Wairoa Wastewater Treatment Plant Discharge Resource Consent Application and AEE

Wairoa District Council

November 2018

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Status:	Final

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Ref: Application-C0-WDC2018C0-Wairoa_WWTP_Discharge_Consent_AEE-Final.docx

Revision Status: Final Date: November 2018

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1 EXECUTIVE SUMMARY

1.1 Preamble

Wairoa District Council (WDC) operate the Wairoa wastewater treatment plant (WWWTP) which is located near Rangihoua / Pilot Hill south of Wairoa. It currently discharges its treated wastewater into the Wairoa River during out-going overnight tides. Discharge resource consent CD940404W granted by Hawke's Bay Regional Council (HBRC) on 23 August 1999 authorises the discharges of odours to air and of treated wastewater to the Wairoa River. This consent will expire on 31 May 2019.

During the last four years WDC have reviewed the entire wastewater system, consulted with their community regarding their concerns and aspirations relating to wastewater management, and developed an integrated programme of actions to improve the wastewater reticulation and treatment and to progressively transition from the existing river discharge to a land discharge (irrigation) system. In addition, WDC committed to supporting environmental initiatives that aimed to reduce rural runoff and improve the water quality and inter-dependent ecosystems of the entire Wairoa River catchment.

In addition to the main discharge of treated wastewater, reticulation pump stations overflow during some storm events. These are untreated wastewater discharges dominated by stormwater and occur via pipes directly to the Wairoa River adjacent to each pump station. The main WWWTP discharge pipeline also has a surcharge overflow structure beside Kopu Road which enters a stormwater drain and then cascades down the riverbank onto the mudflats of the Wairoa River. This only operates while the main discharge occurs at rates or pressures greater than the outlet can discharge. A key purpose of this application for resource consents is to allow WDC to modify the discharge pipeline and flow regime to significantly reduce the use of this overflow structure.

This report and supporting documents seek a replacement discharge resource consent, and a number of associated resource consents, to continue discharging Wairoa's treated wastewater into the Wairoa River; but with a number of significant improvements occurring over time. It also seeks consents for the pump station overflow discharges of stormwater-diluted untreated wastewater to the river and discharges of treated wastewater via the surcharge overflow of the main WWWTP discharge pipeline to an adjacent stormwater drain. This application also supersedes the application for consents that were lodged by WDC in December 2017 for authorising the overflow discharges from the pump stations and the WWWTP discharge pipeline surcharge structure.

1.2 Structure of the Application

This report is in support of the consent applications for treatment and discharge of wastewater from the Wairoa wastewater pump stations and WWWTP. After setting out a description of the current wastewater system, this report details the long-term discharge solution proposed for the WWWTP and the resource consents requirements for this proposal. The activities requiring resource consents referred to in this report are referred to as the Project or Proposal.

The preparation of these consent applications has been informed by work undertaken over more than 5 years. More recently, in the last two years the Project has been significantly supported with community engagement and technical reporting; from which this application document brings together a series of reports and builds on previous technical and community engagement processes.

The work undertaken has evolved to reflect community expectations. It has been supported by internal council decisions and advanced as technical knowledge has progressed. This document serves as a summary bringing together this work. Rather than repeating this work the document provides extensive referencing of supporting documents. It is intended to provide a summary and direct connections to the

relevant reports and text in meeting the requirements of Section 88 and Schedule 4 of the Resource Management Act (RMA).

An extensive reference list is provided in Section 11, and in order to manage the bulk of reproduction and the overwhelming extent of documentation, only key reports are included with this document in the package of consent application documents. Related documents not included are supplied electronically[1] and can be obtained upon request from WDC. A diagram showing the relationships between all of the reports that directly relate to the production of this application is presented in Figure A0 in Appendix A.

While the reporting structure may seem complicated and interwoven, it has been structured this way for two key reasons, being:

1) Timing – there has been pressure on Council to deliver decisions on the future of critical infrastructure and develop modified discharge regimes in a short space of time. Several work streams have had to work concurrently, and the structure of reporting has allowed various technical teams to work simultaneously while integrating feedback loops for the development of the discharge regime and assessments of effects.
2) Pre-determination – community engagement has been critical in forming the direction of the project. While beneficial, the engagement process has meant that timing on developing options has been condensed. To remain true to the community engagement process special care has been taken by the Project Team to avoid progressing to the next step without engagement of the community. This avoidance of pre-determination has resulted in significant time constraints being placed on the Project Team and the need to manage multiple work-streams in a stepwise and parallel fashion.

1.3 Introduction, Consent and Project Highlights

This resource consent application is part of a larger project based on a vision for the way Wairoa manages its wastewater in future. This resource consent application provides a critical and significant step in achieving the long-term **aspirational** 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. A wider programme of actions (Package) includes implementing improvements not only for managing Wairoa's wastewater, but also opportunities for improving Wairoa River catchment water quality.

Wairoa River's poor water quality has developed over more than 100 years. The proposed programme (Package) of actions is not intended to be a 'quick fix'; but it is intended to outline the key steps and a commitment by Wairoa District Council (WDC) and its community to take every opportunity over the next 30 years to achieve improvements and reduce the volume of wastewater entering the Wairoa River. Some steps can be implemented within the next 10 years, while others will take longer. And then there are things that the community has not yet thought of that may appear in the future to be taken advantage of; with the key being a commitment to ensure that the community is ready to take advantage of them when the opportunities present themselves.

The key aspects of the Package are:

- Repair and renew Wairoa's leaky sewer reticulation, thus reducing wastewater flows;
- Install some additional treatment processes at the WWWTP to remove solids and pathogens;
- Install additional storage for treated wastewater;
- Develop irrigation to divert wastewater from the river and beneficially re-use it; and
- **Modify the current surface water discharge regime to reduce the scale of effects on the Wairoa River[2].**

[1] Other referenced documents not included with this report can be obtained upon request from WDC.
[2] This aspect of the Package is highlighted in bold as it is the basis for this resource consent application.

Reticulation improvements will significantly reduce volumes of groundwater and stormwater entering Wairoa's leaky wastewater system which will eventually reduce the frequency of pump station overflow events so that they may only occur during unusually large storm events. The resulting reductions in wastewater flows will assist with stabilising the WWWTP's treatment performance and will reduce the volumes of treated wastewater that require storage and discharge into the environment, irrespective of whether that is land or the river.

Although the existing discharge of treated wastewater to the river has not been shown to cause any detectable effects on river water quality or ecology, there is some opportunity to improve the wastewater quality and modify the discharge regime so that the potential effects are reduced. Additional treatment will improve the quality of the treated wastewater to be discharged so that it will result in less dilution to become undetectable in the environment upon discharge. It will also be more acceptable for discharging into the river while protecting it from risks of harm to its ecological, public health, and recreational values. The addition of storage ponds will provide WDC with the flexibility and adaptability to manage discharges of treated wastewater into the environment so that effects are further minimised.

Discharges of treated wastewater to the river will be managed so that the volumes increase with increasing river flow rates. Equally, discharges will also gradually occur less often and will transition over time to cease during daytime out-going tides and low river flow conditions. The aspirational goal is that discharges will eventually cease altogether when the river is flowing less than median flow.

This resource consent application is for the surface water discharge of Wairoa's treated wastewater and occasional wastewater pump station overflows of wastewater-contaminated stormwater to the Wairoa River as part of the larger programme of works. It also includes applications for consents for the modification, maintenance, and operation of the related discharge structures.

1.4 Proposed Changes to Reticulation, Treatment, and Discharge Regime

Table 1.1 below summarises the proposed programme of changes and their timing. While there are a range of activities proposed as part of the programme, the elements covered specifically by the resource consents being sought are coloured in Table 1.1.

Early in the first stage a filter and UV lamp disinfection system will be installed at the outlet of the second pond. The outfall will be designed to cope with the expected discharge rates and to avoid siltation blockages when idle. Provision is also to be made to allow the outfall pipeline to be realigned and relocated within a defined area of the riverbed so that it is always close to the edge of the main river channel as it migrates. This will minimise siltation and blockage issues for the outfall and will also ensure that the discharged wastewater is rapidly dispersed and then transported out to sea.

Table 1.1: Summary of Wairoa's Future Treated Wastewater Discharge System

Stage Timing	Storage Capacity#	Irrigation Area#	River Discharge Parameters*	Pump Station Overflows#
Stage 1 0-5 years	No change (5,400 m^3 within the 2nd WWWTP pond).	Develop up to 50 ha	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only. ½ median to median river flows: <3,000 m^3/d discharge on **any** outgoing tide. Median to 3 x median river flows: <5,000 m^3/d discharge on **any** outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Occur less often than now (<10 events/year). Triggered during larger storms.
Stage 2 6-10 years	Increase total to about 10,000 m^3	Expanded up to 100-150 ha total	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only **but limited to no more than 30 days discharge in December to March**. ½ median to median river flows: <3,000 m^3/d discharge on any outgoing tide. Median to 3 x median river flows: <5,000 m^3/d) discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Rare (<8 events/year); only during larger storms.
Stage 3 11-20 years	Increase total to 50-100,000 m^3	Expanded up to 300 ha total	Below ½ median river flows: **no discharge at any time**. ½ median to median river flows: <3,000 m^3/d discharge **only on outgoing tide at night**. Median to 3 x median river flows: <5,000 m^3/d discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during very large storms.
Stage 4 21-30 years	Increase total to 200-400,000 m^3	Expanded up to 600 ha total	Below **median** river flows: no discharge at any time. Median to 3 x median river flows: <5,000 m^3/d discharge **only on outgoing tide at night**. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during unusually large storms.

Notes: * bold text highlights what is changing within each stage.
intended changes which depend on commitments outside resource consent processes.

It is important to note that Stages 3 and 4 are aspirational and depend on sufficient storage and irrigation being implemented.

In order to achieve these improvements, WDC need time to implement changes to each element of the wastewater system, which is why the programme shown above is laid out in stages over the next 30 years. The development of each stage is dependent upon the extent to which the irrigation and storage are able to be developed. In order to manage and respond to the level of uncertainty with these goals over the next 30 years, the proposed consent conditions framework incorporates an adaptive management approach to monitor WDC's progress, refine future options for the following 5 year periods, and optimise the discharge and storage regime management throughout the 35-year term of the resource consents.

1.5 Resource Consent Requirements

The proposed activities requiring resource consents are:

- North Clyde, Alexandra Park, and Kopu Road pump station overflow discharges to the Wairoa River during storms;
- discharge of treated wastewater from the main WWWTP via and outfall structure and surcharge pressure release overflow structure to Wairoa River;
- discharges to air from the main WWWTP; and
- riverbed occupation and disturbance for relocation and maintenance of the main WWWTP outfall pipeline in the Wairoa River bed.

The following consents are required:

- Discharge to water (Wairoa River) from WWWTP outfall;
- Discharge to water (Wairoa River) for pump station overflows;
- Discharge to air (WWWTP);
- Occupation and disturbance of river bed for periodic relocation of WWWTP outfall;
- Construction of a new structure within CHZ1 for the purposes of a network utility operation;
- Disturbance associated with construction and maintenance;
- Vegetation clearance and soil disturbance; and
- The associated occupation of space.

As identified in the Strategy Planning report (Stradegy, 2018:C9), which is integral with this AEE and application for consents, the **bundled consent classification is discretionary**.

A term of 35 years is sought for all consents.

1.6 Additional Initiatives Outside of Discharge Consenting Context

Irrigation across farms and potentially WDC's forested part of their landfill are part of the larger Package, but not part of this consent application. Also, associated large storage facilities for treated wastewater as a supply for irrigation and avoidance of discharges to the river during periods of low river flows are proposed to be considered further. **These activities fall outside and are not part of this resource consent application.**

Support of catchment improvements including funds and collaboration with community groups, farmers, iwi, DOC, and HBRC are also proposed, and again will be actioned as part of the wider programme.

1.7 Consultation

Consultation has been extensive during the initial development of this proposal. This included a Stakeholder Group who discussed and drove direction of option selection, iwi hui-a-hapu, public

meetings, media releases, and LTP consultation. All feedback supported the core elements of the proposal, including WDC's support for environmental improvement activities across the entire Wairoa River catchment.

After completing the main phase of community consultation further refinements have been made to develop the Conceptual Design (particularly the discharge regime constraints) which are believed to be improvements on the changes that were developed and agreed through earlier consultation.

Consultation with HBRC, HBDHB, and DOC staff has also occurred throughout the community consultation and subsequent preparations for the consent applications in order to obtain relevant information and to gauge their views on the proposed changes and timing of implementation. Care has been taken to avoid conflicts of interest for their roles as regulatory authorities, but their feedback has been supportive of the proposed changes and implementation timing.

1.8 Assessment of Environmental Effects

The existing discharge to the river over the last 37 years has not been shown to have caused detectable effects on the river's water quality, sediment characteristics, benthic communities or public health. It therefore appears to have had less than minor adverse effects on the physical environment. Despite this, the discharge under its current form and programme has been culturally unacceptable (and not just to tangata whenua) and has been perceived as having adverse effects on the public health risks and recreational values of the river.

The proposed changes to the reticulation, treatment, and discharge regime (including diversion of some wastewater to irrigation of local farm land) will reduce the effects of Wairoa's wastewater on the river. During summer months the discharges are intended to cease, except during large storm events. Ultimately, should sufficient land area be irrigated and large enough storage be constructed, the discharge to the river will cease and will consequently have zero effects on the river. This will improve the river environment, albeit probably undetectably improved due to the poor quality of the river from widespread rural sources of contaminants.

1.9 Statutory Assessment

This report is prepared in accordance with s88 and the Fourth Schedule of the Resource Management Act, with the Stradegy planning report (Stradegy, 2018:C9) addressing the Schedule 4(2)(2) and 104(1)(b) matters.

Customary Marine Title (CMT) claimant groups have been notified and consulted regarding these resource consents as required under Section 62 of the Marine and Coastal Area (Takutai Moana) Act 2011.

Lastly, WDC requests public notification of this application under Section 95A(3)(a) of the RMA.

2 CONSENTING OVERVIEW

2.1 Summary of Wairoa's Wastewater Discharges

Wairoa's wastewater is reticulated via pump stations to the Wairoa wastewater treatment plant (WWWTP) near Rangihoua / Pilot Hill to the south of the urban area. The treated wastewater then discharges into the Wairoa River during overnight out-going tides. Figure 2.1 maps the wastewater reticulation system, pump stations, WWWTP, and associated discharge locations.

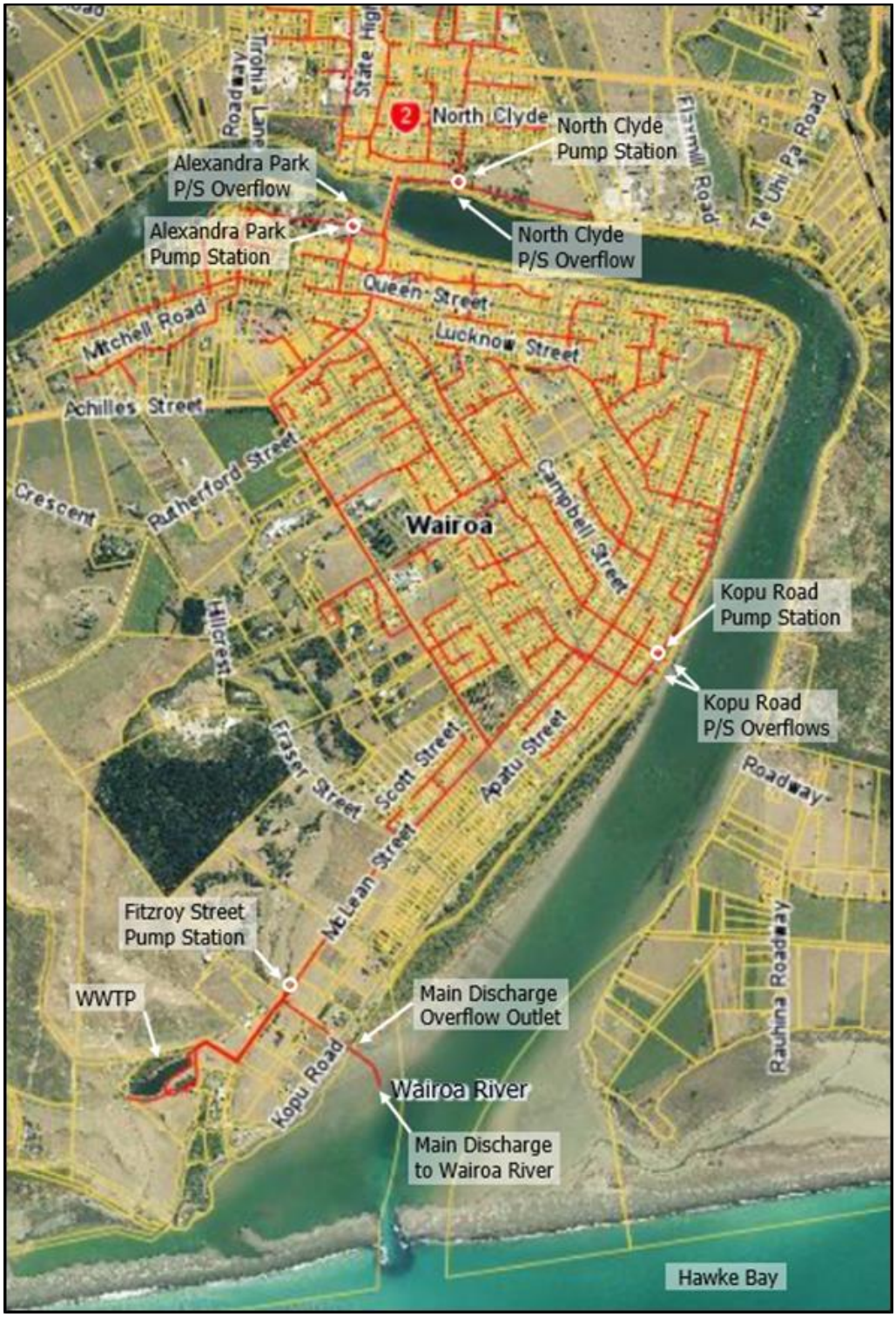

Figure 2.1: Wairoa's Wastewater System and Discharge Locations

In the pipeline upstream of the WWWTP's main discharge, an overflow structure discharges some treated wastewater from the last manhole in the outfall pipeline between Kopu Road and the riverbank into an adjacent stormwater drain below Kopu Road which terminates at the riverbank. The frequency and volume of these discharges has not been fully characterised, but it is driven by the discharge flow capacity limitations of the main river outfall causing the pipeline to surcharge.

In addition to the main WWWTP discharge, three of the wastewater pump stations overflow to the river during storm events that create high wastewater flows. These pump station overflow discharges are primarily stormwater with some contamination from wastewater. During such events the river is generally flooding and receiving the urban stormwater runoff as well as rural runoff from the wider upstream catchment.

WDC are implementing reticulation improvements in order to reduce the excessive volumes of stormwater and groundwater that are the primary cause of the pump station overflow discharges, and there has already been some reduction in the frequency of overflows and the triggering level of rainfall has risen (overflows only occur during larger storm events than was the case during previous years).

2.2 Historic and Existing Resource Consents and Designation

The WWWTP site is authorised under the Wairoa District Plan (WDP) by way of a Designation (D53) for the purpose of "sewerage treatment" which over-rides the underlying Rural zone and WDP consenting rules for land use activities. Designation D53 allows the WWWTP to be operated, maintained, and modified as necessary for the treatment of Wairoa's wastewater.

The WWWTP's main outfall discharge has only had two authorisations over its lifetime. The first was a Water Right to Discharge which allowed Wairoa Borough Council (WBC, which was changed to WDC during the 1989 restructuring of territorial authorities) to construct and commission the WWWTP and its river discharge outfall in 1981. It was issued by the Hawke's Bay Regional Water Board on 1 September 1979 under the Water and Soil Conservation Act 1967.

