Te Kaunihera-ā-Rohe o Ngāmotu

New Plymouth District Council

Wastewater Management Options for Urenui and Onaero

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1. Executive summary

This report provides further information on the Urenui and Onaero Wastewater Project as requested by the Strategic Projects Committee on 6 March 2024 (resolution below).

b) Management explores and reports back what other options might be available to address the environmental problem the project aims to address at a lower cost, while continuing to progress the current proposed solution.

The Current Option for a wastewater scheme for Urenui and Onaero involves collecting and piping wastewater from the Urenui and Onaero towns and domains to a local treatment plant, then irrigating the treated water to land.

Legal Obligations

The Council currently provides wastewater collection and discharge to leach fields at the Urenui and Onaero domains. Under Section 130 of the Local Government Act 2002 (LGA) Council is required to continue to provide wastewater services where it already does so.

The Urenui and Onaero townships use septic tanks for wastewater treatment. While the Council is not responsible for the septic tanks (these are managed by the private landowners), the outflows from the septic tanks have been found to be contaminating the Council's stormwater discharge making it non-compliant with the Coastal Plan for Taranaki 2023 (Coastal Plan) and needs to be addressed.

Under the Health Act 1952 (Health Act) NPDC has a general obligation to "improve, promote, and protect public health within its district" along with specific obligations to address a "nuisance" and any "conditions likely to be injurious to health or offensive". The most current public health risk assessment by Te Whatu Ora indicated that contamination linked to wastewater presents a public health risk.

The fact that Council's legal obligations extend to both the townships and the domains has been taken into the account in the selection of solutions as the combinations must complement each other to be effective.

Options Assessment

There are three broad options for how the wastewater from Urenui and Onaero can be handled. Wastewater can either be:

- treated and discharged to land at source on individual properties
- collected and transported to the existing New Plymouth wastewater treatment plant (NPWWTP), either trucked or piped, or
- collected, treated and discharged locally to land, or sea or to surface water (river).

These options have been explored for:

- each township individually
- each domain individually, and
- combining the wastewater from the four areas

Options were assessed progressively against three steps of criteria:

1. whether they are practical, viable and protective of public health and the environment.
2. whether the cost could potentially be less than the Current Option and the difficulty of consenting
3. full comparison to the current option.

Options that met the first stage of criteria were then compared to the next stage criteria. Options that failed to meet that stage were not progress any further.

Thirteen different options were assessed. Five options progressed past the Stage 1 assessment as shown in the Summary of Options Assessment table below. These included one option for the townships, one for the domains and three options for combined wastewater flows from all four locations.

Options T5 (low pressure sewer combined townships, treat and discharge) and D4 (existing pipe network from baches and campgrounds, treat, discharge to land on new sites) dropped out at Stage 2 due to cost.

Summary of Options Assessment

Option	Township	Domains	Combined		
	T5	D4	C2	C3	Current
	Low pressure sewer combined townships to central location, treat and discharge	Existing pipe network from baches and campgrounds,	Collect and pipe to NPWWTP	Collect and pipe to 944 Main North Road, partially treat and store, pipe to NPWWTP	Collect and pipe to 944 Main North Rd, treat and discharge to land
Post Step-1	Yes	Yes	Yes	Yes	Yes
Post Step-2	No	No	Yes	Yes	Yes
Preferred option	N/A	N/A	No	No	Yes

Options C2 and C3 required further investigation to determine whether they would be lower cost than the Current Option. Risks, opportunities, advantages, and disadvantages were also considered for these options alongside the Current Option.

Cost comparison

Cost estimates Class 5 ($million)	C2 Collect and pipe to NPWWTP (Waitara capacity issues addressed prior to starting)	C3 Collect and pipe to 944 Main North Road, partially treat and store, pipe to NPWWTP when Waitara capacity allows	Current Option Collect and pipe to 944 Main North Rd, treat and discharge to land
Capital Cost	43	38	32
30 year NPV operational cost	3	3	8
Total	46	41	40

Overall the cost estimates for options C2, C3 and the Current Option were similar, given the project stage and level of accuracy of the estimates, cost are shown in the cost comparison table above.

The Current Option does have some significant advantages over Option C2 and C3:

- it aligns with NPDC's desire to implement the preferred options as quickly as possible to address the impact of failing septic tanks,
- is a standalone project that does not rely on upgrades or the resilience of any part of the existing network or the New Plymouth Wastewater Treatment Plant,
- is consistent with the National Policy Statement (NPS) direction to move away from sea discharges,
- aligns with Ngāti Mutunga's desire to treat the wastewater within their rohe and discharge to land, and
- is comparatively more likely to gain the required resource consents and already has the required land purchased.

Option C2 requires major upgrades to the existing Waitara wastewater network and transfer pump station are required before additional flows from Urenui and Onaero could be considered. The required upgrades would take considerable time to plan and construct and are estimated to cost $32M. $12M is currently allocated in Council's draft 24-34 LTP in years 1-10, to address the Waitara network overflows. A further $20M to upgrade the Waitara TPS is not currently included in the draft LTP.

Pumping through Waitara is required for Options C2 and C3 the resilience and level of service for Urenui and Onaero will be linked to the resilience of the Waitara network. If the Waitara network fails, the Urenui and Onaero system also fails.

Options C2 and C3 would involve pumping flows from Urenui and Onaero to the NPWWTP via the Waitara network through the rohe of all but one of the Te Atiawa hapū including through Owae marae and several crossings of the Tangaroa stream and associated wetland areas. Ngāti Mutunga (Urenui and Onaero mana whenua) have expressed their desire to treat the wastewater within their rohe and discharge the treated water to land and have indicated that they are not in a position to speak for other iwi or hapū who will likely be impacted should wastewater be piped through to Waitara or New Plymouth.

Based upon this assessment the Current Option is the recommended preferred option for management of wastewater in Urenui and Onaero.

2. Background

On 6 March 2024 Council officers presented an update on the Urenui and Onaero Wastewater Project to the Strategic Projects Committee. Following this presentation the committee agreed the following resolutions:

That, with regards to the Urenui and Onaero wastewater project:

a) Management reports back on the possibility of utilising the fast track consenting process to potentially reduce costs and expedite the project once details of the fast-tracking process becomes available.
b) Management explores and reports back what other options might be available to address the environmental problem the project aims to address at a lower cost, while continuing to progress the current proposed solution.

The purpose of this report is to address the second point in the resolution b) and provide options on other potentially lower cost options.

The Current Option for the Urenui and Onaero wastewater scheme involves collecting and piping wastewater from the Urenui and Onaero towns and domains to a local treatment plant, then irrigating the treated water to land.

2.1 Environmental concerns

Water quality testing of the Urenui River has shown there are issues with the performance of some private septic tanks, which are contaminating the surrounding environment and stormwater system.

Due to health concerns, Te Whatu Ora (Health New Zealand) has advised recreational users of Urenui River to stay off the mud flats, avoid collecting kai mātaitai/shellfish from the river and avoid swimming in the river for 72 hours after heavy rain. Ngāti Mutunga has also updated the existing rāhui on Urenui River to align with this advice.

Since 2019, NPDC has been working with Taranaki Regional Council (TRC), Ngāti Mutunga and Te Whatu Ora (TWO) to help residents fix and maintain their septic tanks and managing wastewater issues at both the Onaero and Urenui campgrounds. Unfortunately, this work is unlikely to resolve the contamination issue as the towns' septic tanks are too close together (due to property size) and the soil isn't suitable for septic tanks. Further information on the testing undertaken is included in Appendix A – *Urenui stormwater investigation (2019 – 2022), TRC, 2024*. Health risk advice from TWO is included in Appendix B.

In addition to the water quality concerns, the wastewater flows from the domains are currently greater than our resource consent allows, the Onaero wastewater irrigation site is at risk of coastal erosion, and the Urenui wastewater irrigation site is on culturally important land.

2.2 2021/31 LTP Consultation

During NPDC's community consultation on the 2021-31 Ten-Year Plan, Ngāti Mutunga and locals made it clear that they wanted a long-term solution to the contamination of the Urenui River, which has led to NPDC approving the construction of a new wastewater treatment system.

2.3 Council's Legal Obligations

Council is legal obligated to continue to provide wastewater services to the domains. This is a requirement under Section 130 of the Local Government Act 2002 (LGA) which requires Council to continue to provide wastewater services where it already does so. There is provision to discontinue providing a wastewater service provided it is being provided to less than 200 people and the Council satisfies the procedural requirements for cessation. Among other requirements this would require a binding referendum and 75% support from the affected persons.

Council is legally obligated to address the contamination of the stormwater discharges caused by the septic tanks. Council has worked with TRC, TWO and property landowners to remove four identified contamination sources. While these have made an improvement, contamination by human faecal matter has still been detected in the waterways. This contamination means that stormwater discharges to the Urenui estuary are currently noncompliant with the Coastal Plan for Taranaki 2023 (Coastal Plan). The Council will need to address the contamination in its stormwater discharge to comply with Rule 2 or obtain a resource consent under Rule 4 for the stormwater discharge. It is unlikely that a resource consent could be granted under this non-complying rule as we are unable to meet the conditions of Policy 30.

Council also has a general obligation under the Health Act 1952 (Health Act) "to improve, promote, and protect public health within its district" along with specific obligations to address a "nuisance" and any "conditions likely to be injurious to health or offensive". The most current public health risk assessment by Te Whatu Ora indicated that contamination linked to wastewater presents a public health risk. Furthermore, the TRC have concluded in their report that "it appears unlikely that septic tank wastewater contamination in Urenui could be completely eliminated without fundamental changes to the way in which wastewater from the township is treated and disposed of."

On balance we consider Council is legally obligated to address the contamination of the river linked to the septic tanks. The fact that Council's legal obligations extend to both the townships and the domains has been taken into the account in the selection of solutions as the combination must complement each other to be effective.

2.4 Cultural Considerations

Although the resolution specifically asks management to look for lower cost options, Council also has other statutory obligations and one of these is to "take into account the relationship of Māori and their culture and traditions with their ancestral land, water, sites, waahi tapu, valued flora and fauna, and other taonga", as per clause 77(1)(a) of the Local Government Act 2002 and Clause 6(e) of the Resource Management Act 1991.

Council is working with Ngāti Mutunga to progress the Current Option. Ngāti Mutunga have advised Council that their preference is to manage the Urenui and Onaero wastewater within their rohe (area) and have the treated water discharged to land.

2.5 Current Project Budget

The current estimated total budget for the Urenui and Onaero Wastewater Project, along with the proposed budget for the 2024/34 LTP are shown in Table 1.

Table 1: Project budget

Estimated project spend to the end of 23/24 financial year	$8 million*
2024/34 LTP proposed project budget	$33 million
TOTAL project cost Class 5 estimate	$41 million*
2021/31 LTP project budget	$29 million
Current approved TOTAL project budget (2021/31 LTP + $5.5M additional Main North Road property)	$35 million

*Assumes Waiau Road property will sell for the purchase price of $3.3 million.

3. Options For Consideration

There are three broad options for how the wastewater from Urenui and Onaero can be handled. Wastewater can either be:

- treated and discharged to land at source on individual properties (an on-site decentralised solution)
- collected and transported to the existing New Plymouth wastewater treatment plant (NPWWTP), either trucked or piped, (a centralised solution disposed of out of the rohe) or;
- collected, treated and discharged locally to land, or sea or to surface water (river) (a centralised solution disposed of within the rohe).

These options have been explored for:

- each of the two townships individually
- each of the two domains individually, and
- combining the wastewater from the four areas

The resulting options considered are:

At source options for individual townships

T1 Water free toilets and greywater/soakage field for remainder of wastewater.

T2 Upgrade septic systems to advanced treatment including UV treatment.

Collect and transport options for individual townships

T3 Storage tank installed on each property (needs to be easy access), store, truck to NPWWTP.

T4 Low pressure sewer to central township location, store, truck to NPWWTP.

Collect, treat and discharge options for combined townships

T5 Low pressure sewer combined townships to central location, treat and discharge locally.

At source options for individual domains

D1 Water free solutions for toilets and greywater/soakage field for remainder of wastewater.

D2 Install advanced treatment septic systems which include UV treatment.

Collect and transport options for individual domains

D3 Existing pipe network from baches and campgrounds, store, truck to NPWWTP.

Collect, treat and discharge locally options for individual domains

D4 Existing pipe network from baches and campgrounds, pipe, treat, discharge to land on new sites.

Domains and townships combined options

C1 Collect and pipe to 944 Main North Road, store, truck to NPWWTP.

C2 Collected and pipe to NPWWTP on demand (Waitara capacity issues would need to be addressed prior to implementing this option).

C3 Collect and pipe to 944 Main North Road, partially treat and store, pipe to NPWWTP when Waitara capacity allows.

C4 Current option, collect and pipe to 944 Main North Road, treat and discharged to land.

As council is legally required to provide solutions for both townships and domains any individual option must ultimately be considered alongside other individual options, to ensure there is a broader solution for all four areas.

Options dismissed early

Piping through Waitara to the NPWWTP without upgrades or storage

Piping through Waitara to NPWWTP without network upgrades or having an ability to cease pumping during wet weather, has not been considered as this option would increase the frequency and the volume of existing overflows in Waitara. Council's emergency consent to discharge out the Waitara outfall expires in 2040 and cannot be extended as this type of discharge is prohibited under the Coastal Plan for Taranaki 2023 (Coastal Plan).

Discharging the treated water to the coast via a local outfall

New discharges of treated wastewater to the coast are prohibited under Rule 7 of the Coastal Plan for Taranaki 2023.

Discharge of treated water to surface water

This is considered culturally offensive to Ngāti Mutunga. Discharge of treated wastewater to surface water is a discretionary activity under the *Regional Fresh Water Plan for Taranaki, 2001*, this means there is the ability to grant or decline resource consent. One of the matters of national importance under the RMA (the legislation under which resource consents and notice of requirements are processed) is "the relationship of Māori and their culture and traditions with their ancestral land, water, sites, waahi tapu, valued flora and fauna, and other taonga", Clause 6(e). If Ngāti Mutunga were to actively oppose the granting of resource consent and designation on the basis that the discharge was considered culturally offensive, it would be very difficult to gain consent. Council has also already purchased land, demonstrating that discharge to land is a viable alternative for this project, that is supported by Ngāti Mutunga. This would strengthen the argument against granting consent for discharge to surface water.

In addition, the level of treatment would also need to be considerably higher for discharge to surface water (total nutrient removal) likely requiring use of the Membrane Bioreactor process. The cost for this type of treatment is in the order of 50% more than the Current Option. When you take into account the cost of the pump station, pipeline to the river and river discharge structure the overall cost is likely to be similar to the Current Option.

Discharge of treated water by deep well injection

Previous investigations identified that costs were similar to discharge to land, with a much higher risk as deep well injection of treated water is an untested technology in New Zealand and comes with the risk of potentially contaminating existing freshwater aquifers.

Discharge through wetland to surface water

Ngāti Mutunga has indicated that this option offers no cultural advantages when compared to direct discharge to surface water and would be higher cost than direct discharge to surface water due to construction of a wetland to discharge to.

4. Options Assessment Process

Options were assessed progressively against three criteria:

1. whether they are practical, viable and protective of public health and the environment
2. whether the cost could potentially be less than the Current Option and the difficulty of consenting
3. full comparison to the current option

Options that met the criteria progressed and were compared to the next criteria. Options that fail to meet the criteria did not progress any further.

Step 1 Practical, Viable and Protective

Practical – options were assessed on their practicality of use and operation, a wastewater system must be easy to use and effective for those are using it daily. For Urenui and Onaero townships and domains this includes:

- families of all sizes and ages from small children to the elderly, including those with disabilities
- businesses including cafes, offices, hotels
- accommodation including motels, campgrounds, bed and breakfast, holiday homes
- school, early childcare
- bowling club

This also includes Council staff who will be required to operate the system on a day to day basis.

Viable – options were assessed on whether it is viable to install the system across the entire townships, capable of operating successfully and reliably long-term, including resilience during severe weather events.

Protective - options were assessed on whether they would be protective of public health, address the environmental issues caused by the failing septic systems and not cause any further environmental issues.

Options that were not considered practical, viable or protective of public health and the environmental were ruled out at this stage.

Step 2 Cost, Consenting

At this step high level costings were prepared to determine whether the option could potentially be lower in cost than the current option. The option was also assessed for whether any resource consents would be required, whether consents could be granted and how difficult it would be to obtain resource consent.

Options that were not likely to be lower cost than the Current Option or that couldn't be consented or would be very difficult to consent would be ruled out at this stage.

Step 3 Full Comparison to Current Option

At this step a detailed comparison prepared to compare the option against the Current Option.

5. Assessment Of Options

5.1 At source options for individual townships

Option T1 - Water free toilets and greywater/soakage field for remainder of wastewater

Step 1 - Practical, Viable, Protective

This option would use a water free solution for toilets with the remainder of the wastewater produced being discharged to a soakage field or utilised as a greywater system.

Toilets contribute approximately 25% of total wastewater from residential properties[1], with the remainder being wastewater from laundry, showers, kitchen. This proportion can vary depending on the type of activity undertaken on that property. The remainder of the wastewater produced on a property would still need to be managed by either installation of a soakage field or greywater system. The faecal bacteria loading is reduced when wastewater from toilets is removed however faecal bacteria is still likely to be present. It is possible that applying this water to land on such small properties with unsuitable and nutrient saturated soil may still result in faecal bacteria being detected in stormwater from the area. Therefore this option may not address the environmental impacts that need to be addressed.

Some of the common types of waterless toilets include

- Composting toilets – systems that naturally decompose human waste into compost that can be used as fertiliser for gardens
- Incinerating toilets – where the waste is burnt into sterile ash which is then disposed of in the rubbish collection.
- Dry flush toilets – system that use liner bags that collapse and seal the waste every time you flush and store it in airtight pockets for disposal via the rubbish collection.

These types of systems generally require a level of commitment from the owner to maintain the system, including emptying and disposing the contents and acquiring the consumables needed to maintain the system.

Composting toilets generally require:

- Emptying of the system and either burying the partially composted material somewhere on site or storing onsite until it matures and used as fertiliser.
- Addition of a bulking agent which is often added after each use, this could be coconut fibre, wood shavings, peat moss and would likely need to be purchased.
- Toilet cleaners that won't harm the bacteria that are creating the compost.
- The bacteria must be kept happy and thriving to avoid odours.
- Some systems require a connection to electricity to provide aeration.

[1] NZS1547

The Cinderalla incineration toilet requires:

- A 45min to 3 hr incineration cycle after using the toilet 3 or 4 times an hour, i.e. it cannot be used again until this cycle is completed.
- Installation of a toilet liner every time the toilet is used (purchase price of $95 NZ for 500).
- Installation of a flue for every toilet, this would need to be located inside the room and vented through the roof if the toilet isn't on an outside wall adding unknown renovation costs.
- Disconnection of the toilet and running water through the system annually, outside or in a tub, as well as annual cleaning of the flue.
- Emptying of the system every 100 uses and disposal of the ash.

It is uncertain what the impact would be on air quality, from incineration of toilet waste, if this type of toilet was used in a township where there would be numerous discharges in close proximity to each other. Discharge to air for waste management processes is a Discretionary rule in the Regional Air Quality Plan for Taranaki and is therefore likely to require resource consent.

The Laveo dry flush toilet requires:

- use of a long mylar plastic bag which twists to contain the waste.
- use of a powder to solidify the urine so that it can be stored in the bag.
- Each bag lasts around 15 flushes after which the owner must dispose of the waste.

Due to the above requirements these types of toilets are not considered practical for general use across a township. There is also the potential for significant issues with installation and therefore the viability of this option, particularly where flues are required to be installed and toilets are larger than a standard toilet to accommodate storage of waste.

Step 1 assessment

Practical	No
Viable	No
Protective	Partial
Consider further	No

This option is excluded due to the ongoing high user intervention that is required to operate the toilets, the impracticality of retrofitting toilets to existing dwellings, and the uncertainty around whether this option would remediate the environmental issues.

Option T2 - Upgrade septic systems to advanced treatment including UV treatment

Step 1 - Practical, Viable, Protective

Each property would have its existing septic tank and disposal field removed and the ground reinstated. A new advanced aerated wastewater treatment system with tertiary disinfection (UV) will be installed on most properties. A new land disposal system would be installed for each property. Council considers it highly likely that UV treatment will be required due to the historical contamination issues in Urenui. Detailed site investigation, reporting and bespoke system design will be required for each property in the townships. Every property will require a building consent. A significant proportion of properties will require a resource consent as they cannot comply with AS/NZS1547:2012 and the TRC freshwater plan requirements.

Advanced treatment systems have much higher maintenance requirements than primary septic tanks. The UV bulbs in each system should be replaced annually. Quarterly effluent testing of each system should be carried out to ensure discharge meets quality limits. If this is not done then the discharged effluent will still have a pathogen load that could continue causing adverse environmental effects.

The amount of nutrients that are removed by these systems is greater than primary septic tanks but there is still a residual load that needs further removal and treatment within the soil. Advanced onsite treatment does not reduce the volume of wastewater being generated and disposed on each property. There is a significant majority of properties in both townships that likely cannot meet the AS/NZS1547:2012 requirements for soil types, available disposal area, depth to groundwater, proximity to waterbodies and are not suitable for land disposal, regardless of the treated effluent quality. There will be no ability to manage or control the application rate of effluent to ground during heavy rainfall to prevent ground inundation and reduce the risk of contamination. The cumulative effect of this has not been investigated in detail but it is likely that treated effluent will continue entering the groundwater and stormwater systems without the full removal of nutrients, potentially causing adverse environmental effects.

As Council is legally required to resolve the contamination issue, the only remaining option for the properties where onsite treatment and disposal is not feasible is collection and conveyance to an off-site treatment facility. When this is combined with the requirement to convey the wastewater from the domains to a treatment plant, then the marginal cost of connecting the remaining properties in the towns is far less than upgrading individual onsite disposal systems.

Step 1 Assessment

Practical	Yes
Viable	No
Protective	Partial
Consider further	No

This option is not considered further as it cannot provide a solution for all the properties in the townships and the uncertainty around whether this option would remediate the environmental issues.

5.2 Collect and transport options for individual townships

Option T3 - Storage tank installed on each property (needs to be easy access), store, truck to NPWWTP

Step 1 - Practical, Viable, Protective

A new wastewater storage tank would be installed on the front of each property (if possible) that must be easily accessible from the street. A sucker truck would empty this tank out when it is close to full. This would occur on average once every 2 days, depending on occupancy rates and water usage. Level monitoring and SCADA connection to NPDC operations would be required to monitor tank levels and schedule sucker truck visits.

A practical, available tank size for this application would be in the order of 3 m^3. To keep pace with the expected daily average wastewater flows for the towns requires 44 truck visits per day resulting in 15 trucks, working 12 hours per day, every day. There are large peaking factors during wet weather and high occupancy periods. No allowance has been made to the above numbers for surge capacity during extended wet weather events. This would require either significant standby truck capacity or much larger onsite storage.

There will be ongoing odour issues at each property from sucker truck operation. This option commits council to continuous, ongoing truck movements across each township. Trucks are a much more energy and CO_2 intensive way to transport liquids than pipes and pumps. Any manual failure in the process to remove wastewater will result in an overflow of raw sewage to the environment.

Construction of a septage reception facility is also required at the NPWWTP before this operation can start. This is currently in the draft LTP for construction in FY32/33.

The annual opex costs for this are estimated to be in the order of $5M. The capital cost of the truck fleet is estimated to be $7M.

Step 1 Assessment

Practical	No
Viable	No
Protective	Partial
Consider further	No

This option is not considered any further due to intensive operational requirements, disruption to residents and adverse effects, lack of resilience and overflow risks.

Option T4 - Low pressure sewer to central township storage location, store, truck to NPWWTP

Step 1 - Practical, Viable, Protective

This option requires the same total truck numbers as individual tank and sucker truck option T3. It has similar ongoing operational issues, costs and resilience risks.

This option has been discounted due to very high operational requirements, lack of resilience and overflow risks.

Step 1 Assessment

Practical	No
Viable	No
Protective	Partial
Consider further	No

5.3 Collect, treat and discharge options for combined townships

Option T5 - Low pressure sewer combined townships to central location, treat and discharge

Step 1 – Practical, Viable, Protective

This option would involve construction of a new collection network to each property in Urenui and Onaero, and a conveyance pipe network that connects both townships to a centrally located site or sites which are large enough for a treatment plant, post treatment storage and discharge of treated wastewater.

Conveyance with central treatment and discharge is a common wastewater solution which is currently operating in many districts in New Zealand. It is capable of servicing a variety of consumers, has a proven track record of performance and would greatly improve the current environmental issues and will be progressed to Step 2.

Step 1 Assessment

Practical	Yes
Viable	Yes
Protective	Yes
Consider further	Yes

Step 2 – Cost, Consenting

This option is essentially the same as the combined collection, treat and discharge options that are explored further in section 4.7 below. Approximately 80% of the flows from the overall catchment area (townships and domains) come from the two townships. As such, the cost for the treatment plant, disposal area, etc for a system that treats just the townships would be equivalent to options that combine the townships and domains for collection, treatment and disposal.

Consenting requirements for a standalone treatment and disposal system would be equivalent to the requirements for the current option.

Because this option only deals with the townships and does not have any meaningful cost savings over the current combined option, it is not considered further.

Step 2 assessment

Costs	No
Consents	Yes
Consider further	No

5.4 At source options for individual domains

Option D1 - Water free solutions for toilets and greywater/soakage field for remainder of wastewater

Step 1 - Practical, Viable, Protective

The Urenui and Onaero baches are located on very small properties which would be too small to accommodate a functional soakage field or grey water system. This along with the practicality and viability limitations of waterless toilets discussed in section 4.1 of theT1 options, means this option does not meeting the requirements to be considered further.

Step 1 assessment

Practical	No
Viable	No
Protective	No
Consider further	No

Option D2 - Install advanced treatment septic systems which include UV treatment.

Step 1 - Practical, Viable, Protective

The Urenui and Onaero baches are located on very small properties which would be too small to accommodate an advanced treatment septic system and associated septic field. Therefore, this option does not meet the requirements to be considered further.

Step 1 assessment

Practical	No
Viable	No
Protective	No
Consider further	No

5.5 Collect and transport options for individual domains

Option D3 - Existing pipe network from baches and campgrounds, store, truck to NPWWTP

Step 1 - Practical, Viable, Protective

This option would require a storage facility to be constructed at each of the domains. Sucker trucks would be used to remove raw wastewater from this storage and transport it to the NPWWTP. Each domain is subject to large peaking factors during wet weather and/or high occupancy periods. To accommodate this the storage required would either be large to buffer expected flow variation (7 days storage) or small (1 day) with significant surge trucking capacity on standby. It is also likely that an air discharge resource consent would be required for the storage facility.

Urenui domain – Daily average eight truck movements, peak between 21 – 47 truck movements depending on storage volume.

Onaero domain – Daily average two truck movements, peak between three to seven truck movements depending on storage volume.

There will be ongoing odour issues at each site from sucker truck and storage tank operation. This option commits council to continuous, ongoing truck movements in and out of both domains. Trucks are much more energy and CO_2 intensive way to transport liquids than pipes and pumps. Any failure in this manual process to remove wastewater will result in an overflow of raw sewage to the environment.

Construction of a septage reception facility is also required at the NPWWTP before this operation can start. This is currently in the draft LTP for construction in FY32/33.

Both domains are Ngāti Mutunga land and contain multiple sites of significance. It is highly likely there would be strong opposition from Ngāti Mutunga to the construction and operation of such a facility.

When considering option D3 alongside the only potential option for the townships (collection and conveyance to central location), it does not make practical sense operate a separate type of wastewater system to that used to service the townships.

Due to the high manual intensity of operating this option, its high obtrusive nature due to truck movement and odour, and low resilience this option has not been considered further.

Step 1 Assessment

Practical	No
Viable	No
Protective	Partial
Consider further	No

5.6 Collect, treat and discharge locally options for individual domains

Option D4 – Existing pipe network from baches and campgrounds, pipe, treat, discharge to land on new sites

Step 1 - Practical, Viable, Protective

This option would utilise the existing pipe network at the domains to collect the wastewater from the baches and campground. The wastewater would be piped from the existing pump stations at the domains to sites which are large enough for a treatment plant, post treatment storage and irrigation of the treated wastewater to land on site. This option is essentially replacing the septic tank and disposal fields of the existing domain wastewater systems with a new treatment plant and onsite disposal at a new location.

Risks

Land will need to be purchased in the vicinity of each domain for the treatment plant and discharge field. Approximately 4 Ha of flat suitable land would be required for Urenui Domain and approximately 1.5 Ha for Onaero. At a minimum the sites would need to be outside of the Coastal Hazard Zone to ensure the resilience of the infrastructure; away from sites of significance to Māori; have suitable soil and contour for irrigation and have a buffer around the treatment plant. Finding suitable sites with willing sellers is a risk. The further the sites are from the domains the higher the cost of piping. Resource consents will be required for each site.

