

# Wairoa Wastewater Package - A Way Forward

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Prepared for

**Wairoa District Council**

Prepared by

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Environmental  
I m p a c t

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## Wairoa District Council

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# 1 EXECUTIVE SUMMARY

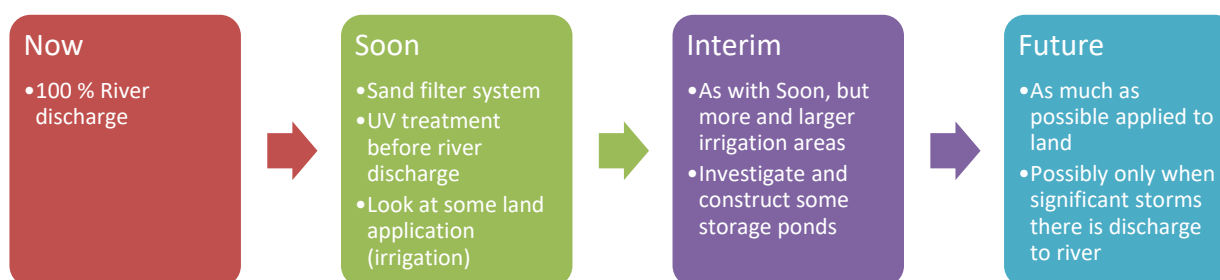
## Vision

This report presents a vision for the future for the way Wairoa manages its wastewater. It signals a long-term goal of removing wastewater discharges from the Wairoa River – and a commitment to improving river health not just related to wastewater – but in a holistic way. This includes implementing improvements not only for managing wastewater, but also opportunities for improving catchment water quality. Collectively this Vision can be achieved by the implementation of a **Package**.

It is intended that this report shows how cultural aspirations and community desires can be balanced with affordability to produce a sensible, affordable solution in the short term, whilst creating a commitment to continuous improvement that will ultimately see the end to the discharge of treated wastewater into the Wairoa River and the health of the river improved.

There are 'quick wins' that can be achieved in the short term, such as irrigating land close to the wastewater treatment plant on areas like the landfill plantation. There are other initiatives that can take place in the next 5 to 10 years to increase the irrigation area. There are yet more proposals that may take 10 years or longer to implement. And then there are things that we have not yet thought of that may appear in the future to be taken advantage of; with the key being a commitment to ensure that we are ready to take advantage of them when the opportunities present themselves.

The situation we find ourselves in with poor water quality has developed over more than 100 years. The **Package** presented in this report is not intended to be a 'quick fix'; but it is intended to signal the first step and a commitment to progress over the next 5, 10, 20 years to take every opportunity to achieve improvements and reduce the volume of wastewater entering the Wairoa River.



## The Starting Point

The need to re-consent treated wastewater discharges from Wairoa District Council's current wastewater scheme for Wairoa in 2019 has resulted in the need to consider alternative locations and methods of discharge to the current river discharge. This report provides an opportunity to be used for discussion within the community to assist in deciding what action is needed to assist with improving the management of the current treated wastewater discharge and the collective management of land within the Wairoa River catchment.

The current treated water river discharge is **not considered acceptable by many** in the community, despite not having any significant measurable effects. The unacceptability relates to the notion of treated wastewater containing pathogens and contaminants entering an environment that is used by a large number of people within the community for recreation and food gathering.



The exact effects and impact of the discharge are likely being masked by the condition of the river as a whole; and in particular the negative impact from a range of upstream contributors to poor water quality. These include hill country erosion, run off from production land and various discharges from roading and urban areas. **The community would like to see water quality in their river improved.**

### **The Options**

There are a range of alternative options to manage and discharge the treated wastewater, but many are technically challenged or are simply too expensive for the community to afford. Options considered have included continuing the existing discharge, modifying the existing discharge potentially with additional treatment, using an ocean outfall and various forms of land application.

These options need to be balanced against the level of investment required, and the potential improvements from investing an equivalent amount of financial resources in the larger catchment. For some wastewater upgrade options, a significant investment in treatment to improve wastewater quality will not improve the quality of water in the river; and the money would have been better spent on land management improvements and advice within the large catchment.

Further, there is the scope that treatment might involve options; being alternatives (one or another), successors over time (one then another) or complementary (both together). There is a need to decide on the minimum level of treatment, the costs and whether investment in treatment is proportionate to the improvement in Wairoa River water quality that would have resulted from the same funds been put into catchment improvements.

While **the need for wastewater management is a modern phenomenon that largely didn't exist 100 years ago**, there is a need to consider tikanga which as a minimum would see wastewater pass through and over Papatūānuku (land). Ideally it would be treated to drinking water standards and soaked into soils so as to entirely avoid discharging into any fresh water bodies or the ocean, but this notion is unrealistic and unaffordable to the Wairoa community at this time.

### **Development of the Package**

If improving the health of the Wairoa River requires the elimination of wastewater discharges it will not be a simple exercise and will take time. It will also involve many related activities and not just one solution; the tap cannot be turned off overnight.

A '**Package**' is proposed to not only incorporate the final target of identifying a system(s) for wastewater discharge that is away from the Wairoa River, but also provide for improvements in the catchment as a whole.

This report follows a draft report titled 'Wairoa River and Wastewater – A Big Picture Solution' which identified a range of opportunities to improve Wairoa River water quality. This earlier report was presented to the Wairoa Wastewater Stakeholder Group on 13 November 2017 and detailed an initial concept to provide additional wastewater treatment, land passage, implementation of land treatment over time and creation of an educational environment for the community to learn about the Wairoa catchment.

This initial package has subsequently been refined in this report with a revised **Package**, with the removal of the high rate land passage concept and the catchment model.

### **The Package**

This **Package** sees the continuation of the existing discharge, with improved water quality, and includes a process to incorporate irrigation and other measures in steps over a 30 year term.

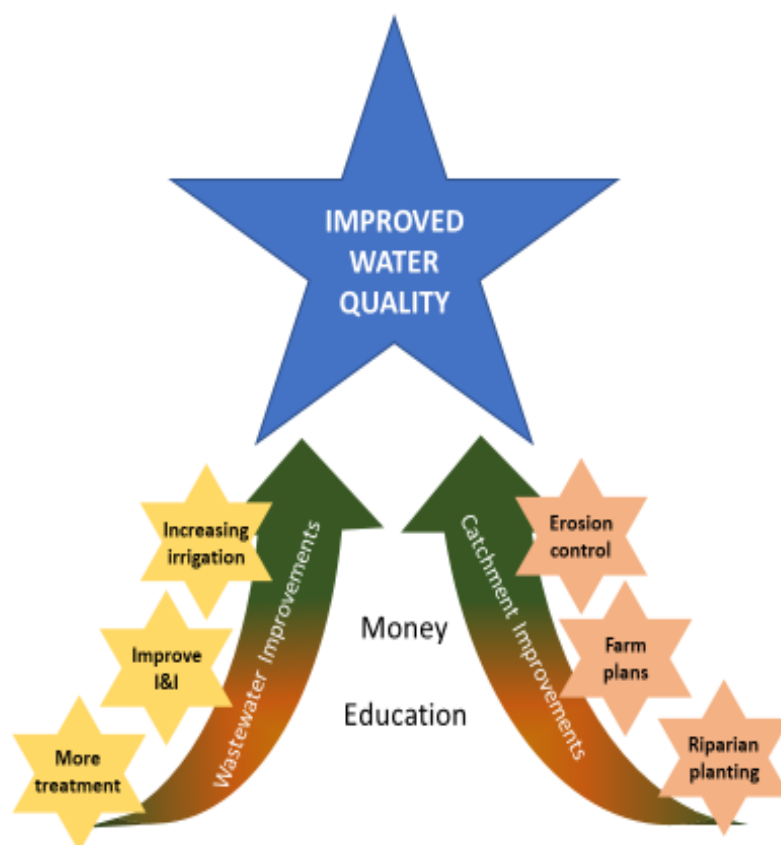


Each step would ideally incrementally lessen the impact on the Wairoa River, and in particular see over time a reduction in any treated wastewater discharge to the river. The Package includes:

- education about water use and improvements to reticulation resulting in less water needing to be discharged;
- more affordable and more effective wastewater treatment technologies achieving further removal of contaminants; and
- the identification and implementation of alternative beneficial uses for water, including recycling, industrial use and irrigation.

