Te Kaunihera-ā-Rohe o Ngāmotu

New Plymouth District Council

OUTLINE BUSINESS CASE

WATER CONSERVATION PLAN

CONCEPT PHASE

22 December 2020

Document control

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Final	Maria Buzzella	22/12/20	Updated after comments

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David Langford	Project Sponsor	Final	22/12/20

Endorsement

Note: *Endorsement from ELT or Elected Members is required when the funding of this project is not already planned and fully budgeted for through the Council's Long Term Plan.*

Role	Minutes of Meeting Reference	Version	Date
Executive Leadership Team			
Elected Members			

Distribution

Name	Role & Business Area	Version	Date

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1. EXECUTIVE SUMMARY

The community of the New Plymouth District served by NPDC's four potable water supplies are not using water efficiently. Currently the ecological effects of this are assessed as minor, however if we continue with current water consumption and expected population growth this will increase to having some effects . It is also expected to lead to difficulty obtaining abstraction consents and represents inefficient use of rate payers money. Finally, a shortage of accurate and reliable data is making it difficult for council and consumers to understand where water is being used and how our consumption can be reduced.

This programme aims to reduce water consumption. This is expected to reduce cost, protect and enhance the natural environment and cultural and community values of the water sources and improve our ability to obtain consents.

This programme is strategically aligned with the National Policy Statement for Freshwater Management, NPDC's vision to create a Sustainable lifestyle Capital, and its five community outcomes, NPDC's Resource Efficiency and Emissions internal Policy, nine of NPDC's twelve Asset Management Objectives, and the He Puna Wai Principals.

The main objective of the programme is to reduce Gross Per Capita Water Consumption (GPC). Four options were considered, each of which is expected to achieve a different reduction in gross per capita water consumption. These options along with their evaluation against the critical success factors identified for the program are given in Table 1.2 and 1.3.

The recommended option is **Option 2 – 25% reduction in GPC** as this allows a comprehensive reduction in the GPC, has the greatest savings and is considered achievable from a NPDC deliverability and community culture change perspective.

The costs for the recommended option are presented in Table 1.1. These include allowance for contingency.

Table 1.1 – Estimated Costs Summary Table

Year	OPEX	CAPEX				Total
		Renewal	LOS	Growth	CAPEX Total	
21/22	**$320,000**	$2,145,000	$0	$4,995,000	**$7,140,000**	**$7,460,000**
22/23	**$333,000**	$2,718,000	$158,000	$5,100,000	**$7,976,000**	**$8,309,000**
23/24	**$548,000**	$468,000	$158,000	$665,000	**$1,291,000**	**$1,839,000**
24/25	**$689,000**	$274,000	$158,000	$247,000	**$679,000**	**$1,368,000**
25/26	**$563,000**	$176,000	$158,000	$37,000	**$371,000**	**$934,000**
26/27	**$485,000**	$158,000	$908,000	$0	**$1,066,000**	**$1,551,000**
27/28	**$472,000**	$158,000	$158,000	$0	**$316,000**	**$788,000**
28/29	**$474,000**	$158,000	$158,000	$0	**$316,000**	**$790,000**
29/30	**$476,000**	$158,000	$158,000	$0	**$316,000**	**$792,000**
30/31	**$479,000**	$158,000	$158,000	$0	**$316,000**	**$795,000**
Total	**$4,839,000**	**$6,571,000**	**$2,172,000**	**$11,044,000**	**$19,787,000**	**$24,626,000**

Table 1.2 – Water conservation programme options

Action	Term	Option 1 (20%)	Option 2 (25%)	Option 3 (30%)
A1 – Water Conservation Officer	Short Term	0.5 FTE as a permanent position	1 FTE as a permanent position	2 FTE as a permanent position
A2 – Universal Water Metering	Short Term	All options include universal water metering. $12,800,000 has been allowed for this action in years 1-10. Details of the cost breakdown of this action can be found in Appendix B.		
A3 - Clean Property Classification and resolve issues with data	Short Term	1.5 FTE for years 1-3		1.5 FTE for years 1-3. 1 FTE for years 4-6
A4 -Benchmarking Water Consumption	Short Term	0.5 FTE for year 1		
A5 - Replacement of oversized flow meters	Long Term	-		$500,000/yr in years 4-6
A6 - Enforcement Action	Long Term	$10,000/yr for years 4-6		
A7 - Green Plumber	Short Term	-	1 FTE to be hired by NPDC for 3 years once meter reading begins(years 3-6)	
A8 - My Council	Long Term	-	$85,000 has been allowed in year 4	
A9 - Financial Support	Long Term	Keep on with ongoing scheme	$75,000/yr for years 3-10	
A10 - Create Standards for Rainwater Use and Grey Water Re-use	Short Term	-	$35,000 for year 2	
A11 - Volumetric Billing for Wastewater	Long Term	-	-	$85,000 for year 4
A12 – Upgrades to municipal facilities	Short Term	$100,000/yr for years 2-10	$300,000 /yr for years 2-10	$500,000/yr for years 3-10
A13- Education / community engagement programme	Short Term	Keep on with current 0.5 FTE permanent position since year 2	Additional 1 FTE (total 1.5 FTE) on a permanent basis since year 2	Additional 1.5 FTE (total 2 FTE) on a permanent basis since year 2
A14 - General Education and Specific Water Conservation Programmes for Organisations	Long Term	-	0.5 FTE for ten years	1 FTE for ten years
A15 - Leak Detection Programme	Short Term	Keep on with ongoing programme		Additional 50% budget as a long term initiative for ten years
A16 - Pressure Management	Long Term	-	$500,000 for year 6	$800,000 for year 6

Table 1.3 – Options Evaluation

Success factor		Option 0 - Status Quo	Option 1 - 20% reduction	Option 2 - 25% reduction	Option 3 - 30% reduction
CSF 1 - Strategic fit	Sustainable Lifestyle Capital	Does not mitigate our impact on the environment or use existing infrastructure in most efficient way	Mitigates our impact on the environment and provides foundation for efficient use of infrastructure	Mitigates our impact on the environment and ensures we are making efficient use of infrastructure	Mitigates our impact on the environment and ensures we are making efficient use of infrastructure
	Resource Efficiency policy	Does not provide leadership in water conservation	Provides some leadership in water conservation but only to a limited extent	Provides an appropriate level of leadership for water conservation at this time.	Represents an visionary program for leadership in water conservation
	He Puna Wai Principles	Does not protect and enhance the Mauri of the water	Starts to protect and enhance the Mauri of the Water	Make good progress in protecting and enhancing the Mauri of the Water	Make good progress in protecting and enhancing the Mauri of the Water
CSF 2 - Reduction in Water use	% reduction in Gross per capita consumption	Long term gains are likely to be negligible	Achieves a significant reduction in water use now and provides the foundation infrastructure to improve upon this if desired in the future	Achieves a significant reduction in water use now and provides the foundation infrastructure and culture change components to lock these in and allow for ongoing improvement	Achieves a significant reduction in water use now and provides the foundation infrastructure and culture change components to lock these in and allow for ongoing improvement
	How easily will the public adapt to the desired rate and scale of change	Insignificant risk as there is no change	Moderate risk, mostly associated with universal water metering implementation without a complete set of initiatives supporting culture change	Low risk, mostly associated with universal water metering but mitigated by a complete set of initiatives supporting culture change	High risk, particularly with the introduction of volumetric billing for wastewater simultaneous with water. Rate of change is likely to cause significant backlash from portions of the community
CSF 3 – Cost Saving	CAPEX and OPEX savings over 30yrs	No savings	$34M saving expected.	$40M saving expected	$33M saving expected
CSF 4 - Deliverability	Level of deliverability risk	No risk as there is no change	Moderate risk. Main risk is delivering universal water metering (risks associated with timeframe - including community reaction, quality and cost)	Moderate risk. Main risk is delivering universal water metering (risks associated with timeframe - including community reaction, quality and cost)	Significant risk. Volumetric billing of wastewater is not currently legal. Rate of change would be difficult to manage within current environment. Key additional risks are pressure management, replacement of oversized flow meters and recruitment and management of additional staff.

2. STRATEGIC CASE

2.1. Problem / opportunity statement

This project aims to address the following problems:

- **Effects on the environment.** Ecological assessment indicates effects of the current takes on the environment are minor. However if we continue with current water consumption and expected population growth this could increase to having some effects. In addition, during times of low flow the more water left in the river the better, particularly as low flow typically coincides with peak demand. This effect on the environment is forecast to increase due to the predicted effects of climate change.
- **Difficulty obtaining consents.** Our abstraction consents for the New Plymouth and Inglewood water supplies expire in June 2021 and if we continue with our current use patterns we will require a consent for additional abstraction for New Plymouth before 2038, Okato before 2031 and Inglewood before 2032. When assessing and making decisions on consent applications, TRC is legislatively required by the RMA and NPS for Freshwater Management to consider if the water is being used efficiently. When measured against national and international best practice we are not using water efficiently. This is illustrated by how our water demand can increase by up to 50% during summer and our average domestic water consumption being 1.5-2 x higher than comparable municipalities as Whangarei, Marlbrough, Nelson, Palmerston North and Kapiti as shown in Figure 2-1.

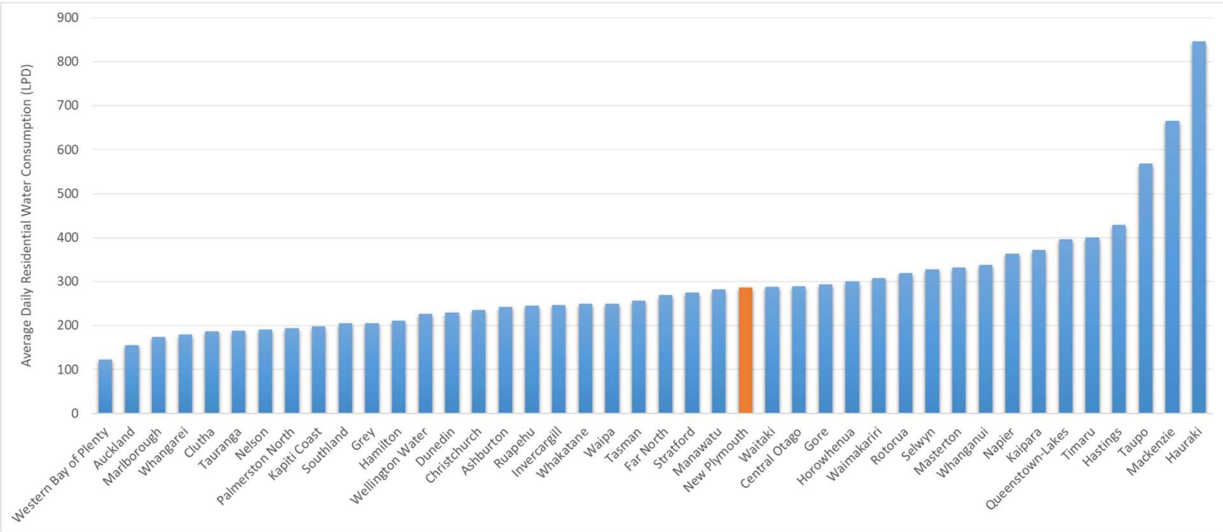

Figure 2-1- Average daily water consumption (litres/person/day) - 2018/19

Source: Water NZ https://www.waternz.org.nz/Category?Action=View&Category_id=1010

The expectations of the community and government are increasing around the amount of water that needs to be left in the rivers. Currently our consent allows us to draw the river down to 55% of the MALF (seven-day Mean Annual Low Flow). The National Policy Statement for Freshwater Management sets a target of abstraction ceasing at 90% MALF, and the TRC are currently considering a target of abstraction ceasing between 75% and 85% of MALF for its next revision of the freshwater plan.

- **Inefficient use of ratepayers' money.** Over $120M CAPEX plus associated OPEX will be required to meet increased water demand due to population growth over the next 30 years if consumption continues at its current rate. Much of this can be deferred or eliminated by reducing consumption.
- **Lack of data:** There is not enough accurate and reliable data to enable council and consumers to be efficient with their water. Data helps both council and customers

understand how much they are using, find leaks, undertake efficiency interventions and quantifying the effectiveness of interventions.

2.2. Benefits statement

The aim of this project is to reduce water consumption. A literature review on the impact of the introduction of a water conservation program including universal water metering and volumetric charging (Reed and Hermens, 2013) [1]showed a 25% reduction in average day demand for Tauranga and 30% reduction in peak day demand, a 25% reduction in average day demand for Kapiti, a peak day demand reduction of 37% for Nelson, a 20% reduction in average day demand for Wide Bay Water Corp in Australia, a 22% reduction in average day demand for Southern Water in the UK. A study of the effect of water meters on household demands by Southampton University showed a 16.5% reduction in household demand in the Southern Water area following the installation of water meters.

The benefits of reduced water consumption are:

- **Reduced cost:** Reducing demand reduces both CAPEX and OPEX costs. To allow for growth over the next 30 years if we continue with our current demand we will need an additional water source for the New Plymouth, Okato and Inglewood water supplies and upgrades to reservoirs and pipes estimated to cost $123M. Reducing demand will defer or eliminate the need for a number of these projects. Reducing demand also reduces operational costs associated with the production of water (e.g. chemicals, power etc) and with the operation of these additional facilities. Finally, reducing water use also reduces wastewater flows and the associated OPEX and CAPEX costs of this activity.

- **Protect and enhance the natural environment:** Water is a precious commodity, essential to life, our community and the environment. We do not have an unlimited amount of water, so we should value it accordingly. If we can reduce our demand by 20-30% this water becomes immediately available for the environment. Reducing the water consumption (and consequently taking less water from the water sources) helps to sustain river flows contributing to improved ecosystem health. This environmental health is mainly needed during summer when rainfall and recharge is at a minimum and abstraction is greatest.

  In addition, reducing water consumption reduces wastewater flows and associated environmental impacts of discharges, chemical and energy use. This in turn reduces operational emissions which aids climate change mitigation. Moreover, by deferring or eliminating capital investments, associated environmental impacts related to construction are also deferred or eliminated.

- **Cultural and community value of the water sources is protected and enhanced:** Water is central to Māori cultural identity, personal identity and well-being. Tangata whenua continue to have a close relationship with water in all its forms, both spiritually and physically. Water is a taonga of huge importance to iwi and hapū and enhancing the health and wellbeing of our waterways is a priority for them.

  Community Expectations around water sustainability and deteriorating environments is increasing. Our communities' expectations are for a safe, affordable and continuous water supply as well as a clean, green environment that we can enjoy for recreation, food, tourism and supporting our economic prosperity. This requires greater understanding of what we take from the environment versus what we really need to take for our water supply needs.

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[1] Reed J and Hermens K (2013) A review of water metering practice in New Zealand and Overseas. Water New Zealand Conference 2013

- **Ability to obtain consents:** Reducing our water consumption will make it easier to renew existing consents and obtain consents for new sources when required.

2.3. Main Risks

The following risks, constrains and dependencies have been identified if we maintain the status quo:

Risk and Consequence Description	Source of risk	Consequence	Likelihood	Mitigation strategy
A new source of water will be required with a significant effect on the environment causing serious damage of local importance with possible regulatory intervention	Environment	Moderate	Likely	Establish a water conservation programme to reduce the gross per capita consumption and in consequence the total demand to avoid requiring a new water source in the short term.
Keeping up with current consumption rates will cost at least up to $123M over the next 30 years. This capital cost and the operational costs of producing drinking water could be significantly reduced (loss of >$10M) by bringing water consumption in line with national best practice.	Financial	Catastrophic	Possible	Establish a water conservation programme to reduce the gross per capita consumption and defer or eliminate CAPEX and OPEX costs.
NPDC cannot obtain a consent for an additional water source as we cannot demonstrate that we are being efficient with what we already take leading to disruption to a community for up to two weeks during a drought.	Operations and service delivery	Major	Possible	An effective water conservation plan and measureable reduction in consumption will give NPDC the evidence needed to obtain a consent for a new source.
Changes in the regulatory arena for consenting may have noticeable impact on long-term levels of service, especially during summer, being consistently below expectations in one or more outcome categories. Some community interest and media attention.	Planning and strategy	Moderate	Likely	Water conservation programme will give to NPDC a buffer and extra time in case there is a change in the regulatory arena.
The He Puna Wai principles include: • Protection / He Puna wai: Ensure that the first right goes to the water and then to the consumer. • Enhance / E kore e mimiti: Te Wai nurtures and provides us with a gift to enhance sustainable use. • Sustains / Ka koropupu tonu: Te Wai teaches us the lesson that “I am the water and the water is me” that we are connected. Not respecting these principles will affect the relationship between NPDC and iwi and hapū, with some impact on public confidence and media attention.	Governance, Reputation	Moderate	Possible	Briefing and consultation with iwi and hapū need to be performed to include their principles as part of the programme and to address their concerns. The success of the programme depends on the community engagement therefore, engagement with hapū becomes essential.

Risk and Consequence Description	Source of risk	Consequence	Likelihood	Mitigation strategy
The National climate change risk assessment[2] indicates that the consequence for New Zealand of climate change on the availability of potable water supply due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level alerts is extreme. There is some evidence of a 0.4%/yr decline in the MALF due to climate change (Tonkin + Taylor, 2020)[3]. If this is correct this would represent a 12% reduction in MALF over the next 30 years. This could lead to additional costs of between $5 and $10M over the 30 years.	Financial	Major	Unlikely	Establish a water conservation programme to reduce the gross per capita consumption and in consequence the total demand.

[2] https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/national-climate-change-risk-assessment-new-zealand-snapshot.pdf

[3] Tonkin + Taylor (2020) Reconsenting of Mangorei Hydroelectric Power Scheme - Hydrology Report. Prepared for Trustpower, August 2020

2.4. Strategic Alignment

This project aligns with a number of strategic documents as follows:

- **National Policy Statement (NPS) for Freshwater Management 2020.** The NPS is based on the fundamental concept of Te Mana o te Wai. Te Mana o te Wai refers to the fundamental importance of water and recognises that protecting the health of freshwater protects the health and wellbeing of the wider environment. It protects the mauri of the wai. It is about restoring and preserving the balance between the water the wider environment and the community. This project directly aligns with this concept by being respectful of how much water we take for people to use.
- **Building a sustainable lifestyle capital:** This project aligns with the councils strategic framework (Figure 2-1) in the following ways:
    - **Prosperity:** It grows a resilient and sustainable economy by reducing the cost associated with providing drinking water.
    - **Sustainability:** It nurtures our environment by leaving more water for the natural environment and adapts to climate change by reducing our energy consumption and improving our drought resilience.
    - **Community:** Water conservation is only effective if the whole community embraces it. Thus a successful water conservation program, specifically the education and community outreach components, leads to supporting an inclusive and connected community
    - **Delivery:** It improves our understanding of where water is used so we can operate the network more effectively.
    - **Partnerships:** The program provides opportunities for partnerships with Tangata whenua, industry and environmental groups.
- **NPDC's Resource Efficiency and Emissions Internal Policy**: This internal policy seeks to provide leadership in the area of water efficiency and requires the identification and capitalisation on opportunities to reduce water use. This internal policy requires council to adopt a Water Conservation Plan where the water consumption/efficiency targets will be established. The business case is to secure the funding required to deliver that plan.
- **He Puna Wai Principles:** Refer to section 2.5 Iwi alignment below.
- **Asset Management Objectives:** This project aligns with 9 of the 12 asset management objectives as follows:
    - We understand that asset data and evidence based decision making are critical to optimising costs and maximising the value our services bring to our customers.
    - We provide reliable services and infrastructure that is resilient to natural hazard and adapts to climate change.
    - We provide system redundancy and emergency back-up systems to critical infrastructure.
    - We work in partnership with Tangata Whenua when we plan for our infrastructure.
    - Our infrastructure is an enabler for economic activity and future growth.
    - We educate our community so they can make the informed choices about how they use our services and manage demand on our infrastructure services.
    - We manage the consumption of energy and associated greenhouse gas emissions to mitigate our impact on climate change.
    - We protect and restore the health of our natural environment.
    - We manage the use of resources in a sustainable way, minimising waste and seek opportunities to use waste and resources to be reused and recycled.
- **NPDC Long Term Plan Climate Change Assumptions:** The proposed programme aligns with the NPDC Long Term Plan Climate Change Assumption as presented in Appendix B of ECM 8086763 (Climate change impacts on droughts) and with LTP forecasting assumptions ECM 8312385.

2.5. Iwi alignment

The scope of work is aligned with the He Puna Wai principles which are:

- Protection / He Puna wai: Ensure that the first right goes to the water and then to the consumer.
- Enhance / E kore e mimiti: Te Wai nurtures and provides us with a gift to enhance sustainable use.
- Sustains / Ka koropupu tonu: Te Wai teaches us the lesson that “I am the water and the water is me” that we are connected.

NPDC has been working together with the Iwi of Ngati Maru, Ngāti Tama, Ngāti Mutunga, Te Atiawa and Taranaki Iwi in a spirit of partnership and collaboration to develop sustainable long term strategy for District’s three waters systems. As part of these regular meetings, the Water Conservation Programme has been discussed and the business case will be presented at the next hui.

Alongside He Puna Wai, NPDC host the Three Waters Hui on a monthly basis. This working group consists of local hapū and iwi representatives together with NPDC officers, where collaboration and presentation of ideas are tabled including Water Conservation and upcoming water consents. As part of the Hui, the information and data used to develop the water master plan and the Water Conservation approach has been shared and explained. In the 24th of June 2020 Hui, Water Conservation as a fundamental milestone for the water sources options for New Plymouth was discussed. An initial briefing focused on Water Conservation was held on the 28th of August. During this hui it was presented a general overview of why the programme is needed, which are the benefits, actions and next steps. The main concern expressed during this meeting by iwi and hapū, was to be sure that the programme focus is not just on residents (60% of the consumption) but also focussed on industry, commerce, and municipal activities. Hapū were keen to see how they can support the programme and are looking for opportunities in this area and how they could be opened up for them. NPDC explained that the presented programme is initially a high level, then, once approved, we will look for collaborative working opportunities with iwi and hapū as part of the plan. Moreover, iwi are keen to look at future opportunities to collaborate on water conservation, particularly within their own hapū.

A draft version of the Water Conservation Consultation Document (Appendix E) was released for comments from iwi and hapū during September 2020 and then on 8th October 2020 hui were presented the high level possible options. As part of the process, iwi and hapū will support on improving the consultation document to better reflect Te mana o te wai and He Puna Wai and cultural aspects. Also, it was agreed their involvement during the detailing phase of the programme.

During all the meetings it was stressed that the success or failure of the programme depends on culture change and community engagement and therefore the need for the active participation of iwi and hapū is essential.

3. ECONOMIC CASE

The purpose of the economic case is to identify the investment option that optimises value for money. Having determined the strategic context for the investment proposal and established a robust case for change, this part of the economic case:

- identifies critical success factors

- identifies and assesses the programme options (or trade-offs) for delivering the service needs, and
- identifies a preferred way forward based on the preferred programme.

