

Chester Consultants Ltd

EOI for Mangawhai Hills Development - Wastewater Management

January 2023

safe
: water
by
design ::

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COVER LETTER

Apex Water Limited (Apex) is pleased to submit an Expression of Interest (EOI) to Chester Consultants Limited for wastewater management services for the proposed Mangawhai Hills development.

Apex brings a high level of technical expertise and experience with design and build projects, and offer you and your client:

- A team experienced in the consenting of on-site wastewater treatment and disposal systems for private developments.
- The knowledge that we are experienced in the design, build and commissioning of water and wastewater treatment plants for local authority and industrial clients.
- A highly experienced project team who have designed, delivered and commissioned similar plants into operational treatment facilities across New Zealand.

Our response covers the information requested in your EOI dated 23 November 2022.

We look forward to the opportunity of partnering with you on this development.

1 COMPANY PROFILE AND CAPABILITY

1.1 Company Profile

Item	Detail
Full Legal Name:	Apex Water Limited
Trading Name (if Different):	Apex Water
Physical Address:	19 Sophia Street, Timaru 7910
Postal Address:	P.O. Box 893, Timaru 7940
Registered Office:	100C Orchard Road, Harewood, Christchurch
Business Website:	https://www.apexwater.co.nz
Type of Entity (Legal Status):	Limited liability company
NZBN Number:	Company number 5744692 NZBN 9429041844243
Country of Residence:	New Zealand
GST Registration Number	117-298-256
Name of parent company:	City Care Limited
Consortium or joint venture:	N/A
Type of business:	Design and construction of water and wastewater treatment plants for municipal and food & beverage clients. Provision of operational and maintenance support to treatment plant owners. Supply of products and consultancy services to water and wastewater clients.
Year established:	2009

1.2 Point of Contact

Item	Detail
Contact Person:	Steve Kroening
Position:	Commercial Manager/Director
Phone Number:	(03) 929 2675
Mobile Number:	027 663 1986
Email Address:	steve@apexwater.co.nz

1.3 Capability

Apex is highly capable in the design, construction and commissioning of turnkey water and wastewater treatment projects up to \$20M in value. Apex staff undertakes the following activities:

- Obtaining resource consents for discharge to land or into water, and discharge to air (if required)
- Process and mechanical design
- Project and site management
- Plumbing and mechanical installation (project-dependent)
- Procurement of all equipment and materials
- Commissioning, operator training and provision of as-built information
- Ongoing support, as required

The following activities are subcontracted to consultants or contractors:

- Civil, structural and electrical design
- Earthworks and civil works
- Mechanical installation
- Electrical installation and automation

Apex's project experience covers municipal applications, including private developments, as well as the food and beverage sector, including wine and dairy.

Our capability statement is provided at the end of this response

2 PROJECT REFERENCES

2.1 Track Record

The following references include recently-completed municipal projects, as well as on-site systems for developers and small communities.

Year	Project Details	Details
In progress	Name: Karaka Village Location: Karaka	Consenting, full design, construction, commissioning and operation of water and wastewater treatment plants for a new subdivision. Wastewater irrigated to land or discharged to water depending on environmental conditions.
2021	Name: Watercare Location: Meremere	250m ³ /day MBR upgrade to an existing oxidation pond. Scope included assistance with obtaining resource consents to discharge to the Waikato River, iwi liaison, full design, construction and commissioning. Approximately one third of the existing pond was reclaimed to allow the new plant to be built. Treatment levels are BOD 10mg/L, total suspended solids (TSS) 5mg/L, <i>E. coli</i> 10CFU/100mL, total nitrogen (TN) 6mg/L and total phosphorus (TP) 3mg/L.
2021	Name: Cardrona Valley WWTP Location: Cardrona Valley	700m ³ /day SBR wastewater treatment plant on a greenfield site to service the existing town, Cardrona Alpine Resort and a new commercial/residential development. Scope included full design, construction and commissioning of the new plant, including plant room and amenities, below-ground tanks, sludge dewatering plant and the land treatment area.

Year	Project Details	Details
2020	Name: Watercare Location: Clarks Beach	250m ³ /day MBR upgrade to existing treatment plant. Scope included design, fabrication, installation and commissioning of a containerized treatment plant to increase the capacity and performance of an existing treatment plant. Treatment levels are BOD 5mg/L, TSS 5mg/L, Coliforms 10CFU/100mL, total inorganic nitrogen (TIN) 5mg/L and ammonia (NH ₄ -N) 1mg/L.
2018	Name: Watercare Location: Owhanake	125m ³ /day MBR upgrade to existing treatment plant. Scope included design, fabrication, installation and commissioning of a containerized treatment plant to increase the capacity and performance of an existing treatment plant. Treatment levels are BOD 5mg/L, TSS 5mg/L, NH ₄ -N 1mg/L, TN 10mg/L, TP 1mg/L and <i>E. coli</i> 50CFU/100mL.
2018	Name: Watercare Location: Warkworth	250m ³ /day MBR upgrade to existing treatment plant. Scope included design, fabrication, installation and commissioning of a containerized treatment plant to increase the capacity and performance of an existing treatment plant. Treatment levels are BOD 2mg/L, TSS 2mg/L, Coliforms 5CFU/100mL, TIN 3mg/L and NH ₄ -N 1mg/L.
2016	Name: Southland District Council Location: Curio Bay	30m ³ /day MBR, expandable to 60m ³ /day and future proofed to 120m ³ /day. Scope included assistance with obtaining resource consents to discharge to water, full design, construction and commissioning. Maintenance and operational assistance has been provided since project completion. Treatment levels are BOD 5mg/L, TSS 5mg/L, TN 5mg/L and <i>E. coli</i> 2MPN/100mL.

Year	Project Details	Details
2013	<p>Name: Department of Conservation</p> <p>Location: Papatowai</p>	<p>13m³/day MBR installed at the DOC camping ground.</p> <p>Scope included assistance with obtaining resource consents to discharge to water, full design, construction and commissioning. Maintenance and operational assistance has been provided since project completion.</p> <p>Treatment levels are BOD 15mg/L, TSS 10mg/L, TN 25mg/L, NH₄-N 5mg/L and <i>E. coli</i> 10CFU/100mL</p>



Watercare Meremere MBR wastewater treatment plant upgrade

Mangawhai Hills Development – Wastewater Management

Expression of Interest | Apex Water



Cardrona Valley SBR wastewater treatment plant



Clarks Beach MBR wastewater treatment plant upgrade

Mangawhai Hills Development – Wastewater Management

Expression of Interest | Apex Water



Curio Bay MBR wastewater treatment plant



Owhanake MBR wastewater treatment plant upgrade

Our capability statement is provided at the end of this response

2.2 Referees

Referee 1

Organisation Name: Queenstown Lakes District Council

Contact Name: Simon Mason

Telephone: 0276 431 913

Email: simon.mason@qldc.govt.nz

Referee 2

Organisation Name: Watercare

Contact Name: Peter Crabb

Telephone: 022 043 1191

Email: peter.crabb@water.co.nz

3 KEY STAFF AND ORGANISATIONAL STRUCTURE

3.1 Key Staff

The following key staff have been nominated for this project should we be selected as your partner. CVs are provided at the end of our response.

Andrew Paton – Contractor’s Representative and Project Director

Andrew is Apex’s General Manager, based in Auckland. He is an experienced project manager, having delivered water and wastewater projects both within New Zealand and overseas. He holds a Bachelor of Engineering (Chemical and Materials).

His most recent project at Apex was delivery of the Meremere wastewater treatment plant upgrade for Watercare in the Waikato Region.

Hugues Boisvert – Project Manager

Hugues holds a BEng in Civil Engineering and CPEng. He is a project engineer with varied experience in the delivery of infrastructure projects in water treatment and reticulation. He has worked on the design and construction of water treatment systems of various scales across the municipal and industrial sectors and also has experience in network operations and managing water infrastructure works. He brings skills in mechanical design, technical draughting and modelling.

Thomas Board – Principal Process Engineer

Thomas is a Chartered Professional Engineer (CPEng, CMEngNZ and CEng[UK]), Fellow of the Institute of Chemical Engineers (FIChemE), holds a Bachelor of Engineering with Honours (Chemical), and has 25 years’ professional experience in the delivery of water and wastewater infrastructure. His experience is split between project management and design of treatment plants, working as both a consultant, water supplier and a contractor. Thomas has designed and delivered over a dozen small to medium sized water treatment plants in New Zealand and Australia.

Paul Peng – Project Engineer

Paul is a project engineer at Apex and has various experience delivering projects in the water treatment sector. He has previously worked on the design and construction of water treatment systems of various scales and has a broad set of

skills, including mechanical design, technical draughting, modelling and project management.

He worked as the project engineer and site manager for the Seddon water treatment plant project for the Marlborough District Council, a 700m³/day membrane plant that included pre-treatment and a full CIP kitchen. His scope of works included design and development of the plant, quality control, procurement, health and safety management and commissioning.