These areas of enhancement and further steps, coupled with education and changes made to address the need to improve water quality in the greater catchment, can occur over time and at a rate that is affordable to a fiscally constrained community. Ultimately, such a programme would result in a far greater improvement in the river's water quality, and would be a wiser investment of funds and effort, than would be achieved by solely focussing on fixing Wairoa's wastewater discharge systems today.

The concept of multiple wastewater enhancement programmes being implemented over time, alongside enhancing management in the wider catchment, is represented in Figure 1.1 below.



**Figure 1.1: The Package**

While ideally all wastewater should be removed from the river, feedback from the Wairoa Wastewater Stakeholder Group indicated a preference in favour of minimising expenditure and land area use to the extent affordable by the community.

The revised Package is summarised below:



Wastewater Infrastructure Improvements	Wastewater Irrigation	Catchment Advocacy
<ul style="list-style-type: none"> <li>• <b>Extra treatment</b> <ul style="list-style-type: none"> <li>• Filtration - sand/media to remove algae and particulate</li> <li>• Disinfection - Ultra Violet Light Treatment to reduce bugs even further than current treatment</li> </ul> </li> <li>• <b>Reticulation upgrades</b> <ul style="list-style-type: none"> <li>• Sewer pipe replacement</li> <li>• Pump station upgrades</li> </ul> </li> <li>• <b>Discharge management</b> <ul style="list-style-type: none"> <li>• Ceasing illegal connections</li> <li>• Add storage to allow for continuous slower discharge rate</li> <li>• Maintain existing discharge</li> <li>• Make upgrades</li> <li>• Change to 24/7 discharge</li> <li>• Make changes over time</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Irrigate neighbouring land</b> <ul style="list-style-type: none"> <li>• Adjacent land</li> <li>• Potentially council land including Landfill forestry</li> <li>• Other farmers in area as needed</li> </ul> </li> <li>• <b>Provide some storage to reduce summer river discharge</b></li> <li>• <b>Develop over time based on willingness and funding</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Contribute to driving catchment improvements</b></li> <li>• <b>WDC to be part of catchment decisions</b></li> <li>• <b>Work with HBRC and community to make changes</b></li> <li>• <b>Work with community to create opportunities</b></li> <li>• <b>Partial funding of catchment administration</b></li> </ul>

In addition, this revised **Package** proposes future discussions and solutions to accommodate unique wastes to be considered for removal from the wastewater system, including mortuary and hospital waste.

Other works that are of importance within this package are the reticulation improvements and upgrades. Reticulation improvements will reduce the amount of stormwater and groundwater entering the system. WDC aim to improve the integrity of the reticulated sewer system so that wastewater flows reduce during storms and wet periods. Reticulation and pump station capacity improvements are already under way, and WDC have a reticulation programme in place over the coming years.

In addition to the Wairoa wastewater system projects, WDC will assist the community with advocacy to implement land management changes across the entire Wairoa River catchment to assist improve the river's water quality. The Package does not see WDC funding or necessarily contributing to the wider catchment improvements, but assist with developing the management and administration support for various catchment programmes.

### Implications

The package aims to balance the following areas that the community have said are important to them:

Financial	Costs to be affordable to rate payers (\$5 million project = \$200/yr or \$4/wk rate increase over 30 years)
Cultural	Inclusion of land for filtration and ideally no wastewater going directly into river
Environmental	Improved bug removal and ideally minimal wastewater going to water
Recreational	Limited wastewater entering water and improved bug removal





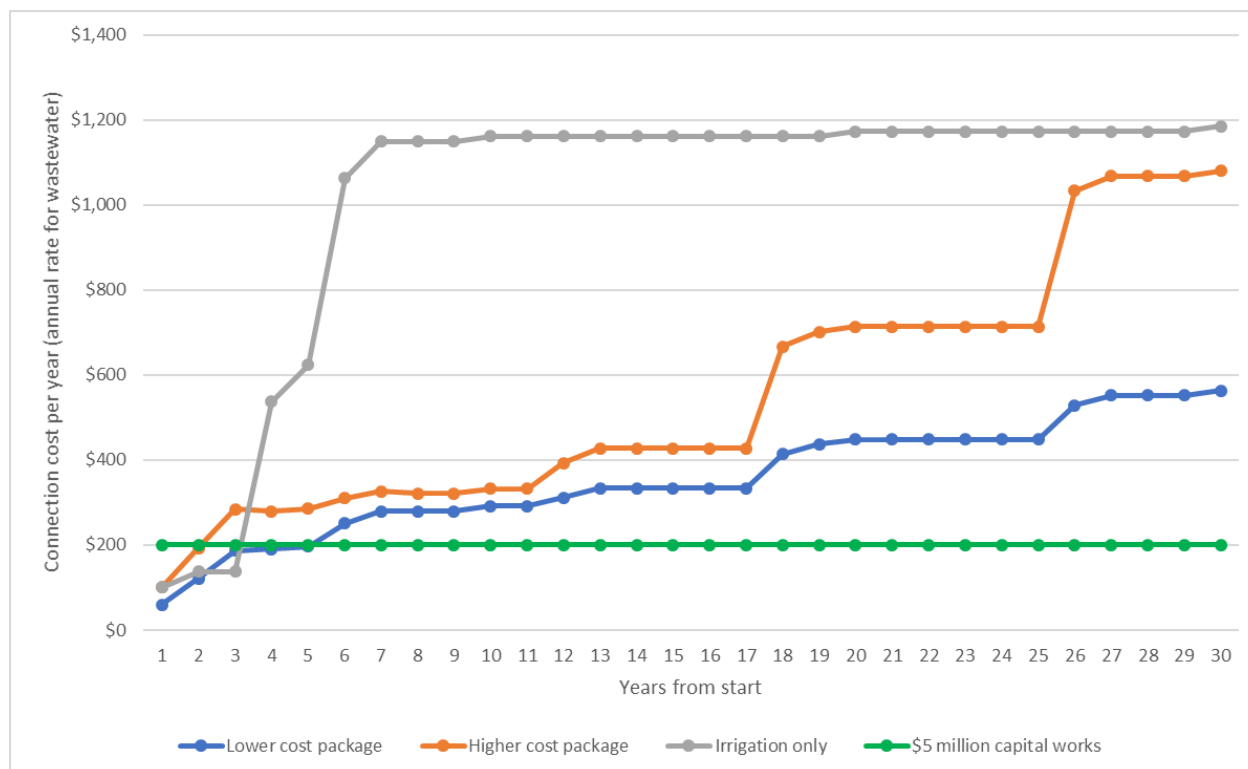
## Timing and Costs

Timing of this package is set out over a 30-year period. During the first 5 years, consenting and design of the initial system will take place. This is likely to be a variation of the current discharge system with improved treatment. From 5 years onwards, the integration of a land irrigation system will assist with gradually reducing, and ultimately removing, wastewater discharge to water. Additionally, catchment improvement projects will be implemented whereby WDC will advocate with HBRC, iwi, and other catchment groups to establish restoration projects to improve water quality in the Wairoa River and its tributaries. To assist with catchment improvement programmes, funding from central government and other agencies will help to balance out the affordability for rate payers.

