Wellington Water

# Porirua WWTP Wastewater Discharge

Alternatives Assessment Report
April 2020

Our water, our future.

# DOCUMENT CONTROL

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# 1. Introduction

## 1.1 Project background

The discharge of wastewater from the Porirua Wastewater Treatment Plant (WWTP) is currently consented until the 6th of July 2020.

Preparation for the replacement resource consent began in April 2017. Between April and October that year, Wellington Water prepared a Consent Strategy, which is summarised in Attachment A. This document identifies the importance of a robust alternatives assessment process to provide confidence to stakeholders, the wider community and Greater Wellington Regional Council (as consent authority) that the right option has been selected. In addition, it is noted that there is a legal requirement to do so through in sections 105(1) (c) and clause 6 (1) (a) of Schedule 4 to the Resource Management Act (RMA).

Wellington Water initiated an alternatives assessment process in October 2017. This process has been on-going up until the lodgement of the Porirua wastewater discharge resource consent application.

## 1.2 Purpose of the report

This report describes the alternatives assessment process that was undertaken by Wellington Water and the decisions made at each stage.

Detailed information on each stage is included in the report appendices.

## 1.3 Acknowledgments

Wellington Water acknowledges the significant input and assistance that members of the project Collaborative Group have had in the completion of the alternatives assessment described in this report.

The members of this group committed significant time to the process, involving several long meetings. The process would have been significantly less robust without their input.

# 2. The assessment approach

## 2.1 The assessment approach adopted in the consent strategy

In its consent strategy, Wellington Water adopted the alternatives assessment process that is shown in Figure 1.

This process sought to ensure that the network and WWTP elements of the overall wastewater system were part of an integrated alternatives assessment process. While adding complexity, an integrated alternative assessment process was considered appropriate because it:

- Recognises the integrated nature of the wastewater network and WWTP in the overall wastewater system and by doing so reflects the direction and commitments in various policy documents to 'integrated' outcomes
- Helps to ensure that an appropriate range of alternatives are assessed, that the process is robust and that the selection of preferred options achieves the best return on investment across the wastewater system
- Would ensure that Wellington Water is well placed to provide a comprehensive and integrated context for the alternatives being considered and the option selected during engagement processes, through the resource consent applications and at any future hearing(s)
- Helps to ensure that wastewater scheme-wide implications are understood by partners, stakeholders and the consent authority.

Key elements of the approach set out in Figure 1 include:

- Initial high level and separate consideration of the network and WWTP options. At the long list stage it was not considered practical to attempt the consideration of combined network and WWTP options as the total number of combined options would be unworkable
- The assessment of combined network and WWTP options at the short list phase, as the numbers become more manageable
- The separate consenting of network and WWTP discharges once the proposed, combined solution had been identified. The 'consenting' phase of the process was separated in this way so that the application for the WWTP could be made before the expiry of the current consent, with applications in respect of the wastewater network to follow at a later time
- The opportunity for 'return loops' should new information be identified or key information change which warrants re-visiting earlier steps in the process.

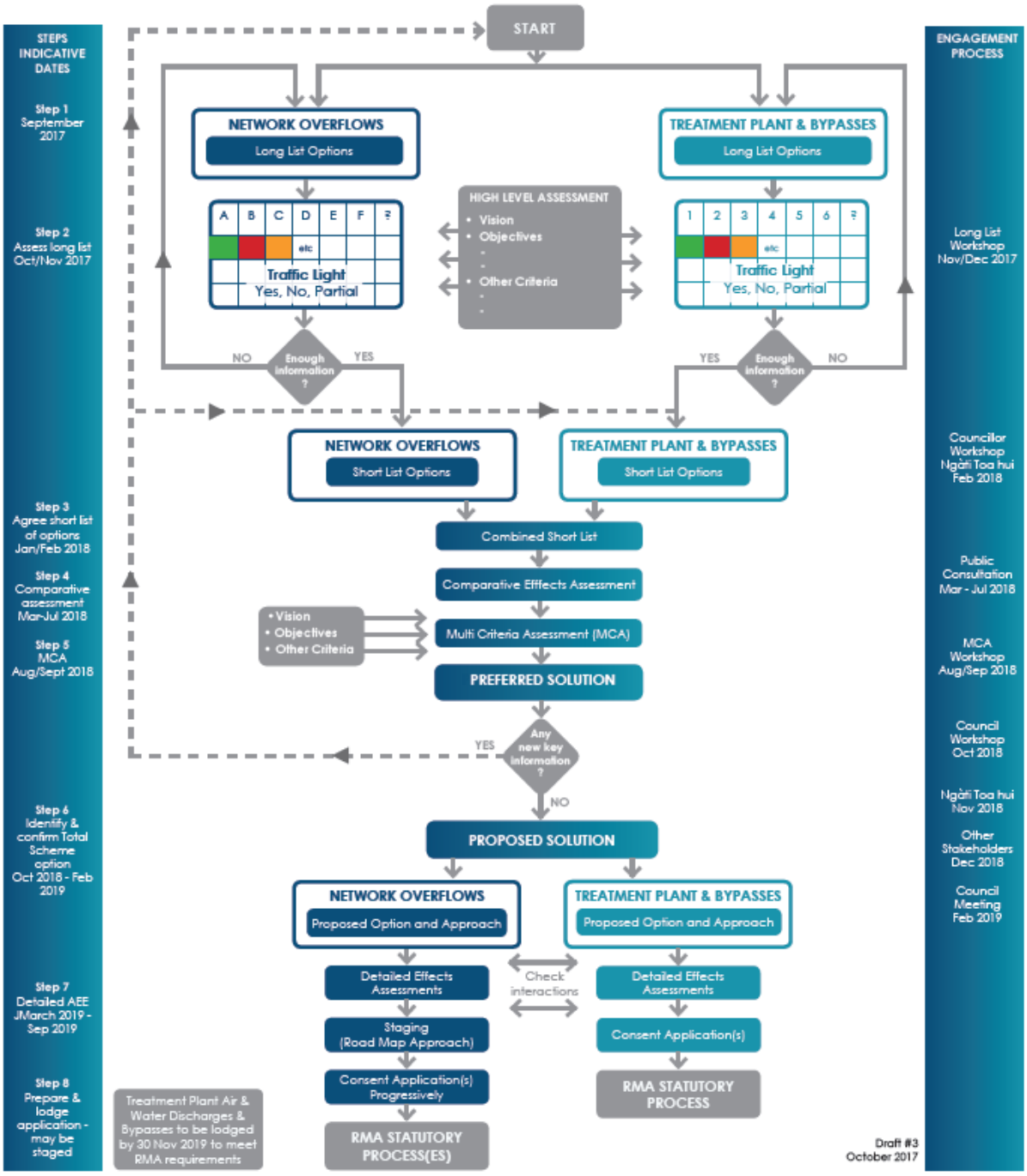


**Figure 1 – Consent Strategy Alternatives Assessment Process**

Guiding principles were adopted for the alternatives assessment process. These were that the process should be:

- Simple
- Transparent, acknowledging uncertainties
- Evidence informed
- Documented
- Fit for purpose
- Consistent with Ngāti Toa kaitiaki role

- Consistent with good practice under the RMA, which includes setting project objectives and considering the RMA definition of 'Best Practicable Option' when selecting the proposed solution
- Collaborative (see section **Error! Reference source not found.** for further information on the approach to this principle).

These guiding principles were initially identified by the project technical team, and then revised by the Collaborative Group at its meeting on 25 October 2017 (see section **Error! Reference source not found.** for more information on the Collaborative Group).

## 2.2 Project objectives

Given the importance of the Porirua wastewater consenting project it was considered important to establish project objectives to assist in guiding the alternatives assessment through to completion. Specifically, in this respect the purpose of setting project objectives was to:

- Ensure consistency with Porirua City Council's, Wellington City Council's and Wellington Water's regulatory, strategic, and corporate goals and responsibilities
- Keep front of mind the public health risks associated with unmitigated wastewater discharging into the environment and the public health benefits provided by wastewater collection and treatment
- Ensure decision making is underpinned by sound evidence
- To assist in the consideration of alternatives
- Achieve the appropriate management of adverse environmental effects in accordance with regulatory requirements
- Recognise wider national and regional strategic outcomes
- Achieve effective and meaningful consultation with stakeholders, tangata whenua and the wider community
- Establish benchmarks against which all key decisions can be assessed and measured.

The key mechanism through which these purposes were achieved was using the project objectives to guide the scope of the assessment criteria at both the long list and short list phase of the alternatives assessment.

Having considered various Wellington Water, Porirua City, Wellington City and Greater Wellington Regional Council documents, the project objectives that were set are:

a) The public health protection and other benefits of the wastewater scheme are recognised and associated risks reduced
b) Wastewater management solutions:
   i. Are sustainable, enduring, and resilient
   ii. Minimise adverse effects on water quality
   iii. Are affordable and value for money
   iv. Take an integrated approach to supporting a healthy catchment, waterways, the harbour and wider coastal environment
   v. Progressively address wastewater network overflows
c) Decision making processes are evidence based
d) Wastewater management solutions are developed in partnership with Ngāti Toa Rangatira
e) The community and key stakeholders are actively involved in developing wastewater management solutions

f) Wastewater management solutions support long term growth and investment and the economic development of the city and sub-region
g) A best practicable option (RMA definition) approach for the management of the wastewater scheme is adopted.

## 2.3 Summary of the process followed

While it was the intent of the project consent strategy to identify a combined network and WWTP solution, this has not proven possible. The preferred WWTP alternative has been selected without the preferred network alternative being fully known, although key parameters, such as projected wastewater flow to the WWTP, are known.

The remainder of this report describes the approach that was undertaken following the process illustrated in Figure 1.

The reasons for, and appropriateness of not identifying a combined network and WWTP solution are described in sections 6 to **Error! Reference source not found.** of this report.

Table 1 summarises this process.

**Table 1 - Summary of Alternative Assessment Steps Undertaken**

| Timing | Project phase | Description |
|---|---|---|
| October – November 2017 | Identification of options long lists | Set project objectives & guiding principles for the alternatives assessment process<br>Identify 'all' of potential options for the wastewater network and WWTP<br>Assess these potential options against fatal flaw criteria (see section 3.1)<br>Report preliminary long lists to the Collaborative Group (see Table 4)<br>Refine long list options based on Collaborative Group feedback and further work by the technical team (see section 3.2)<br>Confirm long lists with the Collaborative Group at the first long list assessment workshop (29 November 2017) |
| November 2017 – April 2018 | Long list evaluation & selection of combined short list | Determine long list assessment criteria with the Collaborative Group, taking project objectives into account (25 October & 13 November 2017)<br>Prepare comparative assessments of all long list options<br>Traffic light assessment against multiple criteria (see Table 5)<br>Collaborative Group workshops (29 November 2017 & 19 January 2018)<br>Meeting with Ngāti Toa (22 February 2018)<br>Recommended combined short list agreed to by the Collaborative Group, involving 3 network options matched with 3 WWTP to make 9 combined options (3 April 2018) |

| | | |
|---|---|---|
| April 2018 to June 2019 | Evaluation of the combined network and WWTP short list | Completion of technical investigations, including network, WWTP process and dispersion modelling<br>Comparative assessments of the combined short list options, including recommended multi-criteria analysis (MCA) scores<br>Confirmation of MCA criteria and weight to be given to each criterion (30 November 2018 & 25 March 2019)<br>MCA workshop with the Collaborative Group (25 June 2019) |
| July to November 2019 | Evaluation of the WWTP short list & selection of the Proposed Solution | Wellington Water and Porirua City Council decision to exercise the return loops in Figure 1 and separate the WWTP short list from the wastewater network process (see section 6)<br>Comparative assessments of the WWTP short list, including recommended multi-criteria analysis (MCA) scores<br>Technical team MCA workshop (28 August 2019)<br>Presentation to the Collaborative Group (29 October 2019) of the results of the WWTP short list MCA and of the technical team's recommended 'proposed solution'<br>Wellington Water selection of the 'proposed solution' taking into consideration the definition of Best Practicable Option from the RMA (8 November 2019) |

## 2.4 Collaborative Group

To ensure that Ngāti Toa and key stakeholders were active participants in the alternatives assessment process, Wellington Water and Greater Wellington established a project Collaborative Group. Establishing this group is consistent with the guiding principles and project objectives (particularly objectives (d) and (e)) for the alternative assessment process.

