ASSET MANAGEMENT PLAN
WATER

2021

GREAT LAKE TAUPŌ
Taupō District Council
fresh thinking

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GREAT LAKE TAUPŌ
Taupō District Council

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Water Supply Summary

Introduction

Taupō District Council provides water for use by individuals, households, commerce, industry and firefighting. This water supply asset management plan enables Council to manage and demonstrate its stewardship of water assets on behalf of its communities in order to provide services cost-effectively, both now and into the future.

Strategic issues

Council operates within the context of these strategic issues:

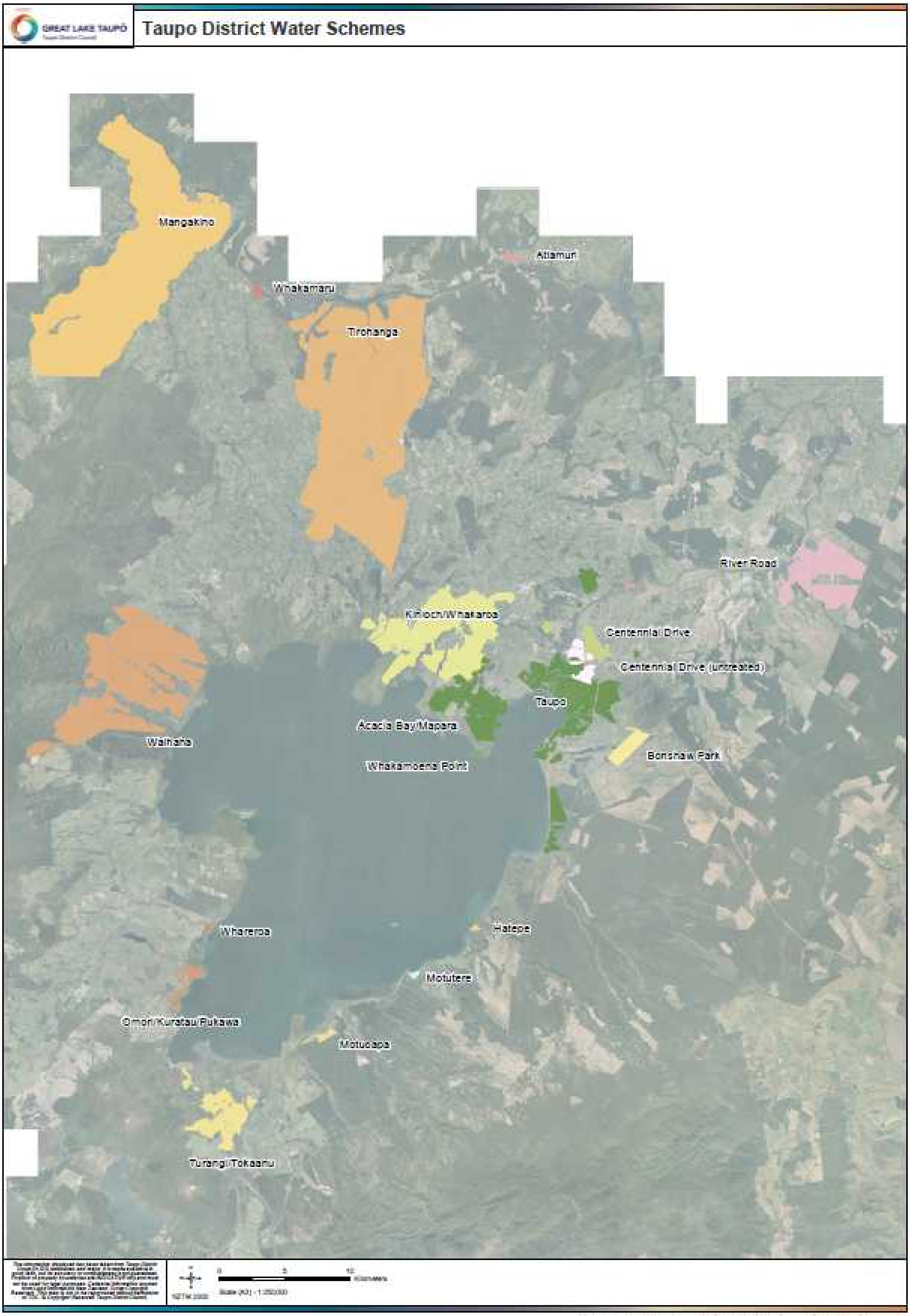
- Drinking water standards and the associated funding impacts (capex and opex) on communities
- Water allocation and water demand management
- The size and number of water schemes Council owns and operates, and the associated funding issues for Council.
- Providing for ongoing growth across our communities
- Ageing assets and corresponding construction renewal backlog
- Upcoming water reform and water regulation changes

Water supply assets

Council operates 18 water schemes for its communities, servicing most of the district's population. Collectively the assets for water supply have a replacement value of $128 million (Aug 2017). The water supplies and properties connected are displayed below.

Scheme / Zone	Properties Connected
Acacia Bay / Mapara Road	*Included in Taupo scheme
Atiamuri	76
Bonshaw Park	69
Centennial Drive (treated and untreated)	75
Hatepe	119
Kinloch / Whakaroa	1,348
Mangakino Township	765
Motuoapa	482
Motutere (campground only)	1
Omori/Kuratau/Pukawa	1,239
River Road	69
Taupō / Wairakei / Waitahanui	12,970
Tirohanga	106
Turangi Township/Tokaanu	2,417
Waihaha	31
Whakamaru	77
Whakamoenga Point	53
Whareroa	198
Total	**20,095**

There are a further 1,247 properties who have connections installed but have not yet connected or using the supply.


Taupo District Water Schemes
Mangakino
Whakamaru
Atiamuri
Tirohanga
River Road
Kinloch/Whakaroa
Centennial Drive
Centennial Drive (untreated)
Taupo
Acacia Bay/Mapara
Waihaha
Bonshaw Park
Whakamoenai Point
Whareroa
Hatepe
Motutere
Omori/Kuratau/Pukawa
Motuoapa
Turangi/Tokaanu

Communities that do not receive Council water supply within the District include: 5 Mile Bay, Waihi Village, Waitetoko, te Rangiita, Orutaua, Motutere Point, Mission Bay, areas of Motuoapa and Whakamaru, and some rural households with their own supplies. 5 Mile Bay, Waihi Village, and part of Whakamaru are planned for connection to Council water supply. Council has no plans to expand its supply network to the remaining communities at this stage.

Levels of Service

Council owns and operates its water assets so that it can provide water to its various communities to the required level of service:

- Drinking water provided by Council is safe to drink (compliance with the drinking water standards)
- There is sufficient capacity to meet current demands and future growth
- The reticulation system is maintained (water loss analysis)
- System failures are addressed in a timely fashion (response times)
- Users are satisfied with water supply
- Demand will be managed efficiently
- Water for fire-fighting in urban supply areas meets volume and pressure standards FW2

Water Supply Strategy

In 2019 Council adopted a new Water Supply Strategy. The Water Supply Strategy sets the direction on how Council will manage our drinking water supplies. The strategy sets 5 outcomes including:

1. We ensure the protection of public health
2. We recognise Te Mana o Te Wai
3. We use water responsibly and sustainably
4. We support the Communities Growth aspirations
5. We ensure that our water supply system is financially sustainable

Goals and responses are included within the strategy that describe how these outcomes be achieved. The Asset Management Plan looks to deliver on the outcomes of the Water Supply Strategy along with the direction set within other Council strategic planning documents such as the Infrastructure Strategy.

State of the assets

Water

Council's single-most important strategic asset is its water which is allocated by WRC, via consents. Council has water take consents to abstract water from lakes, rivers, streams and bores within the district for each of its supplies. Each consent has its own conditions, which must be met, monitored and reported.

Taupo District has relatively abundant natural water resources including rainfall averaging 1,100 mm/yr, the country's largest lake, significant rivers and easily tapped groundwaters and springs.

As water resources become fully allocated, there is a requirement to show water is being utilised efficiently. There will be increasing pressure to justify water take consents and increasing requirements to show the allocated water takes are being well managed.

Hence, with the growing regional and central government focus on efficient use of water resources, the responsibility falls on local authorities to demonstrate prudent management. Council has developed a Water Demand Management Plan (WDMP) as required under the Waikato Regional Plan.

Peak day water demand across the district is high, mainly because of large increases in population during events and holiday periods, as well as due to irrigation (gardens, golf courses, other recreation), and leaks from the system, (which may be on private property as well as within the public network).

While current consents provide sufficient water for the district, increasing demand for fresh water across the country means that new consents or increases to water takes within consents may be more difficult to acquire and demonstration of efficient use will be required.

Water treatment, reservoir and pump stations

Central government has set drinking water standards, requiring communities to have demonstrably safe drinking water by managing contaminations risks.

Taupo, Turangi and Mangakino have appropriate treatment to enable full compliance with the drinking water standards.

The remaining 15 water supplies require a solution to enable compliance with the requirements of the Health Act and drinking water standards. Projects to achieve compliance have been scheduled across years 1 to 4 of the LTP. Operational cost changes have also been planned as these upgrades occur.

Council also has a significant number of reservoirs and pump stations across the District. Many of the reservoir assets in particular are nearing end of life and an increased level of condition assessment is expected in coming years to enable maintenance and renewals programmes to be better informed.

Water reticulation

Reticulation assets include pipes (both gravity and pumping), fire hydrants, valves, water meters, and supporting infrastructure such as chambers and manholes. Water reticulation age and condition across the District is variable. There remains significant quantities of asbestos cement and galvanised pipelines, and associated infrastructure estimated to be beyond their useful life. The current construction backlog value is estimated at in excess of $30M. A large water reticulation renewals programme is planned in the LTP to reduce the construction backlog, corresponding potential for asset failures and the disruption and risks associated.

