PALMERSTON NORTH NATURE CALLS

Manawatū River at Ahimate Reserve
Photo credit: ManawatuNZ.co.nz

Wastewater systems and sustainability

The Best Practicable Option (BPO) for our wastewater system is possibly the biggest environmental and financial decision our city will make and is likely to be the single biggest work programme for our next 10 year plan. It impacts our environment, finances, public health and the quality of our outdoor leisure and recreation. A sustainable wastewater system means having a solution we can live with for the next 50 years and beyond.

The wastewater system isn't just about pipes! People, processes, and technology all have a huge influence on our decision for the preferred option. This factsheet will look at the components of our wastewater system, consider what makes a sustainable wastewater system, discuss the challenges and opportunities for the BPO and examine how the shortlist options could deliver on our sustainability outcomes.

What makes a sustainable wastewater system?

Social and cultural sustainability
A system we can live with as a community.
Protects public health, leisure and recreation, cultural values, landscapes, atua, and the mauri of the Manawatū River.

Economic and financial sustainability
A system we can afford, that supports our growth and development.
Facilitates sustainable economic growth and development and maximises resource recovery.

Sustainability

Resilience and physical sustainability
A system that's built to last.
Can cope with natural hazards, climate change effects, future events and changes.

Environmental sustainability
A system that protects our environment.
Minimises environmental effects on air, land and water. Minimises whole of life carbon emissions.

What makes up the wastewater system?

A sustainable solution means our wastewater system should integrate as much as possible with natural systems. Like natural systems, a wastewater system is not linear but a circular process where water is returned to the environment it is taken from and biosolids are re-used. By examining the inputs, activities and outputs that make up the wastewater system, we can better understand the interdependencies that enable or disable impacts that contribute to sustainable outcomes. We can identify points in the system where little changes can make a big difference in achieving a sustainable system that delivers the key outcomes listed below.

Inputs:

- **Infrastructure** including pipes, pumps, the treatment plant, discharge structures and wetlands.
- **Technology** such as programs, software and tools that control how infrastructure works at all stages of the system; from the "eco" function on your dishwasher, to biological nutrient removal at the wastewater treatment plant.
- **People** create wastewater and our water using behaviour influences wastewater volumes into the system. Our choices as consumers influence how high the contaminant load is.
- **Wet industry tradewaste** is wastewater discharged into the collection system from industrial and trade premises.
- **Natural ecosystems** such as land, coast, ocean and river are the receiving environments for our treated wastewater.

Activities:

- **Management and monitoring** of processes ensure the system is coordinated, runs optimally and meets consent requirements.
- **Collection and conveyance** of wastewater from domestic and industrial sources to the treatment plant and on to discharge points.
- **Treatment** activities include screening, sedimentation, oxidation, biological treatment, and disinfection.
- **Discharge** is the re-entry of treated wastewater into the receiving environment or environments.
- **Resource recovery** involves reusing wastewater, biosolids and biogas for energy production wherever possible.
- **Maintenance** activities such as repairs and cleaning keep the system running.

Outputs:

- **Treated wastewater** is an output of the treatment plant and is discharged into the environment.
- **Screenings** are debris removed from raw wastewater during the first stage of treatment.
- **Biosolids** are a product of the organic sludge produced when we treat wastewater. Biosolids are nutrient rich and can be re-used to benefit the environment.
- **Energy** generated from sludges and biosolids.
- **Odour** arises from the treatment plant and pond system and is discharged to air, subject to consent conditions.

Outcomes:

Outcomes are the impacts and effects of system outputs. Key outcomes sought:


Protect public health and minimise public health risks.


Minimise environmental effects on air, land and water, minimise whole-of-life carbon emissions and optimise resource recovery.


Contribute to improving the health and mauri of the Manawatū River.


Be developed with the active engagement of the community and key stakeholders.


Be affordable and cost effective.


Be innovative and evidence based.


Be sustainable, enduring, and resilient. Take an integrated approach to the management and cumulative effects on the Manawatū River catchment.