The Collaborative Group involved representatives from:

- Wellington Water
- Greater Wellington Regional Council
- Porirua City Council
- Wellington City Council
- Ngāti Toa
- Regional Public Health
- Porirua Harbour Trust
- Te Awarua o Porirua Whaitua Committee.

The Collaborative Group had active involvement in the traffic light workshops on the long list and the MCA workshop on the short list of combined options. In addition, the Collaborative Group met semi-regularly, as required, to ensure that members were kept informed about and were able to have input to the alternatives assessment process.

## 2.5 Project technical team

A project technical team provided support and advice to the Collaborative Group, including preparing comparative assessment reports to inform option assessment workshops.

The members of the project technical team were:

- Ron Haverland – Wastewater treatment engineering

- Graeme Jenner – Water quality and public health effects
- David Cameron – Water quality and ecology
- Linda Kerkmeester – Landscape & natural character
- Rob Greenaway – Recreation specialist
- Miria Pomare – Cultural impact assessment
- Jim Bradley – Alternatives assessment
- Matt Trlin – Planning
- Paula Hunter – Planning
- Richard Peterson – Planning and alternatives assessment.

Specialist technical advice and modelling inputs were provided to the technical team and the Collaborative Group by a number of other experts.

# 3. Identifying the long lists

## 3.1 Preliminary long lists

Following the process set out in Figure 1, separate long lists of options were determined in relation to the network overflows and the WWTP.

The first step in the process of developing the preliminary long lists was a workshop of the project technical team on 9 October 2017. The full record of this workshop is included in Attachment B.

The workshop first identified fatal flaw criteria and then used these criteria to reduce a full list of all options down to preliminary long lists.

The fatal flaw criteria, developed taking account of project objectives, were:

1. Significant increase in public health risk
2. Significant increase in adverse effects on natural environment
3. Absolutely unpalatable to Ngāti Toa[1]
4. Unavailability of technical or natural resource
5. Significant constraint on growth
6. Absolutely cost prohibitive
7. Absolutely un-consentable
8. No improvement in the wastewater scheme.

In developing the preliminary long lists, the workshop focussed initially on the options relating to the wastewater network and then considered the options relating to the WWTP. In both instances, all possible options were first identified on a white board. These were then assessed against the fatal flaw criteria. The analysis undertaken at the workshop is summarised in

Table 2 and Table 3 below.

**Table 2 - Identification of preliminary long list: wastewater network options**

| Potential Options | Fatal Flaw | Reasons for fatal flaw assessment |
|---|---|---|
| Do nothing – no improvements | Y | Criteria 3, 5, 7 and 8 |
| Business as usual improvements | N | Assumes BAU investment is sufficient to meet growth needs and small incremental improvements |
| Conveyance of all wastewater to the WWTP (no overflows) | Y | Criterion 6 – significant network and WWTP upgrades required |
| Conveyance of a greater level of wastewater to the WWTP than currently occurs (reduced overflows) | N | |

[1] Initially this fatal flaw criteria was 'Absolutely unpalatable to Māori'. This was amended to 'Absolutely unpalatable to Ngāti Toa' by the Collaborative Group on 17 October 2019.

| Potential Options | Fatal Flaw | Reasons for fatal flaw assessment |
|---|---|---|
| Construction of a cross harbour pipeline[2] | N | |
| Overflow treatment (partial) of peak wet weather flows at pump stations using fine screens and ultra-violet disinfection before discharge to local receiving water | N | |
| A second WWTP to treat all (or some) wastewater from the northern and eastern suburbs (with local disposal/reuse). | Y | Criterion 6 - Significant cost and consenting issues |
| Satellite / decentralised WWTPs at key points on the network which treat all flows and discharge to local receiving environment | Y | Criterion 6 - Significant cost for the satellite WWTPs. |
| Satellite / decentralised WWTPs at key points on the network which treat all flows and discharge to local receiving environment in wet weather but otherwise convey treated wastewater to the main WWTP | Y | Criterion 6 - Significant cost for the satellite WWTPs. |
| Satellite / decentralised WWTPs at key points on the network which treat all flows and convey all treated wastewater to the main WWTP | Y | Criterion 6 - Significant costs associated with the satellite WWTPs and the network upgrades. |
| Additional storage of untreated wastewater (in-line[3]) with no local discharge | N | |
| Additional storage of untreated wastewater, off-line[4] at one centralised point on the network with no local discharge | N | |
| Additional storage of untreated wastewater, off-line at various decentralised points on the network with no local discharge | N | |
| Land based disposal of wet weather flows from one or more points along the network | Y | Criterion 4 – no suitable land resource available. Any land would be unsuitable in wet weather. |
| Conveyance of wastewater from Tawa and Johnsonville into the Wellington City network | Y | Criterion 6 - requires significant upgrades to the capacity of the Wellington City network |
| Beneficial re-use | Y | Criterion 4 – no re-use option |
| Air discharge (evaporation) | Y | Criterion 4 |
| Upgrade of private laterals | N/A | Considered 'core asset management'. Will be part of any option. |

[2] A cross harbour pipe-line would divert wastewater flows from Porirua's northern suburb (e.g. Plimmerton and Cambourne) via a new pipeline to the Titahi Bay trunk main. This would by-pass overloaded parts of the southern Porirua network, such as the City Centre pump stations and would consequently reduce the overflows that occur in that part of the network.

[3] 'In-line' storage means installation of large diameter pipes which provide capacity for peak flows to 'back-up' within the pipe network.

[4] 'Off-line' storage means installation of storage tanks into which a portion of flow within the network are directed during peak flows. The stored wastewater is then returned to the network when flows return to normal.

| Potential Options | Fatal Flaw | Reasons for fatal flaw assessment |
|---|---|---|
| Upgrade of public mains | N/A | Considered 'core asset management'. Will be part of any option. |
| I & I / stormwater reduction / Water Sensitive Design | N/A | Considered 'core asset management'. Will be part of any option. |
| Trade waste management | N/A | Considered 'core asset management'. Will be part of any option. |
| Grey water recycling | N/A | Considered an 'add on'. Could be part of any option. |
| Urine separating systems | Y | Criterion 8 |
| Water conversation / demand management | N/A | Considered 'core asset management'. Will be part of any option. |
| Waterless toilets | N/A | Considered an 'add on'. Could be part of any option. |
| A low pressure system | N/A | Considered an 'add on'. Could be part of any option. |
| Zero population growth | Y | Criterion 5 |
| Growth strategies | N/A | Considered an 'add on'. Could be part of any option. |
| Combinations of the above | N | |

***Table note:*** *'Y' means the option was assessed as fatally flawed; 'N' means the option was assessed as not being fatally flawed; 'N/A' means the element was assessed as not being a true alternative or 'option', but instead being either a potential 'add-on' to other options, or part of core asset management.*

**Table 3 - Identification of preliminary long list: WWTP options**

| Potential Options | Fatal Flaw | Reasons for fatal flaw assessment |
|---|---|---|
| Discharge to the coastal marine area (CMA) from the existing outfall (do minimum) | N | |
| Discharge to the CMA from a new coastline outfall | N | |
| Discharge to the CMA from an offshore, ocean outfall | N | |
| Discharge to land (land application) | N | Land is possibly available near to the existing WWTP |
| Discharge to groundwater | Y | Criterion 4 – no groundwater resource available |
| Aquifer re-charge | Y | Criterion 4 – no aquifer available |
| Discharge to freshwater | Y | Criteria 2, 3, 4, 6 and 7 |
| Tidal discharge with coastal or offshore outfall (i.e. discharge on the outgoing tide only) | N | |

| Potential Options | Fatal Flaw | Reasons for fatal flaw assessment |
|---|---|---|
| Satellite treatment plant, which treats the wastewater from part of the city | Y | Criterion 6 - Significant cost for the satellite WWTPs. |
| Shift the WWTP to another location | Y | Criterion 6 – the existing WWTP is well sited and appropriately designated. It represents a large sunk investment |
| Make use of another City's WWTP (a 'sub-regional' plant) | Y | Criterion 6 – significant conveyance cost and cost to upgrade plant to capacity for additional wastewater |
| Upgrade (or new) wastewater treatment at the existing WWTP | N | Can be added to any discharge option. Nature of the upgrade will depend on the receiving environment for the discharge |
| Outfall diffuser options | N/A | Considered an 'add on'. Could be part of any outfall option (see above). |
| Address WWTP bypasses and overflows through additional storage | N/A | Considered an 'add on'. Could be part of any option. |
| Address WWTP bypasses and overflows through upgrade screening capacity | N/A | Considered an 'add on'. Could be part of any option. |
| Address WWTP bypasses and overflows through upgraded UV treatment capacity | N/A | Considered an 'add on'. Could be part of any option. |
| Address WWTP bypasses and overflows through high rate side stream or other treatment facilities | N/A | Considered an 'add on'. Could be part of any option. |
| Reduce and reuse – potable water | Y | Criterion 6 |
| Reduce and reuse – other | N/A | Considered an 'add on'. Could be part of any option. |
| Air discharge consent options | N | The existing air discharge consent is due to expire in May 2020. Effects from this air discharge will need to be addressed in all options. |
| Combination of the above | N | |

***Table note:*** *'Y' means the option was assessed as fatally flawed; 'N' means the option was assessed as not being fatally flawed; 'N/A' means the element was assessed as not being a true alternative or 'option', but instead being either a potential 'add-on' to other options, or part of core asset management.*

Based on this assessment the preliminary long lists that were identified for further analysis and discussion with the Collaborative Group are set out in Table 4. In addition to these options, various other elements were identified as having the potential to be included as part of any option as 'core asset management' or 'add ons'. These elements are set out in Tables 1 and 2. Further discussion of these elements is included in section 9 of this report.

**Table 4 - Preliminary long lists**

| Network elements | WWTP elements |
|---|---|
| • Business as usual improvements<br>• Conveyance of a greater level of wastewater to the WWTP than currently occurs<br>• Construction of a cross harbour pipeline to convey untreated wastewater from northern suburbs to the Titahi Bay trunk main to the WWTP, by-passing overloaded sections of the network.<br>• Treatment of peak wet weather flows at pump stations using milliscreens and Ultra-violet disinfection<br>• Additional storage of untreated wastewater (in-line)<br>• Additional storage of untreated wastewater, off-line at one centralised point on the network<br>• Additional storage of untreated wastewater, off-line at various decentralised points on the network<br>• Combinations of the above | • Discharge to the coastal marine area (CMA) from the existing outfall (do minimum)<br>• Discharge to the CMA from a new coastline outfall<br>• Discharge to the CMA from an offshore ocean outfall<br>• Discharge to land (land application)<br>• Tidal discharge for options 1,2 and 3 above<br>• Upgrade (or new) treatment process at the existing WWTP<br>• Air discharge consent options<br>• Combinations of the above |

## 3.2 Refining the long lists

The preliminary long lists in Table 4above were presented to the Collaborative Group meeting on 25 October 2017. Feedback from the Collaborative Group, along with work undertaken by the technical team, was used to further refine each long list.

The technical work undertaken involved developing descriptions of each option and identifying what combinations of the options are appropriate (e.g. for the networks, what combination of conveyance upgrades and storage are appropriate).