Prior to WBC seeking the original authorisations to construct the WWWTP and its river discharge outfall, a wide range of options was assessed for the location and type of treatment plant and for the location and receiving environment for the discharge of WWWTP's treated wastewater. The discharge options included land, river, and ocean receiving environments. The outcome of the reviews was to construct the WWWTP and install its river discharge outfall in their current locations.

As an integral part of WBC's decision to construct the WWWTP and its river discharge, WBC decided to adopt a discharge regime that restricted the timing of discharges to overnight out-going tides and avoided, for as long as possible, discharging while the river mouth was closed. A key aspect of successfully implementing these discharge timing restrictions was the inclusion of 5,400 m^3 of storage within the WWWTP ponds. The primary reasons for the discharge timing restrictions were:

- to ensure that the discharged wastewater would be flushed out to sea;
- to ensure that the discharged wastewater would not be carried back upstream past the urban area;
- to minimise adverse effects on the river's water quality and ecology; and
- to minimise public health risks of contact with contaminated river water or consumption of shellfish containing pathogens.

The Water Right expired on 31 May 1998 and was replaced by discharge resource consent CD940404W under the RMA for the discharges of odours to air and of treated wastewater to the Wairoa River. This consent was granted by Hawke's Bay Regional Council (HBRC) on 23 August 1999 for a 20-year term

expiring on 31 May 2019. A copy of this current resource consent and its conditions is presented in Appendix F.

Resource consent CD940404W was granted on the basis that:

- It was not shown to be causing any actual significant adverse effects on the river receiving environment;
- The discharge quality and regime would meet the river water quality standards of the Regional Coastal Plan and therefore protect the river environment from adverse effects;
- Public health risks would be avoided or appropriately managed through restrictions on discharge timing (overnight out-going tides and ceasing for as long as practicable when the river mouth is closed) and issuing of public health warnings when discharging while the river mouth is closed;
- The continued discharge to the Wairoa River estuary better met the purposes of the RMA than discharge onto land because the establishment of a land discharge option would create significant adverse effects on the community's economic and social wellbeing, while not necessarily being able to provide for their health and safety better than the current river discharge system.

Prior to HBRC granting consent CD940404W, WDC had investigated options for land discharges to replace, at least partially, the river discharge. However, their preliminary investigations had shown that land discharges would be difficult to implement, very expensive for the community, and of little environmental benefit because of the lack of any measurable effects of the existing discharge on the river receiving environment. WDC's decision to continue discharging to the river led to discussions about the public health risks which confirmed that the most appropriate means of protecting public health was to continue restricting discharge timing so that it only occurred during overnight out-going tides and to avoid discharging while the river mouth was closed off from Hawke Bay.

However, the consent decision noted that it was desirable and intended that WDC would use the 20-year consent term to consider what additional treatment might be suitable for reducing pathogen concentrations and for at least partly addressing cultural values and concerns in an affordable manner. Land discharges were to be borne in mind as one of the potential avenues of consideration for the future discharge system upon expiry of this consent.

The key conditions of consent CD940404W controlling the discharges of treated wastewater to the Wairoa River are:

2. The total discharge of sewage effluent as authorised by this Resource Consent shall not exceed 5400 cubic metres per day.

3. The discharge of sewage effluent as authorised by this Resource Consent shall;

   (i) Only occur during periods of ebb tide 30 minutes after high tide to 6 hours after high tide;

   (ii) Only occur after 6:00 pm; and

   (iii) Shall cease by 6:00 am at all times.

4. During times of river mouth closure, the Consent Holder shall cease the discharge of sewage effluent into the Wairoa River, unless:

   (i) The ability to store excess effluent has been exceeded; or

   (ii) Prior to full capacity, it is recognised that the maximum storage capacity is likely to be exceeded during a time when no discharge is allowed.

Where discharge is required for reasons 4(i) and 4(ii) above, the discharge shall only be in accordance with condition 3. The Consent Holder shall give notice to the Environmental Regulation Section of the Hawke's Bay Regional Council of the date discharge was stopped due to river mouth closure, and the date discharge re-commenced.

11. Sewage effluent discharged from the treatment plant shall meet the following standards:

    COD not greater than 220 mg/l
    Total Ammonia not greater than 36 mg/l
    Suspended Solids not greater than 87 mg/l

The discharges of odours to air from the WWTP are constrained by the following condition of consent CD940404W:

15. The discharge of odour shall not be offensive or objectionable beyond the boundary of the sewage treatment plant.

    Note:
    When assessing whether the odour is offensive or objectionable the Council shall generally follow the procedure outlined on pages 29 and 30 of the Regional Air Plan (January 1998).

At the time of granting this consent, the daily wastewater flows were usually 800-1,600 m^3/d and peaking at about 2,400 m^3/d, which was well within the consented daily discharge limit of 5,400 m^3/d. At least two days of storm inflows could be stored within the WWWTP's storage capacity of 5,400 m^3 when the river mouth was closed, and this was seen as an appropriate withholding time to allow for the mouth to re-open.

However, during the term of this consent, daily wastewater flows have gradually increased to the point that they had roughly doubled. This increase has been particularly apparent for winter and storm event flows. The storm events have been the key cause of pump station overflow events and exceedances of the consented WWWTP discharge limits requiring overnight out-going tide timing and, on occasions, exceedances of the 5,400 m^3/d total daily volume limit. The increased flows have also reduced WDC's ability to cease discharges for more than a day or two when the river mouth is closed.

In April 2017 a significant rainfall event caused high wastewater flows which lifted the manhole cover between Kopu Road and the riverbank and allowed wastewater to overflow. In response, WDC replaced the existing 300 mm diameter surcharge and outfall pipes with larger 375 mm pipes, extended the surcharge pipe to the base of the riverbank, cleared silt from the outfall, and modified the outfall to help keep it clear of sediment in future. The surcharge overflows were found to still occur regularly due to siltation, flow rates, and elevation head from the WWWTP.

WDC's discussions with HBRC also found that the modifications to the main outfall and surcharge structures were outside the scope of the existing WWTP discharge consent and the surcharge discharge had not previously been consented despite it having always existed since construction of the WWWTP. In order to legitimise the changes to the discharge structures and the overflow discharge to the river, WDC lodged resource consent applications in December 2017. These applications (DP180254L and CD940404Wb) were placed on hold shortly afterwards for further information under s92 of the RMA. This application seeks to supersede those applications and provide the information requested.

2.3 Development of a Long-Term Integrated Discharge Solution

The need to reconsent treated wastewater discharges from WWWTP upon expiry of its current consent on 31 May 2019 resulted in the need to consider alternative locations and methods of discharge to the current river discharge. It also generated discussion within the community regarding the poor water

quality and ecological health of the entire Wairoa River catchment and what actions are needed to assist with improving the management of the 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 on the river. Cultural values, as described in the Tangata Whenua Worldviews report (How, 2017:A4I2) include the views that direct discharge of wastewater to any waterway, including the sea, is culturally offensive, and that ideally after complete treatment, wastewater should be fit for human consumption. The wider community's opposition to the current discharge relates to the treated wastewater containing pathogens and contaminants entering an environment that is used by a large number of people within the community for recreation and, to a lesser extent, 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, and the ultimate goal of ceasing the wastewater discharge is a key aspect of this.

Through a comprehensive community consultation process, involving expert and community reviews of a variety of options for the treatment and discharge of Wairoa's wastewater, the following key features were agreed:

- Additional treatment was required for pathogen control prior to discharge;
- Ideally 100 % land discharges should replace the 100 % river discharge regime;
- Significant volumes of storage will be necessary for discharge management; and
- Development of future storage and irrigation needed to occur gradually so that it would remain affordable for the community.

After completing the main phase of community consultation further refinements have been made to develop the Conceptual Design (particularly the discharge regime constraints) which are believed to be improvements on the changes that were developed and agreed through earlier consultation. The river discharge regime refinements were informed by eCoast's hydrodynamic modelling of the river flows and a range of potential discharge regime scenarios.

2.4 Future Resource Consenting Requirements and Activity Status

The proposed activities requiring resource consents are:

- North Clyde, Alexandra Park, and Kopu Road pump station overflow discharges to the Wairoa River during storms;
- discharge of treated wastewater from the main WWWTP via and outfall structure and surcharge pressure release overflow structure to Wairoa River;
- discharges to air from the main WWWTP;
- riverbed occupation and disturbance for relocation and maintenance of the main WWWTP outfall pipeline in the Wairoa River bed.

The following consents are required:

- Discharge to water (Wairoa River) for pump station overflows
- Discharge to water (Wairoa River) from WWWTP outfall;
- Discharge to air (WWWTP);
- Occupation and disturbance of river bed for periodic relocation of WWWTP outfall
- Construction of a new structure within CHZ1 for the purposes of a network utility operation,

- Disturbance associated with construction and maintenance,
- Vegetation clearance and soil disturbance, and
- The associated occupation of space.

As identified in the Strategy Planning report (Stradegy, 2018:C9) which is integral with this AEE and application for consents, the bundled consent classification is discretionary. A term of 35 years is sought for all consents.

2.5 Other Consents and Approvals

No other consents are required. However, a Concession is required from the Department of Conservation (DOC) under the Conservation Act to allow the WWWTP outfall pipeline to continue discharging into and occupying a small area of the Whakamahi Lagoon Wildlife Reserve.

The status of the existing Conservation approval for the outfall pipeline is unknown to WDC and DOC, despite searches of their records. It is believed that WDC's predecessor, Wairoa County Council, obtained authorisation from DOC's predecessor, the Commission for the Environment, in order to enable the WWWTP to be constructed and commissioned in 1981.

WDC have not yet applied to DOC for this concession but intend doing so upon completion of the resource consenting processes. This application will be determined by the reserve's management board which is still in the process of being set up as a direct outcome of recent Treaty of Waitangi settlement legislation.

Any consents required for implementation of the storage, irrigation, and river catchment enhancement aspects of the wider programme of initiatives will be sought separately and at times that are relevant to developing their details and commencing construction and related activities.

3 PROJECT BACKGROUND

3.1 Wairoa's Wastewater System

During the 1950's Wairoa's wastewater was reticulated by underground gravity-flow pipes and pumped by several pump stations to the Kopu Road pump station (originally known as Lion Street pump station due to its proximity to the Kopu Road intersection with Lion Street). At this location the pump station discharged Wairoa's wastewater directly into the Wairoa River; minimal treatment occurred within the reticulation, so this discharge was essentially raw sewage.

The WWWTP was constructed near Rangihoua/Pilot Hill in 1980-81 to provide a centralised treatment system so that the discharge quality and river environment improved. At the time of constructing the WWWTP a new sewer main was installed to link the Kopu Road pump station to a new pump station at Fitzroy Street which then pumped all wastewater up to the WWWTP for treatment. The original pump stations retained their storm overflow outlets to the Wairoa River.

The WWWTP consists of an inlet screen to remove gross solids, an aerated lagoon (4,750 m^3) and a facultative pond (18,250 m^3). The WWWTP has storage capacity of 5,400 m^3 which is mostly achieved through 500 mm fluctuations of water levels in the facultative pond. In 2018 the mechanical aerators on the surface of the aerated lagoon were replaced by a submerged air sparge which introduces fine air bubbles instead of generating waves and stirring. Figure 3.1 shows the WWWTP layout and its main features.

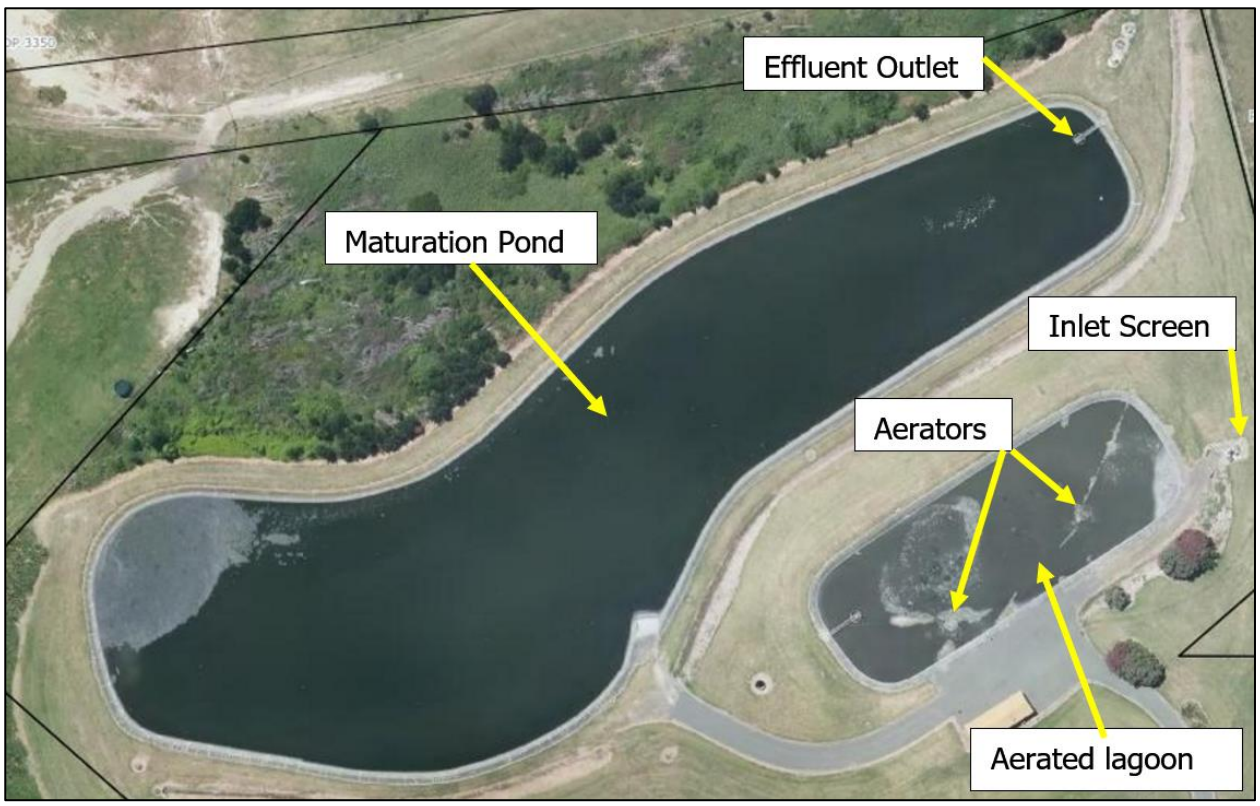

Figure 3.1: WWWTP Layout and Key Features

The outlet of the WWWTP's facultative pond passes through a weir which controls discharges so that they only occur during overnight out-going tides as required by the resource consent conditions. The treated wastewater flows by gravity down a pipeline to Fitzroy Street and then out into the Wairoa River where it terminates about 150 m from the shore.

The WWWTP's treated wastewater has always discharged into Wairoa River on out-going tides between 6 pm and 6 am (overnight). A limit of 5,400 m^3/d has also always been applied. When the river mouth is closed off from the sea, wastewater is required to be stored until its capacity is reached, whereupon discharges can recommence within the normal constraints but with public health warnings as an additional measure.

Further details of the WWWTP's design, operation, and discharge regime are presented in Section 5 below and in LEI, 2017:A2I1.

3.2 Background Reporting

Multiple reports have been generated to describe the existing wastewater system and its issues, performance, and effects on the environment. There were also reports on the variety of receiving environments and possible alternative discharge locations and regimes, community values, and wastewater treatment options. These reports were used to assist with WDC decisions, informing the community consultation discussions, and developing the preferred treatment and discharge option based on the outcomes of earlier reports.

The initial background reports in Phase A were given codes to reflect their subject area and level of detail. These were A1 – reticulation, A2 – treatment, A3 – water receiving environments, A4 – cultural values, A5 – land treatment options, A6 – values, and A7 – planning. The second half of each report code used I for initial assessments or D for detailed assessments.

The second phase of reporting was consultation and optioneering which primarily had report codes starting with B. A key outcome of this phase was the Best Practicable Option (BPO) assessment report (LEI, 2018:B4). The final phase of reports was Phase C which included the Conceptual Design report (LEI, 2018:C1.0), its supporting documents, and the resource consent AEE documents.

Figure A0 in Appendix A presents a flow chart of these reports and how they relate to each other. It is recommended that readers refer to this figure to understand these relationships, the extent of reporting that is available, and to quickly identify the report code for identification of relevant background reports. The report codes are generally used throughout the consent application documents.

3.3 Stakeholder Group and Public Consultation

The consultation processes and outcomes are described in more detail in Section 6 below, the BPO report (LEI, 2018:B4), and in the Consultation Summary that is presented in Appendix B.

The community consultation process used by WDC involved the creation of a Stakeholder Group which included three tangata whenua representatives, two Wairoa District Councillors, one business representative, one AFFCO representative, one youth representative, and one grey power representative. The Stakeholder Group was tasked with identifying preferred options, and the process involved:

- reviewing the existing system including its challenges and key constraints;
- identifying their values and aspirations for the future system;
- assessing a wide range of theoretical options against their agreed criteria in order to refine options; and
- selecting their preferred options.

An iterative feedback process and increasingly detailed technical and community values-based assessments of options were used to select the preferred option.

Towards the end of the Stakeholder Group option selection process, WDC consulted directly with iwi through two hui-a-iwi and consulted with the general public on the selected and discarded options through public meetings and newspaper articles seeking their feedback. The public meetings in August and November 2017 were presented with summarised information from the Stakeholder Group process and the community was invited to have their say. In March 2018 WDC's Councillors voted to implement the selected option (the Package), and it was then incorporated into the draft 2018-28 Long Term Plan (LTP 2018-28) for further public consultation in May 2018 to inform Councillors' June 2018 decision on whether to approve LTP budgeting for its implementation.

The Stakeholder Group process, hui-a-iwi, and pubic consultation all consistently agreed with the proposed programme of initiatives (Package) and transitioning of future discharges away from the river and instead onto land by irrigation. Affordability of changes and strong desires to improve the whole river catchment's water quality were also common themes. It was generally accepted that a 30-year programme would be necessary to address these points.

3.4 Development of the Integrated Programme of Initiatives

The process and information used to develop The Package are described in detail in The Package report (LEI, 2017:B2A2), the BPO report (LEI, 2018:B4), and the Conceptual Design report (LEI, 2018:C1.0).

WDC relied upon technical advisors, a targeted Stakeholder Group, hui-a-iwi, and public meetings to identify the concerns with the existing system, future design constraints, option evaluation criteria, aspirations, and ranking methodology for assessing options. A wide range of potential combinations of changes to each section of the wastewater system provided an overview of the continuum of options. The options were narrowed down by the Stakeholder Group and then refined.

An integrated system with gradual implementation over the next 30 years, known as The Package, was developed and then adopted by WDC's councillors. It was subsequently incorporated into the 2018-28 LTP which included further public consultation. The Package was shown to be the BPO for treating and discharging Wairoa's wastewater, and it formed the basis for the Conceptual Design report. The Conceptual Design report forms the basis for the consent applications and assessments of effects reports.

3.5 Long Term Plans

WDC's 2015-25 LTP included a budget of $4.75M for reconsenting and redevelopment of WWWTP and its discharge system. At that time the nature of any development of the WWWTP and its discharge were unknown, but adequate funding needed to be allocated regardless.

WDC's 2018-28 LTP was developed after WDC had already approved the implementation of the package of initiatives that had been proposed through the Stakeholder Group and community consultation processes. Based on its supporting documentation, the budget for reconsenting and development of the WWWTP and its discharge system were increased to $8.15M spread over the next 6 years. WDC's Infrastructure Strategy 2018-48, Asset Management Plan, and 2018-28 LTP all provided summaries of the intended changes to the reticulation and WWWTP.