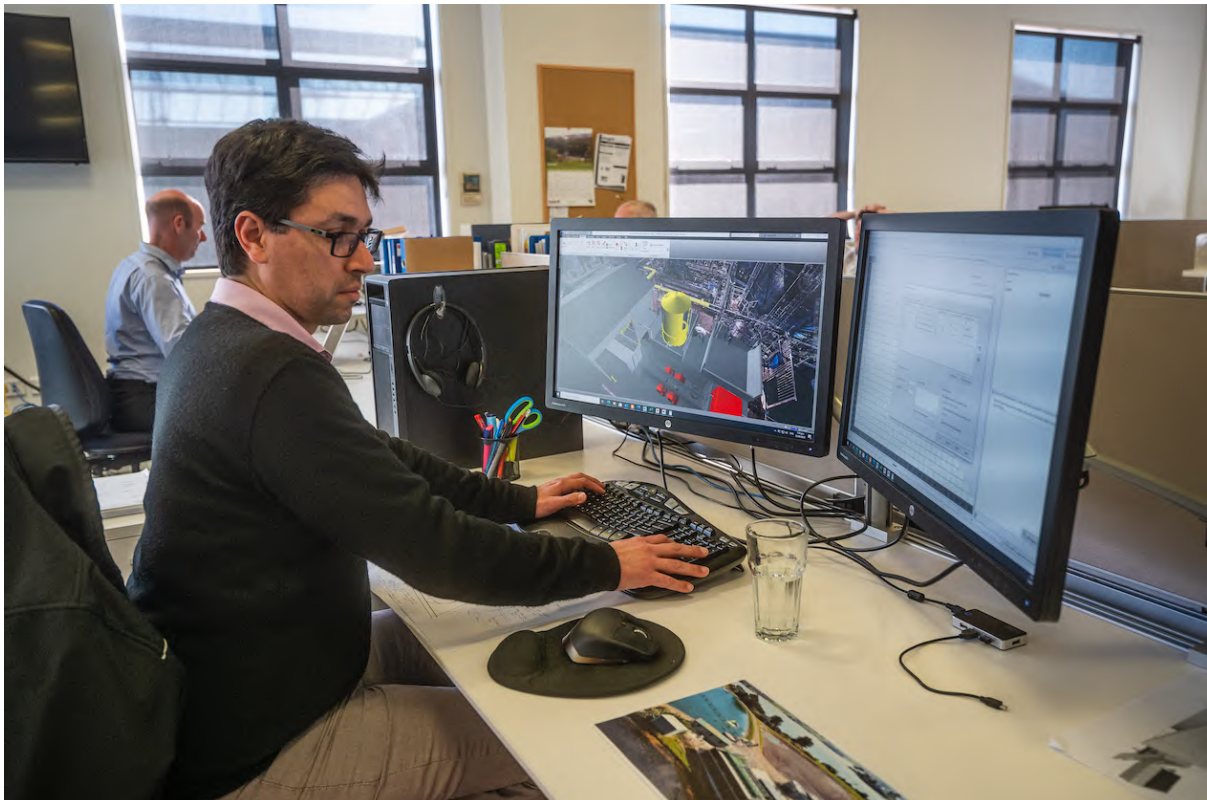
Paul holds a B. Eng Technology (Mechanical).

Anna Dolan – Project Engineer

Anna holds a BEng in Chemical and Materials Engineering. She is a process engineer with skills in wastewater design, technical report writing and technical draughting. Her software skills include Microsoft Office AutoCAD LT, ApsenTech HYSYS, VMG – Symmetry, Matlab, HTML and Javascript. At Epsom Girls Grammar School she was Deputy Head Prefect and was awarded the Pasifika Outstanding Achievement Award for Academic Excellence (top Pasifika student at Level 3).

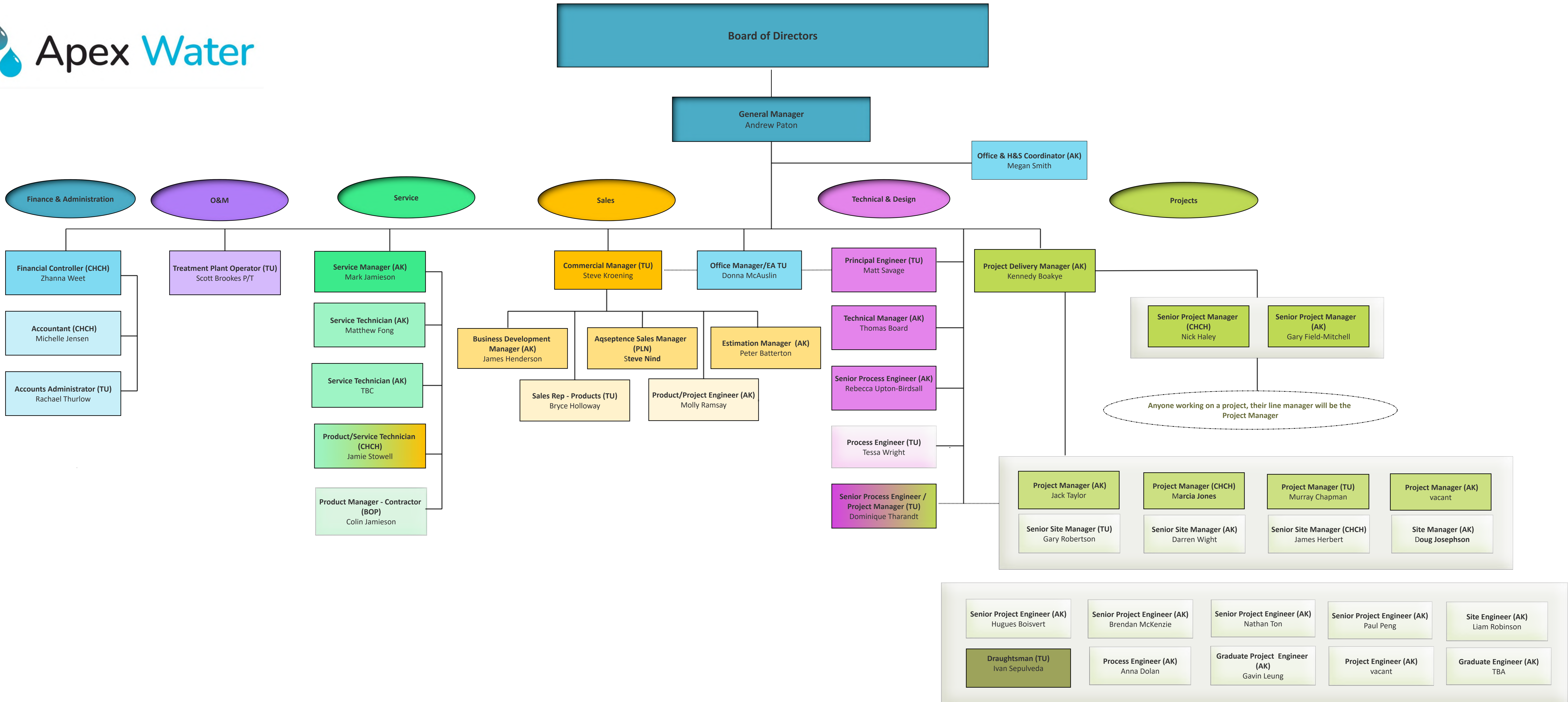
Darren Wight – Site Manager

Darren is an experienced site manager who has worked in the water, wastewater, industrial, food and dairy industries. With skills in staff management, planning, health and safety, maintenance, installation and building relationships, Darren ensures work sites run smoothly, safely and efficiently.



3.2 Organisational Structure

Our company organisational structure is provided overleaf.



4 DESIGN APPROACH AND METHODOLOGY

4.1 Treatment Technology

Design Specification

The EOI provides the following basis of design for the proposed 450-500 house subdivision at Mangawhai Hills:

- 3 people per house at 180L/person/day
- 50 new lots per year
- 5mg/L cBOD₅
- 5mg/L TSS
- 10mg/L TN
- 5mg/L TP
- 100CFU/100mL *E. coli*

Irrigation of treated water will be to the area outlined in the figure below.



