GWE
CONSULTING ENGINEERS

POKENO HOUSING & TOURISM PROJECT
WASTEWATER SERVICING REPORT

Pokeno

POKENO DEVELOPMENTS NZ LTD
December 2025 | Final R1

Creative Thinking | Better Environments
gwe.co.nz

DOCUMENT CONTROL RECORD

Client:	Pokeno Developments NZ Ltd
Project Location:	Pokeno
Job Number:	J7237
Document:	Pokeno Housing & Tourism Project | Wastewater Servicing Report
Version:	Final R1
Document Status:	Final - Approved for Issue
Date:	December 2025
Prepared by:	 Gareth Williams, Director
Reviewed by:	 Dylan Walton, Senior Wastewater Engineer
Approved by:	 Gareth Williams, Director
Filename:	https://gweconsult.sharepoint.com/sites/ActiveProjects/COM/Pokeno Housing+Tourism Project-J7237/04-WW/04-Reports/RWW01v1 FINAL R1-Pokeno-WW Servicing.docx

GWE Consulting Engineers
Ground Floor Oceanbridge House 25 Anzac Street Takapuna Auckland 0622
PO Box 32 311 Devonport Auckland 0624

DOCUMENT STATUS

STATUS	DATE	DETAILS	AUTHOR	CHECKED	APPROVED
Draft	August 2025	RWW01v1 Draft	GW	DW	GW
Final	November 2025	RWW01v1 FINAL	GW	DW	GW
Fina R1	December 2025	RWW01v1 FINAL R1	GW	DW	GW

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

EXECUTIVE SUMMARY

We understand that Waikato District Council (WDC) has identified capacity constraints with their existing contract with Watercare for access to the Pukekohe WWTP. WDC has also formally advised the applicant that no new wastewater connections are available in Pokeno for housing and development projects.

Given this constraint, we have been instructed to advise the applicant on options for a centralised wastewater treatment plant (WWTP) for Pokeno, independent from Watercare.

The Pokeno Housing and Tourism Project Wastewater Servicing Report provides a high-level technical assessment of wastewater solutions for the staged development across Yes Valley, Pokeno West, and Pokeno South/Havelock.

The Project includes a centralised wastewater treatment plant (WWTP) located at Yes Valley. This has been briefed to be staged and scalable to provide for the existing and future development of Pokeno.

Scenarios have been examined for wastewater volumes of approximately 5,000 m^3 and 10,000 m^3, in order to provide a wastewater solution for the needs of the Project, along with providing an opportunity for Pokeno as a whole. This includes allowance for a wider servicing catchment beyond the Project and an additional a conservative volume for light/medium commercial activities.

A WWTP located at Yes Valley is technically feasible, scalable, and a viable alternative to connecting to Watercare's Pukekohe WWTP.

A Membrane Bioreactor (MBR) or hybrid MABR/MBR system is recommended. These technologies can reliably achieve stringent nutrient and pathogen removal targets, consistent with best practice in New Zealand. Treated wastewater is expected to meet very high discharge standards, with >97% reductions in cBOD, TSS, TN, and TP, and near-complete pathogen removal. The anticipated discharge quality will exceed that currently consented at Watercare's Pukekohe WWTP.

A MBR or hybrid MABR/MBR system is scalable over time to encompass the Project and activities beyond Project associated with growth in the wider Pokeno area. The system can be staged based on actual demand generated by growth. This means the systems can be future proofed for the final design volume, with its modular technology matching the investment with actual demand for wastewater treatment.

There are multiple discharge and reuse options for managing treated discharge which can be determined at the substantive application stage. These include:

- Land-based disposal via pressure-compensating drip irrigation (PCDI).
- Wetland polishing/land contact prior to surface water discharge to a tributary of the Waikato River.
- Direct discharge to the Waikato River.

The applicant has considerable landholdings that provide opportunities for wetland polishing/land contact devices.

The Waikato River is a sensitive receiving environment subject to Te Ture Whaimana o Te Awa o Waikato. Discharge approaches will require robust cultural consultation, ecological assessment, and compliance with best practice within New Zealand.

Ownership and management of all wastewater infrastructure could be via private utility, body corporate, or vesting with Council (subject to acceptance). A clear management framework will be required through the life of the resource consent. GWE have been briefed that the applicant as discussing these matters with WDC.