The value of the investment of the existing WWWTP facility is in excess of $ 2.8M at optimised replacement value. The value of the existing reticulation and pump stations is in excess of $6M.

3.6 Best Practicable Option

This application is required to demonstrate that the Best Practical Option (BPO) is being sought as part of this consenting process. The BPO development and BPO assessment process are described in detail in the BPO report (LEI, 2018:B4) which concludes that the proposed integrated programme of wastewater system modifications is the BPO as defined by the RMA, and in particular the continued wastewater

discharge to the Wairoa River, is appropriate. The key reasons for concluding that the integrated package of initiatives forms the BPO are:

- all components have been selected in order to function effectively as an integrated wastewater management and discharge system;
- the timing of implementation in stages is affordable for the community and matches the timing of future flow reductions being achieved;
- flow reductions are important to minimise pumping requirements, stabilise wastewater treatment processes, minimise storage requirements, and minimise discharge volumes including pump station overflow discharges to the river during storm events;
- the scale of flow reductions proposed is affordable and will be sufficiently effective in the medium to long term to suit the future discharge regimes;
- the existing treatment plant design is acceptable for its loads and it does not need augmentation for performance reasons;
- the addition of filtration and UV disinfection to the outflow from WWWTP is primarily responding to cultural, recreational, and public health values when discharging to the river;
- storage is an expensive aspect which is best implemented as irrigation areas expand;
- irrigation is the preferred means of land discharge as an alternative to the river; and
- every aspect of the integrated proposal is the most effective and efficient use of WDC's limited finances to manage the community's wastewater while protecting and enhancing the environment.

3.7 Development of the Conceptual Design

Following on from the outcomes of the BPO report, the key design and operational features of each aspect of the current and future wastewater system was reviewed and developed to ensure that the future system would be fully integrated. Hydrodynamic modelling of the existing discharges to the river was undertaken, and this also included modelling a range of discharge scenarios that had been developed by LEI based on increasing discharge flows as river flows increase. The modelling outputs helped to quantify the river's assimilative capacity and dispersion rates for each river flow and discharge flow scenario.

Based on the modelling outputs, and the aspirational targets for the future irrigation and storage developments, the river discharge regime was refined in the Conceptual Design report (LEI, 2018:C1.0). The stage timing adopted earlier was retained, and the details of actions for each stage were refined. Table 3.1 below summarises the Conceptual Design's key features.

Early in the first stage a filter and UV lamp disinfection system will be installed at the outlet of the second pond. The outfall will be designed to cope with the expected discharge rates and to avoid siltation blockages when idle. Provision is also to be made to allow the outfall pipeline to be realigned and relocated within a defined area of the riverbed so that it is always close to the edge of the main river channel as it migrates. This will minimise siltation and blockage issues for the outfall and will also ensure that the discharged wastewater is rapidly dispersed and then transported out to sea.

Table 3.1: Summary of Wairoa's Future Treated Wastewater Discharge System

Stage Timing	Storage Capacity#	Irrigation Area#	River Discharge Parameters*	Pump Station Overflows#
Stage 1 0-5 years	No change (5,400 m^3 within the 2nd WWWTP pond).	Develop up to 50 ha	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only. ½ median to median river flows: <3,000 m^3/d discharge on **any** outgoing tide. Median to 3 x median river flows: <5,000 m^3/d discharge on **any** outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Occur less often than now (<10 events/year). Triggered during larger storms.
Stage 2 6-10 years	Increase total to about 10,000 m^3	Expanded up to 100-150 ha total	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only **but limited to no more than 30 days discharge in December to March**. ½ median to median river flows: <3,000 m^3/d discharge on any outgoing tide. Median to 3 x median river flows: <5,000 m^3/d) discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Rare (<8 events/year); only during larger storms.
Stage 3 11-20 years	Increase total to 50-100,000 m^3	Expanded up to 300 ha total	Below ½ median river flows: **no discharge at any time**. ½ median to median river flows: <3,000 m^3/d discharge **only on outgoing tide at night**. Median to 3 x median river flows: <5,000 m^3/d discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during very large storms.
Stage 4 21-30 years	Increase total to 200-400,000 m^3	Expanded up to 600 ha total	Below **median** river flows: no discharge at any time. Median to 3 x median river flows: <5,000 m^3/d discharge **only on outgoing tide at night**. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during unusually large storms.

Notes: * bold text highlights what is changing within each stage.
intended changes which depend on commitments outside resource consent processes.

It is important to note that Stages 3 and 4 are aspirational and depend on storage and irrigation to be fully implemented.

3.8 Progress on Implementation of Related Initiatives

Applications for resource consents to irrigate treated wastewater onto 24 ha of the Mucalo farm adjacent to WWWTP have been lodged with HBRC and WDC's regulatory arm. These are being processed and will hopefully be granted soon. The consents will be for a 5-year term which will allow for the construction to occur and for a trial period of irrigation upon which to develop a long-term irrigation design, operational optimisation, and subsequent consent applications.

Additionally, WDC are progressing preparation of applications for resource consents to irrigate parts of two other nearby farm properties and some of the forested area of WDC's landfill property. These consent applications will hopefully be processed during 2019.

WDC have been actively supporting a variety of environmental initiatives that aim to improve the Wairoa River's water quality and riverbank ecosystems. This includes funding and support for an iwi-led native plant nursery which will supply plants for the riverbanks. During 2018 WDC were asked to administer the Eastland Group Wairoa Community Contestable Grants which is worth $150,000 with $15,000 allocated annually for 10 years. The 2018 distribution directly supported initiatives related to the health of the Wairoa River.

During 2018 WDC have also been actively collaborating with HBRC, Tatau Tatau o te Wairoa and other iwi and community groups to drive the development of a Catchment Management Plan.

Further details are provided in the Catchment Contribution Summary (LEI, 2018:C3).

4 RECEIVING ENVIRONMENT

4.1 Location

WWWTP is located on Rangihoua / Pilot Hill on Whakamahi Road south of Wairoa. WWWTP's river discharge pipeline traverses and terminates within the Whakamahi Lagoon Government Purpose (Wildlife Management) Reserve. This pipeline lies beneath the river's mudflats extending directly in line with Fitzroy Street for about 100 m then turning towards the river mouth; it terminates about 150 m from the shore. The riverbed is approximately 400 m wide at this location but is about 800 m wide at high tide.

In the pipeline upstream of the WWWTP's main discharge, an overflow structure discharges some treated wastewater from the last manhole in the outfall pipeline between Kopu Road and the riverbank into an adjacent stormwater drain below Kopu Road which terminates at the riverbank. The frequency and volume of these discharges has not been fully characterised, but it is driven by the discharge flow capacity limitations of the main river outfall causing the pipeline to surcharge.

The North Clyde, Alexandra Park, and Kopu Road pump stations have storm overflow discharge pipes which terminate near the riverbank. The Kopu Road pump station has two outfalls to the river. The Fitzroy Street pump station's storm overflow discharges into the main outfall pipeline from WWWTP. A map is presented in Figure 2.1 above.

4.2 Legal Descriptions

The relevant land titles associated with this resource consent application are listed in Table 4.1 below. In addition, some areas of WDC's road reserve (Kopu Road and River Parade) and the Crown-owned riverbed are traversed by the various discharge structures.

Table 4.1: Land Parcel Legal Descriptions

Land Use or Purpose	Street Address	Legal Description	Certificate of Title	Surveyed Area (ha)	Land Owner
WWWTP site	Whakamahi Road	Part Lot 1 DP 3350 SO 7253, Wairoa District	HBJ2/800	5.48	WDC
Whakamahi Lagoon Wildlife Reserve (WWWTP discharge outfall)	Whakamahi and Kopu Roads (Opposite 268-274 Kopu Road)	Part Section 2 Block V Clyde Survey District	HBM3/248	136.9427	Crown (DOC)
Wairoa Riverbank Esplanade Reserve (Kopu Road Pump Station)	Opposite 108 Kopu Road	Part Section 9 SO 9425; Section 1 SO 10721 Block V Clyde Survey District	HBM3/298; Unknown	9.5025; 6.1650	WDC WDC
Alexandra Park Recreation Reserve (Alexandra Park Pump Station)	19 Marine Parade	Section 1 SO 10489 Block V Clyde Survey District; Part Section 9 SO 9425	Unknown; HBM3/298	4.78 9.5025	WDC WDC
Wairoa Riverbank Esplanade Reserve (North Clyde Pump Station)	Corner of Freyberg Street and River Parade	Part Section 9 SO 9425	HBM3/298	9.5025	WDC

Whakamahi Lagoon and some of the adjacent area of the Wairoa River estuary and Hawke Bay coastline are gazetted as the Whakamahi Government Purpose Wildlife Management Reserve. The adjoining Rangihoua / Pilot Hill Reserve is gazetted as an Historic Reserve. Section 22 of the Reserves Act 1977 includes a clause that specifically requires this type of reserve to be managed and maintained so that its scenic, historic, archaeological, biological, cultural, scientific, or natural features or wildlife are managed and protected to the extent compatible with the principal or primary purpose of the reserve.

4.3 Wairoa Climate

Wairoa has a mild climate with moderate annual rainfall and generally low wind speeds. The highest rainfall months are generally April, June, and July, while November, December, and February are generally the driest months. The warmest months are December to February (18-19^{o}C averages) while July is the coldest (about 9.5^{o}C average). The strongest and most common winds are from the NNE.

Details of Wairoa's climate are presented in LEI (2017:A3I2) and LEI (2018:A3I4).

4.4 Wairoa River Catchment

The Wairoa River is the largest river in the Hawke Bay region and has a catchment area of 3,563 square kilometres. The land uses in the catchment are mostly farming (dominated by hill country sheep and beef farming) and forestry. The lower flats are used for cropping, horticulture and pasture (including some dairy farms). The township of Wairoa is located on flats adjacent to the upper section of the river's estuary.

Its upper catchment drains some of the eastern side of Te Urewera, including Lake Waikaremoana, which is covered in unmodified native bush and receives moderate (1,500 mm/y) to high (3,200 mm/y) annual rainfall. Three hydroelectric power stations use some of the outflows from Lake Waikaremoana before discharging the water back into the Waikaretaheke River. Another hydroelectric power station is fed from a dam across Waihi Stream, which is a tributary of the Waiau River; the Waiau River drains the southern catchment of the Wairoa River catchment. The Waihi power station was identified in late 2015 as a significant source of silt entering the river system due to broken sluice gates.

The headwater catchment's high rainfall and steep gradient feeding into a low-lying meandering river channel generate frequent floods and highly variable flow rates. The tidal influence on water levels is observed almost 11 km inland from the river mouth, but the salt front does not intrude that far.

The river's outlet to Hawke Bay is controlled by a natural gravel bar which is redistributed by coastal currents that occasionally close off the estuary from the sea, forcing the river flows to pass through the gravel bar instead of through a defined channel. HBRC use excavators to re-open the channel through the bar when necessary and safe to do so.

Details of the Wairoa River's features are presented in LEI (2017:A3I2) and LEI (2018:A3I4).

4.5 Wairoa River Hydrology

Because the river is tidal for at least 11 km inland and upstream of these tributaries entering the Wairoa River, flows for the Wairoa River cannot be measured accurately downstream of the last tributary. Some water is also lost to groundwater aquifers in this area as the river meanders across the valley floodplains. HBRC therefore calculate daily river flows for the Lower Wairoa River based on the Marumaru and Waiau measurements.

Table 4.2 below summarises the river flow statistics for the three key monitoring sites (as shown on the LAWA website) and HBRC's calculated flows for the Lower Wairoa River.

Table 4.2: Wairoa River Flow Statistics (m^3/s)

Statistic	Marumaru	Waikaretaheke	Waiau	Lower Wairoa
Lowest Record	2.2	0.11	3.4	7.6
7-day MALF	5.8	-	14	19
Median	31	17	38	60
Mean	65	21	49	119
Mean Annual Flood	1,600	86	560	2,200
Highest Record	2,600	130	1,300	4,015

The Wairoa River estuary is tidal with a neap[3] tide and a spring[4] tide range of 1.2 m and 1.4 m respectively. Table 4.3 outlines the tidal ranges and gives an estimation of the tidal prism volumes[5]. The tidal cycle of the Wairoa River estuary is not sinusoidal due to a high river flow rate whereby there is a 5.2-hour inflow and a 7-hour outflow (Argo Environmental, 2010).

Table 4.3: Tidal ranges in Wairoa River (Source: Argo Environmental, 2010)

Tidal Condition	Neap Tides	Spring Tides
Mean high water	1.5 m amsl	1.6 m amsl
Mean low water	0.3 m amsl	0.2 m amsl
Range	1.2 m	1.4 m
Tidal Prism	3,500,000 m^3	4,100,000 m^3

The effect of the tide at Wairoa is still noticeable at the Railway Bridge, some 7 km upstream from the mouth of the River, although only minor. The tidal prism volumes also highlight the large volume of salt water that enters and leaves the estuary every tidal cycle.

At low river flow rates the in-coming and ebb tides can have an equal or greater flow rate of marine water than the river flow rate, resulting in stratified and brackish estuarine conditions which can then migrate up river for several km. Argo Environmental (2010) referred to a 1996 Bioresearches report which noted that river flow rates of ~200 m^3/s or greater result in zero in-coming and ebb tide flow rates of seawater at the mouth of the river; the entire flow is terrestrial and has no marine component.

The river's mouth to Hawke Bay is controlled by a natural gravel dune which is very mobile and redistributed by coastal currents that occasionally close off the estuary from the sea, forcing the river flows to pass through the gravel dune instead of through a defined channel. Sometimes the river naturally breaks through the dune to form a new mouth but usually HBRC use excavators to re-open the channel through the dune when necessary and safe to do so.

During these river mouth closure times marine inflows and river outflows are restricted, which has a damming effect and raises the height of the estuary water levels. This then backs up the lower reaches of the river so that the height of the river water level is maintained at increased elevations for several km inland (it has been observed upstream of the Railway Bridge) during low to moderate flows. When the mouth is closed the river also forms eddies and has difficulty dispersing the wastewater discharge, even during out-going tides. Closure of the mouth also elevates flood levels so that smaller rainfall events cause worse flooding than would have been the case when the mouth is open.

Further details of the river environment are provided in LEI (2017:A3I2) and LEI (2018:A3I4).

The river's hydrology through Wairoa to the coast was modelled by eCoast based on their in-river monitoring data. This indicated that the tidal flows generated strong currents through the mouth and the

[3] Neap tide - a tide just after the first or third quarters of the moon when there is least difference between the high and low tides.
[4] Spring tide - a tide just after new or full moon when there is greatest difference between the high and low tides.
[5] Tidal prism - the volume of water in an estuary between mean high tide and mean low tide

main channel but the adjacent lagoon arms of the estuary had very slow or no currents. Figure 4.1, sourced from eCoast (2018:C1.1), shows the peak ebb and flood tidal currents.

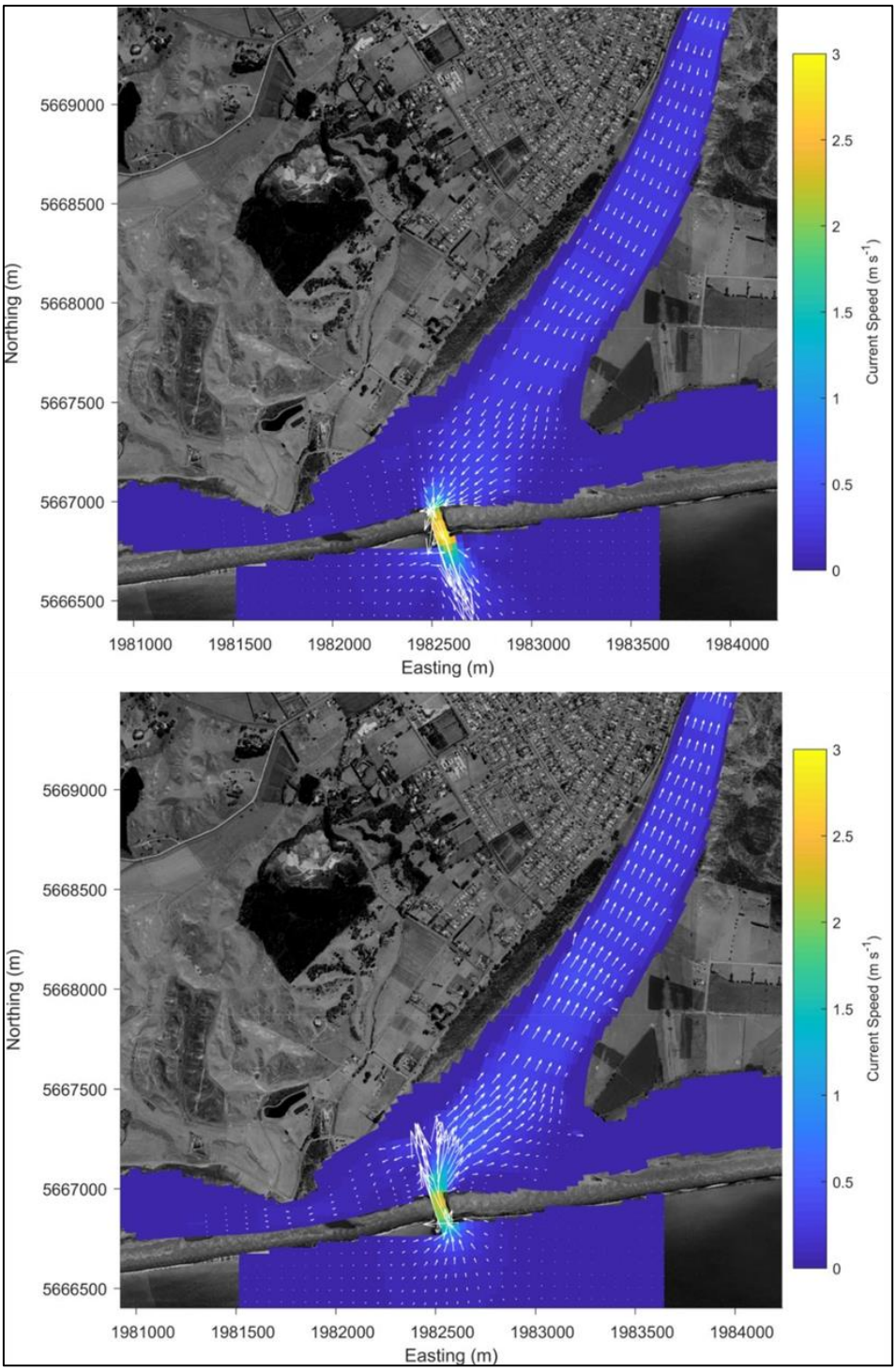

Figure 4.1: Modelled Surface Layer Peak Ebb (Upper Panel) and Flood Tidal Currents (Source: eCoast, 2018:C1.1)

The effects of these river current patterns are that they determine the locations of erosion and deposition across the riverbed, and how actively erosion or deposition would be occurring. These currents are also directly responsible for the rate of dispersion of the wastewater discharges from the pump station overflows and main WWWTP outfall.

The river channel is about 95 m wide at the Alexandra Park pump station overflow discharge, 190 m at the North Clyde pump station overflow discharge, 340-350 m wide at the Kopu Road pump station overflow discharge, and 900 m wide during high tide (400 m during low tide) at the main WWWTP discharge outfall.

4.6 Wairoa River Water Quality and Public Health Risks

Wairoa River's water quality has been stable across the years of regular monitoring undertaken by HBRC and its predecessors. It is consistently one of the worst water bodies in the Hawke's Bay region for clarity and suspended solids, which is mainly a reflection of the readily erodible hill country, but it is generally low in nutrients (nitrogen and phosphorus) despite the sediment loads. It is generally unsuitable for contact recreation, and often considered to be high risk, due to elevated pathogen concentrations (as indicated by *E. coli* analyses). The contaminant sources are upstream of Wairoa, and the wastewater discharges are only a very minor to negligible contributor of contaminants to the already poor river water quality.