Step 1 assessment

Practical	Yes
Viable	Partial
Protective	Yes
Consider further	Yes

This option is practical for the baches and campgrounds that would use it. It may be viable depending on whether suitable land can be procured, and this option would be protective of the environment. This option will progress to Step 2 for further consideration.

Step 2 - Cost, Consenting

Piping distances and related costs could potentially reduce if sites closer to the domains than 944 Main North Road can be purchased. However, other costs are likely to increase significantly compared to the portion of the costs of the Current Option which are attributed to the domains. This is due to duplication of processes, economies of scale and the fixed cost nature of many of the components of the treatment and discharge system.

Land

More land will be required for two sites than would be needed if the domains wastewater was combined and treated with the township's wastewater. This is due to still requiring a buffer of non-irrigated land around the boundary of the site, still needing a buffer between the treatment plant and site boundary and needing additional land to locate a treatment plant at both sites. Land is also likely to cost more comparatively as smaller lots generally demand a higher price per hectare than larger lots.

Treatment plant and irrigation

The treatment plants and irrigation systems will be scaled down compared to the Current Option but will still have components that are needed regardless of wastewater flows, i.e. there is a large fixed price component.

High level capital costs are provided in Table 2 for this option with a key assumption that suitable land can be found within 2km of the domains. These are then compared to the proportion of cost for the Current Option which could be allocated to the domains based upon the flow they contribute.

Table 2 Capital cost comparison for Option D4 and current option

	Urenui Domain	Onaero Domain
High level capital cost for option D4 (Class 5)	$11,000,000	$8,000,000
Approximate proportion of the total flow from both townships and domains	11%	2%
Proportion of the current capital costs attributed to the domains based on flows (Current Option capital cost estimate $41M Class 5)	$4,510,000	$820,000

*Excludes 2M of costs that would need to be written off to move to another option.

Operational costs

Operational costs are also anticipated to be higher as two treatment plants and irrigation systems would need to be managed on an ongoing basis.

Consents and designations

Consents for both sites could be sought at the same time but there would still be considerable additional work to be completed due to having to baseline each site separately and model effects for both sites. There would also be additional engagement and consultation require with two sets of site neighbours rather than one.

As Council is also legally required to address the environmental concerns related to septic tank failure issues in the townships, the costs of this option for the domains must be added to the cost of a viable option/s for the townships when comparing to the current option. The only township option that progressed to Step 2 was option T5 - Low pressure sewer combined townships to central location, treat and discharge. Option T5 was not considered to have any significant cost savings when compared to the Current Option and therefore the combination of T5 and this option would cost considerably more than the Current Option.

Step 2 assessment

Costs	No
Consents	Partial
Consider further	No

This option would not provide any cost savings compared to the Current Option when combined with option T5 for the townships.

5.7 Domains and townships combined options

Option C1 - Collect and pipe to 944 Main North Road, store, truck to NPWWTP

Step 1 - Practical, Viable, Protective

This option would involve construction of a new collection network for each property in Urenui and Onaero, and a conveyance pipe network that connects both townships and domains to the site at 944 Main North Road. Untreated effluent would be stored on site in a large facility, most likely a lined pond to account for flow variation due to occupancy and rainfall. A fleet of sucker trucks would then empty this pond and deliver the effluent to the New Plymouth wastewater treatment plant where it would go through the treatment process and be discharged to sea via the marine outfall.

The average daily flow arriving at the site from both townships and both results in even greater volumes and subsequent truck numbers than other options.

It has the same issues for operations, resilience, risks and costs and so it has not considered any further on same basis.

Step 1 Assessment

Practical	No
Viable	No
Protective	Partial
Consider further	No

Option C2 - Collect and pipe to NPWWTP without buffer storage (requires upgrades to Waitara network)

Step 1 - Practical, Viable, Protective

This option would involve construction of a new collection network for each property, and a conveyance pipe network that connects both townships and domains to the site at 944 Main North Road. The effluent would then be pumped on to Waitara, where it would discharge into the reticulation network, arriving at the New Plymouth wastewater treatment plant where it is treated and discharged to sea via the marine outfall.

Due to the long pumping distance between the site at 944 Main North Road and the closest connection point in Waitara, odour and septicity of the wastewater becomes a significant issue. A chemical or oxygen dosing facility will be required to manage this. An odour bed will be required at the point of discharge in Waitara.

The Waitara network currently has significant existing capacity issues that lead to overflows during wet weather. All these issues will need to be addressed before the additional flows from Urenui and Onaero can be connected.

The Waitara transfer pump station that collects and pumps the entire Waitara network on to the New Plymouth wastewater treatment plant has a consent to discharge untreated wastewater to sea during heavy rain. The new coastal plan prohibits the renewal of this discharge consent. If the additional flows from Urenui and Onaero are discharged during wet weather we are knowingly adding to the total amount of wastewater that would overflow during wet weather. An upgrade of the transfer pump station would be required as it is currently unable to handle wet weather flows.

The environmental issues that are currently occurring would be fully addressed by this option.

Step 1 Assessment

Practical	Yes
Viable	Partial
Protective	Yes
Consider further	Yes

Step 2 – Cost, Consenting

The reticulation and conveyance networks for this option is the same as for the current local treatment and discharge option. An initial, high-level assessment of this options capital and operational costs shows that they are similar to the current local treatment and discharge.

Consents and designations would likely still be required for the pump stations and other infrastructure. None of these are prohibited activities so resource consents could potentially be granted. The acceptability to local hapu of pumping wastewater to Waitara would need to be determined.

Step 2 assessment

Costs	Yes
Consents	Partial
Consider further	Yes

Due to the similarity in cost and potential for resource consents to be granted, this option has progressed to a full comparison to the current option. This is summarised in Section 5.8.

Option C3 - Collect and pipe to 944 Main North Road, partially treat, store, pipe to NPWWTP when Waitara capacity allows

Step 1 - Practical, Viable, Protective

This option would involve construction of a new collection network for each property, and a conveyance pipe network that connects both townships and domains to the site at 944 Main North Road. Untreated effluent would be stored on site in a large storage facility, most likely a lined pond to account for flow variation due to occupancy and rainfall. A pipeline would be constructed to pump wastewater from this pond to the Waitara network. Due to the issues with septicity and odour discussed in option C2 above, the pond should allow for some primary treatment to occur. The pond will also require a live storage volume sized for 7 days of wet weather flows. This will allow for the temporary halting of the discharge into the Waitara network during periods of heavy rain, when the Waitara network is operating close to or beyond capacity.

The environmental issues that are currently occurring would be fully addressed by this option.

Step 1 Assessment

Practical	Yes
Viable	Partial
Protective	Yes
Consider further	Yes

Step 2 – Cost, Consenting

The reticulation and conveyance networks for this option is the same as for the current local treatment and discharge option. An initial, high-level assessment of this options capital and operational costs shows that they are similar to the current local treatment and discharge.

Consents and designations would likely still be required for the storage ponds, pump stations and other infrastructure. None of these are prohibited activities so resource consents could potentially be granted. The acceptability to local hapu of pumping wastewater to Waitara would need to be determined.

Step 2 assessment

Costs	Yes
Consents	Partial
Consider further	Yes

Due to the similarity in cost and potential for resource consents to be granted, this option has progressed to a full comparison to the current option. This is summarised in Section 5.8.

Option C4 - Current option, collect and pipe to 944 Main North Road, treat and discharge to land

Step 1 - Practical, Viable, Protective

This option would involve construction of a new collection network for each property, and a conveyance pipe network that connects both townships and domains to the site at 944 Main North Road. A new treatment plant, storage facility for treated effluent and land disposal system will be constructed on the site.

This option is the baseline against which the two options (C2 and C3) that passed both assessment criteria have been compared against.

5.8 Step 3 Assessment

Options C2 (Collect and pipe to NPWWTP without buffer storage (requires upgrades to Waitara network)) and C3 (Collect and pipe to 944 Main North Road, partially treat, store, pipe to NPWWTP when Waitara capacity allows), were considered likely to be similar in cost to the Current Option, with a potential for resource consents to be granted and therefore progressed to Step 3 – full comparison to the Current Option, C4 (collect and pipe to 944 Main North Road, treat and discharge to land).

Engineering consultants Beca were commissioned to undertake the comparison of these three options. Full details of their assessment are included in Appendix C - *Comparison of Options – Piping to New Plymouth and Local Treatment and Land Discharge, Beca, 2024.* A summary of their comparison of options is shown in Table 4.

Key findings

Overall the cost estimates for options C2, C3 and the Current Option were similar, given the project stage and level of accuracy of the estimates, as shown in Table 3.

Table 3 Cost Estimates

	C2	C3	Current option
Cost estimates Class 5 ($million)	Collect and pipe to NPWWTP (Waitara capacity issues addressed prior to starting)*	Collect and pipe to 944 Main North Road, partially treat and store, pipe to NPWWTP when Waitara capacity allows	Collect and pipe to 944 Main North Rd, treat and discharge to land
Capital Cost	43	38	32
30 year NPV operational cost	3	3	8
Total	46	41	40

*includes a flow based portion (12%) of upgrade costs for work to Waitara network and pump station, not all costs ($32M).

For Option C2 major upgrades to the existing Waitara wastewater network and transfer pump station are required before additional flows from Urenui and Onaero could be considered. The Waitara network has capacity during dry weather but in wet weather the āadditional flow would increase the frequency and volume of overflows from the network and discharges via the Waitara ocean outfall. These discharges are inconsistent with the Regional and National Coastal Policy Statement and would likely be unable to gain a resource consent. The required upgrades would take considerable time to plan and construct and are estimated to cost $32M. $12M is currently allocated in Council's draft 24-34 LTP in years 1-10, to address the Waitara network overflows. A further $20M to upgrade the Waitara TPS is not currently included in the draft LTP.

As pumping through Waitara is required for Options C2 and C3 the resilience and level of service for Urenui and Onaero will be linked to the resilience of the Waitara network.

Waitara has several known resilience issues, including flood risk to the town bridge and seismic risk to the transfer pump station. If the Waitara network fails, the Urenui and Onaero system also fails.

Option C3 which includes the construction of oxidation ponds for pretreatment of the Urenui and Onaero flows before pumping to NPWWTP has not been assessed in detail. This option utilises a large storage/treatment pond to avoid the need to upgrade the Waitara network. There are potential risks around the pond size and location and the ability to fit these within the 944 Main North Road site. New MBIE dam safety regulations may affect the pond design.

Options C2 and C3 would involve pumping flows from Urenui and Onaero to the NPWWTP via the Waitara network through the rohe of all but one of the Te Atiawa hapū including through Owae marae and several crossings of the Tangaroa stream and associated wetland areas. Ngāti Mutunga (Urenui and Onaero mana whenua) have expressed their desire to treat the wastewater within their rohe and discharge the treated water to land and they have indicated that they are not in a position to speak for other iwi or hapū who will likely be impacted should wastewater be piped through to Waitara or New Plymouth.

The Current Option for a new local WWTP at Onaero would operate as an independent system that removes impacts on the Waitara wastewater network and New Plymouth Wastewater Treatment Plant.

The Current Option aligns with NPDC's desire to implement the preferred options as quickly as possible to address the impact of failing septic tanks. It is a standalone project that does not rely on upgrades or the resilience of any part of the existing network or the New Plymouth Wastewater Treatment Plant. It aligns with Ngāti Mutunga's desire to treat the wastewater within their rohe and discharge to land. It is also comparatively more likely to gain the required resource consents and already has the required land purchased.

Table 4 Comparison of Options

<table>
<tr><th></th><th>OPTION C2 (OPTION 1A)</th><th>OPTION C3 (OPTION 1B)</th><th>CURRENT OPTION (OPTION 2)</th></tr>
<tr><td>Option Description and assumptions:</td><td>Option 1A: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) and disposal of treated wastewater to sea via the existing outfall.

Includes reliance on upgrades to the Waitara wastewater network, Waitara transfer pump station (TPS) and rising main and NP WWTP to manage existing capacity issues.</td><td>Option 1B: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) and disposal of treated wastewater to sea via the existing outfall.

Includes oxidation/detention ponds to allow greater independence from existing capacity issues. Some long-term upgrades to the Waitara network and NP WWTP are still required.</td><td>Piping wastewater locally to a new local treatment plant and disposal of treated wastewater to land.</td></tr>
<tr><td>Wastewater collection:
Same for all options</td><td colspan="3">Townships - Low pressure sewer (LPS)
Urenui domain and campground - Existing gravity reticulation retained.
Onaero domain - LPS</td></tr>
<tr><td>Wastewater conveyance:
Preferred option currently under review</td><td colspan="2">Urenui township and domain - Central/transfer pump station in Urenui township pumps to second transfer pump station on SH3
Onaero domain – LPS pumps to transfer pump station on SH3
Urenui township – LPS pumps to transfer pump station on SH3</td><td>Urenui township and domain - Central/transfer pump station in Urenui township pump to WWTP
Onaero domain – LPS pumps to WWTP in shared main
Urenui township – LPS pumps to WWTP in shared main</td></tr>
<tr><td>Wastewater transfer:</td><td><table><tr><th>Location</th><th>Solution</th><th>Storage at PS</th><th>Concept flow rate</th></tr><tr><td>SH3 – exact location TBC</td><td>Transfer pump station using progressive cavity pumps (PC) and 200OD PE100 rising main to Waitara.</td><td>24hrs ADWF</td><td>18 L/s</td></tr></table>Odour/septicity remains a risk and management required for long distance pumping (9.5km rising main) – concept is for oxygen or chemical feed facility and bio-filter at discharge to Waitara</td><td><table><tr><th>Location</th><th>Solution</th><th>Storage at PS</th><th>Concept flow rate</th></tr><tr><td>SH3 – exact location TBC</td><td>Transfer pump station using progressive cavity pumps (PC) and 200OD PE100 rising main to Waitara.</td><td>4hrs ADWF – additional storage provided at oxidation ponds</td><td>18 L/s</td></tr></table></td><td>Not required</td></tr>
<tr><td>Wastewater treatment:</td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Not required, note odour management required at rising main discharge to Waitara.</td></tr><tr><td>Treatment</td><td>Existing NPWWTP and sea outfall</td></tr></table></td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Oxidation ponds with 7 days detention storage</td></tr><tr><td>Treatment</td><td>Existing NPWWTP and sea outfall</td></tr></table></td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Not required</td></tr><tr><td>Treatment</td><td>New/local WWTP and land discharge</td></tr></table></td></tr>
</table>

<table>
<tr><th></th><th colspan="2">OPTION C2 (OPTION 1A)</th><th colspan="2">OPTION C3 (OPTION 1B)</th><th colspan="2">CURRENT OPTION (OPTION 2)</th></tr>
<tr><td>Downstream network upgrades:

Note: % attributed to U&O project provided by NPDC based on initial high level estimate</td><td colspan="2"><table><tr><td>Location</td><td>Mitigation option</td></tr><tr><td>Waitara network</td><td>Waitara overflows program/reticulation upgrades – 12% attributed to U&O project</td></tr><tr><td>Waitara TPS incl. rising main</td><td>Waitara TPS pump station upgrades including pumps, storage tanks, rising main, and demolition of existing structures – 12% attributed to U&O project</td></tr><tr><td>New Plymouth WWTP</td><td>Buffer storage at NPWWTP – 4.5% attributed to U&O project</td></tr><tr><td></td><td>Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td></tr></table></td><td colspan="2"><table><tr><td>Location</td><td>Mitigation option</td></tr><tr><td>Waitara network</td><td>Oxidation pond storage negates need for upgrades. 0% attributed to U&O project</td></tr><tr><td>Waitara TPS incl. rising main</td><td>Oxidation pond storage negates need for upgrades. 0% attributed to U&O project</td></tr><tr><td>New Plymouth WWTP</td><td>Buffer storage at NPWWTP – 0% attributed to U&O project</td></tr><tr><td></td><td>Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td></tr></table></td><td colspan="2">Sludge transferred to NP WWTP via tanker for further processing. Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td></tr>
<tr><td>Capital cost estimate: (Class 5):

Refer Appendix A for detailed breakdown, assumptions, and disclaimer.

Costs for existing Waitara network and NP WWTP upgrades provided by NPDC.</td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Collection – LPS system</td><td>9,100,000</td></tr><tr><td>Conveyance and transfer - Transfer to Waitara including odour/septicity management</td><td>24,980,000</td></tr><tr><td>Treatment – not required.</td><td>-</td></tr><tr><td>Existing network upgrades - Share of Waitara network and NP WWTP upgrades</td><td>8,480,000</td></tr><tr><td>Total capital cost estimate</td><td>42,560,000</td></tr></table></td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Collection – LPS system</td><td>9,100,000</td></tr><tr><td>Conveyance and transfer - Transfer to Waitara</td><td>23,790,000</td></tr><tr><td>Treatment – pre-treatment at U&O oxidation ponds (1.6Ha) with 6 days buffer storage</td><td>2,900,000</td></tr><tr><td>Share of NP WWTP upgrades</td><td>1,830,000</td></tr><tr><td>Total capital cost estimate</td><td>37,620,000</td></tr></table></td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Collection – LPS system</td><td>9,100,000</td></tr><tr><td>Conveyance and transfer - Conveyance to new local WWTP</td><td>8,680,000</td></tr><tr><td>Treatment - New WWTP and land disposal (cut and carry pasture)</td><td>12,760,000</td></tr><tr><td>Share of NP WWTP upgrades</td><td>1,830,000</td></tr><tr><td>Total capital cost estimate</td><td>32,370,000</td></tr></table></td></tr>
<tr><td>Operational Costs:</td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Annual Operating Cost</td><td>147,000</td></tr><tr><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>3,000,000</td></tr></table></td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Annual Operating Cost</td><td>159,000</td></tr><tr><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>3,300,000</td></tr></table></td><td colspan="2"><table><tr><td>Item:</td><td>Cost ($)</td></tr><tr><td>Annual Operating Cost</td><td>396,000</td></tr><tr><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>8,200,000</td></tr></table></td></tr>
</table>

	OPTION C2 (OPTION 1A)		OPTION C3 (OPTION 1B)		CURRENT OPTION (OPTION 2)	
Total Cost of Option:	Item:	Cost ($)	Item:	Cost ($)	Item:	Cost ($)
	Capital costs	43M	Capital costs	38M	Capital costs	32M
	Operating costs	3M	Operating costs	3.3M	Operating costs	8.2M
	Total Cost	46M	Total Cost	41M	Total Cost	40M
	All upgrades to the Waitara network must be completed before this option can be implemented. Total cost of these upgrades estimated to be $32M. *Total costs have been rounded to two significant figures		*Total costs have been rounded to two significant figures		*Total costs have been rounded to two significant figures	
Complexity of operation:	Maintains a centralised wastewater treatment system and removes the requirement to operate a new full WWTP. Adds expense and complexity of chemical or aeration dosing which is required to reduce septicity from long distance piping.		Maintains a centralised wastewater treatment system and removes the requirement to operate a new full WWTP, however operation of the oxidation pond still has operational inputs to manage (similar to a simple WWTP) as well as long distance conveyance requirements. Adds management of oxidation pond, desludging, and long-distance piping.		Requires operation of a second WWTP and land discharge system.	
Resilience:	Dependent on the resilience and capacity of downstream network. Relies on chemical or aeration facilities to manage septicity of system and odour issues. Requires multiple stages of pumping and long piping.		Requires multiple stages of pumping and long piping. Storage allows for some independence from downstream network limitations (up to 7 days storage). Still relies on overall resilience of the Waitara network.		Independent system. Constrained by land discharge environmental limitations	
Cultural acceptability	Requires: -piping wastewater from Ngāti Mutunga through the rohe of six of the seven Te Atiawa hapū. -piping wastewater out of Ngāti Mutunga rohe. -discharge of treated wastewater to sea. This option has not yet been discussed with local iwi and based on previous discussions is likely to face some opposition.		Requires: -piping wastewater from Ngāti Mutunga through the rohe of six of the seven Te Atiawa hapū. -piping wastewater out of Ngāti Mutunga rohe. -discharge of treated wastewater to sea. This option has not yet been discussed with local iwi and based on previous discussions is likely to face some opposition		Meets Ngāti Mutunga's desire to treat their waste in their rohe and discharge treated wastewater to land. Council is working with Ngāti Mutunga in the spirit of partnership.	
Ability to consent:	Consent required for pump station consent for air discharge. Regional consent for new discharge is not required. Notice of requirement for designations for pump station and associated storage will be required. Discharges to a system which relies on the Waitara outfall emergency discharge consent which expires in 2040. There is a clear policy in the Taranaki Regional Coastal Plan which states that existing consented overflows that contain untreated human sewage will be eliminated and that no further consents will be		Consenting of ponds and pump stations required for air discharge. The consenting of the ponds in particular would attract additional risk. The ponds could also trigger new dam safety regulations from MBIE due to their volume and require a minimum offset of 300m neighbouring properties. This may not be able to be achieved within the 944 Main North Road site and a new site could be required. Notice of requirement for designations for pump station, oxidation ponds and associated storage will be required.		Requires regional discharge to land consent as well as discharge to air for treatment plant, land discharge and potentially pump stations. Notice of requirement for designations for WWTP, pump station and associated storage will be required.	

	OPTION C2 (OPTION 1A)	OPTION C3 (OPTION 1B)	CURRENT OPTION (OPTION 2)
	granted. Furthermore, these types of discharges are prohibited (i.e. a new consent cannot be granted). Therefore, the proposed upgrades identified at the Waitara TPS and rising main must be implemented as flows from U&O that contribute towards an increase in overflows from the Waitara outfall are almost fatally flawed from a consenting perspective.	This option includes many of the consenting requirements/risks of both a new local WWTP as well as the consents and cultural challenges of the conveyance to NP WWTP options.	
Consistency with national policy statement (NPS):	Flows will be discharged via the NP WWTP outfall which requires reconsenting in 2040. Option does not align with NPS to move away from discharges to the sea where feasible.	Flows will be discharged via the NP WWTP outfall which requires reconsenting in 2040. Does not align with NPS to move away from discharges to the sea where feasible.	Proposed discharge to land aligns with NPS direction to move away from sea discharges.
Consumption of growth capacity at NPWWTP	Additional flows from Urenui and Onaero reduce the capacity available for growth in New Plymouth at NP WWTP.	Additional flows from Urenui and Onaero reduce the capacity available for growth in New Plymouth at NP WWTP.	Will not use up capacity at of NP WWTP as wastewater is treated and discharged to land locally.
Uncertainty:	Initial planning of downstream network upgrades has been undertaken by NPDC; however, the Waitara TPS and rising main upgrade is not currently in the 2024-34 draft LTP as the project scope is undefined. Very high-level concept designs for this option have been completed in 2009 by Opus, with details around effectiveness/risks associated with the odour management facility yet to be confirmed.	No planning or design has been undertaken for this option. Pond requirements still need to be determined. A pond of this size is likely to be subject to the Dam Safety Regulations 2022 requiring regular inspections.	This option is a reasonable way through the planning and consultation phases. Key environmental investigations (soils, ecology, groundwater) have not found any significant unexpected issues.
Timeframe for delivery:	Upgrades to Waitara network and Waitara TPS including rising main are needed prior to implementation of this option. The Waitara transfer station upgrade is not currently in the 2024-34 draft LTP. Likely 6 years from planning to implementation excluding consent processing.	Design, consenting and management requirements for the oxidation ponds are still to be assessed in detail. Land requirements for the pond are not well understood at this stage. Design, planning and consultation have not commenced.	Standalone project doesn't rely on upgrades to any part of the existing network. Design and planning well progressed. Aligns with NPDC's desire to implement the preferred option as quickly as possible to address the impact of falling septic tanks.
Key Risks:	Interdependencies with Waitara and NPWWTP upgrades result in high risk of delays due to the high complexity of these projects (especially Waitara).	Design, consenting and on-going management requirements for the oxidation ponds has not been assessed. Overflow risks of partially treated wastewater associated with new oxidation ponds. Odour discharge from ponds difficult to avoid and can impact wide area/number of residents. Pond systems have high operational carbon emissions due to sludge accumulation.	Requires regional consenting for the proposed land discharge – manageable risk assuming pasture with spray irrigation. Storage of treated wastewater only – therefore overflow risks lower than other options.

6. Preferred option

Thirteen different options were assessed. Five options progressed past the Step 1 assessment as shown in Table 5. These included one option for the townships, one for the domains and three options for combined wastewater flows from all four locations.

Options T5 (low pressure sewer combined townships, treat and discharge) and D4 (existing pipe network from baches and campgrounds, treat, discharge to land on new sites) dropped out at Stage 2 due to cost.

Option C2 and C3 required further investigation to determine whether they would be lower cost than the Current Option. Risks, opportunities, advantages, and disadvantages were also considered for this option alongside the Current Option. Details of this assessment is included in section 5.8.

Overall the cost estimates for options C3 and the Current Option are similar, given the project stage and level of accuracy of the estimates.

The Current Option does have some significant advantages over Option C2 and C3:

- is consistent with the National Policy Statement (NPS) direction to move away from sea discharges,
- aligns with Ngāti Mutunga's desire to treat the wastewater within their rohe and discharge to land,
- is comparatively more likely to gain the required resource consents and already has the required land purchased,
- it aligns with NPDC's desire to implement the preferred options as quickly as possible to address the impact of failing septic tanks, and
- is a standalone project that does not rely on upgrades or the resilience of any part of the existing network or the New Plymouth Wastewater Treatment Plant.

Based upon this assessment the Current Option is the recommended preferred option for management of wastewater in Urenui and Onaero.

Table 5 Summary of options assessment

Option	Townships					Domains				Combined			
	T1	T2	T3	T4	T5	D1	D2	D3	D4	C1	C2	C3	Current
	Water free toilets and greywater/soakage field for remainder of wastewater	Upgrade septic systems to advanced treatment which includes UV treatment	New easy access storage tank on each property, store, truck to NPWWTP	Low pressure sewer to central township location, store, truck to NPWWTP	Low pressure sewer combined townships to central location, treat and discharge	Water free solutions for toilets and greywater/soakage field for remainder of wastewater	Install advanced treatment septic systems which include UV treatment	Existing pipe network from baches and campgrounds, store, truck to NPWWTP	Existing pipe network from baches and campgrounds, treat, discharge to land on new sites	Collect and pipe to 944 Main North Rd, store, truck to NPWWTP	Collect and pipe to NPWWTP (Waitara capacity issues addressed prior to starting)	Collect and pipe to 944 Main North Road, partially treat and store, pipe to NPWWTP. when Waitara capacity allows	Collect and pipe to 944 Main North Rd, treat and discharge to land
Step 1 – Practical, Viable and Protective **Practical** – easy to use and likely to be effective for those using it. **Viable** – able to be installed, capable of operating successfully and reliably long term, resilient. **Protective** – of public health and the environment													
Post Step-1	No	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes	Yes
Step 2 – Cost, Consenting **Cost –** high level costs **Consents** – ability to consent													
Post Step-2	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A	No	N/A	Yes	Yes	Yes
Step 3 - Full Comparison to Current Option													
Preferred option	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	Yes

7. Appendix A - Urenui stormwater investigation (2019 – 2022) (ECM 9239275)

Date: 30 April 2024

Subject: **Urenui stormwater investigation (2019 – 2022)**

Author: T McElroy, Manager – Science & Technology

Approved by: AJ Matthews, Director - Environment Quality

Document: 3256830

Purpose

1. The purpose of this memorandum is to provide the Committee with an overview of the Urenui stormwater investigation carried out between 2019 and 2022, including a summary of the findings.

Executive summary

2. In August 2019, water samples collected by staff from Te Rūnanga o Ngāti Mutunga (Ngāti Mutunga) and Taranaki Regional Council (TRC) found evidence of sewage contamination in two waterways in the lower Urenui township, discharging into the Urenui Estuary. These findings initiated a joint response between Ngāti Mutunga, TRC, New Plymouth District Council (NPDC) and Te Whatu Ora (TWO), in order to investigate the source of the pollution, assess the broader public health risk, and ultimately work towards rectifying the issue.
3. Extensive investigations were carried out to locate and eliminate direct contamination sources. Four significant contamination sources were located; two discharging into the Ngakoti Street stormwater network and two discharging into the Whakapaki Street modified stream. All four contaminant sources were removed. No further direct contaminant sources were conclusively identified.
4. All reasonable and practicable steps were taken as part of this investigation to identify and resolve the contamination. However, despite the elimination of all identified sources, further faecal source tracking carried out in November 2022 showed evidence of ongoing contamination of the affected waterways. Given the presence of human faecal indicators, the cumulative effects of septic tank discharges infiltrating underground drainage pipes and adjacent surface water bodies, potentially via shallow groundwater in some areas, are the most likely source.
5. It is anticipated that the removal of the four identified contaminant sources will have had a positive impact on water quality, relative to the level of pollution that was likely occurring prior to 2019. Due to limited sampling, it is not possible to confidently determine whether contaminant concentrations have significantly reduced in response to those interventions. However, the available data indicate improved water quality with reduced concentrations of *Escherichia coli (E. coli)*, ammoniacal nitrogen and electrical conductivity observed in both waterways.
6. While further works to address other sources are possible, it is difficult to ascertain whether additional interventions will lead to measurable reductions in contamination. Some interventions may generate issues with drainage and surface flooding; these would need to be carefully managed.