Within 5 Years	Within 10 years	Within 20 years	Within 30 years
<ul style="list-style-type: none"> <li>•Improvement of areas of the reticulation system (i.e. pipe relining)</li> <li>•Improve treatment of effluent discharging from the WWTP to the estuary, allowing for 24 hour discharge</li> <li>•Add an area of irrigation (&lt;50 ha) close to treatment ponds</li> <li>•WDC to advocate for Wairoa River Catchment initiatives</li> </ul>	<ul style="list-style-type: none"> <li>•Expand wastewater irrigation area to WDC forestry block (landfill area) and neighbouring land</li> <li>•Continue reticulation improvements</li> <li>•Develop storage capacity to make treatment more effective and irrigation options more viable</li> <li>•Catchment projects underway (i.e. riparian planting and retirement of grazing land in priority sub-catchments)</li> </ul>	<ul style="list-style-type: none"> <li>•Further irrigation areas identified and infrastructure put in place (i.e. up to 300 ha of irrigation)</li> <li>•Catchment project works have covered 50% of the catchment area</li> </ul>	<ul style="list-style-type: none"> <li>•Removal of all (or most) wastewater discharge to the river</li> <li>•Further irrigation areas identified (i.e. up to 600 ha of irrigation)</li> <li>•Up to 70% of the catchment area has had project works established and maintenance of these areas will be ongoing</li> </ul>

Figure 1.2 below provides an indicative idea of three potential costs scenarios for capital and operating costs spread over a 30 year period for:

- the gradual implementation of a Package using an initial land passage treatment system with more irrigation gradually introduced over time;
- again the gradual implementation of a Package, but a more costly route for establishing irrigation whereby council are responsible for greater costs, such as land purchase; and
- the adoption of a 100 % land application/irrigation programme at an early stage.



**Figure 1.2: Annual Rate Cost Associated with Wastewater Package**

### The Solution

A long term sustainable wastewater solution, requiring multiple angles to be considered, is needed for Wairoa. Opportunities and action to improve the Mauri of the Wairoa River are also needed. Both objectives can work alongside each other, and potentially can be complementary when addressed as a **Package**. The Package for consideration is sand filtration and UV treatment followed by a 30-year implementation of gradual irrigation expansion.

It is worth remembering that it has taken more than 100 years for the river to reach its current condition; fixing it will not happen overnight



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## 2 INTRODUCTION

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### 2.1 Purpose

The purpose of this report is to identify a method of how Wairoa's wastewater can be managed and discharged, and how this process can be used to assist with an overall improvement in the quality of water in the Wairoa River.

### 2.2 Background

The Wairoa wastewater discharge consent is due to expire in May 2019. An application to discharge treated wastewater needs to be made to the Hawke's Bay Regional Council (HBRC) by 30 November 2018. Wairoa District Council (WDC) staff have been working alongside advisors to develop options for a new discharge system, which has been informed with input from the Wairoa Wastewater Stakeholder Group (WWSG) and feedback received from the community.

Community feedback and results of water quality monitoring is clear that the condition of the Wairoa River is not great, to the point that its condition caused by upstream sources of contaminants (silt, nutrients, and pathogens) is potentially masking any effects of the treated wastewater discharge that occurs shortly before the Wairoa River reaches the sea. The community would like to see improvements to the management and quality of water in the river as a whole.

While removal of treated wastewater from the Wairoa River is desirable from an environmental and cultural perspective, alternatives have technical limitations and are expensive; to the point where they are currently unaffordable for this small rural community. A solution is needed to allow the discharge of treated wastewater, and at the same time recognition is also needed of the current state of the river.

### 2.3 Scope

This report is to provide:

- An understanding as to the drivers for the updated system
- The revised package that includes modification to the filtration system
- An adoption of land application over time
- Potential catchment initiatives and advocacy
- Identification of other wastewater catchment works that are included in WDC's Long Term Plan (LTP) 2015-25
- Associated timing and high-level costs



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## 3 THE EVOLUTION OF OPTIONS AND THINKING

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### 3.1 Background Work

Over the last 18 months there have been a range of investigations taking place to identify options for managing and discharging Wairoa's wastewater. The identification of options has been assisted with the input of a Wairoa Wastewater Stakeholder Group. There have been a series of options considered and reports prepared that have allowed the narrowing down of a package of works that may well be suitable for managing Wairoa's wastewater. In particular, a draft report was prepared titled Wairoa River and Wastewater – A Big Picture Solution (LEI, 2017:B2A1), which was presented to the Wairoa Wastewater Stakeholder Group on 13 November 2017.

That report outlined a package of works that could be implemented over time. Specifically, it included:

- continuing the current discharge to the estuary;
- additional treatment (filtration and ultraviolet light) and/or a high rate land passage system;
- investigations and works to reduce the volume of water needing treatment;
- reducing pump station overflows;
- developing opportunities over time to apply the wastewater to land; and
- contributing to the establishment and administration of a larger river catchment management programme.

This proposed solution provided for a land passage system to be developed in a way that mimicked the catchment and could be used as an educational show piece to highlight management that impacted on water quality.

The report provided an overview of the work undertaken to date and a rationale as to why and how a package is suggested that evolves over time and integrates with the catchment. This report should be viewed if further details are required.

### 3.2 Package Refinement

The above report was presented at the 9<sup>th</sup> Wairoa Wastewater Stakeholder Group meeting on 13 November 2017. Feedback from the group was that some design aspects incurred additional costs and did not deliver tangible benefits. Specifically, it was identified that the high rate land passage system was not going to provide for extra treatment, and there would be a maintenance requirement to keep this system functioning. Further, the model catchment concept while of initial interest may potentially over time have less relevance and become redundant.

It was made clear that ideally if the wastewater was treated to a high enough standard, then it could continue to be discharged to the water. A desirable component was some form of sand filtration system which allowed the water to be filtered, preferably with media/sand/soil sourced locally; which could be considered to provide for contact with Papatūānuku. This could then be followed by a disinfection system to reduce pathogens. The extent of contact in this revised system is considerably less than that proposed in the initial system.

While treating the water prior to continuing the surface water discharge was an acceptable option in the revision developed, it had to be accompanied by the other aspects of the original package; including:

- reticulation improvements to reduce the water volumes needing treatment;
- reducing pump station overflows;



- exploring and developing land application opportunities over time to allow the river discharge to cease; and
- contributing to developing greater awareness of the need to improve land management in the river catchment which would all improve the river's health and water quality.

It was intended that this revised package would be presented at the hui-a-hapu and public meeting on the 26 and 28 of November 2017 respectively. It could then be subject to discussion, debate and further refinement.



## 4 THE PACKAGE

### 4.1 Overview

If improving the health of the Wairoa River requires the elimination of wastewater discharges it will not be a simple exercise and will take time. It will also involve many related activities and not just one solution; the tap cannot be turned off overnight.