1 INTRODUCTION

This technical report has been prepared to support a fast track referral application for the proposed Pokeno Housing and Tourism Project.

Pokeno Developments NZ Limited proposes staged development across its landholdings for the Pokeno Housing and Tourism Project using the Fast Track Approvals Act 2024 ("FTAA").

The Pokeno Housing and Tourism Project is proposed across three precincts and will include the following activities:

1.1 Yes Valley

The proposed activities would occur over landholdings incorporating 42A Potter Road and 242, 370 Bluff Road and include:

a. A tourism resort including a range of activities such as hotel accommodation (200 room hotel), glamping/motorhome areas, a conference centre, spa and restaurant facilities.

b. A farm showground and NZ Made Hub (to provide local New Zealand brands with the opportunity to showcase their products).

c. Enhancement of ecological areas, streams and wetlands.

d. Infrastructure including, new roads, water supply network, stormwater management devices.

1.2 Pokeno West

The proposed activities would occur over landholdings incorporating 87, 109 and 119 Helenslee Road and 53 Munro Road and include:

a. Vacant lot residential subdivision in stages for approximately 1,500 dwellings plus a superlot for the future neighbourhood centre.

b. Infrastructure including, new roads, water supply network, stormwater management devices and network, reserves, recreation trails.

c. Wastewater infrastructure and any bulk "main" to connect to wider solution (outlined further below).

d. Enhancement of streams and wetlands.

1.3 Pokeno South/Havelock

The proposed activities would occur over landholdings incorporating 5 Hitchen Road, 88 and 278 Bluff Road and include:

a. Vacant lot residential subdivision in stages for approximately 750 dwellings.

b. Infrastructure including, new roads, water supply network, stormwater management devices and network, reserves, recreation trails.

c. Wastewater infrastructure and any bulk "main" to connect to wider solution (outlined further below).

d. Enhancement of ecological areas, streams and wetlands.

1.4 Centralised Infrastructure

A centralised wastewater infrastructure solution is proposed which would service all of the Yes Resort and urban development activities in the Pokeno West and Pokeno South/Havelock Precincts. The volume scenarios evaluated also can provide for the connection of Pokeno to the WWTP to provide for future growth. This includes the following activities which would be located at Yes Valley:

a. Wastewater treatment plant (WWTP).

b. Treated wastewater disposal areas (potential to include 42A Potter Road, 35 Trig Road, 39 and 135 Potter Road and 242 Bluff Road).

c. Treated wastewater management and disposal.

d. Re-use options for treated wastewater.

The purpose of this report is to provide a high level-level assessment of wastewater flows, treatment options, and discharge approaches for the development.

The high level options and design for the reticulation and treatment plant will focus on solutions that are robust, proven and currently installed within New Zealand.

2 PURPOSE AND SCOPE OF REPORT

This report has been prepared by GWE to provide a high-level assessment of wastewater servicing for the proposed Pokeno Housing & Tourism Project.

The report addresses:

- Wastewater design flow volumes and characterisation of influent wastewater.
- An assessment of suitable wastewater reticulation models.
- Review of suitable treatment technologies for a centralised WWTP.
- Indicative treated wastewater quality requirements based on suitable discharge route(s).

Assessment of suitable secondary/tertiary treatment options beneficial reuse and disposal options.

3 EXISTING ENVIRONMENT

Some of the Precinct areas adjoin the Waikato River. Predominantly clay soils limit infiltration and inform disposal design.

The Waikato River is a sensitive receiving environment subject to Te Ture Whaimana o Te Awa o Waikato (Vision and Strategy); discharges must therefore meet a very high treatment standard. Cultural values, ecological effects, and proximity to the Tuakau water treatment plant (WTP) intake are key considerations.

It should be noted that the existing land is used for agricultural purposes and is currently being used for dairy and assimilates nutrients relating to these activities.

3.1 Background

3.1.1 Surrounding Area

The wider environment covers a large area of rural land around Pokeno in Waikato District. The area has seen considerable industrial and residential growth over the past two decades on both sides of SH1.

3.1.2 Existing Wastewater Servicing – Pukekohe WWTP

The existing industrial and residential areas of Pokeno are serviced by the Pukekohe WWTP, owned and operated by Watercare Services Ltd. (WSL). The WWTP is located at Parker Lane to the west of Tuakau, approximately 10 km from the proposed development areas.