7. Based on observations made throughout the course of this investigation in conjunction with the recent faecal source tracking test results, it appears unlikely that septic tank wastewater contamination in Urenui could be completely eliminated without fundamental changes to the way in which wastewater from the township is treated and disposed of.
8. Wastewater discharge provisions are currently under review as part of the Land and Freshwater Plan development process. Over the coming months, TRC will be working with district councils, iwi and the broader community to ensure discharges such as these are managed appropriately to reduce their environmental impact throughout the region.

Recommendations

That Taranaki Regional Council:

a) receives the Urenui stormwater investigation memorandum

b) notes the findings therein.

Background

9. In August 2019, staff from Ngāti Mutunga and TRC collected water samples to test for evidence of septic tank wastewater discharging into the Urenui Estuary, as part of a Curious Minds citizen science project: Te Āhua o Ngā Kūrei - Ngāti Mutunga Estuary Project[1]. This investigation was in response to questions raised by members of the Urenui community around the possibility of septic tanks in the lower township discharging wastewater into the estuary.
10. Samples were collected from the Punawhakakau Stream, the Whakapaki Street modified stream, and the Ngakoti Street stormwater network (as shown in Figure 1, below). These locations were chosen because the stream and stormwater networks were located in close proximity to numerous properties in the lower township and therefore presented potential flow paths for wastewater to reach the estuary.

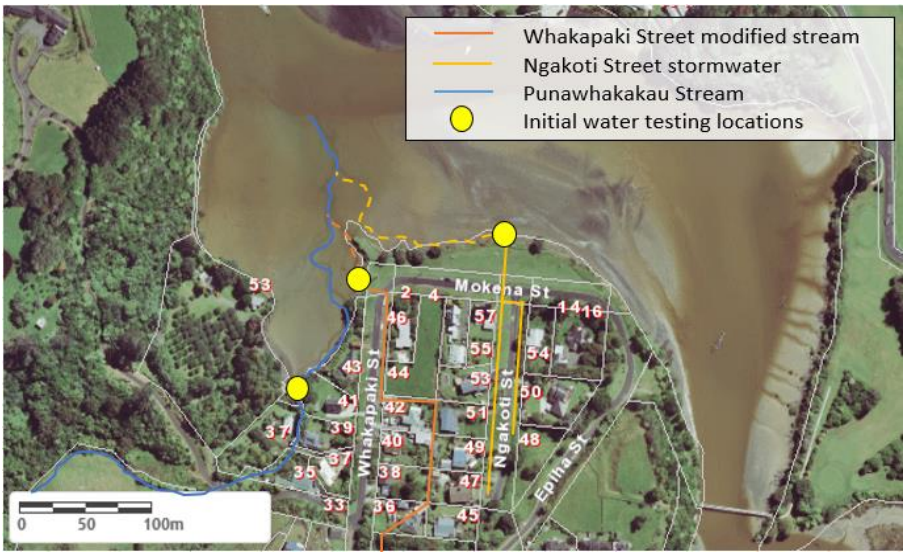

Figure 1 The Lower Urenui Township, with the Punawhakakau Stream (blue), Whakapaki Street modified stream (orange) and Ngakoti Street stormwater network (yellow). Sample locations shown as yellow dots.

[1] An agenda item covering off the broader findings of this project was presented to the Policy and Planning Committee by staff from Te Rūnanga o Ngāti Mutunga and TRC in June 2020.

11. The testing was completed in two stages; samples were first tested for *E. coli* as a general indicator of faecal pollution. If the results were sufficiently high, additional testing was carried out to determine the specific source(s) of faecal pollution using advanced source tracking analyses. The second phase of testing included the Whakapaki Street modified stream and the Ngakoti Street stormwater samples.
12. The results showed strong evidence of sewage contamination in the modified stream and the Ngakoti Street stormwater network, both sourced from the lower township area (document 3263704). It was determined that *E. coli* numbers in the Punawhakaku Stream were low and did not warrant further testing.
13. These findings prompted a joint response between TRC, Ngāti Mutunga, New Plymouth District Council (NPDC) and Te Whatu Ora (TWO), in order to investigate the source of the pollution, assess the broader public health risk, and ultimately work towards rectifying the issue.

Discussion

Joint response

14. In order to identify options for investigating and remediating the contamination issue, a working group was established with staff from TRC, NPDC and TWO. A steering group was also established with staff from the same agencies and representatives from Ngāti Mutunga in order to retain oversight of the project and provide direction where key decisions were required.
15. Locating the contamination source(s) was a key priority, with the employment of a range of investigative survey methods.
16. NPDC carried out inspections at 32 properties in the lower township. These inspections included risk assessments of septic systems based on proximity to waterways, septic tank specifications, site drainage and flooding susceptibility, and other factors. The findings of these inspections helped to narrow down the investigation area, and prompted the working group to seek further information from some property owners where necessary.
17. TRC carried out further water testing along the Whakapaki Street modified stream and Ngakoti Street stormwater network in order to narrow down the source of the contamination. Between August 2019 and November 2022, water testing surveys were carried out on 22 separate occasions. Additional water testing was also carried out by NPDC. TRC also carried out an assessment of property compliance with respect to Rule 22 in the Regional Freshwater Plan for discharges from on-site domestic wastewater systems.
18. NPDC engaged a contractor to carry out comprehensive CCTV surveys of the Ngakoti Street stormwater network and the piped section of the Whakapaki Street modified stream. As-built schematics were produced which highlighted undocumented underground pipework connections which prompted further investigation.
19. Ngāti Mutunga placed a rāhui on the estuary advising people not to collect shellfish, swim in the estuary or walk on the mudflats.
20. A public health risk assessment for the estuary was undertaken by TWO, and corresponding warning signage was installed by NPDC. This included advising people to avoid collecting shellfish from the estuary, and to avoid the mudflats on the township side of the river.
21. The working group developed information packs and held community open days in order to engage with the community and provide education on managing domestic septic tank systems for optimal performance and reduced environmental risk.

Key interventions

22. The investigation discovered four direct, or semi-direct sources of septic tank wastewater discharging into surface waters and piped drainage in the lower township.

23. The first source originated from a property with an old, undersized septic tank which was piped directly to an adjacent waterway. TRC issued an Abatement Notice to the property owner to cease the discharge and a new system was subsequently designed and installed.
24. The second source was located on a property where the effluent field had been directly connected to a piped waterway. The effluent field was disconnected and the pipe was sealed.
25. The third source was associated with a cracked and flooded stormwater pipe located in close vicinity to the effluent field in an adjacent property. Water testing results indicated that contaminated groundwater was infiltrating this section the stormwater network. Further assessment of the network found that this particular section had become obsolete and redundant. As a result, the pipe was decommissioned and sealed off from the rest of the network.
26. The fourth source was associated with a stormwater sump located on private property which was connected to the street stormwater network. This sump was not sealed, and was collecting water from numerous underground pipes. Results of high frequency conductivity measurements and discrete water quality samples provided strong evidence that septic tank wastewater was entering this sump via one or more of the pipes. This sump was replaced and the pipes of concern were disconnected.
27. Although there was no evidence linking NPDC's Yandle Park public toilet block to any surface water contamination, the effluent disposal system was upgraded as a precautionary measure.
28. Despite extensive investigations, no further sources were conclusively located. However, numerous potential pathways were identified that may have been contributing to the problem.
29. Infiltration of sub-surface flow and shallow groundwater into underground pipes appeared to be a likely contaminant pathway. The Whakapaki Street modified stream originates from a spring in Rattenbury Park, and as such, continual flow discharging from this outlet is not unexpected. However, the year-round flow of water discharging from the Ngakoti Street stormwater network highlights the infiltration of groundwater either as seepage from the grassed swale at the top of Ngakoti Street, sub-surface drainage connections from private properties, and potentially through cracks and broken joins in the network itself. Water was also observed entering the Whakapaki Street modified stream via similar pathways.

Water quality results

30. In November 2022 (following the completion of the interventions described above), water samples were collected and analysed for the same faecal source tracking markers that were originally tested for in August 2019 as a means of assessing whether the investigation and associated interventions had managed to eliminate all sources of septic tank wastewater contamination.
31. Analysis of the faecal source tracking samples showed evidence of ongoing human faecal contamination in the Ngakoti Street stormwater network and Whakapaki Street modified stream (document 3263705). Of the two faecal source tracking methods that were undertaken at the outset of the investigation, the faecal sterol results indicated that human faecal content in both waterways was lower in 2022 compared to the 2019 results. There was also evidence of other faecal sterol sources present in both waterways (i.e. ruminant, avian and plant decay). Results of the fluorescent whitening agent (FWA) test method suggested that wastewater sources were distant and/or diluted by the time they discharged from the two outlets.
32. It is important to interpret these results with caution. Although they do reliably confirm that septic tank wastewater contaminants were still present in both waterways, these results alone cannot be used to infer whether contamination levels had changed meaningfully between 2019 and 2022, given that these samples only depict water quality at two points in time.
33. The ongoing water testing that took place throughout the investigation assessed concentrations of *E. coli*, enterococci, ammoniacal nitrogen, oxidized nitrogen and electrical conductivity as general markers of wastewater contamination (document 3257411). Although these markers were tested on multiple occasions, the same caveat mentioned above also applies to these results as the sample size is limited

and the results only provide snapshots of contaminant concentrations at the time the samples were collected.

34. With this in mind, the maximum concentrations of these markers in the recent samples collected downstream of the contamination zone were generally lower than those collected prior to the intervention measures. Maximum *E. coli* concentrations were an order of magnitude lower than those in the earlier samples. In the Whakapaki Street modified stream, maximum enterococci concentrations were three orders of magnitude lower. Reduced concentrations in ammoniacal nitrogen and electrical conductivity were also observed.
35. It is also important to note that while these general test methods are useful markers of wastewater contamination, *E. coli* and enterococci are associated with faecal matter from a range of warm blooded animals, including cows, sheep, birds, and possums, and it is not unexpected to have occasional elevated counts of *E. coli* detected in urban stormwater and streams. Therefore, the numbers of faecal bacteria present in water discharging from the two outlets may not always be attributed to domestic wastewater sources. Paired faecal source tracking analyses are necessary to make this distinction.
36. Measured and modelled flow rates of the Whakapaki Street modified stream, Ngakoti Street stormwater outlet, Punawhakakau Stream and Urenui River provide an indication of dilution and mixing potential of these outlet discharges in the receiving waters (document 3257411).
37. Based on field observations, the Whakapaki and Ngakoti street outlet discharges tended to converge with the Punawhakau Stream before joining the Urenui River approximately 300 metres from the coast.
38. At low tide and under median flow conditions, the estimated dilution factor of the combined outlet flow mixing with the Punawhakakau Stream is approximately 1:11 (one part outlet flow to 11 parts stream flow). The estimated dilution factor of the combined outlet flow mixing with the Urenui River is approximately 1:1,228 (one part outlet flow to 1,228 parts river flow). Mixing and dilution potential is greater at high tide when the estuary is inundated with seawater.
39. Previous recreational water quality monitoring results from samples collected near the river mouth during high tide and fine weather conditions found consistently low levels of faecal indicator bacteria (TRC, 2020).
40. Following revision of the recreational water quality monitoring programme in 2021 to collect samples on a fixed day of the week irrespective of weather and tide, results have shown much higher levels of faecal indictor bacteria (TRC, 2023; https://www.lawa.org.nz/explore-data/swimming/). These results reflect the influence of preceding rainfall and the resulting run-off of contaminants from throughout the catchment (consistent with results observed elsewhere in the region), as well as the effects of variable tidal inundation.
41. The public health risk assessment was updated by TWO in September 2023. The review recommended retaining the original public health advice due to the evidence of ongoing contamination. Ngāti Mutunga also reviewed and updated the rāhui to align with this advice.

Conclusions

42. In August 2019, faecal source tracking analyses found evidence of septic tank wastewater contamination in the Ngakoti Street stormwater network and Whakapaki Street modified stream prior to discharging into the Urenui Estuary. It is not known how long the contamination had been occurring prior to its discovery.
43. Extensive investigations were carried out to locate and eliminate direct contamination sources. Four significant contamination sources were located; two discharging into the Ngakoti Street stormwater network and two discharging into the Whakapaki Street modified stream. All four contaminant sources were removed. No further direct contaminant sources were conclusively identified.
44. All reasonable and practicable steps were taken as part of this investigation to identify and resolve the contamination. However, despite the elimination of all identified sources, further faecal source tracking carried out in November 2022 showed evidence of ongoing contamination of the affected waterways.

Given the presence of human faecal indicators, the cumulative effects of septic tank discharges infiltrating underground drainage pipes and adjacent surface water bodies, potentially via shallow groundwater in some areas, are the most likely source.

45. It is anticipated that the removal of the four identified contaminant sources will have had a positive impact on water quality, relative to the level of pollution that was likely occurring prior to 2019. Due to limited sampling, it is not possible to confidently determine whether contaminant concentrations have significantly reduced in response to those interventions. However, the available data indicate improved water quality with reduced concentrations of *E. coli*, ammoniacal nitrogen and electrical conductivity observed in both waterways.
46. While further works to address other sources are possible, it is difficult to ascertain whether additional interventions will lead to measurable reductions in contamination. Some interventions may generate issues with drainage and surface flooding; these risks would need to be carefully managed.
47. Based on observations made throughout the course of this investigation in conjunction with the recent faecal source tracking test results, it appears unlikely that septic tank wastewater contamination in Urenui could be completely eliminated without fundamental changes to the way in which wastewater from the township is treated and disposed of.
48. Wastewater discharge provisions are currently under review as part of the Land and Freshwater Plan development process. Over the coming months, TRC will be working with district councils, iwi and the broader community to ensure discharges such as these are managed appropriately to reduce their environmental impact throughout the region.

Financial considerations—LTP/Annual Plan

49. This memorandum and the associated recommendations are consistent with the Council's adopted Long-Term Plan and estimates. Any financial information included in this memorandum has been prepared in accordance with generally accepted accounting practice.

Policy considerations

50. This memorandum and the associated recommendations are consistent with the policy documents and positions adopted by this Council under various legislative frameworks including, but not restricted to, the Local Government Act 2002, the Resource Management Act 1991 and the Local Government Official Information and Meetings Act 1987.

Iwi considerations

51. This memorandum and the associated recommendations are consistent with the Council's policy for the development of Māori capacity to contribute to decision-making processes (schedule 10 of the Local Government Act 2002) as outlined in the adopted Long-Term Plan and/or Annual Plan. Similarly, iwi involvement in adopted work programmes has been recognised in the preparation of this memorandum.

Community considerations

52. This memorandum and the associated recommendations have considered the views of the community, interested and affected parties and those views have been recognised in the preparation of this memorandum.

Legal considerations

53. This memorandum and the associated recommendations comply with the appropriate statutory requirements imposed upon the Council.

References

TRC, 2020: Freshwater contact recreational water quality at selected Taranaki sites. State of the Environment Report Summer 2019-2020. Technical Report 2020-01.

TRC, 2023: Can I Swim Here? 2022-2023 Report Card.

Appendices/Attachments

Document 3257411: Key water testing results from the Urenui stormwater investigation

Document 3263704: Urenui Faecal Source Tracking Analysis Report 2019

Document 3263705: Urenui Faecal Source Tracking Analysis Report 2022

Urenui stormwater investigation - key water testing results (2019-2022)

Table 1: Explanation of water quality parameters as wastewater markers

Water quality parameter	Description
Electrical conductivity	Electrical conductivity (EC) is a measure of how well water conducts electricity. EC specifically provides an indication of the amount of dissolved salt or solid material in the water; with pure water being a poor conductor of electricity. Conductivity increases as the amount of dissolved salt increases. Wastewater typically contains elevated dissolved salt content compared to freshwater during base flows. Therefore, in some circumstances EC can be a useful marker of dilute wastewater contamination in fresh water bodies. See the following website for more information on electrical conductivity (https://www.lawa.org.nz/learn/factsheets/groundwater/electrical-conductivity/).
Ammoniacal nitrogen	Ammoniacal nitrogen (NH4-N), also often called 'ammonium', is the concentration of nitrogen present as either ammonia (NH3) or ammonium (NH4). Ammoniacal forms of nitrogen enter waterways primarily through point source discharges, such as raw sewage or dairy shed effluent. It is toxic to aquatic life at high concentrations.
Nitrate + Nitrite nitrogen	Nitrate and nitrite nitrogen are two forms of oxidized nitrogen. In soil and water, ammonia is sequentially converted into nitrite and then nitrate via an oxidative process called nitrification. The relative concentrations of nitrite present in water are generally much lower than nitrate. Nitrate can also become toxic to aquatic life at high concentrations. In this investigation, elevated concentrations of ammoniacal nitrogen relative to nitrate nitrogen were used as another marker of wastewater contamination. See the following website for more information on nitrogen and its different forms (https://www.lawa.org.nz/learn/factsheets/nitrogen/).
E. coli	*Escherichia coli* (*E. coli*) is a species of bacteria which is commonly used as a general marker of faecal contamination in aquatic environments. *E. coli* occur naturally in the intestinal tracts of warm-blooded animals and are therefore indicative of faecal contamination from a range of animals including livestock, birds, and humans. See the following website for more information on faecal indicator bacteria (https://www.lawa.org.nz/learn/factsheets/faecal-indicators/).
Enterococci	Enterococci are a group of bacteria which are also commonly used as a general marker of faecal contamination in aquatic environments. Enterococci are indicative of faecal contamination from warm blooded animals, but some species can also be isolated from the environment in the absence of faecal contamination (e.g. in soils and vegetation), and therefore this marker is less-specific to faecal sources. See the following website for more information on faecal indicator bacteria (https://www.lawa.org.nz/learn/factsheets/faecal-indicators/).
Faecal sterols	Faecal sterols are compounds that are present in animal faeces which are related to the diet of the animal. The ratios of various faecal sterols detected in a water sample provide evidence as to whether faecal contamination can be attributed to humans or other animals. See the attached faecal source tracking reports for further information on interpreting faecal sterol testing results.
Fluorescent whitening agents	Fluorescent whitening agents (FWAs) are chemical compounds commonly found in laundry powders. The presence of FWAs in water above certain concentrations is indicative of wastewater contamination. See the attached faecal source tracking reports for further information on interpreting FWA testing results.

Table 2: TRC Urenui investigation water testing results – Whakapaki Street modified stream (upstream of contaminant sources)

Location	Intervention timeline	Sample	Collected	Time	Discharge rate	Temp.	Electrical Conductivity (EC)	Escherichia coli	Enterococci	Total Ammoniacal N	Nitrate N + Nitrite N
					L/s	°C	mS/m	no. / 100 mL	no. / 100 mL	g/m³	g/m³
Site A (WHA U/S)	n/a	TRC201424	22 May 2020	13:35	n/a		18.3	60	370	< 0.010	1.54
Site B (WHA U/S)	n/a	TRC201960	02 Jul 2020	11:21		12.0	18.1	10	< 10	< 0.010	1.71
Site A (WHA U/S)	n/a	TRC201963	02 Jul 2020	11:52	n/a	12.7	18.1	10	10	< 0.010	1.79
Site B (WHA U/S)	n/a	TRC202193	28 Jul 2020	14:09	1.5	13.8		< 10	10	< 0.010	2.30
Site B (WHA U/S)	n/a	TRC202904	21 Sep 2020	11:20		13.6	18.5	10	10	< 0.010	1.97
Site B (WHA U/S)	n/a	TRC210871	23 Feb 2021	15:05	0.4	16.9	18.4	50	540	< 0.010	1.29
Site B (WHA U/S)	n/a	TRC212306	09 Jul 2021	09:25		12.3	18.1	80	30	< 0.010	1.95
Site B (WHA U/S)	n/a	TRC212371	29 Jul 2021	13:45	1.5	14.3	18.3	110	< 10	< 0.010	2.10
Site B (WHA U/S)	n/a	TRC212558	11 Aug 2021	09:30	1.3	12.1	18.4	< 10	10	< 0.010	2.20
Site B (WHA U/S)	n/a	TRC213587	04 Nov 2021	17:05		14.9	18.3	100	30	< 0.010	2.10

NB: exact sampling locations withheld for property owner privacy

Table 3: TRC Urenui investigation water testing results – Whakapaki Street modified stream (downstream of contaminant sources)

Location	Intervention timeline	Sample	Collected	Time	Discharge rate	Temp.	Electrical Conductivity (EC)	Escherichia coli	Enterococci	Total Ammoniacal N	Nitrate N + Nitrite N
					L/s	°C	mS/m	no. / 100 mL	no. / 100 mL	g/m³	g/m³
Site C (WHA D/S - Outlet)	No intervention	TRC193113*	02 Sep 2019	08:56	1.2	13.4		727			
Site C (WHA D/S - Outlet)	No intervention	TRC201136	23 Apr 2020	11:35	1.0	15.8	21.5	50,000	1,000,000	1.49	1.26
Site D (WHA D/S)	No intervention	TRC201135	23 Apr 2020	11:00	n/a	15.3	20.7	30,000	900,000	1.39	1.25
Site C (WHA D/S - Outlet)	No intervention	TRC201420	22 May 2020	12:40	1.2		19.7	4,000	18,000	0.19	1.62
Site D (WHA D/S)	No intervention	TRC201421	22 May 2020	12:50	n/a		22.7	11,000	38,000	2.60	1.72
Site D (WHA D/S)	No intervention	TRC201958	02 Jul 2020	09:41	n/a	12.3	20.6	7,000	24,000	1.49	2.20
Site E (WHA D/S)	No intervention	TRC201961	02 Jul 2020	10:39	n/a	12.7	19.4	2,000	70	0.28	2.10
Site D (WHA D/S)	No intervention	TRC202191	28 Jul 2020	13:35	n/a	13.9		7,000	27,000	0.12	2.50
Site E (WHA D/S)	No intervention	TRC202192	28 Jul 2020	13:50	n/a	14.0		540	280	0.03	2.60
Site D (WHA D/S)	No intervention	TRC202905	21 Sep 2020	11:30	n/a	14.0	18.7	500	1,300	0.08	2.10

Location	Intervention timeline	Sample	Collected	Time	Discharge rate	Temp.	Electrical Conductivity (EC)	Escherichia coli	Enterococci	Total Ammoniacal N	Nitrate N + Nitrite N
					L/s	°C	mS/m	no. / 100 mL	no. / 100 mL	g/m³	g/m³
Site E (WHA D/S)	No intervention	TRC202903	21 Sep 2020	10:15	n/a	13.6	19.0	360	1,500	0.07	2.10
Site C (WHA D/S - Outlet)	Source 1 removed	TRC204155	11 Dec 2020	10:40	10.0	16.4	20.1	70	160	0.06	2.90
Site D (WHA D/S)	Source 1 removed	TRC204156	11 Dec 2020	10:45	n/a	16.2	20.2	60	170	0.08	2.70
Site E (WHA D/S)	Source 1 removed	TRC204157	11 Dec 2020	10:55	n/a	16.1	20.4	40	60	0.12	2.70
Site C (WHA D/S - Outlet)	Source 1 removed	TRC204415	06 Jan 2021	10:40	1.5	17.8	21.7	9,000	600	1.20	2.20
Site D (WHA D/S)	Source 1 removed	TRC204416	06 Jan 2021	11:00	n/a	17.5	20.1	1,200	380	0.28	1.98
Site E (WHA D/S)	Source 1 removed	TRC204417	06 Jan 2021	11:10	n/a	16.7	20.1	2,600	300	0.47	2.10
Site C (WHA D/S - Outlet)	Source 1 removed	TRC210538	04 Feb 2021	08:15	1.0	16.5	19.7	210	330	0.03	1.46
Site D (WHA D/S)	Source 1 removed	TRC210542	04 Feb 2021	09:10	n/a	17.1	21.5	2,900	2,200	1.55	1.53
Site E (WHA D/S)	Source 1 removed	TRC210543	04 Feb 2021	09:25	n/a	18.2	19.2	1,500	1,600	0.16	1.58
Site D (WHA D/S)	Source 1 removed	TRC210869	23 Feb 2021	13:40	n/a	17.9	18.9	1,700	580	0.03	1.16
Site E (WHA D/S)	Source 1 removed	TRC210870	23 Feb 2021	14:05	n/a	16.8	19.0	480	720	0.04	1.34
Site D (WHA D/S)	Source 2 removed	TRC212304	09 Jul 2021	08:30	n/a	12.7	19.0	50	70	0.03	2.20
Site E (WHA D/S)	Source 2 removed	TRC212305	09 Jul 2021	08:40	n/a	13.3	19.6	1,400	70	0.87	2.10
Site D (WHA D/S)	Source 2 removed	TRC212369	29 Jul 2021	12:45	n/a	14.5	19.4	1,500	180	0.06	2.80
Site E (WHA D/S)	Source 2 removed	TRC212370	29 Jul 2021	12:55	n/a	14.5	19.2	2,100	230	0.17	2.70
Site D (WHA D/S)	Source 2 removed	TRC212556	11 Aug 2021	08:50	n/a	12.4	19.5	600	70	0.11	2.50
Site E (WHA D/S)	Source 2 removed	TRC212557	11 Aug 2021	09:00	n/a	12.7	19.6	1,800	240	0.39	2.50
Site D (WHA D/S)	Source 2 removed	TRC213586	04 Nov 2021	16:54	n/a	16.7	19.0	180	70	< 0.010	1.99
Site C (WHA D/S - Outlet)	Source 2 removed	TRC224734	10 Jan 2022	10:55	n/a		19.3	4,000	7,500	< 0.010	2.30
Site C (WHA D/S - Outlet)	Source 2 removed	TRC226286	13 Apr 2022	14:05	0.7	17.0	19.7	80	260	< 0.010	1.59
Site D (WHA D/S)	Source 2 removed	TRC228440	18 Oct 2022	06:55	n/a		19.9	320	3,800	0.12	2.20
Site D (WHA D/S)	Source 2 removed	TRC228526	25 Oct 2022	12:50	n/a	15.0	19.4	150	90	< 0.010	2.00
Site C (WHA D/S - Outlet)	Source 2 removed	TRC228994*	16 Nov 2022	08:15	1.3	16.3	19.5	290	5	0.10	1.74

* = Faecal source tracking samples also collected (recorded as Site 2 in 2019 report)

NB: exact sampling locations withheld for property owner privacy

Table 4: TRC Urenui investigation water testing results – Ngakoti Street stormwater network (downstream of contaminant sources, at outlet)

Location	Intervention timeline	Sample	Collected	Time	Discharge rate	Temp.	Electrical Conductivity (EC)	Escherichia coli	Enterococci	Total Ammoniacal N	Nitrate N + Nitrite N
					L/s	°C	mS/m	no. / 100 mL	no. / 100 mL	g/m³	g/m³
Site F (NGA - Outlet)	No intervention	TRC193114*	02 Sep 2019	09:16		13.9		579			
Site F (NGA - Outlet)	No intervention	TRC201133	23 Apr 2020	09:45	0.1	17.5	19.1	1,300	170	1.01	0.82
Site F (NGA - Outlet)	No intervention	TRC201423	22 May 2020	12:25	0.1		19.0	40,000	430	1.04	1.00
Site F (NGA - Outlet)	No intervention	TRC202006	02 Jul 2020	14:21	0.6		19.8	2,100	290	0.82	0.83
Site F (NGA - Outlet)	No intervention	TRC202190	28 Jul 2020	14:27	0.6	14.1		2,600	4,000	1.58	0.77
Site F (NGA - Outlet)	No intervention	TRC202356	13 Aug 2020	14:45	0.4	13.8	19.3	11,000	1,900	0.91	0.54
Site F (NGA - Outlet)	No intervention	TRC202900	21 Sep 2020	09:20	0.3	14.1	22.0	26,000	6,800	3.90	0.47
Site F (NGA - Outlet)	No intervention	TRC204153	11 Dec 2020	10:10	1.0	17.3	20.0	1,000	2,100	0.52	1.32
Site F (NGA - Outlet)	No intervention	TRC204413	06 Jan 2021	10:25	0.8	18.7	20.7	500	80	1.96	0.67
Site F (NGA - Outlet)	No intervention	TRC210537	04 Feb 2021	08:00	0.1	19.3	16.7	80	180	0.11	0.52
Site F (NGA - Outlet)	Source 1 removed	TRC212307	09 Jul 2021	09:55	0.6	14.1	19.9	1,300	160	1.43	0.87
Site F (NGA - Outlet)	Source 1 removed	TRC212372	29 Jul 2021	13:05	0.6	14.3	18.9	2,300	60	0.93	1.03
Site F (NGA - Outlet)	Source 1 removed	TRC212559	11 Aug 2021	11:15	0.4	13.8	23.0	400	90	1.67	0.69
Site F (NGA - Outlet)	Source 1 removed	TRC213588	04 Nov 2021	17:15	0.3	16.0	17.7	300	430	0.30	0.45
Site F (NGA - Outlet)	Source 1 removed	TRC224735	10 Jan 2022	10:50			24.0	7,000	180	5.00	1.12
Site F (NGA - Outlet)	Source 1 removed	TRC226287	19 Apr 2022	13:55	0.1	18.4	19.6	130	190	0.44	1.19
Site F (NGA - Outlet)	Source 2 removed	TRC228441	18 Oct 2022	06:20	0.3		18.6	3,000	7,400	0.25	0.77
Site F (NGA - Outlet)	Source 2 removed	TRC228523	25 Oct 2022	12:15		15.6	18.9	2,000	10	0.13	0.49
Site F (NGA - Outlet)	Source 2 removed	TRC228995*	16 Nov 2022	07:50	0.3	17.4	18.6	700	80	0.27	0.56

* = Faecal source tracking samples also collected (recorded as Site 3 in 2019 report)

Table 5: Median flows and estimated dilution factors for the outlets and receiving waters (at low tide)

		Punawhakakau Stream	Urenui River
		15.5 L/s	1,963 L/s
Ngakoti Street outlet	0.4 L/s	40	4,909
Whakapaki Street outlet	1.2 L/s	14	1,637
Combined outlet flow	1.6 L/s	11	1,228

NB: Outlet flows measured (see Table 2, Table 3). Stream and river flows estimated (https://shiny.niwa.co.nz/nzrivermaps/).