Facilitate long term growth and economic development.


Enhance people's use and enjoyment of the Manawatū River.

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System challenges

The BPO process involves detailed investigations to understand the challenges for our wastewater system in achieving sustainability outcomes.

Storage and conveyance

Pipelines and pump stations collect, move and store wastewater and treated wastewater. Basins and tanks store wastewater for treatment and land application; wetlands store treated wastewater for river discharges.

Challenges for storage and conveyance are:

- Optimising the amount of storage and size of pipes and pumps to achieve value and minimise energy use.
- Location of large storage basins.
- Management of storage basins to minimise weed growth, algae and odour.

Wastewater flows and contaminant loads

Managing volumes of wastewater and loads of contaminants coming into treatment and out of treatment into environment. The contaminants factsheet summarises findings of the BPO investigations and identifies these challenges:

- Understanding current wastewater flows and factors affecting flow volumes.
- Identifying contaminant and their concentrations and loads in incoming wastewater and treated wastewater to be discharged into the environment.
- Projecting future wastewater flows, contaminant concentrations and loads so the new wastewater system has capacity through to 2073 (50 year design horizon).
- Planning and designing the system to manage future flows and contaminant concentrations and loads.

Inflow and infiltration

Inflow and infiltration occur during periods of heavy rainfall when overflow from the stormwater and groundwater systems enters the wastewater collection network. Illegal cross connections between stormwater and wastewater networks, and cracked and broken pipes contribute to inflow and infiltration. This can result in water that has not been fully treated entering the environment.

Challenges for the BPO are to:

- Reduce inflow and infiltration.
- Manage the costs of reducing inflow and infiltration.
- Minimise inflow and infiltration from new developments.
- Avoid or reduce wastewater overflows from the wastewater collection network.

Tradewaste

Tradewaste is wastewater discharged to the wastewater collection network from industrial and trade premises. Businesses acquire a permit to discharge their wastewater into the network, and often pre-treat wastewater on-site to reduce the contaminant loads before it enters the city's wastewater system.

Challenges for tradewaste are:

- Understanding current volumes and the contaminants in tradewaste.
- Projecting future tradewaste flows and contaminant loads for trade waste through to 2073 (50 year design horizon).
- Achieving compliance with the tradewaste bylaw and permits.
- Managing pricing for trade waste permits.
- Understanding implications for compliance with future resource consent conditions.
- Protecting Council's wastewater system, operator health and safety and public health and safety.

Contaminants

Contaminants are chemicals, fats, oils, solids, organics, bacteria, viruses and nutrients that change the condition of wastewater and need to be removed before wastewater can enter the receiving environment.
Contaminants present challenges of:

- Understanding current types and amounts of contaminants entering the treatment plant and being discharged from the treatment plant.
- Projecting future types and concentrations of contaminants entering the treatment plant and being discharged from the treatment plant through to 2073 (50 year design horizon).
- Understanding the assimilative capacity of receiving environments and the regulatory requirements that apply to them.
- Understanding the types of organic chemicals and microplastics and their effects on the wastewater system and receiving environments.

An overview and findings from BPO investigations into tradewaste and contaminants are summarised in the Contaminants factsheet.

Treatment

Palmerston North's wastewater currently goes through a four-day treatment process at the Totara plant. The plant will require upgrades to meet capacity for the future and align with the new wastewater system selected from the shortlist options.

Challenges for the BPO to reach this alignment include:

- Understanding the wastewater quality dimensions and requirements for each receiving environment and how the treatment system can achieve these.
- Making the most of innovation and technology while managing concerns about the trade off between cost and the receiving environment.
- Matching treatment options to shortlist options.
- Designing a treatment system that consistently achieves water quality regulations and is flexible to accommodate future changes.
- Being able to construct the new treatment system while the existing one continues to run.

BPO technical investigations into treatment options are summarised in the Treatment factsheet.