3.1. Critical Success Factors

Critical success factors are attributes essential to successful delivery of the proposal, against which identified long-list options can be assessed. The following critical success factors were identified:

Table 3-1: Critical Success Factors

Generic Critical Success Factors	Broad Description	Proposal-Specific Critical Success Factors
CSF 1 - Strategic fit	How well the option integrates with other strategies, programmes and projects.	- Does it supports the creation of a Sustainable Lifestyle Capital - It is aligned with the Resource efficiency internal policy - Does it align with He Puna Wai's principles
CSF 2 – Reduction in water use	Reduction in total water demand this option achieves. This is an indicator of how well the option reduces the impact to the environment and supports cultural and community expectations	- What is the expected percentage reduction in gross per capita consumption (reducing climate change water supply availability risk) - How easily will the public adapt to the desired rate and scale of change
CSF 3 – Cost Savings	How cost effective is the option	- Saving over 30yr period as measured against status quo
CSF 4 - Deliverability	Level of risk in delivering the programme and achieving expected savings.	- Level of deliverability risk for council

3.2. Programme options

3.2.1. Programme Objectives

Water Conservation Programme is composed of a group of different actions, initiatives or projects that support the implementation of the Water Conservation Plan. Initially proposed are the initiatives that are the foundation to track success and that could drop consumption by between 20% and 30%.

A Water Conservation workshop was held with internal NPDC key stakeholders on 01 July 2020 to discuss the programme objectives. The main objective that was agreed is the need to **reduce the gross per capita consumption (GPC).** This was selected as water usage (water taken from initial source) is the most reliable source of data available and is the most meaningful measure of our impact on the environment and the effectiveness of the program. Based on this we are proposing the following main goal.

Main goal:

- Gross Per Capita consumption is reduced by XX% between 2016 and 2030. (% reduction to be determined in selection of preferred option)

Sub-goals:

To achieve this reduction in gross consumption will require a reduction in all the main demand areas, namely Residential, Industrial and Commercial, Municipal and Leakage. The proposed goals for each demand area are given below:

1. Residential per capita consumption (RPC) is less than XXX L/p/d by 2030.
2. Leakage is less than XX L/con/day by 2030.
3. Benchmarking industrial and commercial consumption by 2025 and setting a reduction goal by 2026.
4. Benchmarking municipal consumption by 2025 and setting a reduction goal by 2026.

For residential per capita consumption and leakage, the target can be established based on local and international best practices and it will depend the preferred option chosen. For industrial, commercial and municipal consumption the first step is to understand current consumption and to enable the setting of a reduction target.

3.2.2. Individual actions to be considered as part of the programme

A water conservation programme is necessary to minimise and reduce the problems presented in Section 2.1 in a sustainable long term way. As part of the programme a variety of different actions, in addition to the ongoing actions (see section 3.2.3), can be considered to reduce gross per capita consumption. These individual actions are explained in more detail below. As the effectiveness of the individual actions cannot be measured due to their inter dependencies we have grouped the proposed actions into 4 options. These options are detailed in section 3.2.3.

Due to the nature of the actions the proposed initiatives are focused on the next 1-3yrs plan (short term) and 3-10yrs (medium term). It is expected that the water conservation plan will be reviewed on a 3 yrly basis (to coincide with the LTP cycle) to update these actions based on the effectiveness of the previous work and improved understanding of the use of water. These actions are based on a water conservation workshop held with internal NPDC stakeholders on 01 July 2020. .

Each action falls into one or more of the following five categories:

1. Metering
2. Data and Information
3. Demand Management (excluding metering actions)
4. Education and Communications
5. Network Losses Reductions

It is important to note that metering is also a demand management tool, however, as many other actions are dependent on the implementation of metering, they have been individually assessed.

The individual actions ordered by category are as follows:

All Categories

Action 1 – Water Conservation Officer: a Water Conservation Officer (WCO) is recommended to oversee demand reduction across all four demand areas. This role will implement, benchmark, monitor and update actions in this area, as well as actively searching for potential new initiatives that could further reduce water use focused on Municipal Properties.

Metering

Measuring and charging for water use by meters is the most important and effective element of the Council's water conservation actions because so many other initiatives are dependent on the information it provides. Whilst there are numerous water demand management methods that can be employed to achieve a reduction in water usage, these do not in general meet the criteria of being fair and equitable or reduce the daily peak water demands (the main driver for building new water infrastructure). Water metering, including volumetric billing, has been successfully proved to reduce water demand (particularly peak demand) in other municipalities when included as part of a wider water conservation program

While installing meters and implementing volumetric billing on extraordinary connections such as industries, commerce and municipal buildings is ongoing, specific future actions could include:

A2 – Universal Water Metering (UWM): Under universal water metering all on demand customers have a water meter and pay volumetrically. This considers all the residential properties that are served with potable water by NPDC and the restricted demand customers (those in rural areas where the water is trickle fed to a tank rather than straight to tap). Universal water metering is now common within New Zealand with over half of the population having a meter and paying volumetrically. Details of the options assessment for the meter type and complicated properties for this action are presented in Appendices B and C. The preferred options considered as part of the actions are:

- Meter type: Option 3. AMR Meter (Appendix B)
- Complicated properties: Option 2b. Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage equally (Appendix C – ECM 8422242).

Water New Zealand's National Performance Review for 2018/19 illustrates a strong correlation between metering and low domestic per capita water consumption. Examples include Western Bay of Plenty (123L/p/d), Auckland (156L/p/d) and Whangarei (179 L/p/d) as opposed to New Plymouth's domestic consumption of 287L/p/d.

Metering also delivers on user pays equity in the sense that users pay for their own water usage rather than subsidising the use of other consumers – it is fairer. This makes the metering and charging for water usage similar to any other domestic consumables (e.g. electricity, gas).

The installation of water meters is expected to take 2 years, followed by mock billing for one year to enable customers to understand and manage their consumption, with full billing starting the following June. .

Data and Information

More reliable and detailed data is needed to provide clear understanding of supply, demand, losses and overall patterns of use. Data-related actions are highly interrelated, and together will create a clear picture of NPDC's potable water network usage. Specific actions include:

A3 - Clean Property Classification and resolve issues with data: it is important for the Council to have a single version of property type information, however, this is not currently the case. All properties should be classified as one of the following:

- Residential;
- Industrial;
- Commercial;
- Municipal.

In addition, it may be useful to create sub-groupings, for example, Commercial might usefully be broken into food establishment, offices and education; Municipal into buildings, parks and firefighting.

A4 -Benchmarking Water Consumption: NPDC aims to understand baseline water consumption, that is, how/when and where each of the four demand areas consumes water. It will be necessary to identify the most important measurements to focus on and track over time, and decide how the data will be analysed. Benchmarking is particularly useful for tracking changes resulting from new initiatives being applied.

This initiative is dependent on metering being in place, which will provide a steady stream of water use data from across the New Plymouth District at a fine level of detail.

A5 - Replacement of oversized flow meters: Some bulk flow meters located in high flow areas such as the intake, reservoirs and main trunks are inaccurate due to being oversized for the normal range of flows they monitor. Replacing these will further refine our understanding of water consumption.

Demand Management

An important way to conserve water is to influence human demand. This involves the application of selected incentives and deterrents to encourage efficient and equitable use of water. Specific actions include:

A6 - Enforcement Action: Currently NPDC sends a warning letter to properties that are detected as being wasteful of water. However, after the letter is sent, there is no clear compliance approach on next steps so Council is in the process of updating guidance to enable sustained investigation of, and enforcement against, those who waste water.

A7 - Green Plumber: This person would help high users understand where water is being used on their property and options to reduce their consumption. This action relies on metering data.

A8 - My Council: This would give residents a portal where they can log on to get their latest water meter readings and understand their regular use to better manage their consumption. This is similar to what is available to many power customers with a smart meter. It would also enable NPDC to issue alerts and share forecasts for water consumption. This action relies on metering data.

A9 - Financial Support: This initiative will provide financial support or incentives for consumers looking to make changes that support water efficiency. One example is looking at how the council can improve and promote the Sustainable Homes Voluntary Targeted Rates Scheme clause 7 (b) for water conservation initiatives including fixing leaks. Also under this action is support those for whom the change to universal water metering has a disproportionate impact such as large low income families.

A10 - Create Standards for Rainwater Use and Grey Water Re-use: This initiative is for NPDC to develop a set of standards for Rainwater use and Greywater reuse to assist residents with implementing these systems in a way that maintains public health.

A11 - Volumetric Billing for Wastewater: Currently wastewater is billed at a flat rate per household. This initiative would see wastewater billed volumetrically based on the volume of water used. This initiative is dependent on universal water metering being completed. This initiative is also dependent on the Government's response to the Productivity Commission's Inquiry into Local Government Funding and Financing recommendation to enable volumetric wastewater charging.

A12 – Upgrades to municipal facilities: This initiative is to make funding available for capital modifications to NPDC facilities to reduce their water consumption. This is important as NPDC need to act as a role model for the rest of the community.

Education and Communications

To maximise the success of demand management initiatives residents and organisations need to have access to information on how to reduce their consumption of water.

A13- Education / community engagement programme: Since December 2017, NPDC has encouraged the people of New Plymouth to reduce water consumption by the Wai Warrior education and community engagement campaign. It makes sense to target consumers directly and educate them on simple ways that they can save hundreds of litres of water in their homes. The campaign uses social media in the form of YouTube videos and Facebook posts to engage the community, as well as provide them with plenty of water saving tips. Out in the community, NPDC's Three Waters Education Officer visits schools and community events to teach children about how everyone can do their part to cut down on how much water they use. Currently, this program is being delivered by one person for about 20 hrs per week. This option is to increase the resourcing for this program.

A14 - General Education and Specific Water Conservation Programmes for Organisations: This action supports organisations (industrial, commercial and community) to develop their own water conservation programs.

Network Losses Reduction

Early identification and reduction of leaks is expected to have a significant impact on overall water demand.

A15 - Leak Detection Programme: NPDC already has a leak detection survey underway to identify leaks within the water network. This initiative is to accelerate the current leak detection program, largely based on the additional data provided by universal water metering.

A16 - Pressure Management: The lower the pressure the less water that comes out, this applies to both household fixtures and fittings and leaks. Pressure reduction also helps reduce the likelihood of a leak developing in the first place (both on private and public pipes). However this needs to be balanced by the need to main adequate pressure so that the network is accessible and useable. We currently have pressure management for Inglewood and Fitzroy. This initiative would see this program extended to potentially include Waitara, New Plymouth CBD, the Port and Glen Avon.

3.2.3. Programme options identification

Four potential options, each of which is made up of a combination of actions, were considered.

A base case **Option 0 or "status quo"** has been included and is used as a baseline for comparing costs and benefits of alternative investment options. This Option 0 includes the continuance of actions already underway. These include:

- Installation of non-billed meters for new connections
- Water restrictions
- Enforcement action
- Education programme
- Metering of extraordinary connections
- Leak detection programme
- Financial support as part of the Sustainable Homes Voluntary Targeted Rates Scheme (clause 7 – b)

Additionally, three water conservation program options are proposed, each of which achieves a higher reduction target as follows:

- **Option 1** - The minimum option required to deliver the essential or core service requirements (the must haves) - 20 % reduction in the GPC. This option considers the ongoing actions (Op 0 – Status quo) together with new proposed ones.

- **Option 2** – An intermediate option required to deliver essential and desirable service requirements - 25 % reduction in the GPC. This option considers the ongoing actions (Op 0 – Status quo) and Op 1 proposed actions together with new proposed ones.

- **Option 3** – A more ambitious approach required to deliver the essential, desirable and aspirational service requirements - 30 % reduction in the GPC. This option considers the ongoing actions (Op 0 – Status quo), Op 1 and Op 2 proposed actions together with new proposed ones.

Detail of the proposed options for the water conservation programme is presented in the following table. Within each option are short term (0-3yrs) and medium term (3-10yrs) actions. Detail on each action has been already presented in Section 3.2.

Table 3-2 – Water conservation programme options

Action	Term	Option 1 (20%)	Option 2 (25%)	Option 3 (30%)
A1 – Water Conservation Officer	Short Term	0.5 FTE as a permanent position	1 FTE as a permanent position	2 FTE as a permanent position
A2 – Universal Water Metering	Short Term	All options include universal water metering. $12,800,000 has been allowed for this action in years 1-10. Details of the cost breakdown of this action can be found in Appendix B.		
A3 - Clean Property Classification and resolve issues with data	Short Term	1.5 FTE for years 1-3		1.5 FTE for years 1-3. 1 FTE for years 4-6
A4 -Benchmarking Water Consumption	Short Term	0.5 FTE for year 1		
A5 - Replacement of oversized flow meters	Long Term	-		$500,000/yr in years 4-6
A6 - Enforcement Action	Long Term	$10,000/yr for years 4-6		
A7 - Green Plumber	Short Term	-	1 FTE to be hired by NPDC for 3 years once meter reading begins(years 3-6)	
A8 - My Council	Long Term	-	$85,000 has been allowed in year 4	
A9 - Financial Support	Long Term	Keep on with ongoing scheme	Additional $75,000/yr for years 3-10	
A10 - Create Standards for Rainwater Use and Grey Water Re-use	Short Term	-	$35,000 for year 2	
A11 - Volumetric Billing for Wastewater	Long Term	-	-	$85,000 for year 4
A12 – Upgrades to municipal facilities	Short Term	$100,000/yr for years 2-10	$300,000 /yr for years 2-10	$500,000/yr for years 2-10
A13- Education / community engagement programme	Short Term	Keep on with current 0.5 FTE permanent position since year 2	Additional 1 FTE (total 1.5 FTE) on a permanent basis since year 2	Additional 1.5 FTE (total 2 FTE) on a permanent basis since year 2
A14 - General Education and Specific Water Conservation Programmes for Organisations	Long Term	-	0.5 FTE for ten years	1 FTE for ten years
A15 - Leak Detection Programme	Short Term	Keep on with ongoing programme		Additional 50% budget as a long term initiative for ten years
A16 - Pressure Management	Long Term	-	$500,000 for year 6	$800,000 for year 6

3.3. Whole of Life Cost

3.3.1. Most Likely Whole of Life Cost

The difference in cost between options 1-3 against the Option 0 (status quo) is given in Table 3-3 and Figure 3-1 (negative values represent the savings i.e. where Water Conservation is cheaper than the status quo). These show that all options have a net saving of $34-$41M when measured across 30 years, with Option 2 having the highest expected savings of $41M. These saving are across a total activity spend of $374M for the 30 years (NPVed value for Option 0 – Status quo) so represent a saving of 10% of total cost.

Table 3-3 - 30yr savings against Op 0 (M$)

Option against Op 0 (status quo)	Savings
Op 1 (20%)	$34.3
Op 2 (25%)	$41.3
Op 3 (30%)	$36.0

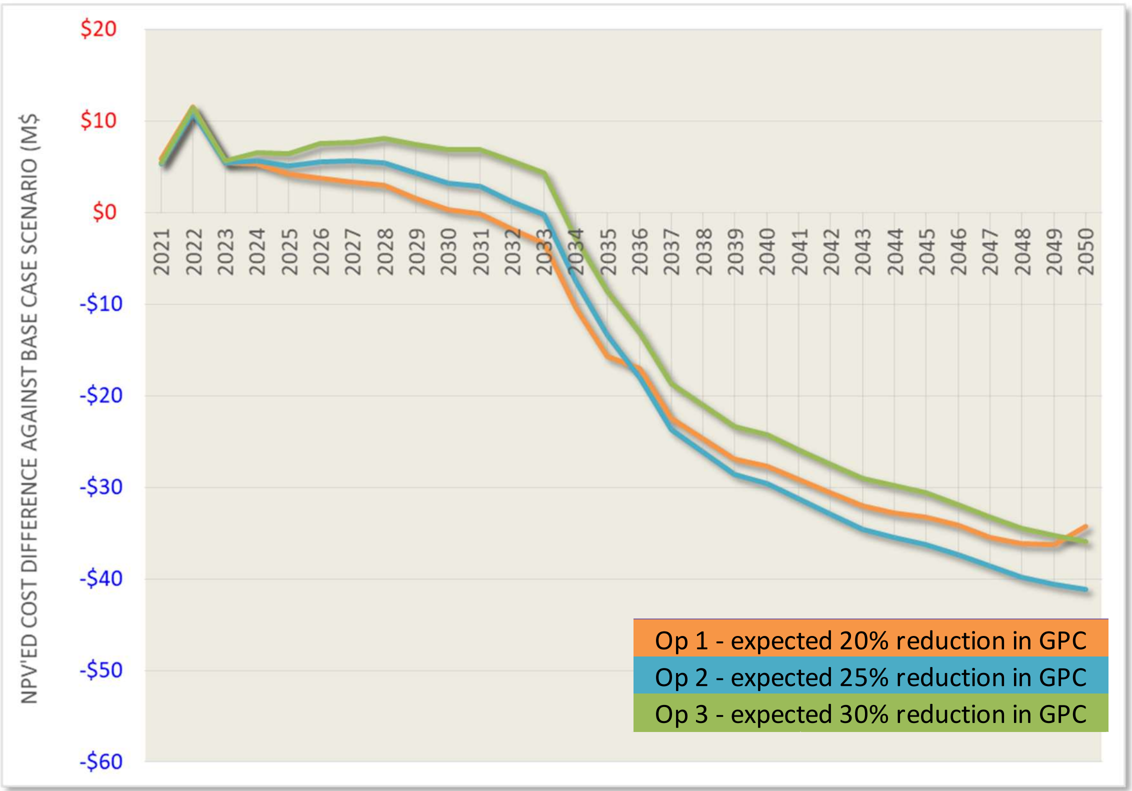


Figure 3-1 - Option 0 status quo vs Options 1, 2 and 3

These findings are based on a water revenue model developed for NPDC by Dialogue Consultants. The model provides a range of water related outputs, one of which is the whole of life costings for the implementation of water conservation. The model uses the following key assumptions:

1. A 30yr timeframe.
2. The costs are subject to a net present value calculation using a 6% internal rate of return which is considered to include inflation.
3. The % reductions referred to in the options take effect in year 4 of the LTP (i.e. when volumetric billing begins)

4. The demand forecast for Option 0 is based on CH2M Beca projections for the water master plan (see Table 3-4 for details).

Table 3-4 – Demand forecast

Water Supply System	Peak Demand (MLD)	
	2020/2021	2050/2051
New Plymouth	51.1	64.8
Inglewood	2.8	3.8
Oakura	1.5	2.4
Okato	0.8	1.3

5. To simulate options 1, 2 and 3, the reduction in the GPC in the model was reflected in the demand curve (water consumption rates were reduced keeping the same population growth as for the status quo option)
6. Capex projections are made based on the GHD water master plan and 2018-2028 LTP, updated to reflect current understanding of the network.
7. $2M/yr was allowed for as yet unidentified growth projects in years 15-30 for the Option 0. This amount was reduced to 2.5M/yr in years 27-30 for Option 1 and no costs were considered for Options 2 and 3 based on the demand forecast with reduced GPC.
8. The 30 years project costs (CAPEX and OPEX) used in the simulations for the most likely scenario are presented on Appendix D.

3.3.2. Sensitivity of Whole of Life Cost

To better understand the whole of life cost, the sensitivity of the model to a number of key assumptions was tested. This identified the key variables (combination of effect on result and uncertainty inherent assumption) as being: the inclusion of unidentified growth projects, cost of universal water metering and volume related OPEX costs. Each of these key variables were then combined to make a Worst Case Scenario and Best case scenario based on the parameters below.

Worst Case Scenario

- Only growth estimated projects (including a new water source) for the next 15yrs (considered in the APLAN), therefore any growth projects that had not been estimated and considered under the APLAN were excluded.
- Additional 50% metering CAPEX.
- 50% reduction in volume and metering OPEX related costs.

Best Scenario

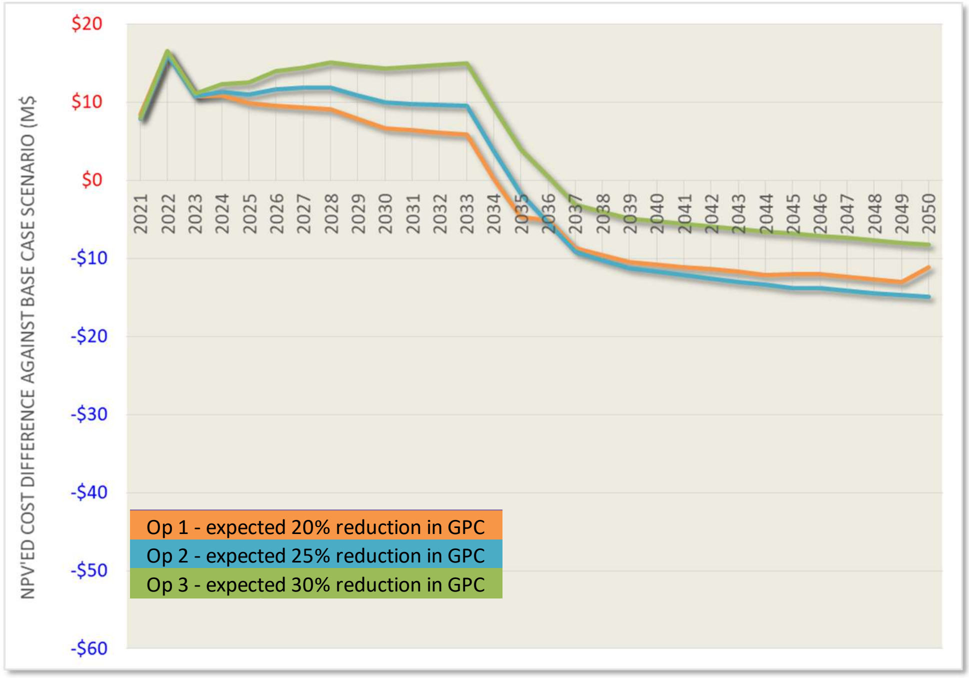
- Growth estimated projects (including a new water source) for the next 15yrs and non-estimated projects for the remaining years.
- 20% reduction in metering CAPEX.
- Additional 50% in volume metering OPEX related costs.

The results are presented in Figure 3-2 and Table 3-3, where it can be observed that even for the worst case scenario Water Conservation is still cheaper than the status quo.

Table 3-5 - 30yr savings against Op 0 (M$)

Option against Op 0 (status quo)	Worst Case	Most likely	Best Case
Op 1 (20%)	$11.1	$34.3	$44.9
Op 2 (25%)	$15.1	$41.2	$53.7
Op 3 (30%)	$8.4	$35.9	$49.9

Worst Case Scenario



Best Case Scenario

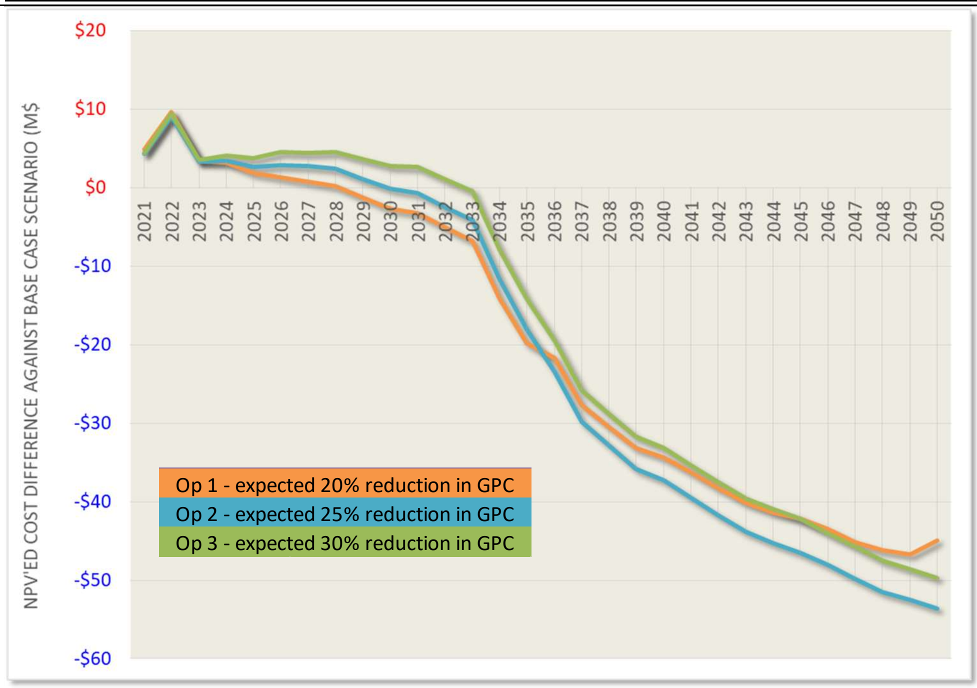


Figure 3-2 – Cost comparison by sensitivity analysis

A sensitivity analysis was also performed to assess the possible variations on the Internal Rate of Return. Figure 3-4 shows a histogram of savings of the different options against the status quo option when varying the IRR. This indicates that while the magnitude of savings varies with internal rate of return the outcome does not.