Science for Communities

16 October 2019

To: Thomas Mcelroy
Taranaki Regional Council
Private Bag 713
STRATFORD 4352

Email: thomas.mcelroy@trc.govt.nz

From: ESR Christchurch Science Centre
PO Box 29181
CHRISTCHURCH 8540

Email: faecalsource@esr.cri.nz

REPORT ON FAECAL SOURCE TRACKING ANALYSIS

The following samples were received on 6 September 2019 and were analysed for faecal sterols and fluorescent whitening agents (FWAs) as requested.

ESR Number	Client Reference	Date Sampled	Sterols Volume (mL)
CMB191001	Site 2 (stormwater)	2/9/19, 08:56	3,500
CMB191002	Site 3 (stormwater)	2/9/19, 09:15	3,500

Results of faecal sterol analysis:

ESR Number	Client Reference	coprostanol	24-ethylcoprostanol	epicoprostanol	cholesterol	cholestanol	24-methylcholesterol	24-ethylepicoprostanol	stigmasterol	24-ethylcholesterol	24-ethylcholestanol	total sterols
CMB191001	Site 2	3963	925	*39*	5377	330	862	*11*	276	2130	122	14035
CMB191002	Site 3	8235	2268	232	2895	541	577	56	420	1282	237	16743

NOTES: All values are reported in parts per trillion (ppt).
Coloured values indicate that the measured level is close to or below the lowest measurement standard and caution should be used in calculation of some ratios.
Values in italics are below the lowest measurement standard.
Bold results generated from a linear calibration curve because could not be extrapolated from normal quadratic curve.

Interpretation of faecal sterol ratios:

ESR Number	**Client Reference**	**Total Sterols** ppt	**Faecal** F1, F2	**Human** H1, H2, H3	**Ruminant** R1, R2, R3	**Wildfowl**	**Conclusion**
CMB191001	Site 2	14035	F1+F2	Yes (H1+H2+ H3+H4)	(R1)	No	Strong human source
CMB191002	Site 3	16743	F1+F2	Yes (H1+H2+ H3+H4)	(R1+R3)	No	Strong human source

NOTES: Sterol levels below 2000 ppt may be too low for some sterol interpretations.
For Human and Ruminant sterols, the ratio's meeting thresholds are noted in brackets.
Where Yes is also in brackets this indicates a lower degree of certainty.

Results of FWA analysis:

ESR Number	Client Reference	FWA µg/L	Conclusion
CMB191001	Site 2	0.11	Human source detected
CMB191002	Site 3	0.02	Low level detection of human source

NOTE: Refer appendix for interpretation guidance

Summary:

ESR Number	Client Reference	Faecal Sterols	FWAs	Overall Conclusion
CMB191001	Site 2	Strong human	Human	Human
CMB191002	Site 3	Strong human	Low level detection of human source	Human

Notes:
Brief details of the methods of analysis are available on request.
These results relate to samples as received.
This report may not be reproduced except in full.

Brent Gilpin
Science Leader

Susan Lin
Scientist

APPENDIX: Assay Interpretation Guidance Notes

PCR Marker interpretation notes

- Each marker is strongly associated with, but not exclusive to the source tested for. They each have some degree of non-specificity.
- Each marker is a separate test and the levels of the various markers within the same sample cannot be compared. For example, if sample A has a BacH result of 1,000 and a BacR of 100 it is not valid to say there is more human contamination than ruminant in sample A.
- Levels of the same marker in different samples can be compared. For example;
    - If sample A has a BacH result of 1,000 and sample B has a BacH of 10,000 it is valid to conclude there is more human faecal contamination in sample B than in sample A; or
    - If site H sampled in January has a GFD result of 500 and when sampled in February has a GFD result of 10,000, it is valid to conclude the level of avian faecal contamination in February is greater.
    - To be classified as a significantly greater or lesser result the level of marker should vary by a factor of 10.
- Both Human markers are required to be present for a positive human result.
- Ruminant specific markers are reported using a percentage value based on levels of this marker relative to the general marker in fresh ruminant faeces.
    - Samples reported as 50-100% ruminant are consistent with all of the general faecal marker having come from a ruminant source.
    - The lower levels reported (10-50%) may be a consequence of the presence of other sources of pollution, or in fact ruminant sources may still account for all the pollution, but this may include aged faecal material where relative levels of the ruminant marker decline more rapidly than the general marker.
    - Levels less than 10% ruminant suggest a very minor contribution from ruminant sources.

The detection limits of these methods vary depending on the volume of water filtered for analysis. We recommend a minimum volume of 200 mls and a maximum of 1000 mls, this range gives the following detection limits:

mls sample filtered	General GenBac / 100 mls	Human BacH / 100 mls	Human BiADO / 100 mls	Human HumM3 / 100 mls	Ruminant BacR / 100 mls	Ruminant Sheep / 100 mls	Ruminant Cow / 100 mls
< 400 mls	<110	<83	<110	<8	<91	<100	<11
400-700mls	<42	<33	<43	<3	<36	<41	<5
700-1000mls	<21	<17	<21	<2	<18	<21	<2

mls sample filtered	Dog DogBac / 100 mls	Avian GFD / 100 mls	Avian E2 / 100 mls	Gull- 2
> 400 mls	<79	<72	<99	presence / absence test
400-700mls	<31	<29	<40	
700-1000mls	<16	<14	<20	

Valid as at: July 2017

FWA interpretation notes

The analysis of FWAs in septic tank and community wastewater consistently identifies levels between 10 and 70 µg/L. In previous analysis of water samples levels of FWA greater than 0.1 µg/L suggest human sewage, with levels greater than 0.2 µg/L strongly indicative of human sewage. Levels greater than 0.1 µg/L correlate well with other indicators of human pollution and indicate a local or recent source of pollution. FWAs degrade under sunlight exposure and will undergo dilution. Levels lower than 0.1 µg/L may be indicative of dilute or distant sources of human pollution.

Reference: Devane M., Saunders D. and Gilpin B. (2006). Faecal sterols and fluorescent whiteners as indicators of the source of faecal contamination. Chemistry in New Zealand 70(3), 74-7. http://www.nzic.org.nz/CiNZ/articles/Devane_70_3.pdf

Faecal sterol Intepretation Notes:

Faecal sterol ratios must be interpreted with consideration to the levels of sterols, and relative to one another. For example H1 is typically also above 5-6% in ruminant faeces. Human and ruminant sources generally require at least two of three ratios to reach thresholds.
Plant sterols and mixed sources also have differing effects on sterol interpretations which must be considered.

Conclusions are the best interpretation of sterols in our opinion. Conclusions in **bold** are highly supported by the sterol data, conclusions in brackets are supported by sterol data with some variation from a pure source, or with a lower degree of certainty.

Ratio Key:

Ratios indicative of faecal pollution (either human or animal)		
F1	coprostanol/cholestanol..	>0.5 indicative of faecal source of sterols
F2	24ethylcoprostanol/ 24-ethylcholestanol.	>0.5 indicative of faecal source of sterols.
Human indicative ratios (values exceeding threshold in red)		
H3	coprostanol/ 24-ethylcoprostanol	Ratio >1 suggests human source
H1	% coprostanol	Ratio >5-6% suggests human source
H2	coprostanol/(coprostanol+cholestanol)	Ratio >0.7 suggests human source
H4	coprostanol/(coprostanol+24-ethylcoprostanol)	Ratio >0.75 suggests human source
Ruminant indicative ratios (values exceeding threshold in blue)		
R3	24-ethylcholesterol/24-ethylcoprostanol	Ratio <1 suggests ruminant source, ratio >4 suggests plant decay
R1	% 24-ethylcoprostanol	Ratio >5-6% suggests ruminant source
R2	coprostanol/(coprostanol+24-ethylcoprostanol)	Ratio <30% suggests ruminant source
Avian indicative ratios (values exceeding threshold in yellow)		
A1	24-ethylcholestanol/(24-ethylcholestanol+24-ethylcoprostanol+24-ethylepicoprostanol)	A1 Ratio >0.4 suggests avian source AND A2 Ratio >0.5 suggests avian source
A2	cholestanol/(cholestanol+coprostanol+epicoprostanol)	

Valid as at: July 2017

Science for Communities
He Pūtaiao, He Tāngata

22 December 2022

To: Thomas McElroy
Taranaki Regional Council
Private Bag 713
STRATFORD 4352

Email: thomas.mcelroy@trc.govt.nz

From: ESR Christchurch Science Centre
PO Box 29181
CHRISTCHURCH 8540

Email: faecalsource@esr.cri.nz

FINAL REPORT ON FAECAL SOURCE TRACKING ANALYSIS

The following samples were received on 17th November 2022 and was analysed for faecal source PCR markers, FWA and faecal sterols as requested.

ESR Number	Client Reference	Date Sampled	Site Description	*E.coli* cfu / 100mL
CMB220822	TRC228994 STW001162	16/11/2022 09:15	Whakapaki Street stormwater outlet	290
CMB220823	TRC228995 STW001165	16/11/2022 08:50	Ngakoti Street stormwater outlet	700

Results of faecal source PCR Marker Analysis:
Please refer to the appendix for guidance on interpretation of these results

ESR Number	Client Reference	Site	*E.coli* cfu / 100mL	General GenBac / 100 ml	Human BiADO / 100 ml	Human HF183 / 100 mls	Human crAssphage / 100 mls	Conclusion
CMB220822	TRC228994 STW001162	Whakapaki Street	290	5,900,000	1,800	9,800	29,000	Human faecal source detected
CMB220823	TRC228995 STW001165	Ngakoti Street	700	940,000	360	140	1,600	Human faecal source detected

Abbreviations: NA = sample was not analysed for this marker.
NC = not calculated
LOQ = limit of quantitation

Comment PCR Markers:
Significantly more human faecal source markers were detected in the Whakapaki Street stormwater outlet than in the Ngakoti Street stormwater outlet.

Results of FWA analysis:

ESR Number	Client Reference	Site	Fluorescent Whitener #1 (ppb)	Conclusion
CMB220822	TRC228994 STW001162	Whakapaki Street	0.01	Human faecal source detected
CMB220823	TRC228995 STW001165	Ngakoti Street	0.01	Human faecal source detected

Results of faecal sterol analysis:

ESR Number	Client Reference	Site Description	coprostanol	24-ethylcoprostanol	epicoprostanol	cholesterol	cholestanol	24-methylcholesterol	24-ethylepicoprostanol	stigmasterol	24-ethylcholesterol	24-ethylcholestanol	total sterols
CMB220822	TRC228994 STW001162	Whakapaki Street	512	111	*7*	1307	137	321	*0*	257	886	230	3767
CMB220823	TRC228995 STW001165	Ngakoti Street	442	168	*31*	1580	157	504	101	441	1090	279	4793

NOTES: All values are reported in parts per trillion (ppt).
Coloured values indicate that the measured level is close to or below the lowest measurement standard and caution should be used in calculation of some ratios.
Values in italics are below the lowest measurement standard.

Interpretation of faecal sterol ratios:

ESR Number	Client Reference	Site Description	Total Sterols ppt	Faecal F1, F2	Human H1, H2, H3	Ruminant R1, R2, R3	Wildfowl	Conclusion
CMB220822	TRC228994 STW001162	Whakapaki Street	3767	F1+(F2)	Yes	No	(Yes)	Human
CMB220823	TRC228995 STW001165	Ngakoti Street	4793	F1+F2	Yes	No	(Yes)	Human

NOTES: Sterol levels below 2000 ppt may be too low for some sterol interpretations.
Where Yes is also in brackets this indicates a lower degree of certainty.

Comment Faecal Sterols:
There is clear human sterol signature in both samples. Plus a possible wildfowl / plant signature.

Summary:

ESR Number	Client Reference	Site Description	Faecal Sterols	FWAs	PCR Markers	Overall Conclusion
CMB220822	TRC228994 STW001162	Whakapaki Street	Human	Human	Human faecal source detected	Human
CMB220823	TRC228995 STW001165	Ngakoti Street	Human	Human	Human faecal source detected	Human

Notes:
Brief details of the methods of analysis are available on request.
These results relate to samples as received.
This report may not be reproduced except in full.

Paula Scholes
Laboratory Operations Technical Lead

Beth Robson
Principal Technician

Susan Lin
Scientist

Brent Gilpin
Senior Science Leader

APPENDIX: Assay Interpretation Guidance Notes

PCR Marker interpretation notes

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mls sample filtered	Dog DogBac / 100 mls	Avian GFD / 100 mls	Avian E2 / 100 mls	Gull- 2
> 400 mls	<79	<72	<99	presence / absence test
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Valid as at: July 2017

FWA Interpretation Notes

The analysis of FWAs in septic tank and community wastewater consistently identifies levels between 10 and 70 µg/L. In previous analysis of water samples levels of FWA greater than 0.1 µg/L suggest human sewage, with levels greater than 0.2 µg/L strongly indicative of human sewage. Levels greater than 0.1 µg/L correlate well with other indicators of human pollution and indicate a local or recent source of pollution. FWAs degrade under sunlight exposure and will undergo dilution. Levels lower than 0.1 µg/L may be indicative of dilute or distant sources of human pollution.

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A2	cholestanol/(cholestanol+coprostanol+epicoprostanol)	

Valid as at: July 2017

8. Appendix B – Health risk advice, Te Whatu Ora

Urenui stormwater contamination - updated public health risk assessment

Reply | Reply All | Forward

LW Lauren Woollard [TDHB] <Lauren.Woollard@tdhb.org.nz>

To Thomas McElroy; Nicolette West; 'natalie@ngatimutunga.iwi.nz'

Cc Neil DeWet [TDHB]; Bruce Gatward-Cook [TDHB]

Fri 8/09/2023 12:13 pm

Retention Policy Never Delete - Default (Never) Expires Expiration Suspended (Never)

Follow up. Start by Monday, 11 September 2023. Due by Monday, 11 September 2023.
You forwarded this message on 11/09/2023 11:21 am.

[EXTERNAL EMAIL] CAUTION: This email is from an external sender. To minimise cyber security risks, do not click on any links or open any attachments unless you are certain that the sender is legitimate. Please note that no legitimate sender will ever ask you for password details.

Good afternoon,

Getting back to you with an updated assessment of the public health risk associated with stormwater contamination in Urenui township. Thank you Thomas and Nicolette for sharing recent sampling data and information about site suitability.

Our first main point is that there has been good progress made on remedial works since 2019, reflected in reductions in both indicator bacteria counts and human faecal sterols in stormwater samples taken from the township between 2019 and 2022. However, the most recent sampling of stormwater continues to show elevated indicator bacteria counts, and still identifies a human faecal source, likely reflecting the long-term unsuitability of the site for so many septic tank systems.

As such we would continue to recommend:

1. Against collecting shellfish from the river, due to their ability to concentrate and store any pathogens present in the water.
2. No warnings against swimming in fine weather conditions (especially at high tide, due to associated dilution), though we would continue emphasizing the importance of staying out of the water for 48 hours after heavy rain.
3. Advising people (especially young children) to stay off the mudflats below the township, due to the proximity to the stormwater outlets and lower dilution of contaminated stormwater.

We agree about the importance of getting out some communications before the summer bathing season starts to help people better understand the potential risks, and think a joint approach with councils and Ngāti Mutunga would be best – I have cc'd in Dr Neil de Witt, Medical Officer of Health for Taranaki, and Bruce Gatward-Cook, Media & Communications Manager, who would be points of contact for a joint media statement.

Regards,

Lauren Woollard (she/her)
Health Protection Officer
National Public Health Service | Taranaki
waea pūkoro: (06) 753 7798 ext 8517 | īmēra: lauren.woollard@tdhb.org.nz
David Street | Private Bag 2016 | New Plymouth 4340

Te Whatu Ora
Health New Zealand

Te Whatu Ora – Health New Zealand

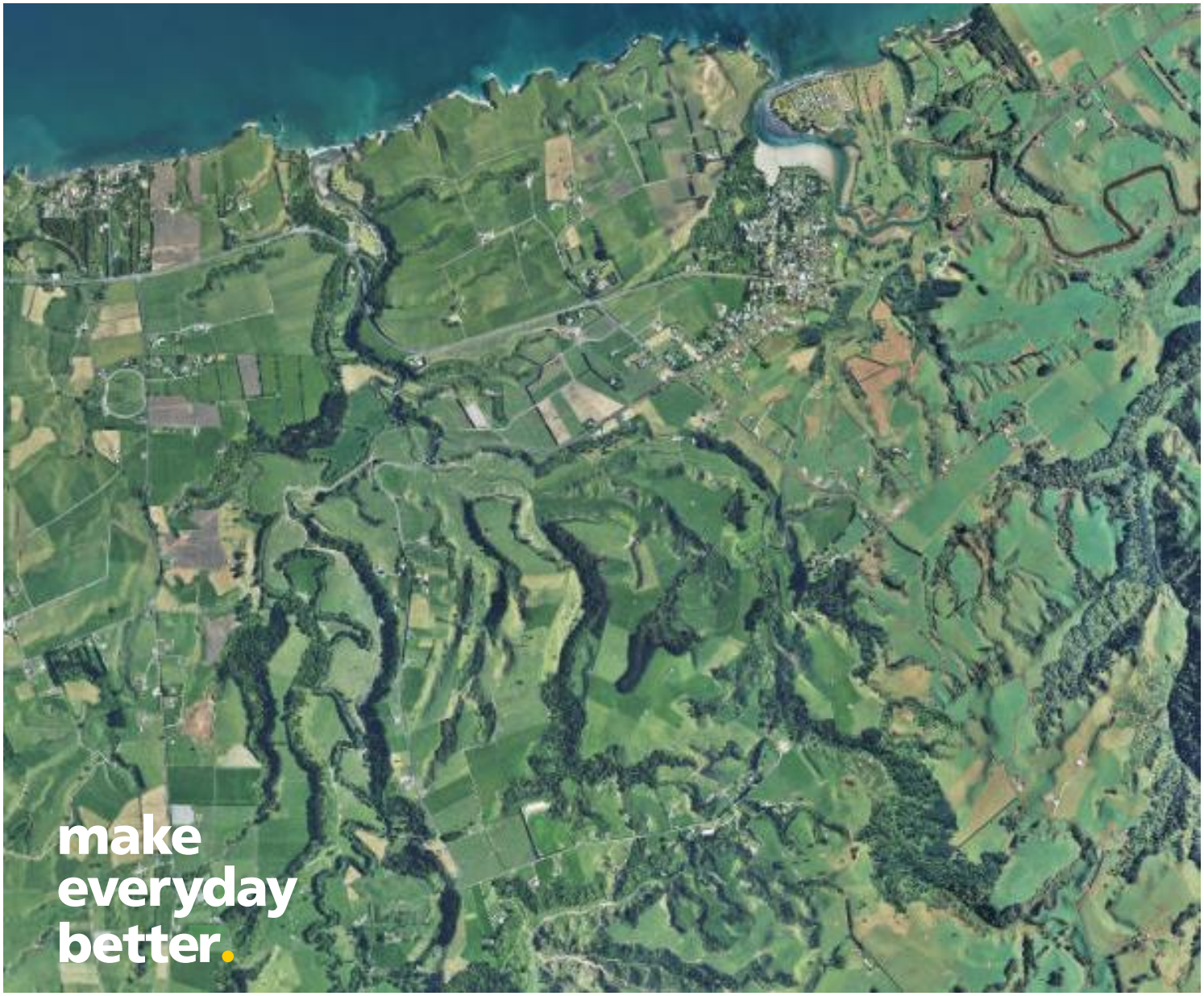
9. Appendix C - Comparison of Options – Piping to New Plymouth and Local Treatment and Land Discharge, Beca, 2024 (ECM 9240193)

Comparison of Options - Piping to New Plymouth and Local Treatment with Land Discharge

Urenui & Onaero Wastewater Project

Prepared for New Plymouth District Council
Prepared by Beca Limited

17 April 2024



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Contents

Appendices

Appendix A – High Level Planning Assessment

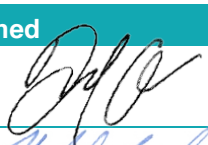
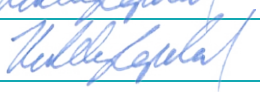
Appendix B –Cost Estimates

Appendix C – NPDC Developer Impact Assessment Urenui & Onaero, Beca, 2022

Revision History

Revision Nº	Prepared By	Description	Date
1	Daniel Gilmour, Claire Scrimgeour	Working Draft	21/02/2024
2	Daniel Gilmour, Ben Melvin	Issue for comment	12/04/2024
3	Daniel Gilmour	Final	17/04/2024

Document Acceptance

Action	Name	Signed	Date
Prepared by	Daniel Gilmour, Claire Scrimgeour		17/04/2024
Reviewed by	Roddy Copeland		17/04/2024
Approved by	Roddy Copeland		17/04/2024
on behalf of	Beca Limited		

1 Executive Summary

Beca has been engaged by New Plymouth District Council (NPDC) to review options for the conveyance of wastewater generated in Urenui and Onaero townships and domains for treatment. The comparison between piping to the New Plymouth Wastewater Treatment Plant (NPWWTP) (Option 1) and local treatment with land discharge (Option 2) for managing flows from Urenui and Onaero has been evaluated against various criteria such as cost, resilience, cultural acceptability, consentability, and delivery time frame. Two sub-options for Option 1 were investigated and are as follows:

- Option 1A: Includes upgrades to the Waitara wastewater network, Waitara transfer pump station (TPS) including rising main and NPWWTP to manage existing capacity issues and allow for the additional flows.
- Option 1B: Includes oxidation/detention ponds to allow increased independence from existing capacity issues. Some long-term upgrades to the NP WWTP would still be required.

Concept designs for Option 2 including assessment of the conveyance, local treatment plant and disposal fields have been previously undertaken and provided in separate reports. Evaluation of Option 1 provided in this report is largely drawn from information provided by NPDC and the earlier Opus concept design in 2009. The assessment results indicate that:

Option 2, which involves the construction of a new local wastewater treatment plant at Onaero, operates independently and eliminates impacts on the Waitara wastewater network and New Plymouth Wastewater Treatment Plant (NPWWTP). Alternatively, Option 1A, transferring wastewater to the NPWWTP, has the potential to worsen existing network issues and result in discharges that contradict regional and national coastal policy statements, making it unlikely to acquire resource consent.

Due to overflows identified through the New Plymouth wastewater model significant upgrades to the existing Waitara wastewater network and transfer pump station need to be addressed before the addition of flows from Urenui and Onaero can be implemented under Option 1A. A $12M program of work to address the Waitara network overflows is included in the draft LTP in years 1-10. The Waitara Transfer Station upgrades are not currently planned or funded in Council's long-term plan, requiring possible funding adjustments to enable the Urenui and Onaero project to proceed.

Assessment of Option 1B, which includes balancing and pretreatment via oxidation ponds before pumping to NPWWTP to avoid the need for upgrades to the Waitara network. It has not been developed in detail and there are potential risks related to pond size, operation, location constraints at the Main North Road site, and new Ministry of Business, Innovation and Employment (MBIE) dam safety regulations that need be assessed.

Option 2 has the lowest capital cost but higher operational costs compared to sub-options 1A and 1B, both sub-options involve ongoing maintenance and operation activities. The total combined cost including CAPEX and the NPV for operational costs show that all three options are relatively close given the project stage and level of accuracy of the estimates.

Option 2 aligns with NPDC's urgency to address failing septic tanks promptly. It is an independent project that doesn't depend on upgrades to any existing network components or the New Plymouth Wastewater Treatment Plant. Whilst Option 2 has the highest total cost, the design best accounts for cultural impacts discussed with Ngāti Mutunga, is more likely to gain the required resource consents, already has the required land purchased, and it has the lowest estimated capital cost.

Option 2 has been identified as the preferred option as it ranked highest overall against the options assessment criteria, has the best alignment with Ngāti Mutunga preferences, removes the risk of non-compliance with Regional and National Coastal policies and has the lowest estimated capital cost.

2 Introduction

2.1 Purpose of this report

New Plymouth District Council (NPDC) intends to develop a wastewater scheme for the Urenui and Onaero communities. NPDC's existing wastewater network currently only extends to the eastern extent of Waitara township which is about 10km away from Onaero. The purpose of this report is to compare two options for the conveyance of wastewater collected from Urenui and Onaero for treatment.

- Option 1: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) and disposal of treated wastewater to sea via the existing outfall, and
- Option 2: Piping wastewater locally to a new local treatment plant and disposal of treated wastewater to land.

Beca Ltd (Beca), has been commissioned by NPDC to perform a desktop assessment to compare the two options. This comparison includes an assessment of advantages, disadvantages, risks, opportunities, and class 5 estimates (+/- 100% as defined by NPDC Cost Estimating Framework).

Concept designs for Option 2 including assessment of the conveyance, local treatment plant and disposal fields have been previously undertaken and provided in separate reports.

Evaluation of Option 1 has been provided in this Report and has been broken down into four main sections:

- The review and updating of previously developed options (Opus 2007, 2008 and 2011) to pipe wastewater from Urenui and Onaero to the existing wastewater network in Waitara
- A review of available data to assess the likely capacity, limitations, and risks of additional wastewater on the existing Waitara wastewater network; and
- A review of available data to assess the likely capacity, limitations, and risks of additional wastewater on the existing NPWWTP.
- A review of potential cultural impacts and planning requirements.

A separate report has been prepared to determine the likely pump and pipe configurations to convey wastewater from Urenui and Onaero, and each domain, to the proposed local wastewater treatment site at 944 Main North Road (Option 2). For the purposes of this report only the conveyance of wastewater from a pump station in the vicinity of Onaero to Waitara, and the network and NPWWTP impacts beyond, have been assessed.

2.2 Available Information

The following information has been reviewed in preparation of this report:

- NPDC Developer Impact Assessment Urenui & Onaero, Beca, 2022
- D1.2 Literature Review and Gap Analysis Report Urenui and Onaero Sewerage Scheme Project, Beca,2021
- Urenui – Onaero Sewerage Scheme Optioneering Report – October 2011 – Opus
- New Plymouth WWTP Master Plan Report: Part B, Beca, 2010
- Urenui – Onaero Sewerage Rising Main Alternatives Report – November 2008 - Opus
- Urenui – Onaero Sewerage Transfer Pump Station and Rising Main – June 2007 – MWH New Zealand Ltd
- Urenui – Onaero Sewerage Design Report – May 2007 - Opus
- Urenui and Onaero Sewerage Treatment and Disposal Study – June 2004 – CH2M Beca Ltd

3 Options

The two wastewater schemes considered in the Options Report and included below in the summary and traffic light MCA table are:

- Option 1: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) via the existing Waitara network and disposal of treated wastewater to sea via the existing outfall, and
- Option 2: Piping wastewater to a new local treatment plant and disposal of treated wastewater to land.

Two sub-options are included for Option 1, which are:

- Option 1A: Includes upgrades to the Waitara wastewater network, Waitara transfer pump station (TPS) including rising main and NPWWTP to manage existing capacity issues and allow for the additional flows.
- Option 1B: Includes oxidation/detention ponds to allow increased independence from existing capacity issues in Waitara. Some long-term upgrades to the NP WWTP would still be required.

Option 1A requires the upgrades to the existing Waitara wastewater network to be funded and completed before this option can be implemented and for the purposes of the assessment in this report, Option 1A includes a portion of the costs of these, reflective of the proportion of the flow from Urenui and Onaero. Option 1B assumes that flows will be pumped to NPWWTP in dry weather flow conditions and therefore doesn't require the upgrades to be completed but does require a storage pond to enable balancing during peak flows and rainfall events.

Note, we have not undertaken concept/feasibility design for Option 1B and the assessment provided in the summary table and MCA is largely drawn from information provided by NPDC and the earlier Opus concept design in 2009.

