Waitakere City Council
Te Taiao o Waitakere

Action Plan 2010

for

improving on-site wastewater treatment & disposal in Waitakere City

September 2010

ON-SITE WASTEWATER LIAISON GROUP

Document Information

Author	Mark Essex:	Qmex Limited, WLG Project Manager (2005-10)
Reviewer:	Tony Miguel: Ann-Marie Worth:	Deputy Director City Services, WLG Project Sponsor Services Delivery Manager, WLG Project Director
File Name	wlg action plan 2010_v1.5 internal.doc	
Version	1.5 internal	
Status	Final	
Create Date	Monday, 10 November 2008	
Last Update	Thursday, 7 October 2010	
Access	Internal Council use only	
Abstract	An important outcome of the 2005 *Water & Sanitary Services Assessment* was formation of the **Waitakere City On-Site Wastewater Liaison Group** comprising staff members, councillors and community representatives. The objective of the group is to implement best practical options for the improvement of on-site wastewater systems, with the aim of improving receiving environment water quality and reducing public health risks associated with on-site wastewater disposal. An important early output from this Group was the August 2006 *Action Plan for Improving On-Site Wastewater Disposal in Waitakere City*. This document is the second review of the original Action Plan 2006. It will be the final version produced under Waitakere City Council and recommends a way forward for the new Auckland Council. The risk assessment methodology of this report is based on the original Action Plan prepared for Waitakere City by URS New Zealand Limited (Aug 2006).	

Front & back cover image: Lion Rock and Piha Beach, looking north from the coast road, Dec 2008

Front insets: wormorator-plant filter-evaporator 'lo-tech' on-site wastewater system installed at Huia Hall & Museum; public meeting sponsored by the Piha-Karekare Local Water Agenda Group (Mar 2007); automated & alarmed hi-tech on-site wastewater system.

Contents

Tables

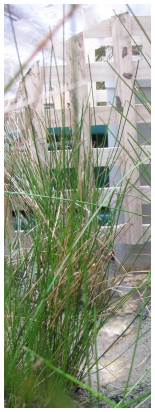
Figures

Executive Summary

Treating and disposing of domestic wastewater in rural areas has become more challenging in the last 20 years. Aging septic tanks and blocked drainage fields are causing pollution of groundwater, streams and beaches in Auckland's rural areas but can not simply be replaced with the same type of system now. The newer 'hi-tech' range of on-site wastewater treatment systems are effective but expensive to install, require regular, skilled maintenance to avoid failure and add another increment to the rising cost of household electricity. Added to these issues, the drainage area required to disperse treated effluent in Auckland's clayey soils can sometimes not be achieved by growing families needing to enlarge their existing homes but who live on smaller lot sizes.

In answer to these difficulties, and prompted by community claims of a vacuum in regional and local council leadership on this issue, the Council and community volunteers established the **Waitakere City On-Site Wastewater Liaison Group** (WLG) in 2005. The objective this group was simple: find practical and cost-effective solutions to solving the wastewater and water-related issues facing rural property owners. The Council was also concerned at the rising public health and environmental risks caused by failing on-site wastewater systems.

Now in its fifth year, WLG has already achieved significant advances in understanding the sources and processes involved in water pollution. The group has provided educational material and technology demonstration days, brokered agreements for improved wastewater treatment for community organisations, and lead the way in identifying and implementing exciting new technologies that promise to revolutionise on-site wastewater management over the next 10 years.



The most promising of these is "Project Pipi" constructed in September 2009 at the Huia Hall. It is a zero-energy, nil-discharge, non-odour and low-maintenance on-site wastewater system which has quickly become known as a 'no-tech' solution. This worm-plant filtration-evaporation system needs no power or pump for most situations and has fewer site constraints, being lightweight, modular and above ground. It also comes at substantially less cost than many hi-tech systems. Project Pipi has been under trial now for 1 year under the heavy flow conditions of a popular community hall and has proved to be reliable, flexible, easy to maintain and very cost effective.

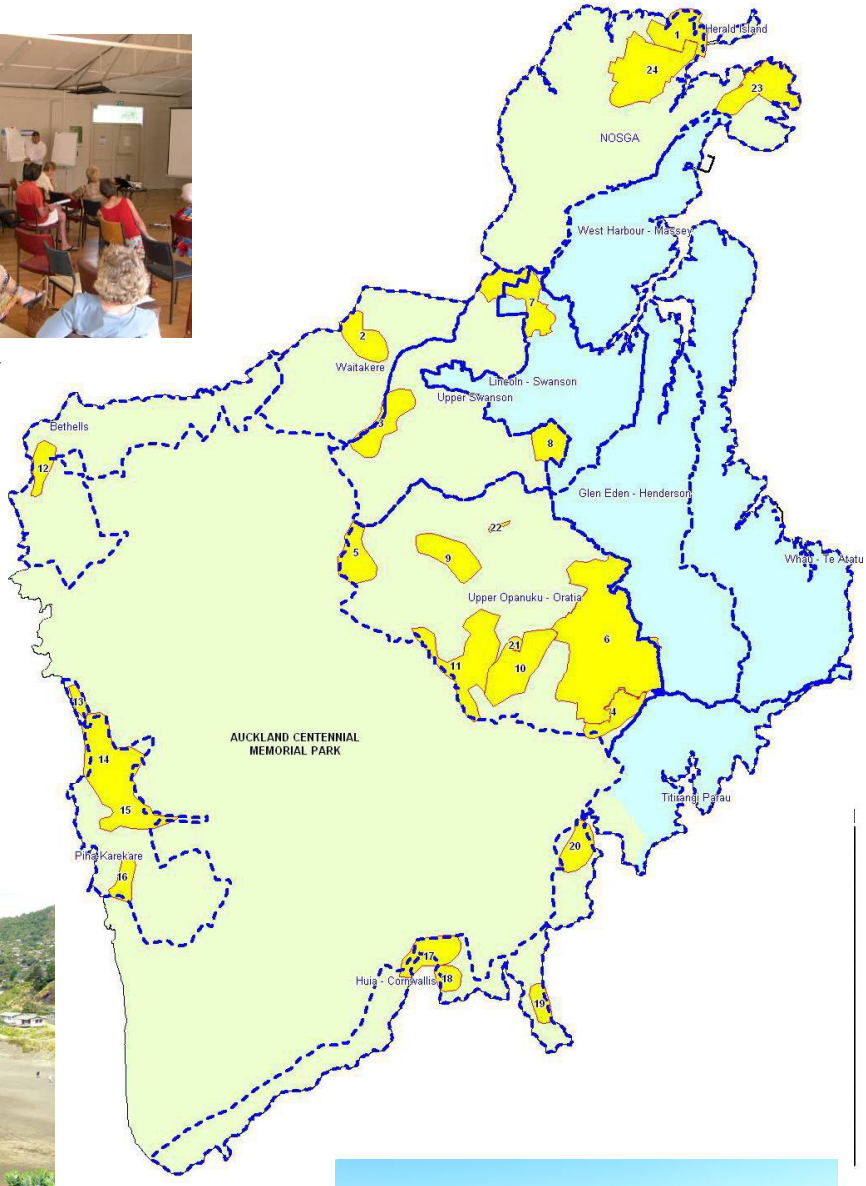
What now for WLG? On 1 November 2010 Waitakere City will be replaced by the new Auckland Council, with no guarantees that the group's forum and progress made since 2005 will continue. Yet with 45,000 on-site wastewater systems across the Auckland region, constructive collaboration between the new council and its rural communities will be come ever more important in minimising the public health and environmental risks associated with on-site wastewater disposal.

This final Action Plan of the Waitakere City On-Site Wastewater Liaison Group has been prepared with expansion in mind. If the collaborative council-community approach pioneered by WLG was rolled out across the region, then clean, reliable, and environmentally sustainable on-site wastewater treatment and disposal could approach best practice within 10 years, helping Auckland to maintain its position as one of the top 10 cities in the world.

ON-SITE WASTEWATER LIAISON GROUP

WLG sub-communities of rural Waitakere City:

Local Water Agenda Group meeting



Piha Lagoon

Huia Bay

1 Introduction

Since 2005, this Council has been facilitating a community-lead forum called the **Waitakere City On-Wastewater Liaison Group**, or WLG, made up of community representatives, city councillors and council staff. This community involvement approach had its origins in the 1990s and WLG was officially formed in 2005. This was in response to a strong request by Waitakere's rural communities for a more collaborative, council-community approach to resolving the wide variety of water-related problems faced by rural residents.

Number 1 on this list of problems was and is on-site wastewater management.

For many decades, the traditional septic tank has been the means of collecting, 'treating' and disposing of domestic wastewater to the ground. While effective for 20 to 30 years, the system eventually starts to break down as roots and effluent matter clog the drainage field and the septic tank itself becomes leaky.

In the last 25 years, effluent 'break-out' and odour from old septic tanks and drainage fields has become an unpleasant problem for a growing number of rural property owners. This is exacerbated by stormwater intrusion and overland flowpaths carrying break-out effluent down through lower properties and into streams and beaches. Water quality monitoring by Waitakere City since the mid-1990s shows regular high readings of faecal coliform and E-coli in west coast and Manukau Harbour streams, lagoons and beaches, and a major source of this pollution is aging septic tank systems.

More recent technological advances in mechanised wastewater treatment have lead to the emergence of 'hi-tech systems designed for the single dwelling situation. These include re-circulating sand filtration, packed bed reactors and aerated treatment systems. So promising has this technology been, that most new and replacement on-site wastewater treatment systems in the Auckland region are required to be hi-tech. However the efficiencies these systems bring come at a cost – typically $20,000 upwards for the average 5-person household, including consents and monitoring charges; total costs exceeding $30,000 are not uncommon. Hi-tech systems also require regular and skilled maintenance to keep them operating effectively. With the rising cost of power, installing and then running a hi-tech system has become a major cost issue for rural property owners.

Sadly, a growing number of owners are failing to maintain their hi-tech systems, leading to the same odour and effluent pollution problem as the old septic tank systems they replace.

Whether an old septic tank or a new hi-tech system, the treated liquid effluent still has to be returned to the ground according to strict limits related to the household flow generated, local soil type and percolation rate, ground contour and the disposal area available. As rural living has become more popular and old baches re-modelled into family homes, the effluent load per property has risen. Unfortunately for many owners, their available land area is just not sufficient to provide adequate ground disposal of treated effluent and in many cases new homes and additions to existing homes have been declined on this basis – in some extreme cases home-owners have even been required to remove an existing bedroom in order to gain resource consent for new on-site wastewater treatment systems.

While rural living has many attractions therefore, it can also be expensive, and the biggest cost item in comparison to urban living is on-site wastewater management. What was needed to tackle this growing problem? A champion, to work with and speak for the 6,000+ rural families of Waitakere City who live with this issue every day. WLG has provided this role since 2005.

1.1 Making a difference

WLG has given rural communities a collective voice in lobbying local and regional councils about the water and wastewater problems they face. In adopting a collaborative approach to developing options for better wastewater management, the Council and communities have also tackled related issues such as stormwater intrusion and flooding, groundwater pollution, water quality in streams and beaches, and potable water supply.

Change in some areas, such as regional design standards and consent cost relief, has been slow. In other areas the community itself, with support from Waitakere City, has reacted swiftly and effectively to mitigate sources of pollution and introduce better practices in wastewater management. WLG has sponsored a number of public meetings and technology demonstration days that have been well-attended, with a surprisingly widespread level of interest among individual property owners.

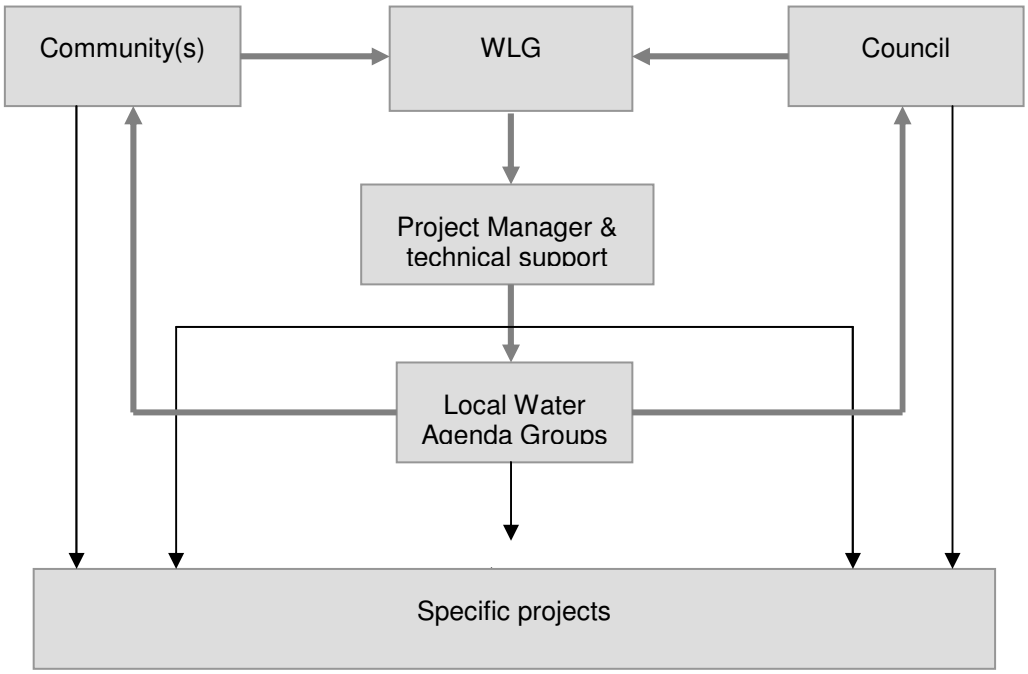
Rural residents have been genuinely impressed, and in turn motivated, by the Council joining with them as a facilitator and co-worker, rather than the more-traditional role as regulator and enforcer of rules. Infractions of site drainage standards have been found during the course of WLG investigations but the Council has declined to impose harsh penalties in favour of working with individual property owners to find a workable and affordable solution.

Section 3 explains the WLG process in more detail and specific actions that have made a difference for rural property owners over the last 5 years.

1.2 WLG structure

The success of WLG is attributable to both the Council and community representatives accepting their respective roles and responsibilities within the overall structure shown below:

Figure 1. WLG Structure



The Council has provided project management and technical support to WLG, and several improvement projects have gone forward for Annual Plan funding and implementation. The Council also arranges and facilitates regular meetings and coordinates follow-up activities for the group. This arrangement provides the community with access to various Council resources including meeting rooms and equipment.