Demand forecast

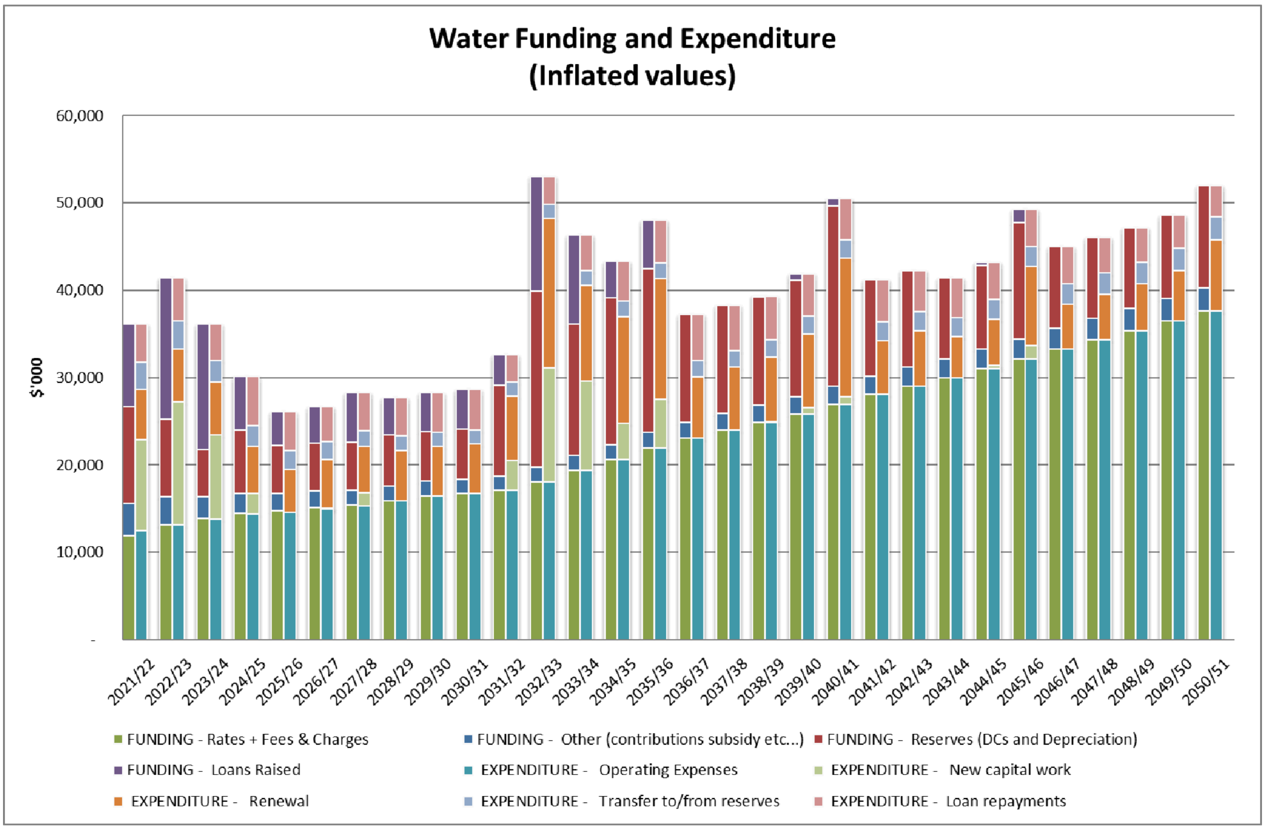
The recent review of the Council's growth model (water) projects at Council will be supplying water to a further 979 properties in the next 10 years. In the past couple of years growth has exceeded expectations and may continue to do so. As growth occurs Council is required to invest in the infrastructure to support this growth. Therefore Council must act to meet these demands and has done so by including specifc growth projects within the LTP. The growth rate at Kinloch has continued to strongly exceed the growth model. Therefore, timing of future growth projects in Kinloch are based on a greater growth rate than the growth model suggests.

Financials

The financial projections (most likely scenario) contained in the graph below for capital, renewal and operational expenditure are based on the following influences:

- The need to upgrade water treatment plants to comply with the drinking water standards.
- Ongoing growth and corresponding investment in infrastructure to support this growth.
- Significant renewal spending for underground assets and reservoirs.
- Tables and graphs below allow for inflation projections that are in line with those forecast by BERL for LGCI over the 30 years.

The total projected spend over the next 30 years for water is outlined in the following graph.



New works

The significant portion of new works is associated with meeting drinking water standards compliance for our water supplies. This includes membrane plant upgrades at Kinloch, Omori, Hatepe, Motuoapa and Centennial; UV plant upgrade at Motutere Point; connection of Whakamoenga Point and Bonshaw Park to the Taupo water scheme; bore head improvements at Atiamuri, Whareroa and Whakamaru; general improvements at Turangi and Mangakino; and cyanotoxin treatment at Taupo.

Council will also be extending the Turangi water network to service Waihi Village, and the Whakamaru network to currently un-serviced parts of the township in new works projects.

There will also be significant new works required to keep up demand on services due to growth. These projects include; new reservoirs in Kinloch and Taupo and pipeline upgrades in Taupo across the Control Gates bridge, and in Richmond Heights and and Wairakei.

Renewal

Of the $49.3 million dollars allocated to water renewals over the next 10 years approximately $38 million is for water pipe renewals with the remaining being primarily treatment plants, and pump stations.

Operations & maintenance

Operations and maintenance costs are projected to average $6.7 million per year for the next 10 years, which is 40% higher than the past 3 years. The increased operations costs are required to meet:

- Increased costs to operate and maintain more sophisticated treatment facilities.
- Increases in expenditure on network operations e.g. pipe flushing program and back flow protection checks.

Risk management

Risk management is essential for management of Council assets so that essential services such as water supply can be provided consistently. Council imposes high health and safety standards for its plant and network, especially where water treatment plant or pump stations are built on low-lying land near lakeshores or riverbeds, or volcanic and/or seismically unstable areas lie just offshore. Using a likelihood and consequence matrix to assess risks, the following high risks have been identified:

- Public safety matters related to inadequate water treatment
- Fire, damaging the reticulation network due to structural/electrical damage to the water treatment plants or pump stations
- Earthquake, damaging water treatment plants, and possibly also causing electrical or electronic failures, and/or structural and mechanical damage
- Flooding, making water treatment plants inaccessible or making them inoperative because of damage or tank contamination.
- Tomos, causing breaks in the reticulation system
- External contractor failure, leading to failures in the network, service failures, and /or drinking water standard failures

All of these risks have potentially serious consequences for the District's population, and for the District's economic wellbeing because they jeopardise the District's reputation and therefore, the visitor industry.

Technical Notes

Asset Management Practices

Council uses a range of decision making tools to establish its maintenance, renewal and new works expenditure, including: process, analysis and evaluation techniques for life cycle asset management; information systems to store and manipulate data; and data and information analysis from a number of sources (technical, financial, customer service)

Improvement Programme

Councils are required to have improvement programmes to improve their asset management planning. Improvement actions are documented, and Council staff work through the actions during the development of the plan.

International Infrastructure Management

The plan is considered an intermediate plan based on the requirements of the International Infrastructure Management Manual. This plan incorporates recommendations from the last review carried out by Waugh Infrastructure Ltd in 2018.

Changes Post Consultation

The following changes have been made to the draft Asset Management Plan following the public consultation process and subsequent Council deliberations.

- Inclusion of $30,000 operational funding in Year 1 for a scoping exercise relating to providing Motutere Point, Waitetoko and Tauranga Taupō to Council water supplies.
- Inclusion of $50,000 for a scoping exercise on connecting unconnected marae to Council water supplies.

1.0 INTRODUCTION

1.1 Background

1.1.1 PURPOSE OF THE PLAN

Taupo District Council is responsible for managing a range of community owned assets such as the Water supply network. To ensure all these assets are managed in an efficient and affordable way asset management plans are required.

This Water supply Asset Management Plan (WAMP) details how the water supply infrastructure assets that are owned by the community will be managed in a conscientious manner to cost effectively meet the needs of the community.

Council manages approximately $128 million dollars of water supply infrastructure assets on behalf of the community. These assets are summarized in asset data section. The value of assets is based on the valuation completed August 2017 and adjusted annually to 2019.

The size of the water supply network investment, importance of water supply services to the community and requirements of legislation, drives a demand for excellence in the management of these assets. The community expects the water supply network to be managed optimally, to provide secure and safe water, within the agreed levels of service, while minimising costs of the service.

The overall purpose of asset management planning is:

"To meet a required level of service in the most cost-effective way (through the creation, operation, maintenance, renewal and disposal of assets) to provide for existing and future customers".

This asset management plan (AMP) is the tool for combining management, financial, engineering and technical practices to ensure that the level of service required by customers is provided at the lowest long-term cost to the community. The plan is intended to demonstrate that Council is managing the assets responsibly and that customers will be regularly consulted over the price/quality trade-offs resulting from alternative levels of service.

The main benefits derived from asset management planning are:

- Improved understanding of service level options and standards.
- Minimum lifecycle (long term) costs are identified for an agreed level of service.
- Better understanding and forecasting of asset related management options and costs.
- Managed risk of asset failure.
- Improved decision making based on costs and benefits of alternatives.
- Clear justification of forward works programmes and funding requirements.
- Improved accountability over the use of public resources.
- Improved customer satisfaction and organisational image.

A fundamental objective throughout the preparation (and future review) of this plan will be to identify potential opportunities for reductions in asset lifecycle costs.

The overall responsibility for water supply asset management and the update of the Asset Management Plan at TDC, sits with the Asset Manager Water (AM). The AM plans and implements the capital programme as well as renewals programmes across network assets. Lifecycle management plans for each water scheme are updated by the AM for inclusion in the AMP document.

The AM works closely with the Operations Manager 3 Waters (OM) who manages the operation and maintenance of all water assets as well as renewal planning and implementation for water treatment assets.

Senior Leadership and Elected Member (Councillor) involvement is through the review and approval of the AMP document, LTP and annual plan process. All AMPs are formally updated on a 3-yearly basis, which coincides with the LTP review cycle.

This Asset Management Plan has been updated internally by the Asset Manager Water, building on the existing 2018 AMP document. Data has been collated and updated using the AMS and recent asset valuation data. Contributions for this plan have also been made from water team staff, asset managers from other service areas & other engineering officers within the Infrastructure division. Financial updates have been provided by TDCs finance team.

1.1.2 LEGISLATIVE REQUIREMENTS FOR ASSET MANAGEMENT PLANNING

Section 10 of the LGA states the purpose of local government is to:

- to enable democratic local decision-making and action by, and on behalf of, communities; and
- to promote the social, economic, environmental, and cultural well-being of communities in the present and for the future.

The recent focus on AM planning, results from the Local Government Amendment Act 2002, November 2013 amendment and subsequent amendments. The Act places an emphasis on strategic financial planning and requires local authorities to:

- Prepare and adopt a Long-Term Plan (LTP) with a 10-year planning horizon every three years, taking into account asset creation, realisation, and loss of asset service potential.
- In determining their long-term financial strategy, consider all relevant information and assess the cost/benefit of options.
- Manage assets prudently, in the interests of the district and its inhabitants and ratepayers.
- Clearly identify significant forecasting assumptions and risks underlying financial estimates.
- Identify any significant negative effects that any activity within the group of activities may have on the social, economic, environmental, or cultural well-being of the local community.

The preparation and implementation of an AMP from which long-term financial strategies will be developed, is a means of TDC complying with these requirements.

It is also important to highlight Section 17A of the LGA which requires local authorities to review the cost-effectiveness of current arrangements for meeting the needs of communities within its district or region for good-quality local infrastructure, local public services, and performance of regulatory functions. This section applies to the regular review of for instance the delivery of 3 waters services.

1.1.3 THE HAVELOCK NORTH OUTBREAK, GOVERNMENT 3 WATERS REVIEW AND REFORM

The outbreak of gastroenteritis in Havelock North in August 2016 shook public confidence in the fundamental service provision of safe drinking water. Approximately 5,500 of the town's 14,000 residents were estimated to have become ill with campylobacteriosis. Some 45 were subsequently hospitalised and the outbreak contributed to four deaths. A number of residents continue to suffer health complications.