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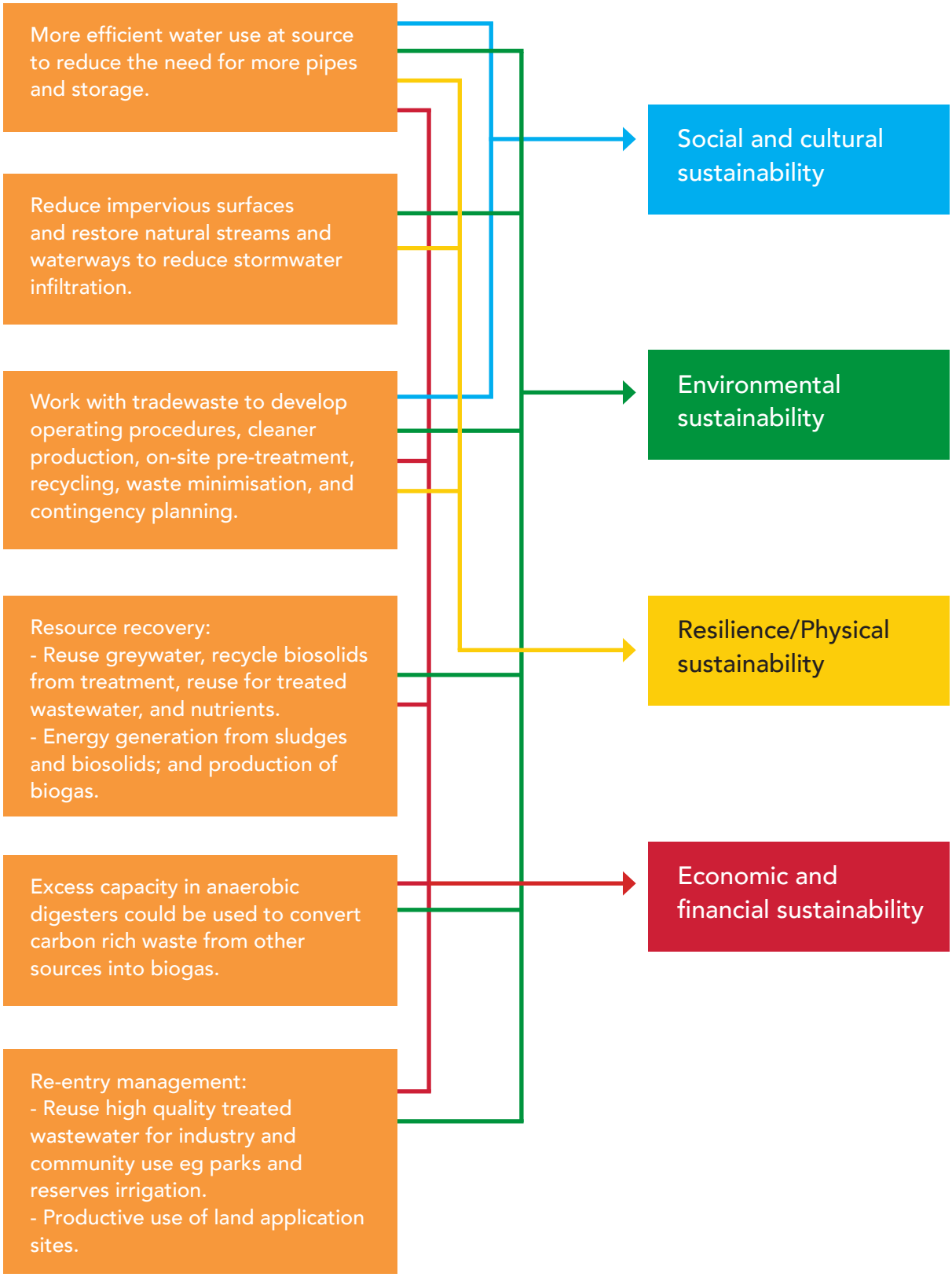
Opportunities for sustainability

Technical investigations for the BPO shortlist options have identified opportunities to contribute to sustainable outcomes for the new wastewater system. The feasibility of these opportunities will depend on which shortlist option is chosen.