GWE understands that the Pukekohe WWTP is at capacity for all new WDC connections. Therefore, a decentralized, wastewater system is proposed for this Project.

4 PROPOSED DEVELOPMENT

The development of the land is likely to proceed in multiple stages, with scalable infrastructure and will consist of the following:

- Pokeno West: ~1,500 dwellings.
- Pokeno South / Havelock: ~750 dwellings.
- Yes Valley: 200-room hotel, glamping/motorhome, conference centre, restaurants, spa, farm showground.
- Miscellaneous wastewater from light/heavy commercial activities. We have allowed 1,000 m^3/day from these activities. Note – the requisite pre-treatment will be required on site depending on the proposed industrial activities.

The total wastewater volume for the Project is anticipated to be 5,000 m^3/day (rounded) and up to 10,000 m^3/day to provide for Pokeno's future growth. Staging of development is anticipated, requiring scalable/modular wastewater infrastructure that will be added to as the development grows.

5 WASTEWATER RETICULATION OPTIONS

A number of reticulation options are available within New Zealand, and the following are considered suitable for the development:

a. Conventional Gravity Sewer System.

b. Septic Tank Effluent Pumping/Gravity (STEP/STEG).

c. Vacuum Sewer System.

d. Low Pressure Sewer System (LPS).

The options will be evaluated in more detail at the concept design stage and once detailed development plans are available and on the following specific key factors that will include:

- Ease of Construction.
- Site topography.
- Operational Complexity.
- Reliability.
- Requirement for Separate Pumpstations.
- Potential for Infiltration and Inflow (I&I).

6 WASTEWATER TREATMENT OPTIONS

A centralised WWTP is proposed for the Project to ensure a single coherent solution is provided that utilises the economy of scale to provide a cost-effective solution, matches the development intent of the wider area and reduces the potential for overall nuisance effects, including odour and noise. As part of the substantive application's design the following evaluation criteria will be used to determine the most suitable technology for the WWTP:

- Ease of construction.
- Operational complexity and maintenance.
- Reliability.
- Potential for staged/modular upgrades.
- Ability to meet stringent current and potential future discharge quality targets (long-term discharge security).
- Use of technologies that are common within a NZ context and consistent with current and emerging technologies.

We have determined that a high level of treatment is required for the Project that is likely to include nutrient removal and disinfection. Wastewater treatment technologies that we have assessed as suitable, and have a strong track record of used within New Zealand, include:

- Sequencing Batch Reactor (SBR) – reliable, but larger footprint.
- Modified Ludzack-Ettinger (MLE) – nutrient removal, but less compact.
- Membrane Bioreactor (MBR) – compact, robust, high-quality discharge.
- Hybrid MABR/MBR – enhanced nutrient removal, high energy efficiency.

Due to the requirement for a high level of treatment it is likely that an MBR or MABR/MBR hybrid (with nutrient removal and disinfection), both consistent with best practice, will be required for the Project. These are the technologies adopted by WDC at Te Kauwhata.

7 WWTP BASIS OF DESIGN

Wastewater flows and loads from the Project have been derived based on housing unit equivalent (HUE) data provided by the applicant. The Project is likely to occur across several stages, with an anticipated residential HUE design horizon of approximately 5,000 HUEs. An additional allowance of 1,000 m^3/day has been included to cover light/medium commercial, community and mixed-use development.

Scenarios have been examined for wastewater volumes of approximately 5000 m^3 (rounded) and 10,000 m^3, in order to provide a wastewater solution for the needs of the Project, along with providing an opportunity for Pokeno as a whole. This includes allowance for a wider servicing catchment beyond the Project and an additional a conservative volume for light/medium commercial activities.

7.1 Flows

Watercare standards identify a per capita flow allowance of 225 litres/person/day as the recommended design basis to determine flows from residential dwellings.

As per Watercare standards, a residential occupancy of 3.0 persons/HUE has been adopted. An additional conservative allowance of 1,000 m^3/day has been included to cover commercial, community and mixed-use developments. As the reticulation network is likely to utilise an LPS system, I&I flows into the network are expected to be minimal.

Table 1 outlines the anticipated flows from the development and will be utilised for sizing the process units at the WWTP at the concept design stage. The predicted flows have been rounded up to 5,000m^3/day.

