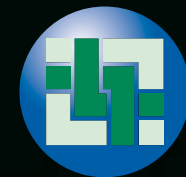
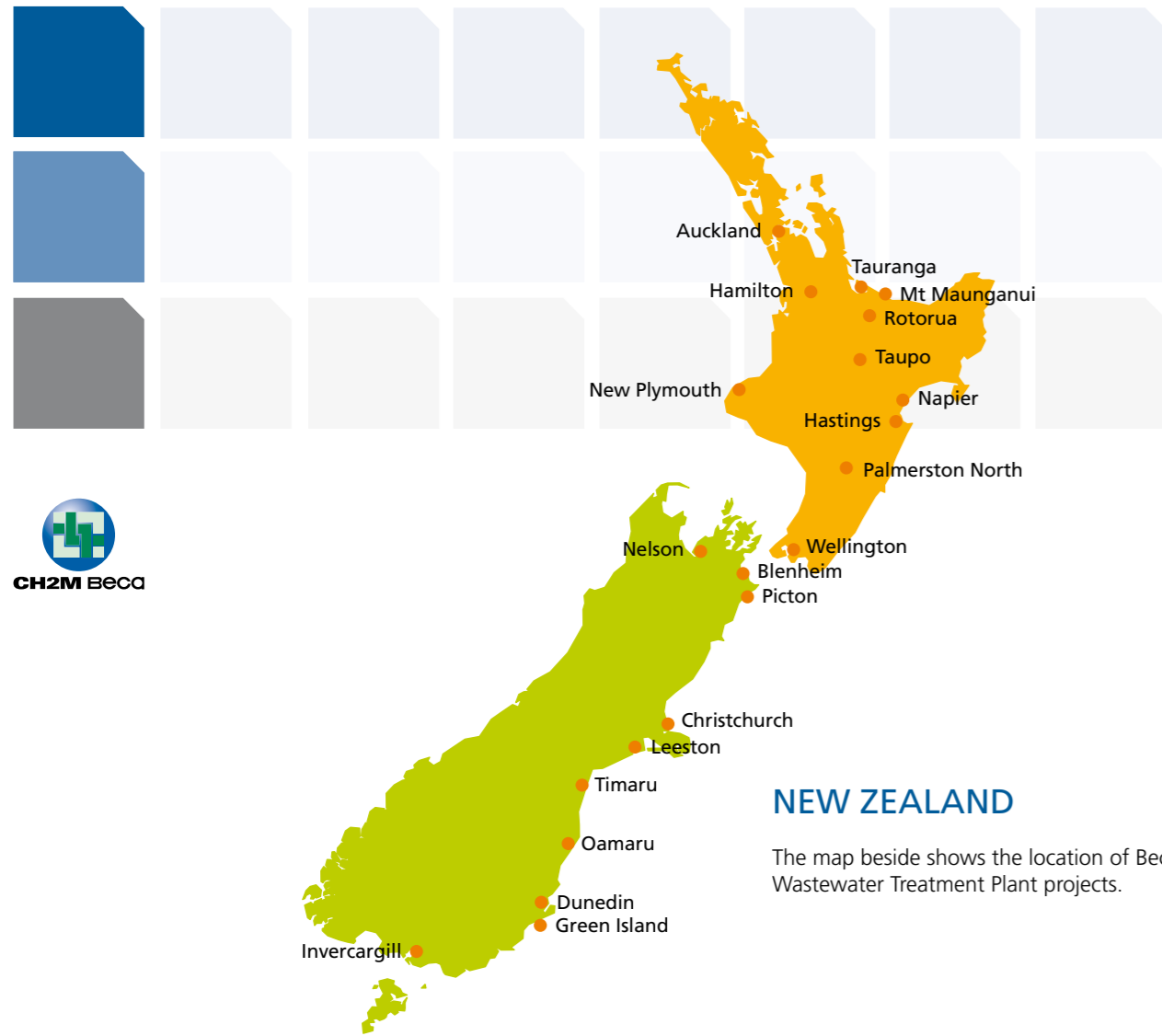




# A Legacy of New Zealand Wastewater Treatment Plants



**CH2M BE&K**



## INTRODUCTION

The current Beca wastewater team in New Zealand has an unbroken lineage stretching back over almost 45 years, proudly tracing its roots to predecessors who were the fathers of modern wastewater and environmental engineering in New Zealand. Leicester Steven, John Fitzmaurice (as Steven and Fitzmaurice) and Martin Ferner (in Beca Carter Hollings & Ferner) pioneered new wastewater technologies throughout New Zealand from the early 1960's. Succeeding originally as separate companies, the two firms merged in 1989 to form "Beca Steven" to create a specialist water and wastewater group within the larger Beca organisation. As larger and more complex treatment plants were won and delivered by Beca Steven to clients throughout the country, overseas expertise was brought in from a number of eminent international consultants, culminating in 1998 with the formation of an equal joint venture between CH2M HILL and Beca – "CH2M Beca" was born.