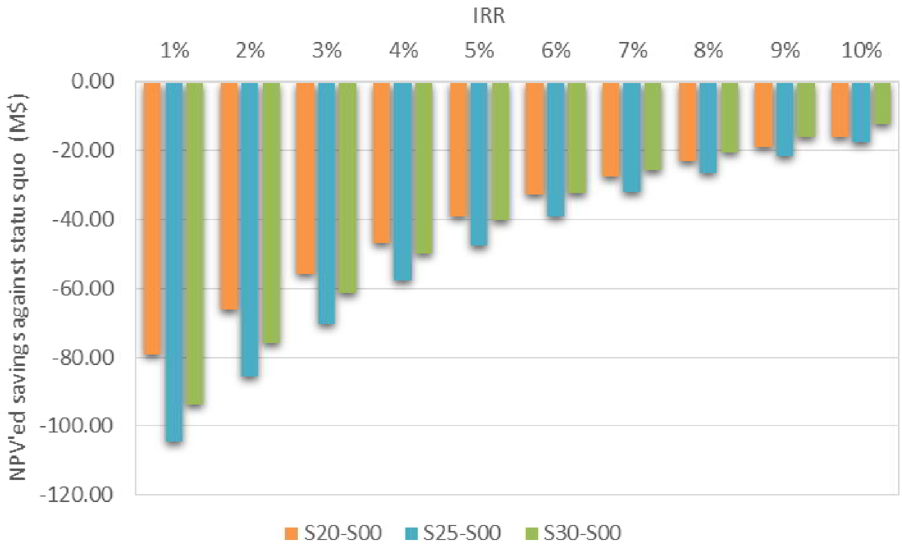


Figure 3-3 – Internal Rate of Return sensitivity analysis

3.1. Programme Options Assessment

The four options were assessed against the Critical Success Factors introduced in Section 3.1. Each programme option is assessed as fully meeting, partially meeting, or not meeting each critical success factor.

Table 3-6: Critical Success Factors

Success factor		Option 0 - Status Quo	Option 1 - 20% reduction	Option 2 - 25% reduction	Option 3 - 30% reduction
CSF 1 - Strategic fit	Sustainable Lifestyle Capital	Does not mitigate our impact on the environment or use existing infrastructure in most efficient way	Mitigates our impact on the environment and provides foundation for efficient use of infrastructure	Mitigates our impact on the environment and ensures we are making efficient use of infrastructure	Mitigates our impact on the environment and ensures we are making efficient use of infrastructure
	Resource Efficiency policy	Does not provide leadership in water conservation	Provides some leadership in water conservation but only to a limited extent	Provides an appropriate level of leadership for water conservation at this time.	Represents an visionary program for leadership in water conservation
	He Puna Wai Principles	Does not protect and enhance the Mauri of the water	Starts to protect and enhance the Mauri of the Water	Make good progress in protecting and enhancing the Mauri of the Water	Make good progress in protecting and enhancing the Mauri of the Water
CSF 2 - Reduction in Water use	% reduction in Gross per capita consumption	Long term gains are likely to be negligible	Achieves a significant reduction in water use now and provides the foundation infrastructure to improve upon this if desired in the future	Achieves a significant reduction in water use now and provides the foundation infrastructure and culture change components to lock these in and allow for ongoing improvement	Achieves a significant reduction in water use now and provides the foundation infrastructure and culture change components to lock these in and allow for ongoing improvement
	How easily will the public adapt to the desired rate and scale of change	Insignificant risk as there is no change	Moderate risk, mostly associated with universal water metering implementation without a complete set of initiatives supporting culture change	Low risk, mostly associated with universal water metering but mitigated by a complete set of initiatives supporting culture change	High risk, particularly with the introduction of volumetric billing for wastewater simultaneous with water. Rate of change is likely to cause significant backlash from portions of the community
CSF 3 – Cost Saving	CAPEX and OPEX savings over 30yrs	No savings	$34M saving expected.	$40M saving expected	$33M saving expected
CSF 4 - Deliverability	Level of deliverability risk	No risk as there is no change	Moderate risk. Main risk is delivering universal water metering (risks associated with timeframe - including community reaction, quality and cost)	Moderate risk. Main risk is delivering universal water metering (risks associated with timeframe - including community reaction, quality and cost)	Significant risk. Volumetric billing of wastewater is not currently legal. Rate of change would be difficult to manage within current environment. Key additional risks are pressure management, replacement of oversized flow meters and recruitment and management of additional staff.

3.2. Preferred Programme

The preferred option is Op2 – 25% reductions in GPC as this allows a comprehensive reduction in the GPC (reducing water supply availability risk associated with climate change and reducing operational emissions), has the greatest savings (i.e. lowest whole of life cost) and is considered achievable from a NPDC deliverability and community culture change perspective.

4. COMMERICAL CASE

Consideration of the commercial case, i.e. Procurement approach, for the different projects will occur once the preferred option has been confirmed.

5. FINANCIAL CASE

5.1. Implementation Costs

The costs for implementation of the first 10 years of the program are given in Table 5-2.

The following assumptions have been made in determining these initial cost estimates:

- Contingency has been applied as per Table 5-1.
- The costs for metering of extraordinary connections are not included as they are budgeted for separately.
- The approach to complicated properties for universal metering is option 2b – meter per lateral and split equally for grouped properties (refer to Appendix C for details).
- The approach to meter type and reading meters is AMR (refer Appendix B for details).

Table 5-1: Contingency assumptions for the next ten years

Actions considered in the preferred option (Option 2)	Budget Class	Contingency
A1 – Water Conservation Officer	Class 2	0%
A2 – Universal Water Metering	Class 4	30%
A3 - Clean Property Classification and resolve issue with data	Class 5	0%
A4 -Benchmarking Water Consumption	Class 5	0%
A6 - Enforcement Action	Class 5	50%
A7 - Green Plumber	Class 5	0%
A8 - My Council	Class 5	50%
A9 - Incentive Tools	Class 5	50%
A10 - Create Standards for Rainwater Use and Grey Water Re-use	Class 5	50%
A12 - Upgrades to municipal facilities	Class 1	5%
A13- Education/ community engagement programme	Class 5	0%
A14 - General Education and Specific WC Programmes for Organisations	Class 5	0%
A16 - Pressure Management	Class 5	50%

Table 5-1 – LTP Cost estimate

Funding source		21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
OPEX Total		**320,000**	**333,000**	**661,000**	**689,000**	**563,000**	**485,000**	**472,000**	**474,000**	**476,000**	**479,000**
CAPEX	Renewal	2,145,000	2,718,000	468,000	274,000	176,000	158,000	158,000	158,000	158,000	158,000
	LOS		158,000	158,000	158,000	158,000	908,000	158,000	158,000	158,000	158,000
	Growth	4,995,000	5,100,000	665,000	247,000	37,000					
CAPEX Total		**7,140,000**	**7,976,000**	**1,291,000**	**679,000**	**371,000**	**1,066,000**	**316,000**	**316,000**	**316,000**	**316,000**
Action Total		**7,460,000**	**8,309,000**	**1,952,000**	**1,368,000**	**934,000**	**1,551,000**	**788,000**	**790,000**	**792,000**	**795,000**

5.2. Funding Source

The whole programme will require funding in the LTP.

5.3. Funding Drivers

The logic behind the above split between renewal, level of service and growth is detailed below for each project.

- **A2 – Universal Water Metering:**
  - General considerations: Detailed information of the estimated costs for Universal water metering are presented in Appendices B and C. The funding drivers for the project is split between renewal and growth on the following basis.
  - Renewals:
    - **Laterals and Tobys:** Some laterals and tobys will be replaced as part of the project as the existing toby will not accept a meter. Normally, these assets are renewed when the associated water main is renewed or if they fail. The cost for this replacement has been apportioned based on when the associated water main would been renewed if this project had not continued. Tobys should be renewed every 50 years. The average life of the existing tobys is 40 years. Based on this 80% for the cost of installing laterals and tobys is funded by renewals.
    - **Meters**: As described in Appendix C, existing dumb meters will be replaced by AMR meters. Dumb meters should be renewed every 15 years. The average life of the existing meter stock is 6.4 yrs. As such 42.6% of the cost to replace dumb meters is funded by renewals.
    - **Overheads**: The overhead component that is attributed to renewals is 22% based on the overall proportion of the cost attributed to renewals. The overheads include personnel costs associated with the delivery and contingency.
  - Growth funding component: A key driver for this project is to allow for growth and its associated increase in water demand by reducing the amount of water used by the rest of the community. Thus the remaining costs not attributable to renewals is proposed to be funded from growth. This includes the balance of costs from the laterals, tobys and dumb meter replacements, installation of new meters, purchase of software and the applicable component of the overhead. If water conservation was not done an additional $66M of growth projects would need to be added to the Infrastructure Strategy or brought forward including the Eastern, Central and Western feeder duplication, Veale Rd Reservoir, new source for New Plymouth and Onaero and upgrade of the Inglewood WTP.
- **A12 - Upgrades to municipal facilities:**
  - General considerations: The definition of the potential new initiatives that could further reduce water use focused on Municipal Buildings will take place once the programme is approved. It is assumed that the funding drivers of the cost is divided between renewal and level of service equally as most will have some form of renewal component involved and the balance will be covered by LOS as it is neither growth or renewal
- **A16 - Pressure Management:**
  - Pressure Management is a level of service initiative as it cannot be attributed to growth or renewal.

Overall this equates to the following ratios for the program of works

Table 5-3: Funding ratios

FUNDING DRIVER	PERCENTAGE (%)
Renewal	33%
LOS	11%
Growth	56%

5.4. Growth Projects

One of the key drivers for this project is to allow for growth and its associated increase in water demand by reducing the amount of water used by the rest of the community. As such the need for the asset is driven by all forms of growth that will be serviced by any of the four potable water supplies. As such the growth elements of this project apply to the "Water Network – All Networks" catchment.

6. MANAGEMENT CASE

6.1. Programme governance arrangements

- Project Sponsor: David Langford
- Business Owner: Mark Hall
- Project Owner: David Taylor (Initiate, assess and concept stages)
  TBC (Plan, deliver, handover, close stages)

This investment's risk is classified as: **Tier 1 - High risk and complex**

6.2. Benefits Realisation

The following table summarises the benefits to be measured and how it will done.

Benefits	Measurement / KPIs	Timescale	Measured by
Cost reduction, protection and enhancement of the natural environment and the cultural and community value of water and improve the ability to obtain consents	Reduction in the Gross Per Capita Consumption	To be measured annually	Total flow per day measured at the water intake flow meters divided by current population. This action will be taken as part of action A4 - Benchmarking Water Consumption

6.3. Programme Steering Group

- David Taylor
- Graeme Pool
- Henry Classen

6.4. Programme technical team

A WC Technical team is proposed to assist the Programme Manager in different technical issues that may arise. The technical team can vary along time depending on the needs of the programme. The initial proposed technical team includes:

- Graeme Pool: focus on operation (engineering);
- Jim Robinson: focus on operation (field);

- Justin Lundon: focus on metering;
- Denise Rowland: focus on the education programmes;
- Maria Buzzella: focus on the water master plan;
- Engagement Lead: focus on community engagement; and
- Storm Newland: focus on business intelligence.

6.5. Programme manager

Maria Buzzella will act as the program manager initially. This will be reviewed as the projects progress.

The programme manager is responsible for overall coordination of the program. Responsibility for delivery of individual initiatives is given below:

Table 6-1: Programme manager and responsibilities per action

Actions	Responsible
A1 – Water Conservation Officer	Water Conservation officer
A2 – Universal Water Metering	Specific Project Manager
A3 - Clean Property Classification and resolve issue with data	Specific Project Manager
A4 -Benchmarking Water Consumption	Water Conservation Officer
A5 - Enforcement Action	Operations
A6 - My Council	BTG
A9 - Incentive Tools	Water Conservation Officer
A10 - Create Standards for Rainwater Use and Grey Water Re-use	Water Conservation Officer
A12 - Upgrades to municipal facilities	Water Conservation Officer
A13- Education / Community Engagement Programme	Water Education Officer and Engagement Lead
A14 - General Education and Specific WC Programmes for Organizations	Water Education Officer
A16 - Pressure Management	Specific Project Manager

Effective co-ordination of the projects will be required. Also, the programme manager is responsible for the inter-dependencies of projects, and any risks and other issues that may arise.

The programme manager is responsible for the overall integrity and coherence of the programme, and will develop and maintain the programme environment to support each individual project within it.

The programme manager's responsibilities will include:

- Supporting the development of required project documentation for each project.
- Implement programme and project management standards and ensure consistency within the programme.
- Ensure communication and progress reporting to the Governance and Steering Group.
- Manage the programme budget.
- Identify projects which could contribute to the business objectives of the programme
- Guidance in the delivery of projects
- Ensure that any required amendments, re-scoping or re-planning of projects are aligned with the programme.

- Ensure that the delivery of the projects is to the appropriate levels of quality, on time and within budget, in accordance with the programme plan and programme governance arrangements.
- Implement programme reporting arrangements.
- Ensure that there is efficient allocation of common resources and skills within the projects.
- Manage third party contributions to the programme.
- Develop, update and monitor the programme plan.
- Programme risk management
- Support project closures and include outputs into the programme.
- Programme communication to stakeholders coordinated with project levels.

6.6. Project managers

Some projects will require specific project managers. These projects are:

- A1 – Municipal buildings projects
- A2 – Universal Water Metering
- A3 - Metering Restricted Demand Customers
- A10 - Create Standards for Rainwater Use and Grey Water Re-use
- A8 - My Council
- A9 - Incentive Tools
- A13 - Pressure Management

Small projects, could be managed directly by the programme manager. Project managers will be responsible for:

- Supporting the development of the required project documentation for each project.
- Implementing project management standards and programme standards.
- Ensuring communication and reporting progress to the Programme manager.
- Managing the project budget.
- Delivery of projects
- Ensuring that the delivery of the projects is to the appropriate levels of quality, on time and within budget.
- Development, update and monitoring of the project plan.
- Project risk management
- Project closures and communications of outputs.
- Project communication to stakeholders.
- Managing the resources assigned to the project.

6.7. Programme organization structure

The following organisation structure is proposed:

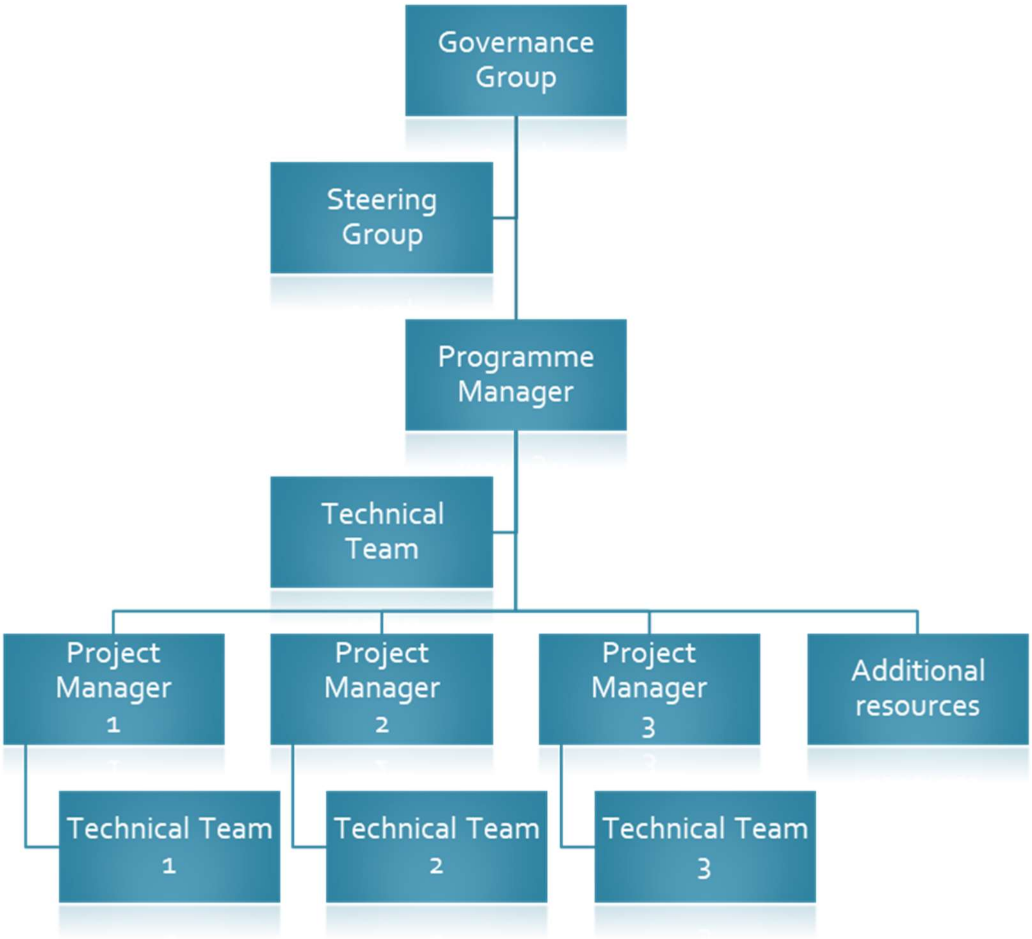


Figure 6-1 – Programme organization structure

6.8. High Level Timeline

The key aspects of the project plan are presented in the high level timeline in Figure 6-2. The driver for beginning immediately is to enable the deferral of upgrades to the central and eastern feeders which are currently operating at or near capacity.

Actions	2020/21	2021/22	2022-23	2023/24	2024/25	2026/27	2027/28	2028/29	2029/30	2030/31
Programme Start-up	■	■								
A1 – Water Conservation Officer	■	■	■	■	■	■	■	■	■	■
WC Officer - Contract process	■									
WC Officer - Implementation		■	■	■	■	■	■	■	■	■
A2 – Universal Water Metering	■	■	■	■	■	■	■	■	■	■
Options assessment (metering type and complex properties)	■									
Install meters		■	■							
Mock invoicing				■						
Creation of supporting processes and documentation (Tariff Structure, reading and invoicing frequency, others)		■	■	■						
Volumetric charging					■	■	■	■	■	■
A3 - Clean Property Classification and resolve issue with data		■	■	■						
Contract Process (FTE)		■								
Clean Property Classification and resolve issue with data		■	■	■						
A4 -Benchmarking Water Consumption		■	■							
Contract Process (FTE)		■								
Benchmarking Water Consumption			■							
A6 - Enforcement Action		■	■	■	■	■	■	■	■	■
Contract Process (FTE)		■								
Enforcement Action		■	■	■	■	■	■	■	■	■
A7 - Green Plumber			■	■	■	■	■	■		
Planning			■							
Implementation				■	■	■	■	■		
A8 - My Council				■	■					
Planning				■						
Implementation					■					
A9 - Incentive Tools				■	■	■	■	■	■	■
Planning				■						
Implementation					■	■	■	■	■	■
A10 - Create Standards for Rainwater Use and Grey Water Re-use		■	■							
Planning		■								
Implementation			■							
A12 - Upgrades to municipal facilities		■	■	■	■	■	■	■	■	■
Business Case		■	■	■	■	■	■	■	■	■
Implementation		■	■	■	■	■	■	■	■	■
A13- Education / community engagement programme		■	■	■	■	■	■	■	■	■
Contract Process (FTE)		■								
Eductation rogramme implementation			■	■	■	■	■	■	■	■
A14 - General Education and Specific WC Programmes for Organisations				■	■	■	■	■	■	■
Contract Process (FTE)				■						
Benchmarking Water Consumption					■	■	■	■	■	■
A16 - Pressure Management				■	■					
Planning				■						
Implementation					■					

Figure 6-2 – Programme high level timeline

More detailed programs for some projects will required. These are likely to be:

- A1 – Municipal buildings projects
- A2 – Universal Water Metering
- A3 - Metering Restricted Demand Customers
- A10 - Create Standards for Rainwater Use and Grey Water Re-use
- A8 - My Council
- A9 - Incentive Tools
- A13 - Pressure Management

6.9. Risk management

The Programme Manager will also be responsible for ensuring that arrangements for the management of risk are in place, together with the appointment of a risk manager. The risk register is intended to be continuously updated and reviewed throughout the course of the project.

The main risk of the programme is not achieving the targeted % of reduction in the GPC. The success or failure of the programme, and in consequence the degree of reduction, depends on the actions implemented and community buy-in. As shown in Section 3.3.2, overall financial risks associated with the implementation of the programme are few. However, the Water Conservation Officer will be responsible for tracking risks and establishing mitigation measures.

As regards the meter type and complicated properties associated to A2 - Universal Water Metering, the specific risks have been also considered in the Appendices B and C respectively.

The following risks, constraints and dependencies have been identified for the proposed option.

Risk and Consequence Description	Source of risk	Consequence	Likelihood	Mitigation strategy
The success or failure of the programme depends on culture change and community engagement with temporary impact on long-term levels of service, with limited community interest and media attention.	Planning and strategy	Minor	Possible	Need to engage the community and this means, iwi and hapū, industries, commerce, residential and municipal users. In this manner, the educational and communication component of the program should be strong enough to account for all the demands on these areas.
National water reform agenda is proposing that the provision of water services will be handed over to a new inter-regional delivery organisation during the project period. This could lead to Major disruption to the organisation resulting in failure of the project.	People and Knowledge	Major	Possible	Monitor water reform progress and delay project if necessary. If looking likely establish reading and billing processes on a platform for which they will be easier to hand over.
TechOne finance replacement planned shortly before UWM implementation. If the roll out has issues this will lead to a poor customer experience and potentially some impact on public confidence reflected on local media.	Governance	Moderate	Moderate	Consider separate dedicated water billing system.
The project will require a large amount of change to internal processes, procedures and roles that if not planned for appropriately could lead to moderate disruption to the organisation or project resulting in reduced performance.	People and knowledge	Moderate	Possible	Scope and plan in advance the need resources. Resources have to be funded and locked in.
Legal challenge to approach with complex properties that may lead some impact on public confidence.	Legislative compliance	Moderate	Unlikely	Understand cost impacts of other methods of charging complex properties

6.10. Health & Safety Overview

Highlight any key H&S risks that the implementation of the project will expose people to. Based on NPDC – Our Critical Risks Framework (see below).

