Somersby Water Treatment Plant

Gosford City Council

Wyong Shire Council
Central Coast

Somersby Water Treatment Plant is where water from Mangrove Creek Dam, Mangrove Creek Weir, Mooney Mooney Dam and a number of groundwater bores is filtered and disinfected to make it safe to drink.

About

Somersby Water Treatment Plant was built in two stages. The first stage was completed in 1971 followed by the second construction stage in 1986.

The plant can produce treated water at a rate of up to 1666 litres per second, which is equal to 144 million litres per day or 57.6 Olympic size swimming pools.

Treated water is produced at the plant 365 days per year. In order to monitor the plant, operators attend the site every day.

Somersby Water Treatment Plant

Upgrades

From 2012, more than 70 projects will be completed over a five year period as part of the Somersby Water Treatment Plant capital works plan. The plan involves replacement and renewal of assets to improve reliability, efficiency, safety, asset performance and improve the treatment process.

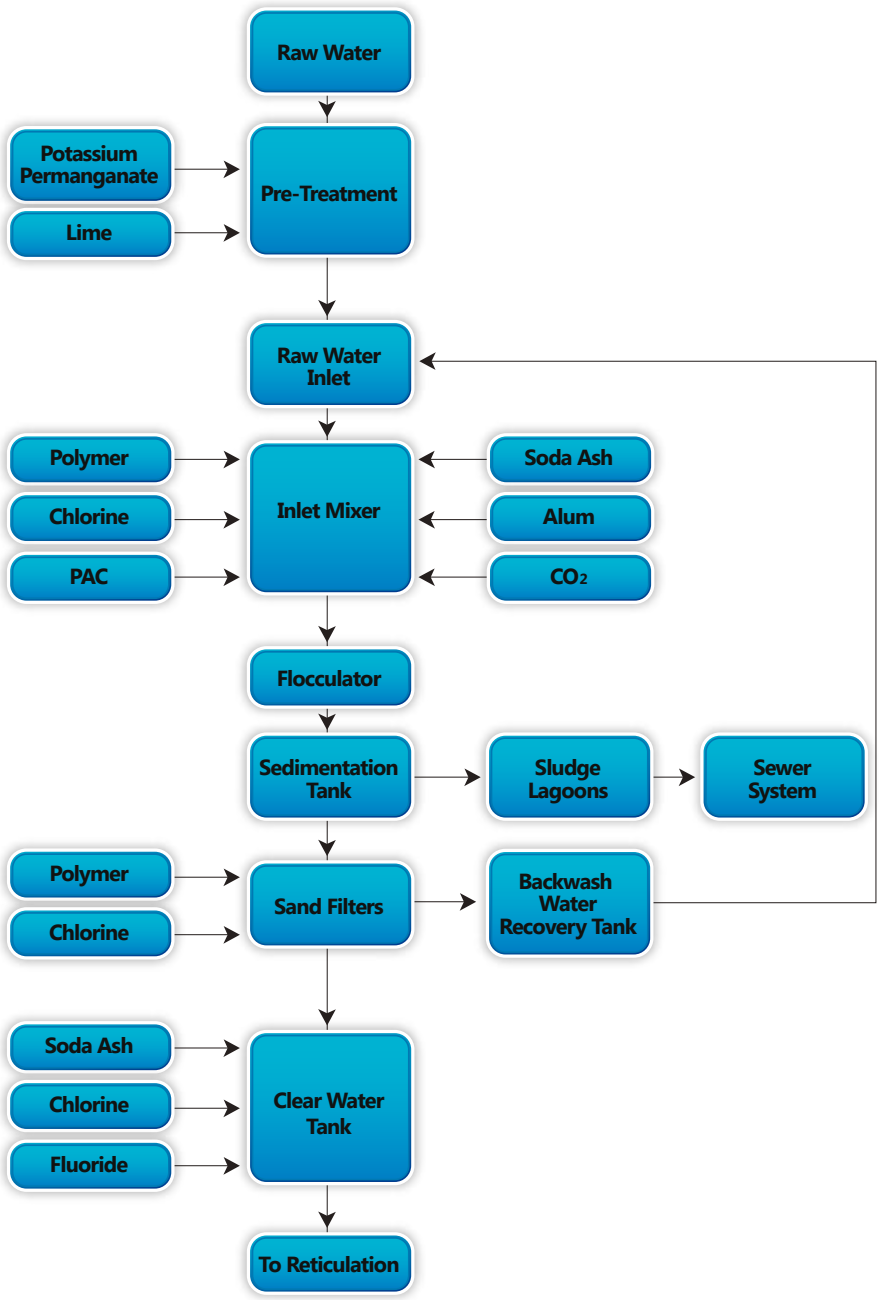
Process

The water treatment process at the Somersby Water Treatment Plant has been selected to economically deliver water that meets Australian Drinking Water Guidelines.

Somersby Water Treatment Plant typically treats raw water from Mooney Mooney Dam and Mangrove Creek Dam. The raw water is treated with rapid mixing, flocculation, sedimentation, filtration, chlorination and fluoridation.

Somersby Water Treatment Plant

Process Flow Schematic



Chemicals used in treating water

All chemicals used in the treatment process are used in levels that are approved in the *Australian Drinking Water Guidelines*. The chemicals are useful in removing impurities so the water is safe to drink.

Pre-treatment chemicals	
Lime	Increases the pH level of the raw water.
Potassium Permanganate	Oxidises iron and manganese which can then be removed by the flocculation process.
Powder Activated Carbon	Absorbs impurities in the water and removes tastes, odours and blue green algae toxins.

Treatment chemicals	