This publication is an illustration of the proven experience, technical skills, reliable project management and innovation which Beca and its predecessor companies – referred to for simplicity as "Beca" – has brought to so many New Zealand wastewater clients through the last four decades, and which we continue to provide both now and into the future.

It is also a tribute to our people and the trust and confidence they inspire that so many clients over the years have retained Beca as their strategic advisors, design engineers and project managers on an on-going basis.

A Legacy of New Zealand Wastewater Treatment Plants

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## SUMMARY TABLE OF SERVICES PROVIDED

Project Name	Client Adviser/ Project Manager	Conventional Contract	DB(O) Contract	Preliminary/ Primary Treatment	Biological Treatment	Advanced Treatment/BNR	UV Disinfection or Filtration	Membrane Technology	Process Plant Upgrading	Odour Control	Sludge Treatment	Construction Management	Pond System
Rosedale WWTP (Stage 2) (North Shore)	Orange	Green	Blue	Orange	Green	Blue	Orange		Blue		Green	Blue	
Mangere WWTP (Project Manukau)			Blue	Orange		Blue	Orange		Blue	Orange	Green	Blue	
Hamilton WWTP (Puketapu Project)	Orange	Green		Orange		Blue			Blue	Orange	Green	Blue	
Waihi Beach WWTP (WBOP DC)			Blue	Orange	Green				Blue	Orange	Green	Blue	
Thames Coromandel Eastern Seaboards WWTPs (Tender Design)			Blue	Orange	Green	Blue		Green	Blue	Orange	Green	Blue	
Chapel Street WWTP (Tauranga)	Orange	Green		Orange	Green				Blue	Orange	Green	Blue	
Te Maunga WWTP (Tauranga)			Blue	Orange	Green				Blue	Orange	Green	Blue	
New Plymouth Carrousel Plant		Green		Orange	Green				Blue	Orange	Green	Blue	
New Plymouth Sludge Drying			Blue	Orange					Blue	Orange	Green	Blue	
Napier Milliscreening Plant		Green		Orange					Blue	Orange	Green	Blue	
Hastings Milliscreening Plant		Green		Orange					Blue	Orange	Green	Blue	
Whakapapa WWTP (Ruapehu DC)		Green		Orange	Green				Blue	Orange	Green	Blue	Orange
Project Takitini (Ohakea Airbase)				Orange					Blue	Orange	Green	Blue	
Paraparaumu WWTP Upgrade			Blue	Orange		Blue	Orange	Green	Blue	Orange	Green	Blue	
Porirua WWTP		Green		Orange	Green				Blue	Orange	Green	Blue	
Hutt Wastewater Scheme			Blue	Orange	Green		Orange		Blue	Orange	Green	Blue	
Wellington Wastewater Scheme	Orange		Blue	Orange	Green	Blue	Orange		Blue	Orange	Green	Blue	
Blenheim WWTP	Orange	Green		Orange	Green				Blue	Orange	Green	Blue	Orange
Picton WWTP	Orange	Green		Orange	Green	Blue	Orange		Blue	Orange	Green	Blue	
Christchurch WWTP Expansion				Orange	Green				Blue	Orange	Green	Blue	
Leeston Ponds		Green		Orange	Green				Blue	Orange	Green	Blue	Orange
Timaru WWTP				Orange	Green				Blue	Orange	Green	Blue	
Oamaru Wastewater Scheme		Green		Orange	Green				Blue	Orange	Green	Blue	Orange
Green Island WWTP		Green		Orange	Green		Orange		Blue	Orange	Green	Blue	
Invercargill WWTP (Upgrade)	Orange	Green		Orange	Green				Blue	Orange	Green	Blue	



A Legacy of New Zealand Wastewater Treatment Plants

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## PUKETE WASTEWATER TREATMENT PLANT

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## PUKETE WASTEWATER TREATMENT PLANT

Beca was first involved with Hamilton's wastewater in the 1970s when we were responsible for investigating, designing and building the city's original treatment plant in Pukete Road, commissioned in 1976. This was a primary treatment plant with an innovative disinfection system using sodium hypochlorite produced through the electrolysis of brine. Discharge was to the Waikato River through a multi-port outfall that was physically modelled by Beca and the Canterbury Engineering School.