- ☐ **Vehicle Movements**
- ☐ **Personnel Security**
- ☐ Confined Space Entry
- ☐ Working in/on/over water
- ☐ Working at height
- ☐ **Excavation**
- ☐ **Public Health**
- ☐ Forestry Operations
- ☐ Fire and Explosion
- ☐ Structural Collapse
- ☐ **Working with electricity** (residual current from incorrect earthing)
- ☐ Toxic Release

7. Appendix

Appendix A – Implementation Cost Summary

Appendix B – Universal Water Metering – Meter Type Options Assessment

Appendix C – Complicated Properties Options Assessment

Appendix D – 30y Whole Life Costs assumptions (most likely scenario)

Appendix E – Water Conservation Consultation Document

Appendix A – Implementation Cost Summary

Action	Funding source		21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
A1 – Water Conservation Officer	**OPEX Total**		**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total		**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**
A2 – Universal Water Metering	**OPEX Total**				**173,000**	**153,000**	**155,000**	**157,000**	**159,000**	**161,000**	**163,000**	**166,000**
	CAPEX	Renewal	2,145,000	2,560,000	310,000	116,000	18,000					
		LOS										
		Growth	4,995,000	5,100,000	665,000	247,000	37,000					
	CAPEX Total		**7,140,000**	**7,660,000**	**975,000**	**363,000**	**55,000**					
	Action Total		**7,140,000**	**7,660,000**	**1,148,000**	**516,000**	**210,000**	**157,000**	**159,000**	**161,000**	**163,000**	**166,000**
A3 - Clean Property Classification and resolve issue with data	**OPEX Total**		**120,000**	**120,000**	**120,000**							
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total		**120,000**	**120,000**	**120,000**							
A4 -Benchmarking Water Consumption	**OPEX Total**		**40,000**									
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total		**40,000**									
A6 - Enforcement Action	**OPEX Total**				**15,000**	**15,000**	**15,000**	**15,000**				
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total				**15,000**	**15,000**	**15,000**	**15,000**				
A7 - Green Plumber	**OPEX Total**				**80,000**	**80,000**	**80,000**					
	CAPEX	Renewal										
		LOS										
		Growth										

Action	Funding source		21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
	CAPEX Total											
	Action Total				**80,000**	**80,000**	**80,000**					
A8 - My Council	**OPEX Total**					**128,000**						
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total					**128,000**						
A9 - Incentive Tools	**OPEX Total**				**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total				**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**	**113,000**
A10 - Create Standards for Rainwater Use and Grey Water Re-use	**OPEX Total**			**53,000**								
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total			**53,000**								
A12 - Upgrades to municipal facilities	**OPEX Total**											
	CAPEX	Renewal		158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000
		LOS		158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000	158,000
		Growth										
	CAPEX Total											
	Action Total			**316,000**	**316,000**	**316,000**	**316,000**	**316,000**	**316,000**	**316,000**	**316,000**	**316,000**
A13- Education/ community engagement programme	**OPEX Total**		**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**
	CAPEX	Renewal										
		LOS										
		Growth										
	CAPEX Total											
	Action Total		**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**	**80,000**
A14 - General Education and Specific WC Programmes for Organisations	**OPEX Total**					**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**
	CAPEX	Renewal										
		LOS										
		Growth										

Action	Funding source		21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
	CAPEX Total											
	Action Total					**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**
A16 - Pressure Management	**OPEX Total**											
	CAPEX	Renewal										
		LOS						750,000				
		Growth										
	CAPEX Total							**750,000**				
	Action Total							**750,000**				

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

WA2019 – Universal Water Metering

Options Analysis - Water Meter Type

PROJECT PHASE - PLANNING
September 2020

ECM# 8413812

Document control

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Reviewers

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Glossary

Term	Meaning
3GPP	3rd Generation Partnership Project The 3rd Generation Partnership Project (3GPP) unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), and provides their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.
620MC	The model name of a mechanical water, in manifold format, manufactured by Sensus. Classed as a “manual meter” as it can only be read manually.
640MC	The model name of a mechanical water, in manifold format, with integrated radio; it is manufactured by Sensus. Classed as a “Smart meter”, it has an integrated radio that transmits telemetry for pick up by a drive-by receiver.
AMI	Advanced Metering Infrastructure Infrastructure that facilitates the collection of meter telemetry (eg. readings, alerts, warnings), over the air, into a cloud data repository without any human involvement (ie. machine-to-machine communication).
AMR	Automated Meter Reading Automated Meter Reading (AMR) is a term to describe the automatic collection of: consumption, diagnostic and status data from water meters and the transmission of that data to a central database for billing, analysis and network management.
Cat-M1	Alternative name for LTE-M
Complicated properties	Complicated properties are defined as those properties where: • There is no single Council water supply point per property. Instead, like other parts of the property (eg. shared driveways), the water supply point is shared with neighbours. • The Council does not own, or have legal access to, the connecting pipe from the Council water supply point to each property.
Manual meter	A simple meter that is “manual” in the sense that is not able to process data. Readings are the only metric available and must be collected manually.
IoT	Internet of Things The Internet of things describes the network of physical objects—“things”—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet
LPWAN	Low Powered Wide Are Network Low Power Wide Area (LPWA) technology refers to a class of wireless technologies that are well suited to the specific needs of machine-to-machine (M2M) and IoT devices.
LTE-M	Long Term Evolution for Machines The simplified industry term for the LTE-MTC low power wide area (LPWA) technology standard published by 3GPP in the Release 13 specification. Also known as Cat-M1.
NB-IoT	Narrow Band – Internet of Things Narrowband Internet of Things is a Low Power Wide Area Network radio technology standard developed by 3GPP to enable a wide range of cellular devices and services.
NPV	Net Present Value The sum of future cashflows discounted back to a given date at a specified discount rate.
PCC	Per capita consumption
Smart meter	Contains an integrated radio that transmits meter telemetry.
UWM	Universal Water Metering
WOL	Whole of Life The period to which a financial analysis pertains.

Table of Contents

1. EXECUTIVE SUMMARY

This document considers the options for meter type as part of the Universal Water Metering Project and recommends using an AMR meter. AMR meters are meters that can be read automatically from a passing vehicle.

Four meter options were considered, AMI, AMR, clip on AMR and manual meter. This was reduced to a short list of AMI and manual meters as: no AMI meters can be found that fit into a manifold and the technology is relatively immature in New Zealand and clip-on AMR meters have a higher cost and no advantages over a AMR meter.

Of the short list, AMR meters are recomeded due to the following:

- Minimal difference in whole of life cost($14,477,000 for manual meters vs $15,131,000 for AMI meters)
- Highest weighted score based on a benefits analysis over a range of key factors
- Safer method of collecting readings.
- Speed, ease and accuracy of collecting the readings. The experience of other councils show that drive-by readings could be competed in 1/20th the time taken for manual readings (based on the quarterly reading round of 2,400 taking around 200 person-hours).
- A better customer experience through correct bills delivered first time every time and more quickly than is currently possible
- Reduced pressure on Retic and Finance teams as a result of:
    - Accuracy of AMR - removes human error in readings which take significant time and effort to correct
    - Ability to work with incorrect or incomplete asset data. The quality of our asset data means that sometimes the locations of meters are not recorded correctly making it difficult for manual readers to find the meter. AMR will collect the readings within a 500m range reducing the need for spatial accuracy.
- Network status – insights to the network status through alerts (eg. leaks, backflow, pipe burst)
- Ability to extract usage data for analysis
- Accessibility - meters installed on private property can usually be read from the road without having to access the private property.

2. Universal Water Meter Type

Introduction

This document provides detail to the Universal Water Metering (UWM) component of the Water Conservation business case[1] - specifically, an options analysis of water meter type to be used for universal installation.

This document should also be read in conjunction with a second UWM options analysis that deals with the approach taken for complicated properties[2].

Background

The main objective of the Water Conservation programme is to reduce gross per capita water consumption in the district.

In order to reduce consumption, a range of options have been developed that consider various measures (eg. pressure reduction, increased leak detection, UWM, education) and the degree to which they deliver reduced consumption (minimum -20%, intermediate -25% or ambitious -30%).

UWM is acknowledged as the most effective measure for reducing per capita consumption (PCC) and is included in each of the three options being proposed in the Water Conservation programme.

3. Options Analysis

The options for the type of water meter, to be implemented in UWM, are analysed sections below.

Meter Installation method

Two alternate meter installation formats were considered - inline and manifold. A meeting of the UWM Project Board held on 15th October 2020[3] decided that the manifold format for meters was to preferred over in-line meters as a result of the number of manifolds that have already been installed in the reticulation network and the significant investment that it represents.

There is a loose association between the installation format and options of meter type because the preferred installation method limits the choices of options for the meter type.

Options Long List

The long list of options was drawn from a range of metering hardware and reading options, as informed by a water metering pilot and proof of concept testing[4].

---

[1] See *Outline Business Case – Water Conservation Plan* (ECM# 8413816)

[2] See *Options Analysis – Complicated Properties* (ECM# 8422242)

[3] Refer to ECM# 8441624 for details

[4] See *UWM_WaterMeteringProject_AMR_Report* (ECM# 8276307) and *Water Metering – Usage Case Studies* (ECM# 8276304)

Option	Meter type	Reading method
1. Manual meter	Mechanical meter (manual)	Manual
2. Manual meter + smart clip-on	Mechanical meter (manual) + clip on (smart)	Drive by AMR
3. AMR meter	Mechanical meter (smart)	Drive by AMR
4. AMI meter	Smart meter	AMI, direct to cloud

Table 1: options long list

Options Long List - Review

The outcomes of the research and a metering pilot demonstrated that two options were unlikely to deliver on the investment objectives, nor deliver sufficient benefits to warrant inclusion in the short list of options:

- Option 2: manual meter + smart clip-on[5]
  Manual meter with a smart clip on will cost more than a straight AMR meter but with no benefits and reduced accuracy.
- Option 4: AMI
  At the time of the pilot (Jun2019-Dec2019) no suitable AMI solutions were available, due to:
    - No AMI meters were available that were certified for use in New Zealand
    - Spark and Vodafone's rollout of licensed networks (NB-IoT, LTE-M) was underway
    - Uncertainty over which LPWAN protocol would "win" the market

  Since the pilot ended two AMI solutions have become available, however these still have significant issues, including:
    - All meters are in an inline format (rather than manifold) so will not fit into existing manifolds, resulting in significant additional cost
    - Some vendors are small and new to the market with no proven track record
    - None of the options have any track record in New Zealand.

  To consider these options further would require a delay to producing the business case and a delay to the meter roll out. A meeting with the UWM Project Board was held on 15th October 2020 where it was decided that due to the above factors AMI meters would not be considered further[6].

  Note: There is an example of the Technology Purchasing Paradox whereby: *as you wait to purchase technology, more advanced technology is being developed which makes you wait to purchase, while yet more advanced technology is still being developed, ...* and so on. Only the solutions that are available can be assessed at the time a decision is required.

Options Short list

The removal of the manual meter + smart clip-on and AMI options creates a short list of two options:

- Option 1: manual meter
- Option 3: AMR meter.

[5] Refer to the AMR pilot's review and findings (ECM# 8276307)
[6] Refer to ECM# 8441624 for details

Economic Appraisal

The key assumptions made in the whole of life cost analysis, include:

- Manual meter life expectancy is 15 years, as stated by the manufacturer
- AMR meter life expectancy is 15 years, as stated by the manufacturer
- All general recharge costs (enterprise software licenses, utilities, payroll, building) have been excluded
- Financial inputs

Financial Input	Value
Cost of funds	6%
CPI	0%
Staff rate/hour	$75
Manual meter unit cost	$85
AMR meter unit cost – bulk purchase	$175
WOL costing duration	30 years

Table 2: default financial inputs

The table below provides the results of a detailed Net Present Value analysis[7] of the short list of options on a TOTEX basis.

	1. Manual Meter	3. AMR Meter
CAPEX	9,584,000	13,412,000
OPEX	4,893,000	1,719,000
TOTEX	**$14,477,000**	**$15,131,000**

Table 3: NPV analysis of the short listed options

The analysis shows that both options have a similar NPV, over 30 years; with **Option 1. Manual Meter** providing a slightly better economic whole-of-life cost. See Appendix A for the inputs used to derive the NPVs.

Benefits Analysis

A benefits analysis demonstrates the relative strengths and weaknesses of the options being considered. The analysis is based on the following factors:

- Whole of Life cost estimates
- Reading – speed, ease and safety of collecting the reading data
- Health and Safety – how well do the options support a healthy and safe work environment?
- Alerts and diagnostics – capabilities to provide usage alerts (leak, tamper, pipe burst, backflow) and diagnostics (eg. data logging)
- Accuracy – how accurate are the readings that are taken?
- Operational – time and effort required to process and bill the readings
- Meter life – what is the expected life of the meter?
- Maturity – how widely installed and well developed is the option?
- Demand Management – the degree to which the option supports the water conservation objectives.

[7] See UWM_TOTEX_metering.xls (ECM# 8369059)

Factor	Options - Strengths and Weaknesses	
	1. Manual Meter	**3. AMR Meter**
Cost Estimate[8]	**$14.5M**	**$15.1M**
Reading	• Manual reading takes a significant amount of time, as meter readers have to sight each meter and record the reading. For example, the quarterly reading round (~2,400 meters) takes around two weeks to read.	• Automated meter reading is considerably faster than reading meters manually. For example, Marlborough District Council takes 18 minutes to read 900 meters • Meter reading distance is 500m. Meter readers do not need to know the exact location of any meter • Meters can still be read manually • Minimal knowledge and skills required to collect readings.
Health and Safety	• Health & Safety issues exist around meter reading, especially for meters in rural areas with limited or no parking in high speed environments • Need to enter private property to read some meters.	• Readings can be taken from inside a vehicle, significantly reducing Health & Safety risks • Readings can be taken day or night and in any weather – and with no human interaction • Do not need to enter private property to read meters.
Alerts & Diagnostics	No alerts or diagnostics available.	• Network status – can provide alerts and warnings: leak, backflow, burst pipe, tamper, low battery, min/max/peak flow data, time of min/max/peak flow data • Operators can download water usage data for further analysis and troubleshooting.
Accuracy	Prone to misreads from obscured registers (eg. condensation, inundation, degraded face plate, poor light, vandalism) or human error (eg. misreading the register, “fat fingers”, typo).	Completely accurate as readings are collected electronically without need to sight the register.
Operational (processing & billing)	• Current cost per reading is $2.32/meter • All reading rounds need to be completed before the Finance Team can start the billing process • Reading errors (eg. misreads, fat fingers, wrong meter) make it necessary for meters to be read again or may lead to customers querying their bills.	• Potential for significant savings given the reduced effort required to collect mass readings • Operational costs (eg. reading and processing) are substantially lower because of the reading accuracy.

[8] Based on 30year NPV whole of life cost

	Manual Meter	AMR Meter
Meter life	• 15-20yrs • The actual life of installed meters often exceeds the expected life.	• 15yr battery life, as claimed by the manufacturer • The life of the battery is very dependent on the reading frequency and the number times data is extracted • The whole meter must be replaced when battery has expired.
Maturity	Widely used by NPDC, other councils across New Zealand and internationally.	• Currently the default residential meter for NPDC installations • Widely used by councils across New Zealand and internationally.
Demand Management	Good support for demand management objectives.	Very good support for demand management objectives – enhanced by alert and diagnostic capabilities.

Table 4: benefits analysis

Weighted Scores

The individual factors were assigned relative scores and weights based on a qualitative assessment. The settings and results are set out in the table below.

Factor	Factor Score		Factor Weighting	Weighted Score	
	1. Manual	3. AMR		1. Manual	3. AMR
Whole of Life Cost	10	9	25%	2.5	2.3
Reading	5	9	15%	0.8	1.4
Health and Safety	4	7	15%	0.6	1.1
Alerts & Diagnostics	2	7	7%	0.1	0.5
Accuracy	7	10	13%	0.9	1.3
Operational (processing, billing)	7	9	10%	0.7	0.9
Meter life	8	5	5%	0.4	0.3
Maturity	10	7	5%	0.5	0.4
Demand Management	8	9	5%	0.4	0.4
			Total	6.9	8.4

Table 5: weighted scores for benefits

Figure 1, below, depicts the scores for the respective benefits of each option. Note: the higher the score the more positive the benefit is considered; a score of 0 is the least positive.

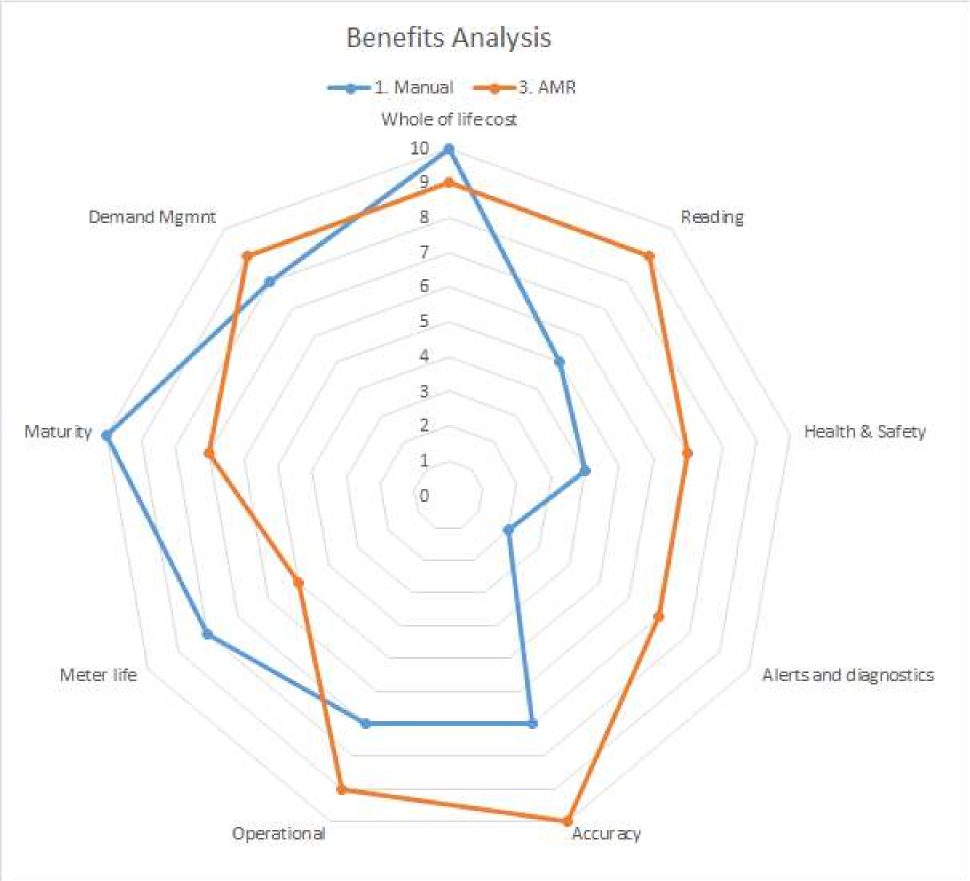

Figure 1: weighted scores for benefit factors

The analysis shows that **Option 3 AMR Meter** has a stronger weighted combination of benefits.

Interconnection with approach to complicated properties

Complicated properties are defined as those properties where:

- There is no single Council water supply point per property. Instead, like other parts of the property (eg. shared driveways), the water supply point is shared with neighbours
- The Council does not own, or have legal access to, the connecting pipe from the Council water supply point to each property.

The meter type chosen for UWM has a loose connection with the approach chosen for complicated properties[9]. This is because the AMR meter type has an expected reading range of 500m, therefore most complicated properties will be able to be read from the street without having to access the property.

[9] See *Options Analysis - Complicated Properties* (ECM# 8422242).

Complicated Property Option	Manual meter	AMR meter
3a. **Meter per lateral and split equally for grouped properties:** install one meter per lateral. Split the bill equally between grouped properties. If overly complex then install the meter at the boundary and split to all dwellings equally.		
3b. **Meter per lateral and – ask whether to split bill equally for grouped properties:** install one meter per lateral then ask all dwellings that share a lateral whether they are all willing to pay for their own plumbing work to connect to the council provided meter. If not then they all billed on an equal split of the cost. This is the same as Option 3a but grouped properties are asked about splitting the bill equally.	Access to private property required to read the some meters.	Meters can be read without having to access the private property.
4. **AMR meters to each unit/flat** Install individual AMR meters to each separate dwelling.		

Table 6: metering options for complicated properties

Preferred option

The preferred option is for the ***AMR Meter*** for the following reasons:

- Minimal difference in whole of life cost($14,477,000 for manual meters vs $15,131,000 for AMI meters)
- Highest weighted score based on a benefits analysis over a range of key factors
- Safer method of collecting readings.
- Speed, ease and accuracy of collecting the readings. The experience of other councils show that drive-by readings could be competed in 1/20th the time taken for manual readings (based on the quarterly reading round of 2,400 taking around 200 person-hours).
- A better customer experience through correct bills delivered first time every time and more quickly than is currently possible
- Reduced pressure on Retic and Finance teams as a result of:
  - Accuracy of AMR - removes human error in readings which take significant time and effort to correct
  - Ability to work with incorrect or incomplete asset data. The quality of our asset data means that sometimes the locations of meters are not recorded correctly making it difficult for manual readers to find the meter. AMR will collect the readings within a 500m range reducing the need for spatial accuracy.
- Network status – insights to the network status through alerts (eg. leaks, backflow, pipe burst)
- Ability to extract usage data for analysis
- Accessibility - meters installed on private property can usually be read from the road without having to access the private property.

4. Recommendation

The **AMR meter** type is recommended for universal water metering.

5. APPENDICES

Appendix A – Inputs to whole of life cost modelling

The inputs to the whole of life costing[10] are set out below.

