# The history of wastewater treatment in Auckland, 1878 to 2005

**Wastewater information sheet 1**

Watercare Services Limited is the water and wastewater service provider for the Auckland region, providing water and wastewater services to around 1.3 million people in the Auckland region. Watercare is wholly owned by the Auckland Council.*

## History

The need for an overall, city-wide reticulated wastewater disposal system was first recognised in 1878 when Auckland's population had reached 30,000.

In those days, the predominant form of wastewater disposal was 'nightsoil' collection – the practice of collecting wastes from individual households – normally carried out in the night by means of a horse drawn 'night cart'. This practice was carried on in some parts of the city well into the 20th century.

As the city became more crowded, nightsoil collection and disposal became increasingly unacceptable. Public concerns grew over smell and the discharge of raw wastewater into local streams and bays around the Waitemata Harbour.

As a result in 1878 the Auckland City Council engaged a visiting hydraulics engineer, William Clark, to report on the city's wastewater disposal options. Clark recommended a reticulated scheme whereby intercepting sewers would terminate at Stanley Street. Here the wastewater would be chemically treated and discharged into the harbour near Parnell. As part of his report, Clark provided an inventory of the sanitary arrangements for Auckland's 3000 houses at that time:

- Water closets 150
- Cemented cesspits 50
- Boxes and pans 1200
- Holes in the ground 500
- No separate lavatory 1000

Clark estimated the new system would cost £35,000, but the onset of an economic depression meant the scheme did not proceed.

In 1888 there was an outbreak of typhoid – a disease associated with poor sanitation. This was particularly prevalent in the crowded working class area of Ponsonby. Medical authorities pointed to defective methods of nightsoil collection, including frequent spilling and the widespread practice of residents spreading nightsoil on their gardens rather than paying for its removal.

At the time, as well as the Auckland City Council there were 19 separate borough councils which administered Auckland and the rapidly expanding suburbs. Most councils tended to dispose of nightsoil and refuse in a neighbouring authority's territory creating an ongoing source of friction.

*[*Prior to November 2010, Watercare was owned by Auckland' s territorial local authorities. As the bulk water and wastewater service provider for the region, Watercare supplied six local network operators which in turn retailed services to consumers.]*

## The Orakei scheme

In 1903, with the city's population now reaching 100,000, recommendations for a reticulated scheme handling both wastewater and stormwater were made by an eminent London engineer, Mr G. Midgley Taylor. In 1908, Taylor's scheme was finally accepted by the Auckland City Council after the intervention of a forceful new city engineer, Walter Bush (designer of the Upper Nihotupu Dam).

Taylor's plan involved a main interceptor flowing eastward from Point Chevalier to Okahu Point where storage tanks would hold the flow of untreated (but screened) wastewater, which would then be discharged through a 300-metre outfall pipe on the high tide. An incinerator to burn the screenings was also part of the scheme.

The costs of the scheme, £355,500 to serve 300,000 people, led to the government forming a body made up of representatives from Auckland City Council and the suburban boroughs to pay for and administer the work. The new authority was called the Auckland and Suburban Drainage Board.

The main outfall works at Orakei were opened by the Board in 1914. The Hobson Bay sewer* pipe was built as part of the original Orakei scheme.

Sewer systems were also developing elsewhere on the isthmus during this period. The first sewers were built in Newmarket in 1880, in Mt Albert in 1901, in One Tree Hill in 1913 and in Ellerslie and Mt Eden in 1915. Systems discharging raw wastewater into the Manukau were built in Onehunga and Otahuhu (1910), Mt Roskill (1925) and New Lynn (1928).

But while the new Orakei system proved to be an efficient way of disposing of wastewater, it soon became obvious that the shores and waters around Orakei were becoming polluted with the sheer volume of wastewater being pumped into the sea. Furthermore, it was equally clear that the system would reach design capacity earlier than estimated.

*[*The Hobson Bay sewer pipe was replaced by Watercare in 2010 by a three-kilometre-long tunnel that connects to a pump station in the Orakei Domain. The wastewater is piped to and treated at the Mangere Wastewater Treatment Plant.]*

Wastewater storage tanks under construction at Orakei in 1911 – today Kelly Tarlton's Undersea World uses this area as display tanks.



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Construction workers in the first section of tunnel between Okahu Bay and Hobson Bay, 1910.

## The Browns Island scheme

In 1931, Drainage Board chief engineer HH Watkins recommended that the Orakei outfall be abandoned and replaced with a new treatment works and outfall on Browns (or Motukorea) Island in the inner Hauraki Gulf. The scheme included a pumping station, sedimentation tanks and sludge drying beds on the island, with facilities for conveying wet sludge for disposal into the sea.