Further details are provided in LEI (2017:A3I2) and LEI (2018:A3I4). Table 4.4 provides statistics of the river's water quality as it passes through the urban area compared with relevant limits or guideline values that applied at the time of reporting in 2016.

Table 4.4: Summary of Water Quality Guidelines and Observed Quality in the Wairoa River Upstream of Wairoa (2004 – 2013) (Source: Ausseil, et al, 2016)

Parameter	Min	Median	Max	Guideline/Limit	Source
TP (mg/l)	0.004	0.026	2.200	0.033 mg/l maximum	ANZECC (2000) Lowland
DRP (mg/l)	0.002	0.006	0.043	0.015 mg/l maximum	HBRC RRMP (2006)
NH_4-N (mg/l)	0.005	0.010	0.119	0.1 mg/l maximum	HBRC RRMP (2006)
NO_3-N (mg/l)	0.001	0.040	0.373	1.0 mg/l maximum for 99% species protection from toxicity effects	Hickey (2013)
Clarity – black disc (m)	0.0	0.6	2.2	1.6 m minimum for contact recreation	ANZECC (2000); HBRC RRMP (2006)
Suspended solids (mg/l)	1.5	13.5	2,900	25 mg/l maximum	HBRC RRMP (2006)
E. coli (cfu/100 ml)	1	46	14,000	540 cfu/100 ml maximum for contact recreation (health) Red alert/Action level	MfE/MoH (2003)
DO (mg/l)	6.8	9.4	12.6	7.5 mg/l minimum for protection of all aquatic organisms	MfE NPS-FM NOF (2014)

The RRMP limit for suspended solids applies at all river flows. The RRMP limits for DRP, NH_4-N, clarity, and faecal coliforms (200 MPN/100 ml) only apply when the river is flowing at or below median flow. Generally *E. coli* have been monitored instead of faecal coliforms, but a conservative comparison of the *E. coli* results against the RRMP limit for faecal coliforms gives some guidance of the river's compliance with RRMP limits.

Table 4.5 below assesses compliance of relevant river water quality parameters upstream of Wairoa during 2004-13 when river flows were less than median flow as required by the RRMP. The removal of results relating to higher river flow rates from this assessment means that some of the higher levels of contamination during elevated river flow (flood) conditions are ignored and consequently the river's water quality is shown to be closer to always complying with the RRMP limits when the river is flowing at or below its median flow rate.

Table 4.5: Compliance of Quality in the Wairoa River Upstream of Wairoa with RRMP Water Quality Guidelines for River Flows Below Median (2004 – 2013)
(Source: Ausseil, et al, 2016)

Parameter	Min	Median	Max	HBRC RRMP 2006 Guideline/Limit
DRP (mg/l)	0.002	0.005	0.016	0.015 mg/l maximum
NH_4-N (mg/l)	0.005	0.005	0.035	0.1 mg/l maximum
Clarity – black disc (m)	0.1	1.0	2.2	1.6 m minimum for contact recreation
E. coli (cfu/100 ml)	1	52	1,300	200 MPN/100 ml maximum for faecal coliforms

In November 2017 the NPS-FM's recreational water quality standards were changed. The 2003 Ministry of Health (MoH 2003) limits were 260 cfu/100 ml for amber alert (caution for contact recreation) and 540 cfu/100 ml for red warning (unsuitable for contact recreation). The 2014 NPS-FM changed the single exceedances of the MoH 2003 limits to annual medians and 95th percentile limits, and introduced further categories (Attribute States) for annual medians up to or above 1,000 cfu/100 ml. The 2017 amendments to the NPS-FM introduced limits on the percentages of results exceeding the MoH 2003 limits and adjusted the limits for median and 95th percentile values for each Attribute State.

Table 4.6 presents statistics for HBRC's *E. coli* monitoring results for sites at the Railway Bridge, Wairoa Ski Club, and downstream of the WWTP discharge and compares them against both the MoH 2003 limits and the NPS-FM 2017 Attribute State limits.

Table 4.6: HBRC Data for *E. coli* Assessed Against Contact Recreation Standards

Statistic or Standard	Railway Bridge (Aug 2004 – Dec 2017)	Wairoa Ski Club (Nov 2010 – Mar 2018)	Downstream of WWTP (Aug 2004 – Jun 2012)
% Exceed 260 cfu/100 ml	17.4	25.6	15.6
% Exceed 540 cfu/100 ml	14.1	13.4	12.5
Median cfu/100 ml	56	80	48
95th percentile cfu/100 ml	2,550	1,250	1,112
MoH 2003 Category	Red	Red	Red
NPS-FM Attribute State	D (Orange)	D (Orange)	C (Yellow)

It is evident from Table 4.6 that all three sites have unacceptably high frequencies of public health risks for contact recreation. Although the sampling date ranges are not consistent across the three sites, the site downstream of the WWTP discharge was overall lower risk for each statistical measure than the other two upstream sites.

It should be noted, however, that these records include occasions when the river was flowing above its median flow rate and/or outside of the summertime bathing season. Both of these aspects are relevant to assessing the actual public health risks posed by the pathogen concentrations, as recreational contact is less likely during elevated river flows and outside the bathing seasons.

The RCEP requirements apply to the main WWTP discharge, due to its location within the CMA. The Class AE(HB) coastal water quality standards control the effects of the discharge but do not provide numerical limits on many specific parameters. The text of this RCEP requirement is as follows:

"The discharge of contaminants shall comply with the following standards after reasonable mixing and disregarding the effect of any natural perturbations that may affect the receiving water body:

a) The natural temperature of the receiving water shall not be changed by more than 3 degrees Celsius.

b) The following shall not be allowed if they have an adverse effect on aquatic life:
   i) any pH change
   ii) any increase in the deposition of matter on the foreshore or seabed
   iii) any discharge of a contaminant into the water.

c) The concentration of dissolved oxygen shall exceed 80% of the saturation concentration.

d) There shall be no undesirable biological growths as a result of any discharge of a contaminant into the water."

4.7 Wairoa Riverbed Sediment Characteristics Near WWWTP Discharge

The riverbed sediment was sampled in 1996, 2007, 2011, and 2017 at three locations: 100 m downstream of the WWWTP discharge outfall, and 100m and 500 m upstream of the outfall. In April 2018 eCoast sampled the sediment at the same three sites and another seven sites across the Wairoa River between the urban area and the coastal lagoons, as shown on Figure 4.1 below. The additional sampling sites were selected to enable comparisons of sites at increasing distances from the WWWTP discharge outfall including near the far riverbank and further upstream of the discharge outfall to be sure of being outside its potential area of influence. eCoast (2018:A3D3) presented the findings of their results against all of the previous studies at the original three sites.

Figure 4.1: 2018 Benthic Sampling Sites (Source: eCoast, 2018:A3D3)

The silt/clay content of sediment at the site located 100 m upstream of the outfall has experienced the greatest variability during 1996-2018, while the site located 100 m downstream has been less variable and the site located 500 m upstream has been relatively constant. These variations in sediment

composition were believed to reflect the changes over time of river channel migration and the extent of erosion and deposition occurring at each site. The sediment compositions of the additional seven sites similarly reflected the prevailing river flow conditions and whether the site was in a depositional, stable, or erosional environment. The redox discontinuity layer depths also reflected the silt/mud contents of the sediments.

After normalising the chemical analyses for each site's silt/clay contents, the organic content at the sampling sites reflected their variations in silt and clay percentages. When compared with other estuaries in Hawke's Bay and around New Zealand, the nutrient contents were not significantly elevated and trace metal contents were low to very low (except for arsenic, which is naturally elevated in the Wairoa geology).

4.8 Wairoa River Ecology Near WWWTP Discharge

The Wairoa River provides habitat for a wide range of fish, including various native species, some of which are rare or critically threatened, and exotic species including large populations of brown and rainbow trout. The Wairoa Estuary, as for other estuarine areas within Hawke's Bay serves as a nursery ground for flounder, short and long-finned eel, and inanga. Both cockles and pipi occur within the estuary and fresh water mussels (kakahi) were also historically abundant

During the benthic sediment surveys described in Section 4.7 above, the sediments were also surveyed for their ecological compositions at these sites. All contaminant levels in the sediments were below ANZECC (2000) Interim Sediment Quality Guidelines low threshold values (ISQG-Low), so there are not expected to be any resulting adverse ecological effects.

Over all of the sampling sites and survey years the benthic ecological communities had low species diversity and generally reflected the degraded and silty/muddy sedimentation patterns for each site. Species composition has varied over the years but all three sites have varied in a similar fashion between survey years.

4.9 Terrestrial Ecology

The Whakamahi and Ngamotu Lagoons including their terrestrial habitats of the mudflats and coastal dune are DOC wildlife management reserves and are designated by HBRC as a regionally and nationally significant conservation area (SCA15) due to their biodiversity values. Birds of significance associated with the estuary include Australasian Bittern, Marsh Crake, Spotless Crake, and Royal Spoonbill. The salt marsh areas are also ecologically important and some plants are rare or threatened. A further description of SCA15 is provided in Stradegy (2018:C9).

4.10 Cultural and Heritage Values

The Tangata Whenua Worldviews report (How, 2017:A4I2) described the cultural and Maori heritage values in the Wairoa locality. It also described the local iwi and hapu tikanga and kawa relevant to the management of human wastes in the Wairoa locality. Figure 4.2 presents a map of all culturally significant sites identified in this report.

Figure 4.2: Map of Cultural Landscape Significant Sites Within 2 Kilometres of the Wairoa WWTP (Source: How, 2017:A4I2)

The extensive Maori occupation and use of the Wairoa River and coastal area as a food resource give this area high cultural value. Geographical features of the coastal dunes/bar and islands within the estuary also have spiritual values as taniwha and significant historical landmarks. The discharges of treated wastewater into the river can subsequently pass over or around some culturally sensitive sites, thus degrading their cultural values. Some care may be required during earthworks for the discharge pipeline to avoid historic and cultural sites and to monitor for accidental discoveries of artefacts.

In relation to wastewater management and discharges, the discharge of human wastewater to the river or ocean is culturally offensive unless, in the case of Wairoa iwi who shared views on this project, the wastewater has been treated to drinking water standards. The cultural preference is to discharge only to land and avoiding direct contact with surface water bodies.

4.11 Amenity, Community, Recreational, and Social Values

Wide strips of land along the riverbanks of Wairoa, North Clyde, and downstream towards the river mouth are gazetted as recreation and/or esplanade reserves. These reserves have scenic value in addition to their recreational and heritage values. In the urban areas and along Kopu Road they are mostly grassed (and regularly mown) but include trees and flower gardens with a shared walkway/cycleway along the full length of the reserves. Picnic tables, public artworks, and some playgrounds are also located sporadically along the reserves.

In addition, the Whakamahi Lagoon and Ngamotu Lagoon Wildlife Management Reserves have very high amenity, recreational, and social values due to their protected natural habitat values.

The Rangihoua / Pilot Hill Historic Reserve is located between the WWWTP and the Whakamahi Lagoon, and this has very high historic and cultural values in addition to its amenity (scenic) and recreational (walkways) values. Its historical value is very high because of its use for a significant Maori occupation

(including fortification and battles), as the signal station for assisting shipping navigational safety over the river mouth, and as the site of several World War II gun bunkers.

Recreational use of these reserves is generally walking, running, cycling, and picnicking. Rowing, yachting, and powerboating clubs have their clubrooms and boat ramps within these reserves.

The river itself has recreational value for boating and swimming activities. It is also a food source for fish, whitebait, and shellfish. However, it should be noted that the RCEP manages the area of the main WWWTP discharge outlet for aquatic purposes only, and not for contact recreation purposes.

The recreational use summary (LEI, 2017:A3D5) presents more details of the community's recreational use of the Wairoa River and its riverbank reserves from urban Wairoa out to the sea.

4.12 Natural Hazards

The river regularly floods during large storm events but is generally held within its flood control stopbanks. Strong winds can also blow down trees and powerlines. The NZCPS and RCEP identify flooding and its management structures (stop banks), coastal erosion, storm surges, and dynamic coastal processes as hazards that require careful management in the coastal environment. On a longer term, sea level rise is also acknowledged by the RCEP as a hazard for coastal areas.

As is the case for the entire East Coast of the North Island, Wairoa is at risk of large seismic events (earthquakes) which can generate liquefaction of urban Wairoa and tsunamis. It is also at risk of volcanic ash fall-out in the event of an eruption of a volcano within the Tongariro-Bay of Plenty volcanic zone. However, these events will cause damage to much larger widespread areas of the North Island and will generally not be focussed solely on Wairoa. It is also important to note that these events will probably also have greater effects on the reticulation and many other vital aspects of the community's well-being and infrastructure than the effects on WWWTP and its discharges.

LEI (2017:A7I3) presents further details and commentary on natural hazards implications for WWWTP and its discharge system.

4.13 Statutory Context

The Regional planning environment is outlined in Section 2 of Stradegy (2018:C9). In summary, the discharges from the main outlet structure and overflow pipe occur within the CMA, with the overflow discharge from the Kopu Road pump station being within the Coastal Margin. These discharges are therefore subject to consideration under the Regional Coastal Environment Plan (RCEP), while the discharges from the North Clyde and Alexandra Park pump stations are outside the Coastal Margin and are therefore subject to consideration under the Regional Resource Management Plan (RRMP). With the wastewater treatment Plant site also being outside the Coastal Margin, its associated discharge to air activities are subject to consideration under the RRMP.

Section 4 of Stradegy (2018:C9) goes on to identify the relevant provisions of the documents referred to in Section 104(1)(b) of the RMA that apply to the various activities involved in the proposal; these being the New Zealand Coastal Policy Statement, Regional Policy Statement and Regional Coastal Environment Plan as they apply to the Coastal Environment, and the National Policy Statement for Freshwater Management, RPS and Regional Plan as they apply to the freshwater/land environment.

Key points are summarised in Section 3.4 of Stradegy (2018:C9) and include the following, which assist in guiding the following assessments. We return to the Section 104(1)(b) considerations in Section 9 of this report.

- Objective 1 of the NZCPS focuses on the maintenance of coastal water or enhancement where significant adverse effects on ecology and habitat have arisen because of discharges associated with

human activity. Objective 16.1 RCEP has a consistent theme in terms of 'maintenance and enhancement', but introduces contact recreation purposes, where appropriate, as a reason.

- Guideline 3 of Policy 16-1 of the RCEP gives effect to Policy 23(2) of the NZCPS and acknowledges aspects Objective 6 of the NZCPS and Objective 32 of the RPS i.e. the ongoing operation, maintenance and development of physical infrastructure that supports the economic, social and/or cultural wellbeing of the region's people and communities and provides for their health and safety, and in essence contemplates/allows the disposal of sewage directly into the coastal marine area where it is the best practicable option and:
  - 'significant' adverse effects on ecosystems, natural character of the coastal environment and on water quality classified for contact recreation purposes are avoided, or remedied or mitigated where avoidance is not practicable, and,
  - there has been consultation with tangata whenua in accordance with tikanga Maori and due weight has been given to s6, s7 and s8 of the RMA and the affected community in determining the suitability of the treatment and disposal system
- Here it is noted that the receiving environment is not classified for contact recreation purposes,
- Use of mixing zones is acknowledged throughout Policy 23 of the NZCPS and the Guidelines in Policy 16-1 of the RCEP. Some degree of effect is therefore entertained, however Policy 23(1)(d) of the NZCPS seeks to limit this zone to the smallest necessary to achieve the required water quality in the receiving environment, which in this case are those for aquatic ecosystem purposes rather than contact recreation,
- Guideline 3(b) of Policy 16-1 of the RCEP is similar and seeks to limit the location and extent of any mixing zone such that there are no 'significant' adverse effects on any Significant Conservation Area i.e. SCA15 or, subject to the above, the use of receiving waters for recreation or the use of receiving waters for collection of seafood for human consumption.
- As provided to be acknowledged under Policy 4 of the NZCPS, the Hawke's Bay Regional Council has a role in managing the mouth of the Wairoa River at the coast, which influences the discharge regime and the flow patterns of the estuary.
- Culturally, Objective 3 and Policies 2 and 21(e)of the NZCPS, Objectives 34-37 and Policies 57-66 of the RPS and Guideline 3 of Policy 16-1 expects meaningful consultation with tangata whenua and recognition of traditional and continuing cultural relationships with areas of the coastal environment, while Objective 16-2 of the RCEP is to promote the avoidance, remediation or mitigation of the adverse effects of activities on mauri in the CMA,
- Turning to the freshwater environment, the processes to be applied by Regional Councils to set limits and targets through Regional Plans are yet to commence for the Wairoa River, so in the interim Policy A4 requires the following to be considered:
  - the extent to which the discharge would avoid contamination that will have an adverse effect on
    - the life-supporting capacity of fresh water including on any ecosystem associated with fresh water, and
    - on the health of the people and communities as affected by their secondary contact with fresh water, and
  - the extent to which it is feasible and dependable that any more than minor adverse effect on":
    - fresh water,
    - any ecosystem associated with fresh water,
    - the health of the people and communities as affected by their secondary contact with fresh water,

    resulting from the discharge would be avoided.
  - In terms of specific limits and targets, the RRMP falls to apply.
  - Objective 27 of the RPS shares the same 'maintenance' or 'enhancement' themes as the provisions applying to the coastal environment and talks of either 'sustaining' or 'improving' water quality for aquatic ecosystems and contact recreation purposes. Whether it's 'maintaining and sustaining, or enhancing and improving is dictated by Policy 72 of the RRMP,

- In this case, Policy 72 would set out that:
  - The guidelines in Table 7 and the faecal coliform standard in Table 8 of the RRMP and the standards in Guideline 6 of Policy 9.1 of the RCEP only apply below the median flow,
  - That the extent of the mixing zone after which the guidelines apply during flows less than the median flow vary but could be up to 200m or a distance equal to seven times the bed width of the surface water body,
  - The discharge should not cause the concentration of suspended solids or the turbidity in the river to increase by more than 10%,
  - On the basis that existing water quality in this case is poorer than the guidelines and that this is obviously due to upstream influences rather than the discharge concerned, conditions need not be imposed to improve water quality, rather avoid further degradation. As such, the outcome sought by Objective 27 of the RPS, in this particular case, is to 'maintain' and 'sustain', rather than 'enhance' and 'improve'.

- Objective 26.3.1 and Policy 26.4.3 of the Wairoa District Plan are to enable utilities to establish and operate, however this is based on any adverse effects on the environment being avoided, remedied or mitigated, while both Policies 26.4.3 and 26.4.4 go on to refer to operations in way that safeguards the life supporting capacity of the District's water resources and ecosystems, which is largely consistent with the provisions of the RPS and Regional Plans.

5 DESCRIPTION OF ACTIVITIES

5.1 Wastewater System and Discharge Context

WDC is required under Local Government legislation to provide wastewater services as part of its sanitary and community health and well-being purpose. As outlined in Section 3.1 above, the historical development of the reticulation and treatment system has occurred in order to address the sanitation needs of the urban community and to improve the treatment and discharge systems so that the river's water quality could be improved.

It is also apparent that, due to upstream rural erosion and urban contributions of stormwater and other contaminants, the WWWTP's treated wastewater discharges into a poor water quality river which is widely acknowledged to often be unsuitable for contact recreation.

The community have acknowledged that these upstream sources of contaminants are more significantly impacting on the river's poor water quality than the urban wastewater discharges. They are also accepting of the fact that ceasing the wastewater discharge will not address the limitations of water quality in the river.

In order to contribute to addressing the river's upstream poor condition, WDC and the community have agreed to develop and collaborate on the wider package of initiatives to irrigate to land and contribute to rural catchment improvements. This collaborative approach, particularly being more than the discharge of wastewater, is reflected in recent WDC resolutions and funding allocation in the Council's Long Term Plan.