Table 1: Anticipated Flows

SOURCE	HUE	DESIGN FLOW[1,2]
Residential	5,000	3,713
Commercial	n/a	1,000
Total		4,713

Notes:
[1]All flows in m^3/d. Flows based on 675L/HUE.
[2]An allowance 10% has been made for I&I.

No table is necessary for the scenario of 10,000 m^3 as no split between commercial and residential is available.

7.2 Contaminant Load

Contaminant concentrations from the residential development are expected to be in line with standard domestic strength wastewater. GWE have assumed that the wastewater from the commercial developments will have a waste strength of approximately three times that of the domestic sources.

Raw influent contaminant concentrations have been assessed for the following key parameters:

- Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)
- Total Suspended Solids (TSS)
- Total Nitrogen (TN)
- Total Phosphorus (TP)

A high-level mass balance has been undertaken to determine the expected combined stream wastewater characteristics (Refer to Table 2). The associated loads (Refer to Table 3) will be utilised in the concept design and will assist with staging the mechanical elements of the WWTP. These anticipated loads will be confirmed once scheme plans have been determined and the details of the proposed development becomes clearer.

Table 2: Anticipated Contaminant Concentrations (rounded)

PARAMETER	RAW DOMESTIC WASTEWATER	RAW COMMERCIAL WASTEWATER	RAW COMBINED STREAM
5-Day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	250	750	400
Total Suspended Solids (TSS)	300	900	450
Total Nitrogen (TN)	50	150	90
Total Phosphorus (TP)	30	90	50

Note:
[1]All concentrations in mg/L

Table 3: Anticipated Loads

PARAMETER	TOTAL DEVELOPMENT LOAD (10,000M3/D ROUNDED)
5-Day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	4,000
Total Suspended Solids (TSS)	4,200
Total Nitrogen (TN)	900
Total Phosphorus (TP)	500

Note:
[1]All loads in kg/d

7.3 Target Discharge Quality

GWE have undertaken an assessment of the expected requirements for the proposed receiving environment options.

Discharge quality limits are expected to be derived from the potential effects on a number of different elements, including overall water quality, ecology and cultural values. This will be determined as part of the substantive application's design stage which will include a comprehensive AEE.

Table 4 outlines the expected average discharge quality targets the WWTP would be expected to reliably achieve under a discharge consent and are in-line with current best practice within New Zealand for discharges to water. NOTE – Taumata Arowai have released draft standards for discharges of effluent to the receiving environment. It should be noted that the discharge from the MBR or MABR WWTP will far exceed the quality requirements.

Table 4: Anticipated Average Discharge Quality Requirements

PARAMETER	RAW COMBINED INFLUENT	TREATED DISCHARGE (AVERAGE)	95TH PERCENTILE	REMOVAL % (AVERAGE)
5-Day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	400	10	15	97%
Total Suspended Solids (TSS)	450	10	15	97%
Total Nitrogen (TN)	90	5	10	92%
Total Phosphorus (TP)	50	1	3	97%
Faecal Coliforms (FC)	$>1x10^8$ CFU/100 mL	<10 CFU/100 mL	<50 CFU/100 mL	>99%

Note:

[1]All concentrations in mg/L unless otherwise stated.

GWE expects that an MBR or MABR WWTP will be capable of achieving the limits identified in Table 4 with the use of chemical dosing, including supplementary carbon dosing for TN removal and aluminium sulphate (or similar) for TP removal.

As a comparison the nearby Pukekohe Wastewater Treatment Plant is currently operating with the following Discharge Quality Requirements:

Table 5: Pukekohe WWTP Average Discharge Quality Requirements

PARAMETER	TREATED DISCHARGE (AVERAGE)	PERCENTILE
5-Day Carbonaceous Biochemical Oxygen Demand ($cBOD_5$)	<12	90th
Total Suspended Solids (TSS)	<18	90th
Total Nitrogen (TN)	-	-
Total Phosphorus (TP)	<18	-
Faecal Coliforms (FC)	<1000 CFU/100 mL	90th

Consequently, the anticipated discharge quality generated from an MBR or MABR WWTP will exceed that currently consented at Watercare's Pukekohe WWTP.

8 TREATED WASTEWATER REUSE

Highly treated wastewater from the MBR can be reused for non-potable purposes such as irrigation of landscaping, ecological restoration areas, industrial use, golf courses or showgrounds. This reduces demand on water resources and supports cultural and environmental outcomes.