Our Design Assumptions

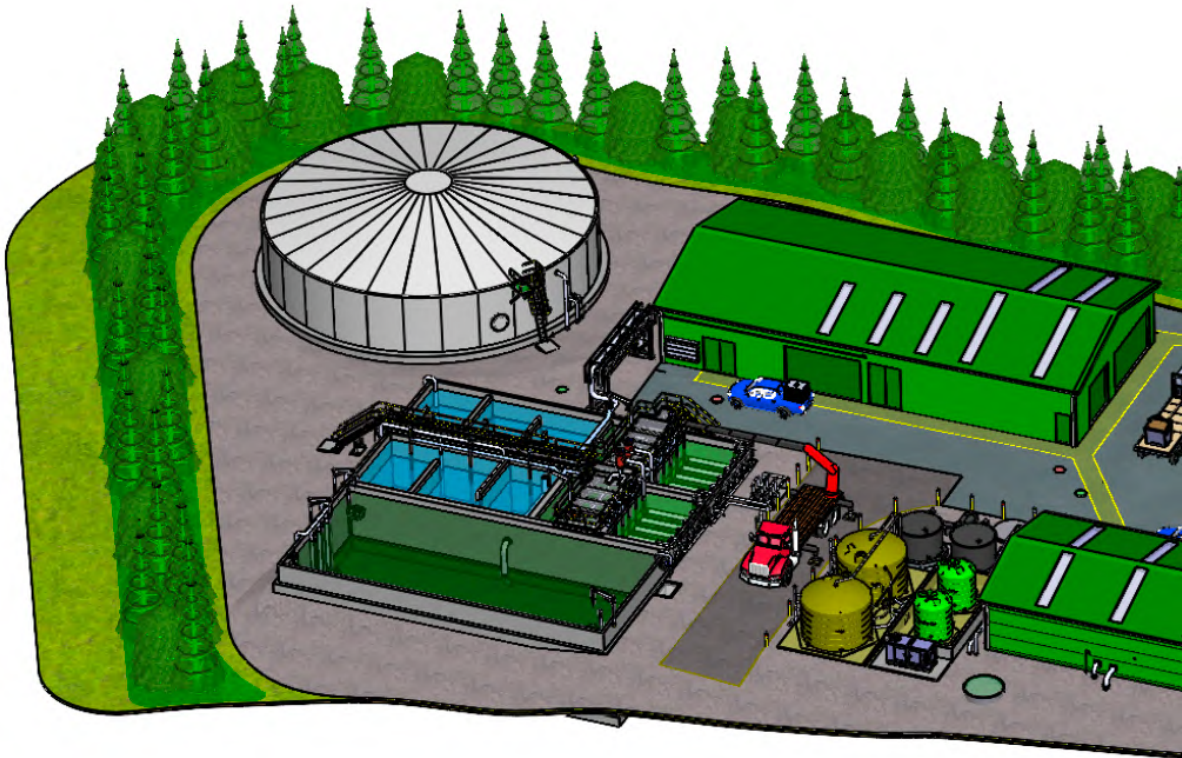
Apex has based the expected raw quality of the wastewater used in the design on national guidance document GD06 and similar small villages in the North Island, such as Clarks Beach.

Influent Concentration	Guidance Document GD06		Clarks Beach	
	Raw Wastewater	Greywater	Median	95 th %ile
Flow (m ³ /day)			1,250	1,250
COD (mg/L)			550	1,100
COD filtered (mg/L)			200	332
BOD (mg/L)	250-350	180-240	270	420
TSS (mg/L)	300-400	130-160		
TKN (mg/L)			65	94
NH ₄ -N (mg/L)			48	65
NH ₃ (mg/L)	Varies			
NO ₃ (mg/L)	<1			
TN (mg/L)	Varies			
PO ₄ (mg/L)	10-30			
TP (mg/L)			10	13
Faecal coliforms (CFU/100mL)	10 ⁸ -10 ¹⁰			

The level of treatment specified in this EOI is in keeping with recent consents issued for residential developments of similar size and will therefore not only minimise the real environmental impact of the development but also significantly increase the probability of discharge consent being awarded. Apex has completed a range of

wastewater treatment plants in recent years that meet these treatment objectives – refer to Section 2.1 above.

In addition to these recent projects, Apex is currently in the process of designing and building a wastewater treatment plant for Karaka Village North, a new development of up to 1,200 houses just south of Auckland.



Design Objectives

The overarching design objective is to make the proposed development as environmentally sustainable as practicable. In considering the various wastewater design parameters, Apex has sought to ensure that the objective is met by selecting a wastewater system that performs to the highest performance standard in terms of level and consistency of treatment under intermittent loading, varying temperature conditions and general reliability.

This suggests a holistic approach to the design of the sewer system, treatment plant, and the disposal and reuse system to ensure that the wellbeing of land, groundwater and nearby surface water is protected in addition to meeting the essential needs of people. These considerations should include:

- Collecting rainwater from properties for on-site reuse to lessen demand on groundwater take.
- Adoption of a low-pressure sewer design to minimise the volume of sewage needing to be treated and disposed of by eliminating ingress of rain and

groundwater into the sewer network. This also breaks the traditional link between peak sewage volumes needing to be disposed of at the same time as soil moisture is highest (both due to rainfall), which is a common obstacle to maximising the amount of land application able to be used for disposal or reuse.

- Treating the water to the highest extent practicable by using a membrane bioreactor with additional disinfection stages to enable beneficial reuse of the wastewater for irrigation and native revegetation projects.
- Adopting a land based wastewater disposal approach.

Depending on the specific application and receiving environment, we design and build a wide range of wastewater treatment plants including the following treatment processes:

- Submerged Aerated Filters
- Activated sludge
- Sequencing Batch Bioreactors (SBR)
- Textile trickling filters
- Membrane Bioreactors (MBR)
- Moving Bed Bioreactors (MBBR)
- Milli-screening plants
- Micro- and ultra-filtration
- Physio-chemical treatment
- Dissolved Air Flotation (DAF)

The common feature of all the plants shown in Section 2.1 above, which are all designed to treat water to a level equivalent or higher standard of that specified for this project, is that they are all MBR plants.

MBR

An MBR system is a combination of the activated sludge process (a wastewater treatment process characterised by a suspended growth of biomass) with a micro- or ultra-filtration system that rejects particles above 0.1-0.4micron in size (which is smaller than an individual bacteria). MBRs have two basic configurations: (1) an integrated configuration that uses membranes immersed in the bioreactor, and (2) a recirculating configuration where the mixed liquor circulates through a membrane module situated outside the bioreactor.

The key benefits of MBR technology for this application include:

- Reliably high level of treatment achieved
- Compact process
- Good at handling seasonal loads
- Good at treating high strength wastewater
- Physical barrier prevents bacteria entering the treated water

- Ideal for use on a system where low-pressure sewer minimises or eliminates high volume peak wet weather flow events

The disadvantages of MBR systems are that, while the membranes provide a physical barrier to solids and bacteria entering the discharge, they also provide a physical limit as to the total flow that the plant can handle so on systems with large peak flows (generally due to rainwater infiltration into the sewer network) mitigation measures such as additional membranes or balance tank volume need to be employed to handle peak flows. In a low pressure sewer system, smart sewer IOT controls can be used to utilise the wastewater storage volume in the pump station already installed at each house to provide this balancing of incoming flow volumes.

Most new sewage treatment plants in the Auckland area, including those that discharge direct to surface water and land discharge systems as proposed for this development, are MBRs. These include systems in Pukekohe, Meremere, Warkworth, Clarks Beach and Waiheke Island. In the Waiheke Island application, the wastewater was unusually strong with peaks ten times as strong as typical sewage. Despite this, the system is able to produce treated water with <10mg/L total nitrogen, <2mg/L BOD, <1mg/L total suspended solids and <1CFU/100mL *E. coli*.

The use of a membrane filter on the discharge of the MBR plant essentially ensures that the treated water has close to zero residual solids and that almost all bacteria are removed from the discharge. While a traditional sewage treatment plant that relies on gravity settling (like activated sludge or SBR) will still have high concentrations of bacteria such as *E. coli*, it is not uncommon for an MBR to have undetectable levels of bacteria in the discharge (e.g. <1CFU/100mL). From a practical perspective and to allow for any minor leaks or damage to membranes, MBRs are often designed to achieve a treated water quality of <5 *E. coli*/100mL.

The MBR proposed produces treated water treated equivalent to Grade A recycled water suitable for dual reticulation for domestic garden use and unrestricted municipal irrigation.

4.2 Staging of the System

The proposed system has been designed specifically to be installed in two stages. Breaking up the system into more than two stages requires reducing individual tank sizes, which disproportionately increases the overall installed cost.

Stage 1 is designed to treat up to 150m³/day and includes:

- The full size headworks screen
- Two 20,000L anoxic tanks
- One 20,000L aeration tank
- One 40,000L membrane tank
- Recycle pumps
- Permeate pumps
- Electrical control room
- Chemical dosing from 1,000L IBC containers or 200L drums depending on flow

Stage 2 is designed to treat up to 260m³/day and includes an additional scope of:

- One 20,000L aeration tank
- One 40,000L membrane tank
- Additional recycle pumps
- One additional permeate pumps
- Upgrade chemical dosing from 1,000L IBC containers and 200L drums to bulk chemical delivery with tanker bay for chemical deliveries.

Please refer to the diagram in Section 4.4 below for possible staging options.