We maintained our historical linkage with Hamilton when Beca was commissioned in 1998 to carry out the concept and detailed design of a secondary treatment upgrade for the 130,000 PE Pukete WWTP. New discharge consents required seasonal nitrogen removal, better BOD and suspended solids removal and a higher level of disinfection with a change from chlorination to UV treatment.

Staging of the upgrade was required to meet council budget constraints and to recognise the relatively short 9-year term of the new consent granted for the plant. We developed a long-term masterplan for the site to confirm locations of future expansion and upgraded process units. Our masterplan allows for expanding the new denitrifying activated sludge process with an additional parallel train and ultimately providing additional tertiary treatment if the discharge consent is tightened in the future. The design included new inlet fine screens, interstage pumping, secondary activated sludge treatment, circular clarifiers, UV disinfection, sludge thickening, thermo/mesophilic digestion and dewatering.

Beca's design included several groundbreaking features, which provided better value and efficiency to Hamilton City Council. Acid/gas phased digestion was an innovation in Australasia and provided greater process efficiency with reduced process retention times, resulting in a smaller capital outlay than with



conventional digestion. It also allowed a third digester to be postponed to a later stage of plant development. A second innovative feature of this project was the installation of blended digester biogas and natural gas 1.5MW cogeneration units, which was a first for New Zealand. With these units, the WWTP was able to meet process heating requirements, site power demand and export excess power to the grid.

In addition, the use of large diameter flat bottomed circular clarifiers with suction scrapers due to the difficult ground conditions resulted in significant construction saving costs. Beca was actively involved in the construction monitoring, process commissioning and staff training for the WWTP.



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## GREEN ISLAND WASTEWATER TREATMENT PLANT

The Green Island WWTP, located in Dunedin, is capable of treating 60,000 PE of industrial load and 15,000 domestic population. Treatment was upgraded in 1999/2000 from millisscreening to biological secondary treatment with UV disinfection, prior to discharge from an extended ocean outfall. Two activated sludge processes in series can cope with weekend swings from high strength to standard loadings producing a very good effluent quality, mean values BOD 40 g/m<sup>3</sup> and SS 30 g/m<sup>3</sup>, from a high strength influent.

With the design of this plant, Beca pioneered the use of thermophilic/mesophilic anaerobic digestion (55°C/35°C) in Australasia. This sludge treatment process has resulted in greater process stability and solids reduction than conventional digestion. Digested sludge is dewatered using centrifuges and cake is carted to the nearby Green Island landfill for co-disposal.

All processes, including aeration tanks and clarifiers, are covered and ventilated to a bark biofilter for very effective odour control. The plant is highly automated and requires minimal staffing despite the full range of processes installed on the site.



Beca was invited by Dunedin City Council to form a team with in-house City Consultants, to deliver this project. Beca provided the technical design services for process, mechanical, civil, structural and odour control aspects, with City Consultants providing project management and contract administration services with some technical design inputs. This teaming arrangement proved to be very successful and DCC has continued to the present, to engage Beca services on a sole source basis for strategic advice on wastewater treatment and ocean outfall dispersion issues.

In addition Beca secured the client advisor role through a competitive bid process for the \$25 million ocean outfall project being constructed at present by McConnell Dowell under a Design-Build contract.



## HUTT VALLEY WASTEWATER TREATMENT PLANT

Beca was originally involved with treating Hutt City's wastewater in the late 1970's when we undertook pilot trial millisscreening of the raw sewage which was discharged from the Hutt Valley through a short outfall into Cook Strait at Pencarrow Heads. We continued with our client Hutt Valley Drainage Board to design and then construct what was a world first, large-scale use of fine screens (0.5 and 1mm Contra Shear millisscreens) on raw sewage. The large volumes of screenings removed from the raw sewage were dewatered and taken to landfill. This project was the first of many similar millisscreening plants added to existing raw sewage outfalls around New Zealand, most of which were projects undertaken by Beca.