However, further investigation to determine actual quality standards will be required at the substantive application stage.

9 BENEFICIAL REUSE AND DISPOSAL OPTIONS

Once the wastewater has been treated to there are a number of beneficial reuse and disposal options available. These options include

- Land based application using PCDI.
- Discharge to a land contact system or wetland and then discharge to freshwater.
- Direct discharge to the Waikato River.
- A combination of the above.

We have outlined these options below.

9.1 Land Disposal using Pressure Compensating Drip Irrigation

PCDI wastewater disposal is common activity within Auckland and New Zealand. Large scale PCDI disposal schemes in New Zealand include the Kinloch Golf Course irrigation scheme and the Omaha Flats WWTP disposal. Further to this, there are a number of smaller subdivisions within NZ that are located outside of council reticulation service areas which utilise a centralised WWTP, with the disposal of treated wastewater to a PCDI field including Opito Bay and Ongare Point.

A land disposal option would require extensive land areas as it would need to cover the peak flow at a disposal rate that would not result in adverse effects, including runoff to sensitive areas including freshwater receiving environments or ponding, particularly during the wetter winter months.

Treated wastewater is expected to have very low levels of nutrients, well beyond the requirements of a land disposal system.

A land disposal option avoids any discharges into sensitive areas and can assist with providing essential water and trace nutrients to maintain vegetation and bush, particularly during extended dry periods.

At the substantive application stage the following would need to be investigated and the site selection for a land disposal system would follow best practice procedures:

- Site investigation to determine land application rates.
- Determine nutrient loadings.
- Determine setback distances from surface waters and other land features.
- An assessment of slopes.
- Determining suitable reserve disposal areas.

The disposal area will be separated into zones and subzones to provide resting periods and to ensure an even distribution of the hydraulic load.

9.2 Polishing Wetland/Land Contact Device and Discharge to Surface Water

Following treatment, the wastewater can be further treated using a polishing wetland or land contact device that may meet cultural requirements of local Iwi.

A combination of vertical and horizontal flow wetlands will enhance water quality, provide a habitat for flora and fauna., provide a high level of amenity value for the development prior to the discharge of water to freshwater including any tributary of the Waikato River (via a permanent stream/inland tributary) or direct discharge to the Waikato River.

NOTE – a combination of land application and wetland/surface water discharge would provide considerable flexibility for the Project to manage wastewater, including as the discharge increases over time with development of the Project's stages.

These options can be considered at the substantive application stage.

10 OWNERSHIP AND MANAGEMENT

For the successful management of wastewater generated from the development, a strong management framework must be implemented and operated during the life of the resource consent and detailed through the future conditions of consent. Ownership and management options include:

- Private utility management.
- Body corporate structure.
- Vesting with Council (subject to acceptance and meeting minimum design guidelines).

The above options will be investigated at the substantive application stage.

11 CONSENTING PATHWAYS

Resource consents will be required for discharges to land, water, and air (odour). Key matters include effects on the Waikato River, cultural values, and technical compliance with best practice within New Zealand.

The Project will also need to ensure compliance with any relevant sections of the Water Services Act 2021.

12 WASTEWATER GENERATED FROM FARMING ACTIVITIES

We understand that some of the proposed activities may generate farm or dairy type wastewaters within the development. Whilst we do not know the extent of the activities, farming activities have the potential solid and liquid wastes that can cause environmental and public health issues. Within NZ, farm dairy effluent (FDE) is managed through a combination of containment, treatment, and land application systems which are designed to protect water quality and maximise nutrient reuse. The effluent typically originates from milking sheds, feed pads, and standoff areas, and contains valuable nutrients (nitrogen and phosphorus).

Treatment is often simply containment devices such as sealed ponds and tanks, which are sized to ensure farm effluent can be stored during periods when land application is unsuitable e.g. during wet winter weather.

Land application is the most common method of effluent reuse with irrigators used to apply effluent to pasture or crops. These systems must be carefully managed to avoid runoff, ponding, and contamination of waterways. Best practices include applying effluent only when soil moisture conditions are suitable, maintaining buffer zones around sensitive areas, and keeping detailed records of application rates and weather conditions.