Many but not all the community representatives belong to their local residents & ratepayers association. These are people that care about their local environment and are prepared to volunteer some of their spare time to bring about environmental and social improvements on behalf of their community. Their role is to explain local issues to the Council and to work with council staff to identify practical solutions. They then relay WLG initiatives back to their community and help to organise support and resources for their implementation.

Project management and technical support has been provided through a local independent consultant with experience in water and environmental engineering and catchment management. Thus in addition to project management tasks, this arrangement has added value and resource to the investigation and design aspect of WLG activities.

1.3 5-year outcomes

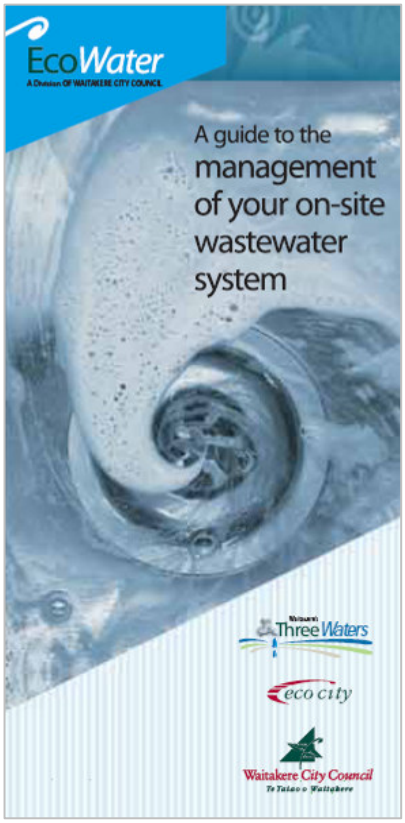
WLG has enabled the Council and rural communities to work together for positive change in the area of on-site wastewater disposal and 4-waters management, to a degree that would not otherwise have occurred.

The first 5 years' outcomes are summarised below under the 6-E categories of the Action Plan schedule in section 5:

Education	Targeted meetings, brochures, technology days and demonstration projects have markedly increased awareness and understanding of the water cycle and how individuals can take actions to reduce pollution and their impact on the environment. The WaterWise campaign, for example, teaches residents the relationship between water use and wastewater volume. As a result, community uptake of reduction initiatives has increased and a noticeable improvement in behaviour toward water and the environment is growing. Individual owners are now assisted to maintain their on-site treatment systems better and thus prolong their effective lives.
Environment	Monitoring of water quality in streams and beaches, together with site inspections, has lead to implementation of best practical options to resolve specific pollution sources. WLG input to bylaw and legislative reviews has improved the effectiveness of environmental guidelines in rural areas. The improved septic tank pump-out and inspection process has directly reduced pollution from on-site wastewater systems.
Efficiency	Feedback and participation from communities enabled the Council's ST pump-out service to be significantly improved, both in the scope and quality of service, and coverage. Progress is being made in developing standardised consent templates for on-site wastewater systems, which will reduce fees and approval times. A comprehensive database now tracks the condition & performance of over 5,000 septic tank on-site wastewater systems in Waitakere City; maintenance contracts must be renewed annually to receive rebates.

Economy	Feasibility investigation by the Council has provided rural residents with more cost-effective ways of managing wastewater, such as clustering. Innovative low-cost alternatives to wastewater treatment and disposal include a 'no-tech' system that requires no power and minimal maintenance, and costing around half that of hi-tech systems. More effort is required to ease the consent cost burden on residents. Encouragement is being given to owners of hi-tech systems - through WLG, LWAGs, the Council's cyclic pump-out and inspection service, and through consent-related advice - to understand that ongoing maintenance of these systems is crucial to their basic function and that maintenance contracts need to be renewed annually.
Engineering	The Council employs local contractors to resolve wastewater-related problems such as stormwater intrusion and overland flowpaths. Council wastewater treatment facilities at Piha are to be upgraded to cater for long term growth and provide treatment for two local community organisations. Wastewater options investigation for Huia-Foster Bay has clearly shown that on-site wastewater disposal is markedly cheaper for residents that any form of community-central or Council scheme, and thus individual commitment from individuals to make this approach work to their advantage in increasing.
Enforcement	The Council has continued to meet its underlying obligations to ensure that public health and environmental risks from on-site wastewater disposal have and are being minimised. However through the WLG process, this is being achieved more effectively by means of education and collaboration with the community, rather than taking the traditional heavy-handed regulatory approach. Regional and local standards for new development are still being imposed but where possible the Council facilitates the process to achieve better outcomes for residents and the environment.

Figure 2. Educational tools help reduce costs and pollution



2 Context

2.1 The environment

The most essential resource for the future of human kind is pure water, vital for human health, biodiversity, irrigation, industry, transportation, tourism and recreation.

However, one third of the world's population already lives in areas where demand for water exceeds the supply. One fifth of all people have no access to clean drinking water whatsoever and over 6,000 people die each day as a result of water-borne pollution. Contamination of rivers and seas by wastewater is now a global health crisis of massive proportions – around half of the world's rivers are in serious 'burnout' due to man-made pollution.

The urgent need for sustainable, integrated water resources management was identified 18 years ago and subsequently endorsed at a number of international forums including:

- World Summit on Sustainable Development, Rio de Janeiro, Brazil (1992);
- Beijing Conference (1995);
- World Water Conference (2000);
- World Summit on Sustainable Development, Johannesburg, South Africa (2002);
- Third International Conference on Water Resources Management, Algarve, Portugal (2005); and
- Fourth World Water Forum on Integrated Water Resources Management. Mexico City, Mexico (2006).

The Rio Earth Summit's *Agenda 21* was formally adopted by Waitakere City in 1993 as the basis for its eco-city vision. Its integrated approach to water management focuses on the need for central and local government to encourage individual and community behavioural change in the way we capture water, store it, use it, and ultimately return it to the Earth's natural water cycle.

Natural eco-systems and processes, including the water cycle, are imperative for human life and development because they are intrinsic to the Earth itself, and we have no ability or technology to substitute for this 'natural capital'.

2.2 Waitakere's Three-Waters sustainability strategy

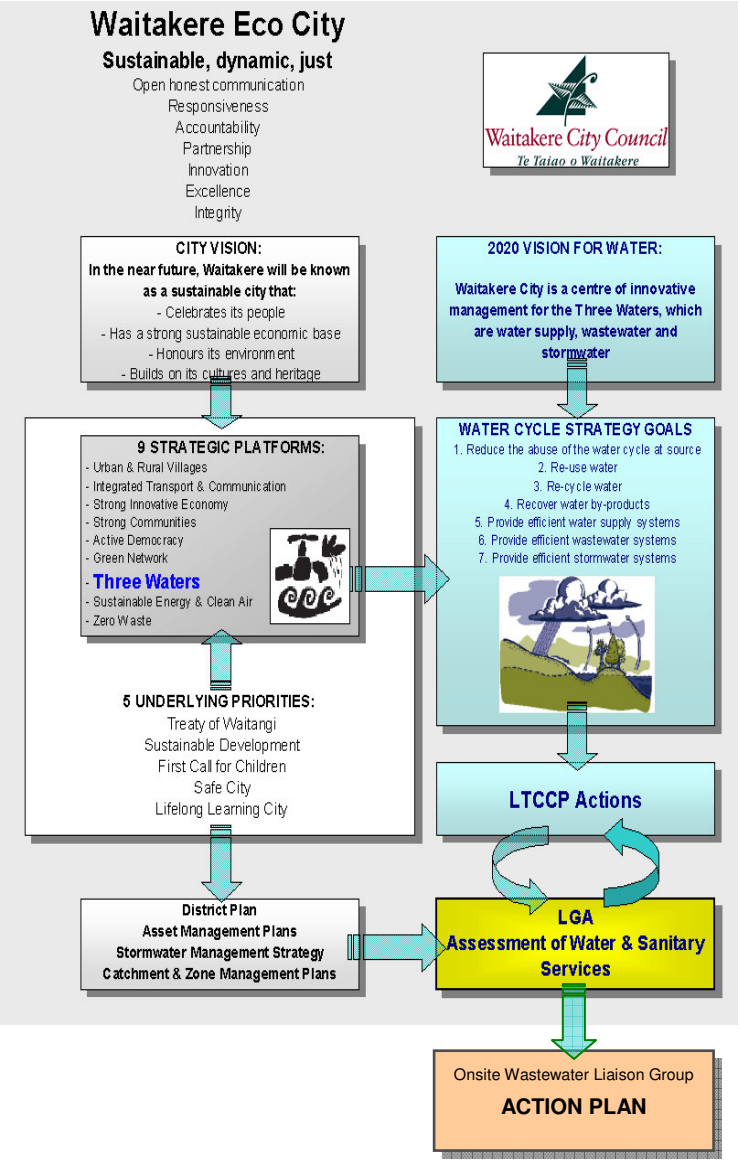
Waitakere as an eco-city has consistently responded proactively to global concerns about the environment. Experimentation here and around the world has shown that we can reduce the amount of water we use, and therefore the wastewater produced, simply by copying the natural water cycle. Water conservation simply means using water respectfully.

The 1987 World Commission on Environment and Development defined sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*".

Principle 1 of the Rio Declaration on Environment and Development states that "*Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.*"

Waitakere City has been working toward improving and encouraging sustainable water use across the Auckland region for some years now. The Council's 2020 Vision for its 'Three Waters' strategic platform has been: '*Waitakere is a centre of innovative management for the Three Waters*'. This is shown diagrammatically below in the overall context of the city's strategic plan framework. The framework's emphasis is on sustainability and the environment, with particular recognition of water as central to a healthy city.

Figure 3. Waitakere Eco-City strategic framework



2008 Environment Strategy

The *Environment Strategy* for Waitakere was adopted in November 2008 to give effect to Auckland's *Sustainability Framework* goals:

- Unique and outstanding environment;
- Pride in who we are;
- Resilient infrastructure;
- Reduce our ecological footprint;
- Put people at the centre of thinking & action;
- Build a carbon neutral future; and
- Think in generation not years.

Delivery on the Environment Strategy objectives has contributed towards implementation of the *Waitakere Ranges Heritage Area Act 2008* with regard to protection and enhancement of the area's natural values.

The Environment Strategy forms part of the Waitakere City *Long Term Council Community Plan* (2009-19) currently being delivered through its various activity and action plans, and provides goals and objectives to meet the challenges of climate change, managing the natural resources of biodiversity, air and water, and reducing the generation of waste over the next 10 to 50 years. This body of work will carry through to the new Auckland Council.

The key targets of the Environment Strategy are:

Table 1. Environment Strategy Targets

Green Network	• Complete an ecologically continuous network, which links the Waitakere Ranges along the stream and open space networks to the coastal areas by 2025.
Low Carbon City	• Reduce community greenhouse gas emissions by 40% per capita from the 2001 base by 2021. • Reduce corporate emissions by 50% from the 2001 base by 2021.
Integrated water management	• Decrease in per capita demand for the mains water by 25% by 2025. • Reduce wastewater overflows by 50% by 2025.
Waste into Resources	• 70% of residential waste and 35% of general waste received by the Transfer Station diverted from landfill by 2015.

Under "Integrated Water Management", important targets include:

- (Water) Demand remains within the Waitakere reservoirs capacity
- Identify and implement different ways water can be harvested and used
- Ensure that stormwater is treated to a level that maintains and improves stream and ground water quality to protect natural water resources
- Sustainable long-term wastewater management and treatment with reuse of biosolids and the water component
- Innovative management of on-site wastewater treatment and disposal

Working toward these targets has included implementing an action plan to reduce corporate and community greenhouse gas emissions, advocating for and facilitating sustainable transport modes, and continuing to manage the quality and quantity of stormwater collected and discharged within Waitakere.

The *Action Plan 2009 for Improving On-Site Wastewater Disposal in Waitakere City* has a key role to play in continuing to support Waitakere's integrated water management policies and targets, as these apply to rural communities outside the 'inner drainage area'. It also now provides a working model for adoption across the Auckland region.

Actions currently undertaken by the Council

Waitakere City provides a continual 3-yearly pump-out and inspection service for septic tank systems. The condition & performance of septic tank and hi-tech on-site wastewater systems is recorded in a comprehensive database, with a copy of the inspection results provided to every owner within one week of the site visit. This is followed up by notification for any systems found to be in danger of failure and one-on-one assistance is provided to owners on how to improve their maintenance actions to prolong the effective life of their system. Where a system replacement can not be avoided, the Council helps the owner to select a practical and cost-effective solution for their site.

The Council also undertakes an ongoing public health & environmental monitoring programme and posts water quality test results regularly on the public website. This includes monitoring and testing lagoon and bathing beach water quality in 13 areas and erecting pollution warning signs at swimming spots when required. The monitoring programme also includes sampling streams and stormwater sources around the city for the presence and concentrations of any wastewater pollution indicators, as well as heavy metals and chemical agents associated with urban development.

Assessment of Water & Sanitary Services

In April 2005, the Council completed the *Assessment of Water & Sanitary Services* (*WASSA*) as required under Part 7 Sections 125-129 of the Local Government Act 2002. In recognising the importance of community water supply and sanitary services, the Act required all territorial local authorities to assess the quality, quantity and adequacy of these services for each community within their jurisdictional districts, and to declare the available options for mitigating any risks associated with continuation of the services.