Alum	Makes impurities bind together so they can be removed in the sedimentation and filtration process.
Polymer	Strengthens the floc particles and keeps them together as they move through the treatment process.
Carbon Dioxide	Lowers pH of the water to help flocculation process without altering the alkalinity.

Post-treatment chemicals	
Chlorine	Disinfects the water before it enters the distribution system to ensure that any disease-causing bacteria, viruses, and parasites are removed.
Soda Ash	Increases the pH level of the water.
Fluoride	Helps reduce incidences of tooth decay.

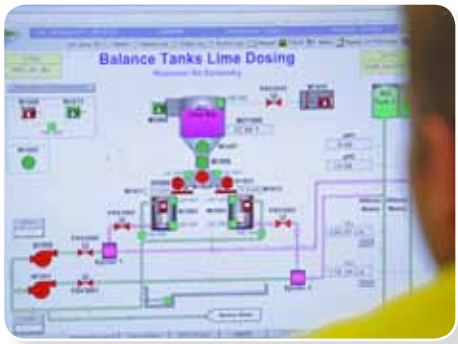
Pre-Treatment

Balance tanks

Water is pumped from Mooney Mooney Dam and Mangrove Creek Weir to the Somersby Balance Tanks for storage and pre-treatment. The pre-treatment process involves Lime and Potassium Permanganate being added to the water.

Lime is added to increase the alkalinity of the water which produces a more stable final product. This helps minimise the risk of pipe corrosion, and taste and odour problems. During times of high manganese levels in the raw water potassium permanganate can be added. The potassium converts soluble manganese to particulate manganese, which is then removed by the flocculation process during treatment.

Following pre-treatment in the balance tanks the water flows by gravity to the treatment plant.



Monitoring Lime Dosing

Balance Tank

Treatment

Inlet Mixers

The inlet mixers include three vertical stirrers that provide rapid mixing of water and treatment chemicals to help impurities in the water bind together.

Liquid aluminium sulphate (alum) and polyelectrolyte (polymer) are added to the rapid mix chamber and stirred vigorously with raw water to separate the clear water from any particles.

Soda ash may be added at this point to increase the pH of the raw water if required. The inlet mixers also allow for dosing of powder activated carbon to remove taste, odours and blue green algae toxins. Chlorine can also be added for secondary oxidation. These mixers ensure the incoming raw water has rapid contact with the treatment process chemicals.

