Water Utility Information (as of 2016)

Basics

Name of utility:		Bureau of Waterworks Tokyo Metropolitan Government		Service type:		Wholesale + Retail water supply	
Administrative population:		13.74 million people		Start of service:		1898	
Population served:		9.37.5 million people		Service area:		626.79	km^2
Volume of water supply							
	Average daily water supply:	4.11 million	m^3/d	Break down	Household	2.96 million	m^3/d
					Industrial	37,000	m^3/d
					Urban	1.11 million	m^3/d
	Average daily water supply per person:	-	L/person/d	Service coverage:		100	%
	Effectiveness:	96.7	%	Revenue water:		96.0	%
	NRW:	4.0	%	Water loss		3.1	%
Water rates							
	Water rates for 10 m^3/month:			1,047/970 yen (with taxes/without taxes)			
				**Calculation condition: the fixed charge is 860 yen and the volumetric charge is 0 yen for 13 mm at 1-5 m^3 use and 22 yen/m^3 at 6-10 m^3 use.			
	Water production cost:	208.95	yen/m^3	Water supply cost:		211.61	yen/m^3

Water Utility Information (as of 2016)

Facilities

Water Treatment Plants: (including the water received for wholesale supply)

Name	Capacity		Water source	Treatment process
Kanamachi WTP	1,500,000	m³/d	Tone River・Arakawa River	Rapid filtration・Advanced water treatment (applied entirely)
Misato WTP	1,100,000	m³/d	Tone River・Arakawa River	Rapid filtration・Advanced water treatment (applied entirely)
Asaka WTP	1,700,000	m³/d	Tone River・Arakawa River	Rapid filtration・Advanced water treatment (applied entirely)
Mikuni WTP	300,000	m³/d	Tone River・Arakawa River	Rapid filtration・Advanced water treatment (applied entirely)
Higashimurayama WTP	1,265,000	m³/d	Tone River・Arakawa River・Tamagawa River	Rapid filtration・Advanced water treatment (applied partially for 880,000 m³/d of Tone River・Arakawa River waters)
Ozaku WTP	280,000	m³/d	Tamagawa River	Rapid filtration
Sakai WTP	315,000	m³/d	Tamagawa River	Slow filtration
Kinuta WTP	114,500	m³/d	Tamagawa River	Membrane filtration・Slow filtration
Kinutashimo WTP	70,000	m³/d	Tamagawa River	Membrane filtration・Slow filtration
Tamagawa WTP	(152,500)	m³/d	Tamagawa River	Slow filtration・Rapid filtration *operation suspended due to raw water degradation
Nagasawa WTP	200,000	m³/d	Sagamihara water	Rapid filtration
Suginami WTP	15,000	m³/d	Ground water	Disinfection only
Total	6,859,500	m³/d		

Pipes

Pipeline length:	27,792 km	Conveyance:	- km	Transmission:	- km
		Distribution:	27,038 km	Others:	- km

Type of material:
- Cast iron
- Steel
- Others

Others

Other information:
- Number of employees: 3,800 (as of August 1 2017)
- Maximum daily supply: 4.51 million m³/d
- Facility utilization rate: 78.6% (maximum daily supply/facility capacity)

Remarks:
- "Overview of the Water Services." Bureau of Waterworks Tokyo Metropolitan Government. https://www.waterworks.metro.tokyo.jp/

Case Study Report (Asaka Water Treatment Plant)