Financial	
T0	30/06/2021
Cost of funds	6%
Staff rate/hr	$80
Use NPV	2
CPI	0.0%
Use CPI	2
Duration	30.0
Meter Cost	
620MC	$75
Choose AMR	3
Meters	
Number of connections	27,803
Existing meters (620MCs)	7,912
Existing billable	2,467
Existing unbilled	1,098
New meters to be installed	19,891
Number growth rate pa	0.75%
Installation period (yrs)	2
Reading Costs	
Prior to mock reading - factor	0
Manual Mly	$5.90
Manual Qly	$2.37
Manual Adhoc	$10
Manual volume discount	60.0%
AMR Mly	$2.67
AMR Qly fraction	15.0%
AMR Qly	$0.36
Manual Adhoc	$10
Processing hours/meter	
Sep19 billing count	2,677
Retic - Manual Qly (hrs)	10

[10] Source: UWM_TOTEX_metering.xls (ECM# 8369059)

Finance - Manual Qly (hrs)	32
AMR Qly fraction	15.0%
Retic - AMR Qly (hrs)	1.50
Finance - AMR Qly (hrs)	4.80
Processing costs (annual)	
% of physical delivery	66.0%
Paper, envelopes	$0.06
Printing	$0.05
Postage	$0.75
Replacement Costs	
620MC - Install	$28.43
640MC - Install	$28.43
640MC - Configure	$2.08
Hardware/Software	
Tablet	$1,488.05
Annual License	$2,304.00
Initial Purchase	$15,075
Installation	
Transition period	2
Number of properties	30,810
Number of connections	
CP type 0	158
CP type 1	22,421
CP type 2a	210
CP type 2b	260
CP type 2c	162
CP type 3	2,694
CP type 4	1,102
CP type 5	1,029
CP type 9	1,317
CP type 100	1,457
	30,810
Manifold boxes - UWM	
Required rate	100%
Required number	19,891
% - hard surrounds	10%
% - medium surrounds	15%
% - soft surrounds	75%
Cost - hard surrounds	$564
Cost - medium surrounds	$464
Cost - soft surrounds	$387
Weighted Average cost	$415.94
Renewal - other	$387

	Renewal - Standard	$387
	Renewal - Metered	$0
	Renewal - Manifold	$47
	Renewals factor	-1
Extraordinary connections programme		
	Annual budget (to 30Jun2022)	$500,000
	Use	$200,000.00
	Number of properties	1,815
	Which to include in project	1
	% of residential	40%
Ratepayer new installation		
	Manifold boxes cost	$0
	620MC	$0
	640MC	$0
	Installation	$0
	Configure	$0
Personnel		Rate
	UWM Project Manager	$200
	Technology and data lead	$125
	Data validator	$23
	Physical infrastructure lead	$100
	Billing lead	$100
	Community engagement and Comms lead	$75
		Utilisation
		100%
		100%
		100%
		100%
		50%
		20%
CP processing costs		
3b	CP option	5
	Number of installations	771
	CPs excluded from implementation	4,476
	Total cost	$869,133
1	Number of CPs	5,247
	CPs excluded from implementation	5,247
	Number of installations	0
	Cost per dwelling	$0
	Total Cost	$0
2a	Number of CPs	5,247
	Average # of CPs per lateral	3.1

	Number of boundary points	1,693
	CPs excluded from implementation	3,554
	Cost per dwelling	$0
	Total Cost	$0
2b	Number of CPs	5,247
	Average CPs per lateral	3.10
	Number of boundary points	1,693
	% willing to connect to meter	25.0%
	Props willing to connect to meter	1,312
	Meters not willing to connect	3,935
	CPs excluded from implementation	3,935
	Cost per dwelling	$3,000
	Total Cost	$3,936,000
3a	Number of CPs	5,247
	Average # CPs per boundary	3.10
	# boundary points	1,693
	CPs excluded from implementation	3,554
	Cost per dwelling	$0
	Total Cost	$0
3b	Number of CPs	5,247
	Average # CPs per boundary	3.10
	# boundary points	1,693
	# laterals per boundary	1.7
	# laterals	2,878
	Percentage of laterals that are 1:1	26.8%
	# SUIPS that are 1:1	771
	# SUIPS that are to split bill equally	4,476
	CPs excluded from implementation	4,476
	Standard cost per installation	$564
	Installation difficulty scalar	200.0%
	Additional cost per installation	$1,127
	Total Cost	$869,133
3c	Number of CPs	5,247
	Average # CPs per boundary	3.10
	# boundary points	1,693
	# laterals per boundary	3
	# laterals	5,079
	Percentage of laterals that are 1:1	70.0%
	# SUIPS that are 1:1	3,555
	# SUIPs that are grouped	1,692
	% of grouped not willing to share	10.0%
	# not willing split (ie connect to meter)	169
	Meters splitting the bill	1,523
	CPs excluded from implementation	1,523
	Standard cost per installation	$564
	Installation difficulty scalar 1:1	100.0%
	Additional cost per 1:1	$564
	Installation difficulty scalar grouped	150.0%
	Additional cost per grouped	$845.46

	Total Cost	$2,146,623
4	Number of dwellings	5,247
	Private laterals	0
	CPs excluded from implementation	5,247
	Cost per dwelling	$3,000
	Total Cost	$15,741,000
5	Number of dwellings	5,247
	CPs excluded from implementation	0
	Cost per dwelling	$6,000
	Total Cost	$31,482,000
6	Number of dwellings	0
	CPs excluded from implementation	0
	Cost per dwelling	$0
	Total Cost	$0

Table 7: data inputs to the whole of life cost modelling

Appendix B – Modelling assumptions

<u>Manifolds extraordinary connections</u>

The Extraordinary Connections project involved the installation of: manifold boxes, manifolds, backflows and meters to all commercial/industrial and residential properties with pools that did not already have a backflow and meter. There were 1815 installations (40% = 726 were residential) to be carried out over four years. Funding of $500K had been allocated for each of the four years.

Therefore there was funding of $800K (=40% of $500k over 4 years) associated with residential installations. This amount was spread over the first two years of the modelling (01Jul2020 – 30June2022) as a credit against project costs.

<u>Mains Renewals</u>

The laterals associated with mains renewals were extracted using a GIS analysis of data from Tech1 EAM.

Renewal	**Lateral Type**				
Year	Other	Standard	Metered	Manifold	**Total**
2021	9	2,372	414	8	2,803
2022	7	1,165	228	5	1,405
2023	5	492	92	2	591
2024	1	340	54	2	397
2025	2	342	78	2	424
2026	1	263	37		301
2027	1	358	56		415
2028	2	327	48	2	379
2029	3	294	49	1	347
2030	1	266	42	2	311
2031	0	453	75	2	530
2032	4	307	47		358
2033	5	379	57		441
2034	1	412	51	1	465
2035	6	415	68		489
2036	4	383	70	1	458
2037	3	279	49	4	335
2038	1	310	69	2	382
2039	2	283	39		324
2040	5	192	29		226
2041	0	247	33	1	281
2042	4	331	48		383
2043	1	309	34	1	345
2044	0	222	32	1	255
2045	0	100	12	2	114
2046	1	108	18	3	130
2047	0	80	12		92
2048	0	61	8		69
2049	1	49	6		56
2050	0	92	13		105
Grand Total	**70**	**11,231**	**1,868**	**42**	**13,211**

Table 8: timing of mains renewals

These renewals, over 30 years, were condensed to two years. Costs were then associated with each of the four lateral types

Renewal Year	Lateral Type				Total
	Other	Standard	Metered	Manifold	
2021-2035	48	8,185	1,396	27	9,656
2036-2050	22	3,046	472	15	3,555
Grand Total	**70**	**11,231**	**1,868**	**42**	**13,211**

Table 9: mains renewals grouped by type and time bucket

Appendix C – Properties

An extract from EAM shows the number of meters. Filtered on:

- Remove meter_status=removed, Split off
- property_status (multiple items) = Current, Future, (blank)
- account_status (multiple items) = Active, (blank)
- meter_status (multiple items) = Active, (blank)

Connection	By Pass	Industrial	Ingle Supp	Lepperton	Month MetSp	Motunui	NP-BB	NP-NC	Oakura	Okato	Urenui	Wait Brix	(blank)	Total
NO connection														
(blank)													4,347	**4,347**
Connected														
ComIndust	23	3	71	3	6		1,054	47	14	14	10	100		**1,345**
FarmLand	1		25	3	1	18	70	2	9	24	14	75		**242**
Res	6		70	3		12	250	998	20	12	21	114		**1,506**
SmalHoldg	1		33			3	96	11	7	2	15	42		**210**
WatBillAcc	18	1	8		3		109		5	2	5	25		**176**
(blank)				1	1		35	40	3	1	2	3		**86**
Total	**49**	**4**	**207**	**10**	**11**	**33**	**1,614**	**1,098**	**58**	**55**	**67**	**359**	**4,347**	**7,912**

Table 10: number of properties grouped by type and tarrif

Aggregate tariffs up to NO/has tariff

- property_status = Current, Future, (blank)
- account_status = Active, (blank)
- meter_status = Active, (blank)

Connection	NO tariff	HasTariff	Total
NO connection			
(blank)	4,347		4,347
Connected			
ComIndust		1,345	1,345
FarmLand		242	242
Res		1,506	1,506
SmalHoldg		210	210
WatBillAcc		176	176
(blank)		86	86
Total	4,347	3,565	7,912

Table 11: number connetction types and whether billed

Properties with meters: 7,912
New meters required: 21,256

Installed but no connection details: 4,347
Have connection details: 3,565

- Non billable tariff (NP-NC): 1,098
- Billable tariff (NP-BB): 2,467

CT	Original State	Forecast	Excluded	Included	%
0	3,975	158	158		
1	18,898	22,421		22,421	76.9
2	1	1	1		
2a	1,309	209		209	0.7
2b	373	260		260	0.9
2c	64	162		162	0.6
3	2,310	2,694		2,694	9.2
4	1,095	1,102		1,102	3.8
5	11	1,029		1,029	3.3
9	1,317	1,317	1,317		
100-0	1	1	1		
100-100	8	8	8		
100-101	1	1	1		
100-110	156	156	156		
100-111	1,291	1,291		1,291	4.4
Total	30,810	30,810	1,642	29,168	100.0
			30,810		

Table 12: forecasted number of complication types

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

WA2019 – Universal Water Metering

Options Analysis – Complicated Properties

PROJECT PHASE - PLANNING
September 2020

Document control

Version	Author	Date	Change
A	J Lundon	02 Sep 2020	Initial draft ECM# 8413812
B	J Lundon	01 Nov2020	Incorporate feedback from DT
C	J Lundon	21 Nov 2020	Incorporate feedback from DL
0			
1			
2			
3			
4			

Reviewers

Name	Role & Business Area	Version	Date
Mark Hall	Project Business Owner		
David Langford	Project Owner		
Paul Lamb	Business Partner [Financial Case Review]		
Richard Gater	Procurement Lead		
Rowan Betts	Risks Lead		

Approver

Name	Role & Business Area	Version	Date
David Langford	Project Sponsor		

Endorsement

Role	Minutes of Meeting Reference	Version	Date
Executive Leadership Team			

Distribution

Name	Role & Business Area	Version	Date

Glossary

Term	Meaning
620MC	The model name of a mechanical water meter, in manifold format, manufactured by Sensus. Classed as a “dumb meter” as can only be read manually.
640MC	The model name of a mechanical water meter, in manifold format, with integrated radio. It is manufactured by Sensus. Classed as a “Smart meter”, it has an integrated radio that transmits telemetry for pick up by a drive-by receiver.
AMR	Automated Meter Reading Automated Meter Reading (AMR) is a term to describe the automatic collection of: consumption, diagnostic and status data from water meters and the transmission of that data to a central database for billing, analysis and network management.
Complicated properties	Complicated properties are defined as those properties where: • There is no single Council water supply point per SUIP (Separately used or inhabited part of a rating unit). Instead, like other parts of the property (eg. shared driveways), the water supply point is shared between neighbours. • The Council does not own, or have legal access to, the connecting pipe from the Council water supply point to each SUIP.
Dumb meter	A simple meter that is “dumb” in the sense that is not able to process data. Readings are the only metric available and must be collected manually
NPV	Net Present Value The sum of future cashflows discounted back to a given date at a specified discount rate.
PCC	Per capita consumption
Point of supply	Point of supply, in relation to the supply of water, means the point on the service pipe which denotes the boundary of responsibility between the customer and the Council. It is generally the tail piece of the water meter, backflow preventer or service valve (toby) regardless of the property boundary.[1]
Smart meter	Contains an integrated radio that transmits meter telemetry (eg. Sensus 640MC)
SUIP	Separately Used or Inhabited Part of a Rating Unit (SUIP) may be defined[2] as • Any part of a property (rating unit) that is separately used or occupied, or is intended to be separately used or occupied by any person, other than the ratepayer, having a right to use or inhabit that part by virtue of a tenancy, lease, license, or other agreement. • Any part of a rating unit that is separately used, or occupied, or intended to be separately used or occupied by the ratepayer. Examples include: - Each separate shop or business activity on a rating unit. - Each occupied or intended to be occupied dwelling, flat, or additional rentable unit (attached or not attached) on a rating unit. - Individually tenanted flats, including retirement units, apartments and town houses (attached or not attached) or multiple dwellings on Mäori freehold land on a rating unit. - Each block of land for which a separate title has been issued, even if vacant.
UWM	Universal Water Metering
WOL	Whole of Life The period to which a financial analysis pertains.

[1] Source: New Plymouth District Council Bylaw 2008 https://www.newplymouthnz.com/-/media/NPDC/Documents/Council/Council%20Documents/Bylaws/Bylaw%202008%20Part%2014%20Water%20wastewater%20and%20stormwater%20services%20amended%202014.ashx

[2] NPDC’s formal definition is contained in the current funding impact statement - https://www.newplymouthnz.com/-/media/NPDC/Documents/Council/Council%20Documents/Plans%20and%20Strategies/Annual%20Plans/Annual%20Plan%202019_20%20adopted%20by%20the%20Council%2021%20May%202019.ashx

Table of Contents

1. EXECUTIVE SUMMARY

Universal Water Metering (UWM) is acknowledged as the most effective measure for reducing per capita consumption (PCC) and is included in each of the three options being proposed in the Water Conservation programme.

This document provides detail to the UWM component of the Water Conservation business case[3] - specifically, an options analysis of the possible approaches to installing water meters at complicated properties.

A complicated property is defined as where:

- There is no single Council water supply point per SUIP (Separately used or inhabited part of a rating unit[4]). Instead, like other parts of the property (eg. shared driveways), the water supply point is shared between neighbours.
- The Council does not own, or have legal access to, the connecting pipe from the Council water supply point to each SUIP.

Options

Five broad options for dealing with complicated properties were considered. These options along with their ranking based on the balance of benefits risks and costs are given in Table 1:

Rank	Option Number	Option description	Cost
1	2b	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage equally	$1,562,000
2	2a	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's billed by UAC	$1,562,000
3	3	Meter at point of supply with ratepayer option to move point of supply where practical	$1,562,000 – $17,839,000[5]
4	1	Only install meters on existing point of supply where one lateral serves one SUIP. Grouped SUIP's billed by UAC	$744,000
5	4	Dedicated meter per SUIP	$17,839,000
6	5	Dedicated private pipe and meter	$31,482,000

Table 1: options and rankings

Preferred option

The preferred option is **2b. Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage equally.**
All of the options have significant issues or challenges, however some of these are more significant than others. On balance the benefits of Option 2b only slightly outweigh 2a such that the final preference will come down to individual opinions.

[3] See ECM #8413816
[4] See the Glossary for a full definition
[5] Based on the range of those willing to pay for their plumber to connect to NPDC meter

2. Introduction

There are a number of decisions that need to be made if universal water metering proceeds. These are:

- Approach to complicated properties
- Meter Type
- Billing structure and frequency
- Leakage rebates
- Approach to hardship.

The memo focuses on the approach to complicated properties. A complicated property is defined as where:

- There is no single Council water supply point per SUIP (Separately used or inhabited part of a rating unit[6]). Instead, like other parts of the property (eg. shared driveways), the water supply point is shared between neighbours
- The Council does not own, or have legal access to, the connecting pipe from the Council water supply point to each SUIP.

Complicated properties include right of ways, cross-lease properties and blocks of flats/units[7].

Within the area serviced by the four water supplies there are approximately 7,100 complicated properties. This represents roughly 23% of the total number of properties. Table 1 breaks these properties down by the degree of complication.

Degree of Complication	Number of properties	% of total
None	23,738	77
Low	1,825	6
Medium	422	1
High	4,825	16
Total	30,810	100

Table 1: number of complicated properties by degree of complication

This document provides an options analysis of the possible approaches to installing water meters and volumetric billing at complicated properties.

This document should also be read in conjunction with the Water Conservation Business Case and the options paper on water meter type[8].

[6] See the Glossary for a full definition
[7] See Appendix A - Complication Types
[8] See ECM # 8413812

3. Options Analysis

The following section sets out the options for analysis.

Options

There are five broad options to installing water meters and volumetric billing for complicated properties as set out below:

1. **Only install meters on existing point of supply where one lateral serves one SUIP. Grouped SUIP's billed by UAC.**
   Install a meter where a relationship of one meter to one SUIP can be maintained. No meters on grouped SUIP's. Where a 1:1 relationship cannot be maintained (grouped SUIP's), bill using a uniform annual charge (UAC). Under this option 4,587 SUIP's would be billed by UAC.

2a. **Meter at existing point of supply - UAC for grouped SUIP's**
Install a meter on each rider main or lateral where council ownership currently ends. Where a relationship of one meter to one SUIP cannot be maintained, bill using a UAC. This differs from Option 1 as every connection has a meter regardless of approach to billing. Under this option 4,587 SUIP's would be billed by UAC.

2b. **Meter at existing point of supply - Split bill for grouped SUIP's**
Install a meter on each rider main or lateral where council ownership currently ends. Where a relationship of one meter to one SUIP cannot be maintained, share the volumetric component of the bill equally between each SUIP connected to the meter. Under this option 4,587 SUIPS would have the volumetric component of the bill split with others.

3. **Meter at point of supply with ratepayer option to move point of supply where practical**
   This is a modification of Option 2b, where property owners on grouped SUIP's are given the option to either:
   - Vest ownership of the rider main with council to enable the point of supply to be shifted to the lateral. This mainly applies to right of ways[9].
   - Connect to a specific point of supply provided by council (usually requiring modification of private plumbing by the home owner). This mainly applies to cross leases[9].

   Under this option between 0 and 4,587 SUIP's would have the volumetric component of the bill split with others[10].

4. **Dedicated meter per SUIP**
   This option involves installing a meter per SUIP whilst minimising changes to the existing pipework. Ownership of pipework and where the point of supply is, would need further consideration. This requires council to modify private plumbing in many cases[10]. Under this option all SUIP's would be directly billed for their use (ie. no UAC's or split bills).

5. **Dedicated private pipe and meter**
   Install a meter and a dedicated private pipe to each SUIP. This requires council to modify private plumbing[10]. Under this option all SUIP's would be directly billed for their use (ie. no UAC's or split bills).

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[9] See Appendix B – Examples of Option Implementations

[10] Currently new rider mains on right of ways are vested with the council. However historically these were private. This option would standardise the approach to councils ownership of rider mains in right of ways

Legal implications of split bills

Sharing the volumetric component of a bill equally between each SUIP connected to a meter is legally complicated. Section 19[11] of the Local Government (Rating) Act 2002 (**Rating Act**) authorises the Council to rate for water based on the volume consumed or supplied. There is an implication within this (and other sections of the act) that this would be done on a one meter to one SUIP basis, however this is not explicitly required. This is illustrated by both Waipa and Kapiti Coast District Councils who currently share the volumetric component of a bill between SUIP's. For more information refer to legal opinion ECM 8413793.

Economic Appraisal

The CAPEX costs for installing meters onto complicated properties for each option are given in Table 2 below.

Option		Additional Cost
1	Only install meters on existing point of supply where one lateral serves one SUIP. Grouped SUIP's billed by UAC	$744,000
2a	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's billed by UAC	$1,562,000
2b	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage equally	$1,562,000
3	Meter at point of supply with ratepayer option to move point of supply where practical. Based on a range of those willing to pay for their plumber to connect to NPDC meter	$1,562,000 – $17,839,000
4	Dedicated meter per SUIP	$17,839,000
5	Dedicated private pipe and meter	$31,482,000

Table 2: cost analysis of the options

See *Appendix C - Notes to the Economic Appraisal* for an explanation of the basis for the calculation.

Options Impact Analysis

The Impact Analysis given in Table 3 shows the relative strengths and weaknesses of the options being considered. The analysis is based on the following factors:

- Consistency and Community – This considers if the option provides a consistent approach to billing and if the option will support the development of a sense of community or cause social friction.

  A consistent approach to billing is preferred as it promotes a sense of "fairness", in that all usage for all consumers is treated in the same way.

  UWM is a significant change for the community and will be received differently. There will be neighbours willing to embrace the communal aspects of shared billing while for others it may be a cause of social friction. They may not want to split the bill due to existing strained relationships or substantially different usage profiles (large families, swimming pools, lush gardens etc.).

  Offering the user options, enhances their sense of engagement in the change process.

[11] Source: http://www.legislation.govt.nz/act/public/2002/0006/latest/whole.html#DLM132231

- Legal complexity – This considers how legally complex is the option to implement and if there are unresolved legal grey areas.
- Ownership of Infrastructure – This considers if the option requires NPDC to work on private infrastructure or to take ownership of infrastructure that this currently private. Working on private infrastructure is not preferred due to the potential liability incurred if something goes wrong. Taking ownership of private infrastructure is not preferred as it places an additional financial burden on Council to maintain and renew that infrastructure.
- Implementation – This considers how quick and easy the option is to physically implement and how complex the result is for the consumer to understand. Considerations include:
    - Data – Different options require a different amount and accuracy of asset and property data and in many instances this data is not currently available.
    - Administration - offering choice to SUIP owners creates a substantial effort to manage including explanation of the options, risks and benefits, negotiations and associated paperwork.
    - Challenges with accessing private property.
- Capital Cost – This considers the capital costs for installing meters onto complicated properties. It does not consider operational costs as these are either negligible (additional costs of reading more meters) or very difficult, and therefore very inaccurate, to estimate (operational and renewal costs of owning what is currently private infrastructure).
- Demand management – This considers to what extent the option supports the demand management objectives of universal water metering.

	Options					
	1	2a	2b	3	4	5
	Only install meters on existing point of supply where one lateral serves one SUIP. Grouped SUIP's billed by UAC	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's billed by UAC	Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage	Meter at point of supply with ratepayer option to move point of supply where practical	Dedicated meter per SUIP	Dedicated private pipe and meter
Consistency and community	Low • Lack of consistency in approach to billing • 4,587 SUIP's billed by UAC	Low • Lack of consistency in approach to billing • 4,587 SUIP's billed by UAC	Low • Possible cause of social friction (unwillingness to share the bill) • 4,587 SUIPs with split bills	Medium • Fosters social cohesion through providing choice and engagement with process. • Up to 4,587 SUIP's with split bills	High • High consistency as all SUIPs billed volumetrically	High • High consistency as all SUIPs billed volumetrically
Legal complexity	Low • No legal grey areas	Low • No legal grey areas	Medium • Possible legal issues related to splitting consumption equally between SUIPs	Medium • Possible legal issues related to splitting consumption equally between SUIPs for those users who do not opt to move point of supply	High • Legal issues due to the need for non-voluntary access to private infrastructure and property	High • Legal issues due to the need for non-voluntary access to private infrastructure and property and need to vest resultant infrastructure with the property owner
Ownership of Infrastructure	• Installation is on NPDC owned infrastructure	• Installation is on NPDC owned infrastructure	• Installation is on NPDC owned infrastructure	• Installation is on NPDC owned infrastructure (which may have changed at the property owner's request)	• Will result in NPDC owning significant amounts of infrastructure on private property	• Will result in NPDC installing a significant amount of infrastructure that will be vested with the property owner
Implementation	Easy • Quick and easy to implement • Simple to understand the consumers	Easy • Quick and easy to implement • Simple to understand for consumers	Easy • Quick and simple to implement • More challenging to understand for consumers	Difficult • Administratively complex to implement. • Potential for lengthy negotiations with property owners • Requires council to take ownership of private rider mains. • More complex to understand for consumers	Moderate • Very high quality data required • Some situations will be very difficult to resolve. • Easy to understand for consumers • Once installed there is clear understanding of who owns what and where point of supply is • Will require changes to private plumbing	Difficult • Significant work on private property required including vesting council installed infrastructure with the property owner. • Easy to understand for consumers • Once installed there is clear understanding of who owns what and where point of supply is
Capital Cost	Lowest installation costs ($0.8M)	Relatively low installation costs ($1.5M)	Relatively low installation costs ($1.5M)	More costly ($1.5-$17.8M)	Expensive to implement ($17.8M)	Very expensive to implement ($31.5M)
Demand Mgmnt	Low • No support for demand management goals • Consumers unaware of their usage • Incomplete network data makes leak detection and benchmarking significantly more difficult and/or inaccurate	Low • No support for demand management goals for these properties. • Complete network data makes leakage detection and benchmarking possible	Medium • Increased support for demand management goals • Complete network data makes leakage detection and benchmarking possible	Medium • Encourages community engagement with water conservation goals. • Better coverage for network status/data	High • Strong support for demand management goals • Additional data improves benchmarking and leak detection outcomes	High • Strong support for demand management goals • Additional data improves benchmarking and leak detection outcomes

Table 3: options impact analysis

Assumptions

The assumptions made in determining the preferred option are:

- The data validation work carried out to date provides a reliable sample of the whole population.
- Average number of SUIP's per lateral for complicated properties = 3.1
- Average number of laterals per property boundary for complicated properties = 1.7
- Percentage of connections with one lateral to one SUIP (ie. 1:1) for complicated properties = 22.9%

Interconnection with approach to water meter type

The approach chosen for complicated properties has a loose connection with the meter type chosen for UWM (see ECM #8413812). This is because the AMR meter type has an expected reading range of 500m, therefore most complicated properties will be able to be read from the street without having to access the property.

