

A brief History...

of Sewage Treatment in Rotorua



- 1971 Permit to discharge granted for the first treatment plant located on the shores of the Puarenga Stream.
- 1973 Stage I of the Treatment Plant commissioned.
- 1973-80 Ngongotaha and Eastern areas reticulated
- 1975 Stage II commissioned.
- 1978 Stage III commissioned.
- 1979 Chemical phosphorous stripping added.
- 1978-84 Proposal made to discharge via pipeline into the Kaituna River, which was subsequently rejected.
- 1991 Plant upgrade uncluded activated sludge treatment, followed by forest spray irrigation.
- 2005 Methanol dosing commenced; New Laboratory

The Process...

Raw Sewage

Approximately 20,000m³ of raw sewage is treated daily; it enters the plant via 56 pump stations. The sewage network services a population of about 58,000.

Pre Treatment

Screens remove inorganic materials such as plastic, rags etc. Grit and sand particles are removed which may otherwise cause damage to the mechanical equipment during the treatment process.

Primary Treatment

Sedimentation tanks allow the solids to settle to the bottom forming primary sludge, which is pumped to the sludge thickening and fermentation stage. The liquid (primary effluent) is pumped to the secondary treatment stage.

Sludge Thickening and Fermentation

Primary sludge is pumped through a thickening stage and a portion goes through a fermentation process where Volatile Fatty Acids (VFAs) are produced, an important food source for the phosphorous removing bacteria in the secondary treatment stage. The thickened sludge is pumped to a storage tank to await dewatering, and the overflow liquid, containing the VFAs, continues to the secondary treatment stage.

Secondary Treatment

A Biological process, known as the Modified Bardenpho Process, simultaneously removes nitrogen, phosphorus and organic carbon. Methanol and VFAs are added as additional food for the micro-organisms.



Final Clarifiers

Two final clarifiers follow the Bardenpho reactor. Here the activated sludge settles out, and is recycled back through the Bardenpho process. This is called Return Activated Sludge (RAS). The clarified effluent flows to retention ponds where it is stored prior to being pumped through a 3.3km pipeline rising 120m higher to the Whakarewarewa Forest.

Sludge Processing

Dissolved Air Flotation units (DAF's) thicken the Waste Activated Sludge (WAS) by injected air bubbles, lifting the sludge particles to the surface where they are scraped off and flow to a storage tank prior to belt pressing to remove liquid. The liquid from the DAF's and belt press is returned to the Bardenpho system. 35 Tonnes of sludge is either composted or landfilled.

Composting

Sludge is mixed with untreated sawdust and bark fines or shredded green waste and aerated for 21 days at 45 - 55°C to destroy pathogens (harmful bacteria) and seeds. This curing process is followed by 4 weeks in windrows, where it is turned weekly, and where temperatures must reach 50°C. The compost or bio solids is stockpiled for a further 13 weeks, and analysed. Certain criteria have to be met before being available for use. The compost is an excellent source of nutrients and organic matter which will enhance any soil condition to promote healthy plant growth. The compost is cheaper than fertiliser.



Environmental Laboratory

Environmental and treatment monitoring are key components of the wastewater treatment process. This ensures the system is functioning effectively and provides historical data and an early warning of any impending problems.

Land Treatment - Forest Spray Irrigation

About 420 hectares of the Whakarewarewa Forest was made available for spray irrigation. The effluent is pumped from the forest holding ponds which have a capacity of 40,000m³ through 24km of underground pipework and 120km of overground pipes to sprinklers. Planted buffer zones separate the spray areas from roads and public walkways. Clay nutrients in the soil retain phosphorus. Nitrogen is denitrified (converted to gas by bacteria in the soil). No more than 3 Tonnes phosphorus and 30 Tonnes nitrogen per year return to the lake via streams and groundwater.