### 3.2.1 Network Long List

The refined **network** long list involved three broad groupings. These were harbour discharge options (i.e. discharge to Porirua Harbour rather than via the existing WWTP), conveyance to the WWTP options and mixed options, as follows:

Discharges to harbour

1. Business as usual (maintaining the current level of service and level of discharges to the harbour, but with capacity improvements to allow for growth and to ensure that level of service does not further deteriorate)
2. Rapid treatment[5] of wet weather flows at northern Porirua pump stations and City Centre pump stations, before discharge to Porirua Harbour

[5] Rapid treatment would involve partial treatment of the wastewater through screening and UV disinfection, before discharging to the harbour

Conveyance of a greater proportion of wastewater to the WWTP

3. Greater conveyance across the whole network
4. Greater conveyance in the north of Porirua + wet weather storage at City Centre, which allows conveyance to the WWTP over time as network flows subside
5. Wet weather storage in north of Porirua + greater conveyance from City Centre
6. Northern diversion (cross harbour pipe) + wet weather storage at City Centre
7. Northern diversion (cross harbour pipe) + greater conveyance from City Centre
8. Storage in Wellington City and storage in the north of Porirua

Mixed options

9. Northern diversion (cross harbour pipe) + rapid treatment at City Centre
10. Rapid treatment in north + wet weather storage in City Centre
11. Greater conveyance in the north + rapid treatment at City Centre

All of the network options would be designed to accommodate projected growth rates within the wastewater catchment. In addition, the conveyance options would be designed to convey all wastewater up to the projected 6 month return interval.

### 3.2.2 WWTP Long List

The refined **WWTP** long list was:

1. Discharge to the CMA from the existing shoreline outfall + existing standard of treatment
2. Discharge to the CMA from the existing shoreline outfall + a higher standard of treatment
3. Discharge to the CMA from a new shoreline outfall + existing standard of treatment
4. Discharge to the CMA from a new shoreline outfall + a higher standard of treatment
5. Discharge to the CMA from a new offshore ocean outfall + existing standard of treatment. This option had two sub-options based on the potential location of the outfall. Option 5a involved a land based section to convey to the treated wastewater from the WWTP to the sea south of Kaumanga Point and the 'Bridge' to Mana Island. Option 5b involved an outfall directly offshore from the WWTP.[6]
6. Discharge to land + seasonal shoreline outfall + existing standard of treatment
7. Storage of wastewater + discharge to the CMA from the existing shoreline outfall on outgoing tide + existing standard of treatment
8. Storage of wastewater + discharge to the CMA from the existing shoreline outfall on outgoing tide + a higher standard of treatment

The meaning of the phrase 'a higher standard of treatment' was not determined at this point of the process. It was intended that if an option which involved a higher level of treatment was advanced

[6] It was considered that the combination of both an ocean outfall and a higher standard of treatment was not a reasonable option as either element on its own would provide an appropriate level of service and an appropriate level of environmental protection, and the combination of these two elements would be prohibitively expensive.

to the short list, then further detail on the treatment element of the option would be determined, based on objectives for the receiving environment.

# 4. Assessing the long lists

## 4.1 Traffic light assessment

Once the refined long lists were identified the next step undertaken was the selection of the short lists. To assist with the selection of a short list, the long lists were assessed against multiple criteria, using a traffic light scoring approach (i.e. red, orange and green). The assessment criteria were developed from the project objectives and taking account of key adverse effects anticipated from the options.

The assessment criteria and the scoring approach are set out in Table 5.

For each criterion (except Tangata Whenua) a preliminary assessment of the options was prepared by an appropriate member of the technical team. These assessments are attached as Attachment C. This preliminary assessment was then discussed at a workshop of the Collaborative Group and a final assessment, and traffic light score, agreed. An assessment was made in relation to the Tangata Whenua criteria by representatives of Ngāti Toa Rangatira at the workshops.

The Collaborative Group's assessment workshop for the network options occurred on 29 November 2017 and its workshop on the WWTP long list occurred on 19 January 2018. The full record of both assessment workshops is included in Attachment D. It is noted that the Collaborative Group decided to apply the fatal flaw criterion *'Absolutely unpalatable to Ngāti Toa'*[7] to the network options that would involve the cross harbour pipeline. Ngāti Toa representatives made it very clear during the meetings that a wastewater pipeline across the Porirua harbour, which is a very significant taonga for them, would be completely unacceptable for the iwi.

As some representatives from Ngāti Toa had not been able to attend both of the long list assessment workshops, a follow-up meeting was held between Wellington Water and Ngāti Toa representatives on 22nd February 2018. The record of this meeting is also included in Attachment D.

A summary of the assessment of the long list options completed at the Collaborative Group workshops, and subsequently at the meeting with representatives from Ngāti Toa, is included in Table 6 and Table 7.

[7] This is one of the Fatal Flaw criteria described in section 3.1 of this report.

**Table 5 – Traffic light scoring approach**

| Criteria | Red | Orange | Green |
|---|---|---|---|
| **Public Health Risk** – associated with contact recreation and shellfish gathering | No significant reduction in public health risks anticipated, recreational water quality guidelines not achieved, significant uncertainty and /or significant information gaps. | Moderate reduction in public health risks anticipated, recreational water quality guidelines partially achieved, moderate uncertainty and some information gaps. | Significant reduction in public health risks anticipated, and/or recreational water quality guidelines achieved, little uncertainty or further information required. |
| **Natural environment** – adverse effects on water quality and aquatic ecology (streams, harbour and the wider coastal environment) | Significant adverse effect in relation to the criterion, significant uncertainty and /or significant information gaps | Moderate adverse effect in relation to the criterion, moderate uncertainty, some further information required | Adverse effect in relation to the criterion is anticipated to be minor or less, little uncertainty or further information required |
| **Tangata whenua** – effects on mauri, kai moana, relationships | Significant adverse effect in relation to the criterion, significant uncertainty and /or significant information gaps | Moderate adverse effect in relation to the criterion, moderate uncertainty, some further information required | Adverse effect in relation to the criterion is anticipated to be minor or less, little uncertainty or further information required |
| **Growth** – supports long term growth and investment, and economic development of city and sub-region | PCC and WCC growth expectations in the catchment will be fully supported over a consent duration of 10-20 years | PCC and WCC growth expectations in the catchment will be fully supported over a consent duration of 20-30 years | PCC and WCC growth expectations in the catchment will be fully supported over a consent duration of 30-35 years |
| **Financial implications / affordability / opex** | Cost estimates are more than 50% greater than existing 30 year infrastructure strategy budgets.<br>Operating costs are more than 50% greater than existing. | Cost estimates are no more than 50% greater than existing 30 year infrastructure strategy budgets.<br>Operating costs are no more than 50% greater than existing. | Cost estimates are within existing 30 year infrastructure strategy budgets.<br>Operating costs are similar to existing. |
| **Social & community –** amenity values, recreation, food gathering, including perception. | Significant adverse effect in relation to the criterion, no or very limited improvement in addressing existing degraded social an community values, significant uncertainty and /or significant information gaps | Moderate adverse effect in relation to the criterion, moderate improvement in addressing existing degraded social an community values, moderate uncertainty, some further information required | Adverse effect in relation to the criterion is anticipated to be minor or less, significant improvement in addressing existing degraded social an community values, little uncertainty or further information required |
| **Technology** – Enduring, long term solution, able to be staged (road map approach), reliable, proven and robust, able to be constructed, Integrated scheme approach, and have flexibility for future technology and capacity upgrades | Unproven technology, suitability for the physical context untested, unique construction methodologies required, the option is unable to be staged or will only bring benefit once fully complete | New technology in NZ, suitable for the physical context, complex construction methodologies required, the option is able to be modular and staged so that additional process units can be added with increasing flows. | Proven technology, suitable for the physical context, standard construction methodologies required, the option is able to be modular and staged so that additional process units can be added with increasing flows. |
| **Resilience** –natural hazard / operational resilience | High risk in the known hazard-scape. Performance will be severely affected by climate change over 50 years.<br>Reduces operational resilience. | Moderate risk in known hazard-scape. Performance will be moderately affected by climate change over 50 years. No improvement in operational resilience. | Low risk in known hazard-scape. Performance will be unaffected by climate change over 50 years. Improves operational resilience as a result of redundancy. |

**Table 6 - Traffic light assessment of the refined network long list**

| Criteria | Harbour discharge options | | Options which involve greater conveyance to the WWTP | | | | | | Options with a mix of increased conveyance and harbour discharges | | | Discussion points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. Business as usual | 2. Rapid Treatment in north and City Centre | 3. Greater conveyance | 4. Greater conveyance in north + storage in the City Centre | 5. Storage in the north and greater conveyance from the City Centre | 6. Cross harbour pipeline + storage in the City Centre | 7. Cross harbour pipeline + greater conveyance from the City Centre | 8. Storage in Wellington City + storage in the north | 9. Cross harbour pipeline + rapid treatment at the city centre | 10. Rapid treatment in the north + storage at the city centre | 11. Greater conveyance in the north + rapid treatment at the city centre | |
| **Public Health Risk** | | ? | | | | | | | | | | The key discussion point related to the current state of the Porirua and Kenepuru Streams which are heavily contaminated. Alastair noted that the Porirua Stream does not meet the national bottom line for E. coli. The group agreed that this would mean that 'Business as usual' is unlikely to be acceptable beyond the short term, and therefore a 'score' of red was appropriate.<br>Options involving greater conveyance capacity and/or storage were assumed to result in a reduction of discharge events from 10 per year to 2 per year, as the additional conveyance capacity or storage would be designed to accommodate the 6 month ARI. These options were therefore considered to represent a measurable improvement, and therefore were scored orange.<br>Consensus was not achieved in relation to option 2, most considered that this would result in a measurable improvement, however some remain concerned about the significance of the residual impacts and wanted the score to be red. Note: In relation to the 'public health risk' criterion, the assessment of the project team's technical specialists, Graeme Jenner and David Cameron, differs from the assessment of the workshop group for Option 2. Graeme and David consider that while the Option 2 public health outcomes may not be quite as good as the conveyance options they are still clearly in the orange group.<br>Sharli-Jo noted that she expects that Ngāti Toa will view all options involving the cross harbour pipeline as being fatally flawed. If Māori spiritual health was included in the 'public health assessment' then these options may be fatally flawed under this criterion. It was agreed that a specific meeting with Ngāti Toa representatives would be held to discuss this issue and the 'scoring' of the options against the Tangata Whenua criterion more generally. The orange score for the cross harbour pipeline options was retained for this workshop. |
| **Natural Environment** | | | | | | | | | | | | It was agreed that the natural environment, while highly valued and sensitive, was not in 'dire straits' as a result of the wastewater network overflows. Claire noted that there is some degree of consensus amongst 'experts' that the single biggest issue for the harbour is sediment. She placed a caveat on this as there are some reasonable information gaps, and further evidence is required to support this expert opinion. The group agreed that it is not currently possible to conclude that any of the options would deliver a marked change (either positive or negative) to the natural environment. It was noted that there will be some difference between the outcomes achieved by the different options but this is all within the moderate range. |
| **Tangata whenua** | | | | | | F | F | | F | | | Representatives of Ngāti Toa expressed clear preference for options involving storage and / or greater conveyance (orange score), rather than options involving rapid treatment and discharge to the harbour (red score). This preference is based on the objective to get as much wastewater to the treatment plant as possible.<br>As the harbour is a very significant taonga to Ngāti Toa options involving a cross harbour pipeline were strongly opposed and therefore fatally flawed. |
| **Growth** | | | | | | | | | | | | Matt recommended that all options be scored green as it can be assumed that growth will be provided for in all options. This assumption and score was generally accepted however there was some discussion on whether it was appropriate for the Business as Usual (BAU) option, which accommodates growth but would make no improvement to the current outcome (level of service). As it is considered that the current level of service is unlikely to be acceptable, it was considered that this option would constrain growth opportunities in the catchment. The group therefore agreed that BAU should be scored orange for growth. |