The idea met with some opposition, notably from the Tamaki Yacht Club and residents of the nearby marine suburbs of Tamaki and Waiheke Island.

After some delay caused by World War II, in 1944 the Board (reconstituted as the Auckland Metropolitan Drainage Board) resolved to go ahead with the Browns Island scheme. Thus began one of the most protracted and bitter disputes in the history of local government in Auckland – and the rise of one of Auckland's most famous personalities, Dove-Myer Robinson.

In 1945, public opposition to the Browns Island scheme crystallised in the formation of the Suburban Drainage League which was soon headed by Dove-Myer Robinson. In leading the public opposition to the Browns Island scheme, 'Robbie' as he was popularly known, began a notable career in public life. He was eventually to become a city councillor, Chairman of the Auckland Metropolitan Drainage Board, Mayor of Auckland (for a record six terms) and the founding Chairman of the Auckland Regional Authority.

Drainage League agitation resulted in petitions to Parliament in 1945 and 1946. In 1948, the Minister of Health intervened and in 1949 a Royal Commission was set up to investigate the Browns Island scheme and report on alternatives. It was Robinson who first advocated an oxidation pond treatment system at Mangere.

The long-running controversy ended in mid-1954 after Robinson, who had been elected chairman of the Drainage Board in 1953, commissioned a panel of international experts to investigate the Browns Island scheme and to recommend an alternative.

Almost a year after initial construction work on the pipeline had began, the Browns Island scheme was officially terminated and replaced by an alternative scheme which was to be located on the Mangere shoreline by Puketutu Island in the Manukau Harbour.

The Mangere proposal entailed a far more comprehensive treatment system including primary, secondary and tertiary treatment using oxidation ponds built over the intertidal seabed. In an immense city-wide civil engineering effort which lasted nearly 10 years, the new treatment plant and oxidation ponds were built along with many kilometres of new interceptors, sewers and numerous pumping stations to serve the new plant.

By 1950 pollution in the upper Manukau Harbour had become a significant problem. Some 18 trade waste sewers discharged untreated waste into the harbour along the northern coast alone, together with untreated urban wastewater effluent at several points and additional effluent from process operations. These discharges to the Mangere inlet resulted in severe ecological damage.

In 1956, immediately prior to the construction of Mangere treatment plant, 25 million litres of trade waste and 675,000 litres of untreated wastewater were being discharged daily into the Mangere Inlet.

The international panel convened by the Drainage Board in 1954 reported that beaches from French Bay and probably Titirangi Bay to the Mangere Inlet were heavily polluted owing mainly to wastewater outfalls. In 1955, a Noxious Fumes Inquiry identified that pollution of the Manukau and its impacts on the harbour mud flats was the source of 'dangerous' fumes in the Mangere Inlet. These were severe enough to 'blacken the paint work of neighbouring houses'.

## The Manukau scheme

The Mangere treatment plant, then called the Manukau Sewage Purification Works (MSPW), was opened in September 1960. It cost the equivalent of $30.3 million. Its oxidation pond system covered over 500 hectares – the biggest of its kind in the world. The old Orakei outfall was finally abandoned – many years later its holding tanks were to become a notable Auckland tourist attraction, the Kelly Tarlton aquarium.

Manukau Sewage Purification Works (MSPW) opened in 1960.

The new MSPW was designed to serve a population of 500,000 and process all the domestic and industrial wastewater of Auckland over a 40 kilometre radius.

As well as saving the Waitemata and Hauraki Gulf from pollution, the building of the MSPW also significantly reduced the pollution of the Manukau. The putrefying mud flats of the upper Manukau were gradually rehabilitated and fish began returning as the harbour water quality improved.

Compared to the wastewater treatment processes in use in Auckland up to that time, MSPW's oxidation ponds were a great step forward. Though at times difficult to manage, oxidation ponds were an effective natural means of treatment and disinfection. Simply speaking, oxidation ponds break down effluent using sunlight, fresh air and bacteria. Sunlight on microscopic algae in the water stimulates photosynthesis, which in turn produces oxygen encouraging the growth of useful bacteria. The bacteria break down the wastewater and in turn provide carbon dioxide for the oxygen producing algae.

From the start, however, periodic odours and insects generated by the ponds caused problems for residents living in close proximity.