A Government Inquiry was established to investigate and report on the outbreak. The final reports of the Inquiry contained comprehensive, wide-ranging and powerful recommendations for improvement to water supplies across New Zealand.

The Three Waters Review, a cross-government initiative led by the Minister of Local Government began in mid-2017 and was run in parallel to the Inquiry. The findings of the Review were consistent with many of the Havelock North Inquiry's findings and raised broader questions about the effectiveness of the regulatory regime for the three waters, and the capability and sustainability of water service providers.

At the time of writing this AMP the Government had started the establishment of a new drinking water regulator (Taumata Arowai), including the introduction of the following two Bills to Parliament:

- The Taumata Arowai - Water Services Regulator Bill, which sets out Taumata Arowai's objectives, general functions, and operating principles, and establishes Taumata Arowai as a Crown agent.
- The Water Services Bill whichdetails the new drinking water regulatory system, and provisions relating to source water protection and Taumata Arowai's wastewater and stormwater functions.

In addition, the Government announced an opt-in 3 waters reform programme, to address the service delivery and funding findings from the review and inquiry. An initial funding package (Tranche 1) of $761 million was made available to provide immediate post-COVID-19 stimulus to local authorities to maintain and improve three waters infrastructure, support reform of local government water services delivery arrangements, and support the operation of Taumata Arowai.

To receive Tranche 1 funding TDC was required to sign a non-binding MOU to share information and participate in the reform programme. TDC will receive $8.32M of funding that will be used to deliver 3 waters projects across the District during 2020 and 2021.

An indicative programme for the second and third phases of this programme is included below. Extra stimulus is expected at each stage however to receive the stimulus Councils are expected to have to opt-in to the establishment of a new multi-regional delivery entity, in Tranche 2, and to handover asset ownership and service delivery in Tranche 3.

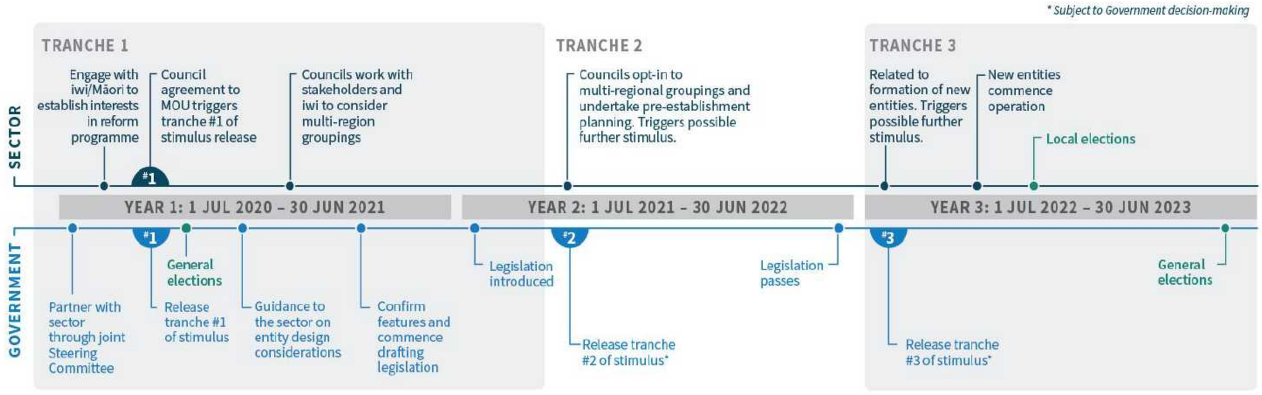


Figure 1.1: Indicative Government 3 Waters Reform Programme

1.1.4 LEGISLATIVE DOCUMENTS

The key legislative documents relating to the management of water service assets are listed in the following table.

Table 1-1: Relevant Legislation

Local Government Act 2002 and Amendments	The LGA empowers local authorities to carry out various water works but does not require them to do so. The Act requires public consultation. Regular review of service delivery is required, as stipulated on Sect 17A
Health Act 1956	Requires Council to: • provide 'sanitary works', the definition of which includes waterworks and includes all lands, buildings, machinery, reservoirs, dams, tanks, pipes and appliances used in connection with any such works. • ensure the provision in any dwelling house of an adequate and convenient supply of water that is potable, and available for the inmates of the dwelling.
Health (Drinking Water) Amendment Act 2007 and 2019	The summary of the activities required by council under HDWAA 2007 as below: • Register drinking water supplies operated by the Council. Ensure details on register are kept up to date. (Includes networked supplies and community purpose self-supplied buildings.) • Take all practicable steps to ensure each supply provides an adequate supply of water to each point of supply. • Take reasonable steps to protect source water. • Take all practicable steps to comply with the drinking water standards including: ▪ Ensuring MAVs are not exceeded ▪ Monitoring water in accordance with the standards ▪ Ensuring samples are analysed by a MoH recognised laboratory ▪ Identifying required level of protozoa treatment ▪ Undertaking a catchment survey ▪ Issuing plumbosolvancy notices

	▪ Keeping records ▪ Take action if standards are breached • Prepare a water safety plan which: ▪ Identifies risks in each water supply ▪ Identifies the critical points in each water supply ▪ Identifies ways to prevent, reduce and eliminate risks ▪ Provides information about the costs and benefits of preventing, reducing and eliminating risks ▪ Includes a timetable for managing the public health risks identified in the supply • Implement the water safety plan. • Keep records to indicate compliance with the Act (and standards). • Investigate complaints about the quality (including wholesomeness) of water provided and record outcomes. • Provide assistance to drinking water assessors. • Assess water supplies serving self-supplied buildings if the territorial authority is advised by MOH of poor-quality drinking water at the building, warn users of the building and take any other action to remedy the situation. • Where the water supplier considers there is a risk of backflow, install a backflow device or require the owner of the property to install a backflow device. • Ensure each backflow device is tested annually. • Ensure any person taking water from a fire hydrant (except the fire service) has written approval and has been assessed as competent to do so. A high-level summary of changes made in the 2019 amendment include: • remove requirements for the Ministry of Health to consult for 3 years and gazette changes for 2 years prior to making any changes to the drinking-water standards: • clarify that water safety plans must include timetables to implement measures that mitigate risks to drinking water: • streamline processes for the appointment of drinking-water assessors: • remove unnecessary references to designated ports and airports.
Taumata Arowai–the Water Services Regulator Act 2020	The purpose of this Act is to establish Taumata Arowai–the Water Services Regulator and provide for its objectives, functions, and governance arrangements.
Resource Management Act 1991	Requires Councils to: ▪ sustain the potential of natural and physical resources to meet the reasonable foreseeable needs of future generation ▪ comply with District and Regional Plans ▪ avoid, remedy or mitigate any adverse effect on the environment. ▪ take into account the principles of the Treaty of Waitangi in exercising functions and powers under the Act relating to the use, development, and protection of natural and physical resources

	▪ Comply with resource consents issued by the Waikato Regional Council for abstraction of water, protecting & maintaining source structure and maintain daily volume of water taken as per variation 6.
Other Acts and Regulations	• Hazardous Substances and New Organisms Act 1996 • Building Act 2004 • Food Act 1981 • Public Works Act 1981 • WorkSafe NZ Act 2013\ • Health & Safety in Employment Act 2015 • Heritage Pouhere Taonga Act 2014 • Civil Defence Emergency Act 2002 • Public Bodies Contracts Act 1959 • TDC Water Supply Bylaw 2015 • Fire and Emergency Act 2017 • Utilities Access Act 2010 • NZ Firefighting Water Supplies CoP SNZ PAS 4509:2008 • NZ Metadata Standards 2017

1.1.4.1 Water and Sanitary Assessment

A Water and Sanitary Assessment was undertaken in 2008 and 2017.

1.1.5 RELATIONSHIP WITH PLANNING AND STRATEGIC DOCUMENTS

The way in which asset management planning links the strategic planning process with operations and annual plans is illustrated below.

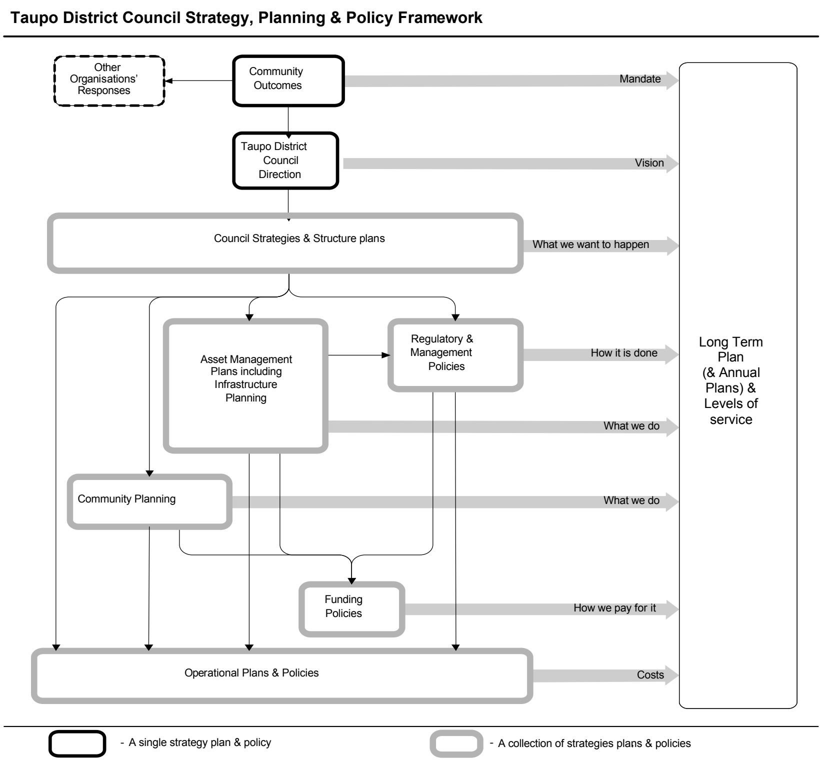


Figure 1.2: Council Planning Framework

AMP's are tactical plans for achieving strategies resulting from the strategic planning process. AMP's are a key component of the council planning process linking with the following documents.

LTP: LTP sets the strategic direction for the Council and is the overarching planning tool which describes the activities the Council will undertake to deliver. It identifies the outcomes the community would like to achieve. It also contains the financial forecast for the next 30 years. This financial forecast is drawn from the AMP.

Annual Plan: This is prepared for year two and three of the LTP period and sets out how Council will undertake its strategic goals and details the specific activities and functions. The works identified in the AMP should automatically become the basis on which future LTP's and annual plans are prepared.

District Plan: The District plan incorporates policies and objectives for land use in Taupo district and is an implementation tool used to protect values and outcomes important to the community. This plan provides a policy framework to guide where and how the future growth should occur. The water supply network is essential services and people into, out of and through the District and provides for the economic and physical wellbeing of the community. The water supply network and treatment plants including boosting pump stations provide the principal water infrastructure for the District and are physical resources of strategic importance which need to be protected from activities which may have an adverse effect on their safe and efficient operation.