Regulatory oversight is provided through both national and regional frameworks. Nationally, the Resource Management Act 1991 and the National Environmental Standards for Freshwater set baseline requirements for effluent discharge and stock exclusion from waterways. Regionally, councils such as Waikato have specific rules (Plan Change 1) governing effluent application rates, pond design and sealing, buffer distances, and consent requirements.

Overall, effective farm and dairy wastewater management in New Zealand requires a combination of well-designed infrastructure, informed operational practices, and adherence to both national and regional regulations. This will be investigated at the substantive application stage and once activities have been confirmed.

13 CONCLUSIONS

A centralised WWTP located at Yes Valley, based on MBR or hybrid MABR/MBR technology, is feasible to service the Pokeno Housing and Tourism Project. The system can achieve stringent discharge standards, minimise environmental and cultural effects, and provide flexible discharge options. The WWTP can be designed to be scalable to treat either scenario of 5,000 or 10,000 m^3 of wastewater from the Project and Pokeno and the receiving environment can accommodate land contact devices and this discharge. MBR or hybrid MABR/MBR technology provide high quality treatment, exceeding required standards. This minimises effects on aquatic environments, and exceeds the discharge parameters from the nearby Pukekohe WWTP.

14 LIMITATIONS

This report has been prepared for the sole benefit of **Pokeno Developments NZ Ltd** as our Client, their appointed representatives, and those reviewing/evaluating the application for Referral under the FTAA according to their instructions, for the specific objectives described herein. This report is qualified in its entirety and should be considered in the light of our Terms of Engagement with the Client and the following:

a. Data or opinions contained within the report may not be used in other contexts or for any other purpose without our prior review and written agreement. Any reliance will be at the parties' sole risk.

b. No responsibility is assumed for inaccuracies in reporting by the information providers. In no event, regardless of whether GWE 's consent has been provided, does GWE accept any liability, whether directly or indirectly, for any liability or loss suffered or incurred by any third party to whom this report is disclosed placing any reliance on this report, in part or in full.

c. GWE has relied on information provided by the Client and by third parties to produce this document and arrive at its conclusions

APPENDIX A

EXPERIENCE AND QUALIFICATIONS

GARETH WILLIAMS

DIRECTOR

QUALIFICATIONS

- BSc (Hons) Environmental Technology
- Master of Research Innovative Manufacturing (Water and Wastewater)

MEMBERSHIPS

- WaterNZ

CAREER HISTORY

- GWE Consulting Ltd, Director (2011-present)
- Andrew Stewart Ltd (2006-2011)
- Beca Ltd (2004-2006)
- ARL Consulting (2000-2004)

CONTACT INFO

s 9(2)(a)

Gareth is the Managing Director at GWE Consulting Ltd overseeing a team of 40 engineers and scientists. Gareth has 25 years' experience in all aspects of water and wastewater treatment, delivering residential and commercial projects in Europe, New Zealand, Australia and the Pacific Islands.

Gareth's role involves detailed treatment and disposal options studies, assessment of environmental effects, client liaison, resource consent applications, and project implementation. He specialises in innovative on-site and decentralised system design for small community water and wastewater treatment systems.

AREAS OF EXPERTISE

- Municipal water/wastewater treatment and process design
- Industrial wastewater treatment and process design
- Onsite and decentralised wastewater treatment and disposal
- Water safety plans
- Commissioning
- Resource Consent Acquisition
- Compliance monitoring and management
- Iwi Consultation
- Expert witness

RECENT RELEVANT PROJECT EXPERIENCE

GWE Consulting ltd
Role: Director

Responsible for the following:

- Wastewater treatment plant design – on site and decentralised (including industrial/food/trade wastewater).
- Potable treatment plant design.
- Resource consent applications for wastewater.
- Project management.
- Peer review of municipal/industrial wastewater treatment and disposal system designs.
- Troubleshooting.

Clients include developers, food manufacturers, architects, and planners within the Auckland and the wider Region. Specific projects include:

- Van Den Brinks – Wastewater Process Engineering input to Karaka, Tuakau and Mt Wellington sites. Primary Treatment (DAF/Chemical treatment) and Biological Treatment (SBR). Peer review of primary treatment options at Tuakau - $2.5m project (flow balancing, DAF, and discharge to sewer).
- Tegal Foods - Wastewater Process Engineering input to Drury site. Primary/secondary treatment systems.
- Opito Bay subdivision – 91 residential lots. Process design of irrigation system.
- DTZ/UGL Ltd – providing professional services in the field of water/wastewater treatment for Auckland Council Southern Region.