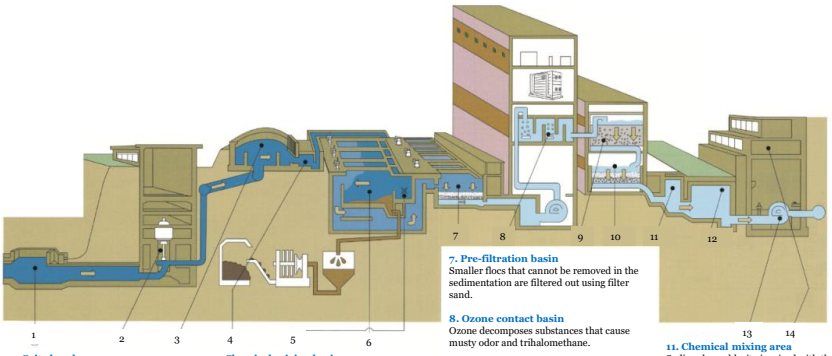
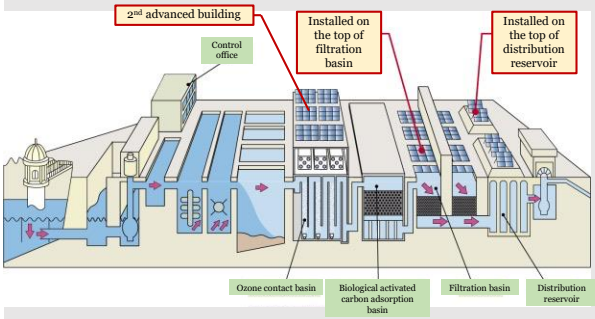
Water Treatment Process

Case #5 Asaka Water Treatment Plant

Key word:	Advanced water treatment; raw water accommodation pipeline; solar power generation
Outline:	<Characteristics> 1. Installation of advanced water treatment process Following the Kanamachi Water Treatment Plant (WTP) and the Misato WTP, the Bureau installed an advanced water treatment using ozonation and biological activated carbon process at the Asaka WTP in November 2004. Together with the second-phase facilities completed in March 2014, the advanced treatment now accounts for Asaka's entire water treatment of 1.7 million m^3/d. This also means that all the water abstracted from the Tone River and its tributaries are now being treated through the advanced treatment at various WTPs of the Bureau including the Asaka. 2. Mutual accommodation of raw water The Asaka WTP has been connected with the Higashimurayama WTP by a raw water accommodation pipeline. This allows the Asaka to use the Tama River's water when needed, in addition to the water from the Tone River and the Arakawa River. 3. Use of PFI (public finance initiative) Since April 2005, the Asaka has operated its power generation facility and sodium hypochlorite production facility under PFI scheme. <Advanced Water Treatment Process> • The advanced water treatment process consists of an ozonation and a biological activated carbon absorption. It aims to reliably and efficiently remove substances that cannot be adequately removed by the conventional water treatment processes such as rapid filtration. • The ozonation oxidizes and decomposes substances that can produce musty odor and trihalomethanes. • The biological activated carbon (BAC) adsorption removes pollutants through activated carbon adsorption and decomposition by microorganisms that grow on the carbon. • The Bureau has installed an "ozonation + BAC" before filtration so it comes in as the final treatment process, as it can trap and remove microorganisms that may leak from the BAC layer. This decision was made based on the research and experiments conducted for six years from 1983. • In addition, the Asaka WTP also uses filtration before "ozone + BAC" in order to reduce trihalomethane precursors efficiently and to reduce the power consumption required for ozone injection. ＜Raw water accommodation pipe> • The utility has installed a "raw water accommodation pipe" that allows raw water from different river systems to be mutually accommodated for efficient use of raw water. • Asaka normally abstracts from the Tone River system, but sending some of its water to the Higashimurayama water treatment plant helps keep enough water stored all the time from the Tama River system, including at the Ogouchi reservoir. • In the event of drought or water quality incidents in the Tone River system, raw water from the Tama River system is used by receiving its water from the Higashimurayama water treatment plant.
Land area:	228,206 m^2 (excluding water drainage facility)
Water treatment process:	coagulation + sedimentation + ozonation + granular activated carbon + chlorine disinfection
Water source:	Surface water (rivers)