Business/Activity Plans: The service levels policies, processes and budgets defined in AMPs are incorporated into business plans as activity budgets, management strategies and performance measures.

Contracts: The service levels, strategies and information requirements contained in AMPs are translated into contract specifications and reporting requirements.

Legislation: The AMP must comply with all relevant legislation and provide the means of meeting legislative requirements.

Bylaws, standards and policies: These tools for asset creation and subsequent management are needed to support AM tactics.

Waikato Regional Council Policy: These references give the policy framework and give effect to the preferred strategic direction for implementation of Resource consent conditions and what level of water demand management plan the region wants, in meeting RMA objectives. Other consent conditions such as screen sizes at source and monitoring of source water abstraction rates and volumes are linked also. The Waikato Regional Council prepared and notified a variation to the Waikato Regional Plan to manage the allocation and use of freshwater over the entire Waikato region. The impact of variation 6 on council would result in more complex conditions for reporting to demonstrate the efficient allocation and use of water, so that WRC can manage water shortage conditions fairly in entire region.
The regulation requires to take continuous measurement and also keep daily records of water take in auditable format. The data provided to WRC should be in a form suitable for electronic storage.

Water Supply Strategy: In 2019 Council adopted a new Water Supply Strategy. The Water Supply Strategy sets the direction on how Council will manage our drinking water supplies. The strategy aims to clearly set out; how the Water Supply Strategy will help to achieve the Council vision; the outcomes that we want to achieve for our drinking water supplies; goals and responses which describe how we will achieve the outcomes. The strategy sets 5 outcomes including:

1. We ensure the protection of public health
2. We recognise Te Mana o Te Wai
3. We use water responsibly and sustainably
4. We support the Communities Growth aspirations
5. We ensure that our water supply system is financially sustainable

Specific asset management goals and responses are included within the strategy including to ensure that robust forward planning is in place, to have in place an asset management plan and practises that achieve Intermediate Status by 2022, and to ensure that Asset Condition data is collected, stored and utilised in line with best practise.

Infrastructure Strategy: The Infrastructure Strategy helps the Council and community to make informed choices about major decisions and investments that will need to be made for its infrastructure. The strategy presents key themes and issues facing our infrastructure and then discusses options available to respond to the issues. Of importance for the water supply AMP the infrastructure strategy selects options that support growth and development, supports water safety and water demand management planning.

Water Demand Management Plan: Council recognises the importance of managing water demand. The Water Demand Management Plan was reviewed in 2016 and is planned for review during the 2020/21 financial year, to meet the resource consent conditions.

Water Safety Plans: Council also has prepared Water Safety Plans for each water supply and these plans outline the upgrades required for each scheme to meet the drinking water standards. These plans are updated every 5 years or following any major change to a scheme as required by legislation.

Stormwater and Wastewater Asset Management Plan: The Stormwater and wastewater assets are vaguely interlinked with water assets. The boundary between these assets types are clearly defined within the respective asset management plan. Water intake pump station soak pits and leads are considered to be water assets. All costs associated with those catch-pits and leads, e.g. operational costs of cleaning sediment from pump station soak pits are included in the Water AMP. Catch-pits and leads outside these areas are included within the Stormwater AMP. Similarly, backflow preventers installed at the boundary of wastewater facilities are considered water assets, whereas backflow preventers inside these facilities are considered wastewater assets.

Parks and open space Asset Management Plan: Community facilities have three areas where assets overlap and these are: reticulation pipes / valves; reservoirs; and pump stations on reserve land.

Growth Management Strategy 2050: At the core of Taupo District 2050 are 12 Strategic directions. These provide the framework of interrelated policies that guide decision making and growth-related issues. Strategic direction 4.5 and 8 relate to Water AMP (refer page 5,6 & 7 of

GMS). The growth model was updated for the 2018 LTP. Council has also developed a 'demographic snapshot' to improve our understanding of our future demands and forward planning.

Structure Plans: Adopted and proposed structure plans outline how growth is to be managed within areas - Taupo Urban Structure Plan (TUSP), Taupo Town Centre Structure Plan (TTCSP), Commercial Industrial Structure plan (CISP), Kinloch Community Structure Plan (KCSP), Mapara Valley Structure Plan and Southern Structure Plan.

1.2 Key Stakeholders

This AMP recognises the following as key stakeholders:

Table 1.2: Key Stakeholders

External	Internal

• The community, including citizens, ratepayers and Iwi
• Residential, commercial and industrial water service users
• Large Water Users (>50m3/day)
  ○ Tenon
  ○ DOC
  ○ TDC
  ○ Hautu-Rangipo Ltd
  ○ Contact Energy
  ○ Fletcher Building
  ○ Rotarangi Anthony Ralph Matara
  ○ L&P Lusty
  ○ BUPA Retirement
• Waikato Regional Council
• Ministry of Health
• Taumata Arowai
• District Health Board (DWA)
• Fire and Emergency New Zealand
• After hours response contractors
• Government agencies (e.g. MBIE, Ministry for the Environment, Audit NZ, Department of Conservation)
• Tangata Whenua, Tuwharetoa Maori Trust Board, Taupo Nui-a-Tia Management Board
• Lakes and Waterways Action Group
• Water NZ
• IPWEA
	• Councillors and community boards
	• Senior Leadership Group
	• Asset Management staff
	• Treatment Plant Operations staff
	• Senior compliance officer
	• Development Engineer
	• Corporate Finance Team including rates staff
	• Policy staff
	• Roading/ Transportation staff
	• Facilities management staff
	• Parks and reserve staff
	• Information Technology Team
	• Strategic Relationships Manager
	• Corporate Communication Team
	• Internal auditor
	• Maintenance contractors
	• Council consultants/ professional service providers

1.3 Purpose of Ownership

One of the biggest contributors to public health is having a clean reliable supply of water for drinking and cleaning purposes. Water supply is a core council service, and TDC has historically developed and taken ownership of water supply assets to meet the public health outcomes desired by the community and or legislation. More details of the historical ownership of water supply assets are included in the life cycle section of this WAMP.

In addition to the public health benefit, the water supply assets also provide the Fire and Emergency New Zealand with a source of water for fire fighting, thereby improving public safety and minimizing property damage as a result of fire. The fire classification is continually assessed and reviewed based on the cost to service.

The water supply assets are owned by the community they serve. The Local Government Act 2002 (LGA) has clearly signaled that such an ownership arrangement should be retained for the foreseeable future. It is likely that asset ownership will change as part of water reform in the coming years. The government has made it clear that new water service entities would be asset owning and publicly owned, with a preference for collective council ownership.

1.3.1 TDC ORGANISATIONS VISION, MISSION, OBJECTIVES, GOALS

Taupo District 2050 District Growth Management Strategy

TD2050 provides a policy framework to guide where and how future growth should occur and identifies a series of actions to achieve this desired pattern of urban growth.

At the core of TD2050 are Council's vision and core values, Council vision and core values.

> *"TD2050 will help contribute to the overarching Council Vision to be: The most prosperous and liveable district in the North Island by 2022".*

Council's Vision and Values have been translated into seven strategic directions related to the ongoing management of growth:

1. *Plan for a district characterised by contained urban communities, bordered by a productive, functional rural environment*
2. *Design and plan compact, walkable and adaptable urban areas*
3. *Create vibrant, diverse places and spaces where people love to live, work, play and invest.*
4. *Recognise tangata whenua cultural identity and build strong, collaborative relationships*
5. *Provide the platform for a sustainable economy*
6. *Integrate sustainable infrastructure provision, land use and funding.*
7. *Manage development to enhance and protect the natural environment*

These provide the framework of interrelated policies that guide decision making on growth related issues.

Census data has shown that Taupo's population has grown by 13% between the 2013 and 2018 census. This is much greater growth than was expected over this period. Taupo's population is likely to continue to grow and put greater needs of TDCs three waters assets.

1.3.2 ASSET MANAGEMENT'S CONTRIBUTION TO CORPORATE OBJECTIVES

Council's goal, as set out in the LTP relating to the water supply scheme is to provide safe, cost effective, sustainable and reliable drinking water, which is compliant with the DWSNZ.

1.4 Assumptions

1.4.1 FINANCIAL

The following financial assumptions have been made. Further information can be found in the LTP document.

Table 1.3: Financial Assumptions

Assumption	Potential risk	Mitigation measure
1. Asset valuations used though out are as at June 2020.	Time between AMP completion and last revaluation	Council undertakes an annual price variance assumption report
2. The revenue received from Rates meets the expectation. Investment Returns eventuate as predicted.	Not the required funds to undertake capital works	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
3. Interest Rate on borrowings remains as predicted within the financial model.	Not the required funds to undertake capital works	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
4. Expenditure of capital projects occurs, and estimated debt levels are as predicted	Potential under performance in capital spend reflected in Council revenue	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
5. No allowance has been made for inflation adjustment within this AMP. The source of funds for the future replacement of significant assets is stated in the revenue and Financing Policy.	Under funding of cost centre	Finance team make allowances for GST and inflation in funding plan and policy
6. The useful lives of significant assets are as per the accounting policies documented in the TYP. Depreciation is charged at 50% for the first year and 100% in subsequent years.	Asset lives have been incorrectly calculated meaning a funding shortfall	Council has asset depreciation checked externally. Asset lives are compared to the latest asset information nationally
7. Levels of service and funding has been based on historic data	The community desires changes to level of service which are not reflected in this document.	Council undertakes pre LTP consultation to gauge the community for different service level needs. Council undertakes consultation with the community as part of the development of this LTP document
8. Allowance has been made for vested assets	The level of allowance for vested assets is incorrect.	Councils LTP and annual plan spend can be adjusted annually to meet Councils

Assumption	Potential risk	Mitigation measure
		revenue and finance policy
9. Assume that the revenue received from Rates is as per expected.	A shortfall in rates funding	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
10. Assume no costs associated with infrastructures on the lakebed	An increase in unbudgeted operational cost	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy.
11. Development Contributions will continue to be collected.		

1.4.2 NON-FINANCIAL

Table 1.4: Non-Financial Assumptions

Assumption	Potential risk	Mitigation measure
1. Assume that growth is going to occur (creation of dwellings) as per the Growth Model predictions.	Changes in growth will impact capital and operational spending	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
2. The Water abstraction volumes requirements will remain within the framework of the resource consent conditions. TDC shall be successful in environment Court hearing processes to provide adequate water to all users of Municipal water supplies, including securing capacity for growth in commercial and industrial sectors. In general, RPV6 will not impact on our ability to supply for all users of the Municipal Supply network	Changes to abstraction volumes through the resource consent will require an increase in operational and capital expenditure	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
3. Contractors will be available for the development and construction of projects.	A shortage on contractors for project completion will mean an increase in project cost	Council can extend tender periods to enable contractors more time to schedule in works.
4. There will be continued growth in public participation in the democratic process and Council will need to respond to this growth.	Increased growth in participation could result in changes in levels of service delivery.	Councils LTP and annual plan spend can be adjusted annually to meet Councils revenue and finance policy
5. There will be no unforeseen legislative changes or central government policy changes	Changes in legislation could impact on the funding levels	Changes in legislation have an implementation period to enable Councils to plan

Assumption	Potential risk	Mitigation measure
that will affect this asset.		
6. Economic and labour market constraints may have a direct effect on recruitment.	If Council is unable to recruit to the required level to complete the works program for the year this could have impact on Councils credibility	Council may have to hire consultants to provide support; this could increase the cost of service delivery which will need to be funded through the annual plan process.
7. That Councils resource consents for its activities will be renewed as required.	The renewal of resource consents will depend on Councils prior performance in meeting the conditions of the existing consent and any changes in legislation	Council works closely with the Regional council to achieve consent compliance. Compliance is also a staff performance criterion, so Council is focused on consent compliance and it is considered that any consent related issues can be resolved.