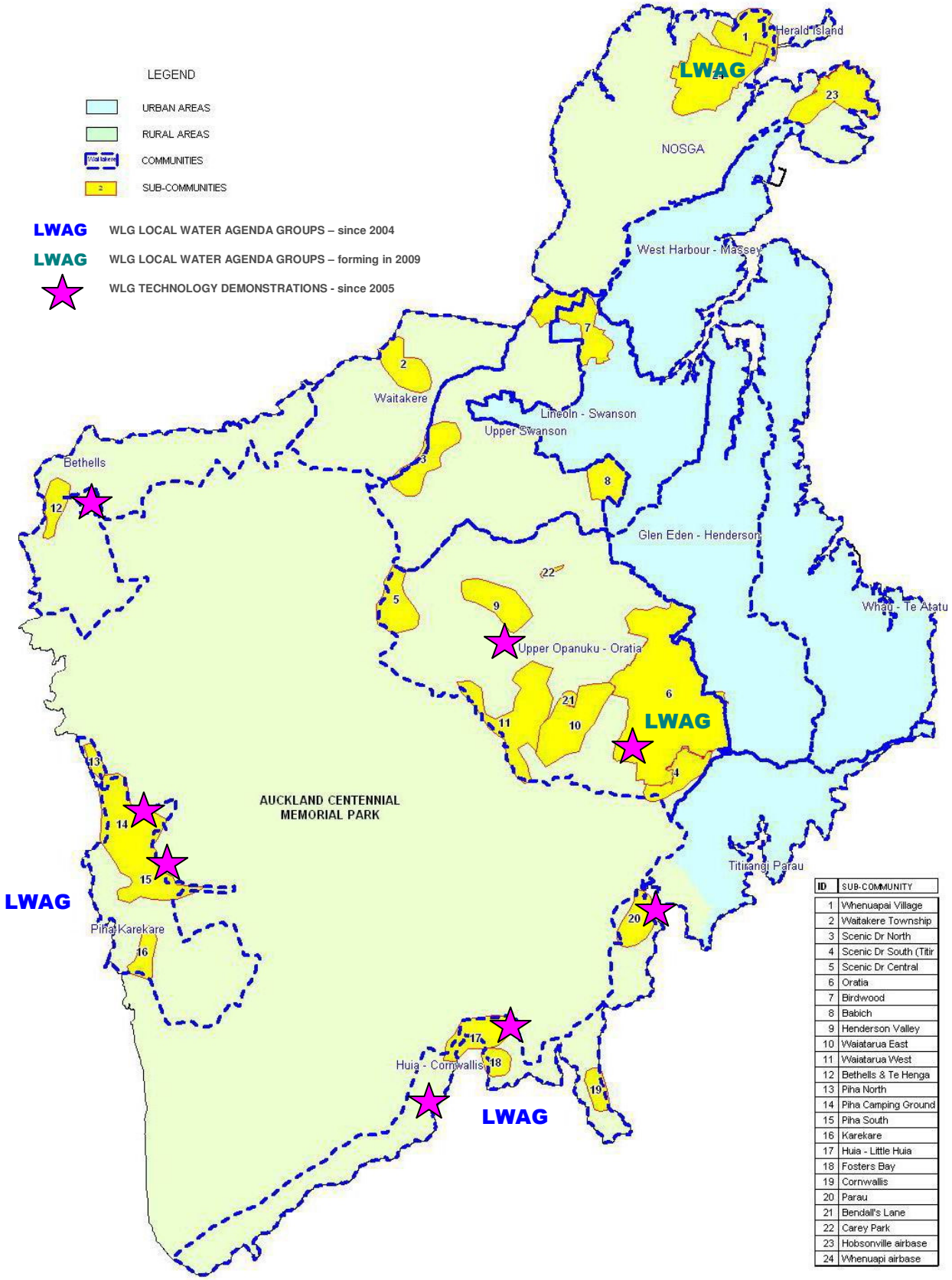
The Assessment for Waitakere included 21 rural communities outside the 'inner drainage area', which rely primarily upon on-site wastewater disposal methods. A risk assessment process considered the potential risk to public health associated with on-site wastewater systems and established a priority basis for addressing issues in these communities.

The first 3-yearly review was completed in early 2009 for inclusion in the 2009-19 Long Term Council Community Plan.

To meet the Act's requirements at a tactical level, the Council developed the 6-E's framework for assessment and promotion of projects to its future works programme. These categories are: *Economy, Efficiency, Education, Environment, Engineering* and *Enforcement*.

The *Action Plan 2009 for Improving On-Site Wastewater Disposal in Waitakere City* gives effect to Waitakere's strategic framework and the *WASSA* tactical plans in rural areas, with regard to wastewater collection, treatment and disposal by on-site means.

Figure 4. Sub-Communities of the *WASSA* 2005 services assessment



2.3 The Auckland region

Waitakere City Council will cease to exist from 1st November 2010, to be replaced by local board representation on the new Auckland Council. Waitakere's (April 2008) submission to the Royal Commission of Enquiry into Auckland's Governance was made "… *with a clear commitment to portray what is best for the people of Waitakere City within the context of what is best for the region*".

Now that the region's new governance structure is in place, will the advances made in on-site wastewater management in Waitakere City be rolled out across the region?

The following sections are provided to illustrate what can be achieved by connecting the Council with its communities, through a collaborative forum such as WLG.

3 WLG 2005 to 2010

3.1 Social

Local Water Agenda Groups

As part of WLG's Action Plan initiatives, two very effective Local Water Agenda Groups (LWAGs) were established with the Huia-Cornwallis and Piha-Karekare residents & ratepayers associations.

Council officers and community volunteers examine local wastewater and water-related issues and develop practical approaches to gathering reliable information and implementing effective solutions. Their work has included site surveys of septic tank condition & performance, water audits, specific wastewater disposal and stormwater improvement schemes, and sponsorship of West Coast Technology Open Days. Exciting technology demonstration projects are also underway, which are promoted by the LWAGs through the Council's Annual Plan funding process.

Both LWAGs continue to be successful in proactively improving water, wastewater and stormwater practices in these two iconic west coast communities. Other communities are encouraged to seek representation on WLG and thus help to implement the Action Plan's laudable objectives in their own area.

LGA Bylaw review process

The Local Government Act 2002 required that every local authority review its existing bylaws before 1st July 2008. The LGA review process involves first determining whether a bylaw is the most appropriate way of addressing the 'perceived problem' and a special consultative procedure must be followed.

In the case of Waitakere City's Bylaw No. 19 *Septic Tanks & Disposal Systems*, a sub-group of WLG was assigned to conduct the review, which concluded that a bylaw was not the effective way of dealing with ownership, operation and maintenance of on-site wastewater systems. Instead, the Council opted to manage on-site wastewater issues through the already-successful WLG forum and Action Plan, along with existing septic tank pump-out services. In this way, the principles of the old bylaw have and are being accomplished more effectively.

The LGA bylaw review process thus established the WLG and Action Plan as a practical fit-for-purpose strategy for effectively managing on-site wastewater disposal into the future.

Piha clubs and council working together

Part of the Council's contribution to improving on-site wastewater disposal in Piha has involved advising several clubs on practical and economic ways of resolving their own on-site wastewater issues. Elevated E-coli readings in the Piha stream and lagoon indicated that the clubs' systems were contributing to this problem.

Piha Surf Life Saving Club and United North Piha Lifeguard Service responded proactively to this assistance and making needed improvements.

Due to site constraints however, the Piha RSA and Bowling Clubs were unable to find a workable and economic on-site solution. Instead, as part of the Piha Domain wastewater treatment plant upgrade design process, the Council has developed a practical agreement with each club that enables them to connect to the new system. The clubs will pay their portion of the capital and ongoing operational costs, while the Council will continue to maintain their systems under the treatment plant maintenance contract. In the interim, before the plant upgrade is completed in late 2010, each club now operates a blind storage tank that is pumped out at regular intervals. Once connected to the Domain treatment plant, these tanks become flow buffer vessels that allow each club's outflow to be kept at an economical 2 m3/day maximum.

While the clubs fund their own improvements, the Council has undertaken the wastewater servicing investigations in the Domain area and through that system is also providing relief for consent fees. EcoMatters Environment Trust, under contract to the Council, conducted water audits and proposed a range of practical solutions to assist clubs in minimizing their water use, thus reducing wastewater production and the cost of tank water refills.

Had the WLG forum not already been functioning successfully, both the RSA and Bowling Clubs may have faced closure and the community would have lost two popular and important community services. Recent water quality tests in the stream and lagoon confirm that a noticeable portion of the pollution problem has been resolved.

West Coast Technology Open Day

WLG's Action Plan item 15 produced a very successful outcome in the first West Coast Technology Open Day, a one-day family festival held at the Piha Domain on November 10th 2007. While children played games and competitions, their parents viewed a wide variety of new technologies being offered to rural residents for fresh water collection and treatment, sustainable energy solutions, and on-site treatment and disposal of domestic wastewater.

Over 25 vendors were present to display their products and systems, and to offer guidance and information packs to the 3,000 or more people that attended the festival. Feedback from the community strongly supported the Council's initiative to provide public education and direction of this kind.

A similar but smaller event was held in Huia in 2008 and the Council now provides an information stall at the annual Huia Festival each Easter Sunday.

Community enterprise model

In Scotland, remote rural communities have been benefitting from setting up their own 'community enterprise', through which the community itself markets a saleable product and/or service to meet a local need. Modest profits from sales are returned back into the community for further socio-environmental improvements. One Scottish Isle for example installed a second-hand wind turbine and now sells excess power back to the national grid.

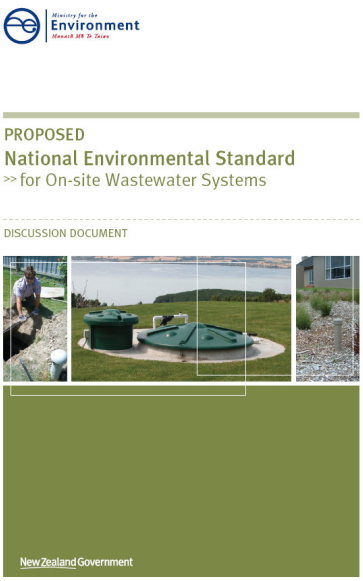
In rural Waitakere, the primary need is a practical and economic solution to on-site wastewater treatment and disposal. WLG believes it has found the 'product' to meet that need and which could be readily marketed through R&R associations to local property owners. The system has been trialled at Huia Hall under the name of Project Pipi (see Environmental below) since September 2009 and has proved very successful. Because of its simplicity, an installed system of this kind could be marketed through local R&R associations at significantly cheaper rates than most mechanical wastewater systems currently on the market.

Although early days yet, both the Piha-Karekare and Huia-Cornwallis communities have been exploring this concept with the Council and Simple Wastewater Solutions Ltd, the system's maker. Over time, uptake of this system in rural communities would bring significant reductions in stream and harbour pollution, as aging and failed systems no longer discharge pollutants to the ground.

Refer **Appendix A6**

3.2 Environmental

National Environmental Standards



In 2009 the Ministry for Environment proposed a national environmental standard for on-site wastewater systems, which would include a 3-yearly pump-out requirement with an inspection & warrant-of-fitness process. The standard would be the responsibility of regional councils to implement and oversee, but it would still allow the process to be continued by local authorities that have the capability to do so.

This was a welcome initiative and vindication of a process that Waitakere City and community representatives have developing for some time through WLG and the Local Water Agenda Groups. Both the Council and several Waitakere community groups tendered submissions supporting the standard and continued operation of the Council's own 3-yearly system.

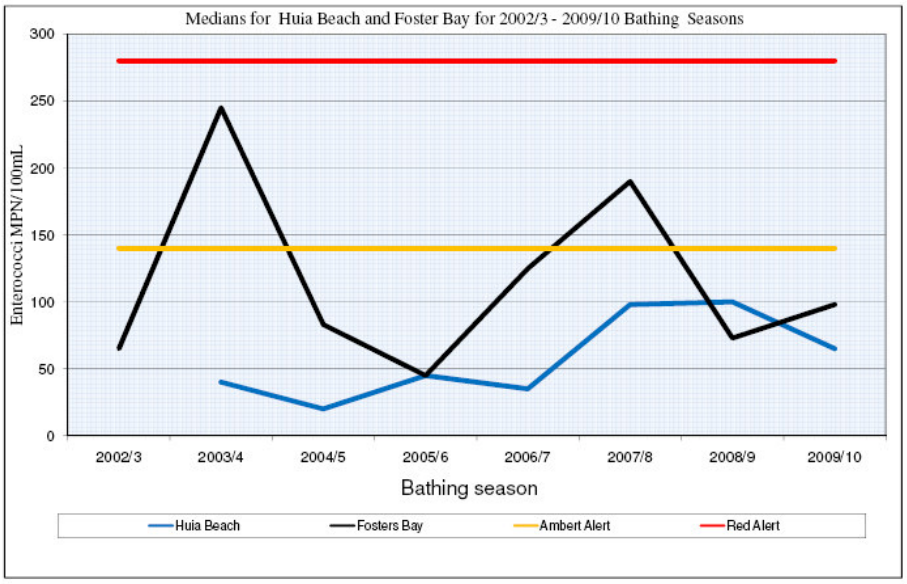
Water quality monitoring

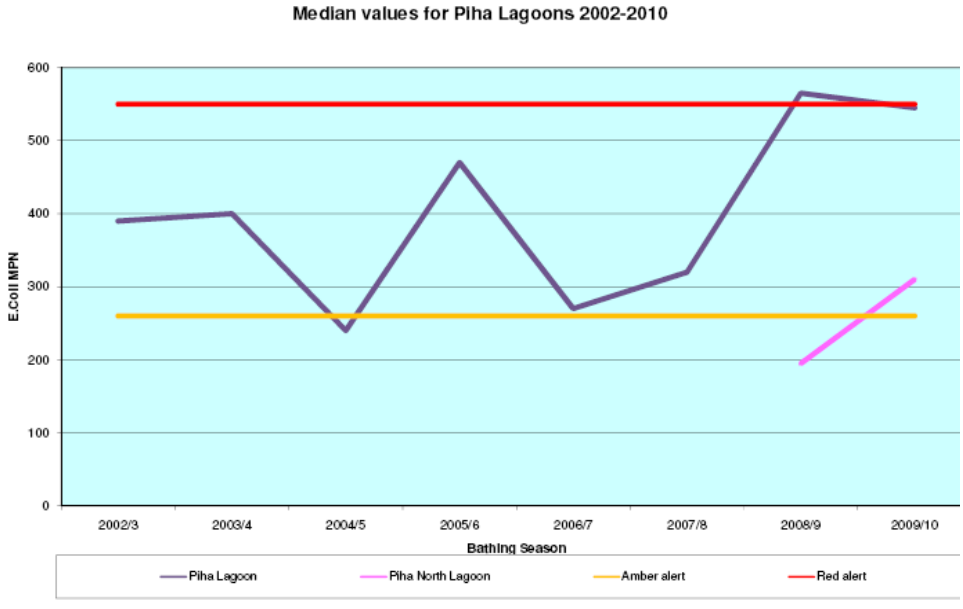
As a result of WLG activities, the Council has expanded its water quality testing regime on West Coast beaches, streams and lagoons, and has made the information more accessible to the public.

This work has confirmed local concerns over the years, that there is a relationship between water pollution and onsite wastewater discharges, as these systems age and deteriorate. It has also shown that animal and vegetative sources - ie ducks, farm animals, domestic pets and naturally-decaying leaves – do contribute significantly to pollution readings.

Median E-coli values from 2002 to 2009 for Huia-Foster Bay and the Piha lagoon are shown below. Note that both sites show a tangible rise in this wastewater pollution indicator over time.