This form of "primary" treatment served Hutt City very well until the late 1990s when new consents required an upgrade from millisscreening to secondary treatment. This significant upgrade was commissioned as a design, build and operate project with Beca acting as the overall process and civil designers. Beca is an equity partner in Hutt Valley Wastewater Services (HVWS), the operators of the whole Hutt wastewater system for the 20 year operating period. The existing fine screening plant and effluent pump station was upgraded with new primary sedimentation, contact stabilisation activated sludge, sludge thickening, sludge dewatering and thermal sludge drying processes.

Ground conditions were poor at the Seaview site, with significant seismic liquefaction concerns, so comprehensive ground improvement works were designed by Beca geotechnical experts. The site hydraulics were extremely tight given the set levels of the existing screening plant and outfall pumping stations, but our designers were able to save capital and operating expenditure costs for the city by eliminating the need for an interstage pumping station. Furthermore, Beca's innovative designers

incorporated the rotating drum sludge dryer, which had only been used once before in New Zealand. The site is in a highly built up industrial area with a very limited buffer zone so most processes were covered and ventilated to a bark biofilter for odour control. We continue to have an ongoing role with this plant, advising HVWS on improving the operational efficiency of the plant and designing minor expansion and upgrading works.



## PROJECT MANUKAU, WATERCARE SERVICES LTD

Since the mid-1980s, Beca has had an ongoing role in investigations, planning, design and implementation of wastewater treatment for the greater Auckland urban area. The Mangere WWTP lies at the heart of this network and we have been closely involved in the upgrading of this facility since engagement by Watercare in 1993 to be the lead consultant advisors for "Wastewater 2000." This project ran for five years and resulted in a masterplan for a major transformation of the old plant into a 21st century facility.

Through Wastewater 2000, resource consents to construct the new plant (Project Manukau) were granted by the Auckland Regional Council in March 1998. The consents set stringent conditions and required Watercare to produce nine separate management plans ranging from construction activities to the management of the wading bird roosts.

CH2M Beca continued to be involved in the implementation of this major undertaking through "Project Manukau." Watercare selected an international consortium, known as Manukau Wastewater Services, of which we were an equity partner, to deliver the upgrade through a design build contract.

Project Manukau progressively transformed the old Mangere Wastewater Treatment Plant into a completely new facility, while providing uninterrupted wastewater treatment service. During the five year project, the secondary and tertiary processes were replaced with new technology and other areas of the plant were either replaced or comprehensively upgraded. The new technology means the treatment cycle for wastewater was reduced from 21 days to 13 hours.

Nine reactor/clarifiers make up the new secondary treatment process. Each circular unit (77 metres in diameter) consists of an outer reactor section and an inner clarifier with a capacity to hold 31.3 million litres of effluent. Each individual unit is capable of managing the wastewater treatment requirements of a small provincial city or the equivalent of 200,000 people.

During the final treatment stage, wastewater is disinfected using ultraviolet (UV) light. The UV disinfection plant, at the time the largest in the world, contains the very latest technology designed to achieve, in conjunction with the secondary treatment (BNR), a 10,000 times reduction in viruses in the treated wastewater discharged into the harbour. This averages about 300,000 cubic metres per day – a flow greater than that of the Wairoa River in the



Hunua Ranges – in effect making it Auckland's biggest river.

The dismantling of the oxidation ponds was one of the most visual aspects of Project Manukau. Before the sea could be allowed to flow back in, however, the ponds had to undergo a massive cleanup. The removal of over 40 years of accumulated sludge from the pond floors and the processing and disposing of the pond sludge presented a major technical challenge. Approximately 3.5 million cubic metres of sludge was dredged and disposed of, and more than 500 hectares of oxidation ponds and sludge lagoons and 13 kilometres of coastline have been returned to a natural harbour environment. This was the biggest coastal restoration effort ever attempted in New Zealand.

## CONTINUED...

The Mangere/Ihumatao foreshore is significant in both its natural features and cultural history. The surrounding area is dominated by the geologically significant ancient volcanoes of Mangere Mountain, Puketutu Island and the Mangere Lagoon. As a historic site of continuous Maori settlement, the area is also very important to Tangata Whenua. For centuries, tribes lived along the Manukau's shores, harvesting the riches of its fisheries, shellfish and bird life. These are all returning to the area as are opportunities for swimming, fishing and seafood gathering.