5.2 Proposed Condition Framework

The following sections of this report outline the specific details of the proposal. Overall however, the intent has been to develop an approach that enables effluent quality to be improved, primarily in response to cultural and social interest, and to reduce the volume of wastewater discharged to the river, again, primarily in response to cultural interests.

This intent is given effect through a progressive resource consent condition framework, that sets out a series of actions to be undertaken within the first five years to reduce inflow and infiltration, improve treatment, increase the public's awareness of wastewater matters and to initial broad catchment management initiatives of consent spanning infrastructure, treatment, social and catchment matters

The framework then sets a platform, in collaboration with the community, to review the influence of these actions on system performance and to decide on the methods moving forward to take further steps towards reducing discharges to the river through increase storage and use of land application resources and improving water quality in the entire catchment. This process is then repeated on a 10 yearly basis to enable further steps towards these goals to be taken.

The philosophy of the consent is to provide a platform for continuous improvement over time so to progressively improve the robustness of the wastewater system and work towards an enhancement in water quality of the Wairoa River.

For such outcomes to be achieved, it is necessary to provide direction and to maintain momentum. A longer-term vision is therefore required, with unnecessary obstacles being avoided. For this reason, the consent sets down an approach over a period of 35 years compromising regular monitoring, reviews of system performance, investigations around options to reduce discharge to the river, community collaboration in decision making, adaptive monitoring, catchment enhancement initiatives and improved

notification and communication with various parties around inevitable system exceedances matters and river moth closures. A term of 35 years would enable commitment and operating systems to be implemented with confidence, knowing that WDC would not have to divert funds and have uncertainty of a shorter term consent.

Suggested Conditions to this effect are provided in Appendix D and are expanded upon in the following sections which outline the details of the proposal that they seek to provide for and implement. The general structure of the condition framework is illustrated in Figure 5.1 below.

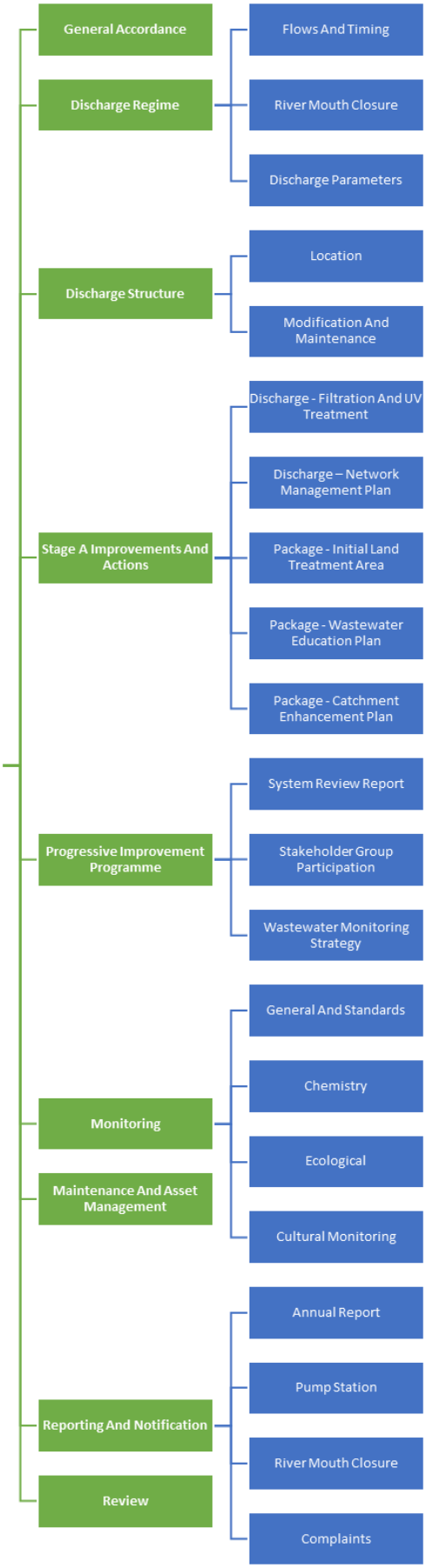

Figure 5.1: Condition Framework Structure

5.3 Existing Discharges

The primary (and currently consented) discharge is for treated wastewater from WWWTP via its main outfall located in the river opposite Fitzroy Street at a point about 150 m from the shore. This discharge has consented wastewater quality limits and discharge limits of up to 5,400 m^3/d only during out-going tides between 6:00 pm and 6:00 am.

When the river mouth is closed, discharges must cease until the WWWTP's storage capacity has been filled, whereupon discharges may resume with the issuing of public health warnings. At times, generally during local storm events, the consented discharge limits are breached. The wastewater quality limits for some parameters have also been breached at times.

In addition to the main WWWTP outfall discharge, the pump stations at North Clyde, Alexandra Park, and Kopu Road have overflow discharge pipes to the Wairoa River. The Fitzroy Street pump station also has an overflow pipe which connects into the main WWWTP outfall pipeline. These pump station overflows have not been specifically consented previously but have always been a feature of Wairoa's wastewater reticulation and discharge system.

The pump stations only overflow during storm events when stormwater flows overwhelm the pumping capacities. At such times, the quality of the discharges is mainly stormwater with minor wastewater contamination (Opus, 2012b indicated that the wastewater was likely to be only about 2% of these overflow discharges). As described in LEI (2018:A2I3) the frequency of storm overflow events from these pump stations has reduced during the last 1-2 years as a result of WDC's reticulation renewal and pump station upgrading projects.

In addition to these discharges, WWWTP's main discharge pipeline includes a surcharge pressure release overflow structure within the last manhole adjacent to the riverbank, just prior to the pipeline's entry into the riverbed. This overflow structure discharges the over-capacity volume of treated wastewater into an adjacent stormwater drain which then cascades down the riverbank and onto the edge of the mudflats. The frequency and volume of discharges has not been monitored, but the volume is included in the measured total volume discharged from the WWWTP outlet. Like the pump station overflows, this has always existed and operated, but has not been specifically consented previously.

5.4 Scope of Proposed Activities

The proposed activities requiring resource consents are:

- North Clyde, Alexandra Park, and Kopu Road pump station overflow discharges to Wairoa River during storms;
- main discharge outfall to Wairoa River for treated wastewater;
- discharges to air from the WWWTP;
- riverbank discharges of treated wastewater from the surcharge pressure release overflow structure for the main WWWTP discharge pipeline; and
- riverbed occupation and disturbance for relocation and maintenance of the main WWWTP outfall pipeline in the Wairoa River bed.

The discharge volumes and frequencies from the pump station overflows to the Wairoa River will decrease over time as a direct consequence of WDC's reticulation repairs, renewals, enforcement actions, and pump station upgrades. Progressively larger storms will be accommodated by the reticulation capacity instead of overflowing the pump stations and discharging to the river.

The treated wastewater discharge volumes and frequencies from the main WWWTP discharge outfall to the Wairoa River will decrease over time as a direct consequence of the reticulation improvements, additional storage and expansion of irrigation.

The main WWWTP outfall pipeline is proposed to be able to be relocated so that it is kept close to the inshore edge of the main active river channel for optimum dispersion and flushing of the treated wastewater discharges out to sea. The yellow outline in Figure 5.1 shows the specific area of riverbed within which the outfall will terminate and within which the connecting pipeline will be relocated and realigned as necessary to suit changes to the outfall relocation.

Figure 5.1: Main WWWTP Outfall Relocation Area

Resource consents are required for the following aspects of the outfall pipeline and its future ability to be maintained and readily relocated or reconfigured to reflect river channel migrations:

- Construction of a new structure within CHZ1 for the purposes of a network utility operation,
- Disturbance associated with construction and maintenance,
- Vegetation clearance and soil disturbance, and
- The associated occupation of space.

5.5 Reticulation System

The majority of Wairoa's gravity sewer network is more than 30 years old and known to be leaky. This makes Wairoa's reticulation prone to excessive groundwater infiltration and stormwater ingress (I & I) which elevate the base flow and peak wet weather flow volumes. The base flows are readily

accommodated by the pump stations, but the peak wet weather flows during local storm events are not always within pumping and reticulation capacities.

The North Clyde pump station was prone to the most frequent overflows in 2012-13 but this has since been resolved by increasing pumping capacity and changing their design to minimise blockages. The Kopu Road catchment is the most prone to excessive I & I volumes compared with the other pump stations' catchments. As a direct result, the Kopu Road pump station overflows the most often and discharges the greatest overflow volumes to the river out of all of the pump stations. Estimates are there is an overflow occurrence of some 10-15 times annually. Details of overflow events are provided in Opus (2012a and 2012b), LEI (2015:A1I1), GEM (2017:A1D1), and WDC (2018:A2I3).

WDC have commenced a reticulation investigation, repair, and renewal programme with an initial focus on the Kopu Road catchment, which will eventually cover all of Wairoa's reticulation. The works so far have already generated significant reductions in wastewater volumes and overflow events for the Kopu Road pump station. This has also assisted with keeping flows within the pumping capacity of the Fitzroy Street pump station.

Pump station improvements recently completed or to be completed in the near future include the installation of modern chopper pump designs (to minimise the potential for blockages of reticulation and jammed pump impellers) and the pump capacities at each pump station have been optimised to match their catchment's typical flow ranges. Software controls for the pumps have been modified to improve pump management and operate more than one pump when flows increase. Further upgrade details are provided in LEI (2018:C2).

Reticulation repairs and renewals will continue to be undertaken in the Kopu Road pump station's catchment and elsewhere in order to reduce I & I contributions. A new main line is proposed to be installed as a dedicated main pipeline from Kopu Road pump station to Fitzroy Street pump station. This will enable the existing main pipeline to service only the flows from the rest of Wairoa's urban area and avoid surcharging caused by Kopu Road flows sharing the capacity of that pipeline.

New generation chopper pumps will be installed at every pump station in order to prevent blockages and reduce maintenance costs. Emergency power generators (or with the capacity to have generators connected) will also be installed at every pump station to prevent pump stoppages and any resultant overflows occurring during power outages (power cuts often coincide with storm events when wastewater flows are also elevated).

The rising main pipeline from Fitzroy Street pump station up to the WWWTP inlet is also proposed to be duplicated in order to double its capacity. This will ensure that all flows entering Fitzroy Street pump station (including additional flows resulting from the new Kopu Road pump station main) will be pumped into the WWWTP for treatment.

The majority of these improvements will be completed within the next 3 years (and some have started). The reticulation renewals will be on-going but the intensity of renewals may reduce after 15-20 years as the I & I issues are reduced.

A key anticipated result of the reticulation improvements is reduced wastewater flows and fewer pump station overflow discharges to the river. Reduced wastewater flows have other benefits:

- Reduced pumping requirements which save power and maintenance costs;
- Improved wastewater treatment performance;
- Reduced need for storage volumes; and
- Reduced volumes requiring discharge to the environment.

5.6 Wastewater Flow Rates

LEI (2017:A2I1) presents details of the wastewater flow variations while WDC (2018:A2I3) presents more recent monitoring data. Figure 5.2 below presents a graph of the monthly average daily inflow to WWWTP (as recorded at the Fitzroy Street pump station) during 2009-18; the daily discharge volumes are similar.

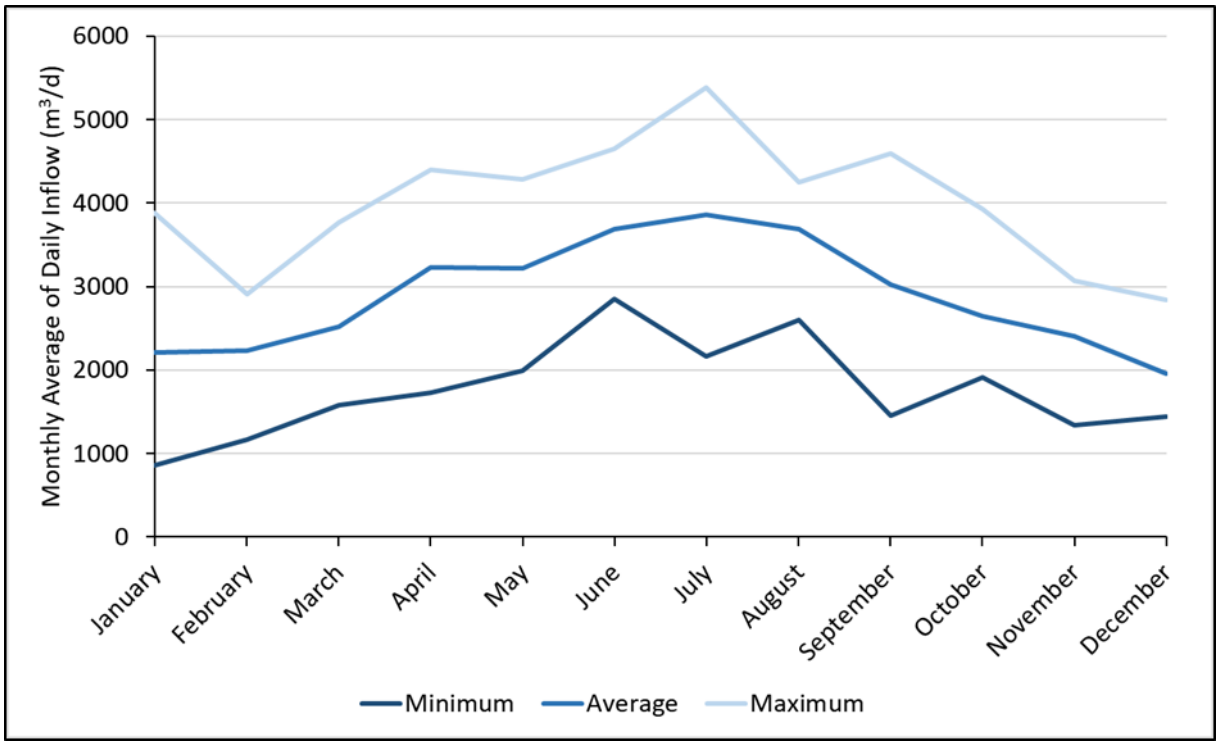

Figure 5.2: Monthly Averages of Daily Wastewater Flows

Annual flow totals recorded during 2009-17 were 1.0 – 1.2 Mm^3/y, with an average of 1.13 Mm^3/y (WDC, 2018:A2I3). Statistics for the daily inflows to WWWTP during 2009-18 are presented below in Table 5.1.

Table 5.1: Daily Wastewater Flows (m^3/d)

Timeframe	Overall Mean	Summer Mean	Winter Mean	90th Percentile
2009-18	2,868	2.134	3,908	5,050
2009-12	2,824	2.358	3,987	5,232
2013-14	2,549	1,677	3,833	4,417
2016-18	2,852	2,147	3,812	5,082
2018 (Jan-Sep)	2,617	1,742	2,856	4,228

Improvements and renewals of the reticulation (mainly in the Kopu Road catchment) and pump station upgrades during 2016-18 have anecdotally reduced frequencies of pump station blockages and overflows, but the variations in seasonal rainfall have also been a factor. Daily flow data for the first 9 ½ months of 2018 indicates reductions of 10-20 % from previous years when adjusted for rainfall variations (this adjustment was important given that July 2018 was the driest July during the last 21 years). This reduction is evident in all of the statistics shown above in Table 5.1 for 2018, but particularly for the winter mean and 90th percentile.

A graph of the cumulative distribution of daily wastewater inflow volumes to WWWTP during 2009-18 is presented below in Figure 5.3. It shows that the 10th to 90th percentile daily flows are between 1,500 and 5,000 m^3/d and that the median daily flow is 2,450 m^3/d.

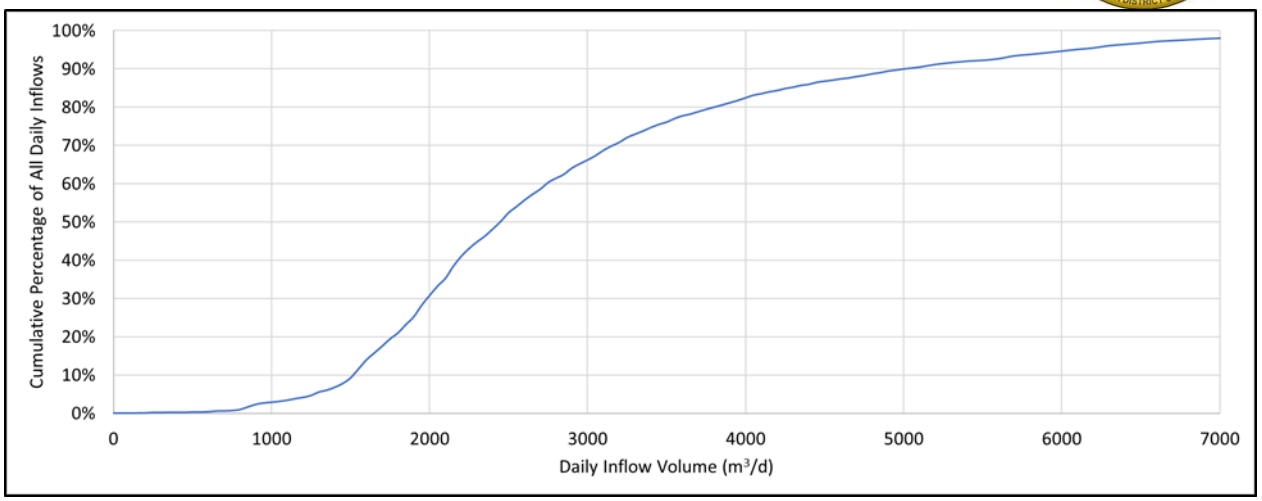

Figure 5.3: Cumulative Distribution of Daily Flows for Wairoa WWTP for 2009-18

LEI's estimates of anticipated future flows based on planned reticulation improvements occurring over specific timeframes are presented in Table 5.2; these flow rates were estimated during the development of the Conceptual Design (LEI, 2018:C1.0)

Table 5.2: Anticipated Future Daily Wastewater Flows

Milestone Year	Overall Mean	Summer Mean	Winter Mean	90th Percentile
2009-18 (current)	2,870	2,100	3,900	5,050
2024 (5 year stage)	2,600	2,000	3,500	4,000
2040	2,100	1,800	2,800	3,500
2050	1,800	1,500	2,100	3,000

It is important to note that these flows are indicative only and are aspirational for the purposes of describing the design constraints for the future development of WWWTP's treatment and discharge systems and for calculating the likely scale of effects of the discharges on the receiving environments. These estimated flow reduction aspirations are potentially very challenging for WDC to achieve, as widespread sources of I & I across the reticulation will be difficult to identify and potentially also physically challenging and very expensive to resolve. The flows are also highly driven by prevailing weather conditions, so a series of storms or unusually wet seasons could easily mask the actual scale of wastewater flow reductions that would have been more apparent during normal or drier seasons.

If flows do not reduce to the extent indicated in Table 5.2 then the storage volume and/or the frequency of discharges to the river will need to increase to accommodate the higher flows. The changes in flows (particularly winter and wet weather flows) are important for estimating the storage volume requirements for the future discharge system, because the higher wet weather flows can't be immediately irrigated (because soils are too wet) and are instead generally stored or discharged into the river.

5.7 Treatment Plant

WWWTP consists of an aerated lagoon and a large facultative pond. The outlet of the WWWTP's facultative pond passes through a weir which controls discharges so that they only occur during overnight out-going tides as required by the resource consent conditions. The treated wastewater flows by gravity down a pipeline to Fitzroy Street and then out into the Wairoa River where it terminates about 150 m from the shore.

An inlet screen removes gross solids from the incoming raw wastewater before it enters the aerated lagoon. In April 2018 the original mechanical aerators on the surface of the aerated lagoon were replaced by a submerged air sparge which injects air bubbles instead of generating waves and stirring.