Figure 5. Median E-coli values for Huia and Piha

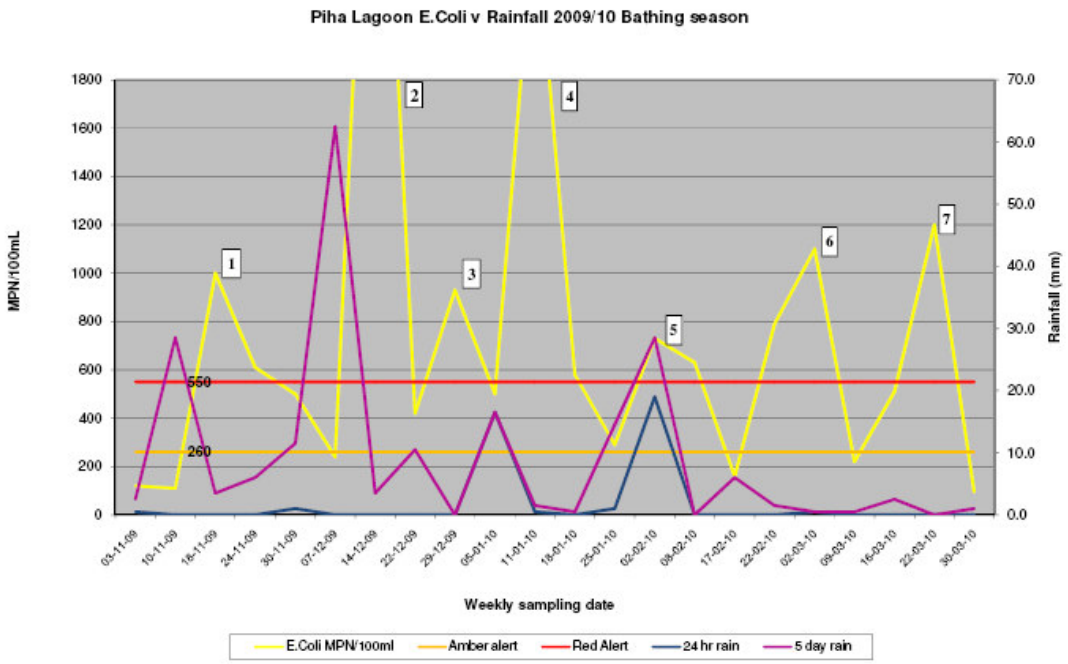




Source: Aqualab NZ Ltd, 2010

The water quality monitoring programme has made it possible for the Council to issue timely warnings to beach users at times when test results indicate that pollution may exceed the Ministry of Health guidelines for beach and lagoon bathing. The following daily results for the Piha lagoon summer of 2009-10 illustrate the relationship between rainfall and postcedent pollution readings; a major portion of this phenomenon is due to stormwater overland flowpaths passing through properties with poorly functioning on-site wastewater systems.

Figure 6. Piha lagoon E-coli vs rainfall (2009-10 summer season)



Source: Aqualab NZ Ltd, 2010

Test results are now regularly posted to the Council's website and the public are encouraged to check this information on:

http://www.waitakere.govt.nz/cnlser/pbr/beaches/waterquality.asp

The Piha Residents & Ratepayers Association, with assistance from the Council, has also taken the initiative to provide water quality test results for the Piha area. Residents and visitors to Piha are invited to check these results on:

http://www.piha.org.nz/?s1=projects&s2=water+quality

Marine and freshwater bodies monitored are in most cases used for contact recreation and are routinely assessed for faecal indicator bacteria as part of what is termed the Waitakere City Recreational Bathing Water Survey. Samples are collected on a weekly basis during summer (November to March), when recreational use of the beach and water is generally at its highest. Monthly sampling is undertaken during lower-use periods.

Monitoring programme results are compared with guidelines published by the Ministry for the Environment (MfE) and Ministry of Health (MoH), entitled '*Microbiological Water Quality Guidelines for Marine and Fresh Water Recreational Areas*' (MfE/MoH, 2003). The guidelines are designed to indicate public health risks associated with faecal contamination of water bodies used for contact recreation activities. Regular exceedances of the guidelines at beaches adjacent to areas with on-site wastewater treatment systems can indicate contamination from that source. The guidelines provide three modes for marine and freshwater bathing waters - surveillance/green mode, alert/amber mode and action/red mode.

Of the recreational water bodies monitored, the following are within close proximity to a sub-community serviced by on-site wastewater treatment systems:

- Armour Bay Beach (Parau sub-community);
- Bethells Beach (Bethells/Te Henga sub-community);
- Bethells Lagoon (Bethells/Te Henga sub-community);
- Cornwallis Beach (Cornwallis sub-community);
- Fosters Bay Beach (Fosters Bay sub-community);
- Huia Beach (Huia/Little Huia sub-community);
- Karekare Beach (Karekare sub-community);
- Karekare Lagoon (Karekare sub-community);
- Lake Wainamu (Bethells/Te Henga sub-community);
- North Piha Beach - north of Lion Rock (North Piha sub-community);
- Piha Beach - south of Lion Rock (Piha sub-community);
- Piha Lagoon (Piha sub-community);
- Piha North Lagoon; and
- Titirangi Beach (Scenic Drive South sub-community).

Refer **Appendix A7**

On-site wastewater investigations

Through the Local Water Agenda Group forum, the Piha-Karekare and Huia-Cornwallis communities requested that the Council investigate on-site wastewater system performance in their areas. This was in response to increasing community awareness of the polluting effects of aging on-site wastewater systems on local water bodies.

In 2006 the Council surveyed a voluntary 10% sample of on-site wastewater disposal systems in the Huia-Cornwallis rural community and found that up to 50% did not meet the standards for satisfactory condition and performance. The Council is working with the Huia-Cornwallis group to narrow down options for improvement of wastewater disposal by the local community. Interestingly, this has shown that properly constructed and maintained individual on-site systems are still significantly cheaper for the community as a whole than a community-scale treatment plant or pumping to the urban wastewater network.[1]

[1] *Huia Wastewater Strategy Report* – Environmex Ltd, July 2009

The Huia on-site survey followed the methodology used in a similar survey of Piha properties in the mid-1990s, from which similar results emerged. The Piha survey was repeated in 2007 on approximately 18% of properties in response to growing concerns of wastewater-related pollution in local streams and lagoons. While about 87% of the properties investigated had average-to-good on-site wastewater systems, 13% were below standard and of these, 8% were considered a moderate to serious health risk. 60% of those surveyed had traditional septic tank systems.

The Council is working through WLG to assist owners of below-standard systems to make the required improvements. This collaborative approach has been a hallmark of the Council's input to the WLG process and its LWAG groups, and local community representatives have conveyed their appreciation for the positive response this has engendered from local residents.

Inspection of on-site wastewater systems now encompasses all properties in the rural area of Waitakere as part of the Council's 3-yearly septic tank pump-out visits.

3.3 Economic

The septic tank pump-out contract

To assist rural property owners in maintaining their on-site wastewater systems in good order, the Council provides a rolling 3-year pump-out and inspection programme for septic tank systems. This service has been provided since 1998.

There are over 6400 individual on-site wastewater treatment and disposal systems currently operating in Waitakere. Standard septic tank systems account for 5,433 of these.

Under the Council contract EW04135C, Interclean Liquid Waste Disposal Ltd provides the inspection, reporting, pumping out and/or cleaning programme for septic tanks, long-drop toilets and grease traps. The cost of pump-out is covered as follows:

- "*A Rural Sewerage Charge be set as a* [annual] *fixed charge on a uniform basis under Section 16 of the Local Government* (Rating) *Act 2002 of $148.00 inclusive of GST upon each septic tank, long drop or grease trap for rating units in the Non-Drainage area of the City* (as defined in the Description of the differential Rating System and Method of Calculation of Rates) *that are scheduled to be pumped out by Council within the three yearly cycle*." (Long Term Council Community Plan and Annual Plan Special Committee, Minute 1194/2005).
- "*An Environmental Monitoring Charge be set as a* [annual] *fixed charge on a uniform basis under Section 16 of the Local Government* (Rating) *Act 2002 of $34.00 on all rating units in the Non-Drainage Area of the City* (as defined in the Description of the Differential Rating System and Method of Calculation of Rates)". (Long Term Council Community Plan and Annual Plan Special Committee, Minute 1195/2005).

Residents are first notified of the date range of pump-out visit by letter. The pump-out is undertaken on each septic tank on a rolling three-year basis and depending on the type of system present. Pump-out of long drop toilets is undertaken where practical but they are sometimes difficult to access.

Following each pump-out, the contractor (currently Interclean Liquid Waste Disposal Limited) provides an inspection report to the Council detailing the following:

- Whether pump-out was completed, or requires re-scheduling (including reasons);
- Property type (e.g. holiday home, public facility);
- System type;
- Tank data (e.g. sludge and scum depth prior to pump-out);
- Drainage field data (type and condition);
- System fault data;
- Separate greywater system, and,
- Occupational Health and Safety (OSH) incident or contractor damage.

A 'Leave-Behind Card' is provided for each resident, informing them of whether the scheduled pump-out was able to be completed or not (ie. dogs, locked gates etc) and any problems encountered. Information on each system, as relayed from the contractor, is entered into the Hansen database.

The Council and the contractor audit approximately 10% of tanks to ensure that pump-out has been undertaken properly. The tank is tested with a sludge meter, which is inserted into the tank through the inspection port (mushroom) and a sample of wastewater from the tank is taken. A comparatively clear sample indicates that pump-out of the tank has occurred.

The Environmental Monitoring Charge applies to every property in the rural area of the City. The charge provides for the cost of recording on-site systems and keeping the Hansen database up to date. It also covers the taking of water samples for the Council's stream, lagoon and beach water quality testing and monitoring programme. Results of water quality testing are posted on the Council's web site.

Where faulty or otherwise below-standard systems are found, the Council works collaboratively with these property owners to help them through the process of rectifying their system.

Pump-out frequency

A 2005 report '*Assessment of Pump-Out Frequencies for On-Site Wastewater Systems*" conducted by URS NZ Ltd on behalf of Waitakere City Council, concluded that the current 3-yearly pump-out frequency is within the range recommended by system manufacturers, on-site wastewater experts and pump-out contractors. The 3-yearly frequency has also proved to be the most efficient and cost-effective cycle for managing and monitoring over 5,400[2] septic tank systems across the city.

Waitakere City's 3-yearly pump-out model has been reflected by the Ministry for Environment in its proposed national standard for management of on-site wastewater systems.

Pump-out process improvements

A review of the septic tank pump-out contract process was undertaken in October 2007 through WLG. It was identified that the following improvements had been achieved in response to feedback from the On-Site Wastewater Liaison Group and individual customers:

- The content and fields of the Hansen database had been improved

[2] Over 400 previously unrecorded septic tanks have been found through the pump-out and inspection process in the last two years.

- Monthly pump-out schedules were now being issued by areas
- The pump-out report had been improved and the report time to residents reduced
- Added to the reporting process were:
    - a Drainage Field Report
    - a Customer Survey leave-behind report
- the Pump-Out Report and Drainage Field Report were now being copied to the Property Bag
- A new database created for customer satisfaction results
- All outgoing letters and notifications were reviewed
- The Contractor's contact telephone number had been added to the Letter of Notification and up to 48 hours notice was being given
- All pump-out vehicles had been overhauled and re-painted
- Satellite tracking devices had been installed on all pump-out vehicles to improve route efficiency and verification of pump-out actions and locations
- The ARC consent was being finalised and work on a new unloading building was about to commence
- A monthly progress meeting between EcoWater and the Contractor was now a regular event that included discussion of customer service performance and the potential for innovations and process improvements

Progress was again reviewed in August 2008 and the following additional improvements noted:

- The pump-out contract has been extended for a further 3 years[3]
- The database irregularities (eg number of tanks) are scheduled for reconciliation this (2008-09) financial year
- Contract costs increases are in line with recommended government parameters in NZS 3910
- Customer satisfaction survey replies are now being received regularly and reveal a high level of satisfaction
- Disputed actions are now being resolved via satellite tracking records
- Contractor delivery on KPI requirements is regularly 100%
- The rural "3-Waters Newsletter" is being sent out twice-annually and provides information on latest innovations, how to maintain and care for on-site wastewater systems, progress on demonstration projects and the results of customer feedback.

Pump-out cost savings

As a result of the improvements and efficiencies made to the pump-out process, the Council has lowered the annual Rural Sewage Charge from $158 to between $148.

[3] Council and the Auckland Transition Authority have approved for this contract be extended to June 2012. The Auckland Council is taking a keen interest in the Waitakere City Council approach to managing on-site wastewater issues and is considering implementing the process across the Auckland Region.

Piha Domain wastewater system

Waitakere City Council, through the Parks & Open Spaces Department, operates a wastewater collection, treatment and disposal system at the Piha Domain, under ARC Discharge Permit No. 27130 for a maximum daily discharge of 13 m3. The wastewater system consists of a variety of septic and flow buffering tanks, grease traps, sand filters and packed bed reactors, which are no longer suitable for the flows and influent quality now occurring at the Domain. Treated effluent is piped to a sub-surface drip irrigation system in the "Trees for Babies" reserve area of the Domain, between the Piha lagoon and beach. The system currently services the Domain toilets, library, campground showers, kitchen, laundry and manager's residence.

The ARC Discharge Permit expired on 31 May 2007. In accordance with Sections 37 & 92 of RMA, ARC agreed to put the permit renewal on hold while the Council investigated the best option for upgrading the system to meet current and future demands. The proposed upgrade works were submitted for ARC Resource Consent in November 2009 and, barring unforeseen delays, the Council plans to have the new treatment system operational for the 2010-11 summer season.

Through WLG negotiations, Agreement was reached with the Piha Bowling Club and RSA for connection to the upgraded treatment plant. This will provide each club with a maximum 2 m3/day allowable wastewater discharge and has prevented the real possibility of both clubs facing closure due to failed on-site systems.

This project has been a major win-win for the community and the WLG collaborative process, which brokered a practical and cost-effective solution where a more-traditional, enforcement approach was leading to the real possibility of closure for two important community organisations at Piha.

3.4 Cultural

While the social needs of Auckland's rural residents tend to be similar – comfortable housing, decent road access, waste collection and the like – each community has a distinct culture that is quite unique. Piha for example is a leading NZ surfing community with a growing café, camping and night-club scene, while Karekare just over the hill enjoys the surf in a quieter bush-living aspect. Huia and Cornwallis are different again, where calm waters and pristine native environment provide a sanctuary for fishing, boating and outdoor environment pursuits.

An important aspect of the WLG process is that it happens at the community level, with local representatives having a leading role in determining water-related policy, standards and improvement works. This enables the Council to understand and take account of local cultural values in a more effective and considerate manner than was the case in past years. This leads to better decision-making and a much higher degree of understanding and buy-in by the community.