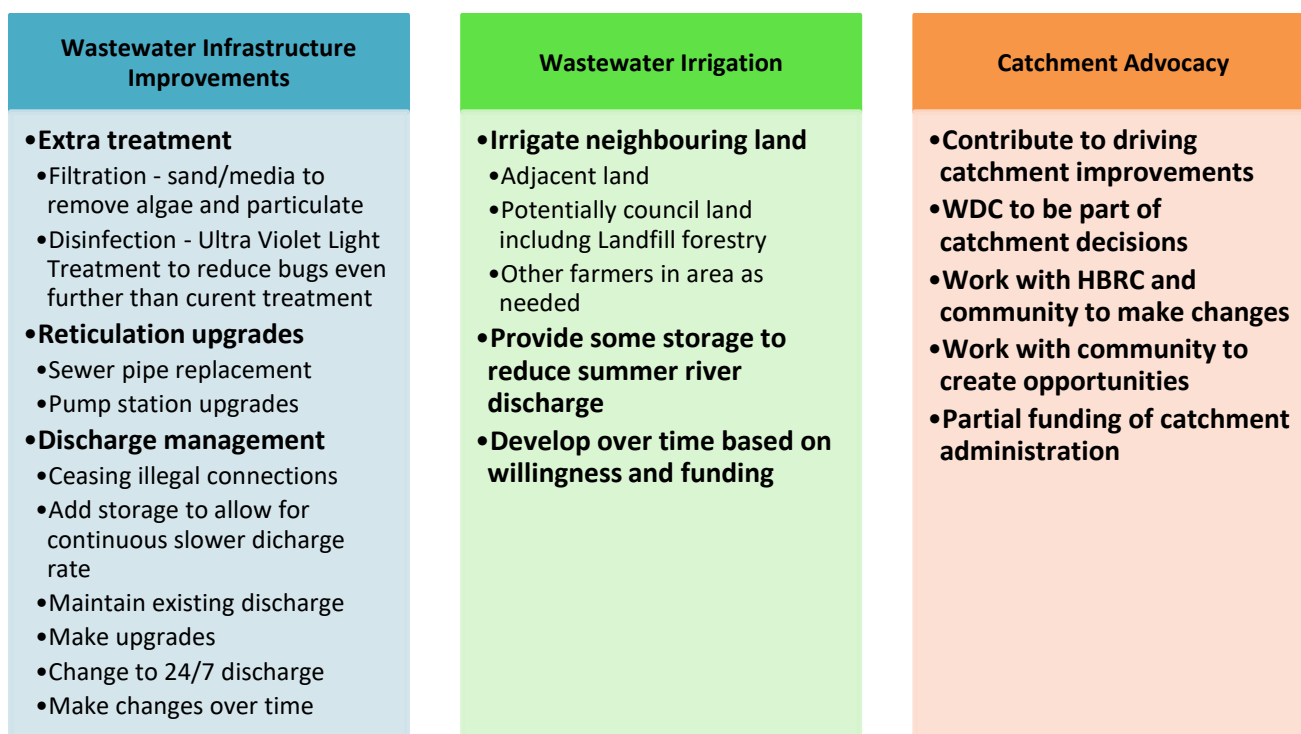
A 'Package' is proposed to not only incorporate the final target of identifying a system(s) for wastewater discharge that is away from the Wairoa River, but also provide for improvements in the catchment as a whole.

Figure 4.1 shows how wastewater and catchment opportunities can work hand in hand over time to deliver an improvement in the river's water quality.



**Figure 4.1: The Package**

There are many options and technologies to improve the wastewater system that meet the community's expectations of a sustainable wastewater discharge system and improved river health. But solutions must be practical, manageable, and affordable. After taking time to understand the issues, a Wastewater Stakeholder Group and the wider community have provided council with guidance and feedback to allow a proposed package of work to be identified. The proposed Package is not a single solution and covers three areas:



## 4.2 Wastewater Infrastructure Improvement

### 4.2.1 Overview

As shown above in Figure 4.1, infrastructure improvements can be divided into three activity groupings. Some of these works have been committed already (e.g. pump upgrades) and some also sit outside the wastewater project (reticulation and stormwater improvements), but are nevertheless related and will ultimately assist with improving the wastewater discharge.

A key part of what is proposed is maintaining the current discharge until alternative options are affordable and workable. This requires the use of the existing discharge, but with a higher quality of wastewater to be discharged.

Based on the Wairoa Wastewater Stakeholder Group feedback, the initial 5-year proposal for managing the current discharge is a sequential system as set out below:



### 4.2.2 Extra Treatment

The primary purpose of the extra treatment is to remove bugs (pathogens). If wastewater is to be discharged to surface water the ideal goal is that pathogens should not impact on the water's ability to be used for contact recreation or food gathering.

The extra treatment is a two-step process, first being filtration to take out suspended material, particularly algae. In addition, the sand filtration system will provide contact with and percolation through geological media and likened to passage through Papatūānuku. The second step is the exposure of wastewater to ultra violet light (UV) that will kill residual pathogens.



The aims of this system are to provide culturally acceptable levels of land passage through a sand filter, particularly contact with Papatūānuku, and high levels of treatment by filtering out and killing pathogens in an affordable manner. Based on the guidance in the Tangata Whenua Worldview for Wastewater Management in Wairoa (How, 2017) report, the aim is that the wastewater will have its mauri revitalised and rebalanced through these treatment processes, and will have minimal effects on the mauri of the Wairoa River and estuarine ecosystems following its discharge to that environment.

Some key details of the proposed sand filtration system are likely to include:

- Sand and gravel sourced from the Wairoa locality (to ensure that local geology is used for Papatūānuku contact);
- Perhaps with locally sourced boulders beneath and around the sprinklers which the water flows over before soaking into the sand bed; and
- Sited within the WWTP or neighbouring land areas while avoiding all known culturally significant sites.

The ultra violet light treatment will occur inside a covered concrete chamber where the wastewater leaving the sand filter flows past ultra violet lamps (like fluorescent tubes). The lamps will operate continuously or, if discharges are not continuous, during the wastewater flow events. They consume electricity which has an on-going operational cost, and they have a limited lifetime which requires regular replacement of the lamps at some cost.

#### **4.2.3 Reticulation Upgrades**

In addition to extra treatment, Council aims to improve the integrity of the reticulated sewer system so that wastewater flows reduce during storms and wet periods and no longer contain significant quantities of stormwater. Reticulation and pump station capacity improvements are already under way, with further changes proposed. Some of these changes are detailed in Section 4.5 below.

#### **4.2.4 Discharge Management**

The wastewater treatment plant ponds will not be modified and no additional treatment processes such as aerators will be added to it. The new sand filtration and ultra violet disinfection treatments will be installed between the outlet of the wastewater treatment plant and the existing discharge pipeline which has its outfall structure in the Wairoa estuary.

The discharge is currently limited by the resource consent conditions to a daily maximum volume of 5,400 m<sup>3</sup>/d during out-going tides between 6 pm and 6 am. Adopting these additional treatments will allow continuous 24-hour discharges into the river because they will achieve significantly reduced disease risks from the discharge into the estuary. As a consequence of a 24-hour discharge, the sizes of the sand filter and UV treatment components will be only a quarter of the sizes that would be necessary for processing the same volume of wastewater in only 6 hours each day.

### **4.3 Wastewater Irrigation**

In addition to the modified discharge system, the long-term aim is to develop a 100 % land discharge system that ceases all discharges to the river. Currently the community can't afford to implement such a scheme, nor does a suitably large area of appropriate land seem to be available for developing irrigation. However, with the implementation of an improved treatment system and consenting of the estuary discharge as an interim measure, the community can use the duration of the new discharge consent to actively pursue and progressively implement new land discharge systems which could eventually achieve close to a 100 % land discharge and lessen or cease discharges to the estuary.