- Auckland Council – processing and peer review of wastewater discharge consents within the Auckland region for the Natural Resources and Specialist Input Department.
- Auckland Council – design, resource consenting, tender management and implementation of the Muriwai Surf Club wastewater treatment and disposal system.
  - BP New Zealand.
  - Bombay Re-configuring primary/secondary treatment system with new aeration system, inlet works and sludge treatment.
  - Dairy Flat Service Station – water/recycled wastewater systems.
  - Bombay Service Station – borewater upgrade and WSP.
  - Kumeu Service Station – WSP and compliance review.
  - Karaka Service Station – water process design and WSP.
  - Wairakei Service Station – water process review and compliance management.
  - Waipapa Service Station - water process review and compliance management.

Andrew Stewart Ltd
Role: Water and Wastewater Manager

- Water and wastewater treatment plant design.
- Land based application of treated effluent.
- Project management.
- Peer review of wastewater treatment and disposal system designs.
- Business development within New Zealand.

Selected projects include:

- Metrowater (now Watercare) – Consent renewal for the Owhanake wastewater treatment plant on Waiheke Island (80 m^3/day). Fit for purpose assessment of existing treatment plant and discharge of UV disinfected effluent to wetland and Matiatia Harbour.
- Piha Domain and Campground – detailed design, contract management of a 36.1 m^3/d treatment plant. Disposal to land via land-based application of UV disinfected wastewater. PHRMP assessment and implementation.
- Karekare Surf Club – Peer review of disposal field options for resource consent application.
- Karekare Public Toilet – Wastewater treatment Plant design and project supervision. Disposal of UV disinfected effluent to a sensitive dune environment. Prelim design of water treatment system.
- Waitakere Railway Station Public Toilet - Wastewater treatment Plant design and project supervision.
- Piha Domain and Campground – investigations and concept design of new wastewater treatment and dune-based disposal system in a sensitive receiving environment.

BECA
Role: Wastewater Process Team Leader

Responsible for the technical management of the Auckland wastewater team within the Water and Environment business unit. Additional duties include marketing the capability of Beca within the industrial and municipal sectors. Selected projects are detailed below:

- Various overseas (China/Thailand) food manufacturing plants – process design of primary/secondary treatment plants e.g., Soymilk processing, dumplings, etc.
- Christchurch WWTP - Peer review for upgrade of two new thermophilic sludge digesters
- Carter Holt Harvey, Kawerau - Design of new buffer basin facility for solids removal, flow balancing and temperature reduction from CTMP liquor (paper mill effluent).
- Carter Holt Harvey, Kawerau - Project managed installation of long-term centrifuge trial unit for dewatering domestic sewage sludge.
- Solid Energy New Zealand, Stockton - Coal runoff treatment options study for the removal of coal fines, pH correction and metals removal prior to discharge. The options identified included lamella technology, lagoons, conventional clarifiers, and DAF technology.
- Napier CC - Sludge treatment and disposal options study including novel drying and composting technologies.

ARL Consulting Ltd
Role: Principal Process Engineer

Omex Environmental
Role: Technical Manager

Hyder Consulting PLC
Role: Process Engineer

TECHNICAL PAPERS

- Annells, D.H. & Williams, G.H., (2002) Foot and Mouth Disease Burial Site Leachate Disposal – A Technical and Commercial Appraisal, 2nd Biennial Conference on Management of Wastewaters (CIWEM)
- Williams, G.H and Houltham A, (2007) – Decentralised Wastewater Management – A Series of Case Studies – NZWWA Annual Conference
- Williams, G.H and Andrew A., (2009) Ensuring a Quality Outcome – experiences in delivering a three-cubicle toilet block in a semi-rural location – NZWWA Annual Conference
- Williams, G.H and Andrew A., (2011) Ticking all the Boxes – A Cost Effective Installation, Low Running Costs, High Quality Effluent and Consent Compliance! Achieved using a Textile Packed Bed Reactor - WaterNZ Annual Conference
- Williams, G.H and Andrew A., (2011) A Quality Outcome for Piha – Wastewater Treatment and Disposal at one of New Zealand's Premiere Tourist Destination - WaterNZ Annual Conference