Project Manukau was the largest infrastructure project undertaken in New Zealand for many years. Its execution on a design build project required total integration between the Beca design team and the contractors. The design team comprised engineers from Beca, New Zealand's largest privately owned professional engineering consultancy with specialist input from CH2M Hill, the leading environmental engineering consultancy in the United States.

Over the duration of the project, around 200,000 hours of engineering design were expended not including those by contractors and suppliers. Further engineering design was involved in the \$60m trade contracts.

Beca was involved in every aspect of engineering from geotechnical through civil, structural, hydraulics, process, electrical, mechanical and numerous other disciplines. The completed project is an impressive example of 21st century engineering.



## NAPIER WASTEWATER TREATMENT PLANT

Since 1970, Beca has been advising Napier City almost continuously on its domestic sewage and industrial wastewater management. Almost 40 years ago, we recommended that the historical shoreline discharge of raw sewage at "Perfume Point" to the north of the city be discontinued and that the sewerage system be completely reconfigured to collect and pump all wastewater from Latham Street pumping station through a new trunk rising main to a comminutor plant and new 1.6km long ocean outfall at Awatato south of the city. The design and implementation of the new system was undertaken by Beca and commissioned in 1972.

Almost 20 years later in 1989, Beca was again involved in the upgrading of the city's wastewater system through the design and construction of a new milliscreening (0.75mm aperture) plant and outfall pumping station capable of treating the entire Napier City wastestreams – up to 1400 L/s. Commissioned in 1991, this milliscreening plant was the fourth large milliscreening facility – prior to an ocean outfall – designed and constructed by Beca following the Hutt, Timaru and New Plymouth projects.

In 1996, recognising that the city needed a long-term wastewater plan, Council commissioned Beca to prepare the "Napier Wastewater Strategy", which involved an Issues and Options Study and extensive consultation with the public, industry and iwi through three Liaison Groups established specifically for this study. In 1999 Beca prepared the AEE and consent applications that proposed a separation of major industrial and domestic wastestreams, with separate treatment strategies for each following Council adoption of the consensus recommendations from the Liaison Groups. Staged consents through to 2025 were

finally granted in late 2003, reflecting the city's preferred long-term strategy with the anticipation that Council would consider upgrading to secondary biological treatment by mid-2025.

Advanced Primary Treatment (APT) with UV disinfection was planned for the domestic and non-separable industrial wastestreams and pilot trials were undertaken by Council with Beca assistance on both APT and on composting of the resultant primary sludge.

The APT was intended to be operational by the end of 2007, but after reconsideration of the two-stage treatment strategy – that is, APT followed by secon-

dary treatment – Council has decided to seek new consents on the basis of moving straight to secondary biological treatment of the domestic and non-separated industry wastestreams. Beca has once again been retained by Council to undertake the necessary technical investigations for the new AEE and to manage a 12 month pilot trial of Biological Trickling Filters (BTF) treating milliscreened wastewater. Council, with assistance from Beca, is proceeding to implement the separation of major industrial wastes from the domestic sewage flows to reduce the design flows and loads on the future biological plant.



## TIMARU WASTEWATER TREATMENT PLANT

Timaru is yet another long-standing wastewater client for Beca, with our continuous 25-year involvement in the city's wastewater system since the early 1980s. Beca was commissioned by Timaru District Council to investigate options for upgrading the historical discharge of raw domestic sewage and industrial wastes through a short beach outfall at Washdyke to the north of the city. The scheme that was eventually adopted, and for which Beca gained pre-RMA consents (until December 2010), was to milliscreen (0.5mm aperture) the total city wastestream in a new treatment plant north of Washdyke and to discharge the primary treated effluent through a new 600m long ocean outfall some 2 km north of the current discharge site.

The new scheme comprising over 4km of major trunk sewers, a new terminal pumping station (1400L/s), milliscreening plant and ocean outfall – then worth about \$14M – was designed and constructed by Beca and commissioned in 1987.

In 1997, anticipating that the treatment plant would need to be upgraded to gain new consents under the RMA, Council requested Beca to prepare a long-term wastewater strategy for the city, with a primary consideration being how to successfully manage the treatment and disposal of the large and very strong trade waste flows, which completely dominate the domestic flows and loads.

After extensive consultation and technical investigations, we identified for Council a preferred way forward, comprising separation and staged upgraded treatment of the industrial and domestic wastewater streams with continued discharge through the outfall. An AEE and consent applications have been prepared for the Stage 1 works (domestic stream treatment upgrade) and, as the city awaits the outcome of this approvals process, Beca continues to assist Council as it moves to implement the next major stage of development for Timaru's wastewater scheme.