4.3 Preferences for Reticulation

Apex recommends adoption of a low-pressure sewer design to minimise the volume of sewage needing to be treated and disposed of by eliminating ingress of rain and groundwater into the sewer network. This also breaks the traditional link between peak sewage volumes needing to be disposed of at the same time as soil moisture is highest (both due to rainfall), which is a common obstacle to maximising the amount of land application able to be used for disposal or reuse.

Based on Watercare standards, adopting a low pressure sewer approximately halves the size of wastewater treatment plant required.

Low pressure sewers are also highly suited to the rolling topography of the site.

4.4 Space Requirements

Plant

To minimise capital costs and cater for staging of investment as the development grows at the expected rate of 50 lots per year, the wastewater treatment plant would largely follow the design of the Meremere sewage treatment plant.



- PLANT NOT REQUIRED AT THIS SITE
- PLANT REQUIRED FOR STAGE 1 (UP TO 100m³/DAY)
- PLANT REQUIRED FOR STAGE 2 (UP TO 250m³/DAY)

This shows an example of possible staging of the plant installation. In this configuration, the coarse screening system and feed sump are not required due to the level of grinding and pressurised feed delivered by the recommended low pressure sewer system. Two aeration tanks, one membrane tank (which is a significant cost component) and the bulk chemical systems are not required until approximately 200 houses are completed. While chemical dosing is still required at the lower initial flows, this could initially be achieved by using 200L drums or 1,000L IBC containers, significantly reducing initial capital investment in bulk chemical storage and delivery infrastructure.

Stage 1 is expected to take up an area of approximately 40m x 12m.

The Stage 2 upgrade will add a 4m x 10m tanker unloading bay and a 5m x 10m bulk chemicals compound. Other upgrades will be installed within the stage 1 footprint.

Land Disposal

The irrigation infrastructure can also be staged by adding more zones as the development grows. Note that the intention to stage the irrigation area must be specified in the resource consent application for discharge consent, otherwise regional council may require all irrigation zones be installed from the start.

While the treatment system proposed produces water clean enough for a wide range of irrigation types, ranging from sub-surface drip irrigation through to spray irrigation at night or even municipal re-use throughout the development, it is proposed that sub-surface drip irrigation be used to minimise both visual impact of the irrigation system and human contact with the treated water.

The amount of irrigation area required depends heavily on soil quality and infiltration rates (which we can assist with evaluating via on-site testing) but, based on conservative allowances of no more than 10mm per day of hydraulic loading and 180kg per hectare per year of nitrogen applied to land, the following requirements provide an initial guideline.

Design Condition	Per 50-House Stage Completed (m ²)	With All 500 Houses Complete (m ²)
Area required at 10mm/day	2,700	27,000
Area required to maintain <180kgN/ha/year	5,475	54,750

As can be seen from the above estimates, even at a conservative irrigation rate of 10mm/day, more irrigation area is required to keep the nitrogen loading sustainable than is required to simply hydraulically dispose of the treated water (the largest of these areas must be used in the system design). As this sizing is calculated at the proposed nitrogen content of 10mg/L in the treated water, this highlights the importance of removing as much nitrogen as possible in the treated water if the size of the irrigation field required is to be minimised.

5 SYSTEM COST BUDGET

Our budget prices, to an accuracy of $\pm 10\%$, are:

- Stage 1 - \$3.2 million plus GST
- Stage 2 – additional \$850,000 plus GST

These budget prices include:

- Detailed design, project management, construction, commissioning and operator training
- Provision of full as-built information
- Preliminary and general
- HSNO certification
- Supply of all equipment, including pumps, valves, instruments, tanks and membranes
- Fabrication of membrane tanks and accessways (we have assumed the site will be made available with suitable load bearing capacity)
- Civil works, including concrete plinths
- Erection of a plant room
- Electrical installation and automation
- Mechanical installation and plumbing

These budget prices exclude:

- Site surveying and geotechnical investigations
- Obtaining resource consents for the discharge to land (and to air, if required)
- Landscaping, site fencing and construction of access roads
- Delivery of wastewater to the treatment plant location
- Treated wastewater reticulation and irrigation from the discharge of the treatment plant

Please note these are budget prices only and this response does not constitute an offer capable of acceptance. We look forward to providing a fixed price offer for this project in due course, once treatment requirements and scope are defined.

6 LIMITATIONS AND RISKS

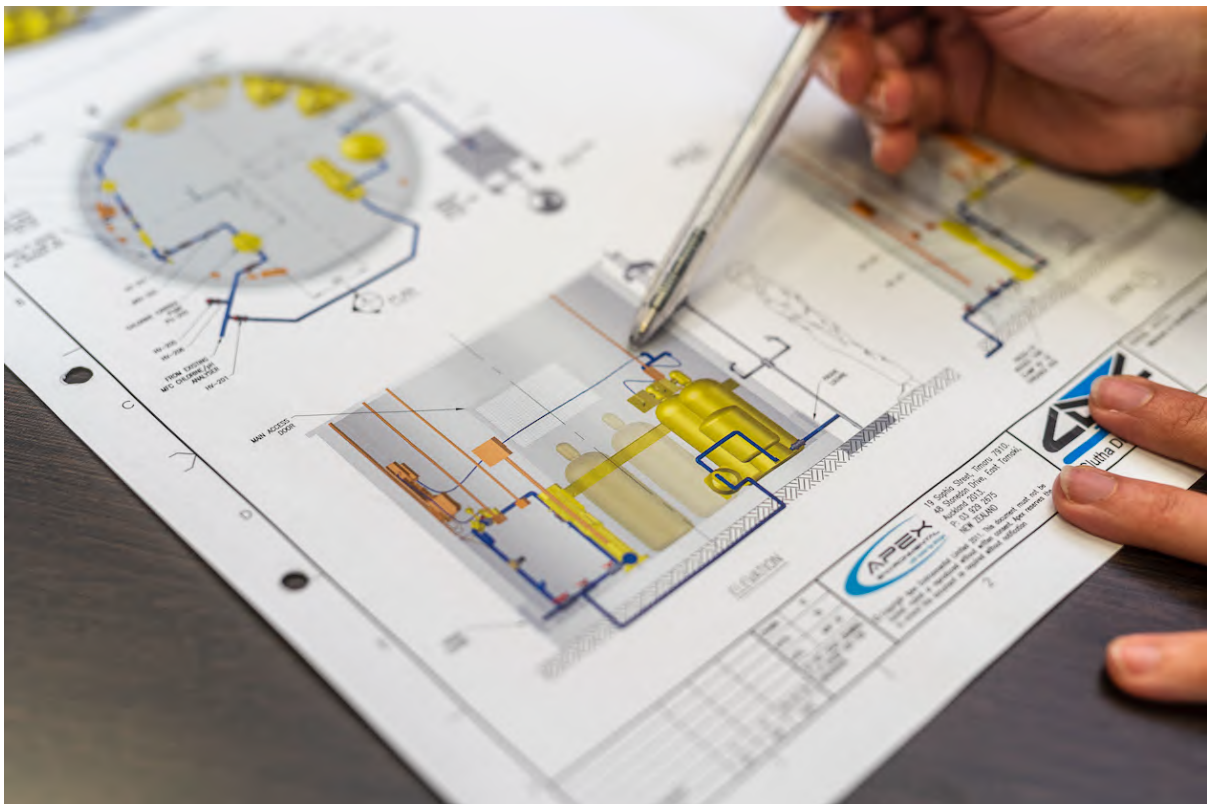
The following limitations or risks have been identified.

Item	Risk	Details
1	Inflation	High current rate of inflation may increase project costs over time.
2	Subcontractor availability/market conditions	Limited availability of resources within the sector, together with high workload, may mean preferred subcontractors and alternatives are unavailable to complete parts of the project.
3	Discharge consent timeframes and conditions	<p>Required timeframes to achieve resource consents are unknown and consent conditions are still to be determined.</p> <p>The level of technology we have proposed (MBR) derisks this concern.</p>

7 DIFFERENTIATORS

7.1 Consenting Precedents

Apex has recently assisted in the consenting of discharges from the Meremere wastewater treatment plant into the Waikato River (Waikato Regional Council) and from the Karaka wastewater treatment plant to land and into water (Auckland Council). We understand what level of information the Northland Regional Council will expect from your application, what discharge conditions are likely to be acceptable, and can assist you in obtaining such consents.



7.2 Our Track Record

As described in Section 2 and further covered in our capability statement, Apex has a proven track record in the design and construction of wastewater treatment plants, including advanced biological systems of the type expected to be required to service this development. Our experience with MBRs is second to none. Apex can be trusted to successfully complete this project, on time, to budget and in accordance with discharge consent conditions.

7.3 Turnkey Project Delivery

Apex is able to provide turnkey solutions, offering you one point of contact (and accountability) throughout delivery of the project. Apex will engage consultants and subcontractors as required to complete all aspects of the project.