1.5 Significant Negative Effects to Providing the Water Service

In general, providing safe drinking water to the community has both public health and environmental benefits.

There are however negative effects in providing this service, these include;

Table 1.5: Negative Effects to providing the Service

Negative Effect	Mitigation measure
The risk of contamination and or loss of supply of a water source.	Water safety plans and water demand management plans kept up to date. Operational procedures, trained staff, business continuity and emergency planning.
Risk of water abstraction volumes getting reduced and difficulty in managing the implementation of demand management plans.	Clear justification of water take volume requirements to match growth forecasts. Water demand management planning in place. Good customer communications.
The cost of providing the service on rate payers, especially smaller communities	Planned District wide rating to improve affordability (consultation part of 2021 LTP)
The cost of keeping up with DWSNZ compliance requirements, requiring significant capital investment.	Public health projects must be prioritised Planned District wide rating to improve affordability (consultation part of 2021 LTP)

To mitigate the significant negative effects council undertakes proactive planning for all aspects of delivery of the service.

1.6 Asset Management Plan Complexity

1.6.1 OUTLINE OF APPROACH

Core asset management practice is basic technical asset management planning undertaken at a level designed to meet minimum legislative and organisational requirements for financial planning and reporting. 'Core' practice provides technical management outputs for current levels of service, demand management, asset lifecycles, asset forward replacement programmes, new capital expenditure and associated cash flow projections.

Intermediate asset management practice is undertaken at a level between 'Core' and Advanced'practice. The focus is to build on the basic technical asset management planning of Core practice by introducing improved maintenance management and more advanced asset management techniques (as appropriate). Further use is made of risk management, asset lifecycle management, and service standard optimisation techniques.

Advanced AMP's identify processes to optimise lifecycle AM strategies and provide a greater degree of confidence in the resulting cash flow predictions. Advanced AM functions include predictive modelling, risk management, optimised renewal decision making (ORDM) and service level reviews. Advanced AMPs include the following:

- Prediction of future demand
- High knowledge of assets owned, including condition assessment and performance
- Knowledge of current utilisation and ultimate capacity
- Ability to predict failure modes
- Ability to analyse alternative options
- Ability to optimise maintenance and operational activities.

The Water Asset Management Plan 2021 follows the IIMM framework and it has been developed and collated internally by the Infrastructure team. It is considered to reflect an "Intermediate" level of development while additionally including the use of some more advanced tools relating to long term programming and pricing renewal projects.

1.6.2 AMP REVIEW BY COUNCIL

The involvement by councillors, including the reviewing and approving of the AMPs is briefly outlined below:

- Workshops are held with the council for group of activities including AMPs which gives them following information
    - What we do
    - Key issues
    - The service(s) we provide
    - Levels of service, performance measures and targets
    - Key projects over the next three years
    - Who pays?
    - Fees and charges
    - Financials
        - Capital expenditure (including renewals)
        - Operating expenditure

- Draft AMPs are provided to councillors to view
- Council finally adopts the AMP

1.6.3 LIMITATIONS OF THIS AMP

As it currently stands, this AM Plan has limitations in the following areas:

- Council funding constraints is likely to result in adjustment to proposed capital programme timeframes.
- Level of service has not been fully consulted on for this AMP
- The asset register is still split between Assetfinda and spreadheets
- Uncertainty around growth numbers. The growth projections need to be reviewed prior to future AMPs.

1.7 Organisational Structure

Taupo District Council has a flat organisational structure. The water services in the District are managed as follows:

- The Head of Operations reports direct to the CEO and has overall responsibility for District infrastructure planning and service delivery.
- The Infrastructure Manager has responsibility of the Three Water's Asset Management in the District and reports to the Head of Operations.
- The Asset Manager is responsible for the strategic planning, asset management, policy planning, and review and improvement planning for meeting compliance with legislation for the service.
- The Development Engineer(s) ensures all vested assets including reticulation, treatment plants, and pump stations conforms to TDC's Code of Practice. The Development Engineer(s) also manage the delivery of engineering advice information to internal and external customers.
- The Senior Monitoring and Compliance officer is responsible for collating all operational and analytical data required for reporting to the District Health Board and Waikato Regional Council to demonstrate compliance for three waters, in consultation with the 3 Waters Operations Manager and Asset Manager.
- The 3 Waters Operations Manager, also reporting to the Head of Operations, has responsibility for operation and maintenance of treatment plants and the supply network including pump stations and reservoirs, some of which is delivered through service delivery contracts. Developing and reviewing operational management plans are also part of the Operations Managers responsibility.
- The Network Engineer(s) is responsible for monitoring KPI of maintenance contractor(s) and responding to service requests and maintenance queries. The responsibility extends from the treatment plant outlet to the connection point. The Network Engineers(s) manage the approval process for all connections to the Three Water's asset network.
- The Asset Manager Stormwater and Solid Waste also fill the role as Asset Management Team Leader, leading internal asset management team meetings to improve knowledge sharing, and provide guidance and support in the improvement of asset management practices across the organisation.

In addition to the Infrastructure and Operations Team members above, the water supply activity is also able to utilise the following in-house resources:

- The Finance Team assists with the development of Asset Management Plan financials;
- IT Team for assisting with development, management & maintenance of communication, geospatial and database systems.
- Customer Service Team for assisting with front line calls, requests and complaints.
- The Policy Team assists with LTP development, public consultation activities, and policy advice and guidance.
- The Facilities Team assists with the management of water supply building maintenance activities.
- The Parks Team provide maintenance services for some of the water supply reserves and provide additional resources when required for emergencies e.g. support with door knocking following water incidents.

The organisational structure of the Infrastructure and Operations teams is illustrated in the following figures.