4 Option 1 - Piping Wastewater to New Plymouth Wastewater Treatment Plant

4.1 Pipeline to NPWWTP

From 2004 to 2011, Opus, Beca, and MWH carried out several assessments to investigate the feasibility of piping wastewater from Urenui and Onaero to the NPWWTP via the Waitara pump station for treatment and discharge. The Opus 2007 Urenui and Onaero Sewerage Design comprised of pump stations at the following locations:

- Existing Urenui Domain Pump Station
- Mokena Street Pump Station
- Transfer Pump Station (near Waiau Rd)
- Proposed Onaero Beach Pump Station
- Rising Main Discharge at Bayly Street

The 2008 Opus update to the 2007 report recommended pretreatment of wastewater via a 1.6ha facultative pond (oxidation pond) located centrally between Urenui and Onaero to manage peak flows, potentially reduce pipe sizing, manage odour, and prevent corrosion (Option 1B). A high-level location plan of the Opus concept is shown in Figure 1.

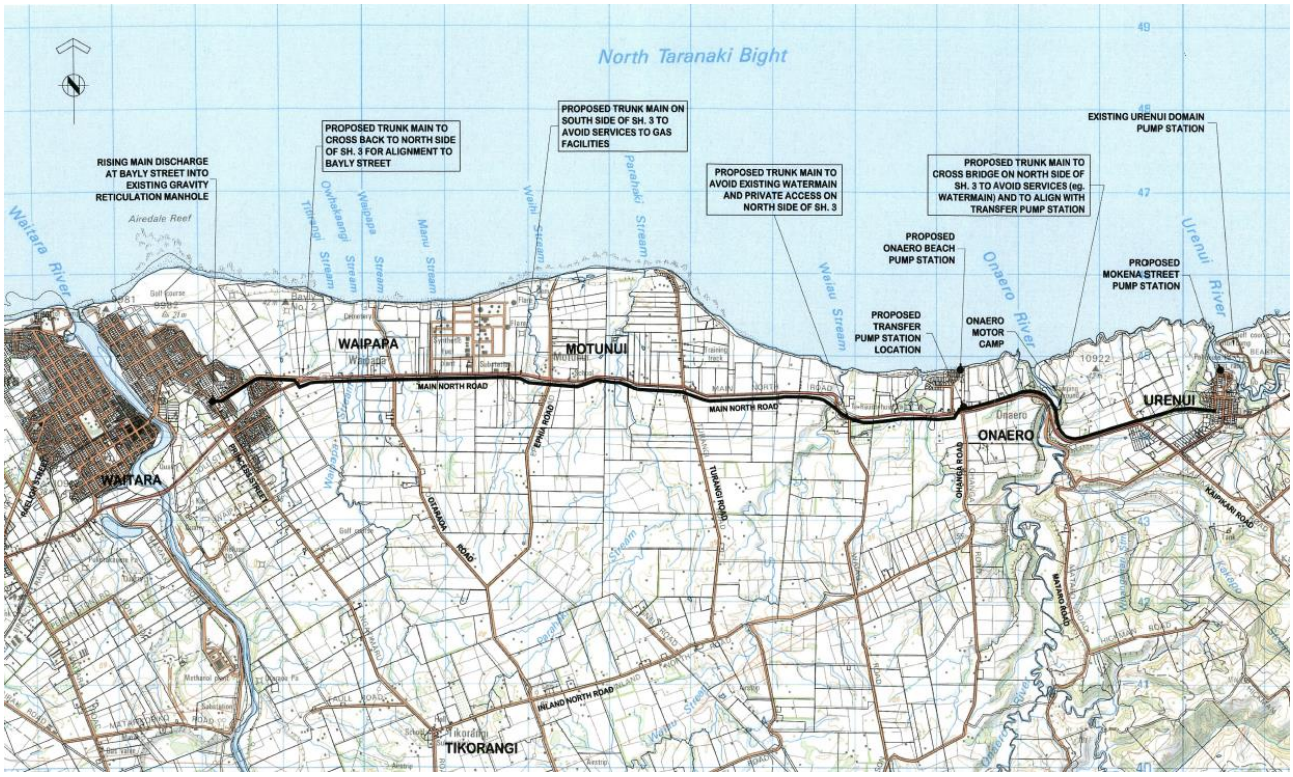


Figure 1 Project Area and Indicative Pipeline Route Opus 2007

4.2 Option Overview

Low pressure sewer (LPS) has been selected as the preferred collection system for the local Onaero and Urenui networks. The introduction of LPS has the benefit of flow control management and grinder type pumps reducing storage requirements.

For Option 1A Emergency storage will be required at pump stations and the size of this is still expected to be significant at a minimum 24hrs of storage at ADWF. Odour/septicity remains a risk and management of these would be required for long distance pumping via the 9.5km rising main.

For option 1B emergency and buffer storage will be required. Seven days of buffer storage will be needed during rainfall events when there is no capacity to convey wastewater through Waitara without causing overflows or adding to overflows that are already occurring. Aeration is required for long term storage to avoid odours, this would also address some of the septicity risk related to long distance pumping.

The local network is proposed to be a combination of LPS with individual on-property pumps and a number of pump stations and rising mains (as indicated in grey boxes in Figure 2 below.) The potential pre-treatment ponds under Option 1B are not shown. While a number of configuration options could be considered, it is likely the bulk of the wastewater will be collected at a pump station in the vicinity of the Ohanga Rd and SH3 (Main North Rd). From this point wastewater would be pumped to the Waitara network (Refer to Figure 1 and blue boxes in Figure 2) before being transferred to the New Plymouth WWTP along with the wastewater from Waitara.

A new 9.5 km pipeline would be required between the transfer pump station and the tie in point with the current Waitara wastewater network on Bayly Street. Existing reticulation would then be used to convey flows to the Waitara transfer pump station (WTPS) and onwards to the New Plymouth WWTP.

The previously completed report in 2011 identified that there is a risk that the wastewater from Urenui and Onaero would be septic due to the long retention times in the collection system and the transfer pipeline to Waitara. As well as odour at the discharge manhole, this may lead to corrosion damage over time to any downstream concrete manholes, pipes, or structures. A detailed odour/septicity review is required to further assess the likely mitigation options required should Option 1 be taken forward. An allowance for operational chemical dosing or aeration for odour management is included under this scenario (Option 1A).

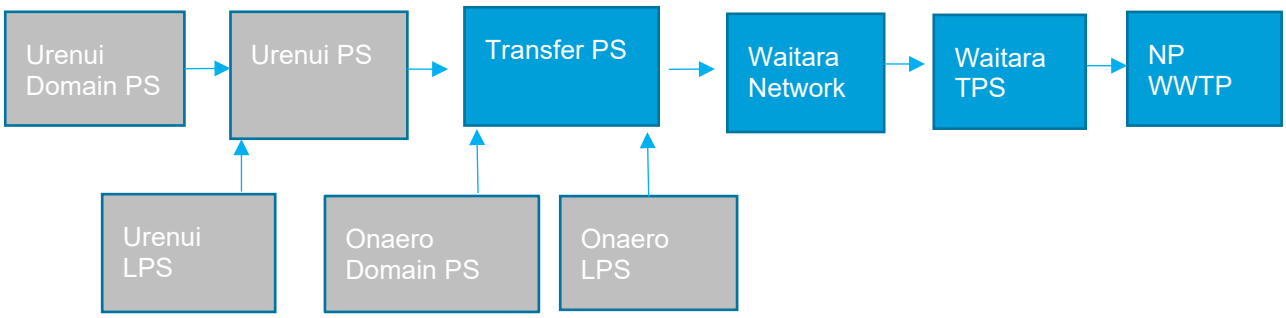


Figure 2 - New Plymouth WWTP Transfer and Treatment Option Schematic

4.3 Pipeline Corridor

For the purposes of this assessment the route of the pipeline between the future Transfer PS and Waitara is assumed to be along SH3 as far as the entrance of Waitara and then Bayly Street to the corner of Princess Street, from where it can discharge into the existing trunk sewer at manhole 40085386. A high-level plan of the overall route is shown in Figure 1.

Along this length, the road corridor is currently used by a number of services, including water supply, stormwater, power, telecom, domestic sewer, and treated effluent from the Methanex plant at Motunui. The route includes the crossing of a number of small streams/culverts (e.g. 584 Main N Rd.) which go under SH3, as well as at least one stock underpass at 650 Main N Rd. These would need review to determine if any pipe bridges or directionally drilled sections would be required or if there is adequate cover to trench over them. The section of the route between Motunui and Princess Street the corridor has services on both sides of the

road so the potential locations for a new pipeline in this area will be restricted. This section of the pipeline route and services are shown in more detail in Figure 3 and Figure 4. The known services include:

- 122mm PVC water main – NPDC owned
- AC 300mm diameter Rising main Methanex
- uPVC 100mm Rising main Methanex
- Above ground powerlines
- Underground telecommunications cables and fibre

Methanex treated process water flows through a private 300 mm AC main. This is not suitable for transferring the Urenui and Onaero wastewater as it bypasses the WTPS and discharges directly to sea via the ocean outfall. The untreated domestic wastewater from Methanex discharges into the Waitara network via a 100 mm rising main which does not have sufficient capacity for additional Urenui and Onaero flows. An appropriate offset to the new rising main would need to be considered to enable construction and ongoing maintenance/repair of the new rising main to occur while minimising the risk of damage to the Methanex pipe. A minimum 1m offset between the rising main and watermain is also required to meet minimum clearance in NZS4404 leaving limited space for installation of the new rising main. A gas transmission pipeline also crosses the corridor near Otaraoa Rd into the Methanex plant. Fibre and telecom are not available on available GIS maps and a new service location request directly to the service providers has not yet been undertaken. Previous project plans show telecom services on both sides of the highway in some sections.

Figure 3 - Methanex to Waitara corridor high level plan

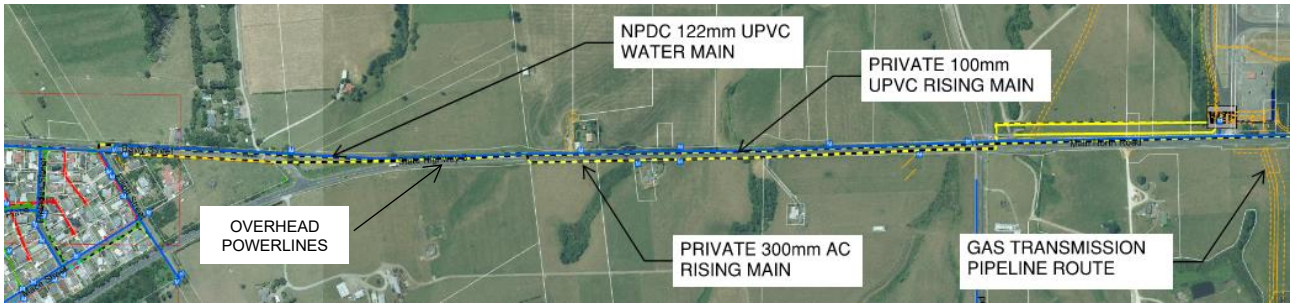


Figure 4 Methanex to Waitara corridor - Existing Services

A planning assessment for this route and the alternative standalone WWTP and land discharge is provided in Appendix A.

4.4 Waitara Network Impacts

4.4.1 Existing Infrastructure Impacted

The overall New Plymouth Wastewater Network configuration is illustrated in Figure 5. The sections of existing infrastructure network that will be utilised or impacted by connecting the Urenui and Onaero flows include:

1. The trunk sewer between Bayly Street and the Waitara Transfer Pump Station
2. The Queen Street Pump Station
3. The Waitara Transfer Pump Station and pipelines
4. The New Plymouth WWTP

The connection location and the impacted sections of the network are indicated in Figure 6.

In most cases these existing assets already have capacity or resilience issues or constraints. The addition of the Urenui and Onaero flows into these systems is likely to incrementally increase the existing resilience and capacity risks. Additionally, the level of service and resilience provided to the Urenui and Onaero network will be reliant on what the downstream existing assets can provide.

The report sections below provide a high-level summary of the existing infrastructure that will be utilised or impacted by the Urenui and Onaero flows along with commentary about the current capacity or resilience risks or limitations. The subsequent sections of this report then set out some of the potential options for mitigating those risks which have been identified.

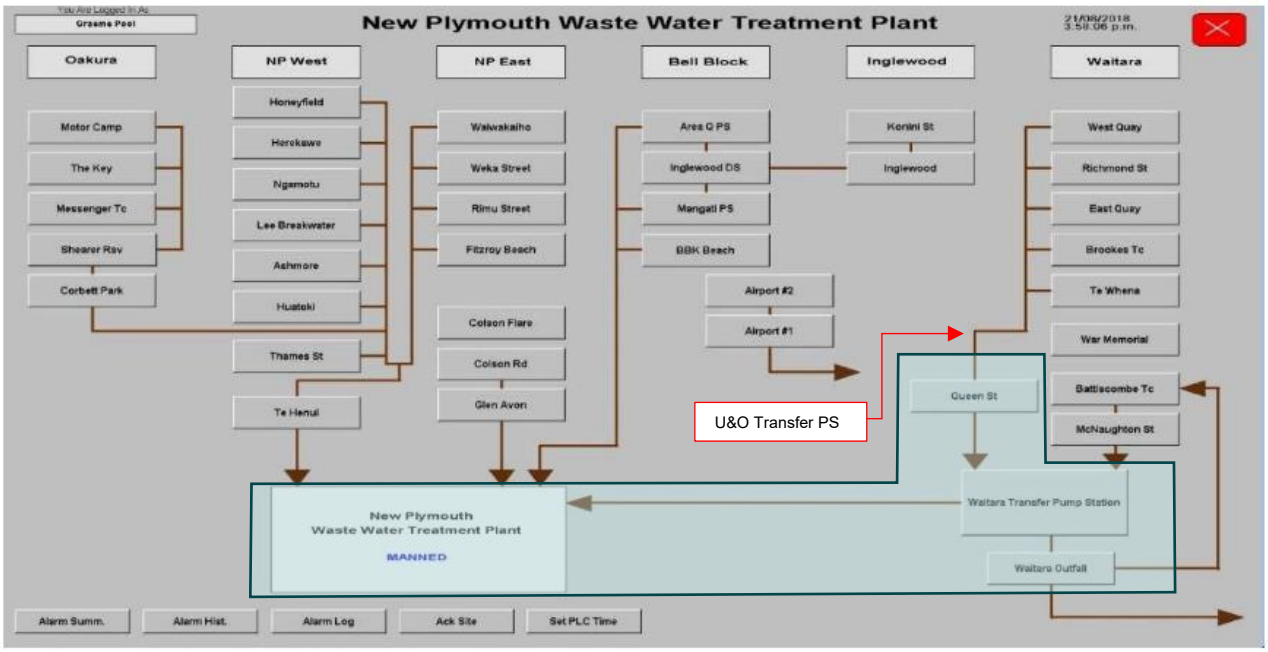


Figure 5 - New Plymouth Overall Network Configuration

4.4.2 Trunk sewer between Bayly Street & Waitara Transfer Pump Station

The existing pipe network from Bayly Street to the Waitara River Bridge is a 300mm diameter gravity trunk main. The trunk main traverses Council owned road reserve, before entering into Ministry of Education (MoE) land, before eventually passing through sites of cultural significance including Manukorihi pa and Owae Whai-Tara Marae (including wetland areas) and connecting into the network on North Street. There is no easement in favour of Council where the trunk main enters private land and therefore ongoing maintenance and future replacement of the trunk main will require direct negotiation with landowners.

The pipeline then passes over the Waitara River on the Waitara River Bridge before increasing in size to 450mm and heading north toward the Waitara Transfer Pump Station (WTPS).

Historic storm events and the creation of the digital wastewater model (ICM Model) have shown that Waitara experiences significant problems with both inflow and infiltration which contribute to several locations of network overflows through the catchment in heavy rainfall events.

Interrogation of the New Plymouth Wastewater ICM model of the Waitara wastewater network in the NPDC Developer Impact Assessment Urenui & Onaero, Beca, 2022, showed that in Dry Weather Flow (DFW) situation there are no impacts on the Waitara system from flows from Urenui and Onaero but during both 5yr and 20yr storm events increased flooding volumes of, 27m^3 and 81m^3 respectively, was predicted on Whitaker Street (as shown in Figures below). An increase in spilling at the Waitara Outfall of 466m^3 in a 1:5yr event and 1,756m^3 in a 1:20yr event and 466m^3 at West Quay Pumping Stations in a 1:20yr event were also predicted by the model. [1]

This indicates that either some network improvements or some form of flow reduction/balancing will be required if the Urenui and Onaero flows are transferred to Waitara. A copy of the full report on the modelling work is included as Appendix C.

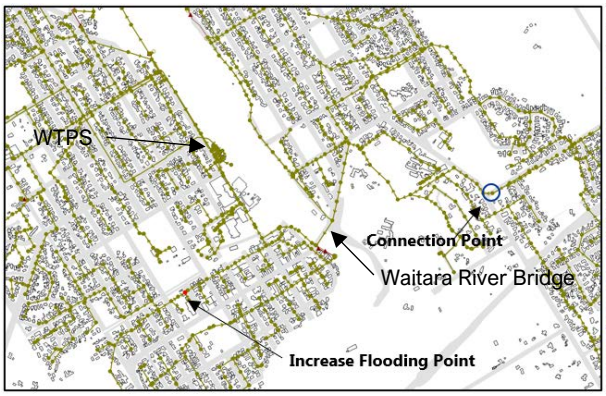


Figure 6: 5-year event predicted overflow

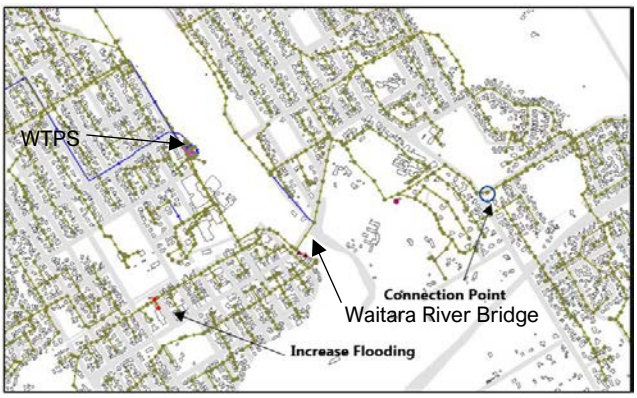


Figure 7: 20year event predicted overflows

In addition to the potential upgrades to the network in this area to deal with overflow risks, there are currently resilience risks with the existing infrastructure that the Urenui and Onaero flows will be connecting into that need consideration. For example, during heavy rainfall the Waitara River Bridge can sometimes become submerged by floodwaters (the CBD end of the bridge is below the 100-year flood level). Debris floating down the river have the potential to damage the wastewater services attached to the bridge presenting a potential contamination risk if the pipeline were damaged. The acceptability of adding additional reliance on at risk assets needs to be reviewed, and any resilience upgrades to that infrastructure will need to account for the additional flows from Urenui and Onaero.

4.4.3 Waitara Transfer Pump Station

Once the incoming Urenui and Onaero flows reach the Waitara network the next major existing conveyance asset that would be utilised is the Waitara transfer pump station (WTPS) and its associated facilities. The WTPS would be utilised to pump the wastewater the additional 14km to the New Plymouth WWTP. Refer to Figure 8 for the network configuration around the Waitara PS.

[1] NPDC Developer Impact Assessment Urenui & Onaero, Beca, 2022

The Waitara transfer pump station consists of the following components:

- Three milliscreens to screen out solids from the incoming flows.
- Two main transfer pumps which operate duty/assist to transfer screened sewage flows to the New Plymouth Wastewater Treatment Plant
- Two storage tanks, with a total capacity of 8,800 m3. The tanks are emptied by gravity discharge back to the wet well for transfer to WWTP by the transfer pumps.
- Two attenuation pumps, which transfer screened wastewater to the storage tanks if the incoming wastewater flows exceed the capacity of the transfer pumps

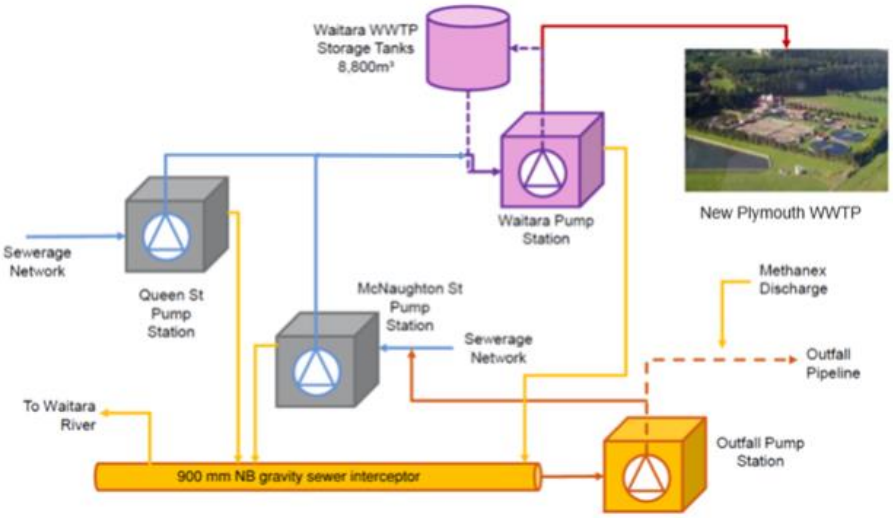


Figure 8 Waitara Transfer Pump Station Arrangement

The WTPS receives flows from two main network pump stations in the area, the Queen Street and McNaughton Street pump stations. Both pump stations receive flow from gravity sewers and other network pump stations. The Urenui and Onaero flows would come into the system via the Queen St pumpstation.

In the past, there has been an incident where the pumps have failed mechanically and there have been discharges via the Outfall Pump Station (OPS). There have not yet been any reported incidents due to unscheduled power outages.

An analysis of plant operations shows that between November 2014 and 13 May 2023 there were 855 incidents where the pump station operated at maximum design flow. While approximately 70% of these events lasted for less than 30 minutes, the remaining events had an average duration of 200 minutes and a maximum of 7,660 minutes of continuous operation. There are also currently issues with the capacity of the headworks (inlet and screens). Any additional inflows are likely to exacerbate these issues with the pump station.

Specific issues with the WTPS have been identified as:

- The WTPS is approximately 50% undersized. NPDC don't currently have a clear level of service for the pump station. The NPDC Operations team have stated that the pump station receives approximately twice the amount of manageable flow in a 1:10yr rainfall event.
- The pump station is a repurposed facility that was originally used as a wastewater treatment plant. However, this adaptation is not ideal for its intended purpose, leading to operational and resilience challenges.
- The WTPS is located on top of potentially liquifiable soil leading to a potential failure in an earthquake.
- Currently the WTPS utilises old storage tanks from the repurposed WWTP to balance flows and uses the old outfall pipe (non-pumped overflow) as temporary storage. The location of the

outfall pipe means that seawater infiltration is a risk. Flows from the tanks are also used to cleanse the rising main.
- The balance tanks require pumped discharge into the tanks. During power outages the pumps do not work.
- The location of the pumpstation is on the stop bank of the Waitara river. There is a risk of flood inundation in a major flood event.
- The rising main pipe has insufficient capacity during high intensity storm events and is too big for average dry weather flow meaning the pump station does not have an optimal operation and requires a high level of operational management.
- In the event that the WTPS is not operational, flow is diverted to the old outfall pipe resulting in untreated wastewater entering the ocean. This is fundamentally unacceptable to Iwi and the local Hapū.
- The 400mm diameter rising main from the transfer pump station discharges at the Links subdivision into a smaller diameter gravity 300mm sewer.

The resilience issues can be summarised as:

- the risk of liquefaction of the ground under the pump station during a seismic event,
- flood risk,
- failure of aging assets.

While these risks will not be increased by the inclusion of the Urenui/Onaero flows the consequence of any resulting system failures may increase slightly. Additionally, the resilience and level of service for the Urenui and Onaero catchment will be linked to the WTPS system resilience which will add risk to the Urenui and Onaero network and may require additional storage within the Urenui and Onaero system to manage this.

4.4.4 Waitara Outfall Pump Station

The Waitara outfall pump station is used in emergency situations when flow exceeds the available storage in the 900mm interceptor. As described above, flow is circulated back to the McNaughton PS until a high-level switch is triggered and flows are pumped to the Waitara outfall.

Current issues with the OPS include:

- Obsolete pumps - new pumps are planned for installation at the pump station later this year (2024)
- There is no manual control for the pumpstation
- The existing generator is antiquated and does not comply with current standards for diesel containment. A new generator would be required.
- There are issues with existing valves which are suspected to be filled with lime restricting their operation. Replacement of the valves will be a major project.
- There is a risk of the pump station floating out of the ground in significant seismic event

As with the transfer pump station, the resilience and level of service for the Urenui and Onaero catchment will be linked to the WTPS/Outfall Pump station system resilience which will add risk to the Urenui and Onaero network and may require additional storage within the Urenui and Onaero system to manage this.

4.4.5 Mitigation Options

There are several upgrades to existing infrastructure required to provide a reliable and resilient network for the community in Waitara. The existing infrastructure may handle the additional flow from Urenui and Onaero in dry weather conditions, however, during wet weather conditions there are likely to be increased frequency of volumes of spills in the network.

To add flows from Urenui and Onaero to the existing network in Waitara, and alleviate the existing known issues, a combination of major upgrades will be required. The identified options can be summarised as:

1. Reduce I&I in Waitara to reduce baseflow
2. Upgrade pumps at WTPS
3. Add storage at Waitara
4. Add storage at Transfer Pump Station near Onaero

A qualitative traffic light rating has been used to compare the mitigation options under cost, risk and uncertainty areas with red being relatively high cost/risk/uncertainty, orange moderate and green lowest.

Reduce I&I in Waitara to reduce baseflow

To reduce demand at the WTPS a reduction in inflow and infiltration from the contributing Waitara network could be considered. A systematic program to undertake the investigation and reporting is included in the Council's Long-Term Plan which would be developed to identify improvements. The improvements would likely include lining or replacement of existing gravity mains, replacement and raising of private laterals and gully traps, upgrading of pipe to increase capacity. Upgrading of pump stations to convey more flow to the WTPS could be considered however this would require the challenges at the WTPS to be resolved.

Measure	Rating	Comment
Cost		The extent of the I&I issues is not fully understood however the ICM model is predicting high amounts of I&I.
Risk		The project would involve replacing or moving existing WW assets on private properties.
Uncertainty		While likely to improve the amount of I&I entering the system the actual reduction in flow is difficult to predict for a given level of investment.

Upgrade capacity at WTPS

Upgrading the pumps and rising main at the WTPS would increase the capacity of the rising main from Waitara to the NP WWTP theoretically managing the additional U&O flow. The NPWWTP would also require upgrading to increase capacity for the new flows and this is discussed in Section 4.5 of the report. Both upgrades are expected to be required to resolve existing network issues without addition of the Urenui and Onaero flows. Investigation into the rising main sizing and whether a second parallel rising main is required however there are no current projects in the draft LTP to assess this.

Measure	Rating	Comment
Cost		New pumps and rising main likely to be in the tens of millions to construct
Risk		Duplication of the rising main would likely require private landowner agreements.
Uncertainty		New pumps and rising main would give good certainty of capacity. There are no current projects to undertake this work.

Storage at Waitara

One option to manage flows from the WTPS to the NPWWTP would be to add additional storage in Waitara. Discussions with the NPDC operations team have suggested that up to 7 days storage is needed to manage inflow into the WWTP following a large rainfall event.

Measure	Rating	Comment
Cost		Significant cost due to the size of storage needed.
Risk		Existing NPDC projects to add storage have struggled from a cultural perspective.
Uncertainty		Limited space to install storage in current urban area.

Storage at Onaero TPS

To address the increased flows more directly from Urenui and Onaero, additional storage at the transfer pump station in the vicinity of Ohanga Rd and SH3 could be installed to provide balancing for say 24 hrs ADF storage (410 m^3). This could allow the TPS pumps to be shut down when the Waitara wastewater network does not have sufficient capacity. This mitigation option clearly only mitigates the effects of the additional Urenui and Onaero peak flows and doesn't provide any increase benefit to the existing system. The cost of this solution is therefore more readily attributed to the conveyance option for pumping Urenui and Onaero wastewater to the NP WWTP and is proposed to be included in the cost estimate.

Measure	Rating	Comment
Cost		Moderate cost to provide
Risk		Existing NPDC projects to add storage have struggled from a cultural and geotechnical perspective. Increases retention times and odour/septicity risk. The balancing duration and volume might need to be larger or this solution on its own is not deemed to be sufficient.
Uncertainty		Flows from Urenui and Onaero are expected to be predictable due to the LPS and new network.

4.5 Wastewater Treatment Plant Impacts

Following conveyance for the Urenui and Onaero flows through the Waitara conveyance infrastructure, these discharges will add additional flows and loads to the existing New Plymouth WWTP. Given the relatively small flows and loads from Urenui and Onaero relative to the total WWTP capacity, these additional flows need to be considered in the broader context of the general capacity and the planned upgrades at the WWTP.

The following section provides a summary of the WWTP processes that the flows and loads from Urenui and Onaero would impact or utilise, and some commentary on the current capacity and how the Urenui and Onaero flows relate to this.