Preferred option

The preferred option is **2b. Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage equally.** All of the options have significant issues or challenges, however some of these are more significant than others. The table below ranks the options against each other and gives the reasons for this ranking. On balance the benefits of Option 2b only slightly outweigh 2a such that the final preference will come down to individual opinions.

Rank	Option	Reason
1	2b	This option is preferred as it is considered to have the best balance of benefits, risks and costs. It is also the most common in New Zealand, being used by Waipa DC, Kapiti Coast DC and Watercare. Feedback from these organisations indicates they have had minimal issues and are not considering any changes at this time. The key challenges with this option are the potential social and legal issues around splitting consumption equally between SUIPs; given the experience of these other organisations
2	2a	This option is the second most preferred as it has a good balance of benefits, risks and costs. This option eliminates the potential social and legal issues around splitting consumption equally between SUIPs, however it has issues with inconsistency of billing and no support for demand management goals for these properties. This is the option taken by Waikato District Council.
3	3	This option is third due to the significant delivery and cost risk. Due to the complexity of voluntary adoption and the associated administration (related to moving the point of supply) it is likely this option would take around 5 years to deliver. There is also significant cost risk associated with the level of uptake and unknown difficulty of installing meters and resolving administrative requirements.
4	1	This option is fourth as it does not support the demand management goals. The additional \$0.7M to do option 2a and get complete set of network data to support benchmarking and leakage management is considered good value for money.
5	4	This option is fifth as it is prohibitively expensive. At this cost nearly half of the \$40M saving from water conservation is lost
6	5	This option is sixth as it is prohibitively expensive. At this cost most of the \$40M saving from water conservation is lost

Table 4: option rankings

4. Recommendation

The recommended approach for complicated properties is **2b. Install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP’s split their shared usage equally**.

APPENDICES

Appendix A - Complication Types

A schema was created for grouping properties according to their type of complication:

Complication Type	Degree of Complication	Property ID	Property ID	Dwellings	Connection
		Single lot	Separate lots		
1	None	1		1	1
2a	Low	1		1	Multi
2b	Med	1		Multi	1
2c	Med	1		Multi	Multi
3	High	Multi		Multi	1
4	High	Multi		Multi	Multi
5	High		Multi	Multi	1
0	Low	*	*	*	Unknown
9	None	*	*	*	0
100	Low	*	*	*	*

Table 5: complicated properties - degree of complication

1. *One property ID, one dwelling, one connection* (eg. PID 13997)
   Straightforward, associate meter with the property
2. *One property ID,*
   a. *One dwelling, multiple connections*
   b. *Multiple dwellings, one connection*
   c. *Multiple dwelling, multiple connections* (PID 9381)

   All meters are associated with the property ID. This may be an issue later when subdivision occurs. Subdivision will require new connections to be installed however defining what property the existing meter now services often is not done so we are left with existing meters on past properties.
3. *Multiple property IDs (parent/child), multiple dwellings, single connection* (PID 110656)
   Council will need to install new connects at the boundary to the dwelling (if possible) or have the properties create a body corporate to manage their single water bill. Currently there is just a standard consumption charge against each property. Non billed water meters are currently associated with the parent property ID with the intention of somehow associating with child properties later on
4. *Multiple property IDs (parent/child), multiple dwellings, multiple connections* (PID 14004).
   Each connection should be assigned to a single child property. Often it is not made clear which child property each meter services during installation. Hard to define in GIS as the child properties usually all cover the whole land parcel in GIS. Currently there is just a standard consumption charge against each child property. Non billed water meters are currently associated with either :
   - The parent property ID with the intention of somehow associating with child properties later on, or
   - Against the child property if the property it services is known.
5. *Multiple property IDs (separate Lots), multiple dwellings, single connection* (hard to find example of but do exist).
   Essentially the same as group 4 above, however these are 'cross boundary connections' that are currently illegal.

0. *No visible lateral mapped*. The property is within the water supply zone so a connection is expected despite it not being mapped in Miles. A check in Tech1 for rates charges can confirm.
9. *Outside the water supply one.* For example a rural property or small holding. Alternatively, it may be within the water supply zone but self-supplied (eg. by tanks or bore).
100. *NPDC Property.* A property owned by NPDC.

Table 6 shows the properties grouped according to their complication type and degree of complication.

Complication Type	Count	Degree of Complication	Sub-totals	%
3	2,694	High	4,825	15.7%
4	1,102			
5	1,029			
2b	260	Med	422	1.4%
2c	162			
0	158	Low	1,825	5.9%
2a	210			
100	1,457			
1	22,421	None	23,738	77.0%
9	1,317			
		Total	**30,810**	

Table 6: Number of properties by complication type

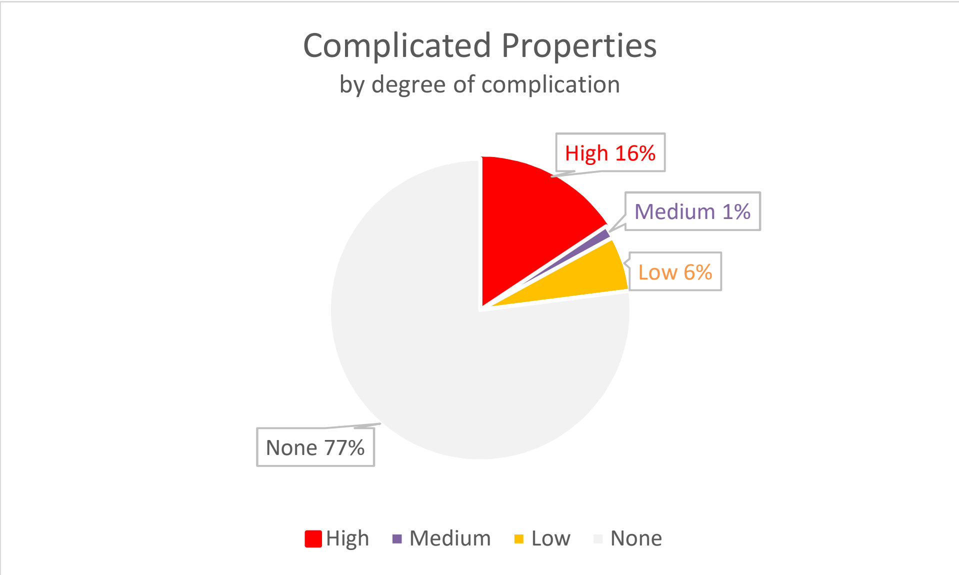


Figure 1: complicated properties by degree of complication

Appendix B – Examples of Option Implementations

Option 3 - Meter at point of supply with ratepayer option to move point of supply where practical

This is a modification of Option 2b, where property owners on grouped SUIP's are given the option to either:

- Vest ownership of the rider main with council to enable the point of supply to be shifted to the lateral. This mainly applies to right of ways. In the example below, at 253 Coronation Ave, a private right of way is vested to Council and meters installed at new point of supply.

Figure 2: option 3 (vested) example

- Connect to a specific point of supply provided by council (usually requiring modification of private plumbing by the home owner. This mainly applies to cross leases. In the example below, 3 SUIPS (A,B and C) at 8 Hori St, opt to connect their plumbing to the three meters installed at the Council's point of supply on the boundary.

Figure 3: option 3 (connected) example

Option 4 - Dedicated meter per SUIP

Taking 219, 221 Coronation Ave as an example. Currently there is

- A group of three SUIPS (the As in the figure below) connected to one lateral.
- Another group of two SUIPS (the Bs) is connected to one lateral
- One SUIP connected to one lateral (the C) so is 1:1 and will need no new pipe

Figure 4: option 4 example

Under this option all SUIPS would have new meters installed at their individual tobys. All SUIP's would be directly billed for their volumetric use (ie. no UAC's or split bills).

Option 5 - Dedicated private pipe and meter

Taking 219, 221 Coronation Ave as an example. Currently there is:

- A group of three SUIPS (the As in the figure below) connected to one lateral.
- Another group of two SUIPS (the Bs) is connected to one lateral
- One SUIP connected to one lateral (the C) so is 1:1 and will need no new pipe

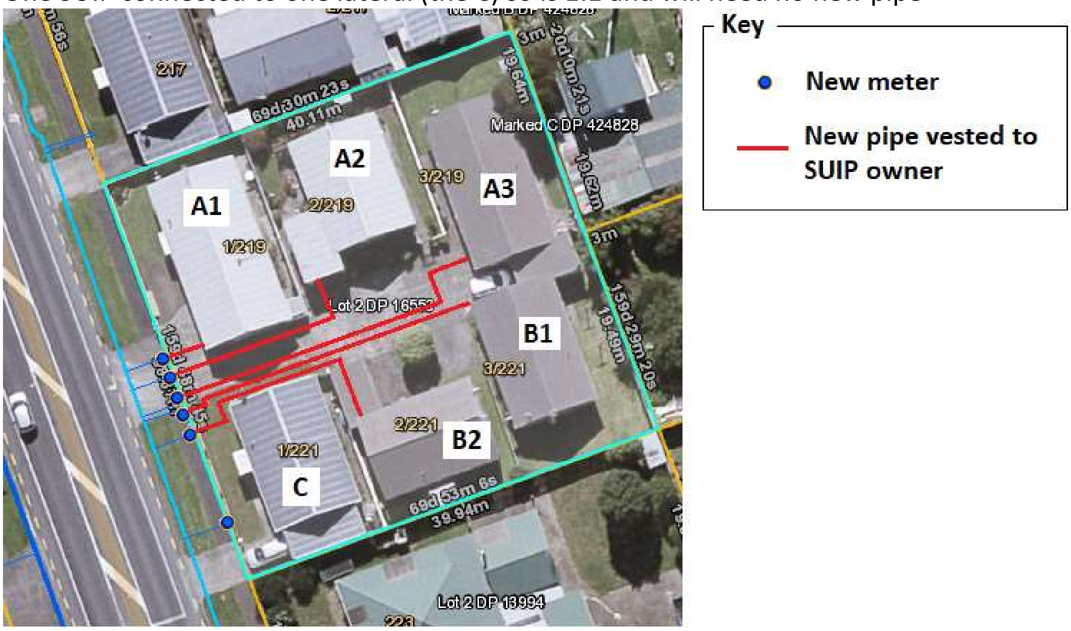


Figure 5: option 5 example

Under this option the A group and B group of SUIPS would have new pipes and meters installed; then all SUIP's (As, Bs and C) would be directly billed for their volumetric use (ie. no UAC's or split bills).

Appendix C - Notes to the Economic Appraisal

The notes, below, demonstrate the underlying calculations/methodology used to calculate the additional costs for each option.

The *Average number of complicated properties per boundary* and *Number of laterals per boundary* were calculated in an analysis of the complicated property portfolio (See *CP_DistinctPropertyCounts .xlsx* (ECM #8398628) and *CP_DistinctPropertyCountsRollup.xls* (ECM #8398631). Double click on the tables below to manipulate the model.

- **Option 1** – only install meters on existing point of supply where one lateral serves one SUIP. Grouped SUIP's billed by UAC

Number of CPs	5,247
Average # of CPs per lateral	3.1
# boundary points	1,693
# laterals per boundary	1.7
# laterals	2,878
Percentage of laterals that are 1:1	22.9%
# SUIPS that are 1:1	660
# SUIPS that are to split bill equally	4,587
CPs excluded from implmentation	4,587
Standard cost per installation	$564
Installaltion difficulty scalar	200.0%
Additional cost per installation	$1,127
Total additional cost	**$744,005**

- **Option 2a** - install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's billed by UAC

Number of CPs	5,247
Average # CPs per boundary	3.10
# boundary points	1,693
# laterals per boundary	1.7
# laterals	2,878
Percentage of laterals that are 1:1	22.9%
# SUIPS that are 1:1	660
# SUIPS that are to be billed UAC	4,587
Percentage of laterals that are grouped	39.3%
# of groups to be metered	1,803
CPs excluded from implmentation	2,784
Standard cost per installation	$564
Installaltion difficulty scalar	100.0%
Additional cost per installation	$564
Total additional cost	$1,562,081

- **Option 2b** - install meters on all existing points of supply. Bill volumetrically where one lateral serves one SUIP. Grouped SUIP's split their shared usage

Number of CPs	5,247
Average # CPs per boundary	3.10
# boundary points	1,693
# laterals per boundary	1.7
# laterals	2,878
Percentage of laterals that are 1:1	22.9%
# SUIPS that are 1:1	660
# SUIPS that are to split bill equally	4,587
Percentage of laterals that are grouped	39.3%
# of groups to be metered	1,803
CPs excluded from implmentation	4,587
Standard cost per installation	$564
Installaltion difficulty scalar	100.0%
Additional cost per installation	$564
Total additional cost	**$1,562,081**

- **Option 3** - meter at point of supply with ratepayer option to move point of supply where practical

Number of CPs	5,247
Average # CPs per boundary	3.10
# boundary points	1,693
# laterals per boundary	1.7
# laterals	2,878
Percentage of laterals that are 1:1	22.9%
# SUIPS that are 1:1	660
# SUIPs that are grouped	4,587
% of grouped not willing to split	90.0%
# not willing to split (ie not connect to meter)	4,128
Meters splitting the bill	459
CPs excluded from implmentation	459
Standard cost per installation	$564
Installaltion difficulty scalar 1:1	250.0%
Additional cost per 1:1	$1,409
Installaltion difficulty scalar grouped	225.0%
Additional cost per grouped	$1,268.19
Total additional cost	**$6,165,094**

- **Option 4** - dedicated meter per SUIP

Number of CPs	5,247
Private mains	0
CPs excluded from implmentation	5,247
Cost per dwelling	$3,400
Total aditional cost	**$17,839,800**

- **Option 5** - dedicated private pipe and meter

Number of CPs	5,247
Private mains	0
CPs excluded from implmentation	5,247
Cost per dwelling	$6,000
Total aditional cost	**$31,482,000**

Appendix D – Properties

An extract from EAM shows the number of meters. Filtered on:

- Remove meter_status=removed, Split off
- property_status (multiple items) = Current, Future, (blank)
- account_status (multiple items) = Active, (blank)
- meter_status (multiple items) = Active, (blank)

Connection	By Pass	Industrial	Ingle Supp	Lepperton	Month MetSp	Motunui	NP-BB	NP-NC	Oakura	Okato	Urenui	Wait Brix	(blank)	Total
NO connection														
(blank)													4,347	**4,347**
Connected														
ComIndust	23	3	71	3	6		1,054	47	14	14	10	100		**1,345**
FarmLand	1		25	3	1	18	70	2	9	24	14	75		**242**
Res	6		70	3		12	250	998	20	12	21	114		**1,506**
SmalHoldg	1		33			3	96	11	7	2	15	42		**210**
WatBillAcc	18	1	8		3		109		5	2	5	25		**176**
(blank)				1	1		35	40	3	1	2	3		**86**
Total	**49**	**4**	**207**	**10**	**11**	**33**	**1,614**	**1,098**	**58**	**55**	**67**	**359**	**4,347**	**7,912**

Aggregate tariffs up to NO/has tariff

- property_status = Current, Future, (blank)
- account_status = Active, (blank)
- meter_status = Active, (blank)

Connection	NO tariff	HasTariff	Total
NO connection			
(blank)	4,347		4,347
Connected			
ComIndust		1,345	1,345
FarmLand		242	242
Res		1,506	1,506
SmalHoldg		210	210
WatBillAcc		176	176
(blank)		86	86
Total	4,347	3,565	7,912

Properties with meters: 7,912
New meters required: 21,256

Installed but no connection details: 4,347
Have connection details: 3,565

- Non billable tariff (NP-NC): 1,098
- Billable tariff (NP-BB): 2,467

Appendix D – 30y Whole Life Costs assumptions (most likely scenario)

Total for the 30 yrs.	S00	S20	S25	S30
CAPEX growing projects				
WA2019 - Universal Water Metering (WMP)	$ -	$ 12,132,520	$ 12,132,520	$ 12,132,520
WA2006 - Water Services For Subdivisions In Un-Service A	$ 527,671	$ 527,671	$ 527,671	$ 527,671
WA2015 - Smart Rd reservoir	$ 8,500,000	$ 8,500,000	$ 8,500,000	$ 8,500,000
WA2016 - Smart Rd development trunk main	$ 2,900,000	$ 2,900,000	$ 2,900,000	$ 2,900,000
WA2017 - Duplicate WTP Outlet	$ 4,100,000	$ 4,100,000	$ 4,100,000	$ 4,100,000
WA2018 - Eastern Feeder Stage 1 (WMP)	$ 3,400,000	$ 3,400,000	$ 3,400,000	$ 3,400,000
WA2020 - Eastern Feeder Stage 2 (WMP)	$ 3,400,000	$ -	$ -	$ -
New Intakes at Lake Mangamahoe	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
OA - Oakura third bore P2	$ -	$ -	$ -	$ -
Western Extensions (Barrett Rd trunk main)	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ -
Veale Rd reservoir	$ 8,000,000	$ 8,000,000	$ -	$ -
Inglewood WTP capacity upgrade	$ -	$ -	$ -	$ -
Western Feeder Duplicate	$ 3,200,000	$ 3,200,000	$ 1,600,000	$ -
Lepperton to Tikorangi	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
Dredging Lake Mangamahoe	$ 2,050,000	$ 2,050,000	$ 2,050,000	$ 2,050,000
Ngatoro Stream Intake and Inglewood Trunk Mai	$ -	$ -	$ -	$ -
WA2026 - New Water Source Investigation.	$ 3,400,000	$ 3,400,000	$ -	$ -
WA2026 - New Water Source Build	$ 50,000,000	$ 12,500,000	$ -	$ -
Non-Estimated continuation growth projects	$ 30,000,000	$ 7,500,000	$ -	$ -
CAPEX fixed projects				
Total Renewals fixed projects	$157,207,423	$157,207,423	$157,207,423	$157,207,423
Total LOS fixed projects	$112,509,133	$112,509,133	$112,509,133	$112,509,133
CAPEX water conservation related projects				
Metering restricted demand costumers	$ -	$ 469,530	$ 469,530	$ 469,530
WC project implementation (Municipal buildings	$ -	$ 900,000	$ 2,700,000	$ 4,500,000
Pressure Management initiatives	$ -	$ -	$ 500,000	$ 800,000
Replacement of oversized meters	$ -	$ -	$ -	$ 1,500,000
Total Renewals fixed projects (additional)				
OPEX volume and UWM related projects				
Customers	$ 54,372,317	$ 54,372,317	$ 54,372,317	$ 54,372,317
Volume	$ 62,574,830	$ 55,089,366	$ 52,042,053	$ 48,985,648
Capital	$245,133,612	$211,466,670	$206,585,398	$204,399,440
Overheads	$113,056,778	$100,207,274	$ 97,731,638	$ 96,094,752
Meter replacements	$ 4,554,344	$ 4,062,453	$ 4,062,453	$ 4,062,453
OPEX water conservation related projects				
Water Pipe repairs	$ -	$ -	$ -	$ 8,100,000
Leak detection	$ 2,550,000	$ 2,550,000	$ 2,550,000	$ 3,697,500
Educational program	$ 40,000	$ 80,000	$ 3,600,000	$ 6,000,000
Tidy up policy and process for enforcement actio	$ -	$ 40,000	$ 40,000	$ 40,000
Water conservation officer	$ -	$ 1,200,000	$ 2,400,000	$ 4,800,000
Clean property data	$ -	$ -	$ -	$ -
Clean property classification	$ -	$ 120,000	$ 120,000	$ 120,000
Benchmarking water consumption	$ -	$ 40,000	$ 40,000	$ 40,000
Green Plumber	$ -	$ -	$ 240,000	$ 240,000
Resolve issues with processes practices and qual	$ -	$ -	$ 240,000	$ 480,000
My council	$ -	$ -	$ 85,000	$ 85,000
Incetive tools	$ -	$ -	$ 975,000	$ 975,000
Education program for I&C	$ -	$ -	$ 400,000	$ 400,000
Volumetric billing for wastewater	$ -	$ -	$ -	$ 85,000
Support creation of organisation specific WC pro	$ -	$ -	$ -	$ 400,000

Op 0 - Status quo
Op 1 - expected 20% reduction in GPC
Op 2 - expected 25% reduction in GPC
Op 3 - expected 30% reduction in GPC

WATER CONSERVATION

CONSULTATION DOCUMENT – OPTIONS PAPER

March 2021

NPDC

2. Water Conservation Consultation Document

This Water Conservation Consultation Document – Options Paper has been prepared by New Plymouth District Council to present ideas for how freshwater can be conserved. It contains a range of potential actions aimed at decreasing water consumption and leakage. Decisions made in response to this Paper will underpin development of a Water Conservation Plan and inform our approach to managing our consumption of water into the future.

Why do we need a Water Conservation Plan?

Fresh water is one of our most precious resources. It is the basis for all life on the planet – plants and animals can't live without it.

It is essential to maintaining healthy, resilient natural environments, such as forests, rivers and lakes. It is also a basic ingredient for a range of industries, from farming to manufacturing and hospitality. NPDC is tasked with collecting, treating, storing and distributing this precious taonga to us all.

A recent NPDC survey[1] showed that 85% of New Plymouth residents think water and the service NPDC provides around it is of high or very high importance.

Tangata whenua have long understood the vital link between people and water, and the need to show care when managing this taonga. A close relationship is maintained with te wai in all its forms, both spiritually and physically:

Ko au te wai, ko te wai ko au: I am the water and the water is me.

Water conservation is the best thing we can do to protect our water resource.

Water Conservation means using our limited freshwater and existing infrastructure wisely and carefully. Taking this approach brings huge benefits, including:

- Significantly reducing the effect on the environment.
- Protecting and enhancing water sources' cultural and community value.
- Reducing energy consumption normally needed to treat and pipe high water volumes.
- Using water resources efficiently in order to postpone local water infrastructure investments.

We should make water conservation a way of life. We all need to work together to make sure we only use what we really need. At the same time, we must continue to invest in our water supply system to meet the needs of our growing population.

[1] NPDC Top Ten Kōrero: Water Survey, 4-10 August, 2020. Figures based on 1600 completed surveys.