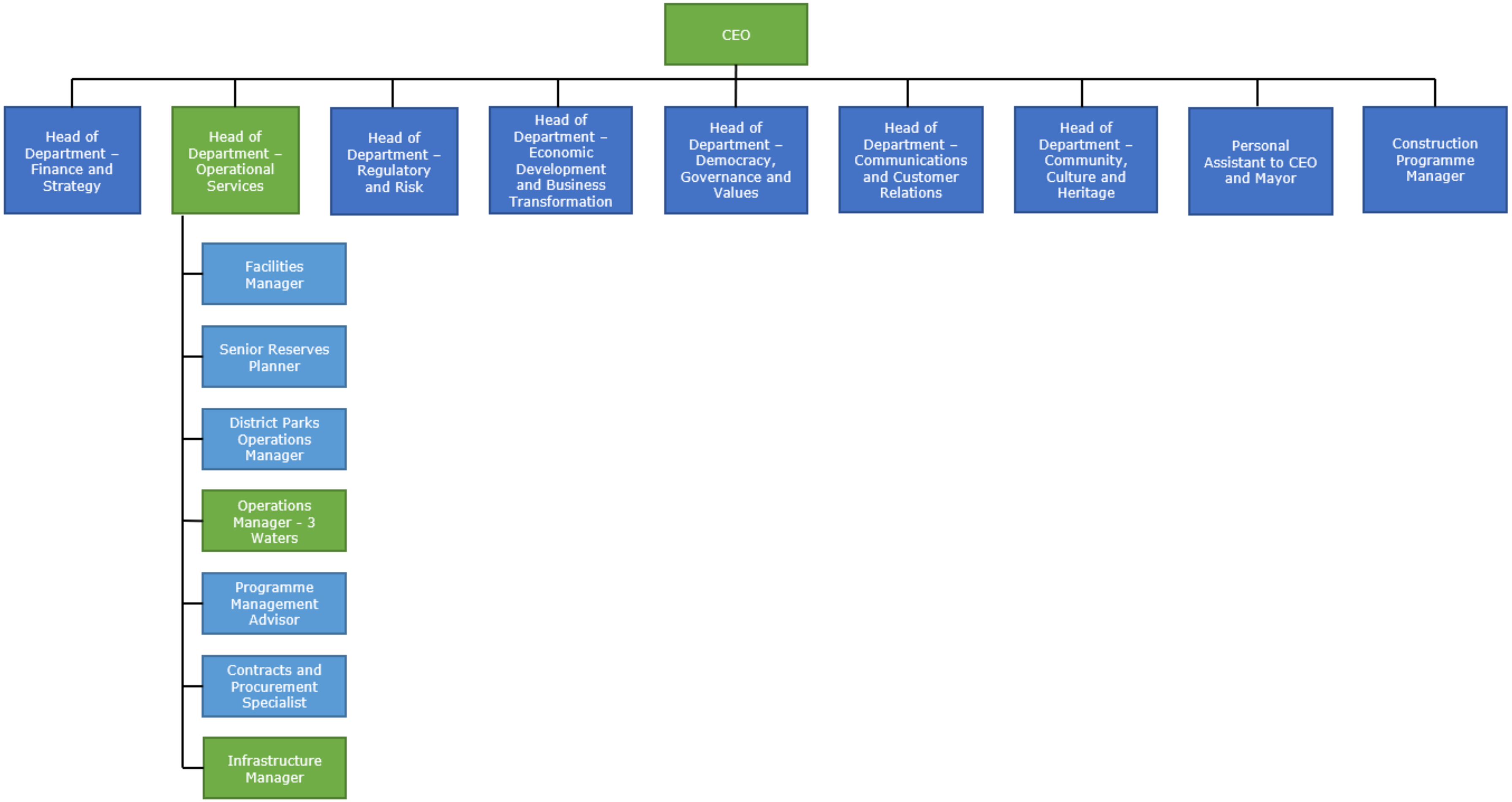


Figure 1: TDC Organisational Structure as at August 2020

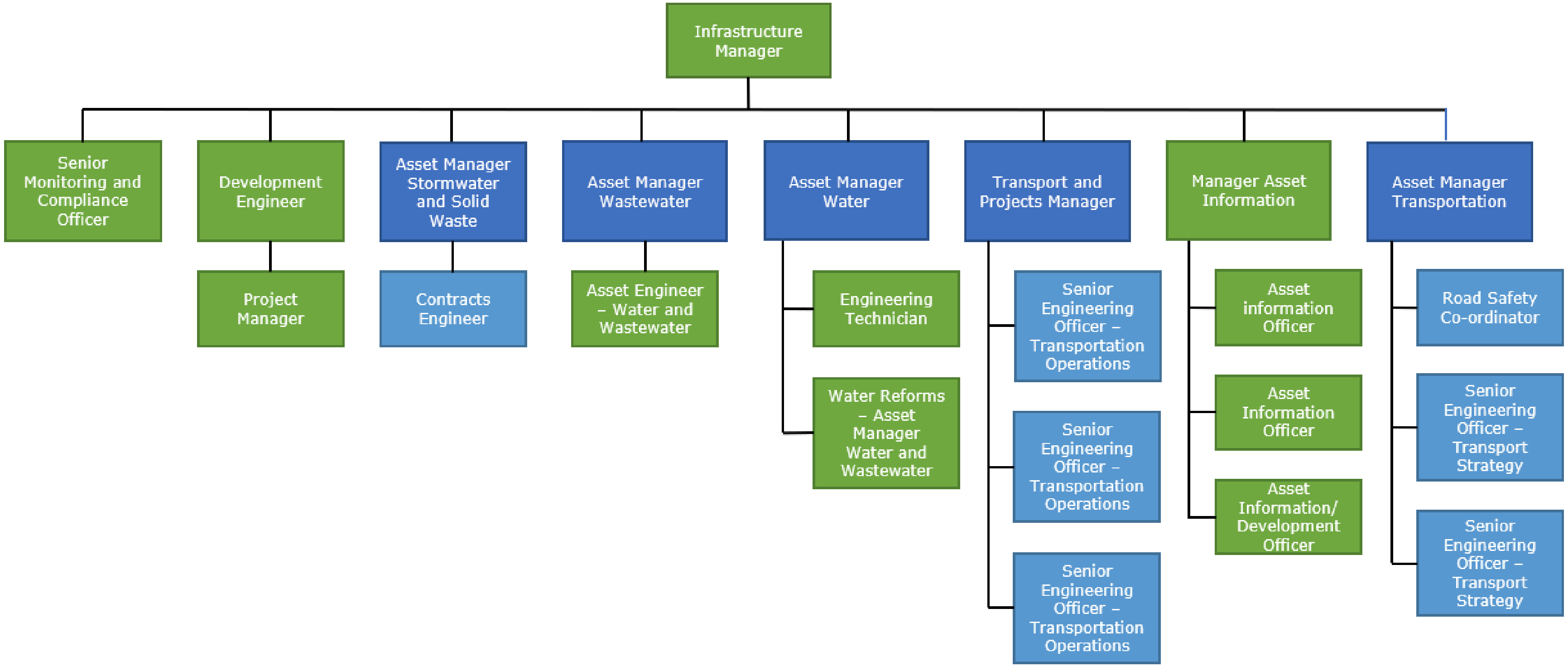


Figure 2: Infrastructure Team Organisational Structure (i.e. who does the work and how it's managed)

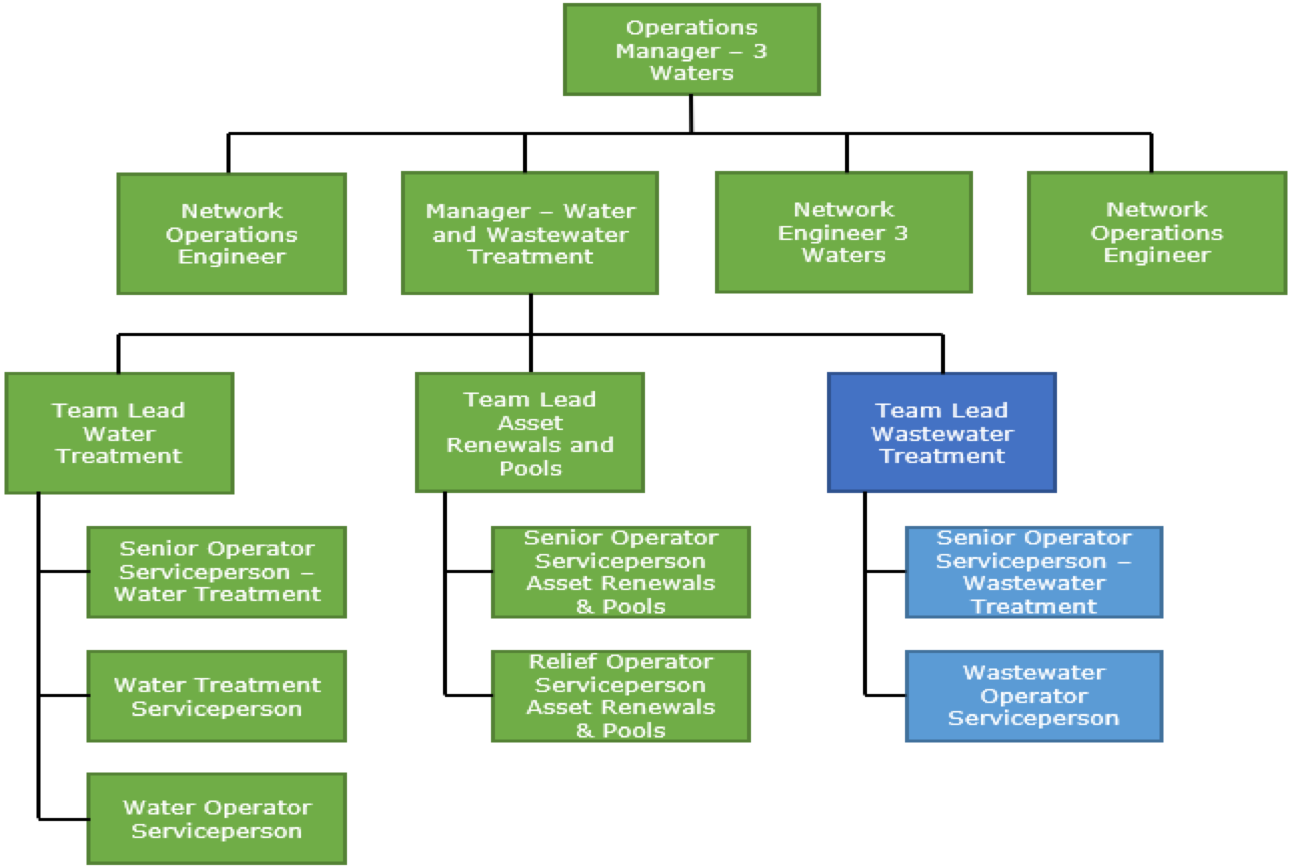


Figure 3: The Treatment Plant Team Organisational Structure (i.e. who does the work and how it's managed)

2.0 DEFINITIONS

As built	Refers to a survey or drawing of the actual assets that have been constructed, recognising that they can sometimes vary from what was planned before work started on site. As-built drawings are needed to ensure that asset information systems contain data on the asset as it has been constructed, not how it was planned in theory.
Community Outcomes	Under section 5 of the Local Government Act 2002, a community outcome "means the outcomes for that district or region that are identified as priorities for the time being". Community outcomes are what New Zealanders want for their local community, now and in the future. Assets have a role in supporting the achievement of those aims.
Critical Assets	Those assets with a high consequence of failure. They are often found as part of a network, in which, for example, their failure would compromise the performance of the entire network.
Development Contributions	Funds paid, typically by developers, to local authorities to help with the cost of growth. These contributions are authorised by Part 8 of the Local Government Act 2002.
IP	Ingress protection is the degree of protection provided by the product enclosure. In many cases, the level of protection provided by the enclosure is marked on the product in the form of an "IP" code.
Drinking Water Assessor	Officer(s) appointed by the Director-General of Health to act as assessors to determine compliance with the Health and Drinking Water Amendment Act.
DVGW	DVGW CERT GmbH is the largest gas and water industry certification body in Europe, covering all the certification procedures required in the gas and water sectors. Ref: http://www.dvgw.de
TCLP	The **TCLP** or Toxicity Characteristic Leaching (not Leachate) Procedure is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes. The TCLP analysis simulates landfill conditions. Over time, water and other liquids percolate through landfills. The percolating liquid often reacts with the solid waste in the landfill and may pose public and environmental health risks because of the contaminant it absorbs. The TCLP analysis determines which of the contaminants identified by the United States Environmental Protection Agency (EPA) are present in the leachate and their concentrations.
Track 24	A financial software tool
Vested Assets	Assets that are transferred to a public entity at nominal or zero cost. Typically, this might result from a situation where a developer has installed assets as part of developing a site and passes them to a public entity to manage, maintain, and deliver services through. The fair value of these assets has to be determined as they are integrated into the organisation's asset information system so that they can be appropriately managed.

3.0 ACRONYMS / ABBREVIATIONS

AM	Asset Manager
AMP	Asset Management Plan
AMS	Asset Management System
Audit	Audit New Zealand
CAPEX	Capital Expenditure
CAP	Capital Assistance Program
CEO	Chief Executive Officer
CIP	Cleaning in Place
CISP	Commercial & Industrial Structure Plan
Council	Taupo District Council
DC	Development Contribution
DWSNZ	Drinking Water Standards for New Zealand
DWA	Drinking Water Assessor
ES	Environmental Services Group at Taupo District Council
EW	Environment Waikato (Waikato Regional Council)
FDA	U.S. Food & Drug Administration
GFA	Gross Floor Area
GIS	Geographical Information System
GMS	Growth Management Strategy
LGA	Local Government Act
LoS	Level of Service
LTP	Long Term Plan (Council's ten-year planning document)
MAV	Maximum Acceptable Value
MoH	Ministry of Health
OPEX	Operational Expenditure
POU	Point of use
PRAMP	Property Asset Management Plan
RMA	Resource Management Act
RPS	Environment Waikato Regional Policy Statement
SAMP	Solid Waste Asset Management Plan
SLT	Senior Leadership Team (CEO and 2nd Tier Managers)
SMP	Stormwater Management Plan
SWAMP	Stormwater Asset Management Plan
T24	Track 24
TDC	Taupo District Council
TRAMP	Transportation Asset Management Plan
UVT	Ultraviolet Transmittance (UV Transmittance)
WAMP	Water Asset Management Plan
WDMP	Water Demand Management Plan
WINZ	Water Information New Zealand
WSP	Water Safety Plan (formerly PHRMP)
WTP	Water Treatment Plant
WW	Wastewater
WWAMP	Wastewater Asset Management Plan
WWTP	Wastewater Treatment Plant.

4.0 ASSET DATA

4.1 Asset Summary and Valuation

Taupo District Council (TDC) is responsible for the management of water assets with a replacement value (excluding land value) of approximately $128 million. The water asset consists of a number of components:

- Treatment Plants (including reservoirs and boosting pump stations)
- Network reticulation (water meters, fire hydrants, valves and pipes)

The following tables give a summary of the asset stock and valuation as at August 2017 and adjusted annually to 2019 for both treatment and reticulation.