Apex's services continue into ongoing support for operation and maintenance of the treatment plant, with a scope to meet your requirements. This can range from full operation through to on-demand support as and when required.



SUBCONTRACTORS

A number of subcontractors would be employed to deliver the full scope of works. Please refer to the table below for the work packages and an indication of who we would likely engage.

Item	Package	Indicative Subcontractors
1	Electrical installation and automation	Kinetic Electrical or Northern Electrical or Dalton Electrical
2	Earthworks and civil works	Civil and Build
3	Mechanical installation	Self-performed or DKJ Welding Limited
4	Stainless steel tank fabrication	HSM Engineering or Longveld

ANDREW PATON

General Manager

BE, Graduate Dip. Accounting



Andrew has significant experience in both New Zealand and overseas managing the delivery of water and wastewater projects. His most recent role was with Brian Perry Civil as a Senior Project Manager. Prior to this, he held the positions of Senior Project Manager and Project Delivery Manager at Filtec Ltd.

Qualifications & Training: Bachelor of Engineering (Chemical and Materials), University of Auckland, Graduate Diploma of Accounting, University of Waikato.

CURRENT	General Manager for Apex Water Ltd
2017-2019	Senior Project Manager, Brian Perry Civil
2013-2017	Project Delivery Manager/Senior Project Manager, Filtec Ltd

Completed projects

Watercare Meremere Wastewater Treatment Plant Upgrade

Senior Project Manager for the upgrade of the Meremere wastewater treatment plant from a pond-based system to a membrane bioreactor, which involved considerable enabling works to reclaim parts of the existing oxidation pond and working with local iwi. Direct management of the mechanical design, allowing efficient delivery of the entire project within 12 months, and directing the electrical, control and automation upgrades, enabling design changes and additions to the scope to be implemented efficiently through a single workgroup. This project was successfully delivered within schedule, while also providing flexibility to adapt the design to evolving project requirements. Exceptional reliability and performance enabling the facility to be granted a new 35 year discharge consent.

NIG Nutritionals Water Treatment Plant

Project Manager for the design and build of a water treatment plant designed to supply 500m³/day of treated feed water compliant with the New Zealand Drinking Water Standards with the provision for supplying partially treated fire water at 46m³/hour. This plant included key process operations such as filtration, demineralization, UV treatment & chlorination and was successfully delivered on budget and on time.

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Completed projects

Watercare Mangere Solids Stream Upgrade

Senior Project Manager, NZ3910 construct only contract for the delivery of 15 sludge handling conveyors and all associated structural steel and walkways. Responsibilities included contract negotiations, procurement and engaging sub-contractors (civil, mechanical and electrical), project documentation including H&S, quality, ITP's, JSEA's and work packs, managing fabrication and site installation, quality control and ensuring H&S compliance.

Oceania Dairy Stage 2 Upgrade—RO Water Treatment

Project Delivery Manager, design and build of a 120m³/hr reverse osmosis water treatment plant, including chemical dosing and pre-filtration tying into the existing plant and maintaining operation of the manufacturing operation. Responsibilities included contract negotiations, design, functional description and layout, procurement and engaging sub-contractors (civil and electrical), project documentation including ITP's JSA's, commissioning plans, managing fabrication and site installation, quality control and ensuring H&S compliance. Responsible for providing all documentation including O&M manuals and as-built drawings.

Casterton Water Treatment Plant

Project Delivery Manager, design and build of two lamella clarifiers and associated pipework, civils, electrical and control retrofitted into an existing water treatment plant in Casterton, Victoria to treat 7.5ML. Responsibilities included contract negotiations, health & safety, design, managing sub-contractors, commissioning and automation, supply of O&M manuals and as built drawings.

Lichfield Chemical Compound

Project Delivery Manager/Project Manager, design and build of a bulk chemical facility to handle caustic soda, sulphuric and nitric acid. Including all civil, electrical and automation works. Responsibilities included contract negotiations, design, project documentation including ITP's, JSA's, commissioning plans, managing fabrication and site installation, ensuring H&S compliance, commissioning and automation.

Clutha District Council Waitahuna Water Treatment Plant Upgrade

Upgrade of an existing water treatment plant to improve throughput and compliance with the New Zealand Drinking Water Standards. Raw water conditioning was upgraded, the clarifier desludging process was automated, the sand filter was completely refurbished and upgraded with a new backwash system and filter to waste line, and the chlorine disinfection process was brought into compliance. Scope included design, procurement, installation and commissioning and the plant is now achieving its design flow of 3,000m³/day.

Helensville WWTP

Project Engineer. Installation of UF membrane plant performing tertiary polishing on effluent from a lagoon. Scope included underground services, building, mechanical fit out, electrical and automation. Main responsibilities included project documentation including ITP's JSA's, commissioning plans, managing programme, managing fabrication and site installation, managing electrical and civil sub-contractors, ensuring H&S compliance, commissioning and automation and providing all documentation, including manuals and as-built drawings.

Richmond Water Treatment Plant

Project Manager. Fabrication and installation of all mechanical works, including pipes, valves, flowmeters and instrumentation. Scope included design and build of caustic, chlorine and UV storage and dosing systems. Main responsibilities included contract negotiations, project documentation including ITP's JSA's, commissioning plans, managing programme, managing fabrication process and site installation, design of chemical dosing systems and UV dosing, managing electrical and civil sub-contractors, ensuring H&S compliance, commissioning and automation and providing all documentation.

HUGUES BOISVERT

Project Engineer

B.Eng. Civil Engineering, (CPEng)



Hugues Boisvert joined Apex Water as a project engineer in February 2020. Hugues has varied experience delivering infrastructure projects in water treatment and water reticulation. He has previously worked on the design and construction of water treatment systems of various scales across the municipal and industrial sectors. Hugues also has experience in network operations and managing water infrastructure works. He brings a varied set of skills in mechanical design, technical draughting and modeling and project management. Hugues completed his studies in Canada and graduated with a Bachelor of Engineering in civil engineering.

CURRENT Project Engineer for Apex Water, Auckland

2018 - 2020 Operations Engineer for Watercare Services Ltd, Auckland

2015 - 2018 Project Engineer for Filtec Ltd, Auckland

Completed projects

Karapiro Water Treatment Plant

Worked as a project engineer on the 7 MLD upgrade to the conventional sand filtration treatment plant at Lake Karapiro. Produced the detailed mechanical design for process/filter tanks, a 12m-high access platform, support structures and pipework. Managed the procurement of materials, mechanical equipment and third party fabrication of the process tanks. Took responsibility for the commissioning and handover of the plant upon resignation of the project manager.

Marlborough District Council Lime Dosing System

Worked as the designer and project manager for the construction and commissioning of a dosing system to handle 1-ton lime bags at a new water treatment plant in Marlborough.

Fonterra Lichfield Demin Water Treatment Plant and Chemical Compound

Worked as a project engineer to deliver a demineralized water system for the boiler upgrade at the Fonterra Lichfield dairy plant. Developed the detailed mechanical & piping design for the new process and produced mechanical drawings for external fabrication and construction. Managed the procurement of all mechanical equipment including piping materials, tanks, pumps and process instruments. Aided with site commissioning and handover of the plant.

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Completed projects

Redoubt Road Watermain Construction

Worked as the water utility's project manager for the construction of a 250NB 2.5km-long new watermain connecting the Redoubt High bulk supply point to new housing developments in the Flat Bush area. Managed the design phase and tendering process, monitored construction and assisted with operational requirements in connecting to the existing network.

THOMAS BOARD

Technical Manager

Chartered Professional Engineer (CPEng); Chartered Member of Engineering New Zealand (CMEngNZ); Chartered Engineer (CEng[UK]); Fellow of the Institute of Chemical Engineers (FIChemE); European Engineer (Eur Ing); BEng (Hons.) Chemical Engineering.



Thomas Board is a Technical Manager for Apex Water. He is a Chartered Professional Engineer and a Fellow of the Institute of Chemical Engineers with twenty years professional experience.

His skills are centered around delivering water and wastewater treatment plants and associated infrastructure, from conceptual and detailed engineering design, through construction and commissioning to tuning, troubleshooting and training, with the aim of handing over a fully automated, functional, efficient and effective facility to his clients.

Thomas is a well rounded engineer, with a broad technical and practical knowledge and has worked around the world including New Zealand and Australia, Philippines, UK and all over the Middle East.

CURRENT Technical Manager - Water, Apex Water, Auckland

2016–2019 Technical Manager, Filtec, Auckland

2012–2016 Principal Engineer, GHD, Auckland

Completed projects

Wastewater Re-use Project

Design Lead to determine the feasibility of alternative drinking water sources for a soft drink bottling plant, including assessment of on an onsite bore water treatment plant and options for a highly advanced processing plant to fully reuse/recycle wastewater as drinking water. Full water reuse/recycling, either via direct potable reuse or indirect potable reuse, involving highly advanced and complex processes to take raw trade waste and treat to potable standard, was considered.