4.5.1 Existing Infrastructure Impacted

The NP WWTP (See Figure 9 - New Plymouth WWTP Processes) treats the municipal wastewater from the New Plymouth urban area, Bell Block, Oakura, Inglewood and Waitara by a process of biological nutrient removal using activated sludge. There is also a substantial industrial load, equivalent to approximately 25% of the total biochemical oxygen demand (BOD) load, treated by the plant. The plant was commissioned in 1984 and has had its capacity expanded several times since.

The wastewater enters the plant at the inlet works to remove plastics and large solids from the wastewater, followed by the removal of grit. The solids are collected and removed regularly for landfill disposal. Following this preliminary treatment, the wastewater enters the bioreactor basins where microorganisms, collectively called “activated sludge”, break down the organic matter in the wastewater. Pathogens and heavy metals stick to the activated sludge and are removed at a later stage of the process. The mix of wastewater and activated sludge then overflows into clarifiers, which separate the solids from the water. The clear water overflows into the chlorine contact tank for disinfection prior to discharge through a 450 m marine outfall offshore of the mouth of the Waiwhakaiho River.

Figure 9 - New Plymouth WWTP Processes

The activated sludge remaining in the clarifiers is returned to the bioreactor basins to maintain biological levels, while the surplus is diverted to the solid stream. This involves thickening and dewatering the surplus activated sludge before being processed in the thermal drying facility (TDF) for sterilisation and disposal by alternative use (soil conditioner).

Thermal drying of the sludge results in a dry granular solid (biosolid) with a moisture content of 5-10%. The temperatures used in the process are such that there is sterilisation of the micro-organisms and pathogens present in the sludge. The biosolid is registered for sale as Taranaki Bioboost 6-2-0 fertiliser. Major construction works were undertaken as part of an upgrade of the NPWWTP between December 2012 and December 2013. The upgrade involved major modification of the plant’s two existing aeration basins to make them more efficient by introducing anoxic and anaerobic zones to the process and improving aeration within aerobic zones. The basins are therefore now referred to as the bioreactor basins.

4.5.2 Impacts of Additional Flows and Loads

The impacts of adding additional wastewater from Urenui and Onaero to the NP WWTP are primarily based on the incremental increase in load to the activated sludge treatment process, particularly BOD load. Peak flows at NP WWTP are not expected to change significantly if Urenui and Onaero are connected due to the limitations of the Waitara TPS, distance from the NP WWTP and low peaking factor expected with LPS[2].

[2] Peaking factor <2 for LPS systems installed in Australia (per comm Ecoflow)

The inflow capacity at the WWTP is currently limited to 1220l/s due to the inlet screen capacity. During high rainfall events flow to the plant is heavily managed by NPDC operations teams, in multiple locations, to prevent the plant being overloaded.

The current load to the reactors is estimated at 6,500 kg BOD/day[3]. Future BOD load from Urenui and Onaero is 81 kg BOD/day or an additional 1.3%. The off-peak load has been used for this assessment as the holiday peak period for Urenui and Onaero would coincide with a period of lighter loading at NP WWTP while many residents were out of town on holiday.

The sludge/biosolids capacity at NP WWTP is currently being upgraded with addition of the new thermal drier which is expected to have plenty of capacity for the small additional sludge volumes from Urenui and Onaero[4].

WWTP Impacts Summary/Conclusion

The additional load from Urenui and Onaero would use up some of the capacity available for growth, potentially bringing forward the next reactor and other upgrades by a very small amount of time. To give an indication of the 'value' of the capacity being used up, the proposed renewal and upgrade costs over the next 30 years for the NP WWTP assets (including Thermal Dryer upgrade cost) could be divided by the proportion of future capacity being used up by Urenui an Onaero.

4.6 Timeframe for delivery

Upgrades to the Waitara network and Waitara TPS, including the rising main, are needed prior to implementation of Option 1A. The alternative would be Option 1b where wastewater is only conveyed through Waitara when capacity is available.

The Waitara transfer station upgrade is not currently in the 2024-34 draft LTP. It could be as much as six years from planning to implementation not including consent processing challenges for these upgrades to be planned designed and constructed. It is likely that implementation of these upgrades, and the associated costs, would need to be brought forward to enable the Urenui and Onaero flows to be conveyed.

4.7 Key Risks

The key risks of the pumping to New Plymouth option identified to date are:

- Option 1A, interdependencies with Waitara and NPWWTP upgrades result in high risk of delays due to the high complexity of these projects (especially Waitara). Most of the required upgrades are not currently funded and are not included in NPDC's current draft LTP.
- Option 1A, the costs associated with the Waitara upgrades would need to be brought forward to enable this option to be implemented
- Option 1B, the specific design of the oxidation ponds and ancillary equipment has not been assessed.
- Option 1B, overflow risks of partially treated wastewater associated with new oxidation ponds has not been assessed.
- Option 1B, odour discharge from ponds difficult to avoid and can impact wide area/number of residents.
- Option 1B, pond systems have high operational carbon emissions due to sludge accumulation.

[3] Based on data July 2021-June 2022

[4] NPDC Memo – Options for surplus micro-organisms – Urenui and Onaero Wastewater Project, Feb 2023

5 Option 2 - Treating Wastewater Locally and Disposing to Land

5.1 Option Overview

Two options have been developed to convey wastewater from Urenui and Onaero to the proposed WWTP site at 944 Main North Road. The two options are discussed in detail in the Beca February 2024 Conveyance Concept Design and Options Analysis Report. A preferred option has not been selected; however, Option 2B was assumed for cost estimates.

The two options include:

Option 1 – LPS Pumping with Primary Pump Station on Main North Road

This option utilises the Urenui township LPS pumping to a primary pump station located outside of the Urenui township on Main North Road, along with the existing refurbished Urenui domain primary pump station. The transfer rising main would gravitate from a high point on SH3 to the second pump station located on Main North Road.

There are two secondary options which relates to servicing low lying properties (at 'Snapper Flats') where the LPS pumps cannot reliably meet the required duty head.

Option 2 – Urenui Centralised Transfer Pump Station

This option requires a primary pump station located centrally within the Urenui township to receive flows from the LPS and the refurbished Urenui domain secondary pump station.

There are two secondary options which relate to the transfer rising main configuration and second pump station on Main North Road. Option 2A: Pressure gravity pressure trunk main and Option 2B: Pressure only trunk main.

For both conveyance options, the WWTP and discharge to land system would be sited at 944 Main North Road. NPDC have selected two potential WWTP technology options Sequencing Batch Reactor (SBR) and submerged fixed growth processes which would both give the required treated wastewater quality suitable for discharge to land. The irrigation method is still being considered, with options for pasture cut and carry and discharge to short rotation native planting. For the cost estimates provided in Section 7, SBR WWTP and irrigation to pasture cut and carry (approx. 20 hectares) have been assumed.

5.2 Pipeline Corridor

The proposed pipeline corridor follows the alignment of the transfer to NPWWTP option. As the pipeline would terminate at 944 Main North Road the heavily congested portion of the road reserve near the Methanex plant is avoided. Between Urenui and Onaero the following services are present:

- 122mm PVC water main – NPDC owned
- Above ground powerlines
- Underground telecommunications cables and fibre

5.3 Existing Infrastructure Impacted

The option of conveying wastewater to a new WWTP site has the major advantage that it has no impact on NPDC's Waitara to New Plymouth wastewater network nor any impact on the NPWWTP, other than the processing of sludge through the thermal dryer.

5.4 Timeframe for Delivery

Because the local WWTP option is a standalone project it does not rely on upgrades to any part of the existing network therefore it can be constructed independently without risk of disruption or impact on the local network.

The design and planning for the local WWTP option are well progressed and aligns with NPDC's desire to implement the preferred option as quickly as possible to address the impact of failing septic tanks.

5.5 Key Risks

Option 2 requires regional consenting for the proposed land discharge, whereas this is not required for Option1. This risk is considered a manageable risk given that pasture with spray irrigation has been implemented elsewhere across New Zealand many times. The 944 Main North Road site is large and flat which means that it's relatively easy to ensure there are no adverse effects on neighbours and the environment for this option and supports the Taranaki Regional Council's policies of a reduction in the volume of discharges of wastewater to the ocean.

The local WWTP option also allows for the storage of treated wastewater onsite and reduces the requirement for pumpstation emergency storage downstream in the network, therefore overflow risks are lower than other options.

6 Consenting

6.1 New Consents

This section outlines the implications for consenting for Options 1A, 1B, and Option 2. A high-level planning assessment of resource consent requirements for the transfer to the NPWWTP and to the proposed site at 944 Main North Road, is provided in Appendix A – Planning Assessment.

6.1.1 Option 1A – Transfer to NPWWTP

The option to transfer the wastewater to the NPWWTP would require a Notice of Requirement (NoR) seeking a Designation (district level) for the pump stations and associated storage. Regional consents will likely be required for construction activities (i.e. sediment discharge) and for air discharge from the pump station.

Discharges to a system relying on the Waitara outfall emergency discharge are permitted as per the existing consent, which expires in 2040. However, there is clear policy direction in both the Taranaki Regional Coastal Plan and the New Zealand Coastal Policy Statement (NZCPS) that aims to eliminate existing overflows containing untreated human sewage and prohibit further consents for such discharges. There is also a risk that an application to vary the existing consent would be required. Discussions with Taranaki Regional Council would be required. This creates a risk that there would be no pathway for a renewal of this consent in the future.

It is considered that the proposed upgrades at the Waitara TPS and rising main are necessary to ensure additional flows from Urenui and Onaero do not increase the frequency and volume of overflows from the Waitara outfall.

Upgrades of the Waitara TPS and rising main are likely to require additional consents, such as potential air discharge consents related to pump stations or air valves if odour standards are not met. Moreover, stormwater management consents will most likely be needed for sediment discharge during construction.

In addition to these requirements, an impact assessment may be necessary to provide a holistic assessment of the transfer pump station and pipeline. Furthermore, investigations under the National Environmental Standard for Contaminants in Soil (NESCS) will likely be required in line with the local treatment option.

6.1.2 Option 1B – Transfer to NPWWTP Oxidation Pond

The option to transfer to the NPWWTP would require a NoR seeking a Designation for the pump stations and associated storage. Regional consents will likely be required for construction activities (i.e. sediment discharge, earthworks). Under Option 1B, the oxidation pond would likely have discharge to air and an alteration to the NPWWTP designation consenting requirements. The pond could also trigger new dam safety regulations from MBIE due to their volume. This option would not require a regional discharge to land consent as wastewater would be pumped back to NPWWTP which already holds the necessary consents for discharge out the outfall

In addition to these requirements, an impact assessment may be necessary to provide a holistic assessment of the transfer pump station and pipeline. Furthermore, investigations under the National Environmental Standard for Contaminants in Soil (NESCS) will likely be required in line with the local treatment option.

6.1.3 Option 2 – Local treatment and discharge

The consenting requirements to pump wastewater to a new local treatment plant and dispose to land are likely to include the following consents:

Regional Level

- Discharge of contaminants to land and air (i.e. from spray irrigation of treated wastewater).
- An operational stormwater discharge consent may be required to discharge stormwater from the WWTP premises onto land (depending on the site specifics and engineering design).
- Construction stormwater for management of sediment discharge from soil disturbance during construction.

6.1.4 District Level

A Notice of Requirement, setting out:

- the reasons why the designation or alteration is needed to achieve the objectives of the requiring authority
- the physical and legal descriptions (noting any distinguishing characteristics) of the site
- the nature of the work, and any proposed restrictions
- the effect that the proposed work will have on the environment, and the proposed mitigation measures
- the extent to which alternative sites, routes and methods have been considered
- the associated resource consents which will be required, and those that have been applied for
- the extent of consultation undertaken with parties likely to be affected by the designation, including the reasons why, if no consultation is undertaken
- additional information (if any) as required by regional or district plans or regulations

Regional discharge to land consent is required for the WWTP operation as well as discharge to air for, land discharge and potentially pump stations.

Notice of requirement for designations for the WWTP, pump station and associated storage will be required as they are under options 1A and 1B.

The proposed discharge to land aligns with NZCPS direction to move away from sea discharges.

The likelihood of gaining consent is increased compared to Options 1a and 1b as the restrictions around ocean outfalls are removed and discharge to land is preferred by Ngāti Mutunga.

6.2 Existing Consents and Policy Statements

6.2.1 Waitara Outfall

Currently NPDC have a discharge consent to discharge wastewater via the gravity outfall pipe at Waitara in emergency events. This consent expires in 2041. Policy 29 in the Taranaki Regional Coastal Plan states that existing consented overflows that contain untreated human sewage will be eliminated, and no further consents granted.

Policy 29: Improving existing wastewater discharges

Adverse effects of existing wastewater discharges to coastal water will be minimised, and:

> *(a) in the case of existing discharges from wastewater treatment plants, the best practicable option will be used to improve water quality and reduce the quantity of discharges; and*
>
> *(b) in the case of existing consented wastewater overflows that contain untreated human sewage, including those occurring during or following extreme rainfall events, the frequency and/or volume of*

discharges should be progressively reduced and eliminated over the course of the existing consent as, in accordance with Policy 26, no further consents will be granted.[5]

Flows from Urenui and Onaero could have the potential to contribute untreated wastewater (Option 1A) or partially treated wastewater (Option 1B) flows, to the Waitara outfall in emergency events.

Policy 23 Discharge of Contaminants of the NZ Coastal Policy Statement also states that:

(2) In managing discharge of human sewage, do not allow:

(a) discharge of human sewage directly to water in the coastal environment without treatment; and

(b) the discharge of treated human sewage to water in the coastal environment, unless:

(i) there has been adequate consideration of alternative methods, sites and routes for undertaking the discharge; and

(ii) informed by an understanding of tangata whenua values and the effects on them.[6]

Even though there is currently a consent for discharge, any discharge of sewage to the Waitara River or the sea is also not considered acceptable from the Waitara community perspective and may have a negative reputational impact on NPDC and potentially damage its relationship with the community. There is a long-standing historical grievance from the community with regard to the building of the Outfall Pump Station (OPS) and its impact on the environment.

The outfall pipe is also understood to have several condition issues which are not well understood and have the potential for risk:

- The outfall sits on the seabed not under
- The outfall is held down with fabric straps which are susceptible to wear and may disintegrate over time
- The pipe has poor resilience to storm damage and possibly moves in 1:10 storm event. This is currently not well understood.

Overall, from a consenting perspective, there is likely no existing pathway to obtaining future consent for discharging untreated human wastewater.

6.2.2 NP WWTP Outfall

The outfall at the NPWWTP is also a consented outfall with an expiry date of 1 June 2041.

Flows from Urenui and Onaero would be treated at the NPWWTP before discharge under both Options 1A and 1B. However, Policy 29 of the Taranaki Regional Coastal Plan clearly states that in the case of existing discharges from wastewater treatment plants the best practicable option will be used to improve water quality and reduce the quantity of discharges. While relatively small, the Urenui and Onaero flow would likely increase the quantity discharged at the NPWWTP.

Policy 23 Discharge of Contaminants of the NZ Coastal Policy Statement 2B (i) also states that:

(2) In managing discharge of human sewage, do not allow:

(b) the discharge of treated human sewage to water in the coastal environment, unless:

(i) there has been adequate consideration of alternative methods, sites and routes for undertaking the discharge; and

[5] Coastal Plan for Taranaki, Taranaki Regional Council, 2023, Page 8

[6] NZ Coastal Policy Statement 2010, Page 22

(ii) informed by an understanding of tangata whenua values and the effects on them.

Therefore, there is a potential pathway for future consenting of the discharge of treated human wastewater, however this would be subject to adequately considering alternatives and being informed by tangata whenua values and effects.

7 Cultural

The cultural impacts of the conveyance of wastewater to a new local treatment plant have been provided by Ngāti Mutunga via a Cultural Values Statement. Option 2 achieves Ngāti Mutunga's preference for managing the treatment of wastewater within their rohe where it is generated. Ngāti Mutunga are also supportive of discharging the treated wastewater to land rather than to sea or surface water.

Options 1A and 1B would involve pumping flows from Urenui and Onaero to the NPWWTP via the Waitara network through the rohe of all but one of the Te Atiawa hapū. The cultural impacts of these options have not yet been discussed directly with Te Atiawa iwi or hapū. Engagement with iwi and hapū should be a priority if either of these options was to be considered further.

A section of the existing Waitara trunk main that would be utilised for the piping of wastewater from Urenui and Onaero to the NPWWTP option is located within Owae marae including several crossings of the Tangaroa stream and associated wetland areas. The Tangaroa stream is a highly important stream that flows through significant wahi tapu sites and is still of great significance to tangata whenua. The stream forms the eastern defences of Manukorihi, a regionally significant pa, waahi taonga and archaeological site.

8 Cost estimates

8.1 Option Cost Estimates

Cost estimates have been prepared for each option and include allowance for earthworks, pipelines, and pump stations, electrical, preliminary and general, contractor margins, engineering design, procurement and contract administration and risk allowances. The estimates have been prepared previously for the LPS (identical for both options) and WWTP/discharge system for Option 2.

Not included in the cost estimates are GST, future escalation, pipeline route easements or right of way procurements, legal fees, land purchase (as land has already been purchased for the local WWTP and disposal field), sale of land or depreciation. It is also assumed land already purchased by NPDC for the local land disposal field would be used for the Option 1B oxidation ponds.

Easement costs are not expected to be required at this stage of design development.

Cost of the existing network upgrades for all options including allocation proportional to the Urenui and Onaero project have been provided by NPDC.

Option 1A

Table 1 - Capital Cost Estimate – Conveyance to Waitara Option 1A

Option 1A – Transfer to NPWWTP	Capital Cost Estimate $
Pipelines	$7,421,080
Pump Stations	$2,133,000
Provisional Costs	$3,100,000
P+G	$3,796,224
Design/Procurement/ Internal costs	$4,170,365
Risk Allowances	$4,359,331
Conveyance Cost Sub Total (Rounded)	**$24,980,000**

Table 2 - Associated System Costs Option 1A Piping Wastewater to NPWWTP via Waitara

Associated System Costs Option 1A	Capital Cost Estimate $
LPS system	$9,100,000
Share of Network Upgrades[7]	$5,835,699
Share of NP WWTP Upgrades[8]	$2,644,301

[7] 12% Waitara overflows programme estimate $12,000,000, 12%Waitara pump station and rising main upgrades estimate $20,000,000, plus preliminary and general costs, contingency and fees of $1,995,699

[8] 4.5% NPWWTP Master Plan upgrades estimate $12,000,000, 1.5% Thermal Dryer Facility Upgrade estimate $80,000,000, plus preliminary and general costs, contingency and fees of $904,301

Associated System Costs Option 1A	Capital Cost Estimate $
Associated System Costs Sub Total	**$17,580,000**
Total Cost (Table 1 + Table 2)	**$42,560,000**

Option 1B

Table 3 Capital Cost Estimate – Conveyance to Waitara Option 1B

Option 1B – Transfer to NPWWTP	Capital Cost Estimate $
Pipelines	$7,421,080
Pump Stations	$2,353,000
Oxidation Pond and ancillaries	$3,750,000
P+G	$4,057,224
Design/Procurement/ Internal costs	$4,449,650
Risk Allowances	$4,659,046
Conveyance Cost Sub Total (Rounded)	**$26,690,000**

Table 4 Associated System Costs Option 1B Piping Wastewater to NPWWTP via Waitara Option

Associated System Costs Option 1B	Capital Cost Estimate $
LPS system	$9,100,000
Share of Network Upgrades [9]	$0
Share of NP WWTP Upgrades [10]	$1,830,000
Associated System Costs Sub Total	**$10,930,000**
Total Cost (Table 3 + Table 4)	**$37,620,000**

[9] 0% Waitara overflows programme estimate $12,000,000, 0%Waitara pump station and rising main upgrades $20,000,000

[10] 0% NPWWTP Master Plan upgrades estimate $12,000,000, 1.5% Thermal Dryer Facility Upgrade estimate $80,000,000, plus preliminary and general costs, contingency and fees of $630,000

Option 2

Table 5 Capital Cost Estimate - Conveyance to Local WWTP Option 2

Option 2 – local treatment and discharge	Capital Cost Estimate $
Pipelines	2,802,730
Pump Stations	1,593,000
P+G	1,318,719
Design/Procurement/ Internal costs	1,451,222
Risk Allowances	1,514,329
Conveyance Cost Sub Total	**$8,680,000**

Table 6 Associated System costs - Option 2 Treating Wastewater Locally and Disposing to Land

Associated System Costs Option 2	Capital Cost Estimate $
LPS system	$9,100,000
Share of NP WWTP Upgrades[11]	$1,830,000
WWTP	$8,000,000
Discharge system (cut and carry to pasture)	$4,760,000
Associated System Costs Sub Total	**$23,690,000**
Total Cost (Table 5 +Table 6)	**$32,370,000**

The cost estimates presented in this section are typically developed based on extrapolation of recent similar project pricing, new and historical quotes for some equipment items, industry unit rates and Beca's general experience. The estimates are based on concept design and other information and are not warranted or guaranteed by Beca. The accuracy of these estimates is expected to be in line with Class 5 accuracy for the scope of work described in this document and are not suitable for final Capex approval. Further design should be undertaken if a more reliable estimate is required.

[11] 1.5% New Plymouth Thermal Dryer Facility incl. Admin/Lab building upgrade estimate $80,000,000, plus preliminary and general costs, contingency and fees of $630,000

8.2 Operational Costs

For the purposes of this report the expected operational cost differences (excluding common collection/conveyance elements) for the different options are estimated below.

Table 7 - Operational Cost Estimates

Component	Pump to NP – dosing for odour control Option 1A $/yr	Pump to NP – oxidation pond for buffering and odour Option 1B $/yr	Local Treatment Option 2 $/yr
Additional transfer pump station (electricity and maintenance)	25,000	25,000	
Waitara PS additional electricity cost	10,000	10,000	
Chemical dosing for odour control (if required)	21,000		
Oxidation pond O&M		40,000	
Oxidation pond desludging allowance		20,000	
Local WWTP O&M			232000
Local WWTP land discharge O&M			164000
Share of NP WWTP overall O&M of $7M (incl Electricity)	91,000	64,000	
TOTAL	147,000	159,000	396,000
NPV 30 years @ 2.5% inflation and 4.5% cost of capital	3.0M	3.3M	8.2M

Assumptions:

- Transfer pump station electricity use $11,000 and op/maintenance costs $14,000 per year
- Chemical dosing for odour/septicity control $43/m^3/year
- Oxidation pond cost for weekly check, monthly grounds maintenance and aerators electricity cost
- Oxidation pond desludging allowance of $20,000 per year, most likely would occur every 10 years @$200,000 cost
- WWTP operation costs from Concept Design Report – SBR option – excludes share of sludge drying costs at NP WWTP which is common to all options
- Net annual operational cost for irrigation system $164,000 (assuming pasture cut and carry)
- The degree of confidence in these operational cost estimates are Class 5 similar to the capital cost estimate of +/-100%.
- The NPWWTP O&M costs have been based on a proportion of the total estimated NPWWTP operations costs estimated as 1.3 % based on the proportion of the load. $7,000,000 annual operating cost for NPWWTP provided by NPDC. With oxidation pond pre-treatment the load proportion reduces to 0.91%.

9 Options Comparison

The Multi Criteria Assessment (MCA) of the options has been completed based on a simple traffic light system as defined below:

MCA Score	Description
	Option has a clear disadvantage when compared to other options
	No measurable/quantifiable difference between options
	Option has a clear advantage when compared to other options

Table 8 - Options Comparison

<table>
<tr><th></th><th>OPTION 1A</th><th>OPTION 1B</th><th>OPTION 2</th></tr>
<tr><td>Option Description and assumptions:</td><td>Option 1A: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) and disposal of treated wastewater to sea via the existing outfall.

Includes reliance on upgrades to the Waitara wastewater network, Waitara transfer pump station (TPS) and rising main and NP WWTP to manage existing capacity issues.</td><td>Option 1B: Piping wastewater to the existing New Plymouth Wastewater Treatment Plant (NPWWTP) and disposal of treated wastewater to sea via the existing outfall.

Includes oxidation/detention ponds to allow greater independence from existing capacity issues. Some long-term upgrades to the Waitara network and NP WWTP are still required.</td><td>Piping wastewater locally to a new local treatment plant and disposal of treated wastewater to land.</td></tr>
<tr><td>Wastewater collection: Same for all options</td><td colspan="3">Townships - Low pressure sewer (LPS)
Urenui domain and campground - Existing gravity reticulation retained.
Onaero domain - LPS</td></tr>
<tr><td>Wastewater conveyance: Preferred option currently under review</td><td colspan="2">Urenui township and domain - Central/transfer pump station in Urenui township pumps to second transfer pump station on SH3
Onaero domain – LPS pumps to transfer pump station on SH3
Urenui township – LPS pumps to transfer pump station on SH3</td><td>Urenui township and domain - Central/transfer pump station in Urenui township pump to WWTP
Onaero domain – LPS pumps to WWTP in shared main
Urenui township – LPS pumps to WWTP in shared main</td></tr>
<tr><td>Wastewater transfer:</td><td><table><tr><th>Location</th><th>Solution</th><th>Storage at PS</th><th>Concept flow rate</th></tr><tr><td>SH3 – exact location TBC</td><td>Transfer pump station using progressive cavity pumps (PC) and 200OD PE100 rising main to Waitara.</td><td>24hrs ADWF</td><td>18 L/s</td></tr></table>Odour/septicity remains a risk and management required for long distance pumping (9.5km rising main) – concept is for oxygen or chemical feed facility and bio-filter at discharge to Waitara</td><td><table><tr><th>Location</th><th>Solution</th><th>Storage at PS</th><th>Concept flow rate</th></tr><tr><td>SH3 – exact location TBC</td><td>Transfer pump station using progressive cavity pumps (PC) and 200OD PE100 rising main to Waitara.</td><td>4hrs ADWF – additional storage provided at oxidation ponds</td><td>18 L/s</td></tr></table></td><td>Not required</td></tr>
<tr><td>Wastewater treatment:</td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Not required, note odour management required at rising main discharge to Waitara.</td></tr><tr><td>Treatment</td><td>Existing NPWWTP and sea outfall</td></tr></table></td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Oxidation ponds with 7 days detention storage</td></tr><tr><td>Treatment</td><td>Existing NPWWTP and sea outfall</td></tr></table></td><td><table><tr><th>Location</th><th>Solution</th></tr><tr><td>Pre-treatment at U&O before transfer pumping</td><td>Not required</td></tr><tr><td>Treatment</td><td>New/local WWTP and land discharge</td></tr></table></td></tr>
<tr><td>Downstream network upgrades:

Note: % attributed to U&O project provided by NPDC based on initial high level estimate</td><td><table><tr><th>Location</th><th>Mitigation option</th></tr><tr><td>Waitara network</td><td>Waitara overflows program/reticulation upgrades – 12% attributed to U&O project</td></tr><tr><td>Waitara TPS incl. rising main</td><td>Waitara TPS pump station upgrades including pumps, storage tanks, rising main, and demolition of existing structures – 12% attributed to U&O project</td></tr><tr><td>New Plymouth WWTP</td><td>Buffer storage at NPWWTP – 4.5% attributed to U&O project</td></tr></table></td><td><table><tr><th>Location</th><th>Mitigation option</th></tr><tr><td>Waitara network</td><td>Oxidation pond storage negates need for upgrades. 0% attributed to U&O project</td></tr><tr><td>Waitara TPS incl. rising main</td><td>Oxidation pond storage negates need for upgrades. 0% attributed to U&O project</td></tr><tr><td>New Plymouth WWTP</td><td>Buffer storage at NPWWTP – 0% attributed to U&O project</td></tr></table></td><td>Sludge transferred to NP WWTP via tanker for further processing. Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td></tr>
</table>

<table>
<tr><th></th><th colspan="2">OPTION 1A</th><th colspan="2">OPTION 1B</th><th colspan="2">OPTION 2</th></tr>
<tr><td></td><td colspan="2">Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td><td colspan="2">Thermal dryer facility and admin/lab upgrades – 1.5% attributed to U&O project</td><td colspan="2"></td></tr>
<tr><td>Capital cost estimate: (Class 5):

Refer Appendix A for detailed breakdown, assumptions, and disclaimer.