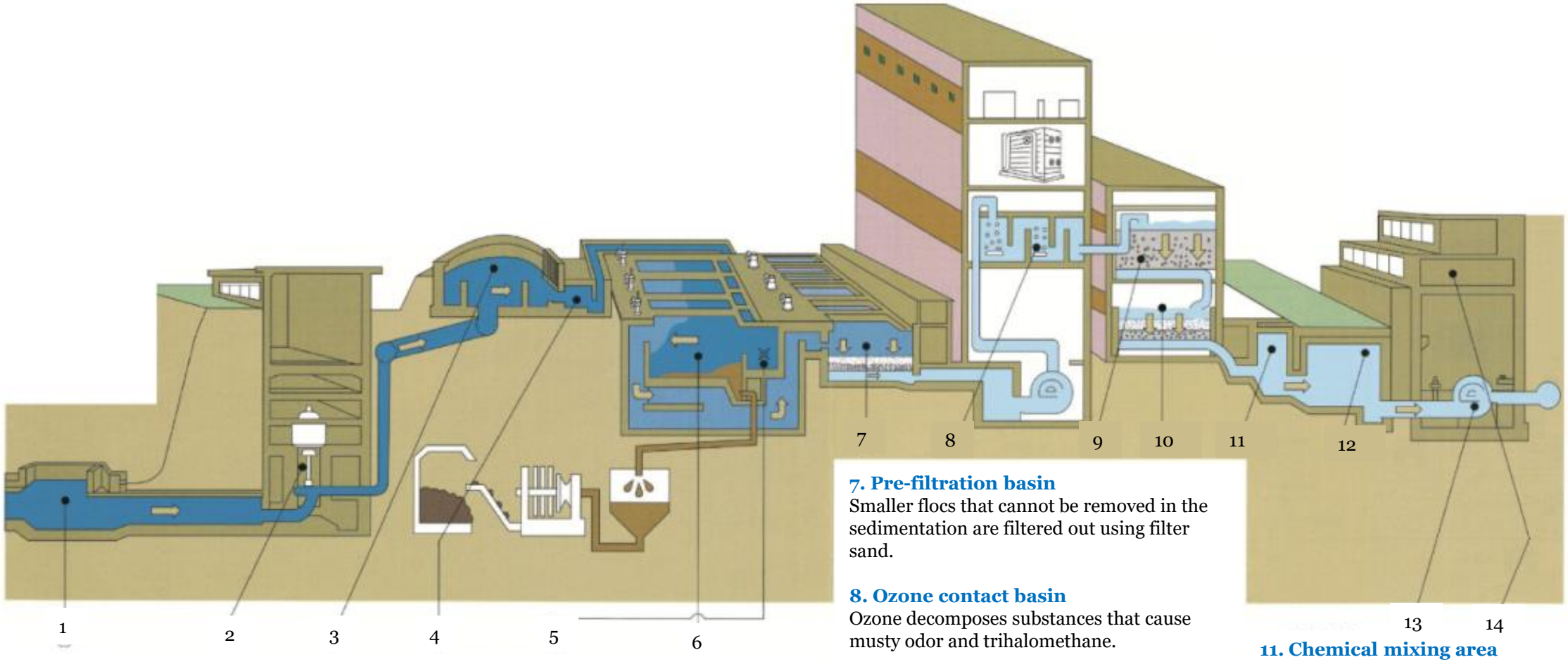
Raw water quality:	• Because the intake point is located in the lower reaches of the Arakawa River, the concentration is relatively high of water quality parameters that could affect the treatment process, such as organic matters and ammonia nitrogen. • In recent years, the concentration of substances that can cause musty odor has been relatively high due to the effects of algae attached to stones on the riverbed. • When the amount of water is short for distribution due to drought and other reasons, water is temporarily taken from the Arakawa Reservoir located right in front of the intake point. This water is susceptible to the water quality within the Arakawa Reservoir (especially the substances that can cause musty odor). <Average raw water quality in FY2018 (maximum)> Turbidity: 12 degrees (740 degrees) Color: 7 degrees (26 degrees) TOC: 1.7 mg/L (2.5 mg/L) Potassium permanganate consumption: 6.0 mg/L (34 mg/L) Ammonia nitrogen: 0.10 mg/L (0.43 mg/L) Iron: 0.43 mg/L (1.0 mg/L) Manganese: 0.076 mg/L (0.099 mg/L) Geosmin: 2 μg/L (20 μg/L) 2-MIB: 6μg/L (170 μg/L)
Chemical dose:	sulfuric acid (pH adjustment), caustic soda (pH adjustment), polyaluminum chloride (flocculation), sodium hypochlorite (disinfection), powdered activated carbon (odor removal)
Capacity:	1,700,000 m^3/d
Start of service	October 1966