Meremere Wastewater Treatment Plant Upgrade

Design Manager and Commissioning Manager for an upgrade to the Meremere wastewater treatment plant, including a 4-stage Bardenpho membrane bioreactor (MBR) treatment process. The plant was designed to be fully automated, with minimal operator intervention, to reliably treat 40-250m³/day of raw sewage to a high standard prior to discharge into the Waikato River. The plant was designed with a high level of redundancy and in accordance with Watercare's engineering specifications. Overall tasks included completion of detailed design, safety in design and HAZOP processes, and system commissioning and performance testing.

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Completed projects

Clutha District Council Waitahuna Water Treatment Plant Upgrade

Lead designer, site engineer and commissioning manager for the Waitahuna water treatment plant upgrade to ensure this 3,000m³/day aging plant was compliant, efficient and automated. This upgrade involved a review of the existing process and implementation of a number of key improvements. Raw water conditioning was improved by enhancing the existing process to substantially improve the coagulation and flocculation steps. The lamella clarifier desludging process was automated. The sand filter media was replaced, broken nozzles repaired and backwash process improved by installing a new larger backwash pump, raising the dirty backwash launder and installing a filter to waste line to allow the filter to ripen prior to putting back into production after an upwash. A new compliant chlorine gas dosing shed was also installed. The overall system was fully automated and fine-tuned.

Watercare Membrane Bioreactors (MBR)

Commissioning Manager for the Warkworth and Clarks Beach MBRs, including commissioning, troubleshooting and optimisation of these two 250m³/day wastewater treatment plants to ensure a well-run and easily maintained system was ready for handover to the end user. As-built documentation was prepared for submission.

Synlait Pokeno Wastewater Treatment Plant

Commissioning Engineer carrying out pre-commissioning, commissioning and optimisation tasks on the Synlait Pokeno biosolids thickening and dewatering plant, producing sludge cake from an industrial effluent treatment process. Implemented enhancements to the Synlait Pokeno sequencing batch reactor wastewater treatment plant including an automated carbon dosing process, automation upgrades and additional process instrumentation.

Pahiatua WTP

Designed the Pahiatua water treatment plant, a 2,200m³/d fully automated WTP, based around raw water conditioning, ultrafiltration membranes and advanced oxidation to supply crystal clear, chlorinated water, low in iron and manganese. Included leading the design from initial concept through to detailed design, including process and mechanical, hydraulics and control. supply chlorinated process water and high purity water for a new milk powder processing facility. Included all design calculations, process flow diagrams and mass balance, hydraulic calculations, P&ID's, process schedules and control functionality. Commissioned, tested, optimised and delivered a full training course for this installation.

Danone Bore Water Treatment Plant and Reverse Osmosis High Purity Water Treatment Plant

Designed these plants to treat 2,000m³/d of bore water to potable water and 700m³/d of potable water to high purity water, to meet the plant process needs and strict product requirements of this milk powder production plant. Included preparing all design calculations, process flow diagram and mass balance, hydraulic calculations, P&ID's, process schedules and control functionality for both plants. Commissioned the bore water plant and proved it completely removed the high iron and manganese from the raw bore water which considerably reduced staining and blockages downstream.

Seddon Membrane Water Treatment Plant

Designed the Seddon membrane water treatment plant, a 800m³/d fully automated WTP based around raw water conditioning, ultrafiltration membranes and advanced oxidation to supply crystal clear, chlorinated and taste and odour free drinking water. Included preparing all design calculations, process flow diagram and mass balance, hydraulic calculations, P&ID's, process schedules and control functionality. Commissioned, tested and optimised the process.

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Completed projects

Open Country Waharoa Bore Water Treatment Plant

Designed a fully automated greensand filtration process to treat raw bore water to exceed NZ Drinking Water Standards (DWSNZ) to serve the production needs of a large milk processing facility and to remove the reliance on tankered water deliveries. Included preparing all design calculations, process flow diagram and mass balance, hydraulic calculations, P&ID's, process schedules and control functionality for this plant. The plant included a fully automated dirty backwash process to allow the client to meet their strict resource consent requirements without surcharging the sewer or stormwater systems, and chemical dosing systems to avoid wastage.

Fonterra Stanhope Membrane Water Treatment Plant

Designed the Stanhope Membrane water treatment plant, a 4,800m³/d fully automated water treatment plant (and extension to 6,000m³/d), based around GE ultrafiltration membranes to supply crystal clear, chlorinated and unchlorinated water for a new cheese processing facility. Included preparing all design calculations, process flow diagram and mass balance, hydraulic calculations, P&ID's, process schedules and control functionality. Commissioned, tested and optimised this process plant to provide process water for the new cheese factory and unchlorinated pure water used in the product itself.

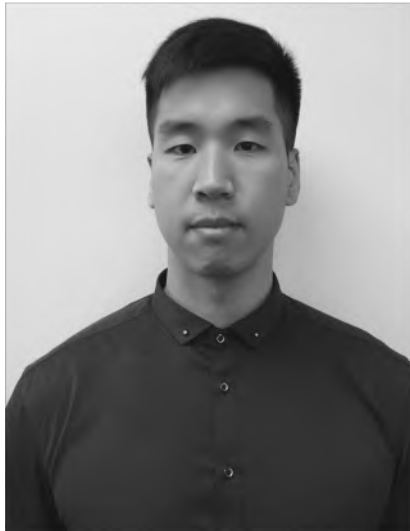
Open Country Horotiu Process Water & High Purity Treatment Plants

Designed and commissioned the Horotiu process water & high purity treatment plants, a 1,500m³/d fully automated WTP plant based around ultrafiltration membranes and UV disinfection, and a 12 m³/d fully automated high purity treatment plant based around reverse osmosis.

PAUL PENG

Project Engineer

B.Eng. Technology (Mechanical)



Paul Peng joined Apex Water as a project engineer in October 2020. Paul has varied experience delivering projects in the water treatment sector.

Paul has previously worked on the design and construction of water treatment systems of various scales across the municipal and industrial sectors. Paul brings a varied set of skills in mechanical design, technical draughting and modeling and project management. Paul graduated with a Bachelor of Engineering.

CURRENT Project Engineer for Apex Water, Auckland

2020 - 2020 Civil Water/Wastewater Engineer, Watercare

2019 - 2020 Project Manager for Filtec Ltd, Auckland

Completed projects

Cardrona Wastewater Treatment Plant

Project Engineer for the WWTP in Cardrona, a sequencing batch reactor based biological sewage treatment plant, designed to treat flows from the new Cardrona Station subdivision. Scope included P&ID design, quality control of fabrication drawings, procurement and mechanical design..

South/Central Auckland Developments

Worked as a civil water/wastewater engineer for various projects. Responsible for South and Central developments for housing, commercial-domestic/non-domestic applications, resource & building consents and EPA/compliance applications.

Marlborough Seddon WTP

Worked as the project engineer and site manager, on a water treatment plant in Seddon, supplying 700m³/d of drinking water. The plant consisted of pre-treatment, treatment, CIP kitchen and compressed air system. Scope included design and development of the plant through P&ID design, drawing development and quality control, fabrication and procurement, health & safety and commissioning.

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Completed projects

New Castle & Dinsdale Pump Station

Worked as design lead and senior mechanical engineer, completing a detailed design proposal to Hamilton City Council, compiling and designing two newly upgraded pump stations for Hamilton City.

CFA Melbourne Containerised Plants

Project Engineer seven sites treating PFOS/PFAs for the Victorian Emergency Department in Australia. Total of 13 containerised water treatment systems including multiple filters in series and parallel configuration, clarifiers, chemical dosing were used to treat the complex chemical. .

Glenshea 3624—South Waikato District Council

Worked as a project manager of a containerised UV/filtration plant. Scope included design & development, P&ID design, development of functional descriptions, development of GA and fabrication drawings, procurement, writing O&M manuals and overseeing fabrication.

Brockman 2—Rio Tinto

Assisted project delivery team with the design & manufacture of five dewatering trailer mounted headworks and five trailer mounted generators. Scope included designing the pump and standpipe system, installation, managing sub-contractors and commissioning.

DARREN WIGHT

Site Manager



Darren works as a Site Manager for Apex Water, based out of our Auckland office.

Darren has vast experience working within the water and wastewater, industrial, food and dairy industries. With skills in staff management, planning, health & safety, maintenance, installation and building relationships, Darren ensures work sites run smoothly and efficiently.

CURRENT Site Manager for Apex Water Ltd

2019 - 2020 Site Manager for Development Partners (Contract)

2018 - 2019 Site Manager for Techo (Contract)

Completed projects

Watercare ,Meremere Wastewater Treatment Plant

Site Manager for the construction of a wastewater treatment plan on an operational site, including the reclamation of 25% of an oxidation pond to build the new plant on. Duties included sub-contractor management, JSEA development, daily progress reporting, drawing and issue management.