3.5 New technologies

Over the 2008/9 bathing season, in conjunction with the routine recreational water sampling program, samples that were over the MfE marine "RED" alert (280 enterococci/100mL) were also analysed for a range of DNA 'markers' specific to human, herbivores, wildfowl and dogs. The results showed that a number of these human/animal sources were detected. While the human marker was not the most numerous detected, it did however render the strongest response of the markers found.

Figure 7. DNA 'markers' found in 2008-09 testing

Date	Markers Found
13 November 2008	Weak Human
18 November 2008	Weak Dog
10 December 2008	Positive Human, Weak Dog
29 December 2008	Positive Human, Weak Dog, Weak Wildfowl
12 January 2009	Not Detected
3 February 2009	Positive Human, Weak Dog
23 February 2009	Not Detected
10 March 2009	Weak Dog

Source: Aqualab NZ Ltd, 2010

By means of this new technology, it was possible to confirm two important questions that have concerned water managers until now:

- Stream and beach pollution readings include appreciable amounts of 'natural' indicators from non-human sources including birds, small bush animals and domestic pets.
- However, human effluent arising from aging and failed on-site wastewater is a major source of pollution in our streams, lagoons and bathing beaches.

While this is disturbing and disappointing to learn, it does provide the needed driver for change and lends weight to the two-fold message that Waitakere City and WLG have been promoting over recent years:

- For public health and environmental reasons, rural residents do need to manage their wastewater treatment and disposal systems better, but ..
- Regional and local councils must take the lead in facilitating improvement, by lowering the consent costs, making the design and consent process easier, and promoting more environmentally sustainable and economic solutions for residents.

Septi-Cure™ Trial-Piha Karekare

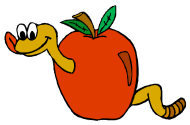
In the ongoing search for ways to improve septic tank performance for rural residents, the Council has trialled a biological activator additive for septic tanks and mini-sewer systems, called Septi-Cure™. A number of residents from Piha and neighbouring rural communities volunteered to have the product applied to their septic tank wastewater system over 2008-09 summer period.

EcoWorld NZ Ltd of Hamilton is the agent for Septi-Cure™. This product is not a chemical treatment, but rather a system-'friendly' bacteria that claims to digest fats, oils and other organic deposits in the septic tank and drainage field, helping to keep the system clear and even un-clogging drainage fields over time. It is environmentally friendly and has no adverse effects on wastewater system components.

The product has been used effectively overseas for some years and is showing similar success rates in the Waikato region. The Council was keen to trial Septi-Cure™ in Waitakere in order to evaluate of its potential to prolong the life of many older septic tank systems, thereby easing the economic burden on rural residents.

The test results showed that the product was very effective on 7 of the 8 sites in the trial, the 8th being "too far gone" to be considered (in the opinion of its owner). The most notable effect was an almost total eradication of the odour problems previously experienced, and some participants noted a marked reduction in solid matter and improved clarity in the liquid effluent - this concurs with the test results for TSS (total suspended solids) in particular.

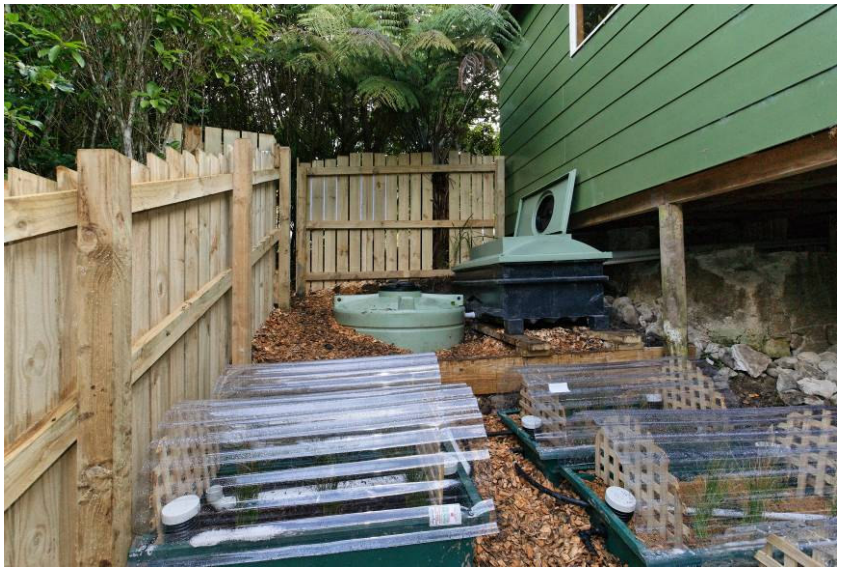
The results provide a reasonable foundation for trialling the product on a larger area, and its application could be beneficial as part of the rolling 3-year septic tank pump-out service.



Project Pipi: Wormorator-plant filter-evaporation

An exciting on-site wastewater innovation was constructed in Huia in June 2009 and has been operating under ARC consent since September 2009 as a technology demonstration project. It is "Project Pipi", the first zero-energy, nil-discharge, non-odour and low-maintenance on-site wastewater system in Waitakere. It quickly earned the category title of a 'no-tech' system.

Figure 8. Project Pipi wormorator and plant filters



Project Pipi[4] is the initiative of the Huia-Cornwallis Local Water Agenda Group and demonstrates this promising new approach to on-site wastewater treatment and disposal as a shared or 'cluster' system for the Huia Hall and neighbouring Huia Settlers Museum. A three-way legal agreement was brokered by

[4] The Pipi system's inventor and installer is Col Bell of Simple Wastewater Solutions Ltd, Matakana.

WLG for construction and operation of the system between the Hall and Museum, and Auckland Regional Council as owner of the Museum land.

The system has three main stages:

- First, a wormorator unit that digests 100% of the solid wastes
- Second, a series of plant filters that achieve secondary treatment of the blackwater and greywater effluent, and ..
- Third, a static evaporator unit that literally evaporates 100% of the treated outflow.

Figure 9. Project Pipi static evaporator

There is normally no power or pumping required, even on near-flat sites, and very simple maintenance that any homeowner can perform.

The Council is pursuing other opportunities to demonstrate this new technology, including a single residential site in Karekare, which will demonstrate the Pipi system for the low flow end of the spectrum. It is hoped that the new Auckland Council will continue to encourage any reliable technologies that can reduce the human 'footprint' on our environment and achieve sustainable living conditions for those in rural areas.

Project Pipi

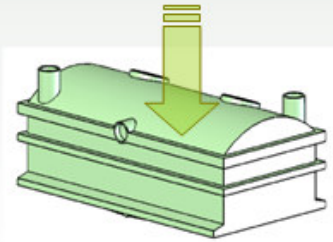
The Wastewater Treatment process

The Wastewater Treatment compound can just be seen from this window, located within the wooden fence. Please feel free to inspect it outside. Here's how the treatment process works …

A handful of tiger worms is worth a loo in the bush !!

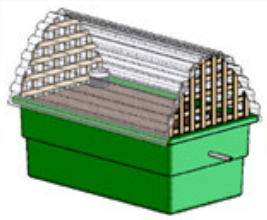
'Blackwater'
- toilets
- kitchen sinks

'Greywater'
- urinals
- hand-basins



Liquids only

Liquids only



Liquids only

Wormorator — Buffer Tank

(Primary treatment)

Plant Filters
(Secondary treatment)

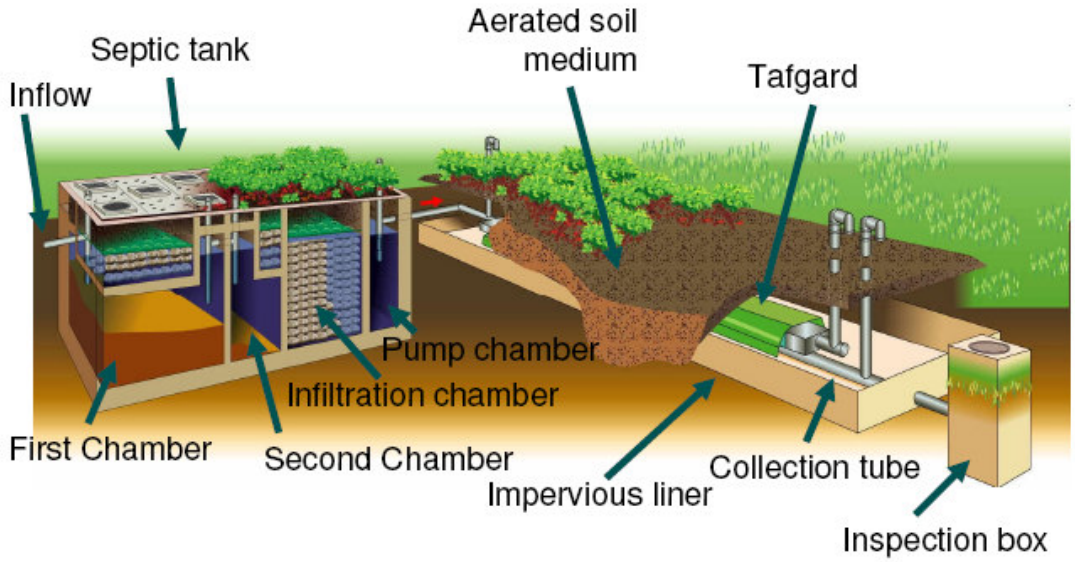
Evaporator
(Disposal)

Figure 10 The Pipi Process

'Tafgard' by Taisei-Kogyo, Japan

Another new and promising technology has recently been discovered in Japan. Called Tafgard by Taisei-Kogyo Company of Japan, this system takes primary-treated effluent from an improved septic tank arrangement and treats and evapo-transpires it through a special closed drainage bed. Thus it is similar to project Pipi as a nil-discharge system, though their basic processes are quite different.

Figure 11. 'Tafgard' system by Taisei-Kogyo



There are three key components to the system:

- An improved multi-chamber septic tank and filter system
- The Tafgard polymer treatment units
- A special aerated soil mixture in the evapo-transpiration garden

Effluent leaving the septic tank has a lower TSS level than standard NZ septic tanks. The effluent passes through the Tafgard treatment 'pipes', made of a plastic array that encourages growth of the healthy bacteria needed to perform the secondary treatment process.

The special aerated soil mixture creates an upward movement of the treated effluent, as opposed to downward drainage, and this process is accelerated by the densely-planted evapo-transpiration bed. The whole bed is contained within a moisture barrier material, effectively forming a nil-discharge disposal system.

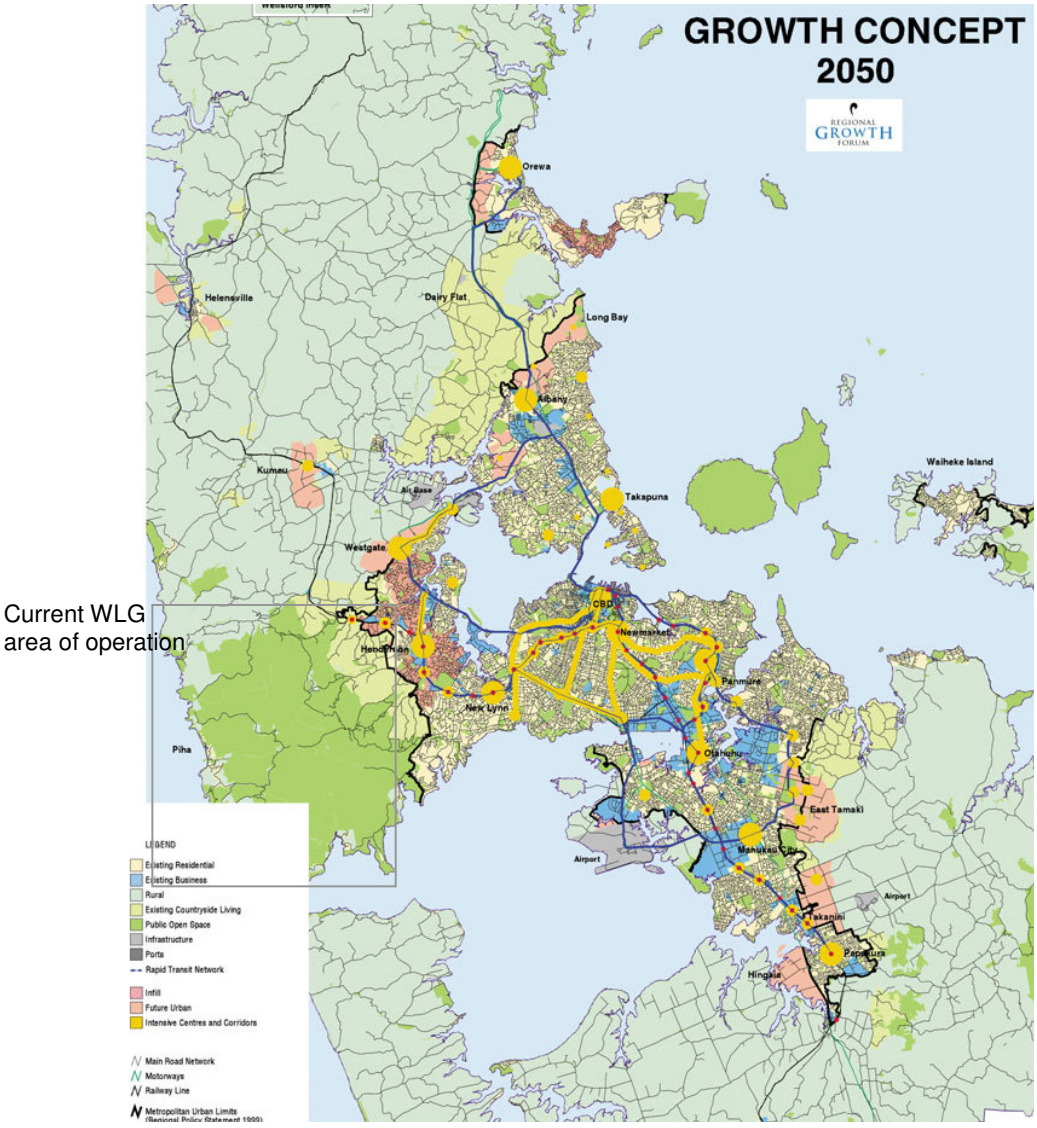
WLG is currently liaising with several rural residents keen to trial the system, which claims to require only 15 m2 of drainage bed for a typical 5-person household.

4 Beyond 2010

Currently, WLG operates for the Waitakere City area only, which has over 6,400 rural and peri-urban properties that rely upon on-site wastewater treatment and disposal methods. This is about 14% of the Auckland region's 45,000 similar unsewered properties. The advances in on-site wastewater management achieved by WLG in its 5-year tenure have been accomplished on a seed budget of around $80,000 per year, which includes much of the investigative reporting, event promotion and project management. There is still a long way to go but this experiment in council-community collaboration has proved very successful to date and offers a template for serious consideration by the new Auckland Council.