Table 4.1: Water Replacement Value Summary

Scheme / Zone	Properties Connected	Treatment Replacement Value	Reticulation Replacement Value
Acacia Bay / Mapara Road	*Included in Taupo	$ 2,308,117.21	$ 7,456,670.38
Atiamuri	76	$ 537,750.37	$ 521,036.39
Bonshaw Park	69	$ 517,167.05	$ 444,759.47
Centennial Drive (treated and untreated)	75	$ 2,396,581.89	$ 3,085,741.04
Hatepe	119	$ 484,771.38	$ 513,827.15
Kinloch / Whakaroa	1,348	$ 1,776,952.97	$ 10,599,350.73
Mangakino Township	765	$ 1,798,772.93	$ 886,041.41
Motuoapa	482	$ 779,280.12	$ 2,242,848.43
Motutere (campground only)	1	$ 239,327.42	$ 112,670.03
Omori/Kuratau/Pukawa	1,239	$ 987,126.59	$ 5,592,395.18
River Road	69	$ 361,944.05	$ 917,425.77
Taupō / Wairakei / Waitahanui	12,970	$ 13,133,671.35	$ 46,630,909.89
Tirohanga	106	$ 1,257,635.46	$ 3,680,349.04
Turangi Township/Tokaanu	2,417	$ 3,479,536.25	$ 8,147,150.72
Waihaha	31	$ 746,913.34	$ 2,931,844.38
Whakamaru	77	$ 895,860.92	$ 485,667.29
Whakamoenga Point	53	$ 304,803.03	$ 468,457.24
Whareroa	198	$ 367,797.88	$ 830,494.04
Total	**20,095**	**$ 32,374,010.21**	**$ 95,547,638.60**

* Acacia Bay/Mapara scheme rating was recently merged with Taupo due to the upcoming connection of these schemes (expected completion June 2021).

Table 4.2: Water Asset Valuation Summary

Type	Depreciated Replacement Value	Replacement Value
Treatment	$16,726,640.93	$32,374,010.21
Water Reticulation	$57,231,630.23	$95,547,638.60
TOTAL	**$73,958,271.16**	**$127,921,648.81**

4.1.1 VALUATION PROCESS

All recorded components have been valued in terms of their replacement and depreciated replacement value. The valuation process has been performed in accordance with generally accepted accounting standards (NZ IAS16 Property, Plant and Equipment) and with NZ local authority asset valuation practices (NZ Infrastructure Valuation and Depreciation Guidelines).

The basic approach has involved:

a) Preparation of the valuation databases from the various sources of information supplied by TDC.
b) Adjustment of asset quantities, materials and techniques to reflect an optimum (least cost) modern equivalent replacement that offers the same level of service as that currently provided.
c) Calculation of optimum replacement cost (ORC) by multiplying asset quantities by appropriate unit construction cost rates and including an allowance for other costs (site establishment, professional fees and financial charges).
d) Prediction and assignment of economic and remaining lives.
e) Calculation of Optimised Depreciated Replacement Costs (ODRC) by deducting an allowance for depreciation, taking into account age, remaining life and residual value.

4.2 Asset Component

4.2.1 SOURCE, TREATMENT PLANTS

4.2.1.1 Description

Taupo District Council manages 18 water supply schemes. There are 19 treatment plants as the Rainbow Point plant in Taupo is currently retained for emergency use. Whakaroa which is part of the Kinloch scheme can be reported separately from a financial perspective, however physically it is part of the Kinloch scheme. Since the 2018 LTP the Waitahanui scheme has been connected to Taupo which has reduced the scheme number by one.

Table 4.3: Source, Treatment Plant Asset Value

Water Scheme		Depreciated Replacement Value
1	Acacia Bay	$ 1,738,128.10
2	Atiamuri	$ 217,834.75
3	Bonshaw Park	$ 187,785.11
4	Centennial Dr	$ 873,953.43
5	Hatepe	$ 218,913.17
6	Kinloch / Whakaroa	$ 587,264.23
7	Mangakino	$ 819,869.08
8	Motuoapa	$ 536,320.20
9	Motutere	$ 197,682.78
10	Omori	$ 619,510.26
11	River Road	$ 331,671.25
12	Taupo	$ 7,416,171.41
13	Tirohanga	$ 558,072.99

14	Turangi	$ 1,119,495.95
15	Waihaha	$ 602,338.03
16	Whakamaru	$ 404,292.71
17	Whakamoenga	$ 164,198.11
18	Whareroa	$ 133,139.37
	TOTAL	**$ 16,726,640.93**

4.2.1.2 Capacity/Performance

The required capacity of each scheme is determined through planning activities including assessment of growth and future demands. Resource consents determine the volume of water that can abstracted and where additional capacity is needed this is applied for. Treatment plant are designed and built to meet the capacity requirements, with upgrades planned as needed by growth forecasts.

The performance of each water treatment plant is assessed based on DWSNZ and resource consent compliance requirements. Performance against the DWSNZ is reported internally on a monthly basis via CEO Reports. External compliance reporting is completed quarterly with reports sent to the DWA (Drinking water assessor) and uploaded to Drinking Water Online (DWO). DWO is a web-based system accessible by all networked water suppliers and district health boards.

Annual Reports are prepared for WRC against consent conditions for each plant detailing the performance of the plant for that year for instantaneous, daily and annual water volume abstraction results, and other parameters as required. Increasingly consent conditions require the provision of flow data direct to the WRC telemetry system daily. This is completed through a link from Councils reporting system Water Outlook.

More information is contained in the appendices on each individual scheme.

4.2.1.3 Condition

The conditions assessment of the Water Treatment assets including boosting pump stations and reservoirs is a live document and is being updated every year by the operations team. The condition rating is stored on an excel spreadsheet (Water Asset Condition and Renewals Plan, TDC Ref: A309067), which is generally derived from the asset register.

Condition assessment data and failure history is used to prepare maintenance and renewal plans which are in turn used to determine the LTP budgets. The asset data team are steadily migrating asset data from the condition assessment spreadsheet into the AMS. Ultimately the AMS will be utilised to store the treatment asset data including attributes, condition assessment data, maintenance plans and records.

The revaluation of these assets is done by external consultants every three years.

4.2.1.4 Treatment Plant Age

The water treatment plants have been constructed at different times as required. In some cases, upgrades have occurred. This information is shown in the table below.

Table 4.4: Treatment Plant Type and Ages

Scheme	Source	Type of Treatment (current)	Construction Year	Upgrade Year	Upgrade Type
Acacia Bay inc. Mapara Road	Lake	Chlorination	1987		
Atiamuri	Bore	Chlorination	1992		
Bonshaw Park	Bore	Chlorination	1990	2019	Bore head security upgrades
Centennial Drive (River intake)	River	Chlorination	1988		Chlorine contact tank added in 2017.
Hatepe	Lake	Chlorination	1983	2017	Chlorine contact tank.
Kinloch	Lake	Chlorination	1985		
Mangakino	Spring	UV treatment and Chlorination	1965	2011-12	Original PS retained and new WTP built to meet NZDWS.
Motuoapa	Lake	Chlorination	1984		
Motutere	Lake	Chlorination		2018	Intake Pipeline Renewal
Omori	Lake	Chlorination	1997	1997	Combining of Pukawa and Omori- Kuratau supplies
River Road	Spring	Chlorination	1994	2018	New Reservoir
Lake Terrace	Lake	Membrane, Chlorination and Fluoridation	2014	1970[1] 2009-14[2] 2019-20[3]	[1]Pump Upgrades [2]New WTP to meet DWSNZ 25MLD [3]Capacity Upgrade to 30MLD
Tirohanga	Spring	Chlorination	1984	2009	Upgrade to allow supply to new subdivision
Turangi	Spring	UV, Chlorination and Fluoridation	1965-67	2011-12	Pump station and WTP to meet NZDWS.
Waihaha	Spring	Chlorination	1983		
Whakamaru	Bore	Chlorination	1983	2014	Service pumps upgrade
Whakamoenga Point	Bore	Chlorination	1992	2008	Upgrade pumps
Whareroa	Bore	Chlorination	1989	2010	Upgrade pumps

4.2.1.5 Booster Pump Stations

There are also a number of booster pump stations within the network as shown below.

Table 4.5: List of Water Pump Stations

Scheme	Pump station
Centennial	AC Baths PS
Kinloch	Loch Eagle PS
Mapara Road	Mapara PS
	Blueridge PS
Omori	High Level PS (Omori)
	Pukawa PS
Taupō	Gillies Avenue PS
	Nukuhau PS
	Woodward Street PS
	Ashwood PS
	Broadland Road PS

Scheme	Pump station
	Titoki PS
	Airport PS
	Botanical Heights PS
Tirohanga	Spencer Road PS
	Serenity Cove PS
Waihaha	Motere PS
Whakaroa	Whakaroa Low PS
	Whakaroa High PS

4.2.1.6 Water Storage

Water storage is provided at each scheme to meet daily and fire demands and to provide resilience in emergency events. Asset value for water storage units is reported within the treatment plant figures.

In total there are 92 water storage units including contact tanks across the district with a combined capacity of 42,547 m^3. Water storage units are included in Assetfinda and condition data and further details are included in an excel spreadsheet (TDC Ref: A918569).

4.2.1.7 Asset Data and Hierarchy – Treatment Plants, Reservoirs and Pump Stations

Asset data for Treatment Plants, Reservoirs and Pump Stations is currently stored in an excel file in objective (Water Asset Condition and Renewals Plan TDC Ref No. A309067). TDC is in the process of transferring all the assets recorded in this excel file into Assetfinda. An example of the hierarchy being setup is included below:

- Water_Pump_Stn — New Asset
  - BLUERIDGE_RES — Edit New Asset
    - Electrical — Edit New Asset
      - Cabinet — Edit New Asset
      - Switchgear — Edit New Asset
      - UPS — Edit New Asset
    - Instrument — Edit New Asset
      - Chlorine Analyser — Edit New Asset
      - Flow Meter — Edit New Asset
      - Level Switch — Edit New Asset
    - Mechanical — Edit New Asset
      - Pressure Tank — Edit New Asset
    - Pipework — Edit New Asset
      - Inlet, Outlet & Valves — Edit New Asset
      - Rising Falling & Scour — Edit New Asset
    - Pump — Edit New Asset
      - Dry Mounted — Edit New Asset
      - Pump Motor — Edit New Asset
      - Pump Plunger and Seals — Edit New Asset
      - Pump Rod — Edit New Asset
    - Reservoir — Edit New Asset
      - Liner — Edit New Asset
      - Roof — Edit New Asset
      - Tank — Edit New Asset
    - Telemetry — Edit New Asset
      - Cabinet — Edit New Asset
      - HMI — Edit New Asset
      - Radio — Edit New Asset
      - Repeater — Edit New Asset
      - RTU — Edit New Asset
    - Valve — Edit New Asset
      - Pressure Relief — Edit New Asset
      - Scour — Edit New Asset

Figure 4.1: Asset Hierarchy Example - Water Pump Stations

4.2.2 RETICULATION

4.2.2.1 Reticulation Description

Reticulation includes pipes (both gravity and pumping), fire hydrants, isolation valves, water meters, strainers, backflow preventors, pressure reducing, relief, scour, air release and boundary valves, and supporting infrastructure such as chambers and manholes.