As part of the upgrade strategy, Beca has also provided advice on the upgrading of the Geraldine, Pleasant Point and Temuka WWTPs. These flows are currently linked through 40kms of pipeline to the outfall, but will be diverted through new wetlands, as part of the Stage 1 upgrade of the Timaru WWTP.



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CHRISTCHURCH WASTEWATER TREATMENT PLANT

## CHRISTCHURCH WASTEWATER TREATMENT PLANT

Beca has a long history of advising and designing upgrades to the Christchurch WWTP, from the 1977/1978 upgrade to the current Biosolids Drying Project, for which we are acting as the client advisors. CH2M Beca was the designer for the 1977/1978 upgrade to large 52m diameter plastic media trickling filters.

Subsequently we were the designers for the 1999/2003 upgrading to Trickle Filter/Solids Contact Process, which was staged to allow the plant to keep operating during the construction phases. The project involved converting the existing rectangular sedimentation tanks to aeration tanks and four new circular secondary clarifiers (49m diameter with flat floors and suction arm removal of sludge).

Furthermore, Beca staff have been the designers for four additional anaerobic digesters from 1997 to present, including two 7,000 m<sup>3</sup> thermophilic digesters currently under construction. We are



currently acting as client advisor for the Biosolids Drying project, which will use landfill gas in a belt dryer to produce pellets for reuse or intermediate landfill cover.

Other projects designed by Beca for Christchurch Wastewater Treatment Plant since 2000 include: conversion of the oxidation pond configuration from two parallel trains each with three ponds-in-series to a seven ponds-in-series flow path which produced faecal coliform results that meet contact

recreation requirements; updating of odour control strategy and implementation of odour mitigation works with further ventilation of foul air to bark biofilters.

Over the years we have proven ourselves as capable and innovative in the field of wastewater treatment plant design and construction such that Christchurch City Council is confident in our ability to deliver innovative and cost-effective projects.





# BLENHHEIM SEWAGE TREATMENT PLANT

## BLENHHEIM SEWAGE TREATMENT PLANT

Continuing a longstanding relationship with Marlborough District Council, Beca has recently been advising them on an upgrade to the Blenheim Sewage Treatment Plant. This relationship dates back to 1968, when Beca first advised MDC on the Blenheim STP.

In recent years, New Zealand wines, and particularly Marlborough wines, have experienced a huge growth in popularity worldwide and local wineries are increasing their processing capacity by 15% per year. To accommodate this growing market, Marlborough District Council needed to upgrade the BSTP that handles the wastewater from the centralised wineries south-east of Blenheim.

Prior to 2002, the Blenheim STP consisted of a number of treatment ponds used to treat domestic wastewater from Blenheim and industrial flows from Canterbury Meat Packers and the Riverlands Industrial Estate. In 2003/04, mainly during the wine vintage, the domestic treatment ponds were overloaded in terms of oxygen demand and their performance deteriorated.

The key influence on industrial load at the Blenheim STP over the next 5 years will be winery production. Total grape crush in the Riverlands Industrial Estate is forecast to increase in BOD loading from 6,250 to 9,600 kg per day (or 120,000 population equivalent). This is substantial in comparison with the connected domestic population of 28,000.

Beca considered aerobic or anaerobic pond upgrades for treatment of the industrial flows, preferring the aerobic option. The aerobic option offered significantly lower capital cost and NPV cost compared to anaerobic treatment. It fully utilises existing basins and presented a relatively simple operation. The

aerobic ponds requires less operator input and have a lower risk of operational problems, especially during the rapid startup when grape crushing commences.

The close working relationship established over many years between Beca and MDC staff contributed to a quick response from MDC in relation to the increasing industrial loads from the wineries.



## PICTON SEWAGE TREATMENT PLANT

Marlborough District's other major population centre and treatment plant is at Picton and Beca has also been involved in upgrading wastewater management for this community.

Until late 1999, raw sewage from the Picton Sewage Treatment Plant was discharged into Queen Charlotte Sound at Kaipupu Point (the headland adjacent to the Ferry Terminal). After investigations revealed future discharge to land wasn't practicable, Marlborough District Council proposed a secondary treatment plant with UV disinfection which would discharge at the same location.