Case Study Report (Asaka Water Treatment Plant)

Treatment flow diagram:	 **1. Grit chamber** Sand and soils mixed in the abstracted water are settled. **2. Water pump** Water is pumped into the receiving well. **3. Receiving well** Water pumped up by the water pump is led to the flocculation basin. **4. Chemical mixing basin** Polyaluminum chloride (flocculant) is added to collect and settle fine sand and soil mixed in the water. **5. Flocculation basin** Fine sand and soil mixed in the water are made into flocs that are easy to settle. **6. Sedimentation basin** While the water is slowly flowing, the flocs in the water settle to the bottom to make the water cleaner. **7. Pre-filtration basin** Smaller flocs that cannot be removed in the sedimentation are filtered out using filter sand. **8. Ozone contact basin** Ozone decomposes substances that cause musty odor and trihalomethane. **9. Biological activated carbon adsorption basin** Activated carbon removes the substances decomposed by ozone. Also, the microorganisms grown on the activated carbon decompose ammonia and other substances. **10. Post-filtration basin** The water is filtered again to make it safe and tasty to drink. **11. Chemical mixing area** Sodium hypochlorite is mixed with the filtered water for disinfection. **12. Water distribution reservoir** Clear water is stored. **13. Transmission and distribution pump** The water stored in the distribution reservoir is sent out for distribution. **14. Control room** The room is used to monitor the dosage of various chemicals and water quality.
Other facilities:	<Solar power generation system> Solar panels installed on the top of the filtration basin. Capacity: 1,200 kW Solar panels installed on the roof of the second-phase building and on the top of distribution reservoirs. Capacity: 500kW   
Order/ contract:	-
Expenses:	Unknown

Other information

https://www.waterworks.metro.tokyo.jp/suidojigyo/gaiyou/shisetsu.html



1. Grit chamber
Sand and soils mixed in the abstracted water are settled.

2. Water pump
Water is pumped into the receiving well.

3. Receiving well
Water pumped up by the water pump is led to the flocculation basin.

4. Chemical mixing basin
Polyaluminum chloride (flocculant) is added to collect and settle fine sand and soil mixed in the water.

5. Flocculation basin
Fine sand and soil mixed in the water are made into flocs that are easy to settle.

6. Sedimentation basin
While the water is slowly flowing, the flocs in the water settle to the bottom to make the water cleaner.

7. Pre-filtration basin
Smaller flocs that cannot be removed in the sedimentation are filtered out using filter sand.

8. Ozone contact basin
Ozone decomposes substances that cause musty odor and trihalomethane.

9. Biological activated carbon adsorption basin
Activated carbon removes the substances decomposed by ozone. Also, the microorganisms grown on the activated carbon decompose ammonia and other substances.