Costs for existing Waitara network and NP WWTP upgrades provided by NPDC.</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td></tr>
<tr><td></td><td>Collection – LPS system</td><td>9,100,000</td><td>Collection – LPS system</td><td>9,100,000</td><td>Collection – LPS system</td><td>9,100,000</td></tr>
<tr><td></td><td>Conveyance and transfer - Transfer to Waitara including odour/septicity management</td><td>24,980,000</td><td>Conveyance and transfer - Transfer to Waitara</td><td>23,790,000</td><td>Conveyance and transfer - Conveyance to new local WWTP</td><td>8,680,000</td></tr>
<tr><td></td><td>Treatment – not required.</td><td></td><td>Treatment – pre-treatment at U&O oxidation ponds (1.6Ha) with 6 days buffer storage</td><td>2,900,000</td><td>Treatment - New WWTP and land disposal (cut and carry pasture)</td><td>12,760,000</td></tr>
<tr><td></td><td>Existing network upgrades - Share of Waitara network and NP WWTP upgrades</td><td>8,480,000</td><td>Share of NP WWTP upgrades</td><td>1,830,000</td><td>Share of NP WWTP upgrades</td><td>1,830,000</td></tr>
<tr><td></td><td>Total capital cost estimate</td><td>42,560,000</td><td>Total capital cost estimate</td><td>37,620,000</td><td>Total capital cost estimate</td><td>32,370,000</td></tr>
<tr><td>Operational Costs:</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td></tr>
<tr><td></td><td>Annual Operating Cost</td><td>147,000</td><td>Annual Operating Cost</td><td>159,000</td><td>Annual Operating Cost</td><td>396,000</td></tr>
<tr><td></td><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>3,000,000</td><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>3,300,000</td><td>NPV 30 years @ 2.5% inflation and 4.5% cost of capital</td><td>8,200,000</td></tr>
<tr><td>Total Cost of Option:</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td><td>Item:</td><td>Cost ($)</td></tr>
<tr><td></td><td>Capital costs</td><td>43M</td><td>Capital costs</td><td>38M</td><td>Capital costs</td><td>32M</td></tr>
<tr><td></td><td>Operating costs</td><td>3M</td><td>Operating costs</td><td>3.3M</td><td>Operating costs</td><td>8.2M</td></tr>
<tr><td></td><td>Total Cost</td><td>46M</td><td>Total Cost</td><td>41M</td><td>Total Cost</td><td>40M</td></tr>
<tr><td></td><td colspan="2">All upgrades to the Waitara network must be completed before this option can be implemented. Total cost of these upgrades estimated to be $32M. *Total costs have been rounded to two significant figures</td><td colspan="2">*Total costs have been rounded to two significant figures</td><td colspan="2">*Total costs have been rounded to two significant figures</td></tr>
<tr><td>Complexity of operation:</td><td colspan="2">Maintains a centralised wastewater treatment system and removes the requirement to operate a new full WWTP.

Adds expense and complexity of chemical or aeration dosing which is required to reduce septicity from long distance piping.</td><td colspan="2">Maintains a centralised wastewater treatment system and removes the requirement to operate a new full WWTP, however operation of the oxidation pond still has operational inputs to manage (similar to a simple WWTP) as well as long distance conveyance requirements.

Adds management of oxidation pond, desludging, and long-distance piping.</td><td colspan="2">Requires operation of a second WWTP and land discharge system.</td></tr>
<tr><td>Resilience:</td><td colspan="2">Dependent on the resilience and capacity of downstream network. Relies on chemical or aeration facilities to manage septicity of system and odour issues.

Requires multiple stages of pumping and long piping.</td><td colspan="2">Requires multiple stages of pumping and long piping.

Storage allows for some independence from downstream network limitations (up to 7 days storage). Still relies on overall resilience of the Waitara network.</td><td colspan="2">Independent system.
Constrained by land discharge environmental limitations</td></tr>
<tr><td>Cultural acceptability</td><td colspan="2">Requires:
-piping wastewater from Ngāti Mutunga through the rohe of six of the seven Te Atiawa hapū.
-piping wastewater out of Ngāti Mutunga rohe.
-discharge of treated wastewater to sea.</td><td colspan="2">Requires:
-piping wastewater from Ngāti Mutunga through the rohe of six of the seven Te Atiawa hapū.
-piping wastewater out of Ngāti Mutunga rohe.
-discharge of treated wastewater to sea.</td><td colspan="2">Meets Ngāti Mutunga’s desire to treat their waste in their rohe and discharge treated wastewater to land.

Council is working with Ngāti Mutunga in the spirit of partnership.</td></tr>
</table>

	OPTION 1A	OPTION 1B	OPTION 2
	This option has not yet been discussed with local iwi and based on previous discussions is likely to face some opposition.	This option has not yet been discussed with local iwi and based on previous discussions is likely to face some opposition.	
Ability to consent:	Consent required for pump station consent for air discharge. Regional consent for new discharge is not required. Notice of requirement for designations for pump station and associated storage will be required. Discharges to a system which relies on the Waitara outfall emergency discharge consent which expires in 2040. There is a clear policy in the Taranaki Regional Coastal Plan which states that existing consented overflows that contain untreated human sewage will be eliminated and that no further consents will be granted. Furthermore, these types of discharges are prohibited (i.e. a new consent cannot be granted). Therefore, the proposed upgrades identified at the Waitara TPS and rising main must be implemented as flows from U&O that contribute towards an increase in overflows from the Waitara outfall are almost fatally flawed from a consenting perspective.	Consenting of ponds and pump stations required for air discharge. The consenting of the ponds in particular would attract additional risk. The ponds could also trigger new dam safety regulations from MBIE due to their volume and require a minimum offset of 300m neighbouring properties. This may not be able to be achieved within the 944 Main North Road site and a new site could be required. Notice of requirement for designations for pump station, oxidation ponds and associated storage will be required. This option includes many of the consenting requirements/risks of both a new local WWTP as well as the consents and cultural challenges of the conveyance to NP WWTP options.	Requires regional discharge to land consent as well as discharge to air for treatment plant, land discharge and potentially pump stations. Notice of requirement for designations for WWTP, pump station and associated storage will be required.
Consistency with national policy statement (NPS):	Flows will be discharged via the NP WWTP outfall which requires reconsenting in 2040. Option does not align with NPS to move away from discharges to the sea where feasible.	Flows will be discharged via the NP WWTP outfall which requires reconsenting in 2040. Does not align with NPS to move away from discharges to the sea where feasible.	Proposed discharge to land aligns with NPS direction to move away from sea discharges.
Consumption of growth capacity at NPWWTP	Additional flows from Urenui and Onaero reduce the capacity available for growth in New Plymouth at NP WWTP.	Additional flows from Urenui and Onaero reduce the capacity available for growth in New Plymouth at NP WWTP.	Will not use up capacity at of NP WWTP as wastewater is treated and discharged to land locally.
Uncertainty:	Initial planning of downstream network upgrades has been undertaken by NPDC; however, the Waitara TPS and rising main upgrade is not currently in the 2024-34 draft LTP as the project scope is undefined. Very high-level concept designs for this option have been completed in 2009 by Opus, with details around effectiveness/risks associated with the odour management facility yet to be confirmed.	No planning or design has been undertaken for this option. Pond requirements still need to be determined. A pond of this size is likely to be subject to the Dam Safety Regulations 2022 requiring regular inspections.	This option is a reasonable way through the planning and consultation phases. Key environmental investigations (soils, ecology, groundwater) have not found any significant unexpected issues.
Timeframe for delivery:	Upgrades to Waitara network and Waitara TPS including rising main are needed prior to implementation of this option. The Waitara transfer station upgrade is not currently in the 2024-34 draft LTP. Likely 6 years from planning to implementation excluding consent processing.	Design, consenting and management requirements for the oxidation ponds are still to be assessed in detail. Land requirements for the pond are not well understood at this stage. Design, planning and consultation have not commenced.	Standalone project doesn't rely on upgrades to any part of the existing network. Design and planning well progressed. Aligns with NPDC's desire to implement the preferred option as quickly as possible to address the impact of falling septic tanks.
Key Risks:	Interdependencies with Waitara and NPWWTP upgrades result in high risk of delays due to the high complexity of these projects (especially Waitara).	Design, consenting and on-going management requirements for the oxidation ponds has not been assessed. Overflow risks of partially treated wastewater associated with new oxidation ponds. Odour discharge from ponds difficult to avoid and can impact wide area/number of residents. Pond systems have high operational carbon emissions due to sludge accumulation.	Requires regional consenting for the proposed land discharge – manageable risk assuming pasture with spray irrigation. Storage of treated wastewater only – therefore overflow risks lower than other options.

9.1 Identification of a preferred option

Based on the ranking assessment Option 2 has the least number of issues for resolution against each criterion, the lowest cost estimate, and has the best alignment with Ngāti Mutunga preferences. It also aligns best with Regional and National Coastal policy statements requiring the reduction and or removal of ocean outfalls for wastewater discharge.

Options 1A and 1B are similar in their rankings due to them being sub options of Option 1. Option 1B is slightly cheaper and more resilient than Option 1A due to the oxidation pond's ability to buffer flows therefore reducing impacts downstream, and the removal of odour and septicity management, however Option 1B includes similar consenting requirements to that of Option 2.

10 Conclusion

This comparison of options between piping to New Plymouth and local treatment with land discharge for the management of flows from Urenui and Onaero has evaluated two main options Option 1 and Option 2, including two sub-options 1A and 1B, against a range of criteria including cost, resilience, cultural acceptability, the ability to consent and time frame for delivery.

The assessment results indicate that:

- A new local WWTP at Onaero (Option 2) would operate as an independent system that removes impacts on the Waitara wastewater network and New Plymouth Wastewater Treatment Plant.
- Both Option 1A and 1B are reliant on the downstream resilience of the Waitara system
- The transfer of wastewater to NPWWTP (Option 1A) has the potential to exacerbate existing network problems and contribute to discharges via ocean outfalls that are at odds with Regional and National Coastal policy statements and would likely be unable to gain a resource consent.
- Major upgrades to the existing Waitara wastewater network and transfer pumpstation are required to be resolved before the addition of flows from Urenui and Onaero should be considered for Option 1A. The upgrades to the transfer pump station are not yet planned or funded in Council's 24-34 draft LTP and would take considerable time and cost to plan and construct. The Urenui and Onaero project would require funding to be brought forward to address these issues before it can commence.
- Option 1B which includes the addition of oxidation ponds for pretreatment of the Urenui and Onaero flows before pumping to NPWWTP has not been assessed in detail. This option utilises a large storage/treatment pond to avoid the need to upgrade the Waitara network. There are potential risks around the pond size and location and the ability to fit these within the 944 Main North Road site. New MBIE dam safety regulations may also affect the pond design.
- Option 2 has the lowest capital cost but a higher operational cost than sub-options 1A and 1B, however, both sub options would include ongoing maintenance and operation activities for the life of the asset.
- The total combined cost including CAPEX and the NPV for operational costs show that all three options are relatively close given the project stage and level of accuracy of the estimates.
- Option 2 requires the construction and operation of a new wastewater treatment plant and discharge irrigation system.
- Design and planning for Option 2 is well progressed.

Option 2 aligns with NPDC's desire to implement the preferred option as quickly as possible to address the impact of failing septic tanks, is a standalone project that does not rely on upgrades to any part of the existing network or the New Plymouth Wastewater Treatment Plant, is sufficiently advanced in design and planning, has had the cultural impacts discussed with Ngāti Mutunga, is more likely to gain the required resource consents, already has the required land purchased and has the lowest total cost.

A

Appendix A – High Level Planning Assessment

Legislative Requirements

Resource Management

Noting that a consenting strategy has been prepared by Beca for the establishment of a WWTP and discharge to land system (Option 2), this assessment provides a high-level overview and summary of resource consent requirements of the two options. The key difference between the two options is that Option 1 would not require a designation or Notice of Requirement (NoR) (as this relates only to the proposed WWTP).

The following table summarises the legislative requirements of the two options and sub-options.

Option 2 - Local Treatment	Option 1A - Treat at NPWWTP	Option 1B - Treat at NPWWTP via Oxidation Pond
Regional Level Requirements		
Consents for: • Discharge of treated wastewater to land. • Discharge of contaminants to air (i.e., from spray irrigation of treated wastewater - depending on whether this is the preferred land discharge method). • An operational stormwater discharge consent may be required to discharge stormwater from the WWTP premises onto land (depending on the site specifics and engineering design). • Construction stormwater for management of sediment discharge from soil disturbance during construction. • Groundwater bore for water supply: depending on the site and subject to confirmation of the availability of a water supply, consent may be required to be sought to establish and use a groundwater bore for water supply purposes. • Biosolids management: depending on how biosolids are managed.	Consents for: • Construction stormwater for management of sediment discharge from soil disturbance during construction. • Potential air discharge consents related to pump stations / air valves if any discharges of odour cannot meet permitted activity standards	Consents for: • Construction stormwater for management of sediment discharge from soil disturbance during construction. • Air discharge consents related to pond. Potentially consents for pump stations / air valves if any air discharges of odour cannot meet permitted activity standards
District Level Requirements		
A Notice of Requirement, setting out: • the reasons why the designation or alteration is	A Notice of Requirement for the transfer pump station and storage tanks (setting out same	A Notice of Requirement, setting out: • the reasons why the designation or alteration is

Option 2 - Local Treatment	Option 1A - Treat at NPWWTP	Option 1B - Treat at NPWWTP via Oxidation Pond
needed to achieve the objectives of the requiring authority • the physical and legal descriptions (noting any distinguishing characteristics) of the site • the nature of the work, and any proposed restrictions • the effect that the proposed work will have on the environment, and the proposed mitigation measures • the extent to which alternative sites, routes and methods have been considered • the associated resource consents which will be required, and those that have been applied for • the extent of consultation undertaken with parties likely to be affected by the designation, including the reasons why, if no consultation is undertaken • additional information (if any) as required by regional or district plans or regulations	requirements as Notice of Requirement for local treatment)	needed to achieve the objectives of the requiring authority • the physical and legal descriptions (noting any distinguishing characteristics) of the site • the nature of the work, and any proposed restrictions • the effect that the proposed work will have on the environment, and the proposed mitigation measures • the extent to which alternative sites, routes and methods have been considered • the associated resource consents which will be required, and those that have been applied for • the extent of consultation undertaken with parties likely to be affected by the designation, including the reasons why, if no consultation is undertaken • additional information (if any) as required by regional or district plans or regulations
National Environmental Standards		
• Depending on the land use history of the preferred site a Preliminary Site Investigation (PSI) may be required to determine NPDC's obligations and consenting status for the change of land use and earthworks associated with the construction of the WWTP under the NESCS. Permitted activity standards are sets out in Regulation 8 of the NESCS and if these cannot be complied with then resource consent as a controlled activity under Regulation 9 or a restricted discretionary activity under Regulation 10. A Detailed Site Investigation (DSI) with soil sampling will	A PSI may also be required for the transfer pump station and pipeline. As per the local treatment option, further investigations under the NESCS may be required.	• Depending on the land use history of the preferred site a Preliminary Site Investigation (PSI) may be required to determine NPDC's obligations and consenting status for the change of land use and earthworks associated with the construction of the pond, transfer pump station and pipeline under the NESCS. Permitted activity standards are sets out in Regulation 8 of the NESCS and if these cannot be complied with then resource consent as a controlled activity under Regulation 9 or a restricted discretionary activity under Regulation 10. A Detailed Site

Option 2 - Local Treatment	Option 1A - Treat at NPWWTP	Option 1B - Treat at NPWWTP via Oxidation Pond
also be required to support a NESCS consent.		Investigation (DSI) with soil sampling will also be required to support a NESCS consent
Works within a Road Corridor		
State Highway • Written consent of Waka Kotahi, as per s176(1)(b) of the RMA. Local Roads • Traffic Management Plan and Corridor Access Request to be provided to NPDC Roading	State Highway • Written consent of Waka Kotahi, as per s176(1)(b) of the RMA. Local Roads • Traffic Management Plan and Corridor Access Request to be provided to NPDC Roading	State Highway • Written consent of Waka Kotahi, as per s176(1)(b) of the RMA. Local Roads • Traffic Management Plan and Corridor Access Request to be provided to NPDC Roading

Relevant legislation and statutory documents

The applications for notices of requirements and discharge consent applications for both options will need to consider the following relevant legislation and statutory documents:

Resource Management Act 1991
National Policy Statement for Freshwater Management 2020
National Policy Statement for Highly Productive Land 2023
New Zealand Coastal Policy Statement 2010
National Policy Statement for Indigenous Biodiversity (proposed)
National Environmental Standards for Freshwater 2020
National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011
Ngāti Mutunga Environmental Management Plan
NPDC District Plan
NPDC Proposed District Plan
Taranaki Regional Council (TRC) Regional Policy Statement
TRC Regional Freshwater Plan
TRC Regional Air Quality Plan
TRC Regional Soil Plan for Taranaki
TRC Natural Resources Plan for Taranaki (proposed)
TRC Regional Coastal Plan for Taranaki
TRC Proposed Coastal Plan for Taranaki – interim version

B

Appendix B –Cost Estimates

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**Units**	**Rate $**	**Subtotal $**
	LPS Collection				
Urenui township					
1.1	Private low pressure P/S incl. boundary kit	169	ea	11,000	1,859,000.00
1.2	Connection between low pressure P/S and existing private drainage	169	ea	540	91,260.00
1.3	Abandon existing septic tanks	169	ea	2,160	365,040.00
1.4	LPS collection pipelines (50 OD SDR11 PE100) - carriageway berm	1875	m	194	363,750.00
1.5	LPS collection pipelines (63 OD SDR11 PE100) - carriageway berm	2111	m	199	420,089.00
1.6	LPS collection pipelines (90 OD SDR11 PE100) - carriageway berm	305	m	216	65,880.00
Onaero township					
2.1	Private low pressure P/S incl. boundary kit	61	ea	11,000	671,000.00
2.2	Connection between low pressure P/S and existing private drainage	61	ea	540	32,940.00
2.3	Abandon existing septic tanks	61	ea	2,160	131,760.00
2.4	LPS collection pipelines (50 OD SDR11 PE100) - carriageway berm	870	m	194	168,780.00
2.5	LPS collection pipelines (63 OD SDR11 PE100) - carriageway berm	250	m	199	49,750.00
2.6	LPS collection pipelines (75 OD SDR11 PE100) - carriageway berm	100	m	205	20,500.00
2.7	LPS collection pipelines (90 OD SDR11 PE100) - carriageway berm	223	m	216	48,168.00
Provisional Cost					
	Shut off, flushing points and Air valves	1	PS	300,000.00	300,000.00
	Pipelines reinstatement	1	PS	50,000	50,000.00
	Net Construction Cost Estimate				**4,637,917.00**
	Main Contractor On-site overheads (P&G)	30%	%	4,637,917.00	1,391,375.10
	Gross Construction Cost Estimate				**6,029,292.10**
	Design Development Contingency	10%	%	6,029,292.10	602,929.21
	Construction Contingency	14%	%	6,632,221.31	928,510.98
	Total Construction Budget				**7,560,732.29**
	Professional Fees	10%	%	7,560,732.29	756,073.23
	Procurement Fees	2%	%	7,560,732.29	170,116.48
	Client-owned project costs	8%	%	7,560,732.29	604,858.58
	Rounding	1	LS	8,219.42	8,219.42
	Total Expected Concept Capital Cost Estimate				**9,100,000.00**

Version 2, 16/04/2024, updates to LPS units, Onaero Domain LPS system removed

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**Units**	**Rate $**	**Subtotal $**
	Conveyance and Transfer Option 1A				
New Pipes / Pump Stations					
1.1	New transfer pump station Urenui township 12 L/s - 75m head	1	LS	540,000	540,000.00
1.2	Emergency Storage for above PS (4hrs ADWF at 50 m^3)	1	LS	162,000	162,000.00
1.3	Biofilter for above pump station (6mx3m)	1	LS	108,000	108,000.00
2.1	New package pump station at Urenui campground 5L/s - 40m head	1	LS	324,000	324,000.00
2.2	Emergency Storage for above PS (modify existing septic tank)	1	LS	108,000	108,000.00
2.3	Sand trap - 1500mm diameter manhole for above PS	1	LS	27,000	27,000.00
2.1	New transfer pump station U&O 18 L/s - 85m head	1	LS	594,000	594,000.00
2.2	Emergency Storage for above PS - refer provisional cost	0	LS	0	0.00
2.3	Biofilter for above pump station (6mx3m)	1	LS	108,000	108,000.00
3.1	New Package pump station at Onaero domain 1.5 L/s - 55m	1	PS	162,000	162,000.00
4.1	Transfer pipeline (200 OD SDR9 PE100) - carriageway and state highway	16400	m	340	5,576,000.00
4.2	Transfer pipeline (160 OD SDR9 PE100) - Urenui township PS to Onaero transfer PS	4000	m	297	1,188,000.00
4.3	Transfer pipeline (90 OD SDR11 PE100) - Urenui camping ground to Urenui township PS	1240	m	227	281,480.00
4.4	Gravity pipeline (150 uPVC) - Bayley St to Princess St trunk main	1200	m	313	375,600.00
Provisional Cost					
	Shut off and Air valves	1	PS	350,000	350,000.00
	River crossing - cost difference for bridge $360k + additional brackets, design etc $140k	1	PS	500,000	500,000.00
	Property purchase or agreement for PS and storage on road or private land	1	PS	excluded	excluded
	Emergency Storage for Onaero transfer pump station (24hrs ADWF at 410 m^3)	1	LS	2,000,000	2,000,000.00
	Odour management – chemical or aeration feed facility at rising main discharge	1	PS	250,000	250,000.00
	Net Construction Cost Estimate				**12,654,080.00**
	Main Contractor On-site overheads (P&G)	30%	%	12,654,080.00	3,796,224.00
	Gross Construction Cost Estimate				**16,450,304.00**
	Design Development Contingency	10%	%	16,450,304.00	1,645,030.40
	Construction Contingency	15%	%	18,095,334.40	2,714,300.16
	Total Construction Budget				**20,809,634.56**
	Professional Fees	10%	%	20,809,634.56	2,080,963.46
	Procurement Fees	2%	%	20,809,634.56	416,192.69
	Client-owned project costs	8%	%	20,809,634.56	1,664,770.76
	Rounding	1	LS	8,438.53	8,438.53
	Total Expected Concept Capital Cost Estimate				**24,980,000.00**

Version 2, April 2024

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**%**	**Rate $**	**Subtotal $**
Network Upgrades Option 1A					
New Pipes, Pump Stations, and Treatment Plant Upgrades - Unit rates and percentage allocation provided by NPDC					
1.1	Waitara overflows program	12%	%	12,000,000	1,440,000.00
1.2	Waitara pump station and rising main upgrades (150 L/s capacity upgrade required)	12%	LS	20,000,000	2,400,000.00
2.1	New Plymouth WWTP master plan upgrades including buffer storage (400L/s at 4hrs required)	4.5%	LS	12,000,000	540,000.00
2.2	New Plymouth Thermal Dryer Facility incl. Admin/Lab building upgrade (Plant capacity 1,220 L/s)	1.5%	LS	80,000,000	1,200,000.00
	Net Construction Cost Estimate				**5,580,000.00**
	Main Contractor On-site overheads (P&G) - assumed included in unit rates	0%	%	5,580,000.00	0.00
	Gross Construction Cost Estimate				**5,580,000.00**
	Design Development Contingency	10%	%	5,580,000.00	558,000.00
	Construction Contingency	15%	%	6,138,000.00	920,700.00
	Total Construction Budget				**7,058,700.00**
	Professional Fees	10%	%	7,058,700.00	705,870.00
	Procurement Fees	2%	%	7,058,700.00	141,174.00
	Client-owned project costs	8%	%	7,058,700.00	564,696.00
	Rounding	1	LS	9,560.00	9,560.00
	Total Expected Concept Capital Cost Estimate				**8,480,000.00**

Version 2, April 2024,

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**Units**	**Rate $**	**Subtotal $**
	Conveyance and Transfer Option 1B				
New Pipes / Pump Stations					
1.1	New transfer pump station Urenui township 12 L/s - 75m head	1	LS	540,000	540,000.00
1.2	Emergency Storage for above PS (4hrs ADWF at 50 m^3)	1	LS	162,000	162,000.00
1.3	Biofilter for above pump station (6mx3m)	1	LS	108,000	108,000.00
2.1	New package pump station at Urenui campground 5L/s - 40m head	1	LS	324,000	324,000.00
2.2	Emergency Storage for above PS (modify existing septic tank)	1	LS	108,000	108,000.00
2.3	Sandtrap - 1500mm diameter manhole for above PS	1	LS	27,000	27,000.00
2.1	New transfer pump station U&O transfer 18 L/s - 85m head	1	LS	594,000	594,000.00
2.2	Emergency Storage for above PS (4hrs ADWF at 68m^3)	1	LS	220,000	220,000.00
2.3	Biofilter for above pump station (6mx3m)	1	LS	108,000	108,000.00
3.1	New Package pump station at Onaero domain 1.5 L/s - 55m	1	PS	162,000	162,000.00
4.1	Transfer pipeline (200 OD SDR9 PE100) - carriageway and state highway	16400	m	340	5,576,000.00
4.2	Transfer pipeline (160 OD SDR9 PE100) - Urenui township PS to Onaero transfer PS	4000	m	297	1,188,000.00
4.3	Transfer pipeline (90 OD SDR11 PE100) - Urenui camping ground to Urenui township PS	1240	m	227	281,480.00
4.4	Gravity pipeline (150 uPVC) - Bayley St to Princess St trunk main	1200	m	313	375,600.00
Provisional Cost					
	Shut off and Air valves	1	PS	350,000	350,000.00
	River crossing - cost difference for bridge $360k + additional brackets, design etc $140k	1	PS	500,000	500,000.00
	Oxidation pond (1.6Ha based on 2009 Opus design)	40,000	m3	60	2,400,000.00
	Oxidation pond ancillaries including inlet, outlet, screen, pumping and pipework	1	PS	500,000	500,000.00
	Net Construction Cost Estimate				**13,524,080.00**
	Main Contractor On-site overheads (P&G)	30%	%	13,524,080.00	4,057,224.00
	Gross Construction Cost Estimate				**17,581,304.00**
	Design Development Contingency	10%	%	17,581,304.00	1,758,130.40
	Construction Contingency	15%	%	19,339,434.40	2,900,915.16
	Total Construction Budget				**22,240,349.56**
	Professional Fees	10%	%	22,240,349.56	2,224,034.96
	Procurement Fees	2%	%	22,240,349.56	444,806.99
	Client-owned project costs	8%	%	22,240,349.56	1,779,227.96
	Rounding	1	LS	1,580.53	1,580.53
	Total Expected Concept Capital Cost Estimate				**26,690,000.00**

Version 2, April 2024

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**%**	**Rate $**	**Subtotal $**
Network Upgrades Option 1B					
New Pipes, Pump Stations, and Treatment Plant Upgrades - Unit rates and percentage allocation provided by NPDC					
1.1	Waitara overflows program	0%	%	12,000,000	0.00
1.2	Waitara pump station and rising main upgrades (150 L/s capacity upgrade required)	0%	LS	20,000,000	0.00
2.1	New Plymouth WWTP master plan upgrades including buffer storage (400L/s at 4hrs required)	0.0%	LS	12,000,000	0.00
2.2	New Plymouth Thermal Dryer Facility incl. Admin/Lab building upgrade (Plant capacity 1,220 L/s)	1.5%	LS	80,000,000	1,200,000.00
	Net Construction Cost Estimate				1,200,000.00
	Main Contractor On-site overheads (P&G) - assumed included in unit rates	0%	%	1,200,000.00	0.00
	Gross Construction Cost Estimate				1,200,000.00
	Design Development Contingency	10%	%	1,200,000.00	120,000.00
	Construction Contingency	15%	%	1,320,000.00	198,000.00
	Total Construction Budget				1,518,000.00
	Professional Fees	10%	%	1,518,000.00	151,800.00
	Procurement Fees	2%	%	1,518,000.00	30,360.00
	Client-owned project costs	8%	%	1,518,000.00	121,440.00
	Rounding	1	LS	8,400.00	8,400.00
	Total Expected Concept Capital Cost Estimate				**1,830,000.00**

Version 2, April 2024, 1.1 Network overflow costs removed, 2.1 NP WWTP upgrades removed

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**Units**	**Rate $**	**Subtotal $**
	Conveyance and Transfer Option 2				
New Pipes / Pump Stations					
1.1	New transfer pump station Urenui township 12 L/s - 105m head	1	LS	540,000	540,000.00
1.2	Emergency Storage for above PS (50 m^3)	1	LS	162,000	162,000.00
1.3	Biofilter for above pump station (6mx3m)	1	LS	108,000	108,000.00
2.1	New package pump station at Urenui campground 5L/s - 40m head	1	LS	324,000	324,000.00
2.2	Emergency Storage for above PS (modify existing septic tank)	1	LS	108,000	108,000.00
2.3	Sand trap - 1500mm diameter manhole for above PS	1	LS	27,000	27,000.00
3.1	New Package pump station at Onaero domain 1.5 L/s - 55m	1	PS	162,000	162,000.00
3.2	New Package pump station at Onaero township 1.5 L/s - 55m	1	PS	162,000	162,000.00
4.1	Transfer pipeline (180 OD SDR9 PE100) - carriageway and state highway	2700	m	324	874,800.00
4.2	Transfer pipeline (160 OD SDR9 PE100) - carriageway and state highway	2850	m	297	846,450.00
4.3	Transfer pipeline (90 OD SDR11 PE100) - carriageway and state highway	1240	m	227	281,480.00
Provisional Cost					
	Shut off and Air valves	1	PS	300,000.00	300,000.00
	River crossing - cost difference for bridge $360k + additional brackets, design etc $140k	1	PS	500,000	500,000.00
	Property purchase or agreement for PS on road or private land	1	PS	excluded	excluded
	Net Construction Cost Estimate				**4,395,730.00**
	Main Contractor On-site overheads (P&G)	30%	%	4,395,730.00	1,318,719.00
	Gross Construction Cost Estimate				**5,714,449.00**
	Design Development Contingency	10%	%	5,714,449.00	571,444.90
	Construction Contingency	15%	%	6,285,893.90	942,884.09
	Total Construction Budget				**7,228,777.99**
	Professional Fees	10%	%	7,228,777.99	722,877.80
	Procurement Fees	2%	%	7,228,777.99	144,575.56
	Client-owned project costs	8%	%	7,228,777.99	578,302.24
	Rounding	1	LS	5,466.42	5,466.42
	Total Expected Concept Capital Cost Estimate				**8,680,000.00**