| Criteria | Harbour discharge options | | Options which involve greater conveyance to the WWTP | | | | | | Options with a mix of increased conveyance and harbour discharges | | | Discussion points |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. Business as usual | 2. Rapid Treatment in north and City Centre | 3. Greater conveyance | 4. Greater conveyance in north + storage in the City Centre | 5. Storage in the north and greater conveyance from the City Centre | 6. Cross harbour pipeline + storage in the City Centre | 7. Cross harbour pipeline + greater conveyance from the City Centre | 8. Storage in Wellington City + storage in the north | 9. Cross harbour pipeline + rapid treatment at the city centre | 10. Rapid treatment in the north + storage at the city centre | 11. Greater conveyance in the north + rapid treatment at the city centre | |
| **Affordability** | | | | | | | | | | | | In introducing this criterion Steve noted that there is approximately $43m within LTP programme over 30 years. This amount has been included in the draft LTP based on a 'greater conveyance' option. All options except those involving the cross harbour pipeline fall within this budget and were therefore scored green. The options involving the cross harbour pipeline all would exceed this draft budget by less than 50%, and have therefore been scored orange. It is noted that at the workshop the score was recorded as red, but further evaluation of preliminary cost estimates has indicated these options fall into the orange score range. |
| **Social and community** | | ? | | | | F | F | | F | ? | ? | The group agreed that the options 1 and 2 which continue with the same frequency of discharges to the harbour would not meet community expectations in reducing overflow instances and therefore should be scored red on the basis that effluent overflows (both partially treated and untreated) to the harbour were deemed to be socially unacceptable, and adversely effected social and community amenity and recreation values.<br>There was some debate about the red score for option 2, given that rapid treatment would improve the quality of this discharge, even if it didn't reduce the frequency. A red score was maintained for option 2 on the basis that this option would not result in any reduction to existing overflow instances, but a question mark was included in the score to reflect that these overflows would at least be partially treated.<br>The group agreed that if the perceptions of Ngāti Toa are included under this criterion as well as the Tangata Whenua criterion then the options involving the cross harbour pipeline (i.e. 6, 7, and 9) are likely to be fatally flawed. If Ngāti Toa perceptions were not included under this criterion then these options would be orange. The group agreed that with Ngāti Toa's acknowledged role as Kaitiaki for Te Awarua O Porirua, it was appropriate that the social and community value assessment of each option should, as a minimum, at least align with the Tangata Whenua values assessment ranking.<br>Options 10 and 11 were scored orange, although some in the group questioned whether a red score would be more appropriate for both options because some of the discharges (where rapid treatment applies) would occur as frequently as present. An orange score was maintained for both options on the basis that both options would result in at least some reduction in existing overflows, with rapid treatment of remaining overflows. A question mark was applied to both assessments to reflect that overflows would however only be partially reduced and that residual overflows (which would exceed other options) would only be partially treated. Both options still presented a largely undesirable social and community value outcome of maintaining overflows (although partially treated) into the harbour.<br>All other options were scored orange on the grounds that no option proposed to completely remove all effluent overflows to the harbour. All other options would reduce overflows/discharges to the harbour (through greater conveyance capacity or storage) and were considered likely to be perceived by the community as having being a measurable improvement, but not a significant enough improvement to merit a green score. |
| **Technology** | | | | | | | | | | | | It was agreed that options involving greater conveyance capacity and storage use standard technology, which is well understood. It was considered that there is uncertainty as to whether the rapid treatment will achieve expected outcome, and that there is less experience in New Zealand with this technology. All options involving rapid treatment were therefore scored orange. |
| **Resilience** | | | | | | | | | | | | Options 1 and 2 were considered to score as orange because neither of the business as usual or rapid treatment options offer any increases in operational resilience. All other options were considered to score green because they provide some degree of operational resilience.<br>Note: The assessment of the project team's technical specialists, Ron Haverland and Steve Hutchinson, differs from the assessment of the workshop group for Option 11. Ron and Steve consider that neither conveyance in the north nor rapid treatment provide an improvement in operational resilience and therefore a score of orange is appropriate. |

**Table 7 – Traffic light assessment of the refined WWTP long list**

| Criteria | 1 Discharge to the CMA from the existing shoreline outfall + existing standard of treatment | 2 Discharge to the CMA from the existing shoreline outfall + a higher standard of treatment | 3 Discharge to the CMA from a new shoreline outfall + existing standard of treatment | 4 Discharge to the CMA from a new shoreline outfall + a higher standard of treatment | 5 Discharge to the CMA from a new offshore ocean outfall[8] + existing standard of treatment | 6 Discharge to land + seasonal shoreline outfall + existing standard of treatment | 7 Storage of wastewater + discharge to the CMA from the existing shoreline outfall on outgoing tide + existing standard of treatment | 8 Storage of wastewater + discharge to the CMA from a new shoreline outfall on outgoing tide + existing standard of treatment | Comments |
|---|---|---|---|---|---|---|---|---|---|
| **Public Health Risk** | | | | ? | ? | | | | As the quality of the WWTP dry weather discharges is high, the key risk to public health relates to bypass discharges. Have not got filter feeders which is an important factor from a public health perspective. As there is uncertainty regarding the level, extent of treatment and environment effect of the WWTP bypasses options 1, 2, 3, 4, 6, 7 and 8 were scored 'orange'. It was noted that the storage options would provide little addition benefit over option 1. Option 2 could be green but not totally confident without modelling and microbiological risk assessment. There was some discussion whether option 4 should be scored green, however some in the group considered the risk from bypasses would remain. Option 5 is considered likely to be 'green' but there is some uncertainty about whether recreation activities will occur near the outfall, therefore a question mark was applied to this option. Knowledge gap regarding recreational use, need for a recreational use assessment – opportunities for resources from Regional Public Health. Because of the strong wind influence discharging on an outgoing tide (options 7 and 8) may not achieve significant benefits and could result in a large investment for little benefit. |
| **Natural Environment** | | | | | | | | | Due to information gaps (at the time of the long list traffic light assessment[9]) regarding the environmental effect of the options all options were scored orange, except option 5. Green scores may be possible for some or all of these options once this information has been collected. It was considered that with the increased dilution and dispersion that would occur with an off-shore ocean outfall, that there is sufficient confidence to score option 5 green. Marine mammals and emerging contaminants need to be considered in future investigations. Dissolved oxygen and BOD of no or little concern, total suspended solids of negligible concern, nutrients are not accumulating so little adverse effects. |
| **Tangata whenua** | ? | ? | | | a | b ? | | | Options 1 and 2 are not expected to improve the current situation, which is an objective for Ngāti Toa, so were therefore scored red. It was recognised that this may change once a better understanding of these options is held. Option 5a was scored orange because of the potential for the outfall pipeline to impact on land based sites of cultural value. Option 5b was scored green because it would avoid these sites and improve the overall outcome. Option 6 was scored orange, with the potential to be red because the potential land sites are either of direct cultural value to Ngāti Toa or in catchments which are of value to Ngāti Toa. Historic position of retaining the discharge point in the same place was considered to be no longer relevant. Land application areas problematic not just for Ngāti Toa but the community generally. |
| **Growth** | | | | | | | | | All options can accommodate the growth needs of the City and sub-region and therefore were scored green. There was some discussion about whether option 6 should be scored orange, because using land for land application of wastewater may limit growth potential. However it was agreed that the potential sites were not anticipated as growth locations within the next 35 years (i.e. criterion timeframe). |
| **Affordability** | | | | | a | b | | | Options 1 and 3 would fall within the draft 30 year infrastructure budget. In relation to options 2 and 4 it was noted that the installation of membrane reactor at the WWTP would be substantially above the draft budget (i.e. would score red) but a lesser upgrade, such as an upgrade to UV treatment, while still being above the draft budget would be more affordable (scored orange). For option 5 the length of the offshore outfall pipeline would drive costs. Option 5a which would have a long pipeline scored red, while option 5b scored orange. Option 6, involving land application would be the most expensive option and was scored red. Options 7 and 8 would be more than the draft 30 year budget, but not 50% more than that budget. |
| **Social and community** | ? | ? | ? | ? | ? | | ? | ? | It was considered that scores for this criterion would be largely driven by public perception. Few of the options were considered likely to be considered favourably, and it was considered that the level of treatment, shoreline discharge location or storage are unlikely to improve public perceptions. Therefore options 1-4 and 7 and 8 were scored orange, and possibly red. Options 5 was scored green, possibly orange, because it was considered that the off-shore nature of the outfall would result in less social impacts. Option 6 was scored red because it was considered that there would be a strong resistance to land application, particularly given it would be only useful for relatively short periods of the year. Need to engage with the community to test perception vs. greater investment. |
| **Technology** | | | | | | | | | Several of the options would involve standard and well understood technology and were therefore scored green. Membrane reactors were considered to be less standard and were therefore scored orange, however a lesser upgrade such as improved UV treatment would be green. Land application (option 6) was scored red because it was considered that this option is unsuitable for the physical context of Porirua. Lot of investigative work still to be done including geotech, mixing, dilution and dispersion. |
| **Resilience** | | | | | | | | | Options 1, 2 and 6 were not considered to offer any improved operational resilience and were therefore scored orange. Option 6 was also considered to present extra resilience risk because of the length of infrastructure required for land application and operational risks. As the existing outfall would |

[8] At the long list stage Option 5 had two sub-options based on the potential location of the outfall. Option 5a involved a land based section to convey to the treated wastewater from the WWTP to the sea south of Kaumanga Point and the 'Bridge' to Mana Island. Option 5b involved an outfall directly offshore from the WWTP.

[9] Further information to fill these gaps was collected prior to the short list MCA.

| Criteria | 1<br>Discharge to the CMA from the existing shoreline outfall + existing standard of treatment | 2<br>Discharge to the CMA from the existing shoreline outfall + a higher standard of treatment | 3<br>Discharge to the CMA from a new shoreline outfall + existing standard of treatment | 4<br>Discharge to the CMA from a new shoreline outfall + a higher standard of treatment | 5<br>Discharge to the CMA from a new offshore ocean outfall[8] + existing standard of treatment | | 6<br>Discharge to land + seasonal shoreline outfall + existing standard of treatment | 7<br>Storage of wastewater + discharge to the CMA from the existing shoreline outfall on outgoing tide + existing standard of treatment | 8<br>Storage of wastewater + discharge to the CMA from a new shoreline outfall on outgoing tide + existing standard of treatment | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | be retained as backup, options 3 and 4 would improve operational resilience and were therefore scored green. Option 5 b was scored green for the same reason. For option 5a while this option would improve the operation resilience it was considered the long pipe along the coastal edge would be subject to extra risks (geotech, stability etc.) and therefore was scored orange. Options 7 and 8 would provide some operational benefit (due to the storage capacity) and therefore were scored green. |

## 4.2 Short list selection

The traffic light assessment set out in Table 6 and Table 7 provides an overview of the relative merits of the different options and some guidance on anticipated environmental, social and cultural effects. However, given its reasonably coarse nature, it did not result in an immediately identifiable short list of options.

The technical team therefore analysed the information presented in Table 6 and Table 7 and a recommended short list was presented to the Collaborative Group at a meeting on 3 April 2018. The following section sets out the key features of the analysis presented by the technical team.

### 4.2.1 Network short list

The recommended short list for the network had been identified by the technical team based on the following approach:

General steps

1. Combine the outcomes of the traffic light workshop held on 29 November 2017 with the outcomes of the hui with Ngāti Toa held on 22 February 2018. Table 8 does this.