Inlet Mixers

Flocculators

The flocculators are horizontal paddles that provide a gentle stirring of water and chemicals. This causes particulate matter to gather together (coalescence) and produce a large floc that is heavy enough to settle.

Flocculators

Sedimentation Tanks

The water from the flocculator is passed into the large horizontal flow sedimentation tanks. As the flow of water slows, heavy floc particles settle to the bottom of the tanks and become sludge. The settled sludge is scraped into hoppers at the inlet end and is pumped into the sludge storage lagoons.

Sedimentation Tanks

Sludge lagoons

Sludge pumped from the sedimentation tanks is stored in four sludge lagoons, where it settles to the bottom. The lagoons also have a drainage system that allows water to flow through a covering of sand and an underground pipe network to a small pump station that pumps the water to the sewer or the backwash recovery tank. Water evaporation to the atmosphere also occurs. When the drying of the sludge is complete the dried sludge is removed to landfill sites.

Sludge lagoons

Sand Filters

The water then overflows from the sedimentation tanks onto the sand filters. The water flows vertically downwards through graded sand to remove any remaining particles in the water. The particles are trapped in the sand and removed by a backwashing filter.

The backwash filter process follows 3 steps:

1. Draining the filter

2. Air backflow to loosen filtration media

3. Water backflow to flush out the particles - clear water is used to remove any particles trapped in the filters. The resulting dirty water flows to the backwash water recovery tank for re-treating.

Sand Filters

Backwash Water Recovery Tank

Backwash from the sand filters flows to the backwash recovery tank. Water recovered from the sludge lagoons is also returned to the backwash recovery tank for re-treating.

Backwash Water Recovery Tank

Post-treatment

Clear Water Tank

The filtered water is mixed with post-treatment chemicals and then stored in the clear water tank located under the treatment plant building. Soda ash is added to the water to correct the pH of the treated water. The water is also treated with chlorine to remove any biological organisms that can be harmful to humans. Fluoride is added to the water for dental health by helping to reduce the incidences of tooth decay. The clear water tank stores 3.8 million litres of treated water ready to send to the reservoirs.

Chlorine dosing equipment

Fluoride Tank

Reservoirs

Once the water treatment process has been completed the water travels to two reservoirs in Kariong before being sent out to smaller reservoirs across the city or directly to the community. Kariong Reservoir 1 is capable of storing 9.1 million litres of treated water. Kariong Reservoir 2 is capable of storing 50 million litres of treated water.

Reservoir

Monitoring and Testing Water Quality

Somersby Water Treatment Plant has an on-site water testing facility which carries out daily tests on the raw water entering the plant and the treated water leaving the plant.

The raw water entering the plant from Mooney Mooney Dam and Mangrove Creek is tested to monitor a range of physical and biological characteristics that would affect the required chemical dose or a possible change to the source of the raw water.

Testing takes place at different stages of the treatment process to monitor the effectiveness of treatment. To ensure the chemical concentrations in the water remain within optimal parameters, online monitoring takes place 24 hours a day, 7 days a week.

The daily on-site testing ensures the treated water leaving the plant meets the Australian Drinking Water Guidelines. The treated water leaving the plant, as well as the water in the reservoirs and reticulation system, is regularly tested for a range of physical, chemical and biological characteristics.

Routine samples of treated water are collected and analysed in accordance with the *NSW Health Drinking Water Monitoring Program*. Further monitoring for research or specific events is also undertaken as required. All samples are tested by Council and/or independent laboratories registered with the *National Association of Testing Authorities*.