Within 2 years of granting consents WDC are proposing to install filtration and UV at the outlet of the WWWTP's facultative pond for disinfection purposes. Its design will include duplicated filter and the ability to turn on more UV lamps for effectively treating elevated wastewater flows. When flows exceed its capacity a bypass system will allow excess wastewater flows to exit the WWWTP without passing through the disinfection process and then mix back into the disinfected wastewater as it flows down the outfall pipeline.

WDC may also install a grit trap between the WWWTP inlet screen and the aerated lagoon inlet.

No other changes are proposed to the WWWTP's design or operation because its treatment performance is currently adequate and the installation of filtration and UV lamps will improve the treated wastewater quality so that it is more acceptable for discharging into the river. The I&I reductions in wastewater flows that are anticipated from the reticulation improvements will assist the treatment performance of the WWWTP.

5.8 Storage

The water levels in the WWWTP ponds are currently varied (surcharged) to store wastewater during its treatment. The total available storage volume is 5,400 m^3 which is primarily held in the facultative pond by varying its operating level by 500 mm.

This storage management system is proposed to be retained, but additional storage will be constructed in future to enable the river discharges to be reduced over time and managed to reflect the river flow conditions. Storage will also be necessary for successful implementation of irrigation systems in the locality.

During the first 5 years following granting of consents, WDC intend to construct an additional 10,000 m^3 of storage for treated wastewater. Most, if not all, of this new storage is likely to be in the form of tanks or ponds located within the WWWTP site. This will increase the total available storage volume to 15,400 m^3.

During each of the two decades following the initial 5-year period, the **aspirational** targets for additional storage capacity are 100,000 m^3 and up to 400,000 m^3 respectively. These storage volumes are only necessary if enough land is able to be developed for irrigation. The combined storage and irrigation will help WDC to achieve the long-term aspiration of ceasing discharges of treated wastewater to the river. Substantial progress towards achieving these aspirations will at least allow WDC to seasonally cease (during summer) and substantially reduce the annual and winter/spring discharges to the river.

5.9 Discharge Quality

The current and potential future discharge quality, as estimated in LEI (2018:C1.0), from the WWWTP outfall is summarised in Table 5.3 below.

Table 5.3: Treated Wastewater Quality During 2008-16

Parameter	Current Quality (2008-16)			Potential Quality		
	Range	Mean	Median	Range	Mean	Median
COD (g/m^3)	34 – 620	158	126	20 – 60	40	35
CBOD (g/m^3)	6 – 190	31	23	3 – 30	20	17
NH_3-N (g/m^3)	4.0 – 36	16.1	15.6	2.5 – 25	12	10
TSS (g/m^3)	7 – 290	64	52	2 – 50	15	10
E. coli (cfu/100 ml)	8 – 470,000	5,250	5,200	0 – 5,000	60	50

The exact characteristics of the future discharge system need to be clarified and will only be known more confidently once filtration and UV have been commissioned in combination with I&I reductions. It is known that the current discharge quality is not having an adverse effect (as noted in Section 8).

Consultation has highlighted the need for pathogen reduction, but the reduction of other parameters has not been established. This is primarily due to ongoing I and I improvements modifying the quality of the effluent and volume to be managed. In addition, further discussion through this consenting process is needed to balance the need for improvement in discharge quality (given effects are acceptable) against the expense of such improvements; with the key issue being the upgrade costs could be spent on other aspects of the Package that may have a more tangible benefit.

The pump station overflow wastewater quality is unknown but it is highly diluted by stormwater (Opus 2012b indicated that only 2% of the flow would be wastewater). The dilution rate would reduce the pathogen content from about 400,000 cfu/100 ml to 8,000 cfu/100 ml. It is likely that the river would already be carrying similar or higher pathogen concentrations.

It is also important to bear in mind that these pump station overflows enter a flooded and heavily contaminated river which is receiving far greater volumes of urban stormwater and rural runoff. The frequency of the pump station discharges is also occasional to rare, and the durations of discharges are short-lived. Future discharges are anticipated to reduce in frequency, duration, and volume as reticulation improvements take effect.

5.10 Discharge Regime and Management

Initially, the WWWTP discharge will remain as it is currently managed, with discharges to the river only occurring during overnight out-going tides and limited to no more than 5,400 m^3/d. Once irrigation has commenced within the first 5 years, the discharges to the river can reduce during summer months (the irrigation season). As irrigation and storage are expanded in future years, the discharges to the river can be further restricted. This will be assisted by the expected reductions in wastewater flows resulting from the reticulation improvements.

The intention of the gradual changes to the river discharge regime is to gradually phase out discharges to the river during low flows, initially only during MALF but ultimately below median river flows. This can be achieved by maximising the use of irrigation and storage to avoid or reduce the need to discharge to the river. Table 5.4 presents the gradual changes in discharge regime for the WWWTP discharge as each stage of the proposed programme is implemented.

Table 5.4: River Discharge Regime Implementation

Stage and Timing	River Discharge Constraints for WWWTP Outfall Discharges
Initial Status Quo	At all river flows: < 5,400 m^3/d on outgoing tide at night (between 30 minutes after high tide to ebb tide commencing no earlier than 6:00 pm and ceasing no later than 6:00 am). Cease when the river mouth is closed until there is no remaining storage capacity, then discharge within normal constraints and issue public health warnings until the river mouth re-opens.
Stage 1 0-5 years	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only. ½ median to median river flows: <3,000 m^3/d discharge on **any** outgoing tide. Median to 3 x median river flows: <5,000 m^3/d discharge on **any** outgoing tide. Above 3 x median river flows: unlimited discharge at any time.
Stage 2 6-10 years	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only **but limited to no more than 30 days discharge in December to March**. ½ median to median river flows: <3,000 m^3/d discharge on any outgoing tide. Median to 3 x median river flows: <5,000 m^3/d) discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.

Stage and Timing	River Discharge Constraints for WWWTP Outfall Discharges
Stage 3 11-20 years	Below ½ median river flows: **no discharge at any time**. ½ median to median river flows: <3,000 m^3/d discharge **only on outgoing tide at night**. Median to 3 x median river flows: <5,000 m^3/d discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.
Stage 4 21-30 years	Below **median** river flows: no discharge at any time. Median to 3 x median river flows: <5,000 m^3/d discharge **only on outgoing tide at night**. Above 3 x median river flows: unlimited discharge at any time.

It is important to note that Stages 3 and 4 are aspirational and depend on storage and irrigation to be fully implemented.

Pump station overflows will reduce in future as a direct result of the reticulation improvement programme, but the scale of reductions that will in fact be achieved is uncertain and difficult to predict. The intensity and frequency of large storm events in any particular year will drive the frequency, duration, and volume of pump station overflows. The aspirational targets for future frequencies of pump station overflow discharges are:

- **Stage 1 (0-5 years):** Occur less often than now (<10 events/year) and triggered during larger storms;
- **Stage 2 (6-10 years):** Rare (<8 events/year); triggered only during larger storms;
- **Stage 3 (11-20 years):** Very rare (<4 events/year); only during very large storms; and
- **Stage 4(21-30 years):** Very rare (<4 events/year); only during very large storms.

The surcharging overflow of the main WWWTP outfall pipeline will also reduce in frequency and volume as a direct result of the reduced frequency of discharges to the river.

5.11 Riverbank Overflow of Main WWWTP Discharge Pipeline

As outlined above, the main outfall pipeline from the WWWTP surcharges and regularly overflows at the last manhole between Kopu Road and the riverbank into an adjacent stormwater drain and then cascades down the riverbank onto the mudflats. The overflow structure has always been a feature of this pipeline and it has always operated when surcharge pressure reaches a specific level. It is a critical part of the pipeline's design to avoid potentially catastrophic failure of the pipeline from over-pressurising.

It is unknown whether the frequency of discharges has increased in recent years, as it was not recognised until recently and has never been monitored. The volume of treated wastewater has not been measured, but it is a portion of the known volume that discharges during overnight out-going tides from the WWWTP; it is not additional to the WWWTP discharge.

Works associated with reticulation improvements, outfall modifications, and the transition to a discharge regime that reflects river flow conditions will gradually reduce these discharges. In the interim however these surcharging overflows will continue to occur at a similar frequency and volume to the last few years when discharge flows to the outfall exceed the pipeline's capacity. WDC will continue to maintain public health warning signage, fencing, and any remediation of spills as required by HBDHB.

5.12 Mitigation of Environmental Effects

5.12.1 General

The following is an overview of the primary mitigation measures proposed.

The generally less than minor adverse effects on the values associated with the Wairoa River do not require mitigation. The proposed reticulation improvements, installation of filtration and UV disinfection treatment, reductions in river discharges, modifications to the river discharge regime to reflect river flows, installation of storage, and expansion of irrigation, and gradual cessation of discharges during lower river flow conditions and expanding proportions of each year all form mitigation measures that will reduce the effects from the current level of effects on the river's water quality and values.

Many of the proposed resource consent conditions (as discussed in Section 5.2 and provided in Appendix D) are intended to operate as mitigation measures for the residual adverse effects of the wastewater discharges on the river's values.

5.12.2 River Water Quality and Values

The proposed phasing in of more strictly managed discharge volumes and timing will gradually implement the primary mitigation measures for addressing the residual adverse effects on the river's water quality and values.

5.12.3 Cultural Values

How (2018:C8) identifies that the most important and relevant mitigation measures for the residual effects on cultural values are the implementation of cultural health index monitoring, accidental discovery protocols for cultural or archaeological remains uncovered during any earthworks, and on-going engagement and collaboration with tangata whenua. These measures are reflected in the proposed consent conditions.

5.12.4 Financial Implications

Spreading the costs over many years will mitigate the rate of increase in financial burden on the Wairoa District's ratepayers. WDC will seek to obtain grants and other financial assistance to help contribute to the costs of implementing the proposed reticulation, storage, river discharge, and irrigation infrastructure.

5.13 Implementation Timing

There are four stages of implementation, and each stage involves steps of improved reticulation, enlarged irrigation and storage, and reduced river discharge volumes and frequencies which also become restricted to higher river flow rates. Table 5.5 summarises the staged programme.

Table 5.5: Summary of Wairoa's Future Treated Wastewater Discharge System

Stage Timing	Storage Capacity[#]	Irrigation Area[#]	River Discharge Parameters*	Pump Station Overflows[#]
Stage 1 0-5 years	No change (5,400 m^3 within the 2nd WWWTP pond).	Develop up to 50 ha	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only. ½ median to median river flows: <3,000 m^3/d discharge on **any** outgoing tide. Median to 3 x median river flows: <5,000 m^3/d discharge on **any** outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Occur less often than now (<10 events/year). Triggered during larger storms.
Stage 2 6-10 years	Increase total to about 10,000 m^3	Expanded up to 100-150 ha total	Below ½ median river flows: <1,600 m^3/d discharge on outgoing tide at night only **but limited to no more than 30 days discharge in December to March**. ½ median to median river flows: <3,000 m^3/d discharge on any outgoing tide. Median to 3 x median river flows: <5,000 m^3/d) discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Rare (<8 events/year); only during larger storms.
Stage 3 11-20 years	Increase total to 50-100,000 m^3	Expanded up to 300 ha total	Below ½ median river flows: **no discharge at any time**. ½ median to median river flows: <3,000 m^3/d discharge **only on outgoing tide at night**. Median to 3 x median river flows: <5,000 m^3/d discharge on any outgoing tide. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during very large storms.
Stage 4 21-30 years	Increase total to 200-400,000 m^3	Expanded up to 600 ha total	Below **median** river flows: no discharge at any time. Median to 3 x median river flows: <5,000 m^3/d discharge **only on outgoing tide at night**. Above 3 x median river flows: unlimited discharge at any time.	Very rare (<4 events/year); only during unusually large storms.

Notes: * bold text highlights what is changing within each stage.
[#] intended changes which depend on commitments outside resource consent processes.

5.14 Proposed Monitoring

5.14.1 General

There are several aspects of the wastewater system that require monitoring. Wastewater flow rates and quality need to be monitored as it is conveyed through the urban reticulation system and treated at the WWWTP. Storage volumes need to be monitored to avoid overflows and to assist with decisions regarding the timing and daily volume of treated wastewater that is to be discharged over the following 24 hours.

The weather and river flow conditions need to be monitored in order to inform and guide decision-makers on the timing and rate or volume of treated wastewater that is to be discharged over the following 24 hours. Periodic and targeted monitoring of the river receiving environment is required to assess the scale and nature of any changes in the river's health from upstream sources and any adverse or beneficial effects of the changing wastewater discharge regimes.

The main reasons for monitoring are:

- to support appropriate management of the treatment processes;
- to observe any changes in parameters over time;
- to trigger changes to treatment processes or discharge timing;
- to demonstrate compliance with consent conditions; and
- to measure the scale of effects of the discharges on the receiving environment.

5.14.2 Monitoring of Wastewater

WDC will continue to monitor daily total wastewater volumes pumped at each pump station. The Fitzroy Street pump station records will be relied upon as records of the daily wastewater volumes entering the WWWTP.

Water levels in the pump station wet wells will continue to be monitored (with alarms) so that overflow events can be accurately identified for their frequencies and durations.

The WWWTP discharge volumes and timing of discharges (for matching with river flows, tidal cycles, and night hours) will continue to be monitored and recorded.

Monthly wastewater quality will be monitored by way of grab samples, not the current regime of collecting composites of 30-minute grab samples over a discharge event. The wastewater quality parameters to be monitored will include pH, COD, CBOD, TN, NH_3-N, DRP, TSS, and *E. coli*. Note that not all of these parameters should have limits set on them, as they are important to track for wastewater treatment performance purposes, not necessarily for environmental effects or consent compliance purposes.

WDC will monitor the volumes in storage by continuously monitoring water levels in the storage facilities. Water level alarms (for high and low levels) will also be installed.

5.14.3 Monitoring of Weather and River Conditions

WDC will need to record the timing of tidal cycles for matching with discharge events when the river is flowing less than 3 x median flow. WDC will need to calculate and record Lower Wairoa River flow rates based on the flows measured and recorded for HBRC's Wairoa River at Marumaru and Waiau River at Ardkeen/Kelliher flow monitoring sites at midday each day. This data can either be automatically communicated to WWWTP's SCADA system or accessed from HBRC's website. Based on these daily

calculated river flows, the relevant timing and total daily discharge volume limit will be set for the up-coming discharge event.

WDC will need to monitor forecast rainfall events at Wairoa and across the river's hill catchment areas. This information will be helpful for predicting river flow conditions over the next few days and particularly over the next 24 hours. Large storm events may also trigger pump station overflow discharges which WDC may be able to prepare in advance for. Actual daily rainfall totals at Wairoa will be useful for enabling WDC to assess whether pump station overflow events are occurring less frequently and under increasingly intense storm rainfall conditions over time.

5.14.4 Monitoring of Effects on River Ecology

The Ecological AEE (eCoast, 2018:C5) proposed a number of sites and parameters for sampling of river water quality and sediments in the vicinity of the wastewater discharges. WDC propose to develop a monitoring programme following granting of consents to reflect the effects and residual concerns regarding the improved wastewater quality and reducing discharge volumes and frequencies. An adaptive monitoring programme is likely to be developed, and it will be informed by, and inform, the wider catchment programmes. The consent review processes are anticipated to be relied upon to modify and adapt the future river monitoring regime as the wastewater discharges reduce and/or the results of monitoring demonstrate the scale and location of any adverse effects.

5.14.5 Monitoring of Cultural Health of the River

Relevant iwi representatives will be invited to prepare appropriate cultural health index monitoring protocols, which may, at their discretion, follow the Mauri Compass methodologies and principles. Following development of their protocols, iwi representatives will then be invited to undertake the cultural health index monitoring in accordance with their protocols and at the frequencies proposed in the protocols. This is expected to be no more frequent than annually. The resulting monitoring report will be included in WDC's subsequent compliance report to HBRC along with any responses that WDC wish to include.

6 CONSULTATION

6.1 General

For details refer to the Consultation Summary that is presented in Appendix B. Some additional details are also presented in the Way Forward (LEI, 2017:B2A2), BPO (LEI, 2018:B4), and Conceptual Design (LEI, 2018:C1.0) reports. These reports detail what was discussed and outcomes of that engagement.

6.2 Consultation Methodology

As outlined in Section 3.3 above, WDC instigated a Stakeholder Group representative of Wairoa's demographics who met a number of times with technical expert assistance to identify concerns with the existing wastewater system and receiving environment, describe the community's values and aspirations, propose potential options for future improvements, assess the effectiveness and acceptability of various options, and help WDC to identify and refine a preferred option for implementation. The views expressed during these meetings guided WDC's direction for further investigations and development of the future discharge system.

Towards the end of the Stakeholder Group process WDC also sought to directly consult with iwi and the public via hui-a-iwi, media releases, and public meetings. These consultation efforts relied upon the preferred treatment and discharge options that were favoured by the Stakeholder Group.

Additionally, and separately, WDC consulted directly with HBRC, DOC, and HBDHB staff to obtain their feedback and guidance on the direction of the proposals. Care was taken to avoid conflicts of interest as their future roles as statutory parties and/or regulatory authorities.

6.3 Stakeholder Group

The Stakeholder Group met on 9 occasions during April to November 2017. In addition, on 26 June 2017 they undertook a field trip to visit WWTP's across the wider Hawke's Bay region to understand the variations of treatment processes, community sizes, and discharge systems.

The Stakeholder Group initially reviewed the existing wastewater system and identified their concerns with it and with the current condition of the Wairoa River receiving environment. They listed their key values under the four pillars of environmental, cultural, financial, and social/recreational categories. A consensus of evaluation criteria and aspirations, and ranked the importance of each to provide a scoring and weighting system for evaluations of future treatment and discharge options. Based on discussions and technical reports, the group considered a wide range of generic options which were gradually more refined over time as the group's views developed. This ultimately enabled and informed the development of the Package of initiatives that have subsequently formed the basis for the Conceptual Design and these applications for resource consents.

6.4 Specific Iwi Engagement

Early iwi engagement was seen as critical for this project. Iwi were consulted through numerous channels, including WDC's Maori Standing Committee, tangata whenua participation in the Stakeholder Group, commissioning of the Tangata Whenua Worldviews report (How, 2017:A4I2), hui-a-iwi, and CMT consultation efforts. CMT claimant groups have either been silent or have shown limited interest and indicated general support. In addition, WDC commissioned a Mauri Compass assessment, and WDC obtained a Cultural Impact Assessment (CIA; How, 2018:C8) of this consent application and its related Conceptual Design. The key points relating to cultural values were:

- Discharges of human wastewater to the Wairoa River or any other waterway are culturally offensive;
- Discharges to land are the ideal form of discharge and final treatment;

- Wairoa River and a number of locations and geographical features within and around the estuary have high cultural values;
- Future discharges to the river would idealistically be treated to drinking water standards and pass through land prior to entering the river; and
- On-going dialogue and collaboration with iwi and hapu is crucial.

6.5 Public Engagement

Public meetings and media publicity occurred during the last stages of the Stakeholder Group process. The consensus from these meetings echoed the Stakeholder Group, being the removal of the wastewater discharge from the Wairoa River. Following close behind this message was a second message relating to the degraded state of the Wairoa River and the need for it to be improved. These positions on the state of the river and managing the wastewater discharge were cautioned by meeting attendees about the solutions needing to be affordable to the entire community. The overall outcome was support for support for the proposed programmes of initiatives to improve the quality of the discharge, transition to irrigation, and assist with Wairoa River catchment improvements.

6.6 Public Consultation for Long Term Plan 2018-28

WDC's draft LTP specifically consulted the public for their acceptance of the previously adopted programme of initiatives referred to as 'The Package.' The outcome of consultation and WDC's deliberations was the adoption of the works programmes and budgets due to the level of community support.