Soon after the original design capacity of the Mangere plant was reached in 1972, a programme of extensions to meet future population growth (up to 750,000 people) got underway. These extensions were completed in 1980.

An aerial view of the the Mangere Wastewater Treatment Plant and the oxidation ponds, 1995.

## Drive to upgrade facilities and improve water quality

In 1987 the Auckland Regional Authority ((ARA) then owner of the Mangere plant) initiated the Auckland Area Sewerage Study in response to Waitangi Tribunal recommendations. The review by the ARA, reconstituted as the Auckland Regional Council (ARC) in 1989, acknowledged the widespread public aspirations for improved water quality in the Manukau Harbour on the one hand, and the need for upgraded and expanded wastewater treatment facilities for Auckland on the other. Its findings recommended retaining the existing plant at Mangere but adding a piped outfall to the Tasman Sea, with an initial discharge point in the Papakura Channel in the Manukau Harbour.

The Tasman Sea outfall was formerly adopted by the ARC in August 1990. This decision was not without public controversy. This controversy resulted in political changes which in turn, in December 1991, led the ARC to vote to rescind its earlier decision and instead reconsider options for substantially higher levels of treatment.

The trade waste review of 1990-1991 played a significant role in influencing effective outcomes for wastewater treatment. It changed the focus from system management and revenue generation to limiting the discharge of contaminants to the receiving environment. The collaborative approach of the review was used as best practice for consultation in the wider wastewater 2000 review of the plant and resulted in constructive relationships between the environmental and industry groups.

In 1992 Watercare Services Ltd was formed as a Local Authority Trading Enterprise and assumed ownership of the Manukau Sewage Purification Works, formally renaming it the 'Mangere Wastewater Treatment Plant'.

With a growing public awareness, as well as a need to future-proof the facility to handle population growth for coming decades, Watercare initiated a community consultation process. The public consensus which emerged supported the upgrading of the existing treatment plant and the replacement of the oxidation ponds with a more reliable, new technology, land-based treatment system.

Work on upgrading the Mangere plant, began in July 1998.

## Mangere Wastewater Treatment Plant upgrade

Between 1998 and 2005, Watercare carried out the biggest environmental restoration programme to be undertaken in New Zealand. The upgrade of the Mangere plant involved:

- an intensive public consultation and consenting process
- constructing a land-based plant that uses world-leading treatment technology
- removing 500 hectares of oxidation ponds and restoring 13 kilometres of coastline.

At $450 million, the upgrade represented Auckland's largest infrastructure investment in a generation. The upgrade had progressively transformed the old plant into a totally new-generation facility, while providing an uninterrupted wastewater treatment service.

The Mangere Wastewater Treatment Plant uses primary (mechanical), secondary (biological) and tertiary (filtration and ultraviolet radiation) methods to treat wastewater, and has the capacity to cater for Auckland's growing population for approximately 30 years.

The technology – which delivered a 10,000-fold reduction in pathogens in the treated wastewater discharged into the harbour – allowed for the 500 hectares of oxidation ponds to be returned to the Manukau Harbour, as well as the restoration of 13 kilometres of shoreline.

The revamped plant reduced the wastewater treatment cycle from 21 days to 13 hours.

Present day, an aerial view of the Mangere Wastewater Treatment Plant site and the harbour foreshore.

## Conserving our environment

With the restoration of the coastline came the development of the Watercare Coastal Walkway which explores the Mangere Ihumatao foreshore, stretching seven kilometres from Ambury Park to the Otuataua Stonefields.

The restored beaches have once again become home to thousands of migratory wading birds that come to feed in the harbour, such as the eastern bar-tailed godwit and lesser known birds which travel from Serbia and Alaska to feed and rest on purpose built bird roosts.

Restored coastline and beaches, home to migratory birds.

## Working with tangata whenua

From the beginning Watercare has recognised the importance of the interests of local Maori and their relationship to their traditional tidal fishing grounds in the Manukau Harbour and Oruarangi Creek estuary.

The breaching of the oxidation ponds as well as the work around Oruarangi Creek were particularly significant, with the sea welcomed back by tribal elders in a special ceremony and blessing.

Watercare acknowledges that the construction of the original plant in the 1950s, while being a significant advance for the development of the Auckland region, was achieved at costs to the interest of local Maori who lost their ancestral fishing grounds in the process.

Today the people of Makaurau marae are enjoying the changes to the harbour, and once again utilising their ancestral fishing grounds.

The sea welcomed back into the restored Oruarangi Creek.

An overview of Watercare's Mangere Wastewater Treatment Plant.

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