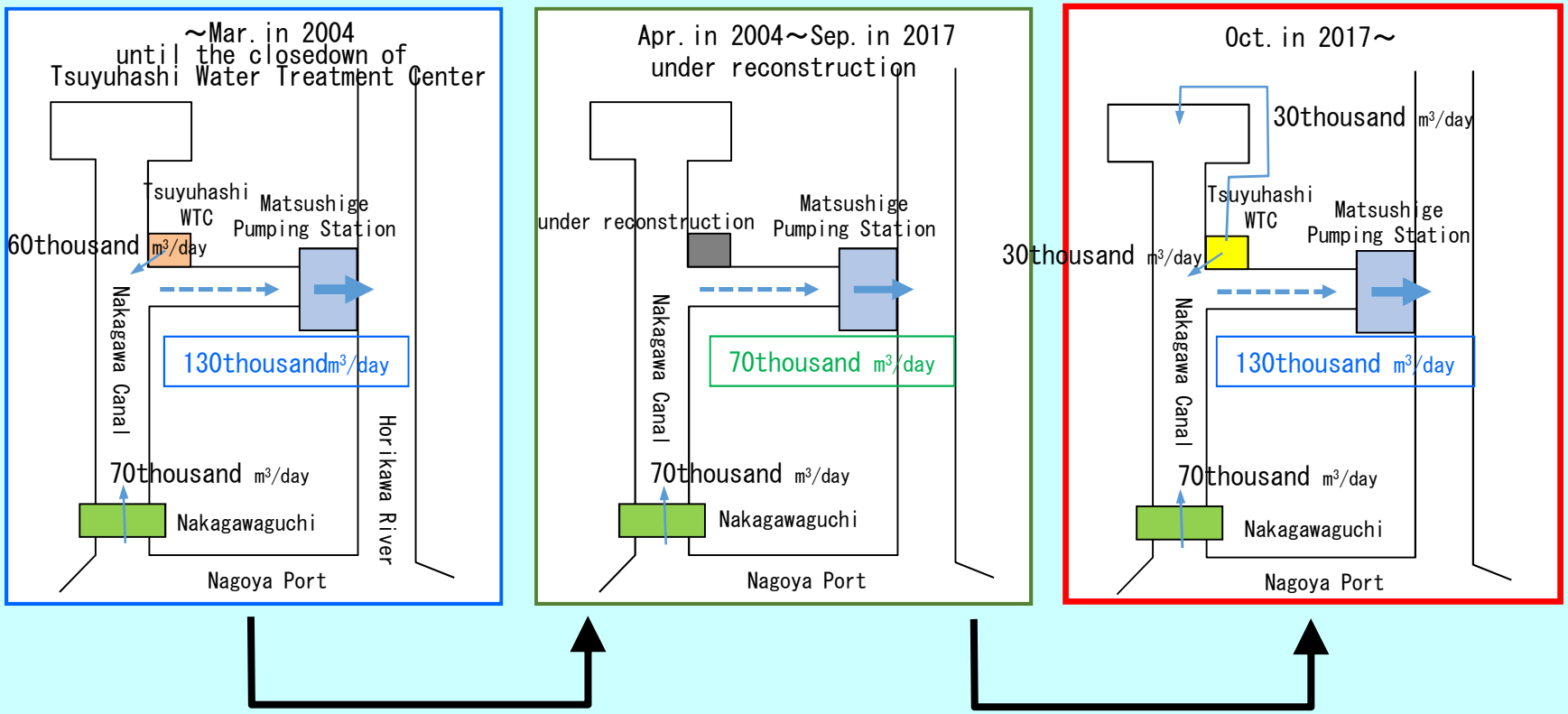
Flat membrane unit



※Watering period is almost irrigation period (April～October)
(Except the period for Shonai irrigation channel (Novemver～March))

Water Circulation of Nakagawa Canal

◆Change of water circulation



・Discharge of reclaimed water was stopped for reconstruction of Tsuyuhashi WTC.
・Water was drained into Horikawa River as much as drawn water from Nakagawaguchi.

・Tsuyuhashi WTC has operated.
conventional activated sludge process ⇒advanced water treatment (60thousand m³/day)
・Water is drained into Horikawa River as much as drawn water from Nakagawaguchi and discharged water from Tsuyuhashi WTC.