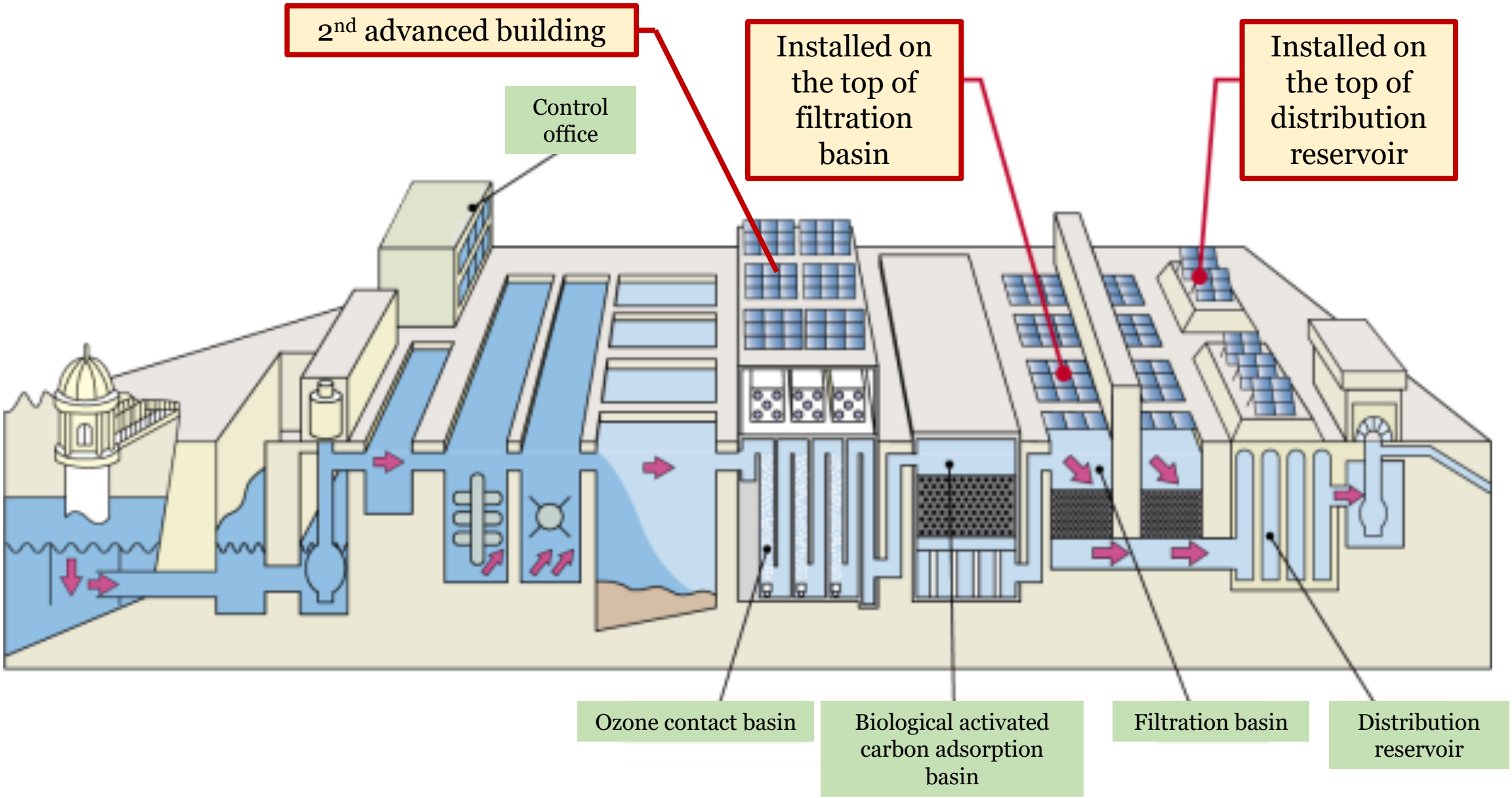
10. Post-filtration basin
The water is filtered again to make it safe and tasty to drink.

11. Chemical mixing area
Sodium hypochlorite is mixed with the filtered water for disinfection.

12. Water distribution reservoir
Clear water is stored.

13. Transmission and distribution pump
The water stored in the distribution reservoir is sent out for distribution.

14. Control room
The room is used to monitor the dosage of various chemicals and water quality.


2nd advanced building
Control office
Installed on the top of filtration basin
Installed on the top of distribution reservoir
Ozone contact basin
Biological activated carbon adsorption basin
Filtration basin
Distribution reservoir