Development Partners Ltd, Miraka Dairy—Contract

Site Manager overseeing Miraka's interests during the construction of a new process plant from civil works through to piping (external) and silo installation. Co-ordinate contractors and Miraka resources as required and facilitate other external resources such as cranes and power companies.

Watercare, Clarks Beach Wastewater Treatment Plant

Site Manager, managing and coordinating a small civil construction site for the upgrade of a water treatment plant. Duties included sub-contractor management, JSEA development, daily progress reporting, drawings and issues management.

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Completed projects

Techo/DKJ Welding Ltd

Project supervisor, Bluebird Foods—Contract

Planning and supervising the relocation of a corn chip packaging line from an existing plant room to a new facility on the same site. Plan and schedule tasks, co-ordinate sub-contractor, develop JSEA's, supervisor relocation and assist on tools.

Machinery Specialists Ltd, Operations Manager

Throughout 2016 this was a challenging role with the absence of the GM due to illness and then the resignation of the Dispatch Manager, I found myself covering several roles throughout the year.

PFS Engineering Ltd, Site Services Manager

Accountable to the Business Development Manager, the primary role was to build and foster client relationships while building a team of site services personnel to conduct of site installation and maintenance work mainly within the food processing industry.

Kalmar Construction Ltd,

Construction Supervisor

Responsible for co-ordination of sub-contractors' manufacturing and erecting structural steel work for a new factory within an existing production site. Also assist the Site Manager with civil works prior to structural work commencing.

Integrated Maintenance Group Ltd, Maintenance Shut Manager—Contract

This was a role that I really enjoyed. Having been away from the NZ Steel site for several months and then being asked to come back and run this maintenance shut, I approached this from a contracting view. This was a highly successful project with completion being 9hrs ahead of program. This gave the Plant Manger the opportunity to get the plant back online early and commence production at \$100k+ per hour. The scope of the project was to oversee the replacement of the iron sand melter oven side wall refractory blocks including the wrecking and replacement of all mechanical hold down equipment

Major Project Experience

safe
• water
by
design •

Industry leaders in water & wastewater treatment:

- ✓ design, build, installation and commissioning of water & wastewater treatment systems
- ✓ turnkey project delivery, including consenting, procurement, installation, commissioning & operator training
- ✓ trials & pilot plants operated onsite, including remote support
- ✓ upgrades to existing plants
- ✓ review & optimisation of existing treatment plant processes
- ✓ advisory services for compliance, resource consents and monitoring
- ✓ supply of equipment

Apex was established in 2009 by Matt Savage and Steve Kroening who, from their Timaru base, cut their teeth on a number of dairy and wine projects in New Zealand.

Since this time the Apex Water team has expanded with staff based in Timaru, Christchurch and Auckland. We are a now multidisciplinary team with a proven track record in achieving great outcomes for our clients and completing projects across the length of New Zealand.

From small boutique wineries to large municipal facilities, we aim to be a partner of choice for the delivery of design and build projects across New Zealand. Over the past 12 years, Apex Water has completed projects for a number of New Zealand's most recognised companies, including Watercare, Fonterra, DB Breweries, Open Country, Villa Maria, Queenstown Lakes District Council and Whakatane District Council.

Apex utilise advanced software in our design processes, including Biowin for biological modelling, AutoCAD Plant 3D for fully-integrated P&IDs, layouts and equipment schedules and drone-based photogrammetry.

Our water treatment plants are designed to the New Zealand Drinking Water Standards and any specific requirements you may have for food production. Our water treatment experience includes filtration, chlorination, UV and RO systems.

Apex Water believe ...

Our values are key to delivering high quality outcomes and these start with who our team is. We value our positive team environment and innovative culture.



Passion for Our Environment



Reputation Before Profit



Safety is Built In



Challenge and Respect



Building Partnerships



Drive to Improve


Watercare Meremere


Wastewater Treatment Plant Upgrade



Key Achievements

- ✓ Successful improvement of effluent quality to cater for future growth in the area
- ✓ Successful integration of the existing oxidation pond to a futureproof, state-of-the-art autonomous process
- ✓ Efficient delivery of the entire project on schedule

 Value: \$7,000,000

 Completed 2021

Contract Scope

Apex Water completed the upgrade of the Meremere wastewater treatment plant for Watercare in the Waikato District. In order to improve effluent quality and cater for future growth in the area, the facility was expanded with a new membrane bioreactor (MBR) designed and constructed by Apex, along with other upgrades to ancillary processes. The existing plant was taken from a low level of mechanization to a futureproof, state-of-the-art autonomous process.

The project involved considerable enabling works to reclaim part of the existing oxidation pond. These were managed directly by Apex during the development of the mechanical design, therefore allowing efficient delivery of the entire project within 12 months. Apex also directed the electrical, control and automation upgrades, enabling design changes and additions to the scope to be implemented efficiently through a single workgroup.

The approach taken allowed the successful delivery of the project within schedule while also providing the Principal flexibility to adapt the design to evolving project requirements. The exceptional reliability and performance of the new process enabled the facility to be granted a new 35 year discharge consent.



Cardrona

Wastewater Treatment Plant



Key Achievements

- ✓ Successful treatment of peak wastewater volumes during winter
- ✓ Site landscaping, fencing & driveways were also completed
- ✓ The plant was completed on time despite COVID 19 disruptions
- ✓ Apex staff operate the plant for a 3-year period & use remote access



Value: \$7,500,000



Completed 2021

Contract Scope

Apex Water were engaged to design and construct a new wastewater treatment plant on a greenfield site in the Cardrona Valley to service the Cardrona Village, Cardrona Alpine Resort and a new residential and commercial development. A key design consideration was the treatment of peak wastewater volumes during winter when temperatures can be extremely cold.

This turnkey project involved considerable earthworks to enable construction in an old quarry, the construction of partially buried treatment tanks and a building to provide spaces for electrical equipment, process plant, dewatering equipment and staff amenities including a control room and laboratory.

The treatment process is a sequencing batch reactor (SBR) to provide a high level of flexibility with seasonal loads, with UV treatment prior to discharge via a land treatment area. Site landscaping, fencing and driveways were also completed.

The plant was completed on time, despite COVID 19 disruptions and has now been vested in Queenstown Lakes District Council.

Apex staff are now operating the plant for a 3-year period and remote access systems allow remote supervision.




Watercare Clarks Beach

Wastewater Treatment Plant



Key Achievements

- ✓ Utilisation of existing wastewater infrastructure to minimise costs
- ✓ Safe completion of the project without disrupting site production
- ✓ Consistently producing high quality effluent

 Value: \$1,800,000

 Completed 2020

Contract Scope

Clarks Beach is a rapidly growing community south of Auckland. With growth comes pressure on existing infrastructure.

Apex Water was engaged by Watercare to provide a robust treatment process that removes the additional load and treats it to exceptionally high standards to minimise environmental impacts.

The treatment plant is located immediately adjacent to the Clarks Beach golf course and therefore features Apex's first-ever golf ball filter to protect the plant from incoming hazards.

The wastewater treatment plant is a containerised MBR plant and maintains a degree of portability, allowing the plant to be relocated in the future if required.

It is consistently producing high-quality effluent despite the wide range of flows and loads.

Training of client's staff was completed following commissioning.



Watercare Waiheke Island

MBR Wastewater Treatment Plant



Key Achievements

- ✓ Providing a Membrane Bioreactor (MBR) plant capable of treating the water to a very high standard so discharge has no adverse effects to the environment
- ✓ Successfully completing the project whilst working with difficulties construction brings working on an island



Value: \$1,700,000



Completed 2020

Contract scope

Waiheke Island is a pristine, natural environment in the Hauraki Gulf. Due to its close proximity to Auckland, Waiheke Island sees an influx of visitors over the holiday season with up to 45,000 visitors per day.

To handle the wastewater produced by this influx, Apex Water provided a Membrane Bioreactor (MBR) plant capable of treating the water to very high standards so that it could be discharged with no adverse effects to the environment.

Due to the difficulties of constructing on the island, the mechanical and electrical elements of the plant were prefabricated in two 40 foot shipping containers and delivered to site ready to operate.

Despite the highly variable wastewater loads the plant is delivering effluent well within specification and ensures only crystal clear effluent enters the bay.



Motueka

Water Treatment Plant



Key Achievements



- ✓ Successful design, build & construction of a bore water treatment plant including access roads and chemical delivery area within a residential area
- ✓ Works were completed safely and all project quality requirements were achieved
- ✓ Successful mitigation of COVID 19 disruptions



Value: \$2,500,000



Completed 2022

Contract Scope

Apex Water was engaged as head contractor for the design and construction of a bore water treatment plant, treating water from three onsite bores to the New Zealand drinking water standards for supply to Motueka.