**Table 8 - Network options – overview of traffic light scores**

| | Harbour discharge options | | Options which involve greater conveyance to the WWTP | | | | | | Options with a mix of increased conveyance and harbour discharges | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Criteria** | 1. Business as usual | 2. Rapid Treatment in north and City Centre | 3. Greater conveyance | 4. Greater conveyance in north + storage in the City Centre | 5. Storage in the north and greater conveyance from the City Centre | 6. Cross harbour pipeline + storage in the City Centre | 7. Cross harbour pipeline + greater conveyance from the City Centre | 8. Storage in Wellington City + storage in the north | 9. Cross harbour pipeline + rapid treatment at the city centre | 10. Rapid treatment in the north + storage at the city centre | 11. Greater conveyance in the north + rapid treatment at the city centre |
| **Public Health Risk** | | ?[10] | | | | | | | | | |
| **Natural Environment** | | | | | | | | | | | |
| **Tangata whenua** | | | | | | F[11] | F | | F | | |
| **Growth** | | | | | | | | | | | |
| **Affordability** | | | | | | | | | | | |
| **Social and community** | | ? | | | | F | F | | F | ? | ? |
| **Technology** | | | | | | | | | | | |
| **Resilience** | | | | | | | | | | | |

[10] '?'indicates that full consensus was not reached on the scoring for this option. Further explanation of this is included in the traffic light workshop notes.

[11] F= Fatal Flaw. As noted in section 4.1, at the traffic light workshop the Collaborative Group determined that the options involving the cross-harbour pipeline were fatally flawed in relation to the fatal flaw criterion 'Absolutely unpalatable to Ngāti Toa'

2. Eliminate options identified above as being fatally flawed (F). These are the cross harbour pipeline options 6, 7 & 9.

Harbour discharge & rapid treatment options (options 1-2 and 10-11)

3. The harbour discharge options (options 1 & 2) and 'mixed options' including an element of rapid treatment options (i.e. options 10 & 11) are the next lowest scoring options. These options were scored red by Ngāti Toa for the tangata whenua criterion. This score was awarded to these options because Ngāti Toa's preference is that network options should seek to get as much wastewater to the treatment plant as is practical and affordable, rather than discharging it to the harbour or streams. The harbour discharge options (1 & 2) were also worst scoring on the public health risk, social and community and resilience criteria. The rapid treatment options (10 & 11) scored the worst on the technology criterion, and some attendees at the traffic light workshop in November 2018 also considered they should score red in relation to the social and community criterion.

   For these reasons it was recommended that none of these options (Options 1-2 & 10-11) be included in the shortlist.

Remaining conveyance options (options 3-5 & 8)

In relation to the consideration of these options it was noted that:

- All could be designed to accommodate projected wastewater flows up to the 6 month average return interval (note: this return interval was still to be confirmed). The options would therefore be similar in terms of the frequency of overflow events, i.e. overflows will only occur in flows above the 6 month return interval.
- Options 4 and 5 are similar in terms of the volume of the overflows and in terms of their implications for the WWTP (peak flow)
- Options 4, 5 and 8 may differ in terms of the physical feasibility of the options (e.g. is there suitable location and space to accommodate the storage tanks?)
- All options vary in terms of the receiving environment for any residual overall discharges. The sensitivity of the receiving environment to the overflow discharges is likely to also vary (e.g. Onepoto arm vs Pauatahanui arm vs Porirua Stream). However, the information currently available is not sufficiently detailed to assess the significance of these differences.
- Option 3, greater conveyance, and options 4 and 5 (combination of storage and greater conveyance) and option 8 (twin storage) will have different implications for the WWTP, i.e. they are expected to have a different effect on peak flows to the WWTP.

Based on these considerations the following steps were recommended by the technical team:

4. Combine options 4 and 5 into a single option – the variations in 4 and 5 would become sub-options, which would be the subject of further investigation during the comparative assessment phase of the project

5. Include option 3, option 8 and the combined option from the step above in the shortlist

Following previous Collaborative Group meetings, an additional option had been identified which seemed to have been missed previously. This option was storage in both the north of Porirua and in the Porirua City Centre. This option is similar in many respects to option 8 which was added during the traffic light assessment workshop in November 2017. However, the receiving environment for residual overflows from one of the proposed storage tanks may differ and it is therefore considered relevant to treat this as a sub-option within a 'twin storage' option.

Applying these steps, the technical team identified the following short list of network options:

- Greater conveyance (long list option 3)
- Combination of storage and conveyance with 2 sub-options (long list options 4 & 5)
- Twin storage with 2 sub-options (long list option 8 - storage in Wellington City + storage in the north of Porirua and a new option involving storage in Porirua City Centre + storage in the north of Porirua).

### 4.2.2 WWTP short list

The traffic light assessment completed for the WWTP (Table 7 above) was more definitive, and as a result the technical team could more easily identify a shortlist of WWTP following these steps:

2. Table 9). The hui with Ngāti Toa in February 2018 confirmed the preliminary scores provided at the traffic light assessment workshop in January 2018.
3. Exclude options 2 and 4 (higher standard of treatment) from the shortlist as the quality of the current treatment is not considered to be the issue, i.e. the current treatment process is capable of treating Porirua's wastewater to a level suitable for the coastal receiving environment
4. Exclude option 6 from the shortlist because of its red score against multiple criteria in the traffic light assessment
5. Exclude option 5a from the shortlist as this scored lower on Tangata Whenua, Affordability and Resilience criteria than option 5b in the traffic light assessment
6. Exclude options 7 and 8 from the shortlist because of the general agreement in the Collaborative Group that these options would not add value.

On this basis the technical team identified the following recommended short list of WWTP options:

- Option 1 - Discharge to the CMA from the existing shoreline outfall + existing standard of treatment
- Option 3 - Discharge to the CMA from a new shoreline outfall + existing standard of treatment
- Option 5b - Discharge to the CMA from a new offshore ocean outfall + existing standard of treatment.

All three options would involve capacity upgrades of the WWTP to enable it to fully treat up to 1,500 litres per second. At this time it was contemplated that any wastewater flows above 1,500 litres per second would be partially treated (if any combined option resulted in flows above that level). The nature of the partial treatment had not been determined at this point in the process, and was to be confirmed if an option that would involve flows at the WWTP exceeding 1,500 l/s was selected by Wellington Water as the preferred solution.

**Table 9 - WWTP options - overview of traffic light scores**

| Criteria | 1 Discharge to the CMA[13] from the existing shoreline outfall + existing standard[14] of treatment | 2 Discharge to the CMA from the existing shoreline outfall + a higher standard of treatment | 3 Discharge to the CMA from a new shoreline outfall + existing standard of treatment | 4 Discharge to the CMA from a new shoreline outfall + a higher standard of treatment | 5[12] Discharge to the CMA from a new offshore ocean outfall + existing standard of treatment | 6 Discharge to land + seasonal shoreline outfall + existing standard of treatment | 7 Storage of wastewater + discharge to the CMA from the existing shoreline outfall on outgoing tide + existing standard of treatment | 8 Storage of wastewater + discharge to the CMA from a new shoreline outfall on outgoing tide + existing standard of treatment |
|---|---|---|---|---|---|---|---|---|
| Public Health Risk | | | | ? | ? | | | |
| Natural Environment | | | | | | | | |
| Tangata whenua | ?[15] | ? | | | a b | ? | | |
| Growth | | | | | | | | |
| Affordability | | | | | a b | | | |
| Social and community | ? | ? | ? | ? | ? | | ? | ? |
| Technology | | | | | | | | |
| Resilience | | | | | | | | |

### 4.2.3 Short list of combined options

The technical team then prepared a short list of nine combined options, by matching the three network options to each of the three WWTP options (see Table 10). This short list was recommended to the Collaborative Group at its meeting on 3 April 2018. The Collaborative Group agreed to this recommendation and the nine options were carried forward as the short list.

[12] At the traffic light workshop two sub-options for option 5 were identified. Sub-option (a) is ocean outfall to the west coast, beyond Kaumanga Point. Sub-option (b) is an ocean outfall directly north of the WWTP. Further details on these sub-options are included in the WWTP traffic light workshop notes dated 19 January 2018 (see Attachment D).

[13] CMA = Coastal Marine Area

[14] References in option descriptions to 'existing standard of treatment' mean secondary treatment and UV disinfection up to 1,500 l/s. Flows above this level will be subject to partial treatment. The nature of the partial treatment for flows above 1,500 l/s is yet to be determined

[15] A '?' indicates that either full consensus was not achieved on the scoring at the workshop or that a possible alternative score might be awarded if additional information was available. The colour of the '?' indicates the preference of the non-consensus or the possible alternative score if the information was available.

**Table 10 – Recommended short list of combined options**

| | | Network Shortlist | | |
|---|---|---|---|---|
| | | Greater conveyance | Combination of storage and conveyance | Twin storage |
| WWTP Shortlist | Discharge to the CMA from the existing shoreline outfall + existing standard of treatment | 1. Greater conveyance in the network, plus existing standard of treatment at the WWTP + discharge to the CMA from the existing shoreline outfall | 2. Combination of storage and conveyance in the network, plus discharge to the CMA from the existing shoreline outfall + existing standard of treatment | 3. Twin storage in the network, plus discharge to the CMA from the existing shoreline outfall + existing standard of treatment |
| | Discharge to the CMA from a new shoreline outfall + existing standard of treatment | 4. Greater conveyance in the network, plus existing standard of treatment at the WWTP + discharge to the CMA from a new shoreline outfall | 5. Combination of storage and conveyance in the network, plus discharge to the CMA from a new shoreline outfall + existing standard of treatment | 6. Twin storage in the network, plus discharge to the CMA from a new shoreline outfall + existing standard of treatment |
| | Discharge to the CMA from a new offshore ocean outfall + existing standard of treatment | 7. Greater conveyance in the network, plus existing standard of treatment at the WWTP + discharge to the CMA from a new offshore ocean outfall | 8. Combination of storage and conveyance in the network, plus discharge to the CMA from a new offshore ocean outfall + existing standard of treatment | 9. Twin storage in the network, plus discharge to the CMA from a new offshore ocean outfall + existing standard of treatment |

It is noted that the alignment of ocean outfall in the short list options was altered from that considered at the long list phase of the project (i.e. option 5b). For the long list, option 5b involved routing the outfall directly from the WWTP out to sea. For the short list, the ocean outfall was assumed to use the existing land-based infrastructure down to Rukutane Point and extending from Rukutane Point approximately 700 metres out to sea (see on page 38). While this is a more circuitous route, it would enable use of the existing land-based infrastructure, including its energy dissipation elements, and thereby would reduce the cost of the option. The dilution and dispersion efficacy of the option remained similar as the diffuser was proposed in the same depth of water (i.e. 10 - 15 metres depth).

# 5. Assessing the short list

## 5.1 Element of the Multi-criteria analysis

To assist Wellington Water to select its preferred option, the short list of combined options was assessed using multi-criteria analysis (MCA).

MCA is a tool to assist decision making on projects involving several options. It is often used for infrastructure options assessments and has been accepted as an appropriate tool in many RMA resource consent and designation projects.

Like traffic light assessment, under MCA each option is evaluated against multiple criteria. But unlike a traffic light assessment which uses colours to 'score' the options, MCA applies numeric scores for each option against each criterion and from these an overall MCA score is calculated for each option.

Two key elements of this assessment approach were discussed and agreed with the Collaborative Group.

The first of these elements are the MCA criteria. At a workshop on 30 November 2018 the Collaborative Group was presented with the criteria used for the traffic light assessment and were asked whether the criteria remained fit for purpose.

### 5.1.1 Criteria

Based on this discussion, the following criteria were adopted. These include changes to the criteria used for the traffic light assessment and the addition of a criterion relating to natural character and landscape.

