

Nightcap Water Treatment Plant

Treatment process

Buffering and pH correction

Raw water is pumped from Rocky Creek Dam and/or the Wilsons River into a raw-water mixing chamber at a rate of up to 900 litres per second. This chamber ensures that water from the river cannot siphon back into Rocky Creek Dam. The water is initially dosed with hydrated lime (lime) to raise the alkalinity and hardness, and carbon dioxide (CO₂) to lower the pH. The CO₂ reacts with the lime to form calcium bicarbonate, which buffers the water, making it more resistant to changes in pH and, together with the CO₂, prepares it for coagulation.

Coagulation and flocculation

Coagulants (aluminium chlorohydrate and polyelectrolyte) are added in the flash mixer, which rapidly disperses the chemicals in the water. From here the water passes into six two-stage flocculation tanks. The gentle mixing conditions in these tanks cause the suspended solids (finely dispersed lightweight particles in the raw water, such as clay) to bind together and form heavier clumps, called floc.

Flotation and filtration

Water then flows into six filtration tanks. Millions of micro-bubbles of air cause the floc to float to the surface, forming a sludge that is then skimmed off and recycled through further treatment in the waste system. The water is filtered through deep sand filters to remove any floc that did not float to the surface, as well as the coagulant chemicals that are bound up within the floc. By removing the suspended solids, this process treats many of the contaminants, such as iron, colour and most pathogens.

Primary disinfection

The filtered water is then pumped through the ozone contact tank where primary disinfection occurs. Ozone, a strong oxidant, is manufactured on-site using generators that convert oxygen (O₂) to ozone (O₃). Ozone breaks down any organic material that may be present (such as taste and odour-causing compounds, algal toxins, pesticides and herbicides) into biodegradable compounds. The top of the tank is enclosed and air is extracted from the roof and diverted to an ozone destruction device, preventing excess

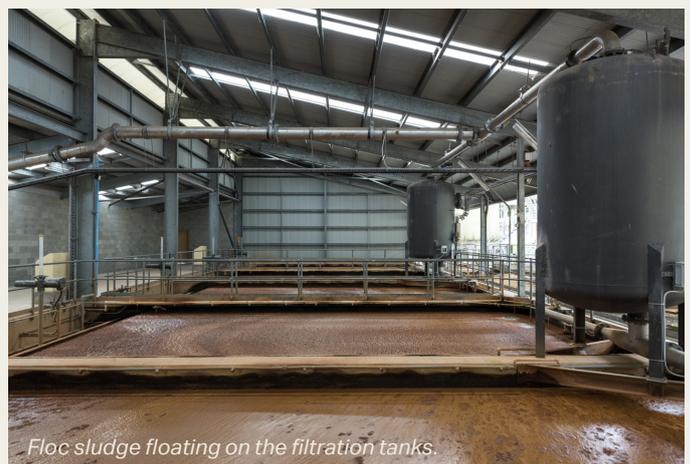
ozone from escaping into the atmosphere. The water is then filtered through a bed of biologically activated carbon, where the microbiological action in the filters consumes and removes the compounds.

Secondary (residual) disinfection and pH correction

The treated water is then dosed with sodium hydroxide to raise the pH to drinking water standards, and sodium hypochlorite (chlorine) to provide protection against disease-causing organisms from the treatment plant to the consumer tap.

Waste water treatment and disposal

The sand filters and activated carbon filters are regularly backwashed to keep them clean. This involves pushing high volumes of water through the filter in the reverse direction to filtration, which expands the filter media and flushes out trapped particles. The waste water from backwashing, as well as the sludge skimmed off the surface of the filtration tank, is sent to the central collection tank for further treatment and reuse. From the collection tank the sludge in the waste water is thickened in a clarifier before passing into a centrifuge. The separated clear water from the clarifier is sent back to the beginning of the plant. The dewatered sludge is then removed for off-site disposal.



Floc sludge floating on the filtration tanks

For further information contact:

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