Water Testing Equipment

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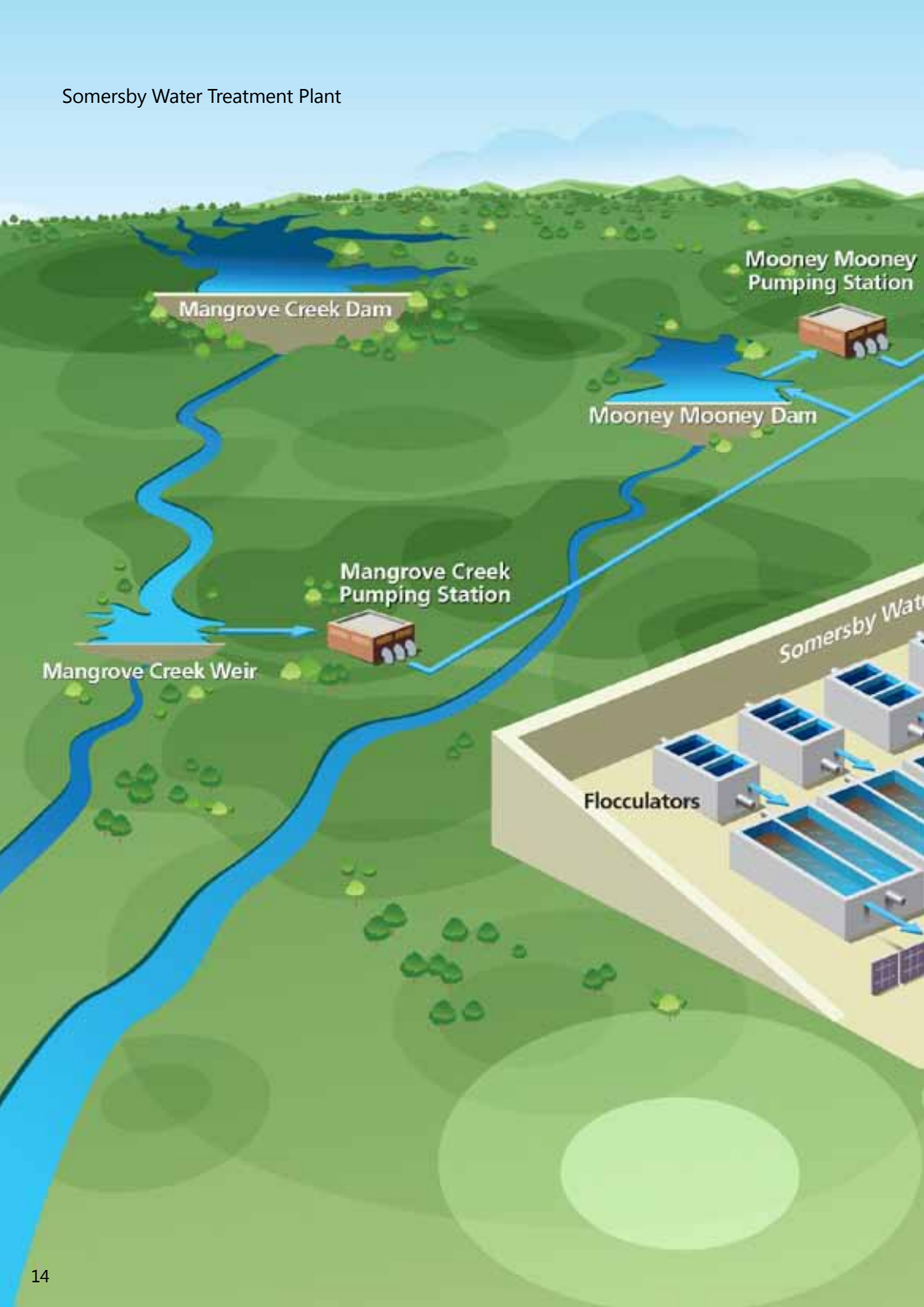