Outside Waitakere City, the remaining 39,000 properties have no such forum and there is no cyclic pump-out system provided for them. Assuming an average daily discharge of 700 litres per day per property (3 to 4 people) and that around 25% of these on-site systems are in poor condition, the annual load of untreated effluent escaping to the environment could be in the order of 2,500, 000 cubic metres, or the equivalent of about 1,000 Olympic-sized swimming pools. Thus it is easy to understand why many of Auckland's bathing beaches, like Waitakere's are too often posted with pollution warning signs.

Figure 12. Rural areas of the Auckland region



5 The Action Plan 2010

It is the sincere hope of all those involved in WLG that the process will be rolled out to the remaining rural areas of Auckland from November 1, 2010 when the new Auckland Council takes over the region's governance.

Without such a forum, rural residents will continue to face alone the increasing public health risks and ever-rising costs related to on-site wastewater management. What would it take to have an effective regional WLG forum?

The following table lists the original 33 action items that WLG has worked to since its inception in 2005. Against these, the estimated cost of a regional roll-out is shown for each item, assuming a 10-year implementation timeframe. The 4-year (2006 to 2010) dedicated cost of running WLG for the 14% of the region's unsewered properties in Waitakere City was a little under $600,000, or about $150,000 per year including all events, investigations, reporting and project management. For region-wide coverage there would be further economies of scale and it is estimated the first 10-year budget would need to be in the order of $2.05M.

This cost should be compared to the investment required by rural residents if the current hi-tech methods and costs continue unabated – likely in the order of $150M over the next 10 years, as new development continues and aging septic systems need replacing.

Auckland city from Chelsea Sugar Refinery

Table 2. Proposed 10-year Budget Allocations Request to 2009-19 LTCCP

Wastewater Liaison Group - Proposed 10-Year Budget Allocations to 2010-2020

	Actions 2006-2010	Expenditure to Date				Proposed 10-Year Forecast										
		2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total 10-yr Forecast
		1st Year	2nd Year	3rd Year	This Year	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	
Economy																
1	Provide funding for demonstration projects.	$20,000	$20,000	$20,000	$24,000	$49,000	$50,000	$50,000	$50,000	$75,000	$75,000	$75,000	$100,000	$100,000	$100,000	$724,000
2	Provide water efficient subsidies (including the retrofitting programme with EcoMatters Trust) for houses that are supplied with drinking water from the council water supply system, in order to reduce the volume of wastewater produced by these households.	$50,000	$0	$0	$0	catered for in Demand Management budget										$0
3	Develop and implement a pilot project aimed at reducing water use.	$44,000	$0	$0	$0	catered for in Demand Management budget										$0
4	Provide incentives for greywater recycling, composting toilets and alternative technologies (note that this is subject to funding approval by the council).	$0	$0	$0	$0	catered for in Demand Management budget										$0
5	Minimise cost of new systems by investigating cluster systems (one system for two or more households), small community systems and bulk tendering.	$10,000	$0	$0	$0	Part of 1 above										$0
6	Provide best value for maintenance contract	$0	$0	$0	$0	catered for in specific Maintenance Contract budgets										$0
7	Review form and scope of pump-out contract for future.	$0	$0	$0	$0	catered for in specific Pump-Out Contract budget										$0
8	Investigate methods of reducing consenting costs for system owners.	$0	$0	$0	$0	ongoing liaison with ARC and WCC consents departments via other budgeted forum										$0
	Subtotal:	$124,000	$20,000	$20,000	$24,000	$49,000	$50,000	$50,000	$50,000	$75,000	$75,000	$75,000	$100,000	$100,000	$100,000	**$724,000**
Efficiency																
9	Minimise maintenance and consenting costs for homeowners.	$0	$0	$0	$0	Part of 8 above										$0
10	Update/improve WCC database of on-site wastewater systems (Hansen).	$0	$0	$0	$0	catered for in Asset Management budgets										$0
11	Work with Auckland Regional Council to establish a regional standard to on-site wastewater systems.	$0	$0	$0	$0	via MfE National Standard - catered for in Asset Management budgets										$0
	Subtotal:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$0**
Education																
12	Provide on-site wastewater information to householders.	$3,000	$7,000	$0	$0	catered for under Services Delivery budgets										$0
13	Provide information to the community on new products on the market.	$3,000	$0	$0	$0	catered for under Services Delivery budgets										$0
14	Provide information to architects, designers and builders on new products on the market	$0	$0	$0	$0	catered for under Services Delivery budgets										$0
15	Organise community symposia to advance on-site wastewater treatment options and alternative technologies incl. Technology Expo	n/a	$28,000	$7,500	$35,000	$0	$40,000	$10,000	$60,000	$15,000	$75,000	$20,000	$75,000	$20,000	$75,000	$390,000
16	Communicate with ratepayers/community groups when warning signs advising against contact recreation are displayed.	$0	$0	$0	$0	catered for under ongoing Water Quality Monitoring project										$0
17	Provide householder with a copy of the inspection report completed by the pump-out contractor.	$0	$0	$0	$0	Part of 7 above										$0
18	Improve records on Land Information Memorandum with regards to on-site wastewater systems.	$0	$0	$0	$0	catered for in Asset Management budgets										$0
19	Facilitate expansion of WLG activities to Auckland region.	$0	$40,000	$0	$0	$2,000	$10,000	$15,000	$20,000	$20,000	$20,000	$15,000	$15,000	$10,000	$10,000	$137,000
	Subtotal:	$6,000	$75,000	$7,500	$35,000	$2,000	$50,000	$25,000	$80,000	$35,000	$95,000	$35,000	$90,000	$30,000	$85,000	**$527,000**

Environment																	
20	Ensure regular checks/maintenance of on-site wastewater systems in rural areas and beach settlements to minimise discharges to streams, estuaries and the ocean.	$20,000	$33,000	$0	$0	Now part of 7 above											$0
21	Regular reporting of water quality results against guideline values.	$0	$0	$0	$0	catered for under ongoing Water Quality Monitoring project											$0
22	Improve water quality testing programme to ensure compliance with guidelines, particularly relating to providing warning signs advising against contact recreation when results are high.	$0	$0	$0	$0	catered for under ongoing Water Quality Monitoring project											$0
	Subtotal:	$20,000	$33,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		**$0**
Engineering																	
23	Promote new and existing technologies to conserve water such as dual flush toilets, water-efficient shower nozzles, vacuum toilets and composting toilets.	$0	$0	$0	$0	Part of 15 above											$0
24	Promote greywater and wastewater recycling systems on individual sites.	$0	$0	$0	$0	Part of 15 above											$0
25	Encourage cluster-type wastewater treatment systems.	$0	$0	$0	$0	Part of 1 above											$0
26	Improve stormwater and overland drainage on roads in consultation with the community	$0	$0	$0	$0	Projects scoped through LWAG forum; physical works catered for in Annual Plan capital and renewal projects											$0
	Subtotal:	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0		**$0**
Enforcement																	
27	The council will continue to enforce regulations to protect public health and property.	$0	$0	$0	$0	Ongoing part of Asset Management practices											$0
28	Review the District Plan to improve performance standards in resource consents.	n/a	$0	$0	$0	Ongoing part of Asset Management and Development Services practices											$0
29	Set appropriate conditions for new developments.	$0	$0	$0	$0	Ongoing part of Development Services practices											$0
30	Review any future bylaw issues for on-site wastewater treatment and disposal systems.	$15,000	$10,000	$0	$0	Issues arise through LWAG forum (part of 31 below); review and solutions part of Asset Management practices											$0
31	Provide project management and technical support to WLG, including citywide and local area Action Plans	$40,000	$45,000	$54,000	$60,000	$65,000	$65,000	$70,000	$70,000	$75,000	$75,000	$75,000	$75,000	$75,000	$75,000		$720,000
32	Review WLG Action Plan(s)	$0	$0	$7,500			$12,000			$15,000			$20,000		$25,000		$72,000
33	Compliance	$0	$0	$0	$0	Compliance is statutory obligation and part of Asset Management reporting											$0
	Subtotal:	$55,000	$55,000	$61,500	$60,000	$65,000	$77,000	$70,000	$70,000	$90,000	$75,000	$75,000	$95,000	$75,000	$100,000		**$792,000**
	Annual Totals:	**$205,000**	**$183,000**	**$89,000**	**$119,000**	**$116,000**	**$177,000**	**$145,000**	**$200,000**	**$200,000**	**$245,000**	**$185,000**	**$285,000**	**$205,000**	**$285,000**		**$2,043,000**
					$596,000												$2,043,000

Note: increasing annual forecasts reflect the recommended expansion of WLG activities from the current Waitakere City are to the new Auckland Council's regional influence.

6 Appendices

A1: WLG & LWAG membership

The individual people that currently form the Waitakere City **On-Site Wastewater Liaison Group** are:

The Council:

• Tony Miguel	Sponsor, Deputy Director: City Services
• Ross Clow	Councillor and WLG Chairperson
• Paul Mitchell	Councillor
• Glenn Moser	Team Leader: Plumbing & Drainage
• Graham Leonard	Water Quality Technician
• Ann-Marie Worth (formerly Martin Glover)	EcoWater Services Delivery Manager(s)

The Communities:

• Graeme Barnard	Whenuapai
• Jo Quatermass	Huia-Cornwallis
• Kerry Gould	Oratia
• Kubi Witten-Hannah	Karekare; Waitakere Community Board
• Malcolm Hahn (deceased)	Whenuapai
• Noel Rugg	Herald Island
• Simon Brown	Piha

Technical support and project management:

• Mark Essex	Qmex Limited

Interested people from other rural communities in Waitakere City are encouraged to join the On-Site Wastewater Liaison Group and thus contribute to the Action Plan initiatives being implemented in their local community.

For the **Local Water Agenda Groups**, the Council provides support through Tony Miguel, Ann-Marie Worth (Martin Glover 2005-09), Graham Leonard, Glenn Moser and Mark Essex. Community representation for the three existing Groups, also on a voluntary basis, is provided as follows:

Huia-Cornwallis:

- Denise Yates (Chair)
- Jo Quatermass
- Denis Browne

Piha-Karekare:

- Kubi Witten-Hannah (Chair)
- Simon Brown
- Graham Caley

Whenuapai-Hobsonville

- Graeme Barnard (Chair)
- Noel Rugg
- Dean Mantell

WLG participants gratefully acknowledge the enthusiastic contribution of two good friends and community representatives who passed away recently: Malcolm Hahn of the Whenuapai R&R and Local Water Agenda Group and the Upper Harbour Protection Society, and Arthur Harrison of the Huia-Cornwallis Local Water Agenda Group.

A2: On-Site wastewater systems in Waitakere

Table 3. On-site wastewater systems in Waitakere City

Type	Number
Hi-Tech systems (various kinds)	1,069
Septic Tank systems – rural areas	4,499
Septic Tank systems – Inner Drainage Area including parks	108
Grease Traps and other chambers	184
Long-drop Toilets	111
LPED pipe systems	43
Total:	**6,014**

Note that for asset management purposes, the above categories are listed separately. However LPED pipe systems are a subset of Hi-Tech systems.

There are approximately 45,000 on-site wastewater treatment and disposal systems in the Auckland region.

A3: Potential for public health risks

Introduction

When appropriately designed, operated and maintained, a traditional septic tank system can effectively treat and dispose of wastewater for several decades. Problems arise however, that are often associated with environmental or community factors not easily mitigated. In Waitakere, there are a number of factors that contribute to a decline in septic tank condition & performance.

First, the predominant soil type in Waitakere is clay. These soils are generally not conducive to on-site disposal of wastewater due to their lower soakage rates. In heavy rain, the ground becomes saturated, which can lead to ponding of effluent on the surface of disposal fields and subsequent discharge to nearby waterways. Steep slopes in some areas of the city also contribute to run-off into waterways.

A number of systems in Waitakere's rural areas were installed 50 or more years ago. These tanks inevitably degrade over time, even with good maintenance and operation, and eventually require replacing.

Traditionally, rural areas of the city consisted of low-density housing, with large lot sizes and disposal fields. Many of these rural areas are becoming semi-urban with higher-density and larger housing, smaller sections and less area for the disposal of wastewater.

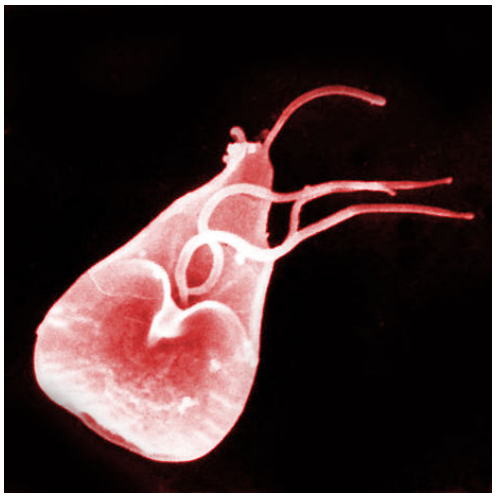
Table 4. Pathogens Potentially Present in Faecal Material (NZ population)

Type	Species	Associated Illness
Viruses	Enterovirus	Includes polioviruses, Coxsackievirus, Echovirus, Enterovirus, Hepatitis A and Hepatitis B virus. Can cause a variety of diseases, including meningitis, fever, respiratory illness.
	Reoviruses	Can cause respiratory disease
	Rotaviruses	Can cause gastroenteritis
	Adenoviruses	Can cause respiratory disease, acute conjunctivitis and gastroenteritis.
	Norwalk Virus	Can cause gastroenteritis
	Astroviruses	Can cause gastroenteritis
Bacteria	*Salmonella sp.*	Widely distributed enterobacteriaceae. Most predominant pathogenic bacteria in wastewater. Infects the gastrointestinal tract. Can cause typhoid and paratyphoid fever and gastroenteritis.
	Shigella	Can cause bacillary dysentery. Infects the gastrointestinal tract. Transmission is mainly person to person, but waterborne transmission has been documented.
	Vibrio cholerae	Causative agent of cholera. Infects the gastrointestinal tract. Transmitted exclusively via water. Outbreaks have been associated with sewage contamination of food (e.g. vegetables, shellfish, etc.)
	Escherichia coli	Several strains are pathogenic. Can cause gastroenteritis. Has a high infective dose.
	Yersinia enterocolitica	Can cause gastroenteritis. Infects the gastrointestinal tract.
	Camplobacter jejuni	Can cause gastroenteritis. Infects the gastrointestinal tract.
	Legionella pnemophila	Can cause acute respiratory disease (Legionnaires Disease). Infects the lungs.
	Clostridium tetani	Can cause tetanus. Spread by contact with open wounds.