- Public Health Risk – associated with contact recreation and food gathering
- Water quality and ecology – including streams, harbour, the coastal shoreline and the wider coastal environment, and terrestrial ecology
- Tangata whenua values – effects on mauri, mana, hauora, kai moana, mahinga kai, heritage and whakapapa
- Growth – supports long term growth and investment, and economic development of the city and sub-region, and is responsive to medium term growth needs and pressures
- Social and community – amenity, recreation and heritage, including perception
- Technology – enduring, reliable and providing flexibility for future technology changes and capacity upgrades
- Resilience – climate change, natural hazards and operation resilience
- Natural character & landscape – including effects on natural character of the coastal environment, landscape fabric, landscape character and visual amenity
- The whole-of-life financial cost of the option

The full record of the discussion at the Collaborative Group meeting is included in Attachment E.

### 5.1.2 Weighting

The second MCA element discussed with the Collaborative Group was the weighting to be given to each criterion in calculation of the overall MCA result. The criteria weightings were discussed at the Collaborative Group meeting on 25 March 2019 (see Attachment E).

The agreed approach to determining the weighting of the non-cost criteria was to identify the importance of each criterion to the Collaborative Group using a scale of 1 to 10 (1 being of little importance, 10 being of very high importance). The importance of each criterion was converted into a weighting by dividing it by the sum of all importance scores. The Collaborative Group did not always fully agree on the importance of individual criterion. In these cases, a base weighting was identified and the alternative positions used as sensitivity scenarios. The various weighting scenarios set by the Collaborative Group are set out in Table 11.

**Table 11 – Weightings for Non-cost Criteria**

| Scenario | Criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Public Health Risk | Water Quality & Ecology | Tangata Whenua Values | Growth | Social & Community | Technology | Resilience | Natural Character & Landscape |
| Base weighting 1 ('Growth at 10') | 15.2 | 15.2 | 15.2 | 15.2 | 10.6 | 7.6 | 10.6 | 10.6 |
| Base weighting 2 ('Growth at 8') | 15.6 | 15.6 | 15.6 | 12.5 | 10.9 | 7.8 | 10.9 | 10.9 |
| Higher weight to technology (Base scenario 1) | 14.7 | 14.7 | 14.7 | 14.7 | 10.3 | 10.3 | 10.3 | 10.3 |
| Higher weight to technology (Base scenario 2) | 15.2 | 15.2 | 15.2 | 12.1 | 10.6 | 10.6 | 10.6 | 10.6 |
| Lower weight to technology & resilience (Base scenario 1) | 16.1 | 16.1 | 16.1 | 16.1 | 11.3 | 4.8 | 8.1 | 11.3 |
| Lower weight to technology & resilience (Base scenario 2) | 16.7 | 16.7 | 16.7 | 13.3 | 11.7 | 5.0 | 8.3 | 11.7 |
| Equal weighting to all criteria | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 | 12.5 |

Having set the non-cost criteria weightings, the Collaborative Group discussed the weight to be given to cost in the overall MCA result. It was agreed to apply 25% as the base weight to be given to cost and apply sensitivity tests at 0% and 50%. In determining that 25% was the appropriate base weighting for cost, the Collaborative Group considered the weighting applied to cost on other infrastructure projects. 25% was considered to be a 'mid-range' weighting for cost and one which reflects financial limitations experienced by Porirua City Council.

The record of both Collaborative Group meetings is included in Attachment E.

## 5.2 MCA assessment of the short list of combined options

The approach taken for the MCA workshop was similar to the traffic light assessment workshop on the long list. That is, relevant members of the technical team prepared comparative assessments of the short list options against each of the MCA criteria in advance of the workshop (see Attachment F), which included recommended scores to be confirmed by the Collaborative Group. These assessments were pre-circulated to the Collaborative Group and then discussed at the MCA workshop, which was held on 25 June 2019.

For the non-cost criteria, a score was agreed by the Collaborative Group taking account of the comparative assessments and based on a scale of 1 to 5. In general terms a score of 1 indicates the option would have a worse outcome relative to the criterion and a score of 5 indicates that the option would have a better outcome. The specific scoring approach taken for each criterion is set out in Table 12.

**Table 12 - MCA scoring definitions**

| Criterion | One | Two | Three | Four | Five |
|---|---|---|---|---|---|
| **Public Health Risk** | High public health risk | Moderate to high public health risk | Moderate public health risk | Low to moderate public health risk | Low public health risk |
| **Water quality & ecology** | High adverse effects | Moderate to high adverse effects | Moderate adverse effects | Low to moderate adverse effects | Low adverse effects |
| **Tangata Whenua Values** | High adverse effects | Moderate to high adverse effects. | Moderate adverse effects | Low to moderate adverse effects | Low adverse effects |
| **Growth** | Would not fully support long term growth needs, and would not support medium term growth needs | Fully supports long term growth needs but does not even partially support medium term growth needs | Fully supports long term growth needs and partially supports medium term growth needs | Fully supports long term growth needs and largely supports medium term growth needs | Fully supports long and medium-term growth needs |
| **Social and Community** | High adverse effects **OR No** short, medium- **or** long-term improvement in remedying or improving existing degraded social and community values resulting from the current | Moderate to High adverse effects **AND/OR Minimal – modest** short, medium- **and/or** long-term improvement in remedying or improving existing degraded social and community values resulting from the current operation of the WWTP | Moderate adverse effects **AND/OR Modest** short, medium- **and** long-term improvement in remedying or improving existing degraded social and community values resulting from the | Low adverse effects **AND/OR Moderate** short, medium- **and** long-term improvement in remedying or improving existing degraded social and community values resulting from the current | Very Low or nil adverse effects **AND Moderate to Significant** short, medium- **and** long-term improvement in remedying or improving existing degraded social and community values resulting from the |

| Criterion | One | Two | Three | Four | Five |
|---|---|---|---|---|---|
| | operation of the WWTP | | current operation of the WWTP | operation of the WWTP | current operation of the WWTP |
| **Technology** | Technology is very complex, proven to not be enduring & to be unreliable, and does not provide any staging / flexibility. | Technology is complex, proven to be enduring or reliable, but not both. The technology also provides only limited staging / flexibility. | Technology is complex, proven to be enduring & reliable, but provides limited staging / flexibility. | Technology is routine, proven to be enduring & reliable, and provides partial staging / flexibility. | Technology is simple, proven to be enduring & reliable, and provides total staging / flexibility. |
| **Resilience** | High risk in the known hazard-scape. Performance will be severely affected by climate change over 50 years. | Moderate to high risk in known hazard-scape. Performance will be moderately to severely affected by climate change over 50 years. No improvement in operational resilience. | Moderate risk in the known hazard-scape. Performance will be moderately affected by climate change over 50 years. No improvement in operational resilience. | Low to Moderate risk in known hazard-scape. Performance will be unaffected by climate change over 50 years. Some improvement in operational resilience as a result of redundancy. | Low risk in the known hazard-scape. Performance will be unaffected by climate change over 50 years. Improves operational resilience as a result of redundancy. |
| **Landscape, Visual & Natural Character** | Significant adverse effect | High adverse effect | Moderate adverse effect | Low adverse effect | Negligible adverse effect |

For cost, a score was calculated using the following approach:

1. Identify the option with the highest estimated cost and give this option a score of 1 (i.e. the worst score)
2. Calculate the score for the other options using this standard formula (where 'option A' is the option under consideration):

   *Score for option A = ((1 - (cost of option A / highest cost)) x 4) + 1*

The formula creates a ratio between the option cost estimate and the highest cost option. It then inverts this ratio by subtracting it from 1. This is done to ensure that an option with a high cost is awarded a low score. This is consistent with the scoring of other criteria in which the most negative outcomes have been given the lowest scores. Finally, the formula converts the ratio into a score between 1 and 5 by multiplying it by 4 and adding 1 (the score already awarded to the option with the highest cost).

The record of the discussion at the MCA workshop is included in Attachment G.

Table 13 below sets out the overall MCA scores and associated option ranks for each of the weighting scenarios agreed by the Collaborative Group and as set out in Table 11 above. Table 13 shows how the different weighting scenarios alter the overall MCA scores. The most significant changes to the overall MCA scores occur under the scenarios with 0% and 50% weight given to cost. When 0% weight is given to cost the overall scores are the highest, and when 50% weight is given to cost they are the lowest. Given that the cost scores are clustered around 1-2, giving greater weight to cost brings down the overall scores. Changes to the weighting of non-cost criteria only have a marginal effect on the overall MCA scores.

The only weighting scenarios that change the ranking of options are when cost is weighted at 0% and 50%.

Under the scenario with cost at 0% the following changes occur:

- Option 2 is the 5th ranked option, whereas when cost is weighted at 25% it is the 4th ranked option
- Option 6 is the 4th ranked option whereas when cost is weighted at 25% it is the 5th ranked option.

Under scenarios with cost at 50% the following changes occur:

- Option 3 is ranked 2nd, whereas when cost is weighted at 25% it is the 3rd ranked option
- Option 8 is ranked 3rd, whereas when cost is weighted at 25% it is the 2nd ranked option.

Changes to the weighting of non-cost criteria does not alter option ranks.

Under all weighting scenarios option 9 (twin storage in the network, plus discharge to the CMA from a new offshore ocean outfall + existing standard of treatment) has the highest overall MCA score. However, the margin between it and the next highest ranked option does vary. The margin is highest (0.24) under the 'Base weighting 2 with cost at 0%' scenario. The margin is lowest (0.07) under the 'Base weighting 1 with cost at 50%' scenario.

Overall it is considered that these results indicate that the MCA outcome has a low sensitivity to the different weighting scenarios.

These overall results were provided to Wellington Water and Porirua City Council to inform their consideration of the 'proposed solution' (see Figure 1 for overall process).

**Table 13 – Overall MCA scores (unshaded) and option ranks (grey shading) of the combined options applying the Collaborative Group weighting scenarios**

| WEIGHTING SCENARIO | OPTIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Base weighting 1 with cost at 25% | 2.29 | 3.15 | 3.27 | 2.25 | 3.02 | 3.14 | 2.62 | 3.35 | 3.51 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Base weighting 1 with cost at 0% | 2.64 | 3.61 | 3.78 | 2.60 | 3.45 | 3.63 | 3.16 | 3.96 | 4.19 |
| | 8 | 5 | 3 | 9 | 6 | 4 | 7 | 2 | 1 |
| Base weighting 1 with cost at 50% | 1.94 | 2.70 | 2.76 | 1.91 | 2.59 | 2.65 | 2.08 | 2.75 | 2.83 |
| | 8 | 4 | 2 | 9 | 6 | 5 | 7 | 3 | 1 |
| Base weighting 2 with cost at 25% | 2.30 | 3.14 | 3.26 | 2.27 | 3.01 | 3.13 | 2.65 | 3.35 | 3.51 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Base weighting 2 with cost at 0% | 2.66 | 3.59 | 3.77 | 2.62 | 3.44 | 3.62 | 3.20 | 3.96 | 4.20 |
| | 8 | 5 | 3 | 9 | 6 | 4 | 7 | 2 | 1 |
| Base weighting 2 with cost at 50% | 1.95 | 2.69 | 2.75 | 1.91 | 2.58 | 2.64 | 2.10 | 2.75 | 2.83 |
| | 8 | 4 | 2 | 9 | 6 | 5 | 7 | 3 | 1 |
| Higher weight to technology (Base scenario 1) | 2.31 | 3.17 | 3.28 | 2.26 | 3.02 | 3.14 | 2.62 | 3.34 | 3.49 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Higher weight to technology (Base scenario 2) | 2.32 | 3.16 | 3.28 | 2.27 | 3.01 | 3.13 | 2.64 | 3.34 | 3.50 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Lower weight to technology & resilience (Base scenario 1) | 2.23 | 3.12 | 3.25 | 2.20 | 3.00 | 3.12 | 2.60 | 3.36 | 3.53 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Lower weight to technology & resilience (Base scenario 2) | 2.25 | 3.11 | 3.24 | 2.21 | 2.98 | 3.11 | 2.63 | 3.36 | 3.54 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |
| Equal weighting to all criteria | 2.37 | 3.21 | 3.29 | 2.32 | 3.06 | 3.14 | 2.64 | 3.34 | 3.46 |
| | 8 | 4 | 3 | 9 | 6 | 5 | 7 | 2 | 1 |

# 6. Exercising return loops

Following the June 2019 MCA workshop, Wellington Water discussed the outcomes of the MCA with Porirua City Council through the Wastewater Treatment Plant and Landfill Joint Committee (19 July 2019) and the Executive Leadership Team (30 July 2019). Following these meetings Wellington Water decided to exercise the 'return loops' that are provided for in the overall alternatives assessment process (Figure 1) and in doing so split the WWTP and wastewater network into two separate consenting projects . This decision was formally confirmed at Wellington Water's 3 Waters Decision Making Committee on 22 August 2019.