6.7 Department of Conservation

DOC have been directly consulted to ascertain the status of the conservation concession for the existing discharge as well as seeking advice on the renewal of that concession and how the future iwi-WDC reserve management board would be expected to operate.

6.8 District Health Board

HBDHB's public health staff have been directly consulted for their evidence of public health effects and advice on the effectiveness of proposed changes to the wastewater system in reducing public health risks. Their feedback indicated that there was no evidence to demonstrate that the discharges had resulted in public health effects, and their views of the proposed changes to the wastewater treatment and discharge systems were supportive.

6.9 HBRC

HBRC staff have been consulted for their views of consent compliance, relevant information about the receiving environment, and the effectiveness of proposed changes to the wastewater system in reducing adverse effects on the river environment. Their feedback indicated that there was limited evidence demonstrating that the discharges had resulted in adverse environmental effects, and their views of the proposed changes to the wastewater treatment and discharge systems were supportive.

6.10 Summary

Robust consultation processes consistently provided WDC with key messages that:

- the health of the health of the Wairoa River is of paramount importance;
- the discharges of wastewater to the river were no longer acceptable;
- the preferred future discharge system needed to aim to be 100 % to land;
- the future wastewater treatment and discharge developments needed to remain affordable for the community; and
- efforts were required across the entire river catchment to improve its health and water quality.

7 CONSIDERATION OF ALTERNATIVES

7.1 General

The BPO report (LEI, 2018:B4) should be consulted in the first instance for details; its outcomes and key conclusions are summarised below. Some of the earlier reports for discussion with the Stakeholder Group are also relevant for details of early considerations of some alternative options.

7.2 Alternative Receiving Environments

The BPO report considered all possible alternative receiving environments. Land and the river were found to be the only feasible options. Both the marine and groundwater environments were found to be unable to provide sufficient benefits or practicalities for pursuing.

7.3 Alternative Discharge Locations

No other location within the river was seen to be beneficial for the financial investment, and this was particularly relevant if the discharge to the river was to reduce and ultimately cease in future.

7.4 Combined Land and Water Discharge Options

A continuum of options is theoretically available, in combination with storage, for combined land and water discharge systems. The proposed system transitions via a combined land and water discharge system towards the ultimate aspirational goal of 100 % land irrigation.

The terrain and soil drainage rates with moderately wet climate are the primary limiting factors for the irrigation which meant that the only feasible irrigation regime is likely to be deficit or perhaps marginally non-deficit. Deficit irrigation requires large land areas and a relatively short irrigation season, and this in turn forces very large storage and/or discharge to another environment (in this case, the river) outside of the irrigation seasons.

7.5 Alternative River Discharge Regimes

A continuum of options is theoretically available, in combination with storage, for varying the timing and volumes of discharges to the river. Storing all wastewater for discharging only during large flood events that occur a few times a year imposes unrealistically large and expensive storage on the community. It also perversely means that the very large discharge volumes required to be released during such storm events may have greater adverse effects than smaller volumes discharged more often during less elevated river flow conditions.

The selected river discharge regimes for each stage of the proposed programme have been adopted as being realistic for the residual volumes and seasonality of wastewater that will require discharging to the river when storage is full and irrigation is not possible. As irrigation and storage are expanded, the discharges to the river can progressively reduce in frequency and volume. The river discharges can also be successfully ceased for lower river flows without risking storage overflows.

7.6 Consultation Outcomes

Consistently the community aspiration was for complete cessation of the river discharge and implementation of irrigation. However, this was tempered by the recognition of the very large costs, difficulties of finding enough suitable land, and lengthy implementation time that would be necessary to achieve this aspirational goal in an affordable and practicable manner.

7.7 Financial Implications

Storage and irrigation over very large areas of land impose the greatest costs on the community. Staging the implementation over 20-30 years or more will assist with making this affordable.

7.8 Best Practicable Option Assessment

As described in detail in the BPO report, the integrated proposal and the continued river discharge component with future modifications have been robustly assessed against BPO criteria and found to be the BPO.

8 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

8.1 Receiving Environment

The Wairoa River is not a sensitive receiving environment for discharges of Wairoa's treated wastewater because of its large flow rate compared with daily wastewater flow rates and poor river water quality from upstream rural sources of sediment and pathogens. During flood events the river's characteristics are even less sensitive, especially to pump station overflows and elevated discharge volumes of treated wastewater from WWWTP.

In the vicinity of the WWWTP outfall the estuarine processes introduce nutrients and wave action that resuspends sediment from the silty riverbed. Tidal fluctuations and long coastal lagoons on each side of the narrow and shallow river mouth combine to generate large eddies and trap brackish water (particularly in the western arm towards Whakamahi Lagoon) which restrict flushing of the estuary out to the sea.

Within the background provided above, it is clear that the existing environment is such that discharges of nutrients and pathogens from a WWTP will be, to a large extent, masked.

8.2 Positive Effects

Despite the discharges having no detectable effects on river water quality, benthic sedimentation patterns and composition, or ecosystems due to the dominance of effects from upstream rural sources of contaminants, there is a possible masking of the wastewater discharges' cumulative effects on the environment. In other words, no effects can be detected not because there are none, but because the background environment is in such a poor state they cannot be detected, or separated, using current analytical techniques and statistical assessments of the widely variable water quality.

In response to this, a precautionary approach has been incorporated into the development of this proposal, primarily driven by the community's aspirations to cease the wastewater discharges to the river and to address cultural values. The overall long-term future result is a significant reduction in the volumes of wastewater and annual loads of wastewater-derived contaminants discharged to the river.

Gradual reductions in discharge volumes and frequencies over time will reduce the cumulative effects of these discharges and consequently enhance river water quality, reduce effects on riverbed sedimentation patterns and composition, and also reduce effects on benthic ecology and the fish and birds that feed in or pass through the area. It is acknowledged however, that these reductions in effects are unlikely to be detectable in the receiving environment.

Ceasing summer discharges will avoid adverse effects when the river conditions tend to be most sensitive to receiving discharges. This will avoid low river flow conditions (most common during summer), warmer water temperatures (which are more prone to encouraging nuisance algal and periphyton growths), increased levels of recreational activities, and increased rates of public use and enjoyment of the riverside reserves. Gradually extending the cessation to other months and seasons will avoid adverse effects on the river for increasing proportions of each year.

Outside of the activities that are the focus of this consent application, the irrigation will beneficially re-use the wastewater while preventing or at least minimising adverse effects on the terrestrial, groundwater, and surface water environments. As indicated in LEI (2018:C3) WDC's support for programmes of environmental enhancements across the rural catchment of the Wairoa River will also achieve tangible benefits for the river and its communities. There is potentially greater benefit for the river at financially more efficient rates than could be achieve by the investment into reducing and ultimately ceasing Wairoa's urban wastewater discharges.

8.3 Effects on River Hydrology

The effects of the discharge volumes on river hydrology are negligible, as the discharge is only 0.2 % of the river's median flow rate and it does not impede or deflect the river flow as it passes the discharge outfall. As future discharges of wastewater reduce in frequency and volume, and are managed to coincide with higher river flow rates and to occur mainly during winter and spring months, the already negligible effects on river hydrology will be correspondingly reduced.

Similarly, the pump station overflow discharges also cause negligible effects on river hydrology because they only occur during storm events when the river is already flowing faster and receiving much larger volumes of urban stormwater. As future I&I reductions are achieved by the reticulation improvements, the frequencies and volumes of pump station overflows will reduce and will progressively occur only during increasingly larger storm events, which will reduce the already negligible effects on the river hydrology.

8.4 Effects on River Water Quality

Reducing discharges over time will improve river water quality as much as these discharges are able to (given their very small contributions to the poor water quality) in a gradually increasing manner over greater proportions of each year. This will be most important during summer low river flow conditions which is the most sensitive time for nutrient and pathogen contributions from treated wastewater to potentially elevate risks for public health, recreation, or nuisance algal / periphyton growth rates.

The lengths of the zones of reasonable mixing downstream of each discharge are important to define, as effects beyond those zones form the basis upon which these discharge consents are to be assessed and determined by HBRC. The RRMP and RCEP provide a definition for calculating the zone of reasonable mixing, which is to be based upon the lesser of 200 m, seven times the width of the bed of the receiving water body, or the point at which full mixing occurs.

The river channel is about 95 m wide at the Alexandra Park pump station overflow discharge, 190 m at the North Clyde pump station overflow discharge, 340-350 m wide at the Kopu Road pump station overflow discharge.

For the main WWWTP discharge outfall within the CMA, there is no specific guidance around a reasonable mixing zone. The 'river' at this point however is 900 m wide during high tide (400 m during low tide) at the main WWWTP discharge outfall.

The distance for full mixing is potentially longer than 200 m for each discharge and seven times the riverbed width is far greater than 200 m so the default reasonable mixing zone length of 200 m would be reasonable to apply to each of these discharge locations, including the main WWWTP discharge despite not requiring this within the CMA. As a more conservative assessment, and to be consistent with the locations of the benthic monitoring sites around the main WWWTP outfall, WDC have chosen to apply a 100 m zone of reasonable mixing for all of these point sources of wastewater discharges.

The hydrodynamic modelling of the river and wastewater discharges (eCoast, 2018:C1.1) generated maps of the dispersion of the wastewater discharges from the existing WWWTP outfall, pump station overflows, and scenarios for a range of future potential outfall discharge regimes. These modelling outputs were able to be used to assess the extent and scale of potential effects downstream for the existing and future discharges. The scenario constraints were also used to set the discharge regime constraints for the WWWTP discharge as irrigation and storage are implemented.

8.4.1 Pump Station Overflows

The key limits on river water quality downstream of the pump station discharges are set in the RRMP, and all of these limits (except suspended solids) only apply at river flow rates at or below median flows. The

pump station overflows have typically occurred during storm events when the river is also flowing above its median flow, so most of the water quality limits do not apply to the effects of these discharges. It is also important and relevant to note that multiple stormwater and rural runoff discharges will have been contributing much higher volumes of water and higher loads of contaminants during these storm events than would be contributed by the wastewater-contaminated stormwater discharges from the pump station overflows.

The hydrodynamic modelling of actual pump station overflows during a storm in March 2012 showed rapid dilution downstream, as shown in Figure 8.2 below.

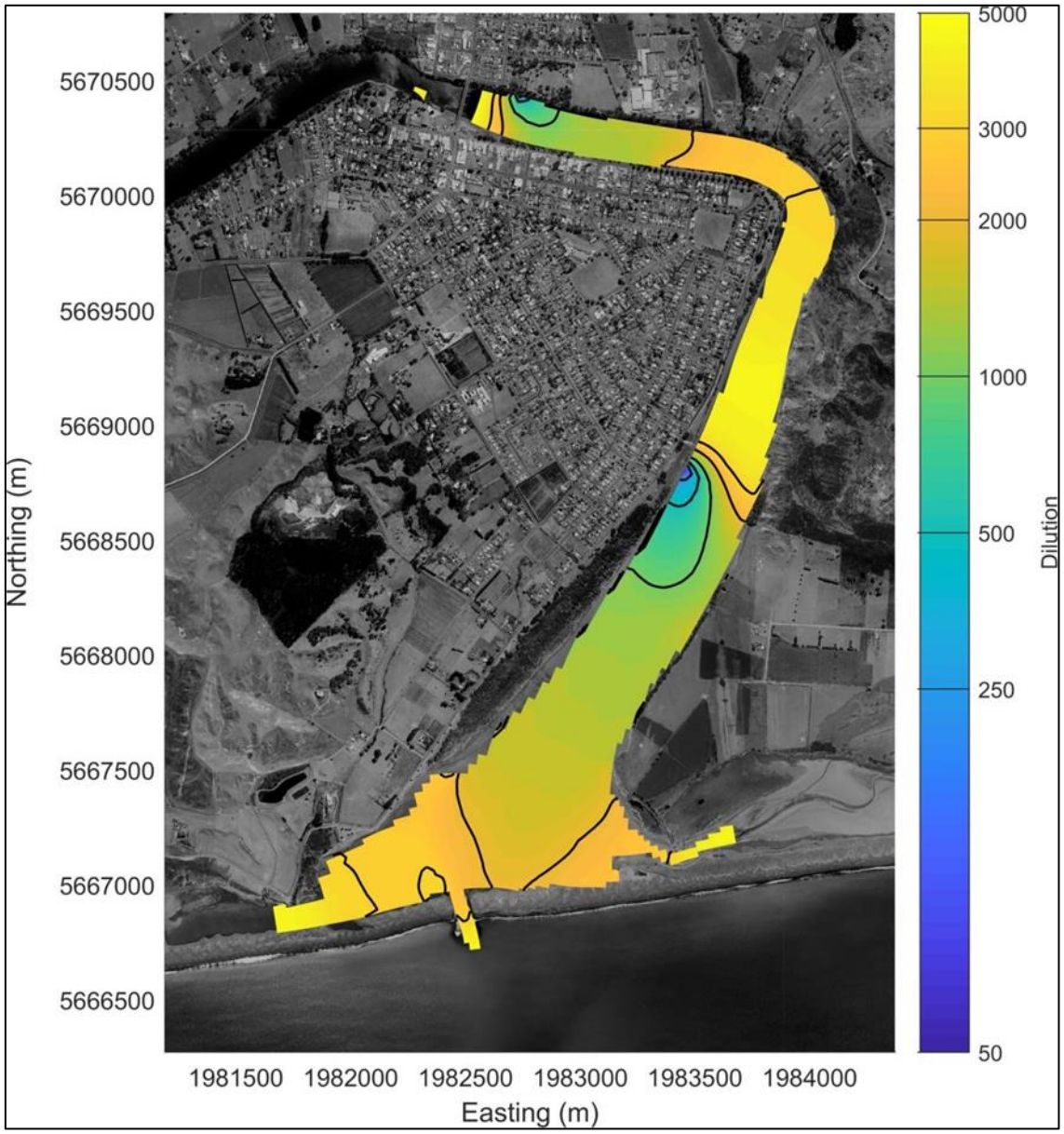

Figure 8.2: Modelling of Pump Station Overflow Dilution in March 2012 (Source: eCoast, 2018:C1.1)

This modelling confirms that the already dilute discharges of wastewater contaminants entering a fast-flowing and more heavily contaminated river will not cause detectable adverse effects and will not breach any of the RRMP water quality limits. The pump station discharges are unlikely to contain suspended solids in excess of the river's suspended solids concentrations during such storm events.

Even if any of the pump station discharges carried significant concentrations of suspended solids or other wastewater contaminants, the rapid dilution by more than 500 times within 100 m of the overflow will reduce those contaminant concentrations to ensure that there are no detectable adverse effects on the river's water quality. The combination of discharged suspended solids concentrations and rapid dilution downstream will ensure that the pump station discharges will not increase the concentration of suspended solids or the turbidity in the river by more than 10%.

The existing discharges of wastewater from the pump station overflows have not been shown to cause, or be likely to cause, any adverse effects on river water quality or its inter-related habitats or ecology. The future reductions in frequencies and volumes of pump station overflows and the gradual increase in intensity of storm event and river flow conditions will further reduce effects.

8.4.2 Main WWWTP Discharge

Instead of the RRMP water quality limits, the RCEP requirements apply to the main WWTP outfall discharge, due to its location within the CMA. The Class AE(HB) coastal water quality standards control the effects of the discharge but do not provide numerical limits on many specific water quality parameters. The text of this RCEP requirement is as follows:

> "The discharge of contaminants shall comply with the following standards after reasonable mixing and disregarding the effect of any natural perturbations that may affect the receiving water body:
>
> a) The natural temperature of the receiving water shall not be changed by more than 3 degrees Celsius.
>
> b) The following shall not be allowed if they have an adverse effect on aquatic life:
>
> i) any pH change
>
> ii) any increase in the deposition of matter on the foreshore or seabed
>
> iii) any discharge of a contaminant into the water.
>
> c) The concentration of dissolved oxygen shall exceed 80% of the saturation concentration.
>
> d) There shall be no undesirable biological growths as a result of any discharge of a contaminant into the water."

The temperature of the wastewater will be very similar to the river and therefore it will not change the river's temperature by more than 3^{o}C after reasonable mixing. The estuary's normal pH will be in the range of 7-8, but ANZECC guidelines allow for the pH of marine waters to be in the range of 7.0-8.7. The treated wastewater pH is within a range of 6.4-8.4 and has a median of 7.6. These pH levels are unlikely to cause pH changes in the river after reasonable mixing.

The existing wastewater discharge generally contains lower suspended solids concentrations than the river, so it is not capable of increasing the deposition of matter on the riverbed. Once filtration has been installed at the WWWTP the discharge will contain low suspended solids concentrations. The discharge flow may entrain some riverbed sediment from the immediate vicinity of the outfall, particularly after being idle for some time while storage and irrigation retain all wastewater flows, but the entrained riverbed sediment will either deposit back onto the riverbed downstream or be carried out to sea. Any entrained sediment is not expected to affect colour or water clarity for a distance greater than 100 m downstream.

The dissolved oxygen concentration of the treated wastewater and its residual BOD are not likely to reduce the river's dissolved oxygen levels. The AEE supporting the application for resource consent CD940404W noted that a dilution of ten was sufficient for the discharged wastewater to avoid causing any adverse effects. BOD is only a potential concern if the contaminants remain within the receiving water for a prolonged period; in this case the discharged contaminants are promptly flushed out to sea.

There is no evidence of the discharged contaminants contributing to any undesirable biological growths in the river. The key contaminants relevant to biological growths are DRP, ammonia, and nitrate. Ammonia also has the potential to cause adverse effects on aquatic life, and this is one of the dominant contaminants in the treated wastewater. Pathogens may also cause adverse effects on aquatic life. The likelihood and scale of effects that might be attributable to discharges of these wastewater contaminants is dependent upon their discharge concentrations and rates of dilution downstream. After accounting for reasonable mixing and cumulative effects with upstream contaminants, the wastewater contaminants would need to exceed relevant water quality guidelines in order to potentially cause adverse effects on aquatic life downstream.

The AEE for the 1998 application for resource consent CD940404W calculated the ammoniacal-nitrogen limit for aquatic toxicity to account for the estuarine receiving environment. It noted:

> *"The most critical situation for ammonia toxicity is in summer when the receiving water is partly saline e.g. for a temperature of 25°C and salinity of 20 g/kg (corresponding to a pH of about 8.0) the criteria for total ammonia would be 4.8 mg/l. In freshwater at 25°C with a pH of 7.0 the criterion for total ammonia would be 16.4 mg/l.*
>
> *Effluent with 30 - 40 mg/l total ammonia would require six to eight times dilution under worst case conditions to comply with the USEPA criterion."*

The existing WWWTP outfall discharge was shown to disperse its contaminants, at its 95th percentile (worst case) level, as shown in Figure 8.1 below. This was generated using WDC's actual discharge flow and timing data with HBRC's river flow data and modelled river currents. It indicates that 100-fold dilution occurs within 100 m of the outfall.

Figure 8.1: Dilution of Existing Main WWWTP Discharge at 95th Percentile (Source: eCoast, 2018:C1.1)

The hydrodynamic modelling of a series of potential future discharge and river flow scenarios in eCoast (2018:C1.1) generated 95th percentile maps of dilution of the WWWTP discharge. Figures 8.2 to 8.6 present the maps for the higher discharge rates that were modelled for each river flow rate. The first four scenarios discharged only during out-going tides, while the fifth scenario discharged continuously over a 24-hour period. In all cases, it is apparent that 100-fold dilution was expected to be achieved for the 95th percentile prediction within 100 m of the outfall.