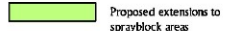
Whakarewarewa Forest Irrigation System

LEGEND

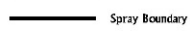
16 Spray block number

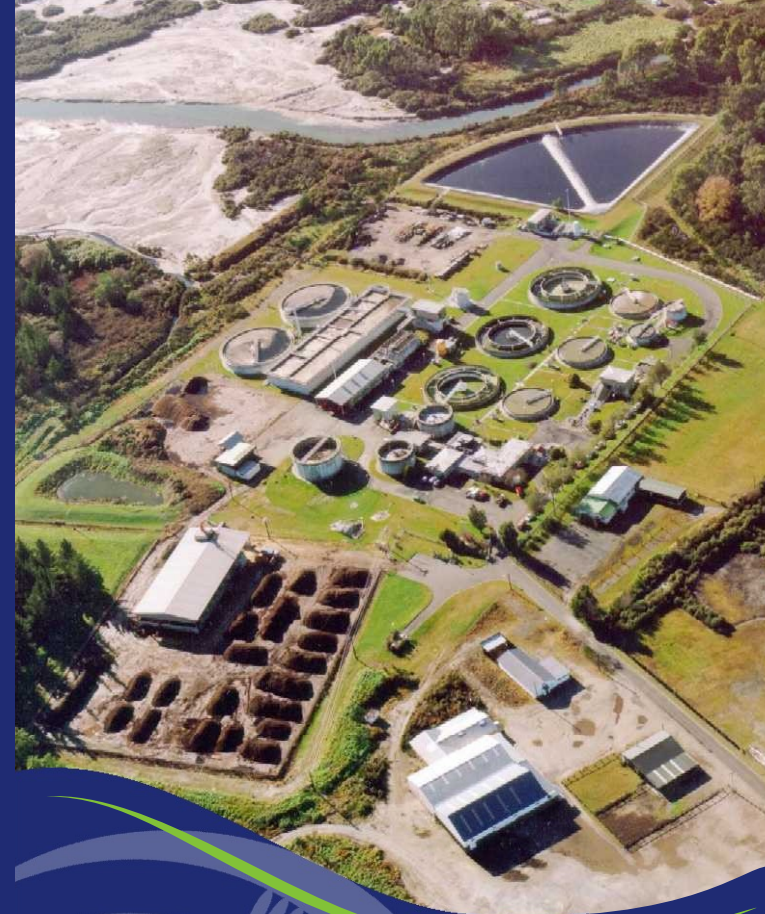
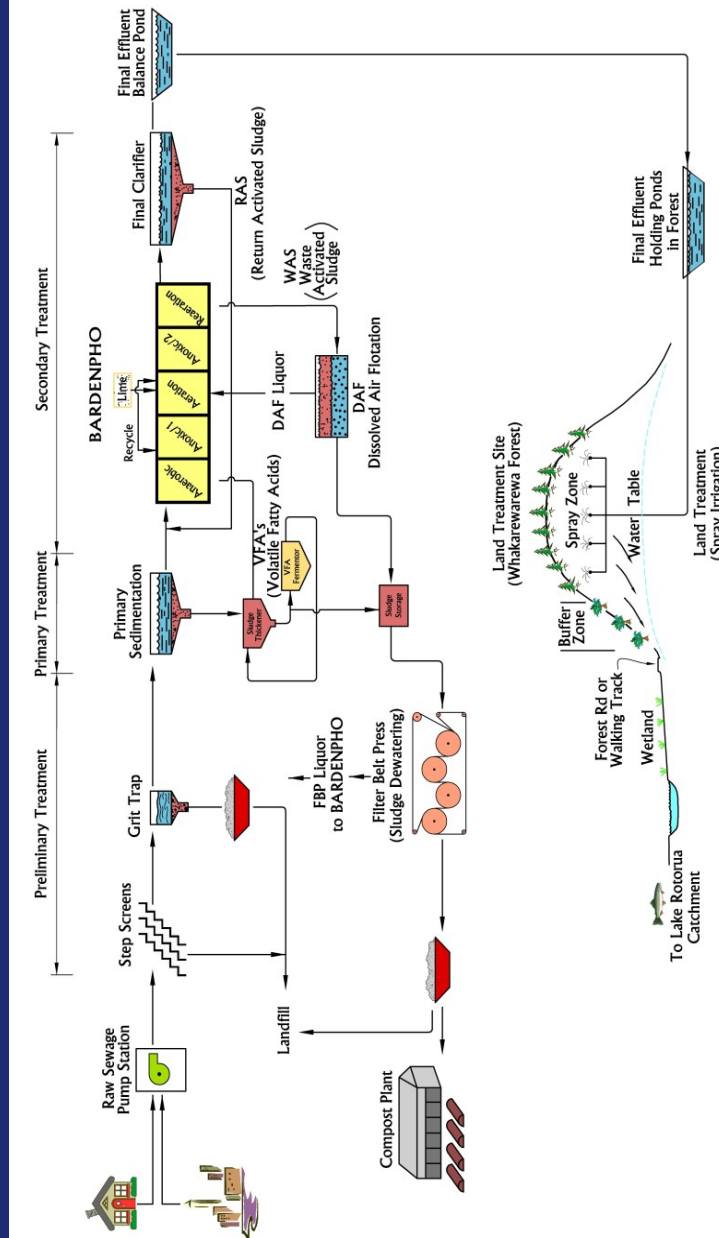
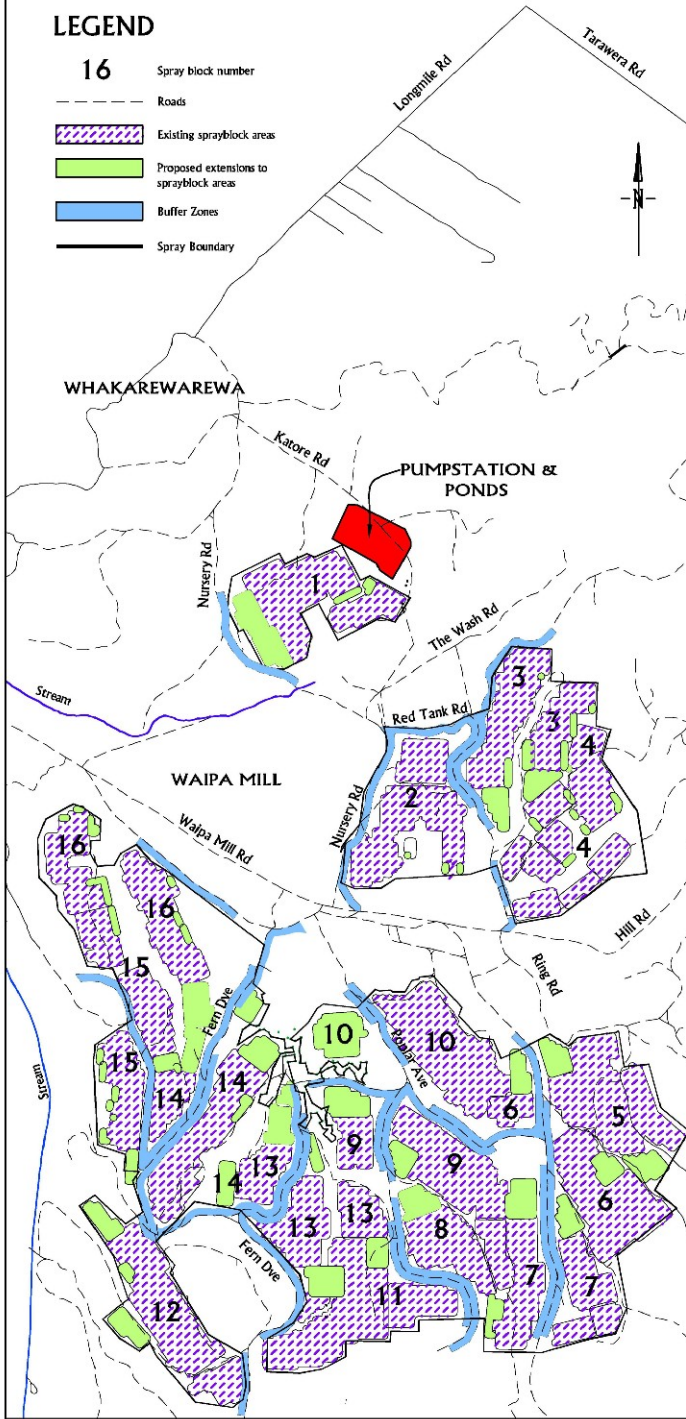
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 Existing sprayblock areas

 Proposed extensions to sprayblock areas

 Buffer Zones

 Spray Boundary



Rotorua
Wastewater Treatment Plant
The Process...

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