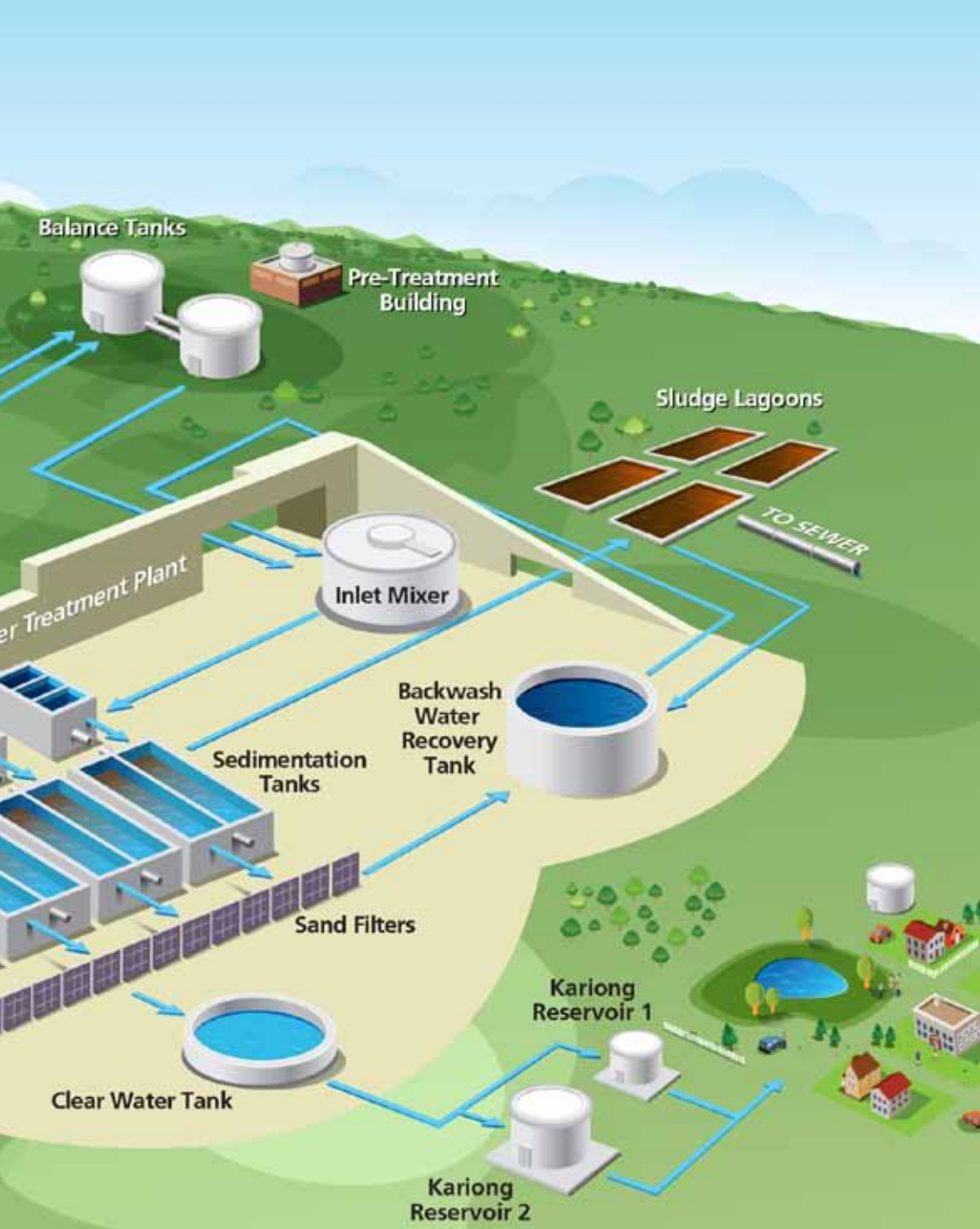
Balance Tanks
Pre-Treatment Building
Sludge Lagoons
TO SEWER
er Treatment Plant
Inlet Mixer
Backwash Water Recovery Tank
Sedimentation Tanks
Sand Filters
Kariong Reservoir 1
Clear Water Tank
Kariong Reservoir 2

GOSFORD CITY COUNCIL

Wyong Shire Council
CENTRAL COAST

For more information
www.gwcwater.nsw.gov.au

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