In order to achieve 100 % (or even 80 %) discharge to land for agronomic benefit, a large storage pond is almost certainly required for holding the treated wastewater during wet periods until the soils return to low enough moisture levels to allow the resumption of irrigation. Storage is vital to ensure that wastewater volumes match what will be required to vigorously grow vegetation and to prevent soil dryness during summer months. The disadvantages of storage are that it comes at a very high price to construct, and requires yet more land to be found for it to be built upon without occupying too much of the irrigable land area.

It is expected that such a land based system would be developed over a period of 30+ years, as land and finances become available. The area required to irrigate and store wastewater will be reliant on a couple of factors, these being; the amount of wastewater entering the treatment plant and the soil moisture of the area to be irrigated.

Improvements to reticulation will assist with decreasing flows to the treatment plant and subsequently the amount of land required for irrigation. Likewise, storage requirements will decrease with lower flows, however, soil moisture capacity will determine when irrigation can occur and how much wastewater can be applied. Further investigation will be required to determine these variables.

#### **4.4 Catchment Advocacy**

In addition to the Wairoa wastewater project, it is proposed that WDC assist the community, including rural landowners, to implement land management changes across the entire Wairoa catchment that will improve the river's water quality and health in the long run. WDC would not fund or necessarily contribute to the wider catchment improvements, but assist with developing the management and administration support for various catchment programmes.

It is clear that the community as a whole would like to see an improvement in river water quality and it is considered appropriate the WDC should be involved at a strategic level and provide advocacy for catchment improvement projects.

#### **4.5 Current Commitment to Make Change**

There are already some improvements to Wairoa's wastewater system underway. A key change is limiting the amount of stormwater and groundwater that enters the aged system causing it to exceed its capacity and overflow onto land and/or into the Wairoa River. This programme to reduce flows helps with developing options to treat and discharge the wastewater.

Specific activities that are proposed include (note that the allocated costs of proposed works are subject to approval through the Long Term Plan approval process):

- In case of power outages – installation of dedicated generators in each pump station (\$600,000 - is in the LTP starting in 2019 with completion in 2026) – **likely to occur**.
- ALL pump stations to have new generation chopper pumps, so no pump blockages occur (\$160,000 - planned for completion end of 2019) – **programmed**
- Sewer reticulation upgrade as per recommendations in a recently completed technical review (parts of the identified \$2,600,000 works are included in the LTP starting in 2020 with completion in 2024) – **likely to occur**.

More recent works to help manage sewerage overflow and reduce stormwater entering the system includes:



- Chopper pumps installed in the Main pumping station Fitzroy \$60,000 – **completed\_01/09/17**
- CCTV Project due for completion 22/12/17 - \$55,000 - **programmed**
- 1,500 m of sewer pipe relining - \$400,000 – **programmed for March 2018**

#### **4.6 Managing Additional Waste Streams**

Wastewater comes from a number of sources, and is not solely domestic in origin from residential properties. Some non-residential wastewater has particular contaminants, which while small in volume, can have a significant contaminant load, impacting on the reticulation, treatment and discharge. Some waste streams also contain components that are culturally undesirable to be in water that is then treated and discharged, particularly if the discharge is to water.

High fat waste streams from food outlets can lead to the formation of fat-burgs that block sewers. Ideally fats should be removed at source using grease traps.

Some businesses can have specialised waste streams that result in traces of contaminants that can be detectable in the waste stream and ultimately the receiving environment. While not used now, mercury from fillings used in dentistry used to be detectable in wastewater.

Waste streams that are readily degradable when placed into the treatment system can over load the treatment process, causing malfunction and odours. This includes the dumping of septic tank pump outs.

Then there are a series of wastes that originate from processes that involve the management of sick or deceased people. While chemical and biological treatment can render such discharge benign in terms of measurable environmental impacts, the practices of such bodily discharges (irrespective of the level of treatment) is not considered appropriate from a Maori world view perspective. In particular, mortuary wastewater that enters surface water as a final discharge environment (i.e. river or sea) is typically viewed as culturally insensitive. Mortuary wastewater carries with it chemical and bodily fluids and the residues of a human body entering water is viewed as tapu.

Going forward as part of the package, there is the opportunity to investigate the extent of specific waste streams and where appropriate develop alternative practices. For example, there may be the opportunity to separate mortuary and some hospital wastes and develop a purpose designed and built land discharge system.



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## 5 PACKAGE IMPLICATIONS

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### 5.1 What Does the Package Mean to the Community

Previous consultation has used a four pillar or quadruple bottom line approach to assist with assessing the suitability of options with respect to environmental, cultural, social/recreational, and financial impacts. Planning constraints or consentability have also been a key aspect of assessment, as consenting processes can either be a barrier that discourages further consideration of an option or they can encourage options that are preferred by the community. In order to assess the effects on any of these bottom line values, the effects of the proposed treatment on the wastewater quality need to be understood first.

### 5.2 Treated Wastewater Quality Effects

The duplicate actions of the sand filtration and UV lamps ensure that the wastewater will no longer contain problematic levels of viable pathogens during normal flows. The sand filter alone will remove most pathogens, and the UV lamps will kill all remaining pathogens. The filtration will also improve the clarity and colour of the wastewater so that it is almost colourless and better suited to effective UV treatment. However, the effectiveness of pathogen removal may not be as high during high wastewater flows periods, but this would typically coincide with elevated river flow conditions.

Algae and suspended solids will also have been removed by the sand filter, which will directly reduce the residual BOD and nutrient (carbon, nitrogen, and phosphorus) loads of the treated wastewater on the estuarine environment receiving the final discharge. The potential for odours being generated from the treated wastewater will also reduce as a result of these improvements.

Depending on the effectiveness of these treatment processes, the treated wastewater might get close to meeting drinking water standards.

### 5.3 Environmental Value Assessment

The discharge of the improved wastewater into the estuary will have reduced effects on the environment because:

- It removes a potential source of disease from pathogens;
- It reduces nutrient contributions to estuarine receiving waters;
- It removes most suspended solids from the discharge;
- It reduces or prevents discolouration of estuarine receiving waters; and
- It reduces or prevents algae contributions to estuarine receiving waters.

The treated wastewater discharge will no longer contribute to any sedimentation build-up on the estuary floor or algal blooms within the estuary. The reduced BOD load of the discharge will also mean that the oxygen in the estuarine environment will no longer be consumed by the treated wastewater contribution; instead the estuary's dissolved oxygen will remain available for aquatic and marine organisms to use for their survival. All of these reductions in wastewater contaminant contributions to the estuary will contribute to generating a healthier estuarine ecosystem.

It should be noted that the existing discharge has not resulted in any detectable effects on the sediments, water quality, or ecosystem in the Wairoa estuary. The dispersion and flushing of the treated wastewater discharge plume has achieved this outcome. The discharge regime of only discharging during overnight out-going tides will have assisted with achieving this outcome. When the bar has closed across the Wairoa River mouth to Hawke Bay, the effectiveness of



dispersion and flushing is likely to be reduced and has been perceived to result in unacceptable water quality within the estuary and urban locality. However, the high load of contaminants from the large rural catchment upstream of urban Wairoa is known to far outweigh the contribution from Wairoa's WWTP discharge of treated wastewater.

#### **5.4 Cultural Value Assessment**

Some important cultural values have been addressed by this proposed system which will provide beneficial outcomes as a consequence of the sand filter ensuring contact with Papatūānuku occurs and achieving removal of pathogens. The Mauri of the wastewater could be considered to have been revitalised to some extent and its impact on the Mauri of Wairoa River estuary has been substantially reduced (improved). However, there is still residual cultural concern with the continuation of direct discharge of treated wastewater to the river instead of being entirely retained on land while avoiding contact or mixing with any fresh water bodies.