The decision to exercise the return loops in the process diagram was taken because new key information had been identified. This information was that:

1. The estimated cost of the network options has increased very substantially from the indicative estimates used for traffic light assessment of the long list options. At the long list phase none of the network options scored worse than 'orange' for affordability, indicating costs estimates were not more than 50% above the 30-year LTP infrastructure strategy budgets. All network options that were carried forward to the short list had scored 'green' under this criterion when cost was first considered on 29 November 2017 (see Attachment C), i.e. they were estimated to be within the 30-year LTP infrastructure strategy budgets. The cost estimates for all 9 combined options were further developed during the short list stage of the work. These updated estimates indicate that the network elements of the combined options are several times greater than the 30-year LTP infrastructure strategy budgets.
2. The Te Awarua-o-Porirua Whaitua objectives were confirmed while the MCA process was underway. These objectives were confirmed by the Te Awarua-o-Porirua Whaitua Committee in April 2019 and include the objective to improve the attribute state for E.coli and enterococci from the current E-state (in the City's streams) and D-state (in the Harbour) to A, B or C-state by 2040. The substantial investment that would be required to address network overflows would not meaningfully contribute to the achievement of these objectives, and an opportunity cost of making such a substantial investment in the network overflow issue is that there would likely be very limited, if any, ability to invest in the 3 waters network to help achieve the Whaitua objectives.

As a result of this new information, Wellington Water decided to exercise the full return loop for the network element of the project, i.e. return to the start of the process as is shown in Figure 1. This decision was made to enable the scope of the network problem to be reconsidered and importantly, reframed in the context of the Whaitua objectives. The decision also enables all options relevant to the network to be reconsidered within this reframed context.

For the WWTP element of the project, Wellington Water decided to exercise the return loop back to the start of the short list phase (again as shown in Figure 1) and re-evaluate the three WWTP options as a standalone assessment. It was not possible to undertake a short list assessment of combined network and WWTP options as the project originally envisaged. This is because the resource consent for the WWTP wastewater discharge is required to be lodged in early 2020, and it would not have been possible to progress the reframed network option process quickly enough to meet this deadline.

Further it is noted that based on projections of inflow to the WWTP, Wellington Water has confidence that with the planned upgrades, the capacity of the WWTP will be sufficient to fully treat all wastewater conveyed to it under the types of network changes that are likely to be considered under the reframed network options process. Therefore, Wellington Water does not consider that

decoupling the WWTP and network elements of the project presents a significant risk to understanding of the pros and cons of the WWTP options.

Finally, Wellington Water considered it appropriate to rely on the previous long list assessment of the WWTP options. This is because the basis for the relevant aspects of the assessment made at the time remains valid. The basis was that (see record of the WWTP Traffic Light Workshop in Attachment D):

- With capacity upgrades, the existing treatment process is capable of treating Porirua's wastewater to a sufficient standard for the coastal receiving environment. Therefore, there is not a need to reconsider the long list options that involved a higher standard of treatment (e.g. long list options 2, 4 and 8 – see section 3.2)
- Alternative receiving environments are not practicable options, in particular it is noted that land application was identified in the traffic light assessment as being expensive and unsuited to the physical context of Porirua.

The remainder of this report sets out Wellington Water's assessment of WWTP options.

# 7. Assessment of the WWTP short list

The WWTP options that were short listed following the traffic light assessment of the WWTP long list were:

- Option 1 - Discharge to the CMA from the existing shoreline outfall + existing standard of treatment (WWTP short list label = option 1)
- Option 3 - Discharge to the CMA from a new shoreline outfall + existing standard of treatment (WWTP short list label = option 2)
- Option 5b - Discharge to the CMA from a new offshore ocean outfall + existing standard of treatment) (WWTP short list label = option 3)

All options involve capacity upgrades within the WWTP so that it will be able to fully treat flows up to 1,500 litres per second (l/s). Current peak flow to the WWTP is capped by the capacity of the network at approximately 1,275 l/s. While the nature of future network improvements is not fully known, Wellington Water is confident that peaks flow to the WWTP will not exceed 1,500 l/s over the 20-year resource consent term being considered by Wellington Water and Porirua City Council. Average flow to the WWTP is well below this peak level. Average flow is currently approximately 300 l/s and is projected to increase to approximately 440 l/s over the potential 20-year resource consent term.

For the purposes of this phase of the alternatives assessment these three options were relabelled to be Options 1, 2 and 3 (see Figure 2 and Figure 3). It is also noted that the alignment of WWTP short list option 3 was refined from long list option 5b. For WWTP short list option 3 the ocean outfall was assumed to use the existing land-based infrastructure down to Rukutane Point and extending from Rukutane Point approximately 700 metres out to sea (see Figure 3).

To assess these options, relevant members of the technical team prepared comparative assessments of the options against each of the MCA criteria agreed with the Collaborative Group on 30 November 2018 (Attachment H). The authors of the comparative assessments were the same authors as those that prepared the comparative assessments for the combined shortlist.

The assessments were based on the relevant sections of the comparative assessments those members of the technical team had prepared in advance of the June 2019 MCA workshop, updated with any new technical information.[16] The scores recommended in the comparative assessments of the WWTP options were consistent with the scoring from the assessments of the combined options , except as necessary to reflect the impact of decoupling network and WWTP options and as informed by new information.

A meeting of the technical team, Wellington Water and Porirua City Council was held on 28 August 2019. At this meeting the comparative assessments were discussed, and MCA scores confirmed. A full set of the comparative assessments and a description of the outcomes of this meeting are included in Attachment H.

The overall MCA scores for each WWTP option determined at the meeting on 28 August 2019 are set out in Table 14. The weighting scenarios listed in Table 14 are those determined by the Collaborative Group, and listed in Table 11.

[16] A key new piece of information that was available for the WWTP comparative assessments was the Cawthron Report assessing effects of outfall options on the marine environment. Updated cost estimates were also available – see Attachment G.


Figure 2 - WWTP option 1
Rukutane Point
Option1
Existing Outfall
Round Point
Tunnel Portal
Outfall Tunnel
Drop Structure
Duplication of this section of outfall is possible
UV Disinfection
Porirua Wastewater Treatment Plant

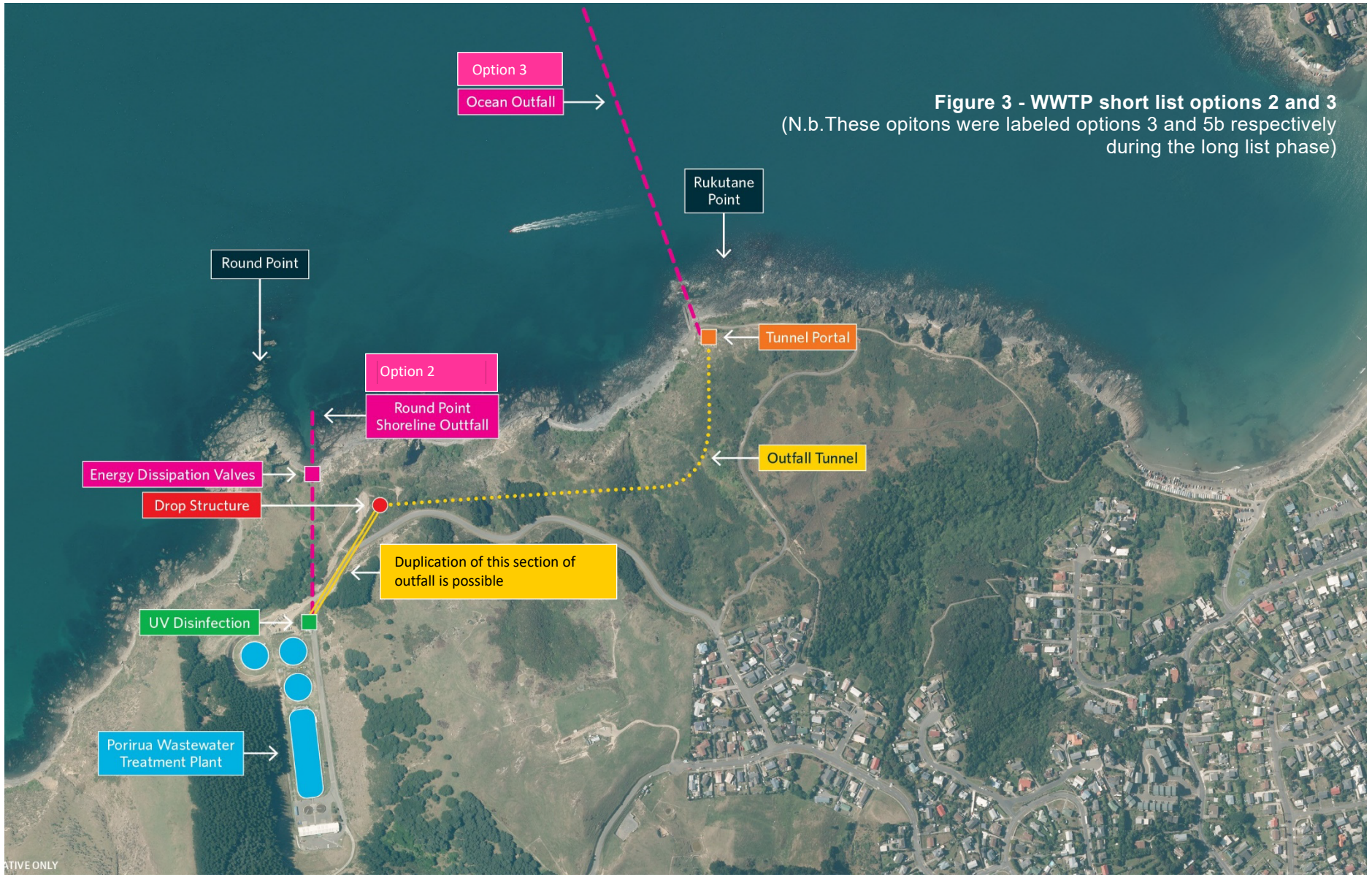


**Figure 3 - WWTP short list options 2 and 3**
(N.b.These opitons were labeled options 3 and 5b respectively during the long list phase)

**Table 14 – WWTP Option MCA scores and ranks, under different weighting scenarios**

Note: Colour coding is used to show those options with the highest overall MCA score and ranking (green shading), 2nd highest overall MCA score and ranking (orange) and the lowest overall MCA score and ranking (red).

| Weighting scenario | | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Base weighting 1 with cost at 25% | Score | 4.1 | 3.8 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 1 with cost at 0% | Score | 4.1 | 3.9 | 4.3 |
| | Ranking | 2 | 3 | 1 |
| Base weighting 1 with cost at 50% | Score | 4.1 | 3.6 | 2.7 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 1, includes removal of existing outfall as part of option 2 | Score | 4.1 | 3.7 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 2 with cost at 25% | Score | 4.1 | 3.7 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 2 with cost at 0% | Score | 4.1 | 3.9 | 4.3 |
| | Ranking | 2 | 3 | 1 |
| Base weighting 2 with cost at 50% | Score | 4.1 | 3.6 | 2.6 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 2, includes removal of existing outfall as part of option 2 | Score | 4.1 | 3.7 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Higher weight to technology (Base scenario 1) | Score | 4.1 | 3.7 | 3.4 |
| | Ranking | 1 | 2 | 3 |
| Higher weight to technology (Base scenario 2) | Score | 4.1 | 3.7 | 3.4 |
| | Ranking | 1 | 2 | 3 |
| Lower weight to technology & resilience (Base scenario 1) | Score | 4.1 | 3.8 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Lower weight to technology & resilience (Base scenario 2) | Score | 4.1 | 3.7 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Equal weighting to all qualitative criteria, cost at 25% | Score | 4.1 | 3.7 | 3.4 |
| | Ranking | 1 | 2 | 3 |

Table 14 shows that the different weighting scenarios have:

- no effect on the overall MCA scores for option 1 – under all weighting scenarios the score for this option is 4.1. Note this consistency occurs when the scores are rounded to 1 decimal place.
- a minor effect on the overall MCA scores for option 2 – the scores for this option range from 3.6 to 3.9
- the most significant effect in relation to option 3 – the scores for this option range from 2.6 to 4.3.