The preferred site for the new secondary plant was at the head of the valley, home to the town's 'refuse tip', with construction costs estimated at \$4.4 million (1999). Construction comprised inlet screening, extended aeration activated sludge process, final clarifier and UV disinfection. The extended aeration

process has coped well with sudden increases in visitor numbers during holiday periods, plus high flows due to inflow/infiltration during wet weather.

Sludges from wastewater treatment plants often create nuisance and high costs for treatment and disposal, however at the Picton plant simple, sustainable natural processes – with the main energy coming from solar and air-drying – enable the Council to produce biosolids with no chemical dosing, minimal offensive odours and little non-renewable energy input.

Waste activated sludge is fed to two 5000 m<sup>3</sup> sludge lagoons for stabilisation by anaerobic digestion at ambient temperatures. The surface layer in the lagoons is rich in algae that produce oxygen. The oxygenated surface layer treats potentially odorous gases emitted from the digestion processes in the lower zone. A 2.2 kW brush aerator is installed in

each lagoon to provide extra oxygen when required and to avoid stratification.

The lagoons are operated to an annual cycle, alternately filled with waste solids each year, then rested for a few months before being drained. Stabilised solids are either pumped (at about 5% DS) or removed by excavator (at about 10% DS) to two drying basins formed in the adjoining borrow pit. After drying by solar and air processes to at least 50% DS, the biosolids are then transferred to stockpiles on the adjoining closed landfill. Storage for at least one year further dries the product and reduces pathogen content so that the biosolids are available for use in council landscaping projects.

Beca provided full services for the Picton plant, from site selection and AEE reports, to full design drawings and tender documentation and then construction monitoring.



## NEW PLYMOUTH WASTEWATER TREATMENT PLANT

Prior to 1984 all New Plymouth's sewage was discharged from a large holding tunnel at Te Henui through a shoreline outfall. Beca was commissioned by New Plymouth District Council in 1965 to investigate options for improving this system. The scheme that was finally recommended was a new terminal pumping station at Te Henui to convey the total wastestream to a new milliscreening plant and long ocean outfall on the east side of the Waiwakaiho River.

Although this scheme was less costly than alternatives and was environmentally acceptable, there was some strong political opposition to it which resulted in a change in Council leadership at the next Council elections. The new Council reconsidered the long outfall and decided to add a secondary treatment stage – including hypochlorite disinfection – to the proposed milliscreening stage, enabling the long outfall to be shortened to 500m. The consequent cost savings of the shortened outfall went towards the increased cost of the biological plant. Beca worked with the city to gain consents for the modified scheme in 1980.

Beca was retained by Council as their designers and project managers for the revised scheme. The main biological process was procured through a "design / build" process – a first for New Zealand wastewater industry – with a Carrousel extended aeration process chosen through the international tendering process. We were responsible for the design of the Te Henui pumping station, the new rising main under the Waiwakaiho River, all the ancillary unit processes and site works around the core biological tankage and the ocean outfall.

The Carrousel plant was commissioned in 1984 and has consistently achieved one of the highest quality

effluents for a municipal treatment plant in the country.

Since then, Beca has continued to work with Council to enhance and expand the New Plymouth plant, assisting with:

- Installation of new belt filterpress sludge dewatering facilities as a precursor to thermal drying of the waste sludge – the original drum thickener had limited capacity to dewater the extended aeration sludges (not an uncommon problem elsewhere).
- Construction of the first large-scale rotary sludge drying facility in New Zealand through another design-build contract – which now produces a marketable biosolid product under the trade name BioBoost.
- Construction of a third clarifier to enable wastewater from other communities within NPDC but outside the city limits to be conveyed to this plant for treatment – clarification was the limiting factor in the original plant's capacity to accept these wastestreams.



## INVERCARGILL WASTEWATER TREATMENT PLANT

Beca was the designer for the original primary sedimentation and sludge digestion plant in 1970 and all upgrading stages since then. These have included a third digester in 1983, two trickling filters with random plastic media and a secondary clarifier in 1990. In 2003, we designed and added maturation ponds and wetlands for improved disinfection of the discharge, which is to the Oreiti/Waihopai River Estuary.



In order to treat high strength wool scour and meat plant wastewaters, two aerated basins were added in 2006. In 2007, additional aeration, tanker reception storage and secondary sludge thickening were designed so that higher than agreed tradewaste loads could be handled.



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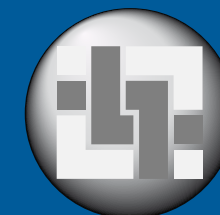
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