#### **5.5 Social and Recreational Values Assessment**

The removal of pathogens and algae from the discharge will be beneficial to the social and recreational acceptability of continuing to discharge treated wastewater into the Wairoa estuary. Public health is protected, and the wastewater discharge is no longer a contributing cause to the community's avoidance of swimming, boating, or fishing in the estuary.

#### **5.6 Financial Values Assessment**

The construction of a sand filter bed and UV system, sized to match the lower flows, as an interim measure is a sound financial investment that the Wairoa community can afford. The ability to incorporate this system into any future land discharge system (instead of making it redundant) is also a wise financial investment. There is no need to construct a large storage pond for this stage of the package, which avoids a substantial financial cost. The effectiveness of the relatively low cost system in significantly improving the wastewater quality is high.

The on-going operational and maintenance costs are modest to low. Power requirements for UV lights can be minimised by effective filtration upstream. UV lights need to be replaced regularly as they have a limited lifespan. Periodic renewal of the sand filter media will incur some cost.

#### **5.7 Planning and Consenting Hurdle Assessment**

Constructing the sand filter and UV system within the existing WWTP site land will have few if any consenting implications and hurdles. The Wairoa District Plan's Designation of the WWTP site for sewerage treatment purposes allows WDC plenty of scope to construct additional facilities for improved treatment of Wairoa's wastewater. HBRC's Regional Plans also have no consenting requirements for small scale infrastructure such as that proposed in this case.

If neighbouring land were to be used to contain some or all of these treatment facilities, some consents would be likely to be required from WDC's regulatory arm for a new use of rural land.



## 6 TIMING

The package has been developed for implementation over a 30 year period. This will allow for expansion of land treatment over time as funds allow. Additionally, acquisition of land for irrigation and further storage will take time to find. A Gantt chart that outlines the main areas of the Package (reticulation upgrades, wastewater treatment, wastewater discharge and catchment works) is outlined in Appendix A and summarised below.

Within 5 Years	Within 10 years	Within 20 years	Within 30 years
<ul style="list-style-type: none"><li>•Improvement of areas of the reticulation system (i.e. pipe relining)</li><li>•Improve treatment of effluent discharging from the WWTP to the estuary, allowing for 24 hour discharge</li><li>•Add an area of irrigation (&lt;50 ha) close to treatment ponds</li><li>•WDC to advocate for Wairoa River Catchment initiatives</li></ul>	<ul style="list-style-type: none"><li>•Expand wastewater irrigation area to WDC forestry block (landfill area) and neighbouring land</li><li>•Continue reticulation improvements</li><li>•Develop storage capacity to make treatment more effective and irrigation options more viable</li><li>•Catchment projects underway (i.e. riparian planting and retirement of grazing land in priority sub-catchments)</li></ul>	<ul style="list-style-type: none"><li>•Further irrigation areas identified and infrastructure put in place (i.e. up to 300 ha of irrigation)</li><li>•Catchment project works have covered 50% of the catchment area</li></ul>	<ul style="list-style-type: none"><li>•Removal of all (or most) wastewater discharge to the river</li><li>•Further irrigation areas identified (i.e. up to 600 ha of irrigation)</li><li>•Up to 70% of the catchment area has had project works established and maintenance of these areas will be ongoing</li></ul>

**Reticulation upgrades** have been accounted for in the Long-Term Plan 2015-25 and works on these are already underway and will continue over time. Additionally, further investigations and removal of illegal connections should be made a priority to minimise the effects of infiltration and ingress of stormwater and groundwater.

**Treatment plant** upgrades and maintenance include desludging that should be programmed to occur every 5 to 10 years and an upgrade/recalibration of the flow meters as soon as possible. Further treatment upgrades form part of the Package whereby an improved quality of effluent will be discharged to the Wairoa River. This includes the filtration system to decrease pathogens, algae and suspended solids leaving the treatment ponds and allows a higher level of UV disinfection. This system would be installed in the short term (2 – 3 years).

**Establishment of irrigation** across neighbouring farms and a WDC forestry block will assist with decreasing the amount of wastewater that is to be discharged to the Wairoa River. The accumulation of these irrigation areas will be staggered over a 30 year period. For example, the Mucalo property could likely start irrigation in 5 years' time, with additional blocks added every five to ten years from then on, dependent on land area availability, consent processing, and cost of infrastructure (including construction of storage and irrigation systems).

**Advocacy.** Within the first five years of this package, WDC could assist to establish a **catchment plan**. This will require involvement with HBRC, iwi, and other catchment groups to establish restoration projects to improve water quality in the Wairoa River and its tributaries and to increase



the stability of the land via pole planting and retirement. Initially, planning and funding applications will occur over the first 5 years with implantation of works to occur from 5 years onwards.

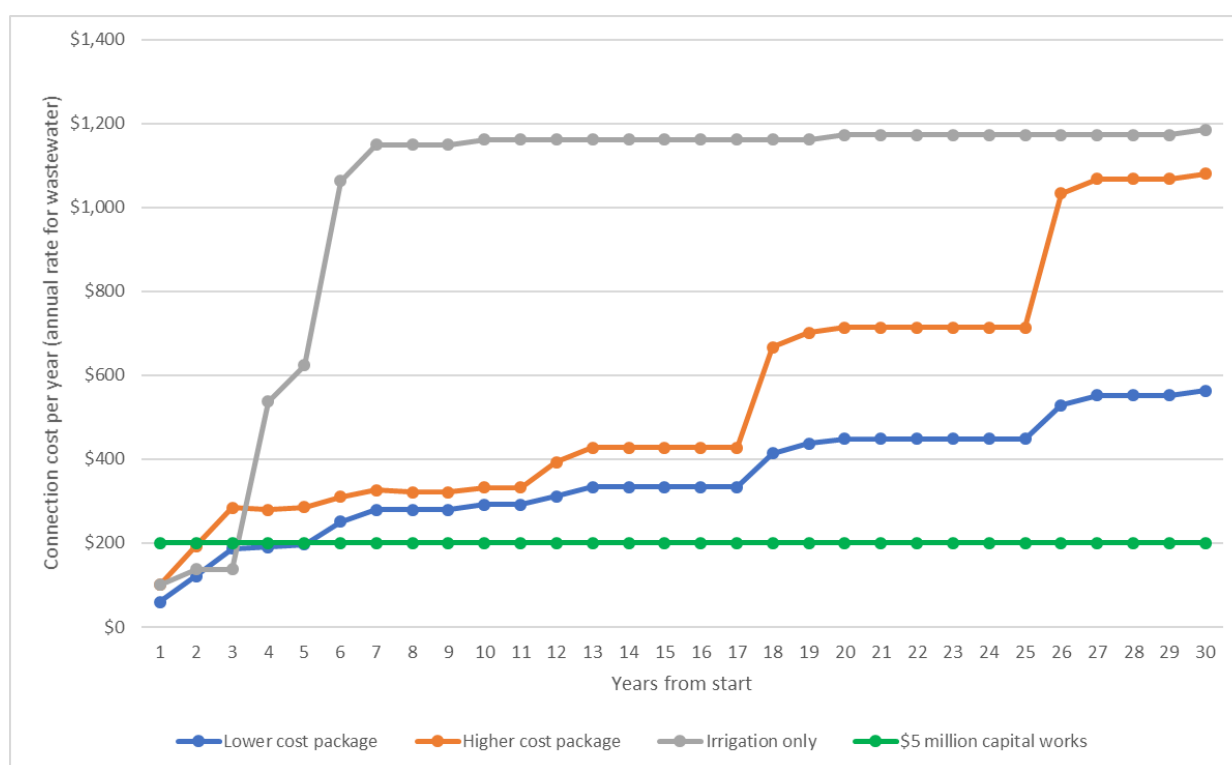


## 7 PACKAGE COSTS

The delivery of the above Package comes at a cost to the community, being an increase in rates to cover the Package. The reality is any changes to the current system will result in rate increases, with options pursuing 100 % discharge to land being very expensive (if in fact 100 % land application is actually feasible). If targeting 100 % discharge to land is essential then there are two options: 1) the costs being incurred now, or 2) costs incurred gradually over time. There is the scope for the increases to be moderated by developing lower cost options with the help of the community.