Version 1, February 2024

	CAPITAL COST ESTIMATE				
Code	**Description**	**Quantity**	**%**	**Rate $**	**Subtotal $**
Network Upgrades Option 2					
New Pipes, Pump Stations, and Treatment Plant Upgrades - Unit rates and percentage allocation provided by NPDC					
1.1	Waitara overflows program	0%	%	12,000,000	0.00
1.2	Waitara pump station and rising main upgrades (150 L/s capacity upgrade required)	0%	LS	20,000,000	0.00
2.1	New Plymouth WWTP master plan upgrades including buffer storage (400L/s at 4hrs required)	0.0%	LS	12,000,000	0.00
2.2	New Plymouth Thermal Dryer Facility incl. Admin/Lab building upgrade (Plant capacity 1,220 L/s)	1.5%	LS	80,000,000	1,200,000.00
	Net Construction Cost Estimate				**1,200,000.00**
	Main Contractor On-site overheads (P&G) - assumed included in unit rates	0%	%	1,200,000.00	0.00
	Gross Construction Cost Estimate				**1,200,000.00**
	Design Development Contingency	10%	%	1,200,000.00	120,000.00
	Construction Contingency	15%	%	1,320,000.00	198,000.00
	Total Construction Budget				**1,518,000.00**
	Professional Fees	10%	%	1,518,000.00	151,800.00
	Procurement Fees	2%	%	1,518,000.00	30,360.00
	Client-owned project costs	8%	%	1,518,000.00	121,440.00
	Rounding	1	LS	8,400.00	8,400.00
	Total Expected Concept Capital Cost Estimate				**1,830,000.00**

Version 2, April 2024

C

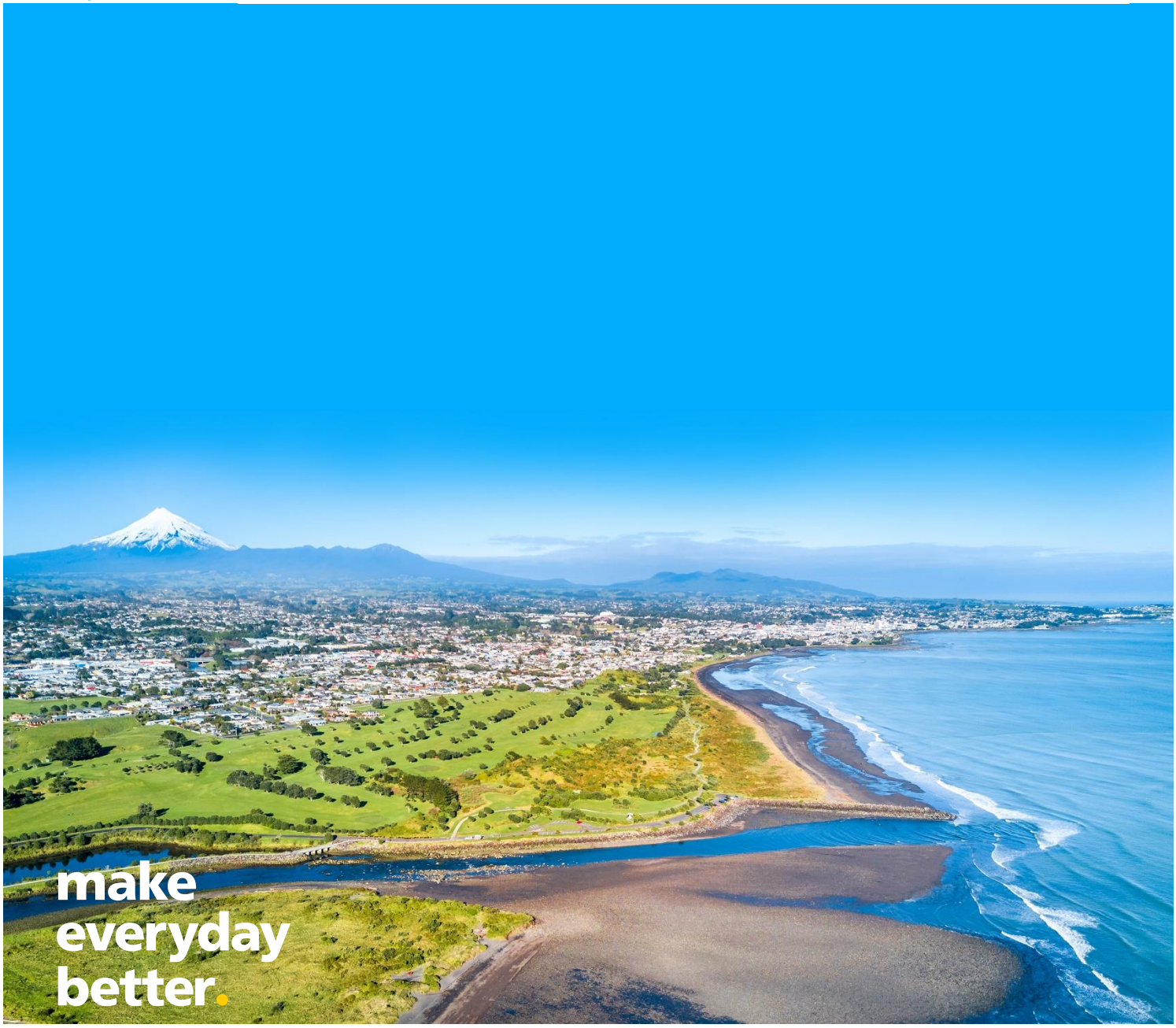
Appendix C – NPDC Developer Impact Assessment Urenui & Onaero, Beca, 2022

NPDC Development Impact Assessment
Urenui & Onaero

Prepared for New Plymouth District Council

Prepared by Beca Limited

23 September 2022



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Revision History

Revision Nº	Prepared By	Description	Date
1	Nicola Graham	Final	22.09.2022

Document Acceptance

Action	Name	Signed	Date
Prepared by	Nicola Graham		22/09/2022
Reviewed by	Daniel Gilmour		22/09/2022
Approved by	Dan Stevens		22/09/2022
on behalf of	Beca Limited		

Contents

1 Introduction

1.1 Study Aims & Objectives

The aim of this Development Impact Assessment (DIA) is to identify the potential impacts on the public sewer network of connecting flows from the wastewater scheme at Urenui and Onaero directly into the Waitara public sewer network. This is achieved through undertaking hydraulic computer modelling of the sewer system with and without the Urenui and Onaero flows, assessing the impact at key points on the sewer network, and identifying any increases to the risk of flooding, pollution or pumping station over-load.

1.2 Network Model

A hydraulic model of the Waitara area has been developed to enable NPDC to better understand the capacity and performance of the existing wastewater network. The model is intended to be used to provide ongoing strategic management of the system.

The model has been constructed in InfoWorks ICM and includes all the wastewater system to fully represent the operation of the network.

A plan showing the catchment modelled is shown in Figure 1.

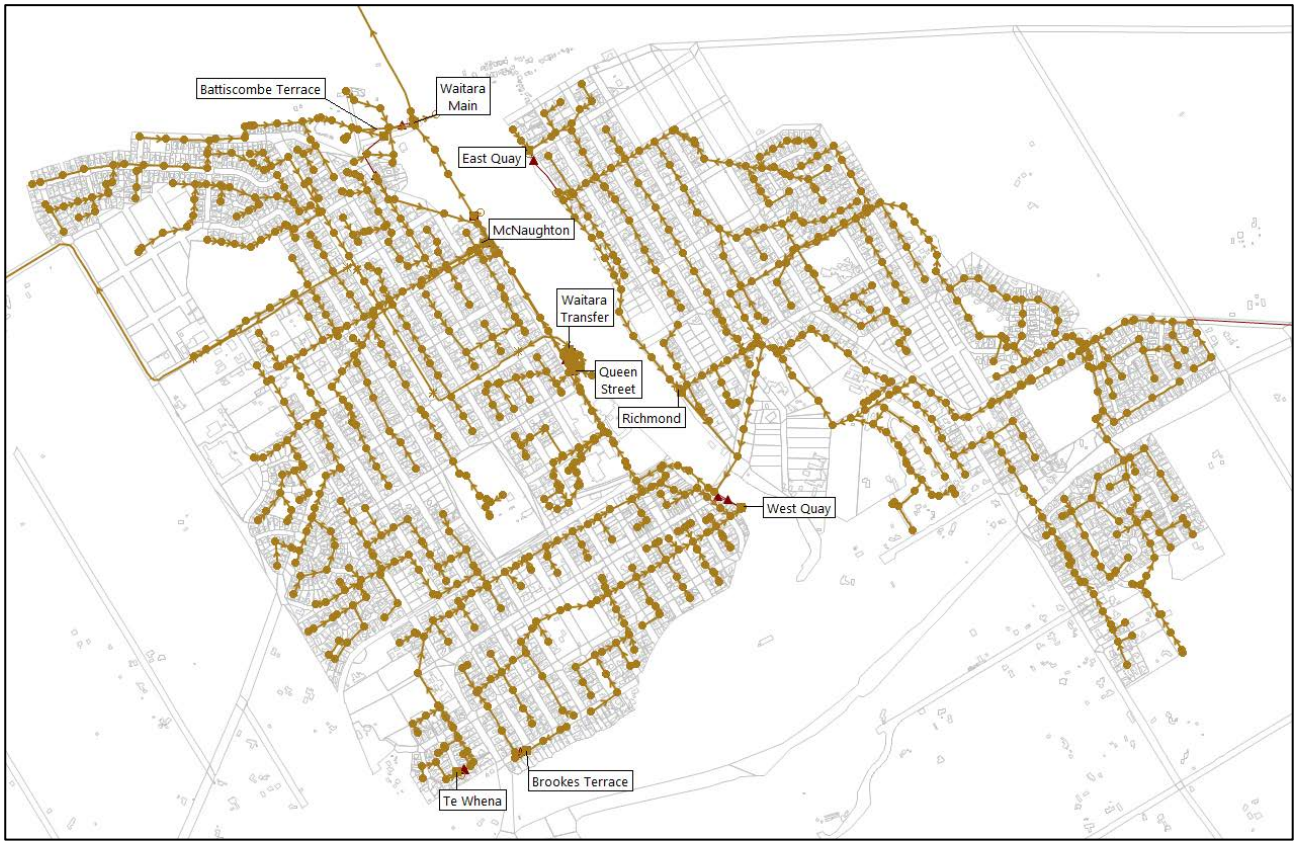

Figure 1 – Location plan of the Waitara catchment

Waitara is a town to the east of Bell Block which spans the Waitara river. The area is mainly residential with some areas of commercial and trade flow. Across the town there are several pumping stations which all drain to the Waitara transfer pumping station and from there discharge to the treatment works. There is also an overflow pipe from the pumping station which discharges to the Waitara outfall pumping station. The total population is 7344 (2018 census).

The model has been calibrated against a flow survey which was installed in May 21 and removed in August 21. The survey consisted of 21 flow monitors. Information has also been used which is recorded at the various pumping stations on Water Outlook.

1.3 Proposed Scheme

A new sewerage collection system is proposed in the Urenui and Onaero area to the East of Waitara with one option being to divert the flows in to the Waitara network. The flow is proposed to enter the network at WA-BAYLY004BSH on Bayly Street, Waitara. The location of the connection point is shown on Figure 2 below.

An assumed flow rate of 15l/s has been modelled, this has been provided by Beca and will give a conservative view of the impact.

This model will be referred to as the additional flow model.

Figure 2 – Location of Connection Point

2 Impact Assessment

2.1 Methodology

The network model of the Waitara catchment has been used to assess the impacts of the proposed development. This is a baseline model which represents current day and does not account for any additional future growth within the catchment.

A constant inflow of 15l/s has been added to the model at WA-BAYLY004BSH on Bayly Street, Waitara. As no further information on profile shape or duration of pumped inflow, a constant inflow has been assumed across the duration of each event to obtain a worst-case scenario.

To obtain a full understanding of the impact of the additional flows the model has been run for the following events:

- DWF
- 5yr Design storm
- 20yr Design storm

Analysis of manhole flooding and spilling to the watercourse has been undertaken and presented in the following sections.

2.2 Impact of Additional Flows on Sewer Capacity

2.2.1 DWF

As shown on the long section below (Figure 3) the network currently has enough capacity to accommodate the additional 15l/s flows without any detriment.

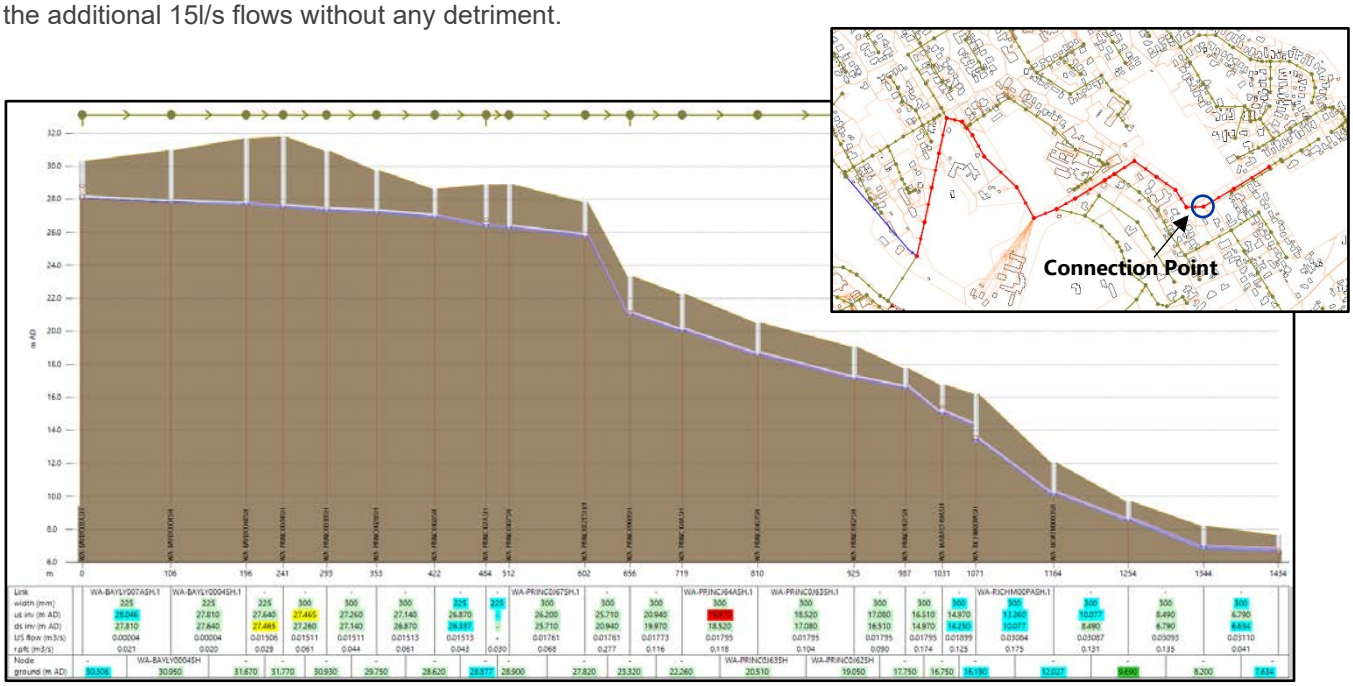

Figure 3 –Long Section and Location Plan – DWF

2.2.2 5yr Design Event

a. Flooding

A 5yr design storm event has been run through the additional flow model and the results compared against the baseline model. A full range of storm durations have been tested to ensure the worst case is obtained.

Results for the 5yr design event show that a 27.3 m^3 increase in flooding is predicted at WA-MEMOR0035SH. This is due to backing up from the downstream network as a consequence of the increased flows coming from the proposed connection point. There are no new flooding locations.

Table 2-1 and Figure 4 below show the details and location of the predicted flooding increase.

Node ID	Ground level (m AD)	Baseline Max Flood/Lost Volume (m3)	Additional Flow Max Flood/Lost Volume (m3)	Flood Increase (m3)
WA-MEMOR0035SH	4.86	269.1	296.4	27.3

Table 2-1 –Flooding Location - 5yr Design Event

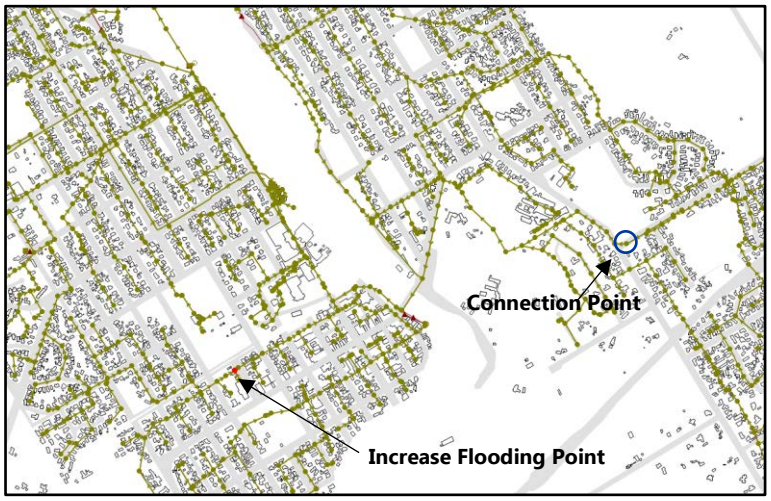

Figure 4 – 5yr Event Flooding Location

b. Spills to Watercourse

Results also show an increase in spilling of 466m^3 at the Outfall Pumping Station. In the baseline situation no spilling is predicted at this location. Table 2-2 shows the spill volumes at Waitara Outfall Pumping Station and Figure 5 below shows the flow hydrograph.

Location	BASELINE Max Flood/Lost Volume (m3)	DEVELOPMENT Max Flood/Lost Volume (m3)	Flood Increase (m3)
Waitara Outfall Pumping Station	0	466	466

Table 2-2 – Spill Volumes – 5yr Design Event

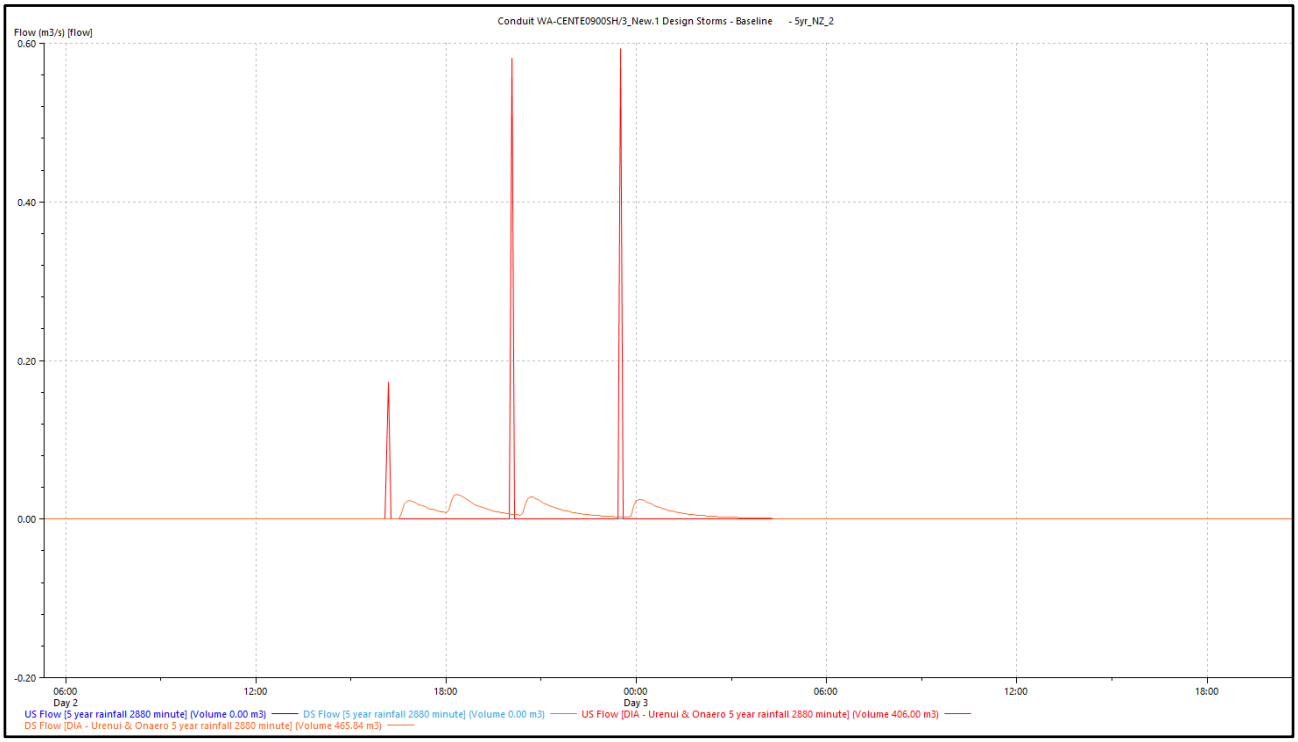

Figure 5 – Spill Hydrograph at Waitara Outfall Pumping Station – 5yr Design Event

2.2.3 20yr Design Event

a. Flooding

In addition, a 20yr design storm event has been run through the additional flow model and results compared against the baseline model. A full range of storm durations have been tested to ensure the worst case is obtained.

Results for the 20yr design event are show that an 81m^3 increase in flooding is predicted at WA-MEMOR0035SH and an additional 4m^3 increase at WA-MEMOR0030SH. This is due to backing up from the downstream network as a consequence of the increased flows coming from the proposed connection point. There are no new flooding locations.

Table 2-3 and Figure 6 below show the details and location of the predicted flooding increase.

Node ID	Ground level (m AD)	Baseline Max Flood/Lost Volume (m3)	Future Max Flood/Lost Volume (m3)	Flood Increase (m3)
WA-MEMOR0035SH	4.86	1049	1130	81
WA-MEMOR0030SH	4.88	2	6	4

Table 2-3 - Flooding Location - 20yr Design Event

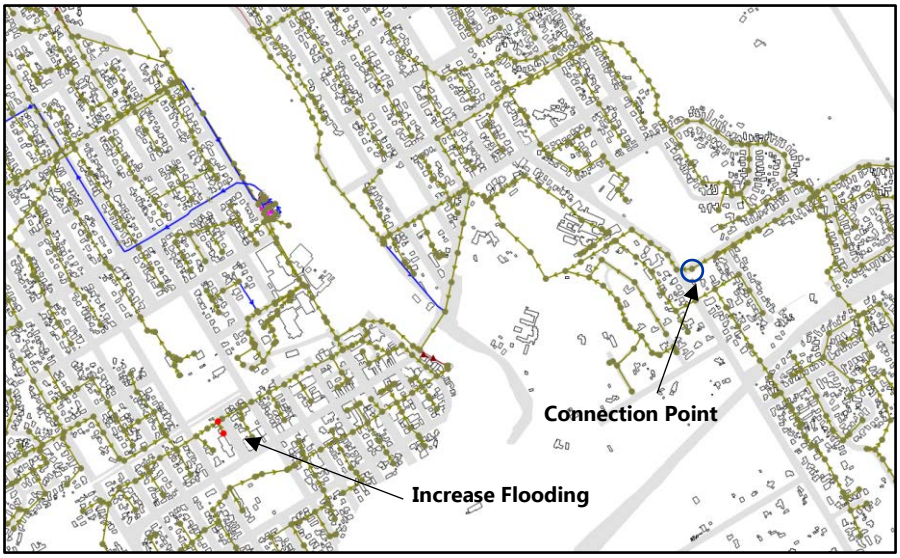

Figure 6 - Flooding Locations - 20yr Design Event

b. Spills to Watercourse

Results also show an increase in spilling of 1756m^3 at the Outfall Pumping Station and spilling at West Quay pumping Station occurs 5 minutes earlier than in the baseline situation. Figure 7 below shows the flow hydrograph at the Outfall Pumping Station and Table 2-4 shows spill volumes.

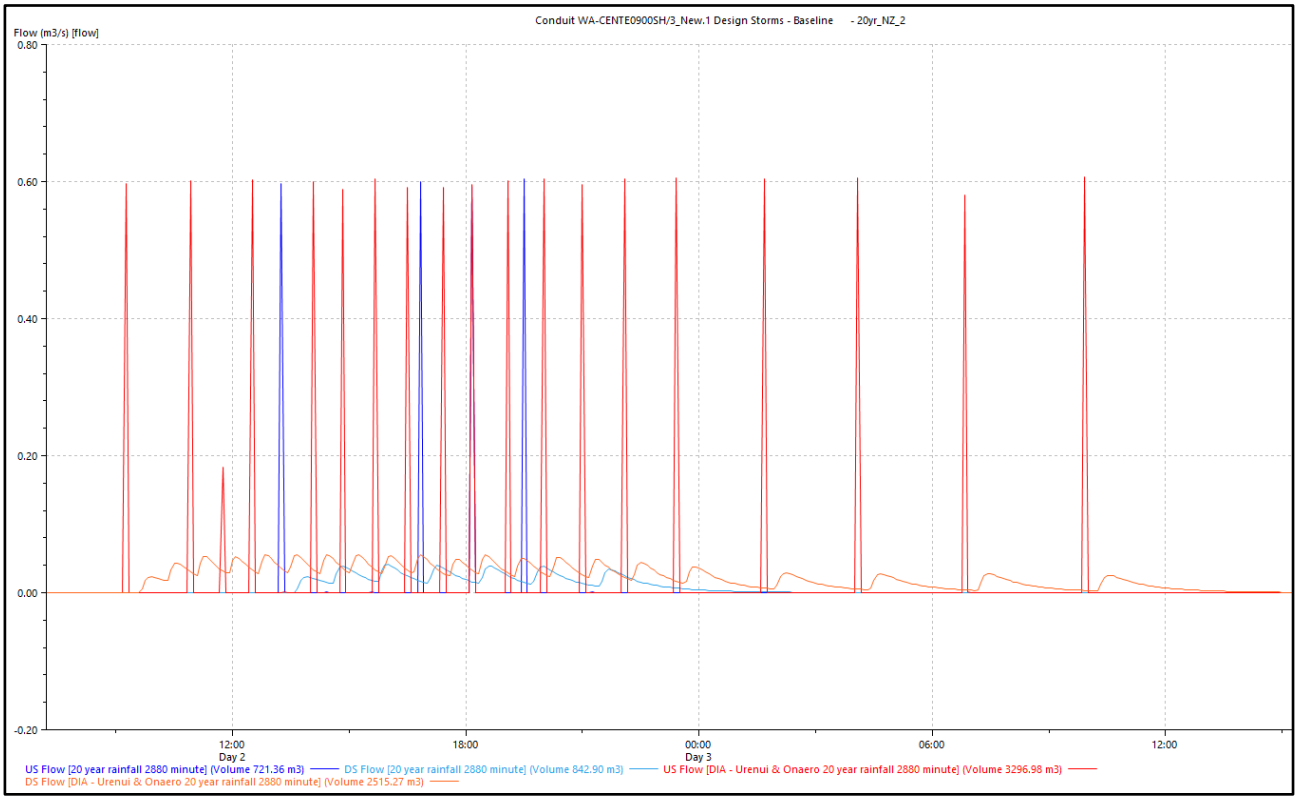

Figure 7 - Spill Hydrograph at Waitara Outfall Pumping Station – 20yr Design Event

Pumping Station Outfall	Baseline Max Flood/Lost Volume (m3)	Additional Flow Max Flood/Lost Volume (m3)	Flood Increase (m3)	Baseline Flooding Onset	Future Flooding Onset	Time difference
Waitara Outfall	843	2599	1756	13:35pm	09:35am	4 hours
West Quay	97.3	97.8	0.5	13:55pm	13:50pm	5 Minutes

Table 2-4 - Spill Volumes – 20yr Design Event

3 Conclusions

A new sewerage collection system is proposed in the Urenui and Onaero area with one option being to divert the flows in to the Waitara network. An investigation was undertaken to assess the impact of the additional 15l/s on the Waitara catchment and to understand if the network currently has capacity to accommodate these extra flows.

Results showed that in DWF situation there are no impacts on the Waitara system but during storm events of 5yr and 20yr an increase in flooding has been predicted at WA-MEMOR0035SH and an increase in spilling to the watercourse at the Waitara Outfall Pumping Station and West Quay Pumping Station.