The diagram below shows opportunities for the BPO to contribute to the different elements of sustainability.



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What does this mean for options?

The BPO process involves detailed investigations to understand the challenges for our wastewater system in achieving the sustainability outcomes.

Options with river-based discharge

The high level of treated water quality required for river discharge means using more sophisticated treatment technology that could generate a wider range of products suitable for re-use. These treatment requirements make river discharge one of the least affordable, affecting the social and financial sustainability of river-based options. There are social and cultural sensitivities around discharging treated wastewater into the river relating to the mauri of the river, swimming, fishing and food gathering.

Options with land-based discharge

Land application sites provide the opportunity to offset costs through production of forestry or cut and carry crops, supporting the economic and financial sustainability of these options. Carbon benefits created by crops could contribute to environmental sustainability. On the flip side, the large amount of land required for wastewater application could reduce economic sustainability, especially if there is an opportunity cost associated with higher value uses. If a land-based discharge option is selected as the BPO, site selection will be subject to further investigations and consultation.

Options with ocean-based discharge

Wastewater for ocean-based discharge requires less treatment and lower investment, potentially offering better financial sustainability than river discharge options.

There are social and cultural concerns about the effects of discharge into the ocean on fishing, swimming and aquatic life, although research suggests these will not be affected. Specific cultural values relating to the ocean as a receiving environment raise questions about the social and cultural sustainability of ocean-based options.

Combination options

Most of the shortlist options propose a combination of receiving environments, enabling potentially less sustainable impacts in one area to be balanced by more sustainable outcomes in another.

This factsheet provides an overview on the possible sustainability challenges and opportunities for the BPO. When the preferred option is selected, further research and investigations will provide more certainty about outcomes identified.

The Manawatū River at sunset
Photo credit: ManawatuNZ.co.nz

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The five shortlist options are:

Option 1

River discharge at the existing point (2 variants)

Option 2

River discharge at two points (2 variants)

Option 3

Land discharge, 97% and river discharge, 3% (2 variants)

Option 4

Land discharge, 45-55% and river discharge, 45-55% (4 variants)

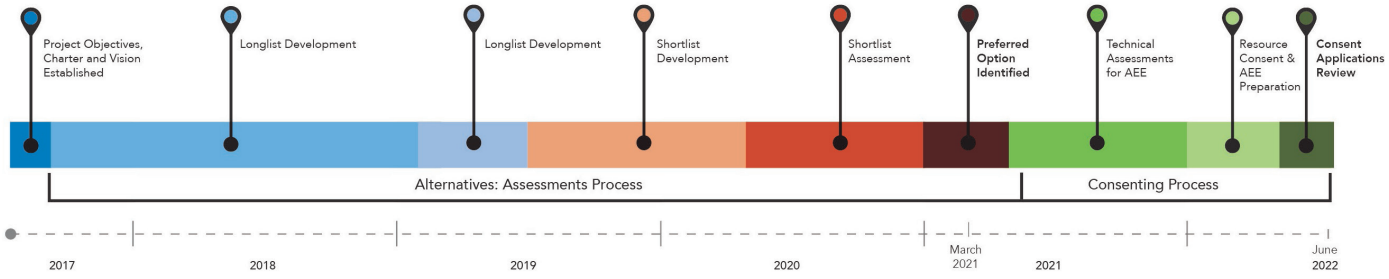
Option 6

Ocean discharge, 97% and land or river, 3% (2 variants)

About this project

The Nature Calls project takes a fresh look at how we manage wastewater in Palmerston North and what we need to achieve before 2022 to future-proof our wastewater management and infrastructure. The process involves engagement with iwi, the community and stakeholders as well as technical investigations, including this one. The timeline below shows expected project progress through to June 2022 when the consent applications for the preferred option will be lodged.

Project timeline



For more information, contact us.

For more information about wastewater, the Nature Calls project and the shortlist options:

Visit www.pncc.govt.nz/naturecalls

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