The scope of works included construction of a new building, access roads and chemical delivery area on a greenfield site within a residential area.

The turnkey water treatment plant consisted of cartridge filtration, UV disinfection, chlorination and treated water storage including an allowance for future growth and process enhancements, such as fluoridation.

Installation of all equipment, including associated pipework, valves and instrumentation, and engagement of subcontractors for the completion of earthworks, buildings, acoustic fencing, mechanical and electrical installation, was managed by Apex.

Works were completed safely and all project quality requirements were achieved.




Open Country Dairy Awarua


Wastewater Treatment Plant Upgrade



Key Achievements

- ✓ Ensuring ongoing compliance with Council discharge limits
- ✓ Successful installation of three new lamella clarifiers
- ✓ Implementing contingency measures and assisting site to operate the plant in accordance with consent conditions

 Value: \$2,725,000

 Completed 2021

Contract Scope

Apex Water completed the upgrade of the wastewater treatment plant that serves the Open Country Dairy and South Pacific Meats processing plants at Awarua, near Invercargill.

With both sites undergoing expansion, an upgrade was necessary to ensure ongoing compliance with the Invercargill City Council discharge consent at increased flows. The upgrade consisted of the installation of continuous feed monitoring equipment to automatically send incoming wastewater to either the anaerobic pond or aerobic pond based on loading, and the installation of three new lamella clarifiers to increase final treatment capacity prior to discharge.

Arrival of two of the three clarifiers was severely delayed due to significant disruption to international shipping caused by the COVID-19 pandemic.

Apex Water engineers took a major role in implementing contingency measures and assisting site to operate the plant in accordance with consent conditions before final equipment was received and installed.




Synlait Pokeno


Wastewater Treatment Plant



Key Achievements

- ✓ Compliant wastewater for Synlait
- ✓ Successfully upgrading the plant to include a biological process
- ✓ Achieving trade waste discharge consent levels
- ✓ Taking an innovative approach to ensure upgrades were cost-effective

 Value: \$1,850,000

 Completed 2020

Contract scope

Babbage Consultants, on behalf of Synlait Dairy, consulted with and contracted Apex Water to upgrade the recently constructed wastewater treatment plant to include a biological process.

This involved converting two of the existing storage tanks into sequencing batch reactors (SBR).

This was to help with achieving trade waste discharge consent levels by reducing levels of BOD, suspended solids, nitrogen and phosphorus in the discharge.

Apex Water has significant experience in brownfield upgrades of existing treatment plants, to achieve ever-tightening consent regulations.

In this instance, Apex Water took an innovative approach to ensure upgrades were cost-effective and took full advantage of existing infrastructure.




NZ Ski Coronet Peak

Wastewater Treatment Plant Upgrade



Key Achievements

- ✓ Successfully improving compliance with wastewater discharge consent with results significantly below resource consent limits
- ✓ Achieving a number of challenges, including reducing nitrogen levels in a very low temperature environment, & limited access to plant in winter

 Value: \$730,000

 Completed 2021

Contract scope

Apex Water completed a substantial upgrade to the wastewater treatment plant at Coronet Peak ski field for NZ Ski to improve compliance with their wastewater discharge consent.

The project involved a number of challenges, including the need to reduce nitrogen levels in a very low-temperature environment, limited access to the plant in winter meaning the plant had to be automated as much as possible, and a defined period over summer in which to complete all site works.

The approach taken was to utilise the existing infrastructure as much as possible to not only reduce costs but to minimise construction risks in a difficult environment. Process upgrades included wastewater feed control to smooth out flows into the plant, creation of anoxic and aerations tanks for biological nitrogen removal, a new autocleaning filter and UV reactor for wastewater disinfection, addition of recycle and waste activated sludge systems and a new automation system to control operation of the plant.

The plant is now running smoothly, with results significantly below resource consent limits, with Apex Water providing 12 months of operational support to NZ Ski through a combination of remote access into the control system and periodic site visits.




Aquaholics Whakatohea Mussels

Wastewater Treatment Plant



Key Achievements

- ✓ Successfully completing the project in time and on budget
- ✓ Installation of pump stations at 3 factory sumps & a full secondary biological processing plant including an SBR, wastewater balancing tank, chemical dosing system, air blower, sludge removal system & discharge UV disinfection

 Value: \$1,045,000

 Completed 2022

Contract scope

Apex Water recently completed the commissioning of a greenfield biological treatment facility for the Whakatohea mussel processing factory in Opotiki. This greenfield plant processes mussels for local and export markets and is a huge boost for the local Opotiki economy.

Apex carried out aboveground works for the treatment plant working closely with Aquaholics Ltd, who delivered the underground work. We installed pump stations at the three factory sumps and a full secondary biological processing plant including an SBR, wastewater balancing tank, chemical dosing system, air blower, sludge removal system and discharge UV disinfection.



Turners & Growers Global

Wastewater Treatment Plant



Key Achievements

- ✓ Successfully completing the project in time and on budget
- ✓ Much of the installation was carried out while the site was operating



Value: \$990,000



Completed 2021

Contract scope

Apex Water completed the installation of a wastewater treatment plant for apple wash water for Turners & Growers in Whakatu, Hastings. This plant takes wastewater that was discharged into a local freshwater stream and diverts it through a chemical neutralisation and balancing tank, then sends the flow to an industrial wastewater sewer.

The work involved installing a 3.5m deep underground pump station next to an existing building and a 300mm diameter discharge line to a 300m³ storage tank. Caustic and sodium bisulphite (SBS) dosing systems were installed for neutralising and dechlorinating the wastewater. An 80m long 100mm diameter discharge pipe was installed to connect to the sewer.

Work was carried out over the summer, with unavoidable disruptive activities completed with a 3-week period where the site was mostly shut down. Much of the installation was carried out while the site was operating, with careful coordination required to ensure the site was not impacted by the construction.



NIG Nutritionals

Water Treatment Plant



Key Achievements

- ✓ Safe completion of the project without disrupting site production
- ✓ Passed all performance tests
- ✓ Compliance with drinking water standards and infant formula requirements



Value: \$706,000



Completed 2021

Contract Scope

Apex Water was engaged by a dairy client to design and build a plant capable of treating bore water to quality in line with the Drinking Water Standards for New Zealand (Revised 2018) and their food production specifications.

Making use of cartridge filtration, softening, UV disinfection and chlorination Apex Water were able to provide a plant which could reliably service the client's requirements and give them end-to-end control on the water production process, which was previously supplied via a third party. A portion of the treated water is used as boiler feed water, with certain requirements for reduced levels of silica, iron, copper, sodium and hardness.

Design review and HAZOP was completed with all relevant client staff at project commencement, with changes and contract variations discussed and agreed between parties during delivery.



Karaka

Water Treatment Plant



Key Achievements

- ✓ Safe completion of the project without any incidents
- ✓ Delivery within budget
- ✓ Delivered in the face of lock downs due to COVID-19 with supply chain located outside of the Auckland border



Value: \$668,000



Completed 2022

Contract Scope

Apex Water were engaged by Auckland Council to design & build a water treatment plant to relieve load on the southern network during periods of drought. Auckland Council had identified the filling of potable water tankers as a source of significant loading on the reticulated water network and sought solutions to allow these tankers to continue servicing the area without drawing water from the city's water supply.

The treatment plant utilises greensand filtration to remove iron and manganese present within the raw water UV treatment and chlorination for disinfection and produces drinking water in line with the Drinking Water Standards for New Zealand (2018). One of the core design objectives was to make the plant re-locatable and suitable for operation in areas where access to power and bulk chemical deliveries could be problematic (ie, disaster response).

Apex Water's parent company Citycare have been contracted to operate the plant with our support.




Fonterra Clandeboye

Wastewater Treatment Plant



Key Achievements

- ✓ Successfully commissioning a world-leading mozzarella cheese product plant for Fonterra
- ✓ Design & build a dissolved air flotation (DAF) treatment system
- ✓ Successfully integrating the plant into the existing infrastructure with minimal space available

 Value: \$2,900,000

 Completed 2020

Contract scope


After years of Research and Development, Fonterra commissioned a world-leading mozzarella cheese production plant at their Clandeboye site. As part of the overall project, Apex Water was engaged to design and build a dissolved air flotation, (DAF) treatment system to ensure the new plant had no adverse effect on the surrounding environment that receives the treated wastewater from the new plant. The heart of the new treatment process is an Apex designed Dissolved Air Flotation (DAF) unit, capable of removing solids, fat and protein from flows of up to 250 m³/hour.


The design and construction phase were particularly challenging as the new plant had to be integrated into the existing infrastructure and with a minimal amount of space available. The construction phase went very smoothly due to the detailed planning and construction methodology followed throughout the build.






**Safe water.
Life starts here.**

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