Fully renovated construction of Tsuyuhashi Water Treatment Center

- Because of terrible aging , we started to renovate it from 2003.
- For the purpose of water quality preservation of public water area , we introduced advanced water treatment that can remove nitrogen and phosphorus more than before.

Fully renovated construction

Commencement on Sep 5th, 2017

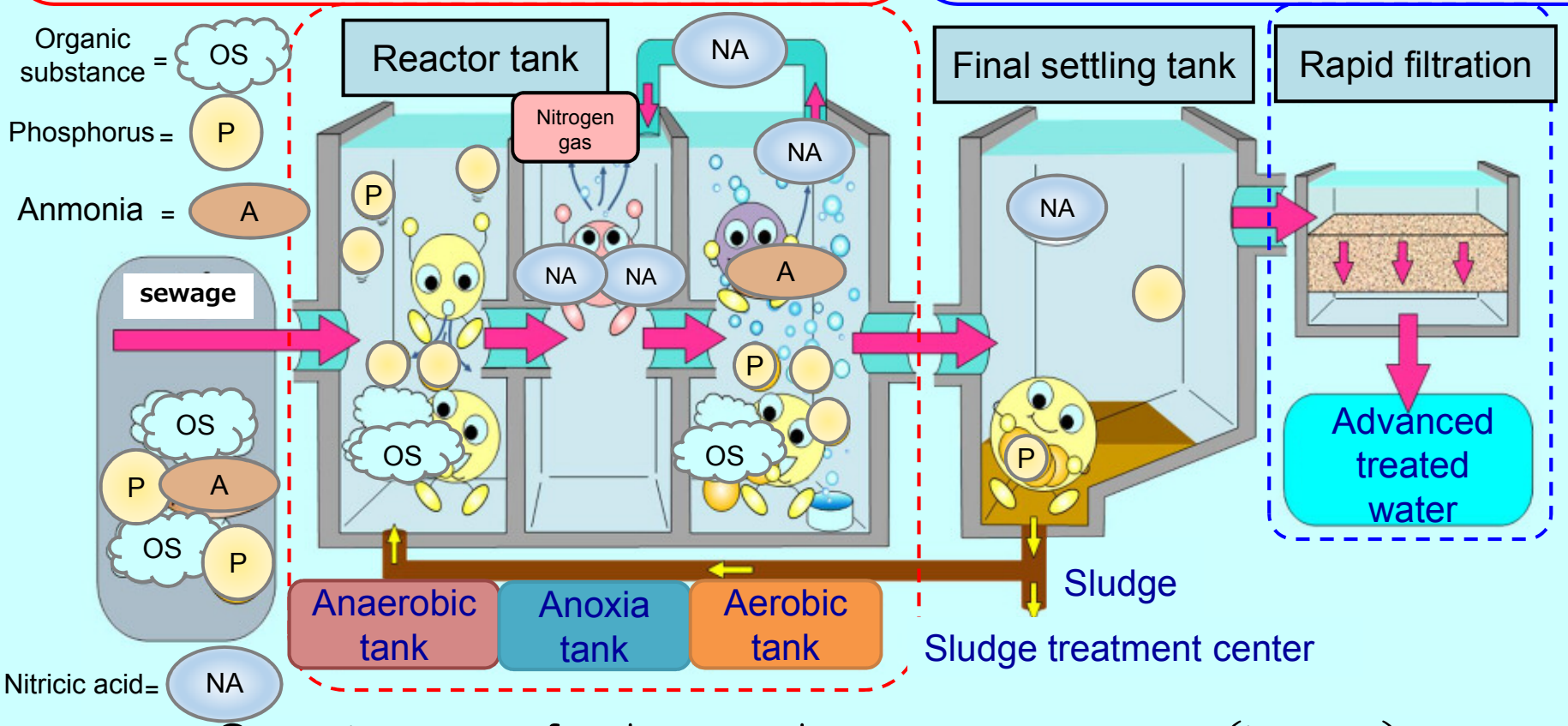
About advanced water treatment

Process of anaerobic – anoxia – aerobic

The process can remove nitrogen and phosphorus which causes eutrophication more than normal conventional activated sludge process.

Rapid filtration

- Removeing more suspeded Solids by sand filtration
- Improving transparency



Contrivance of advanced water treatment (image)