Type	Species	Associated Illness
	Mycobacterium tuberculosis	Can cause tuberculosis. Infects the lungs.
Protozoa	*Giardia lamblia*	Can cause gastroenteritis. Domestic wastewater is a major source of infection.
	Cryptosporidium parvum	Can cause gastroenteritis.
Helminths/ Parasites	Leptospira	Small spirochete which gains access to the host through abrasions to the skin or mucous membranes. Infects kidneys and central nervous system. Does not survive well in wastewater.
	Nematodes (Roundworms)	Can cause pneumonitis in the lungs.
	Toxocara canis	Can cause severe ocular damage and intestinal disturbances.

Another factor contributing to on-site wastewater system failures in Waitakere is the increasing load placed on septic tank systems. Modern appliances such as dishwashers increase the amount of water used and water use in general is higher in areas serviced by reticulated water supply, such as Huia and parts of Piha. In addition, many areas that traditionally consisted of seasonally-occupied holiday homes are now occupied permanently, increasing the load on these aging tanks.

Overloading and other issues can arise from a lack of knowledge regarding systems and how they operate. Poor system maintenance (sometimes caused by a lack of knowledge) is another major reason for system failures. This is now being addressed through community education and information materials provided by the Council, with a corresponding increase in community awareness.



Giardia lamblia - now recognised as one of the most common waterborne diseases in the developed world.

A4: Risk assessment of on-site wastewater systems

An investigation previously undertaken for Waitakere (URS NZ Ltd, 2005) assessed the potential public health risks associated with the existing on-site wastewater systems in 21 sub-communities and 12 public toilet facilities in the city. The risk assessments provided a broad overview of potential health risk at each sub-community and toilet facility, and in turn became an important input to the 2005 *Assessment of Water and Sanitary Services* (*WASSA* 2005).

The risk assessment framework used for the study was based on a similar public health risk assessment undertaken for water supplies in Waitakere in late 2004. The risk matrix used for the assessment is illustrated in the table below. This matrix was applied to risk events linked to types of failures of onsite wastewater treatment and disposal systems for each sub-community – these potential causes of failure are shown in the second table below. These failures can cause human exposure to pathogenic (disease-causing) organisms present in untreated and treated wastewater, and therefore present a risk to public health.

Results of the assessment for the 21 sub-communities assessed are summarised in Table 7 overleaf. For more detail, refer to the full URS report entitled '*Assessment of Public Health Risk Associated with Onsite Wastewater Disposal in Waitakere City*' (URS, 2005).

Table 5. Public Health Risk Matrix

Likelihood*	**Consequence***				
	Insignificant (I)	Minor (Mi)	Moderate (Mo)	Major (Ma)	Catastrophic (C)
Almost Certain (A)	High (H)	High (H)	Extreme (E)	Extreme (E)	Extreme (E)
Likely (L)	Moderate (M)	High (H)	High (H)	Extreme (E)	Extreme (E)
Possible (P)	Low (L)	Moderate (M)	High (H)	Extreme (E)	Extreme (E)
Unlikely (U)	Low (L)	Low (L)	Moderate (M)	High (H)	Extreme (E)
Rare (R)	Low (L)	Low (L)	Moderate (M)	High (H)	High (H)

**Refer to URS (2005) for further detail on definitions of risk consequence and likelihood, and relevant assumptions.*

Table 6. Potential Causes of Failures of On-Site Wastewater Systems

Type of Failure/Risk Event	Potential Contributing Factors
Flooding	Flooding risk and/or proximity to surface water Stormwater control Topography Poor design
Poor drainage	Soil type and poor soakage rates Poor design Groundcover/maintenance
Stormwater infiltration	Stormwater control systems Poor maintenance (e.g. inspection lid not sealed) Inappropriate location of tank
Overloading/excessive water use	Water supply (e.g. reticulated, tank) Water usage (e.g. dishwashers, automatic washing machines) Seasonal/permanent occupancy Poor knowledge of system Small tank size Maintenance (e.g. distribution box)
High groundwater level	Winter groundwater level and/or poor location Soil type
Small and/or steep disposal area	Section/house size Topography or other size constraints
Old/unsuitable systems or poor design	General age of houses/tanks Poor construction
Land subsidence	Land instability and/or erosion (stream or ocean) Topography
Root intrusion	Groundcover/type of system Poor maintenance Soil type
Pump failure or performance	Maintenance Electrical outage Mechanical failure Flooding (overland flow)
Improper use (e.g. use of incompatible chemicals, disposal of nappies etc.)	Lack of education or understanding of system
Disposal field blockage	Maintenance (e.g. distribution box) Improper use Root intrusion No filter/lack of filter maintenance Stock/vehicle access to disposal field Poor design
Structural failure	Corrosion Age Land subsidence (refer to 'Failure of systems due to land subsidence' above)
Telemetry failure (public toilet systems only)	Electrical outage Component failure Loss of, poor or erratic reception

Failure modes presenting the highest overall risk in Waitakere sub-communities, in terms of on-site wastewater disposal, were found to be failure of system performance due to:

- poor drainage;
- high groundwater levels;
- small and/or steep disposal area;
- overuse and/or overloading;
- old/unsuitable systems or poor design; and,
- stormwater infiltration/flooding by overland flow.

Sub-communities in Waitakere with the greatest potential risk associated with on-site wastewater disposal were found to be Piha, Fosters Bay, Huia/Little Huia and Bethells/Te Henga. The higher risk within these sub-communities is due to the potential impacts on water bodies used for contact recreation. The consequences of untreated wastewater entering these water bodies was assessed by URS as 'catastrophic' (ie. major impact for large population), given the high usage of the water bodies for contact recreation.

Water bodies adjacent to these four communities have shown elevated concentrations of faecal indicators.

Council-community collaboration at Piha has resulted in the complete removal of major pollution sources from the RSA and Bowling Clubs. These two clubs are operating temporary blind wastewater tanks, which will soon become balance tanks when the two clubs are connected into the upgraded Piha Domain wastewater treatment plant.

Table 7. Public Health Risk Associated with Community On-Site Wastewater Systems

Sub-Community	Risk Event/Number*													Total Risk Score
	Flooding	Drainage	Stormwater	Overloading	Groundwater	Size/Slope	Old/Poor Design	Land Subsidence	Root Intrusion	Pump Failure	Improper Use	Blockage	Structural	
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Piha	H	E	E	E	E	E	E	L	E	E	E	E	E	187
Fosters Bay	L	E	E	E	E	E	E	L	H	E	H	E	H	182
Huia/Little Huia	L	E	E	E	E	E	E	L	H	E	H	E	H	172
Bethells/Te Henga	L	H	E	E	E	E	E	L	E	E	E	E	E	148
Karekare	H	H	M	M	H	H	H	H	M	M	L	M	L	102
Whenuapai	L	H	H	H	H	H	M	L	L	M	L	M	L	98
Scenic Drive N	H	H	H	M	H	M	M	H	M	M	L	M	L	96
Waitakere T/ship	H	H	H	H	H	H	M	L	L	M	L	M	L	94
Henderson V	H	H	H	M	H	H	M	L	M	M	L	M	L	90
Parau	L	H	M	M	H	M	H	L	L	M	L	H	L	88
Scenic Drive S	H	H	M	M	M	M	M	L	M	M	L	M	L	84
Waiatarua W	L	H	M	L	H	M	M	L	M	M	L	M	L	80
Cornwallis	L	H	M	M	H	M	H	L	L	M	L	M	L	79
North Piha	L	L	L	H	L	H	M	L	H	M	L	H	L	77
Scenic Drive C	L	H	M	M	M	M	M	L	M	M	L	M	L	76
Oratia	H	H	L	M	M	M	M	L	L	M	L	L	L	74
Birdwood	L	H	L	M	M	H	H	L	L	M	L	L	L	74
Babich	L	H	L	M	M	H	H	L	L	M	L	L	L	74
Waiatarua E	L	H	M	L	M	M	M	L	M	M	L	M	L	74
Bendall's Lane	L	H	M	H	M	H	L	L	M	M	L	L	L	72
Carey Park	L	H	M	H	M	L	L	L	M	M	L	M	L	70

Notes:
E = Extreme risk
H= High risk
M= Moderate risk
L = Low risk

- A number of communities were assessed as having high or extreme risks associated with aspects of on-site wastewater disposal. It should be noted that although some of these risks had a lower likelihood (possible, unlikely or rare), due to the significant potential public health consequence if these risk events did arise, the public health risk was considered to be high or extreme.

Priority Sub-Communities

Using the results of the risk assessment, it was determined by URS that the priority sub-communities for further investigation and risk mitigation strategies were:

1. Piha/North Piha;
2. Fosters Bay;
3. Huia/Little Huia
4. Bethells/Te Henga;
5. Karekare;
6. Whenuapai;
7. Scenic Drive North;
8. Waitakere Township;
9. Henderson Valley
10. Parau

It should be noted that the order of priority could change if more in-depth investigations are carried out. Additional sub-communities not on this priority list may also warrant further investigation based on the Council's and community knowledge.

A full reservoir of pure Waitakere water

A5: Mitigation options for on-site wastewater systems

Potential mitigation options for these types of failure listed in Appendix 4 are outlined below.

Table 8. Potential Mitigation Options for On-Site Wastewater Failures

Type of Failure	Potential Mitigation Action
Flooding	• Limited practical mitigation options available • Redirect stormwater and install/upgrade drainage if possible/appropriate • Avoid contact with flood waters or area around wastewater system during flood • Avoid permitting future development in flood prone areas
Poor drainage	• Limited practical mitigation options available • Public education - avoid contact with disposal area, particularly during winter and wet weather conditions • Install disposal systems that use imported media with improved drainage, such as Wisconsin Mounds
Stormwater infiltration or overland flow	• Improve stormwater control by installing diversion drains
Overloading/excessive water use	• Reduce water usage by encouraging installation of water-saving devices (e.g. low-flow shower heads and taps, and dual-flush toilets) • Educate general public on benefits of water saving • Increase size of disposal field where possible
High groundwater level	• Limited practical mitigation options available • Install cut-off drains to prevent surface water flowing onto disposal field • Avoid contact with disposal area, particularly during winter and wet weather conditions
Small and/or steep disposal area	• Limited practical mitigation options available • Increase size of disposal field where possible
Old/unsuitable systems or poor design	• Upgrade to new systems using improved technology
Land subsidence	• Limited practical mitigation options available • Vegetate areas prone to erosion • Construct erosion protection structures where necessary/appropriate • Relocate treatment and disposal system where possible
Root intrusion	• Maintain systems regularly to check for root intrusion • Avoid planting deep-rooting vegetation on or around disposal field or tank
Pump failure	• Maintenance contract for pumped system • Check reliability of pump brand/type
Improper use (e.g. use of incompatible chemicals, disposal of nappies etc.)	• Educate general public on how onsite systems work, and provide recommendations for efficient operation • Install outlet filters
Disposal field blockage	• Maintain disposal field, filter and distribution box regularly • Avoid planting deep-rooting vegetation on or around disposal field or

Type of Failure	Potential Mitigation Action
	tank • Restrict access to disposal field to avoid stock and vehicles damage
Structural failure	• Upgrade system • Inspect/maintain regularly to check for signs of corrosion/structural failure • Mitigate against land subsidence (refer to risk event 8)
Telemetry failure/unreliable telemetry	• Maintain and test components regularly • Improve reliability

Root intrusion clogging a septic tank system, Piha area

A6: Community Enterprise model

Experience from working Community Enterprises in Scotland and elsewhere provide the following profile for communities interested in developing the process to meeting their needs:

Characteristics of a Community Enterprise

Benefits

- Environmental benefits of a low tech system
- Profits can be channeled into other projects that promote community wellbeing
- Builds community capacity, resilience and sustainability
- Employs local people
- Sense of being at the helm of social innovation
- Share journey with other communities
- Prepare for "PowerDown"/Peak Oil/Climate Change

Motivation test

- Why do you want to start a social enterprise? What are your aims?
- Do you know enough about social enterprise?
- How will you ensure your stakeholders are on board?

Challenges

- Developing a shared vision
- Developing capacity and skills
- Developing leadership
- Sustaining energy and passion beyond initial enthusiasm

Failure Modes

- Poor cashflow
- Changes in market
- Loss of key people
- Poor financial management

Model building process

Preparation (checking out organizational culture)

- Culture assessment – what are your values, leadership, etc
- Capacity Assessment – current activity, shills, capabilities, resources, strategic plan
- Risk Assessment - consider current funding, financial systems, investment needed, access to investment and loans

- What legal structure would best suit your aims and culture? Does your existing structure suit your plans or do you need to change it?