Figure 8.2: Dilution of Future Main WWWTP Discharge of 1,600 m^3/d at MALF (Source: eCoast, 2018:C1.1)

Figure 8.3: Dilution of Future Main WWWTP Discharge of 2,400 m^3/d at ½ Median River Flow (Source: eCoast, 2018:C1.1)

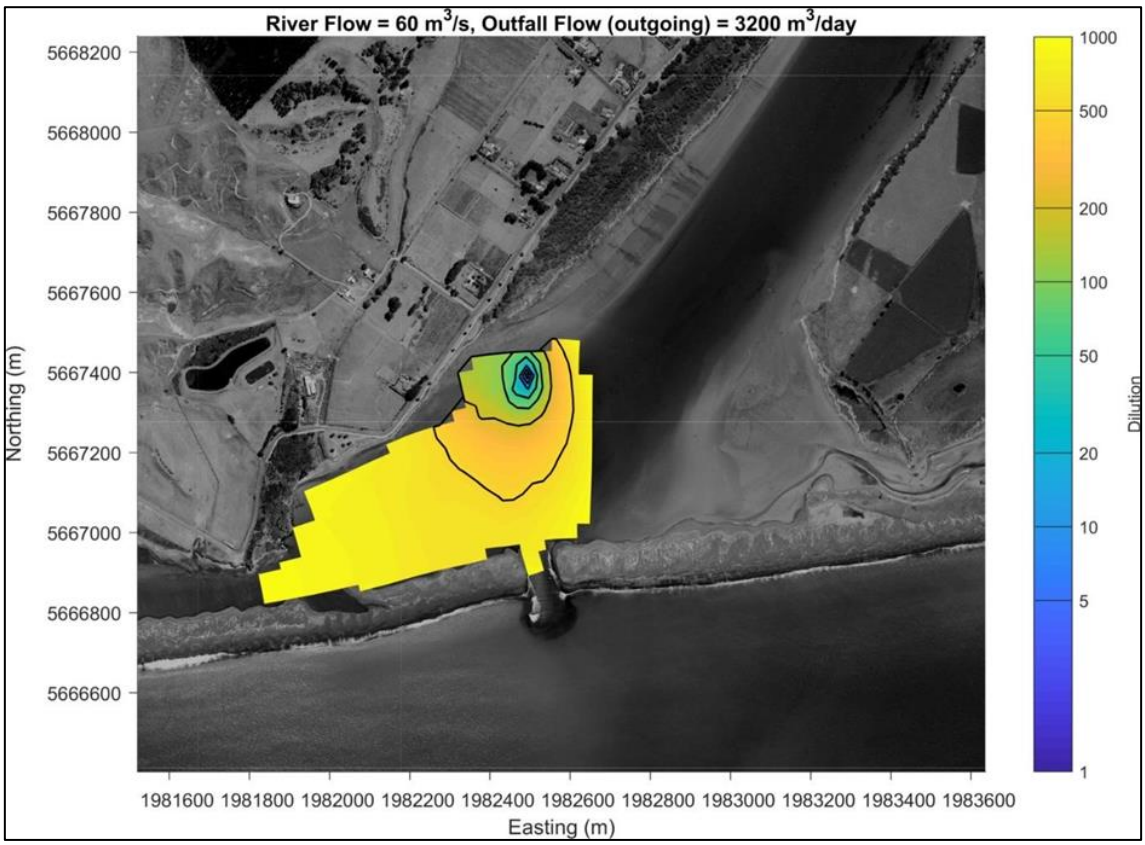

Figure 8.4: Dilution of Future Main WWWTP Discharge of 3,200 m^3/d at Median River Flow (Source: eCoast, 2018:C1.1)

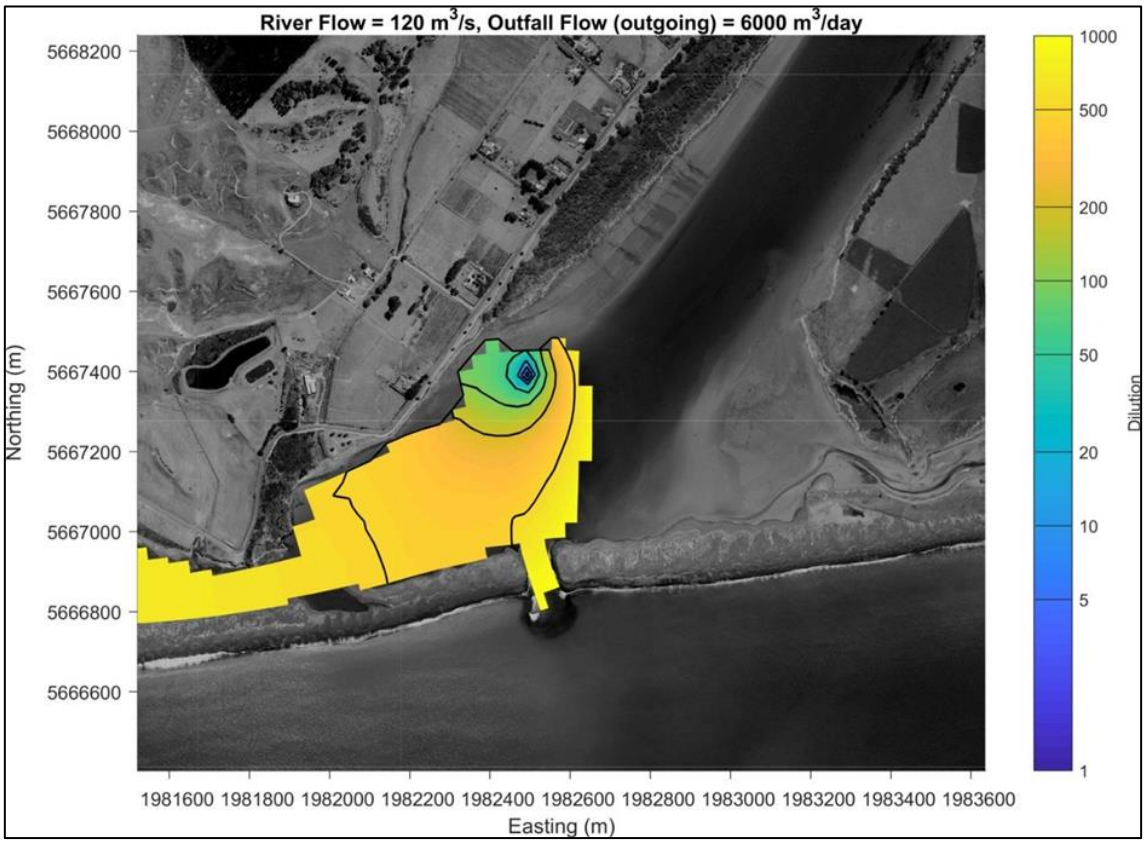

Figure 8.5: Dilution of Future Main WWWTP Discharge of 6,000 m^3/d at 2 x Median River Flow (Source: eCoast, 2018:C1.1)

Figure 8.6: Dilution of Future Main WWWTP Discharge of 10,000 m^3/d for 24 hours at 3 x Median River Flow (Source: eCoast, 2018:C1.1)

The resulting contribution of wastewater-derived contaminants to the river's water quality after 100-fold dilution is presented below in Table 8.1. When added to the river's existing water quality it is clear that the current WWWTP discharge has negligible effects on the river and the potential discharge will have even smaller effects. Despite the ammoniacal-nitrogen contribution, it will still be well within the limit for aquatic toxicity of 4.8 g/m^3 for the estuarine receiving environment.

Table 8.1: Wastewater Concentrations After Reasonable Mixing

Parameter	Discharge Quality		After 100-fold Dilution		Existing River
	Range	Median	Range	Median	Median
Current Discharge Quality					
NH_3-N (g/m^3)	4.0 – 36	15.6	0.04 – 0.36	0.16	0.010
TSS (g/m^3)	7 – 290	52	0.07 – 2.9	0.5	20
E. coli (cfu/100 ml)	8 – 470,000	5,200	0.08 – 4,700	52	85
Potential Discharge Quality					
NH_3-N (g/m^3)	2.5 – 25	10	0.025 – 0.25	0.1	0.010
TSS (g/m^3)	2 – 50	10	0.02 – 0.5	0.1	20
E. coli (cfu/100 ml)	0 – 5,000	50	0 - 50	0.5	85

The existing discharges of treated wastewater from the WWWTP's main outfall have not been shown to cause, or be likely to cause, any adverse effects on river water quality or its inter-related habitats or ecology. Potential changes to the treatment and discharge regime will further reduce the effects to negligible levels and will reduce the frequency of those effects to progressively shorter portions of each year.

8.5 Effects on Public Health Risks

The key public health risks are related to recreational contact with the contaminated river water and consumption of fish and shellfish that could be carrying infectious diseases.

The installation of filtration and UV disinfection at the outlet of the WWWTP prior to discharging to the river will protect public health because the pathogen concentrations will be reduced at least 100-fold. This will reduce the median pathogen concentration in the discharged treated wastewater to less than the median of the river itself. Depending on the statistics of the pathogen concentrations above the median for the treated wastewater, it may meet better NPS-FM criteria and therefore be 'more swimmable' than the river prior to discharging. In addition, the proposed matching of discharge rates to the river flow rates so that the discharge dilutes at least 100-fold within 100 m of the outfall will ensure that any elevated pathogen concentrations in the discharge are diluted so that public health is protected outside of the 100 m dispersion zone.

The river's water quality from upstream sources of contaminants will continue to dominate its public health risks for recreational contact and food supplies. It is also important to keep in mind that public health risks are significantly less when river flows are above its median because people are unlikely to access it for recreation or fishing.

Although public health risks during and following pump station overflow incidents are considered to be low, WDC propose additional measures of issuing public health warning notices, signage, and other response measures as outlined in the proposed consent conditions.

8.6 Effects on Amenity, Community, Recreational, and Social Values

The perceived adverse effects of pump station overflows during storm events and daily discharges of treated wastewater on amenity, community, recreational, and social values will reduce roughly in

proportion to reductions in wastewater discharge frequencies, volumes, and seasonality. The cessation of summer discharges will have a much greater beneficial effect on these values than may be achieved from cessation of discharges during winter months because of the summer focus for recreational activities in and around the river.

Overall, reducing effects in regard to these matters is provided for within the principles and approach of the condition framework, which will involve ongoing community collaboration.

8.7 Effects on Air Quality

Odours from the WWTP are generally of low intensity and readily dissipate within the site's boundaries. Where odours become apparent these usually indicate significant failures of treatment processes and performance. The WWTP operators will have become aware of the treatment problems and are generally able to remedy the treatment processes long before there is any risk of generating offensive or objectionable odours beyond the site boundaries.

Additionally, the WWWTP site is relatively isolated from high sensitivity receptors, with only one dwelling located within 200 m and six dwellings within 500 m of its boundaries. All of these dwellings are in the Rural zone, not Wairoa's urban zone, so they are likely to be more accepting of any minor wastewater odours that may occur within the normal range of odour strengths and types that are typically generated by rural activities.

8.8 Effects on Cultural and Heritage Values

The CIA (How, 2018:C8) provides a detailed assessment of the current and future discharge regimes on cultural values. It noted that the current discharge is culturally unacceptable, and the initial stages take some significant steps towards addressing cultural values. It found that the disinfection treatment is a positive step towards drinking water quality (the aspirational standard for acceptable quality) and the ceasing of discharges to the river for increasingly greater proportions of each year are viewed as very significant steps to address the adverse cultural effects of the existing discharges. The direct engagement and consultation with tangata whenua during the development of the proposed programme has also been addressing cultural values.

The condition framework provides for ongoing collaboration and cultural monitoring to further manage effects on cultural values during the life of the consent.

8.9 Effects on River Ecology

As described in eCoast, 2018:A3D3 and eCoast, 2018:C5, there are currently no discernible adverse effects from the existing WWWTP's main discharge on the benthic ecological values of the Wairoa River. As future discharges of wastewater reduce in frequency and volume, and are managed to coincide with higher river flow rates, any adverse effects on aquatic and benthic ecology will be correspondingly reduced. While the riverbed ecology in the vicinity of the pump stations has not been monitored, it is anticipated that the low frequency of discharge events and their occurrence during storm events ensures that any effects will not be detectable within the background influence of the storm events and more normal river flow conditions.

Dispersion within 100 m of the outfall will be more than 100-fold. When combined with filtration and UV improving the discharge quality for suspended solids and pathogens 100-fold prior to discharge, the discharged wastewater will cause negligible effects and will often be cleaner than the river upstream. The ammoniacal-nitrogen and DRP concentrations in the treated wastewater will need to be diluted in order to attain the RRMP limits, but are still unlikely to result in any detectable adverse effects on the river's ecology outside of the zone of reasonable mixing.

Pathogen effects from the main WWWTP discharge on shellfish are currently unlikely to significantly elevate the public health risks of consumption compared with the contributions of pathogens from upstream sources. Once the filtration and UV disinfection have been installed at the WWWTP, its discharge contributions will be negligible because it will generally contain fewer pathogens than the river.

Ecological and sediment quality effects are historically unable to be detected, but future reduced discharges of improved quality will result in beneficial improvements in the river's ecology, even if those improvements are unable to be detected or are negligible against the background effects of the upstream sources of contaminants.

It is important to bear in mind that the RRMP provisions and recreational water quality guidelines of the NPS-FM only apply to the pump station discharges upstream of the CMA and do not include the main WWWTP discharge outfall. The generalised RCEP AH(HB) requirements apply to the main WWWTP discharge, and these have been shown in Section 8.4 above to be met by this discharge now and in its future improved state.

8.10 Effects on Terrestrial Ecology

The lack of detectable adverse effects of the existing wastewater discharges on the river's benthic and aquatic ecology means these discharges are unlikely to affect food sources for terrestrial ecology such as seabirds. The abundance and diversity of bird life breeding and feeding freely across the entire estuary is an indication of a lack of discernible adverse effects from the wastewater discharges.

As future discharges of wastewater reduce in frequency and volume, and are managed to coincide with higher river flow rates, any adverse effects on terrestrial ecology will be correspondingly reduced. This will be a beneficial improvement for the terrestrial ecology, even if those improvements are unable to be detected or are negligible against the background effects of the upstream sources of contaminants.

8.11 Effects on Marine Ecology

As shown in Section 8.4 above, the main WWWTP discharge will not exceed the guidelines for its receiving environment, including the generalised RCEP AH(HB) requirements and the more specific ANZECC guideline values for some key parameters. Consequently, once the dispersed contaminants from this discharge are further diluted and flushed out to sea via the river mouth, there will be no detectable adverse effects.

The lack of effects on river water quality and ecology means this is unlikely to affect marine water quality or food sources for marine ecology such as crabs or flounder. The EAM (2011) study of flounder caught in the Wairoa River and near Mahia found no evidence of effects on flounder growth rates or trace element accumulations.

As future discharges of wastewater reduce in frequency and volume, and are managed to coincide with higher river flow rates, any adverse effects on marine ecology will be correspondingly reduced. This will be a beneficial improvement for the marine ecology, even if those improvements are unable to be detected or are negligible against the background effects of the upstream and other marine sources of contaminants.

8.12 Effects on Landscape and Natural Character

While the Whakamahi Lagoon wildlife management and Pilot Hill historic reserves have not been formally identified as outstanding natural features or landscapes, their reserve status and the community's high valuation of them for scenic and natural landscape values mean that regard should be had to their potential future categorisation as outstanding.

The very low scale and unobtrusive nature of the outfall structure and the nearby WWTP generate negligible effects on the landscape values. Future relocations of the outfall pipeline will be undertaken with sensitivity for the ecological and landscape values by minimising earthworks and sediment disturbance and maintaining small scale underground structures. It will, after a short time of natural rehabilitation of disturbed surfaces, continue to have negligible effects on these values.

The main WWWTP outfall may form a minor navigational hazard, but this will be no greater than the hazard posed by the current outfall. A navigational warning sign can be placed near the outfall and moved whenever the outfall is moved.

8.13 Effects on Natural Hazards

The outfalls from the pump station overflows and WWWTP discharge are so small in terms of their footprints, protrusions from the riverbank or riverbed, and pipe diameters that they are of no consequence for flood hazards or tsunamis.

8.14 Financial Implications

The proposed programme of activities is affordable for the community. Spreading the high costs of irrigation and storage across a few decades is a significant aspect of making this affordable. The 2018-28 LTP adopted a budget of $6.5M [check] on the basis that this was affordable for this 10-year timeframe.

8.15 Summary of Effects on the Environment

The overall effects of the wastewater discharges on the river environment will be less than minor to negligible. The ultimate aspiration is to cease discharges to the river, at which point there will be zero effects on the river environment. The rare pump station overflow events in future years during unusually large storm events will cause negligible effects on the highly flooded river.

As a result of the treatment improvements and changes of discharge regimes, there will be beneficial improvement for the river water quality and its interconnected habitats and ecology, even if those improvements are unable to be detected or are negligible against the background effects of the upstream sources of contaminants.

9 EVALUATION OF EFFECTS AGAINST STATUTORY PROVISIONS

The Planning Assessment (Stradegy, 2018:C9) provides a thorough assessment of all planning provisions, including Part 2 of the RMA. Its overall conclusions were:

Although containing elements that are located outside the Coastal Marine Area, which introduces consideration of the National Policy Statement for Freshwater Management and the Regional Plan, the primary wastewater discharge is to the Coastal Marine Area which is governed instead by the Regional Coastal Environment Plan and New Zealand Coastal Policy Statement.

Guideline 3 of Policy 16-1 of the Regional Coastal Environment Plan, which gives effect to Policy 23(2) of the New Zealand Coastal Policy Statement is perhaps the most relevant provision, and in essence, contemplates/allows the disposal of sewage (which does not pass through soil or wetland) directly into the Coastal Marine Area, where, amongst other criteria, it is the best practicable option.

It is very clear from the Resource Consent Application that the primary focus of this process has been to develop an adaptive and progressive management framework that provides opportunity for the applicant to put in place a series of measures that are intended to reduce unanticipated overflow discharges, improve the quality of effluent and reduce discharges to the river under a best practicable option approach.

To give effect to this, a condition framework has been developed along the principles of a MERI strategy. The proposed conditions provide for initial implementation that is monitored, followed by evaluation and reporting to develop further actions according to strict objectives, built into the consent, that are then implemented thereafter. The proposed framework provides a roadmap towards enhancing water quality, being the very outcome sought by the array of planning documents against which this proposal is being assessed, and provides for considerable community input over the term of consent.

In having regard to the relevant provisions of the applicable planning documents, the proposal is considered to be largely consistent with their direction and outcomes, and in general respects, sets down a framework that has potential to exceed bottom line approaches.

Cultural and social interests have been the primary driver, but overall, the proposal provides a platform for continuous improvement over time so as to progressively improve the robustness of the wastewater system and to work towards an enhancement in water quality guided by a road map that provides direction and the ability/time to make informed and considered decisions as contributed to by the community and monitoring data.

In coming to a broad judgment, the proposal overall is considered to be consistent with the principals and purpose of the RMA and deserving of consent. Specific consideration has been given to the proposed consent duration of 35 years, and taking Section 8.2.4 of the Regional Resource Management Plan into account, this is considered an appropriate term. A 35 year term would provide for the proposed approach which is considered to represent the most clear, constructive and certain approach to giving effect to the outcomes sought by the community in improving the water quality of the river.

10 CONCLUSIONS

The overall effects of the wastewater discharges on the river environment will be less than minor to negligible. The ultimate aspiration is to cease discharges to the river, at which point there will be zero effects on the river environment. The rare pump station overflow events in future years during unusually large storm events will cause negligible effects on the highly flooded river.

As a result of the treatment improvements and changes of discharge regimes, there will be beneficial improvement for the river water quality and its interconnected habitats and ecology, even if those improvements are unable to be detected or are negligible against the background effects of the upstream sources of contaminants.

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Figure A0

APPENDIX B

Consultation Summary

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Certificates of Titles

APPENDIX D

Proposed Consent Conditions

APPENDIX E

Schedule 4 RMA Checklist

APPENDIX F

Resource Consent CD940404W


WAIROA DISTRICT COUNCIL