Figure 7.1 below provides an indicative idea of three potential costs scenarios over a 30 year period for:

- the gradual implementation of a Package using an initial land passage treatment system with more irrigation gradually introduced over time;
- again the gradual implementation of a Package, but a more costly route for establishing irrigation whereby council are responsible for greater costs, such as land purchase; and
- the adoption of a 100 % land application/irrigation programme at an early stage.



**Figure 7.1: Annual Rate Cost Associated with Wastewater Package**

The costs shown in Figure 7.1 are the annual rate resulting from the capital work activities in that year being spread over the subsequent 30 year period, with operating costs in that year also added.

The Packages described above do not include existing programmed works, including expenditure on reticulation upgrades. They do however, include an estimation of annual operating costs.

There is the possibility that implementation could be cheaper (lower package cost vs higher package cost) if land owners are willing participants and land does not need to be purchased. Further, the entire package does not necessarily have to be implemented, with only sufficient works to a capped amount. For example, the treatment plant modification, discharge structure



upgrade and some nearby irrigation could be implemented up to a total value of \$5 million (as shown Figure 7.1 with the green line). This would equate to approximately a \$200 per connection increase in rates.

Where a river discharge is maintained, at least in the initial years, a contribution to establishing catchment management programmes is included in the costs. However, where the land application package is commenced at an early stage there is no contribution to any catchment programme.

A summary of package costs are shown in Table 7.1. These costs are based over a 30 year period and do not include those costs already accounted for by the council (i.e. reticulation upgrade).





**Table 7.1: 30 Year Costs for Alternative Wastewater Packages\***

		Lower cost <sup>#</sup> package	Higher cost package <sup>#</sup>	Irrigation only
Wastewater Reticulation		\$ -	\$ -	\$ -
<b>Consenting</b>		<b>\$ 1,500,000</b>	<b>\$ 2,500,000</b>	<b>\$ 2,500,000</b>
Treatment Plant	Desludging	\$ 1,200,000	\$ 1,200,000	\$ 1,200,000
	Flow Meter Upgrade	\$ 75,000	\$ 150,000	\$ 150,000
	Treatment - UV treatment	\$ 150,000	\$ 500,000	\$ 500,000
	Filtration – sand	\$ 500,000	\$ 1,000,000	\$ 1,000,000
	<b>Treatment Plant Total</b>	<b>\$ 1,925,000</b>	<b>\$ 2,850,000</b>	<b>\$ 2,850,000</b>
Discharge	<b>Outfall Pipe - system upgrade</b>	<b>\$ 350,000</b>	<b>\$ 500,000</b>	<b>\$ -</b>
	<b>Irrigation</b>			
	Area 1			
	Construction	\$ 250,000	\$ 250,000	\$ 10,000,000
	Use/maintenance	\$ 520,000	\$ 520,000	\$ 3,900,000
	Area 2			
	Construction	\$ 1,500,000	\$ 750,000	\$ 11,000,000
	Use/maintenance	\$ 1,380,000	\$ 960,000	\$ 3,600,000
	Area 3			
	Construction	\$ 500,000	\$ 1,500,000	\$ -
	Use/maintenance	\$ 720,000	\$ 1,080,000	\$ -
	Area 4			
	Construction	\$ 2,000,000	\$ 6,000,000	\$ -
	Use/maintenance	\$ 480,000	\$ 720,000	\$ -
	Area 5			
Construction	\$ 2,000,000	\$ 8,000,000	\$ -	
Use/maintenance	\$ 160,000	\$ 240,000	\$ -	
	<b>Irrigation Total</b>	<b>\$ 9,860,000</b>	<b>\$ 20,520,000</b>	<b>\$ 28,500,000</b>
Catchment works	Oversight & Governance	\$ 430,000	\$ 520,000	\$ -
	Planning & Prioritisation	\$ -	\$ -	\$ -
	Whole Farm Plan	\$ -	\$ -	\$ -
	Implementation and Works	\$ -	\$ -	\$ -
	Audit and Report	\$ -	\$ -	\$ -
	<b>Catchment Total</b>	<b>\$ 430,000</b>	<b>\$ 520,000</b>	<b>\$ -</b>
<b>Total current value investment</b>		<b>\$ 13,715,000</b>	<b>\$ 26,390,000</b>	<b>\$ 33,850,000</b>

Note: \* - costs detailed here are indicative only and are for the purpose of establishing the context and appropriateness of the package.

# - package costs relate to variations in price, particularly for irrigation and whether land is purchased.



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## **8 REFERENCES**

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LEI (2017:B2A1). Wairoa River and wastewater – a big picture solution. Unpublished report prepared for Wairoa District Council, November 2017.

How, N. (2017). Tangata Whenua Worldviews for Wastewater Management in Wairoa. Unpublished report prepared for Wairoa District Council, November 2017.



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## 9 APPENDICES

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- Appendix A Package Timeline
- Appendix B Package Cost Estimates