The key driver for the large range in the scores for option 3 is the difference between this option's unweighted cost score and its unweighted scores for the non-cost criteria. As option 3 is an ocean outfall its overall cost (capital and operational) is estimated to be substantially higher than the cost of the other two options with shoreline discharge. Option 3 has an estimated cost of $50,200,000 (net present value), while option 2 is estimated to be $20,200,000 (net present value) and option 1 is estimated at $11,200,000 (net present value) (see Cost Report in Attachment H). Using the calculation explained in section 5.2, the unweighted cost scores for each option is as follows:

- Option 1 = 4.1
- Option 2 = 3.4
- Option 3 = 1

The unweighted cost score for option 3, i.e. 1, is substantially lower than the unweighted scores awarded to this option in relation to the non- cost criteria. The non-cost scores for option 3 range from 3.5 to 5. Consequently, when the weight given to cost is varied there is a noticeable variation in the overall MCA score for this option.

The cost scores for options 1 and 2 are similar to the scores that these options were awarded for the other criteria. Consequently, varying the weight given to cost does not have the same effect on the overall MCA score for these two options.

In all scenarios, except where cost is weighted at 0%, the ranking of the three options is the same. That is, option 1 is ranked 1st, option 2 is ranked 2$^{nd}$, and option 3 is ranked 3rd. Under scenarios with cost at 0%:

- option 1 is ranked 2nd, whereas otherwise it is the 1st ranked option
- option 2 is ranked 3rd, whereas otherwise it is the 2nd ranked option
- option 3 is ranked 1st, whereas otherwise it is the 3rd ranked option.

Changes to the weighting of non-cost criteria do not alter option ranking.

These results indicate that the MCA outcome is sensitive to the weighting given to cost. This is because there is a relatively high variation in criterion scores awarded for cost (these scores range from 1 to 4.11, i.e. a range of over 3). In comparison, the next highest criterion score range is 1.5 and applies to the Public Health Risk and the Natural Character & Landscape criteria.

Given this, further testing was undertaken following the August MCA workshop on the sensitivity of the overall MCA outcome to cost. This testing sought to understand how much the weight applied to cost needs to be reduced before option 3 becomes the highest scoring option.

Table 15 sets out the results of applying reduced weight to cost under Base weight 1. This indicates that the weight given to cost needs to be reduced to around 7% before option 3 becomes the highest scoring option.

**Table 15 – WWTP option MCA scores with varied weight to cost**

Note: Colour coding is used to show those options with the highest overall MCA score and ranking (green shading), 2nd highest overall MCA score and ranking (orange) and the lowest overall MCA score and ranking (red).

| Weighting scenario | | Option 1 | Option 2 | Option 3 |
|---|---|---|---|---|
| Base weighting 1 with cost at 50% | Score | 4.1 | 3.6 | 2.7 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 1 with cost at 25% | Score | 4.1 | 3.8 | 3.5 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 1 with cost at 20% | Score | 4.1 | 3.8 | 3.6 |
| | Ranking | 1 | 2 | 3 |
| Base weighting 1 with cost at 15% | Score | 4.1 | 3.8 | 3.8 |
| | Ranking | 1 | 2= | 2= |
| Base weighting 1 with cost at 10% | Score | 4.1 | 3.8 | 4.0 |
| | Ranking | 1 | 3 | 2 |
| Base weighting 1 with cost at 7.5% | Score | 4.1 | 3.9 | 4.1 |
| | Ranking | 1= | 3 | 1= |
| Base weighting 1 with cost at 0% | Score | 4.1 | 3.9 | 4.3 |
| | Ranking | 2 | 3 | 1 |

# 8. Selection of the Proposed Solution for the WWTP

## 8.1 Basis for technical team recommendation to WWL

Following the WWTP MCA, the technical team identified option 1 as its recommendation for the 'proposed solution' for the WWTP. This option was identified by the technical team as the recommended 'proposed solution' taking account of:

1. the outcomes of the WWTP MCA (as set out in section 7)
2. the Resource Management Act definition of the 'Best Practicable Option'.

Applying the BPO definition to the identification of the proposed solution is consistent with the project objectives as set out in 2.2 of this report and provides a further check that the appropriate option has been identified.

## 8.2 Check against definition of BPO

The RMA definition of BPO is as follows:

> *means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—*
>
> *(a) The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and*
>
> *(b) The financial implications, and the effects on the environment, of that option when compared with other options; and*
>
> *(c) The current state of technical knowledge and the likelihood that the option can be successfully applied*

Taking the elements of the definition in turn the technical team's assessment was as follows:

*Nature of the discharge, sensitivity of the receiving environment & comparative effects on the environment*

- The nature of the discharge will be the same for all three options, i.e. under all options the discharge would have the same volume and contaminant load
- The two shoreline options (options 1 and 2) would occur in marine environments that are more sensitive to the discharge because there is less opportunity for dilution and dispersion in these near shore environments
- The comparative assessments and MCA scores relating to public health risk, water quality/ecology, tangata whenua values, social / community and natural character, landscape and visual provide information on the likely environmental, cultural and social effects of the options. Averaging the unweighted scores for only these criteria results in option 3 scoring highest (4.4 out of 5), option 1 scoring 2nd highest (3.8 out of 5) and option 2 scoring lowest (3.4 out of 5). The higher score for option 3 reflects the fact that the coastal receiving environment for this option (i.e. deeper waters, further from the coastline) is less sensitive to the adverse effects of the treated wastewater than the near shore receiving environment of

the other two options. Option 2 scored lower than option 1 under these criteria mainly because of the need to construct a new outfall in an area currently not impacted by such infrastructure.

- The MCA scores indicate that options 1 and 3 were not assessed as having adverse effects on any individual environmental, social or cultural value that is greater than 'moderate'. Options 1 and 3 score 3.5 and above for the public health risk, water quality/ecology, tangata whenua values, social / community and natural character, landscape and visual criteria. The MCA scores for option 2 indicate that it was assessed as having more than moderate adverse effects in relation to 'natural character, landscape and visual effects', but otherwise it was assessed as having adverse effects not greater than moderate.
- The comparative assessments which informed the WWTP MCA did not assess any adverse effect as being 'significant'.

*Comparative financial implications*

- At the time of the WWTP MCA, option 1 was estimated to have a Net Present Value of $11,200,000, option 2 was estimated to have a Net Present Value of $20,200,000, and option 3 was estimated to have a Net Present Value of $50,200,000
- While option 3 is best scoring in terms of environmental, social and cultural matters, because of its relatively high cost it only achieves the overall highest MCA score when the weight given to the estimated cost of the options is reduced to approximately 7%. It is considered that giving such a low weight to cost is not appropriate, given the significance of the financial implications of this project for Porirua City Council.
- The financial implications of the options not only include the direct cost of the options, but also their opportunity costs. The greater investment required under option 3, compared to option 1 in particular, would have significant opportunity costs in relation to Council's ability to address the wastewater network issues and the Te Awarua o Porirua Whaitua objectives.

*Current state of technology, likelihood can be successfully applied*

- None of the technical challenges associated with the options would prevent the options from being successfully applied, however it is noted that there are some greater technological challenges associated with options 2 and 3 (as indicated by the MCA scores for these options in relation to the 'technology' criterion).

Overall, as indicated by the MCA results, the technical team considered that option 1 is the Best Practicable Option (BPO).

## 8.3 Reporting of the recommendation & WWL's decision

The results from the WWTP short list MCA, the further analysis summarised in Table 15 and the technical teams proposed recommendation were presented to the Collaborative Group on 29 October 2019 and opportunity for discussion provided. A record of this meeting is included in Attachment I.

Subsequently the recommendation was reported to the Wellington Water 3 Waters Decision Making Committee on 8 November 2019. Based on this recommendation the 3 Waters Decision Making Committee adopted option 1 as the proposed solution. The report to, and minutes of the 3 Waters Decision Making Committee meeting are included in Attachment J.

# 9. Assessment of other elements

As noted in section 3.1 above, during the development of the options long lists, various elements were identified as having the potential to be included in any of the options as 'core asset management' or 'add ons'.

It was intended that, having selected the proposed solution, the opportunity to integrate these other elements into the proposed solution would be assessed. However, after the proposed solution was identified Ngāti Toa has indicated that they would like to be involved in the assessment of these other elements so that their potential to mitigate adverse effects on values of significance to Ngāti Toa can be taken into account.

It is considered that there is not sufficient time to undertake this task with meaningful engagement of Ngāti Toa before the resource consent application needs to be made. As a result, it is now proposed to evaluate the other elements under a condition of the resource consent, in conjunction with representatives of Ngāti Toa. Further details of this approach will be developed and presented to the hearing on the resource consent application.

# 10. Glossary and Abbreviations

| | |
|---|---|
| BPO | Best Practicable Option – RMA definition |
| CMA | Coastal Marine Area |
| Collaborative Group | Group of key project stakeholders involved in overseeing the alternatives assessment process, as described in section 2.4 |
| MCA | Multi-criteria analysis – a technique for assessing overall merits of options in relation to multiple criteria |
| Net Present Value (NPV) | NPV sets out the combined capital and operational costs of options in today's dollars. It is in effect a lifecycle cost. |
| PNRP | Proposed Natural Resources Plan |
| QMRA | Quantitative Microbiological Risk Assessment |
| Rapid Treatment | Where discussed in relation to the long list options, means partial treatment of the wastewater through screening and UV disinfection, before discharging to the harbour |
| RMA | Resource Management Act 1991 |
| Te Awarua-o-Porirua Whaitua | Whaitua is the Māori word for space or catchment. Greater Wellington Regional Council has established a series of Whaitua committees to develop mechanisms to give effect to the National Policy Statement for Freshwater Management. The Te Awarua-o-Porirua Whaitua Committee has done this for the catchment of the Te Awarua-o-Porirua harbour, and adjoining coastal waters. |
| Technical team | Technical experts involved in leading the alternatives assessment, as described in section 2.5 |
| UV disinfection | Ultraviolet light disinfection of microorganisms such as bacteria and viruses |
| WWTP | Wastewater Treatment Plant |

# Attachment A: Porirua Wastewater Consenting Programme – Integrated wastewater management strategy

# Attachment B: Long List Identification Workshop Meeting Record

# Attachment C: Long List Comparative Assessments

# Attachment D: Traffic Light Workshop & Ngāti Toa Meeting Records

# Attachment E: Records of Collaborative Group meetings setting up the MCA process

# Attachment F: Combined Short List Comparative Assessments

# Attachment G:Combined Short List MCA Workshop Record

# Attachment H:WWTP Short List Comparative Assessments and MCA workshop record

# Attachment I: Record of Collaborative Group Meeting on 29 October 2019

# Attachment J: Report to, and Minutes of, Wellington Water's 3 Waters Decision Making Committee