With this in mind, NPDC is creating a Water Conservation Plan (WCP), which will be based on the level of water conservation favoured by the public, iwi and hapū, and councillors. It will provide a guide for water conservation activities that are effective, environmentally sustainable and fiscally responsible. With reference to NPDC's overall vision, of "Building a Sustainable Lifestyle Capital," the WCP's primary aims align with organisational goals:

If we are to safeguard future water supplies and achieve our strategic intent of being a Sustainable Lifestyle Capital for New Zealand, we need to make some changes when it comes to water.

1 *Prosperity*

- Provide a cost-effective service that our community can afford.

2 *Sustainability*

- Sustainably use our water and reduce waste.
- Protect natural habitats, recreational activities and the availability of mahinga kai (food sources).

3 *Community*

- Harness the power of the community to achieve water use reductions.

4 *Delivery*

- Deliver resilient services able to cope under drought conditions.

5 *Partnerships*

- Work collaboratively with local iwi and hapū, businesses, industry and organisations to achieve water take reductions.

How is Water Governed?

NPDC's approach must fit within a wider system of water administration at national and regional government levels. Central government provides national leadership through water-related laws and guidelines, while regional governments around the country are charged with managing allocation and environmental impact in their local areas.

National

Te Mana o Te Wai is a fundamental national water concept. As a country, we have an obligation to protect the health and wellbeing of water, and an important part of this is being respectful about how much water we take for people to use. The concept of Te Mana o Te Wai has been incorporated into New Zealand's National Policy Statement (NPS) for Freshwater Management 2020 (Freshwater NPS 2020) to highlight the need for integrated and holistic management that ensures the wellbeing of water. How this works in practice is left to local communities around the country to decide.

Te Mana o Te Wai is the integrated and holistic wellbeing of the water.

Document Set ID: 8445885
Version: 3, Version Date: 23/02/2021

Regional

As part of the ongoing process of implementing the Freshwater NPS, Taranaki Regional Council (TRC) is working towards:

- Deciding how best to group waterways for effective management.
- Setting water quality and environmental flow limits.
- Incorporating the National Objectives Framework[2] into their activities to support the health of waterways.

Decisions made at the regional level are important for New Plymouth residents because NPDC applies to TRC for consent to draw water from local rivers and streams for human consumption.

The consent application is assessed to ensure that best resource management practices and environmental care are achieved. This may mean limiting how much water can be taken for people to use so that the natural ecosystem retains enough to thrive. We are coming to the end of our current water abstraction consents and we will be applying to the Regional Council to renew them in 2021.

Local

Water supply challenges have been identified for the district, and in response, NPDC is developing an interconnected framework for ensuring a safe and reliable water supply.

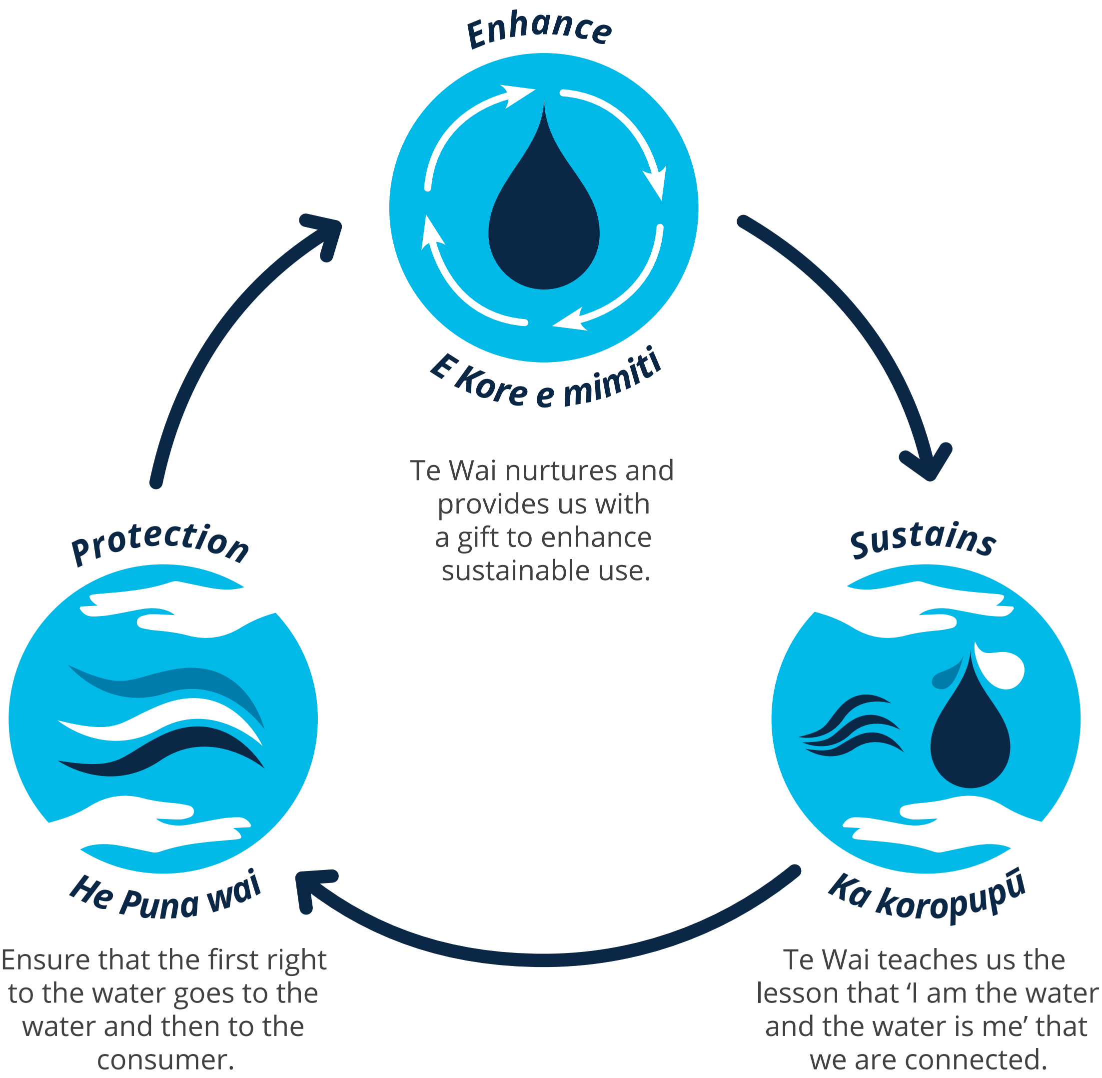
As part of the local strategy, a Resource Efficiency and Emissions Internal Policy has been developed. This document requires NPDC to provide leadership in water efficiency including developing a Water Conservation Plan to detail how our freshwater will be future-proofed.

A sustainable, long term strategy for the three waters system is being explored at a high level through He Puna Wai, which is made up of iwi representatives from Te Atiawa, Taranaki, Ngāti Mutunga, Ngāti Maru and Ngāti Tama, as well as NPDC staff.

[2] https://www.trc.govt.nz/assets/Documents/Plans-policies/SoilWaterPlanReview/DraftFLMP-2NOF.pdf

He Puna Wai.

The water sustains us and we have a responsibility to sustain the water.



The water flowing from Mount Taranaki provides sustenance, connection and identity which will never extinguish. E kore e mimiti; ka koropupū, E kore e mimiti; ka koropupū.

At a more technical level, NPDC hosts the Three Waters Hui. This working group consists of local hapū and iwi representatives together with NPDC officers. Ideas around Water Conservation and upcoming water consents are discussed. This working group's contribution will help inform the Water Conservation Plan to be implemented following the current water conservation consultation process.

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The water belongs to the rivers and streams first, and people second.

Where Does New Plymouth's Water Come From?

New Plymouth District Council provides a huge volume of drinkable water to the community: up to 45 million litres per day over summer, and around 30 million litres[3] per day during the rest of the year. This water is taken from local waterways, treated, and distributed to residents and businesses, as well as to council-run communal facilities and services. Most of this water is subsequently returned to the environment after being treated to a high standard, which protects public health and minimises the effect on the ocean where it is discharged.

New Plymouth district has an extensive water supply system

We draw from four natural water sources in New Plymouth:

- The Waiwhakaiho River (via Lake Mangamahoe) supplies water to New Plymouth, Bell Block, Lepperton, Waitara, Tikorangi, Onaero and Urenui.
- The Ngatoro Stream supplies Inglewood.
- The Mangatete Stream supplies Okato.
- An underground aquifer supplies Ōākura.

Water from these sources is treated via four treatment plants and distributed through a piped network more than 800km in length to 17 water reservoirs, which collectively store around 63 million litres of water. This system allows us to: service peak demand, continue supply during treatment plant outages, and provide adequate flow and pressure for firefighting.

[3] www.newplymouthnz.com/Residents/Your-Property/Water

From Mountain to Tap

NEW PLYMOUTH SUPPLY
Waiwhakaiho River and Lake Mangamahoe

1. Rain falls on the mountain.
2. Water flows down the Waiwhakaiho River to Lake Mangamahoe.
3. Water is taken to the New Plymouth Water Treatment Plant which removes the taste, smell, dirt, algae and bacteria, and adds chlorine.
4. Mains pipes take the cleaned water to reservoir tanks.
5. Half of a reservoir's water is for household use. The remainder is kept aside for firefighting and civil defence.
6. Clean, safe drinking water arrives at your home.

But this extensive system has a high cost for the environment...

Our rivers and streams need enough water in them in order to stay fresh and cool; without adequate minimum flows, aquatic life will suffer. Unfortunately, people tend to use the most water during summer, when flows in natural watercourses are already at their lowest. For this reason, there is tension between meeting the needs of humans and the needs of the environment. This is why treated drinking water must be consciously consumed.

...and it is expensive

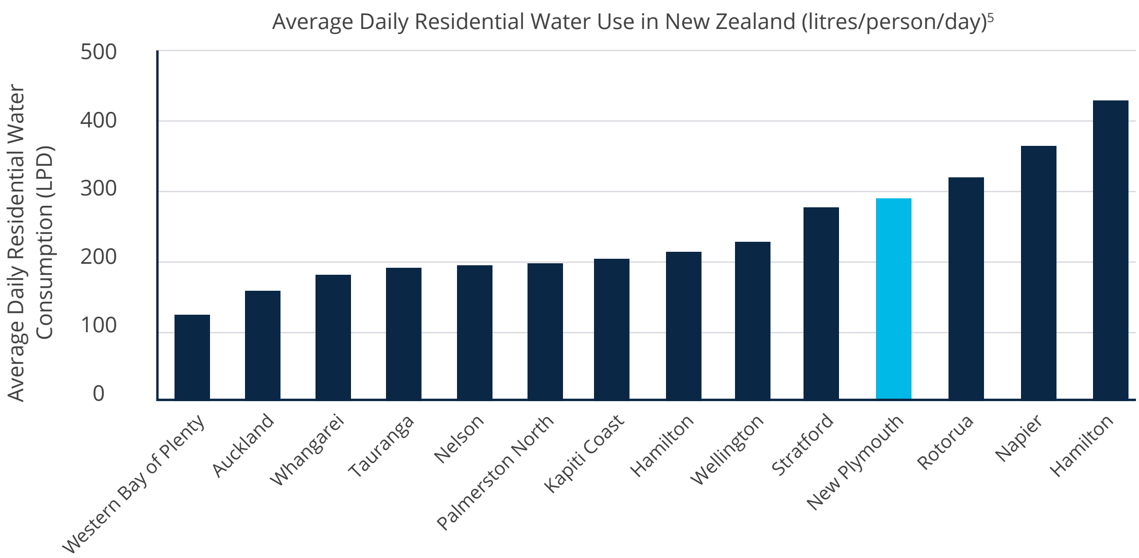
It costs around $12 million each year[4] to provide clean and healthy water to residents, including operating treatment plants and maintaining pipes and reservoirs.

[4] 2019/20 Annual Report

Why Do We Need Change Now?

While NPDC's water management has been meeting the community's needs to date, there are several factors coming together that spell a different future where change is required.

Despite its importance, many of us take water for granted. In New Plymouth, where we have abundant rainfall, we expect an unending supply of fresh drinking water to be available. However, in examining a number of important factors, it is clear that careful planning is now required in order to cater for growth, adapt to climate change and other external events, stay within financial constraints, and comply with regulatory requirements.



[5]WaterNZ, based on FY 2019 figures. www.waternz.org.nz/Category?Action=View&Category_id=1010

Context

It is currently difficult to know exactly how and where New Plymouth's water is being used, and NPDC is working hard to collect more information about local water use.

What is known at a district-wide level is that we use significantly more than we need. NPDC has estimated that the residential per capita consumption[6] averages approximately 275-300 litres per person per day. To compare, half of the world's population uses just 95 litres per person per day[7].

When we look at locations around New Zealand, the differences are striking. People living in cities where water conservation is enthusiastically embraced, including through water metering, tend to use significantly less water than residents of non or low-metered locations.

When comparing ourselves to other similar size municipalities in New Zealand with best local practices, we can see that our residential water consumption is 60% higher.

Also, Aucklanders use just over 150 litres per person per day on average – that's around half of what New Plymouth residents consume. The graph on the previous page clearly shows the effect of, and need for, water conservation best practices: locations to the left place greater emphasis on water conservation activities than those on the right.

Local growth

New Plymouth district has been in a growth phase for the past several years. The population currently stands at approximately 85,000, and with further growth over the next three decades, it is expected to reach 104,000[8] by 2050. Industrial and commercial activity should also increase over the same timeframe.

While growth is not a problem in itself, it will naturally increase demand for clean water, thereby exacerbating the issues already raised around environmental impact, the costs incurred to upgrade the network, and issues around consenting.

Environmental protection

Greater emphasis is being placed on environmental sustainability by ordinary citizens, and this is reflected in progressively more stringent regulatory protections for water over time. People realise we need to leave more water in rivers, streams and lakes so that the natural environment can remain healthy.

2021 Abstraction Consents

Under the RMA, TRC are charged with ensuring that resources are used efficiently. However, because the residents of New Plymouth District are not currently using water efficiently, it is difficult for NPDC to justify a renewal of the existing consent at the current quantity, and equally difficult for TRC to approve it. The same principle applies to consent applications for any additional future water sources.

Furthermore, NPDC's consent to abstract water from the Waiwhakaiho River via Lake Mangamahoe sets a minimum flow at which abstraction must cease. This minimum flow is significantly lower than the government's suggested targets, and the limits TRC are proposing for the next update of the regional freshwater plan. If the district was to meet the government's or TRC's proposed river flows, we would be unable to meet typical summer demand.

[6]The amount of water supplied to residential consumers divided by the number of people living in the district. This excludes commercial, industrial and agricultural demand, as well as losses through leaks.

[7]Learnz; https://bit.ly/2AlYLYh

[8] Source: Long-Term Plan 2021-31 projections

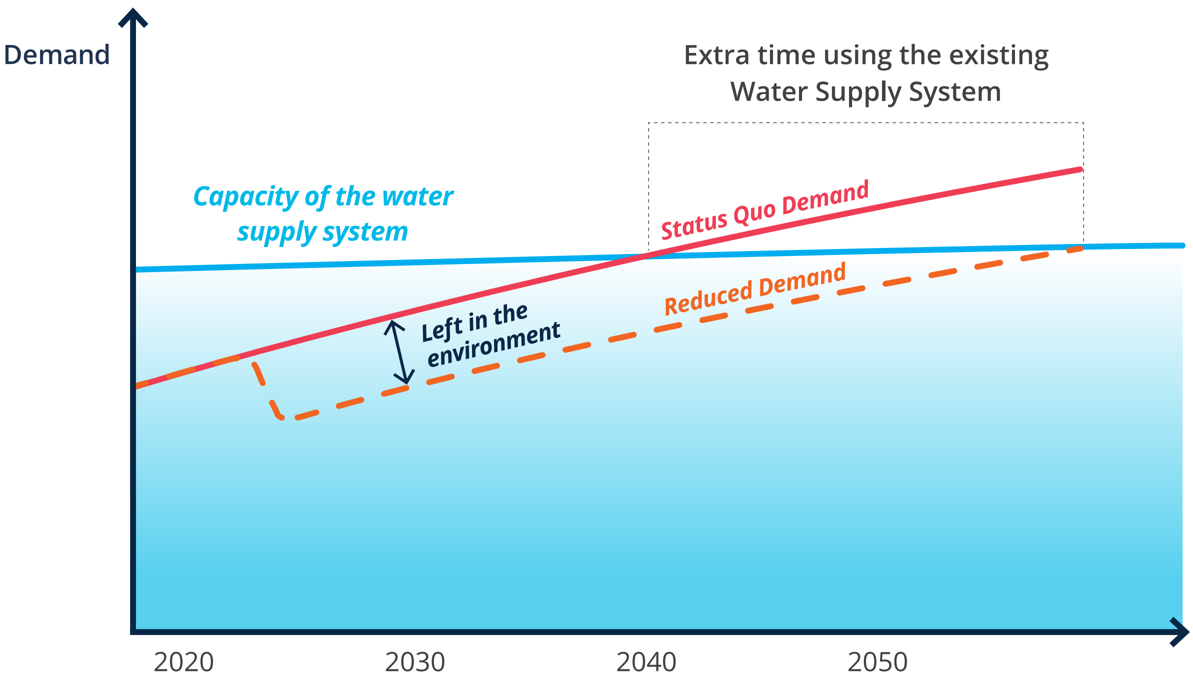
Implications of Not Changing

NPDC's upcoming renewal of water take consents must consider expected population and industry growth. Additionally, we need to consider potential future changes in the regulatory arena.

Meeting upcoming tensions between supply and demand will almost certainly require an additional water source to be found within the next couple of years.

This will have a significant effect on the environment, and cost the district tens of millions of dollars to develop. Taking action now will allow us to fully use the existing infrastructure while also giving us time to find the most sustainable solution.

The graph below shows how the situation will progress, both with and without implementing changes from 2020 onward.



Timeline of when a new water source will need to be operational

- The blue area (supply) shows the amount of water that can reliably be supplied to the district from the existing water infrastructure.
- The red line represents water demand based on expected growth, if water consumption and leakage rates remain consistent with no effort towards conservation. Demand is predicted to outstrip supply in the late 2030s.
- The orange line considers the initial fall and slower growth in water demand expected if water conservation actions are put in place to reduce both consumption and leakages.

In this scenario, a new water source may not be needed until the mid-2050s, giving us up to 15 extra years to continue using the existing infrastructure and secure the most environmentally sound and fiscally responsible solutions.

- The space between the red and orange lines represents additional water that can be left in the environment to support ecosystems. ***The size of this gap (and benefit to the natural world) will depend on how successful New Plymouth's water conservation efforts are.***

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He Puna Wai.

The water sustains us and we have a responsibility to sustain the water.

How is New Plymouth's Water Used?

There are Four Water Use Demand Areas

Residential

Water used for drinking, cooking, cleaning and watering the garden **(55-65% of all water consumed).**

Municipal

Water used by NPDC for parks, reserves, pools and operational activities **(less than 5%).**

Industrial and Commercial

Water used in commercial processes and production, for example, food manufacturing. This also includes retail, schools and hospitals **(20-25%).**

Leakages

Water lost through leaks/bursts in Council and residential properties' pipes and fittings, theft, and water used for firefighting **(15-20%).**

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Let's discuss each of these demand areas further.

Residential

Residential demand accounts for 55-65% of all water consumed in the district, and is the biggest contributor to higher summer demand. Consumption over the summer months can increase by more than 25%, resulting in an extra ten million litres being required each day on average, with peaks of up to 15 million litres a day.

This extra water is mostly used for watering gardens and filling swimming pools, despite being treated to drinking water standard!

New Zealand-wide, only around 20% of treated, drinkable water consumed residentially is used for drinking or cooking, while 80% is used for household tasks such as toilets, showers, baths, washing, lawns and gardens.

Around 500 residential properties (3%) throughout the district are currently metered, meaning the majority of household consumption is being estimated.

What has been done so far to reduce residential water consumption?

Water Restrictions

Summertime water restrictions are successful in reducing peak demand by around 10%. NPDC implements level 1 restrictions every year between 1 January and 31 March unless more extensive restrictions are required. A communications campaign is run to inform residents via newspapers, billboards, radio, social media, news websites and libraries.

Information is available through NPDC's website to allow residents to track rainfall and water use per supply system[9].

NPDC's Water Restriction Levels are detailed below.

L0	Standby: conserve water notices are issued.
L1	Total ban on the use of sprinklers, irrigation systems and unattended hoses. Partial restriction on use of hand-held hoses.
L2	Total ban on the use of sprinklers, irrigation systems and water blasters until the restriction is lifted.
L3	All customers (residential and commercial) are restricted to essential water use only. This applies to critically low supplies.
L4	Crisis: industry liaison.

[9] www.newplymouthnz.com/Residents/Your-Property/Water

Wai Warrior Campaign

Since December 2017, NPDC has encouraged the people of New Plymouth to become Wai Warriors, by accepting the challenge of protecting the region's water through using it wisely as both private citizens and business owners. This initiative is based on educating consumers about simple ways that they can save hundreds of litres of water in their homes.

The campaign uses radio, YouTube, social media and events to engage and provide the community with plenty of water-saving tips. Residents are offered fun rewards for changing behaviour, and a children's activity booklet encourages kids to be 'leak detectives', while also providing fun activities aimed at reducing water use.

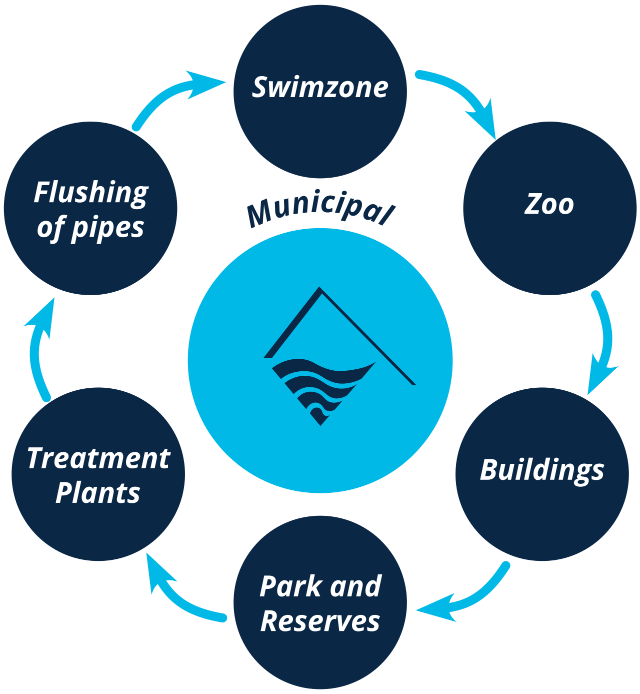
Out in the community NPDC's Three Waters Education Officer visits schools and attends events to teach children and the wider community about conserving water and what they can do to cut down their usage. The Education Officer also offers teacher development courses and tours of the New Plymouth Water Treatment Plant.

The Wai Warrior campaign has undoubtedly contributed to the downward trend seen in residential water usage, however, there is still some way to go before we achieve water consumption levels as low as Western Bay of Plenty (122 litres per person per day).[10]

[10] WaterNZ, based on FY 2019 figures. www.waternz.org.nz/Category?Action=View&Category_id=1010

Municipal

NPDC has approximately 400 connections for its local facilities and services. Most of these are currently unmetered. This has resulted in a lack of good data and information about when, where and how much water is being used. Work is underway to change this through a number of initiatives.