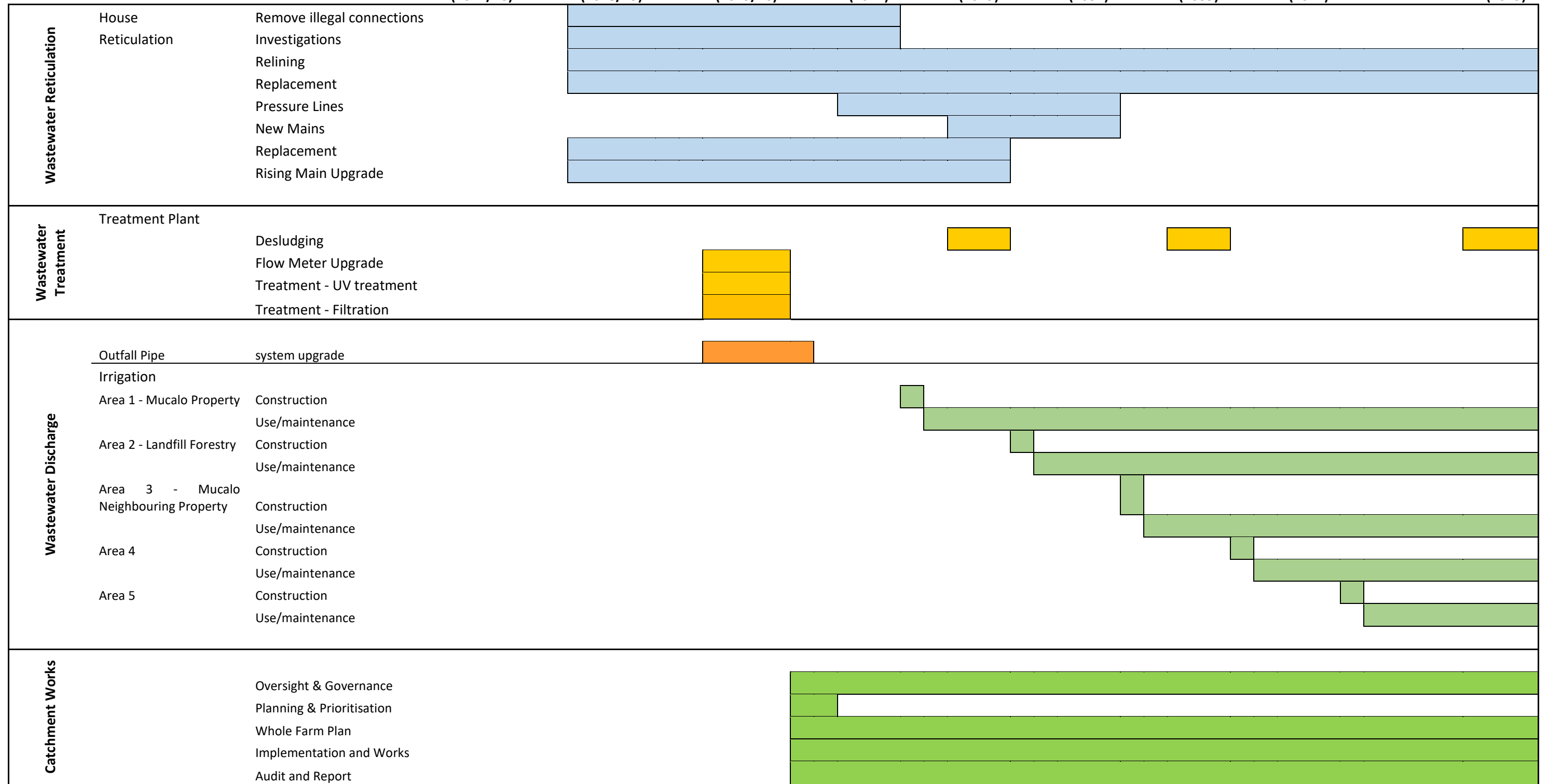
# **APPENDIX A**

## **Package Timeline**



**Package plan over 30 years**

0 years (2017/18)    1 years (2018/19)    2 years (2019/20)    5 years (2024)    10 years (2029)    15 years (2034)    20 years + (2039)    25 years + (2044)    30 years + (2049)





# **APPENDIX B**

## **Package Cost Estimates**



**Revised package description, timing, costs and certainty (red = committed >90% likely to occur; range = essential 60% likely to occur; yellow = desirable >10% likely to occur)**

Item	Description	Time	Cost	Certainty		
Wastewater Reticulation	House	Remove illegal Connections	Stormwater connections connected to wastewater reticulation are removed and diverted to minimise I&I contribution	year 1 to year 5	\$4.75 M to \$20 M	
	Reticulation	Investigations	Research and modelling of reticulation system to encounter what is the best solution for the particular system	Year 1 to year 5		
		Relining	Lining of pipes	Year 1 to year 30		
		Replacement	Replacing asbestos pipes and older leaky pipes	Year 1 to year 30		
		Pressure Lines	Upgrading sections of the reticulation system with pressure lines instead of gravity feed	Year 5 to year 15		
		New Mains	Areas of the reticulation system that need new mains added to avoid increasing loads on already existing systems	Year 10 to year 15		
	Pump Stations	Replacement	Replacing pump station pumps	Year 1 to year 10		
Rising Main Upgrade		Upgrading systems that are no longer coping with the flow rates	Year 1 to year 10			
Wastewater Treatment	Treatment	Desludging	Removing pond sludge build up to allow for increased storage area	Year 5, 10, 15, 20 (every 5 years)	\$100 K to \$500 K	
		Flow Meter Upgrade	Replacing the current monitoring system and calibrate to the current flow rates	Year 2		
		UV Treatment	adding UV treatment to the pond treatment system to decrease pathogen loading rates	Year 2 to 3		\$150 K to \$400 K
		Filtration System	constructing the approved design, sand filtration method	Year 2 to Year 3		
Wastewater Discharge	Outfall Pipe	System Upgrade	upgrading of the outfall pipe to minimise blockages and unconsented overflows	Year 2 to Year 3	\$300 to \$1 M	
	Irrigation Area 1 - Mucalo Property	Construction	Installation of infrastructure pipes and pumps across the Mucalo property. This will see piping from the treatment plant to the hill tops and flats of the associated areas	Year 5		
		Maintenance/Use	Monitoring soil moisture and groundwater levels regularly, soil moisture should be checked before irrigation begins each session; irrigation maintenance of piping, nozzles and pump.	Year 6 onwards		
	Area 2 - Landfill Forestry	Construction	Installation of infrastructure pipes and pumps across forestry site. This will be an additionally connection from the Mucalo property.	Year 10		
		Maintenance/Use	Monitoring soil moisture and groundwater levels regularly, soil moisture should be checked before irrigation begins each session; irrigation maintenance of piping, nozzles and pump.	Year 11 onwards		
	Area 3 - Mucalo Neighbouring Property	Construction	Installation of infrastructure pipes and additional pumps. These will be connected onto existing piping from the Mucalo property.	year 15		
		Maintenance/Use	Monitoring soil moisture and groundwater levels regularly, soil moisture should be checked before irrigation begins each session; irrigation maintenance of piping, nozzles and pump.	year 16 onwards		
	Area 4	Construction	Installation of infrastructure pipes and additional pumps if required, dependent on location from existing irrigation	Year 20		
		Maintenance/Use	Monitoring soil moisture and groundwater levels regularly, soil moisture should be checked before irrigation begins each session; irrigation maintenance of piping, nozzles and pump.	Year 21 onwards		
	Area 5	Construction	Installation of infrastructure pipes and additional pumps if required, dependent on location from existing irrigation	Year 25		
Maintenance/Use		Monitoring soil moisture and groundwater levels regularly, soil moisture should be checked before irrigation begins each session; irrigation maintenance of piping, nozzles and pump.	Year 26 onwards			
Oversight & Governance Planning & Prioritisation Whole Farm Plan	Governance	Management	Manage governance oversight and maintain relationships with existing governance structures (i.e. Regional Council)	Year 3 onwards	Up to \$45 M	
		Research and Planning	Technical advisory team, strategic and operational management, support of catchment projects	Year 3 onwards		
	Works and Catchment Allocation	Research and Planning	Analyse historic field data, research and audit to fit into prioritisation and planning processes	Year 3 to Year 4		
		Works and Catchment Allocation	Plan individual and catchment programmes/targets	Year 4		
	Engagement	Whole Farm Plan	Engagement with individual farmers in target subcatchment to determine farm layout and target areas for works.	Year 4 onwards		
Whole Farm Plan		Process of farm planning, farmer interview, mapping, nutrient budget, targeting 100 farms per year	Year 4 onwards			
Works Programme		Agree on works programme and timing with farmer	Year 4 onwards			



<b>Item</b>		<b>Description</b>	<b>Time</b>	<b>Cost</b>	<b>Certainty</b>
Implementation and Works	Incentives and grant payments	Funding grants applied for to assist with rate payers' contribution, should include central government and other organisations (i.e. industry support, trusts, marae, tourism initiatives)	Year 3 onwards (dependent on grant period)		
	Physical Works	Carry out physical works according to agreed plans (i.e pole planting, riparian zoning, land retirement) aim for 2,500 ha per year of works	Year 5 onwards		
Audit and Report	Audit and monitoring	Auditing of works undertaken on a regular basis (i.e. yearly)	Year5 onwards		
	Reporting	Annual reports completed to account for works undertaken	Year 3 onwards		