Assessment

- How good is your business idea?
- Analyse external market forces (PEST analysis – political, economic, social and technological)
- Explore balance of aims- social, environmental, economic
- Explore balance of income – grants, sales, contracts etc

Testing Your Idea

- Carry out a "quick and dirty" scoping exercise to consider your position in relation to the market, competition, operations, finance
- Who are your customers?
- Why will they buy goods and services from you rather than competitors?
- How much will they be prepared to pay?
- Do the numbers stack up? Explore costs, sales targets, profit margins, break even price

Exploration

- Conduct a feasibility study based on in depth market research, including competitors , customers, demographics, psychographics (attitudes that affect buying behaviour)
- Develop a marketing strategy. How will you promote and advertise your product?
- Identify resources you will need- people, skills, money
- Identify potential barriers

Business Planning

- Integrate all of the above into a clear and concise written Business Plan written with your target audience in mind.
- Identify critical success factors.
- Start Up
- Have right person at the helm
- Build the right team
- Carry out regular reviews
- Focus on sales, marketing and customers
- Be patient. Can take 3 to 4 years to be viable
- Remember why you are in business – your social and environmental aims

Start Up

- Have right person at the helm
- Build the right team
- Carry out regular reviews
- Focus on sales, marketing and customers
- Be patient. Can take 3 to 4 years to be viable
- Remember why you are in business – your social and environmental aims

A7: Water quality monitoring sites

Figure 13. Bathing beaches in Waitakere City

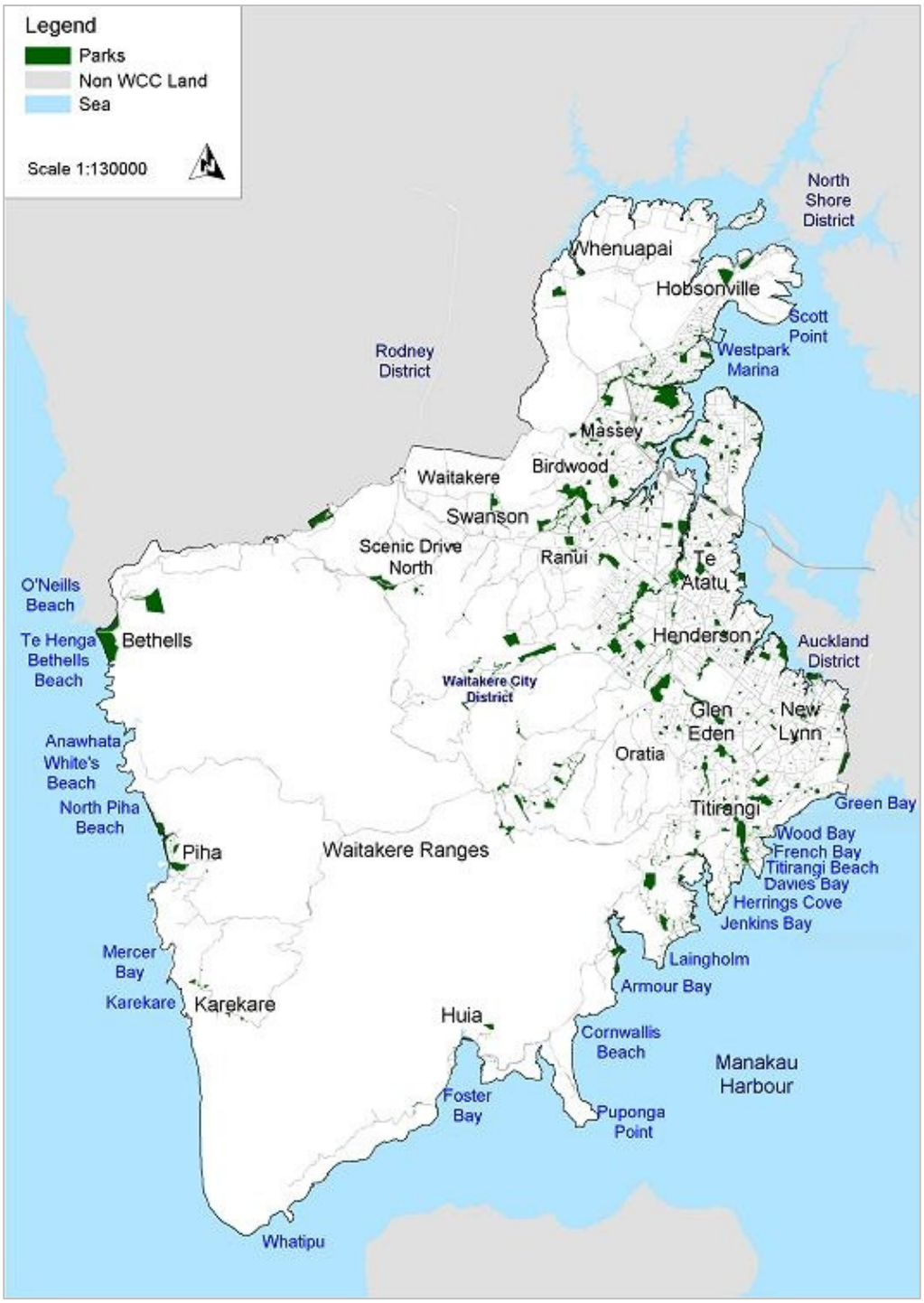
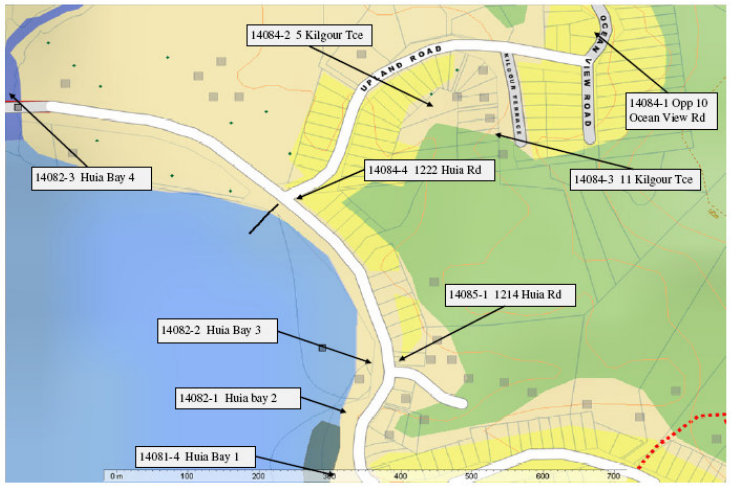
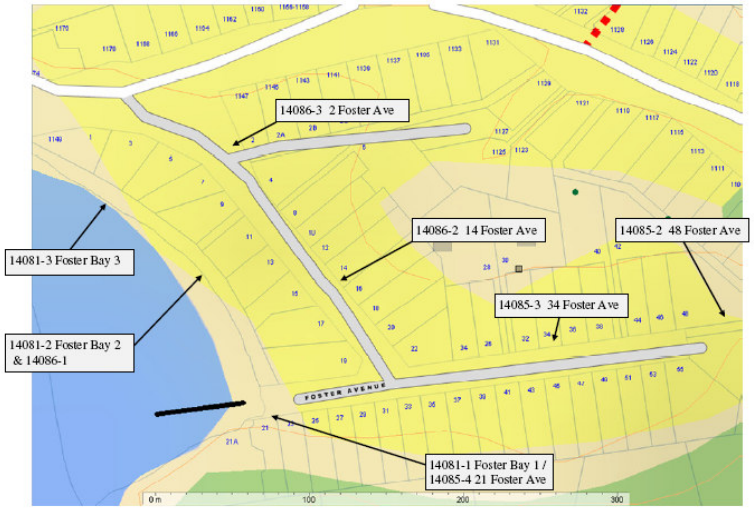
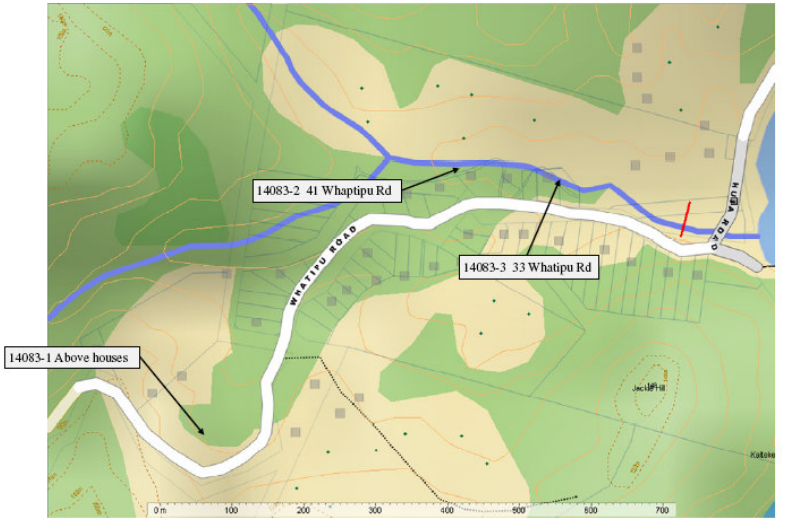


Figure 14. Huia area intensive water quality monitoring sites (2010)

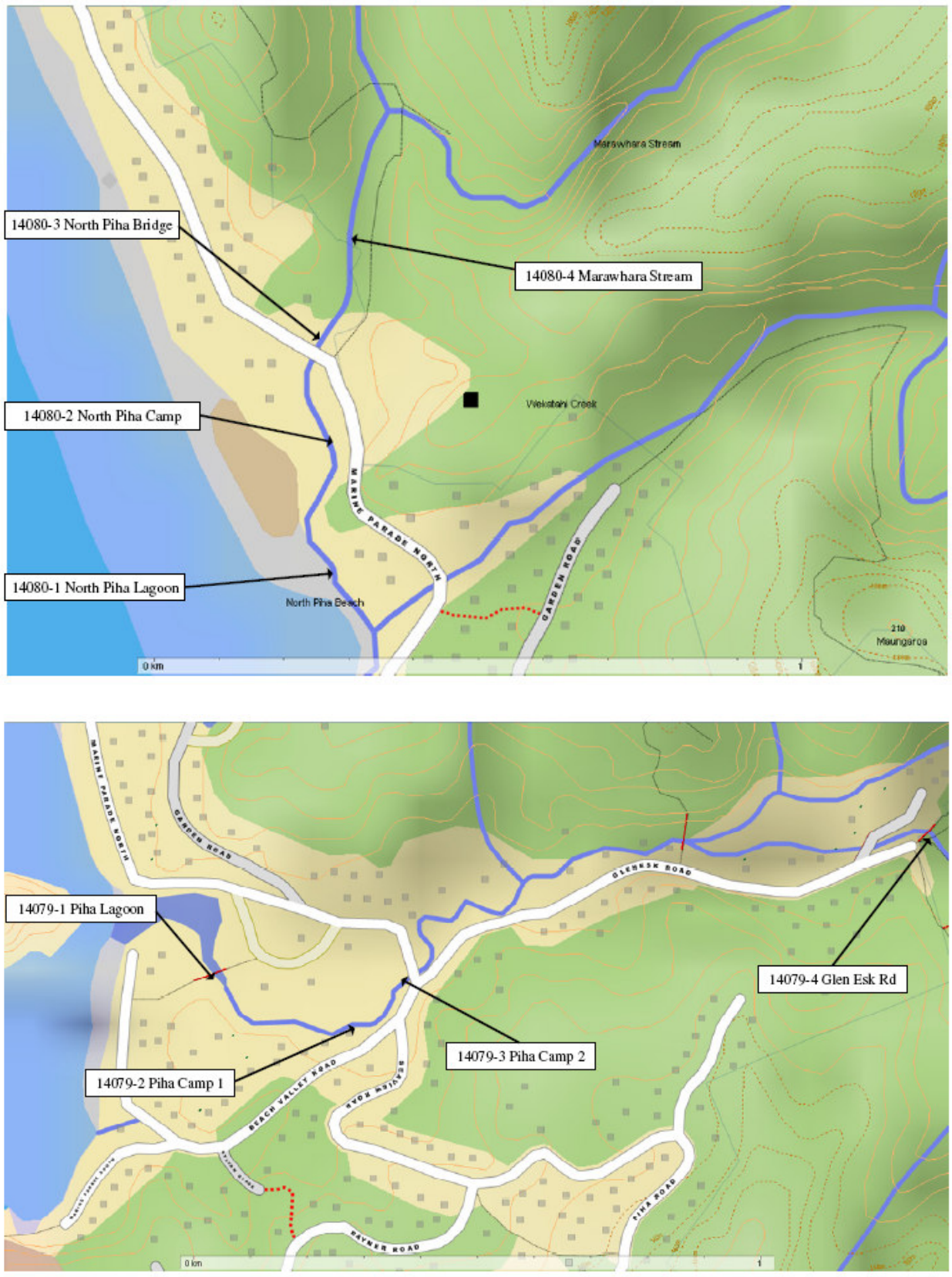






Source: Aqualab NZ Ltd, 2010

Figure 15. Piha area intensive water quality monitoring sites (2010)



Source: Aqualab NZ Ltd, 2010

7 References

Table 9. References

Title	Author	Date
Action Plan for Improving On-Site Wastewater Disposal in Waitakere City	URS NZ Ltd	Aug 2006
Action Plan for Improving On-Site Wastewater Disposal in Waitakere City 2009	Qmex Limited	August 2009
Assessment of Public Health Risk Associated with Onsite Wastewater Disposal in Waitakere City	URS NZ Ltd	April 2005
Assessment of Water Services – Vol 1: Background Report	Qmex Limited and EcoWater	March 2005
Huia Wastewater Strategy Report	Environmex Ltd	July 2009
Integrated Water Resources Management Plan: Project Charter	Qmex Limited	July 2008
WASSA 2009	Qmex Limited	Feb 2009

Members of the Huia-Cornwallis Local Water Agenda Group inspecting the wormorator-evaporator system trial north of Auckland. Frogs and goldfish thrive happily in the treated effluent pond, which also feeds a lush variety of vegetables for the family's consumption.

8 Glossary

ALWP	Air Land and Water Plan (ARC)	
ARC	Auckland Regional Council	
Catchment	The area of land inside an enclosing ridge-line, the natural or altered topography of which carries, by force of gravity, the stormwater (or wastewater) flows that originate within.	
IWRM	Integrated Water Resources Management	
LGA	Local Government Act 2002	
LTCCP	Long Term Council Community Plan (currently 2006 to 2016, changing to 2009 to 2019 later in 2009)	
LWAG	Local Water Agenda Group – a sub-group of the Waitakere City On-Site Wastewater Liaison Group (WLG), representing a single community	
MfE	Ministry for the Environment	
On-site wastewater management system	A small-scale domestic wastewater system comprising the technologies and management protocols for the appropriate handling of household wastewater within the property boundaries of the place of origin of the wastewater. The key components of such a system include some or all of: wastewater source technologies and management wastewater processing technologies and management technologies and management for re-entry of the processed wastewater to the in-boundary physical environment.	AS/NZS 1547:2000 USEPA website
Overflow	Sewage escaping from the piped wastewater network to the surface environment, due to blockage of the system or when the flow exceeds the system capacity.	
Septic tank	A wastewater treatment device that provides primary treatment for domestic wastewater, involving sedimentation of suspended solids, flotation of oils and fats, and anaerobic digestion of sludge.	USEPA website
SMU	Stormwater Management Unit (a large catchment area)	
Stormwater	Rainwater run-off from impervious surfaces (roofs, roads, driveways, paths, parking lots and ground surfaces).	
Subcatchment	A smaller sub-area of the catchment that drains to a certain point in the catchment.	

Waitakere City	The territorial authority administering the city of Waitakere, and or the city itself. Generally referred to as 'Waitakere', as opposed to 'the Council', which refers to the decision-making administration.
Wastewater	Contaminated water from domestic, commercial and industrial activities (see also *Domestic wastewater*).
the Council	Waitakere City Council, specifically the decision-making administration.
Three-Waters	Drinking water, wastewater and stormwater The '4-waters' including groundwater are now generally referred to in the context of integrated water resources management.
TLA	Territorial Local Authority – the local council (city or district) such as Waitakere that administers a territory of New Zealand.
WLG	Waitakere City-sponsored On-Site Wastewater Liaison Group
WSL	Watercare Services Limited

December 2008 issues of the Piha-Karekare and Huia-Cornwallis Local Water Agenda Groups' community newsletter, published by the Council

First published: August 2006
Reviewed, updated and reprinted March 2009 and October 2010

ON-SITE WASTEWATER LIAISON GROUP