What has been done so far to reduce municipal usage?

Civic Centre

A smart meter was installed at the Civic Centre in May 2020 to enable water usage and leakages to be monitored in real time and we are collecting data for analysis on how to reduce our water consumption. This may provide a template for monitoring at other NPDC properties. Water conservation actions at the Civic Centre include installation of low flow fittings such as shower heads, and the scoping of how to use rainwater for flushing toilets.

Brooklands Zoo

Brooklands Zoo is a favourite family destination in New Plymouth - it opened in 1965 and is visited by more than 110,000 people each year. Recently, zoo staff have been exploring ways to reduce the use of potable water, which is primarily used for cleaning and animal care and so does not need to be at drinking water standard. Collecting and storing rainwater on-site was quickly identified as a smart way to take pressure off the local supply.

Captured rainwater is being used to grow some of the large quantities of succulent green plants and grasses a newly arrived pair of leopard tortoises eat every day. Children visiting the zoo are encouraged to water the tortoises' garden with the collected rainwater, and this experience provides a practical example of how people might use untreated water around their own homes.

Other water saving Initiatives, including the recently upgraded otter enclosure water recycling system, could reduce as much as 90% of the treated water used by the zoo.

Effluent Re-use at the Waste Water Treatment Plant

Treated effluent is used instead of drinking water at the New Plymouth wastewater treatment plant for a number of non-potable purposes including cleaning screens, cooling water, chemical dilution and spray bars.

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Industrial and Commercial

Many businesses and industries, including food processing, manufacturing, farming and hospitality rely on water to operate safely. Interestingly, use by this group has remained relatively consistent over the past decade at around eight million litres per day.

Nine large industrial water users operate in the district and account for approximately half of all commercial and industrial demand, with the largest taking around 1.87 million litres per day.[11]

NPDC has a good understanding of how these large commercial organisations use water because they are metered and pay by volume. Similar to what is seen with universal water metering for residential consumers, metered companies are generally more aware of their water use and tend to want to reduce consumption as it directly affects bottom line costs.

Just over half[12] of the remaining commercial users are currently metered, meaning water use and leakage rates are still being estimated for the other half.

Meters are being installed on an ongoing basis to capture data from these customers in order to gain a clearer picture of the wider factors, for example, the behaviour of wet industrial users (e.g. food processing and car washes) compared to dry (e.g. offices and shops). This knowledge impacts how the district can foster economic growth whilst limiting negative effects on the environment and ensuring future supply/ demand management.

What has been done so far to reduce industrial and commercial water consumption?

Metering of Extraordinary Connections

Industrial and commercial operations, as well as properties that use water for pools and/or irrigation are deemed to have 'extraordinary connections'. NPDC's Water, Wastewater and Stormwater Bylaw (2014) requires all extraordinary connections to be metered and charged based on volume used. Owners and tenants could use the information provided to manage their own water use. Installation of meters is ongoing and should be completed by 2023.

Conservation Works Performed by Clients

NPDC supports efforts to save water initiated by the community, and can work collaboratively with businesses to meet their individual aspirations. For example, one of the district's big industrial users of water wanted to expand production but were limited by how much wastewater they could discharge into New Plymouth's waste treatment system. The company has expanded their internal water conservation practices, and have been able to expand production as a result.

[11] Based on NPDC's 2019/20 figures.
[12] 54% in 2016/17 (Source: NPDC).

Leakages

Water network losses and leakage (leakages) happen in all water supply systems, and are a significant cause of waste. Current estimated leakages across New Plymouth district's network are around five million litres per day – this is 15% to 20% of total production! Surprisingly, this level of lost water is reasonably common around the world.

NPDC is required to fix any leaks found in council-owned assets such as pipes, valves and joints, while property owners must take responsibility for leaks inside property boundaries. It is not currently known what proportion of losses is municipal versus private.

Bursts (large breaks) tend to be noticed relatively quickly as they often cause homes and businesses to lose pressure or go without water altogether.

In contrast, smaller leaks (cracks and loose fittings) can go unnoticed for long periods of time. Finding leaks is a complex undertaking that requires a mix of data, modelling and predictive analysis. NPDC understands how important improving network data collection is, and continue to invest in this.

In addition to water wastage, leaks present the risk of water supply contamination as outside material can find its way inside pipes. Leaks also mean energy is wasted in treating and moving water around the city that ultimately escapes before it ever reaches a tap.

What has been done so far to reduce losses and leakages?

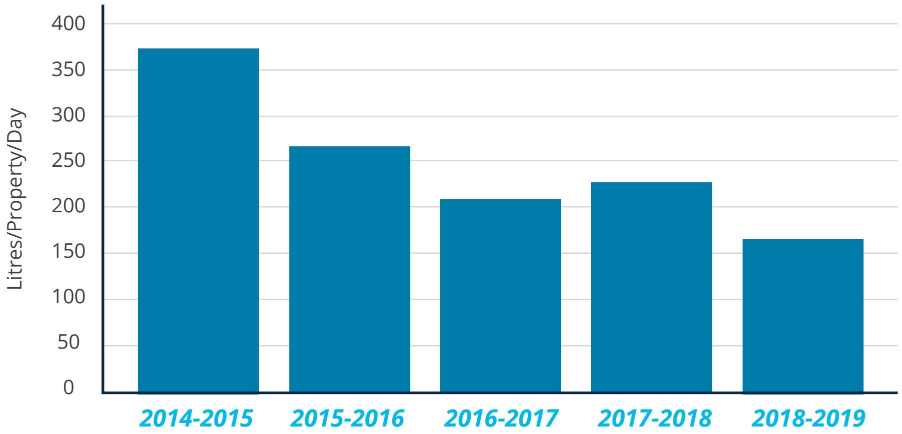
Watermains Renewals

NPDC has invested around $2.3 million annually in network pipes renewals over the past several years.

Leak Detection Programme

A leak detection survey is already underway to identify leaks within the water network. Whenever a leak is detected at a private address, a letter is sent to the owner requesting them to fix the damage and report progress to the Council. In addition, the programme arranges for water meters to be installed where needed. All other leaks in the public network, including those from tobies and manifolds, are repaired by the Council.

Positive outcomes are being recorded through this initiative. We already compare reasonably well with neighbouring districts in terms of leakages, but efforts to reduce network losses have seen significant savings since 2014. As the graph below shows, the amount of water lost through leakages has halved over the past five years.



Five-year Reduction in Network Losses across New Plymouth District[13]

[13] NPDC calculations based on available data.

Pressure management

A tap's water flow is affected by how much pressure exists within the supplying water pipes: the greater the pressure, the stronger the flow. This same principle works in reverse for leaks in pipes and fittings, that is, reducing pressure not only limits the amount of water lost from weak and damaged points, but it can actually reduce the likelihood of a leak forming in the first place. However, this needs to be carefully balanced with ensuring supply is sufficiently pressurised to be accessible and useable across all demand areas, including for use by fire sprinklers. NPDC has so far adjusted pressure in several areas around the district, including New Plymouth's CBD, Fitzroy and Inglewood.

Through ongoing efforts, residential usage has fallen from 336 to 287 litres per person per day since 2015. Even more impressive is the reduction in network losses by more than half over the past five years from 372 litres per property per day to just 169 litres. Industrial and commercial demand has remained steady over this period.

Despite these positive reductions, it is important that NPDC continues to reinforce the water conservation message or risk losing momentum. There is still more that can be done to further reduce water consumption across the district.

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What Actions can we take for the Future?

Our specific goal for Te Wai is to have a sustainable and efficient water supply service that caters for growth, reduces negative effects on the environment, supports recreational activities, and is affordable.

Achieving a meaningful long term reduction in water consumption requires community support because ultimately it is the whole community's behaviour that determines how much water is used. In theory, it would be possible to halve consumption if everyone practised water conservation. With this in mind, NPDC wants to consult with local residents to understand how hard NPDC should tackle water conservation.

This Water Conservation Consultation Document is intended to help determine which level of water use reduction is supported by the community:

- **Status Quo – continue with current total water consumption per person[14] trends.**
- **20% reduction in total water consumption per person.**
- **25% reduction in total water consumption per person.**
- **30% reduction in total water consumption per person.**

[14] Total water consumption per person is calculated by adding residential and non-residential consumption with leakage, and dividing this figure by the population served. This is the same thing as gross per capita consumption.

What level of water savings should we aim for?

Choices made now will have consequences, especially in terms of reducing future problems. These choices will also guide how much effort and resource we will apply to encouraging and supporting behaviour change, and to minimising water loss throughout the network. Each successive level increases water conservation activity, building on the actions of the level below. The more actions we take, the more water we will save.

To understand the economic implications of each proposed option, the Whole Life cost for a 30 year period was calculated for each savings level.

These costs include estimated capital (including upgrading the system) and operational expenses.

The whole of life calculations show that for each level of water conservation there are savings when compared to the status quo option, and these are listed in the following table.

Savings would be achieved primarily through deferring capital investment into the water infrastructure as the district's water use is lowered, and the existing water infrastructure stays viable for longer. In summary as the level of water conservation increases the cost and investment in water infrastructure will be less.

Water Conservation Options

Status Quo

Continuation of current water consumption trends and ongoing water conservation actions.

20%

This scenario looks to carry out foundational actions above and beyond the status quo to encourage a reduction in demand for water across user groups. Achieving a 20% reduction in water use would require significant investment and behaviour change, but represents the minimum change needed to protect the environment and postpone the need for a new water source. A Water Conservation Officer and Universal Water Metering are key actions here.

20% reduction in total water consumption per person – is expected to result in savings of $59.2M when compared to status quo.

25%

This scenario would increase the capacity of initiatives proposed for the 20% reduction as well as introducing pressure management in additional locations. A target of 25% savings would require greater community behaviour change, but would further increase our current water supply system's longevity, and safeguard the health of our rivers.

25% reduction in total water consumption per person – is expected to result in savings of $114.7M when compared to status quo.

30%

This scenario provides a framework for even more extensive water conservation improvements additional to the 25% level. It represents the most stringent course of action, and could be expected to reduce water demand by 30%. This option would allow us even longer to add a new water source to the supply system, while prioritising the environment and existing infrastructure. Additional initiatives include the My Council platform and support for tailored water conservation programmes by commercial users.

30% reduction in total water consumption per person – is expected to result in savings of $114.3M when compared to status quo.

Our Overall Target is to reduce water consumption throughout the district.

This will be achieved by reducing consumption in each of the four demand areas. The values of 'XX' Targets will be informed by the level of savings (status quo, 20%, 25%, or 30%) agreed to by Councillors, while working with local iwi and hapū, and gathering feedback from the general public.

See our overall target – Total water consumed per person reduces by XX% between 2016 and 2030.

All of this is underpinned by better Data Collection and Analysis.

Target 1

Reduce residential water consumption to less than XX L/P/D by 2030.

Target 2

Benchmark municipal consumption by 2025, and set reduction goals by 2026.

Target 3

Benchmark industrial and commercial consumption by 2025 and set reduction goal by 2026.

Target 4

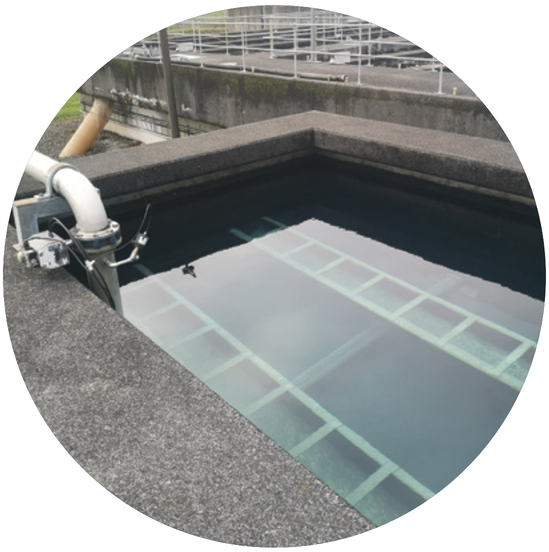
Reduce losses and leakages in the water network to less than XX L/Con/D by 2030 based on best practices.

The following table (Page 26) sets out the specific actions NPDC believes will enable us to achieve water savings.

It shows how water conservation actions will either be added or expanded as we move from the status quo through to higher levels of water savings.

Each action can be applied to one or more of the four demand areas (Residential, Municipal, Industrial and Commercial, and Leakages), and/or contribute to better Data Collection and Management.

In terms of timing, all the proposed actions are intended to happen in the short term (2021-2024) unless stated as longer term (2024-2031) initiatives.



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Water conservation options

Actions and Demand Area	*Status Quo*	*20%*	*25%*	*30%*
Data Culture change	● Scenario 1	● Scenario 1	● Scenario 1	● Scenario 1
Water Restrictions	● Scenario 1	● Scenario 1	● Scenario 1	● Scenario 1
Education / community engagement programme	● Scenario 1	● Scenario 2	● Scenario 3	● Scenario 4
Enforcement Action	● Scenario 1	● Scenario 2	● Scenario 2	● Scenario 2
Metering extraordinary connections	● Scenario 1	● Scenario 1	● Scenario 1	● Scenario 1
Leak Detection Programme (Long Term)	● Scenario 1	● Scenario 1	● Scenario 1	● Scenario 2
Water Conservation Officer	–	● Scenario 1	● Scenario 2	● Scenario 3
Universal Water Metering	–	● Scenario 1	● Scenario 1	● Scenario 1
Financial Support	–	● Scenario 1	● Scenario 1	● Scenario 1
Benchmarking Water Consumption	–	● Scenario 1	● Scenario 1	● Scenario 1
Clean Property Classification and resolve issue with data	–	● Scenario 1	● Scenario 2	● Scenario 3
Green Plumber	–	–	● Scenario 1	● Scenario 1
My Council (Long Term)	–	–	● Scenario 1	● Scenario 1
Create Standards for Rainwater Use and Grey Water Re-use	–	–	● Scenario 1	● Scenario 1
General Education and WC Programmes (Long Term)	–	–	● Scenario 1	● Scenario 2
Pressure Management (Long Term)	–	–	● Scenario 1	● Scenario 2
Volumetric Billing for Wastewater	–	–	–	● Scenario 1
Replacement of oversized meters	–	–	–	● Scenario 1

KEY

- – Action not implemented in this option
- **Scenario 1:** Action is implemented in this option
- **Scenario 2:** Additional resources (people or funds) are applied in this option **compared to Scenario 1.**
- **Scenario 3:** Additional resources (people or funds) are applied in this option **compared to Scenario 2.**
- **Scenario 4:** Additional resources (people or funds) are applied in this option **compared to Scenario 3.**

Actions in more detail

The water conservation actions available to help us achieve different reduction targets fall into five categories, and are described in more detail below:

1. Metering (note that metering is also a demand management tool, but considered separately because many of the other proposed actions are dependent on the data generated and is a successfully proved required action to reduce water use).
2. Data and Information.
3. Demand Management (excluding metering actions).
4. Network Losses Reductions.
5. Education and Communications.

1. Metering

Using meters to measure and charge for water consumption is the most important and effective element of the water conservation actions because so many other initiatives are dependent on the information meters provide. Whilst there are numerous water demand management methods that can be employed to achieve a reduction in water usage, these do not in general meet the criteria of being fair and equitable or reduce the daily peak water demands. Water metering, including volumetric billing, is the only action on its own that has been successfully proven to reduce water demand in other municipalities, being more effective in locking down the reduction when included as part of a wider water conservation programme. Specific future action could include:

Universal Water Metering

What is it?

Universal water metering involves measuring and charging based on water consumption for residential and restricted demand customers (those in rural areas where the water is trickle fed to a tank rather than straight to tap). This is in addition to the commercial and industrial customers that will be measured and billed based on consumption in the status quo option.

How will it support Water Conservation?

Universal Water Metering helps reduce domestic demand by giving users the data to understand and manage their consumption and by giving a financial incentive for using less. The additional data can also be used to optimise network management, leak detection and education initiatives.

Universal water metering is now common within New Zealand with over half of the population having a meter and paying volumetrically. Water New Zealand's National Performance Review for 2018/19[15] shows a strong correlation between metering and low per capita water consumption, with the best examples being Auckland, Tauranga and the Western Bay of Plenty, cities which have around half the residential per capita consumption when compared with New Plymouth. The same publication states that over half of residential properties in New Zealand now have a water meter.

Metering also delivers on social equity in the sense that users pay for their own water usage rather than subsidising the use of other consumers; it is so much fairer. Metering and charging for water use brings this utility into line with other domestic consumables such as electricity and gas.

[15] https://www.waternz.org.nz/NationalPerformanceReview

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2. Data and Information

More reliable and detailed data and information is needed to provide a clear view of supply, demand, losses and overall patterns of use. Data-related actions are highly interrelated, and all rely on meter-generated data. Specific actions include:

Clean Property Classification and resolve issues with data

What is it?

This suite of actions forms the basis for improving data collection, processing and analysis in a consistent and standardised manner. Process improvement has already started, with one important change being the move away from pen and paper recording (which is time consuming and vulnerable to errors), towards digital recording (which is faster, more accurate, and easier for staff and customers alike). Timely data editing where errors are uncovered will also be enabled. Moreover, all properties should be classified according to their demand area.

How will it support Water Conservation?

NPDC needs to understand as much about the water network as possible, as well as how effective water conservation initiatives are. This can only be achieved with a fit-for-purpose data management system, which is populated with high quality, up-to-date information that minimises any guesswork required to balance the network. Efficient processes would ideally translate into cost savings and smart outcomes.

Also, it is important for NPDC to have a single version of property type information, however, this is not currently the case. This information will be kept up-to-date in order to support NPDC's analysis of water use, as well as enabling decision-making based on a finer understanding of where and how water is being used.

Validating existing property connection information and amending incorrect data will create a strong foundation to work from.

Benchmarking Water Consumption

What is it?

NPDC aims to understand baseline water consumption, that is, how/when/where each of the four demand areas consume water.

How will it support Water Conservation?

It will be necessary to identify the most important measurements to focus on and track over time, and decide how the data will be analysed. Benchmarking is particularly useful for evaluating impacts resulting from new initiatives being applied.

The base data will enable new operational capabilities within NPDC, including:

- Alerts.
- Seasonal implications – for example, correlation with weather data.
- Forecasts – for example, usage and financial planning.
- Revealing water restriction compliance in order to support compliance actions.

Replacement of oversized flow meters

What is it?

Flow meters located in high flow areas such as intakes, reservoirs and main trunks are currently oversized for the normal range of flows they monitor, and as a result they tend to under-read water movement. These devices need to be replaced with more accurate meters.

How will it support Water Conservation?

Installation of appropriate flow meters will ensure more accurate data collection.

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3. Demand Management

An important way to conserve water is to influence human behaviour. This involves the application of selected tools and deterrents to encourage and support efficient and equitable use of water. Specific actions include:

Water Conservation Officer

What is it?

A Water Conservation Officer is recommended to oversee demand reduction across demand areas. This role will implement, benchmark and monitor and update NPDC's actions in this area, as well as actively search for potential new initiatives that could further reduce water use.

How will it support Water Conservation?

The Water Conservation Officer will support and guarantee the implementation of the Water Conservation Programme. This role will implement, benchmark and monitor and update Council actions in this area, as well as actively search for potential new initiatives that could further reduce water use focused on Municipal Buildings.

Enforcement Action

What is it?

Currently NPDC sends a warning letter to properties that are detected as being wasteful of water. However, after the letter is sent, there is no clear policy on next steps so the Council is in the process of updating guidance to enable sustained investigation of, and enforcement against, those who waste water.

How will it support Water Conservation?

The enforcement action will reduce the amount of wasted water.

Green Plumber

What is it?

This proposed service is a tool that will provide assistance to high use/waste residential properties. This is a support tool that NPDC will provide free of charge to help people to understand how they can reduce their water consumption by recommending plumbing related actions, sustainability and efficient appliances and performing flow and leak tests in properties. This action relies on metering data to identify residents and track progress and also could be requested on demand.

How will it support Water Conservation?

Working with residents in a collaborative way to educate them and encourage water conservation is expected to result in long-term behaviour change.

My Council online platform

What is it?

This software tool would give residents a portal through which they could log in to find their latest water meter readings to understand regular use and better manage their own consumption. Based on metering data, this is similar to what is available to many power customers with smart meters.

How will it support Water Conservation?

Founded on the idea that citizens with more information can be empowered to use water responsibly, this action aims to support self-responsibility. It would also enable NPDC to issue alerts and share forecasts for water consumption.

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Financial Support

What is it?

This initiative will provide financial support or incentives for consumers looking to make changes that support water efficiency. One example is expanding the Sustainable Homes Voluntary Targeted Rates Scheme to include water efficiency initiatives including fixing leaks. Also under this action is support for those for whom the change to universal water metering has a disproportionate impact such as large low income families.

How will they support Water Conservation?

Increasing the proportion of water efficient options in use across the district will reduce both individual and total water consumption.

Create Standards for Rainwater Use and Grey Water Re-use

What is it?

Where residents wish to use grey water and captured rainwater, NPDC could develop a set of standards to ensure this practice is carried out safely.

How will it support Water Conservation?

Using council-supplied potable water for activities such as watering gardens is a key contributor to peak demand during the summer months, which puts stress on the water network. Residential water capture and re-use has the potential to reduce peak demand especially during summer.

Volumetric Billing for Wastewater

What is it?

While wastewater is currently charged at a flat rate per household, this initiative would see it billed volumetrically based on the amount of water used. Universal water metering will need to be in place before this action can be offered.

How will it support Water Conservation?

This initiative adds to the financial incentive provided by universal water metering through extending the opportunity for reducing costs across both water and wastewater.

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4. Network Losses Reduction

Water loss from leaks wastes 15%-20% of all treated water produced. Early identification and remediation is expected to have a significant impact on overall water demand.

Leak Detection Programme

What is it?

A leak detection survey is already underway, however, there is the potential to expand this programme once meters are installed throughout the district, and the additional information provided can help with identifying losses or leakages.

How will it support Water Conservation?

Identifying unnecessary losses from the network and then partnering with property owners to fix leaks will lessen demand without the need for behaviour change, and remediation actions should have longer term impacts. This also furthers the goal of installing a water meter at every property in the district.

Pressure Management

What is it?

In addition to the suburbs already adjusted as described before, there are opportunities for pressure reduction in Waitara, around the Port, and in Glen Avon.

How will it support Water Conservation?

Any action that reduces the likelihood of water leakage will minimise this significant cause of water loss from the system, further, the lower flow resulting from reduced pressure incidentally reduces water consumption.

5. Education and Communications

Residents and organisations need more knowledge about how to better manage their use of water. Education and community engagement with a focus on residential users is an ongoing action, previously described, that can be considerably expanded as part of the different programme of options to achieve greater water savings and lockdown the gains.

General Education and Specific Water Conservation Programmes for Organisations

What is it?

This action supports organisations to manage their own water conservation. Further, supporting organisations to create their own water conservation programmes is being considered. Industries that succeed in achieving their water saving goals may be issued a 'badge' to acknowledge their efforts.

How will it support Water Conservation?

General education for industry and commerce, based on metering data, can reveal how water use is impacting their bottom line. Organisations are a significant user of clean water in New Plymouth, and supporting them to manage their own water consumption wisely has benefits for the network itself, as well as to the economic success of the district.

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