Table 4.6: Scheme Reticulation Value

Water Reticulation	Depreciated Replacement Value
Acacia Bay	$ 2,333,326.12
Atiamuri	$ 218,909.38
Bonshaw Park	$ 275,915.60
Centennial Dr	$ 1,749,178.90
Hatepe	$ 259,327.00
Kinloch	$ 6,214,408.16
Mangakino	$ 687,687.73
Mapara Rd (supplied from Acacia Bay)	$ 1,884,854.11
Motuoapa	$ 1,535,008.60
Motutere	$ 77,374.00
Omori	$ 2,542,085.82
River Road	$ 654,961.43
Taupo	$ 29,044,544.35
Tirohanga	$ 2,337,173.14
Turangi	$ 3,932,313.16
Waihaha	$ 1,462,978.87
Whakamaru	$ 251,945.78
Whakamoenga	$ 243,331.49
Whakaroa (supplied from Kinloch)	$ 1,025,251.62
Whareroa	$ 501,054.96
TOTAL	**$ 57,231,630.23**

4.2.2.2 Reticulation Age and Condition

Condition assessment data for reticulation infrastructure is generally collected by analysing age, material of construction, sampling and testing records, customer service records, leak detection surveys, water loss calculations, maintenance activities data and historical failures. Specific condition assessment activities include:

- Sampling and testing of pipeline sections following failures, renewals or other planned works (TDC Ref: qA132611).
- Pipe sample condition assessment and recovery programme (in planning 2020/21)
- Asbestos cement pipeline deterioration modelling (TDC Ref: A2276691 and A2276693).
- Fire hydrant flushing, condition and performance monitoring programme (annual programme TDC Ref: fA215580)
- Pressure reducing valve periodic inspections (annual programme TDC Ref: fA216425)
- Valve inspection and exercising programme (in planning 2020/21)

- Backflow device testing (started 2020/21)
- Meter reading operations and follow up maintenance and replacements
- Water loss calculations (annual programme TDC Ref: qA157051).

All of the above assessments feed into renewals planning activities, which is discussed in more detail in Section 8. Condition data collected is fed back to Assetfinda for updating details of the individual asset.

Water reticulation age and condition across the District is variable. There remains significant quantities of asbestos cement and galvanised pipelines estimated to be beyond their useful life. The current construction backlog value is estimated at in excess of $30M. Detail regarding plans to improve pipeline condition are included in Section 8.

4.2.2.3 Reticulation Performance

Reticulation performance is assessed through performance against levels of service including the number of services requests received on the particular asset, how many water quality (taste, odour, colour) related complaints that gets registered, leaks /bursts causing low water pressure and or disruption to water supply, water loss performance against targets, and fire flow monitoring.

Performance of the network is variable. Pipeline failures and corresponding service requests for no water or similar are largely influenced by pipeline age and condition as presented above. Other factors such as third party strikes can also affect performance.

In some of the smaller water schemes, for instance Hatepe and Waihaha, organics and suspended impurities can be elevated which can cause issues in the network as well as water safety concerns. The water network flushing programme, online monitoring of raw water turbidity and selective abstraction systems aims to reduce these problems.

Water loss targets were set as part of the TDC Water Supply Strategy as follows:

- Urban Schemes – Target Current Annual Real Loss = 160 l/connection/day
- Rural Schemes – Target Current Annual Real Loss = 4.2 m3/km watermain/day

Water balances were completed in 2020 and will be re-calculated in 2021. Water loss was above targeted levels in Taupo, Turangi and the rural networks, as shown below.

Table 4.7: Water Loss Performance Jan 2020

Taupo	Current Annual Real Loss = 206 l/connection/day
Turangi	Current Annual Real Loss = 677 l/connection/day
Average of other urban networks	Current Annual Real Loss = 147 l/connection/day
Average of rural networks	Current Annual Real Loss = 6.5 m3/km watermain/day

Council developed a water loss strategy in 2019 and implementation of this is underway. Funding has been secured through the 3 waters reform tranche 1 process to begin delivery of capital improvements required. Remaining improvements have been budgeted for as part of the LTP process. Many of the improvements are associated with improving understanding of where water is being lost, to aid the prioritisation of future renewals spending.

Fire flow testing is carried out to determine performance of fire hydrants against the Fire Service Code of Practice. Results from the 2019/20 program are below in included performance graph for Motuoapa hydrants tested. Where hydrants fail tests, network investigations are completed to determine if capital or operational expenditure is needed to rectify the failure. An example of this is the hydrants at the airport which failed to meet FW3 requirements. A capital project is included in the LTP to connect the airport to higher pressure water supply to resolve this issue.

Table 4.8: 2019/20 Fire Hydrant Testing Programme

Scheme	Tests Planned	Tests Completed	Pass	Pass Rate
Atiamuri	7	5	5	100%
Hatepe	7	6	6	100%
Mangakino	59	56	55	98%
Motuoapa	22	22	22	100%
Okaia, Kinloch	3	3	3	100%
Airport	4	4	0	0%
Wairakei	7	6	6	100%
Whakamaru	9	7	5	71%
TOTAL	118	109	102	94%

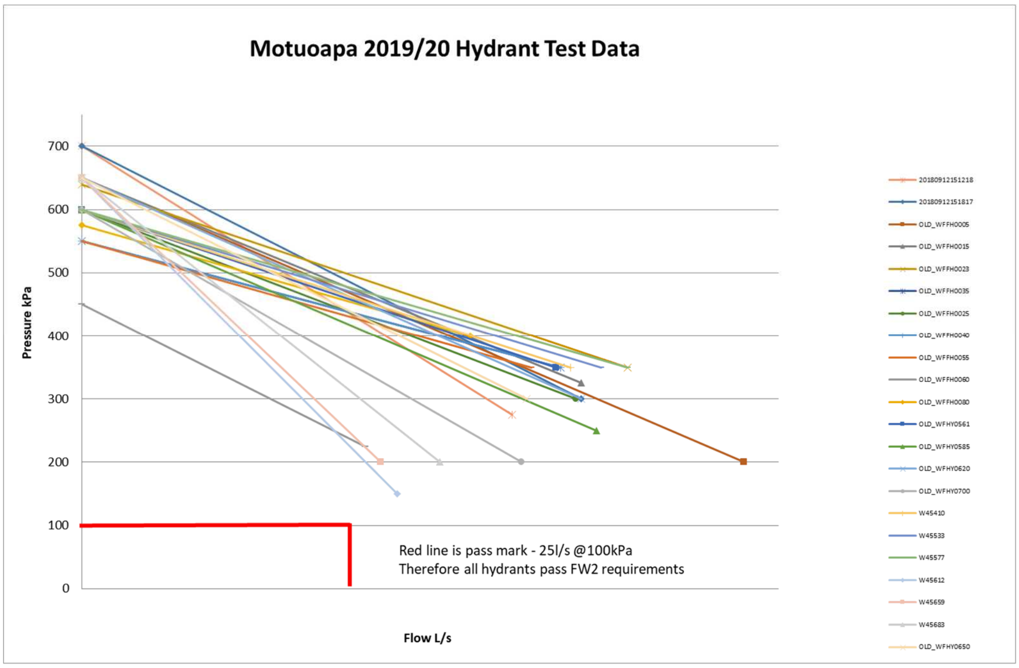


Figure 4.2: 2019/20 Motuoapa Fire Flow Result Graphs

4.2.2.4 Asset Data Collected– Reticulation

Asset data for Reticulation assets is currently stored in Assetfinda. An example of the data within Assetfinda for pipe assets is included below.

Table 4.9: Pipe Assets Data Example

Asset_ID	Asset_Type	MATERIAL	DIAMETER	Community	Quantity_Length	Install_Date	Unit_Cost	Base_Life	Condition	Performance	Accuracy	Criticality	Base_Life_Optional	Renewal Date Calculated	Asset_Owner	Source	Status	Method	Edited_By	Edited_Date
20180103111650	Water Main	uPVC	100	Atiamuri	59.13	30/09/2016	122.98	100	Excellent	Excellent	Excellent	N/A	0	30/09/2116	Public		In Service	As Built	lstewart	15/01/2018
WMN08345	Water Main	PVC	150	Atiamuri	9.67	1/07/1982	160.56	60	Good	Excellent	Excellent	Medium	0	1/07/2042	Public	07 As-Built Plan Digitised (High Error)	In Service	Imported	lstewart	27/11/2017
WMN08346	Water Main	GALV	80	Atiamuri	0.39	1/07/1982	101.35	50	Poor	Excellent	Excellent	Medium	0	1/07/2032	Public	06 As-Built Plan Digitised (Low Error)	In Service	Imported	lstewart	27/11/2017
WMN08347	Water Main	CI	100	Atiamuri	65.72	1/07/1952	122.98	75	Excellent	Excellent	Excellent	Medium	75	1/07/2027	Public	07 As-Built Plan Digitised (High Error)	In Service	Imported	lstewart	18/07/2018
WMN08348	Water Main	CI	150	Atiamuri	68.6	1/07/1952	160.56	75	Excellent	Excellent	Excellent	Medium	75	1/07/2027	Public	08 Running Distance	In Service	Imported	lstewart	18/07/2018
WMN08349	Water Main	AC	100	Atiamuri	0.15	1/07/1952	122.98	50	Very Poor	Excellent	Excellent	Medium	0	1/07/2002	Public	08 Running Distance	In Service	Imported	lstewart	27/11/2017
WMN08350	Water Main	CI	150	Atiamuri	0.22	1/07/1952	160.56	75	Excellent	Excellent	Excellent	Medium	75	1/07/2027	Public	08 Running Distance	In Service	Imported	lstewart	18/07/2018
WMN08351	Water Main	CI	100	Atiamuri	121.28	1/07/1952	122.98	75	Excellent	Excellent	Excellent	Medium	75	1/07/2027	Public	07 As-Built Plan Digitised (High Error)	In Service	Imported	lstewart	18/07/2018
WMN08352	Water Main	CI	100	Atiamuri	70.24	1/07/1952	122.98	75	Excellent	Excellent	Excellent	Medium	75	1/07/2027	Public	08 Running Distance	In Service	Imported	lstewart	18/07/2018
WMN08353	Water Main	GALV	150	Atiamuri	121.26	1/07/1952	160.56	50	Very Poor	Excellent	Excellent	Medium	60	1/07/2012	Public	07 As-Built Plan Digitised (High Error)	In Service	Imported	lstewart	16/04/2018
WMN08354	Water Main	uPVC	150	Atiamuri	145.81	1/07/1992	160.56	100	Good	Excellent	Excellent	Medium	0	1/07/2092	Public	07 As-Built Plan Digitised (High Error)	In Service	Imported	lstewart	27/11/2017
WMN08355	Water Main	GALV	100	Atiamuri	92.08	1/07/1952	122.98	50	Very Poor	Excellent	Excellent	Medium	60	1/07/2012	Public	08 Running Distance	In Service	Imported	lstewart	16/04/2018

The following Figure shows pipeline materials in the network and a summary of useful life of the network.

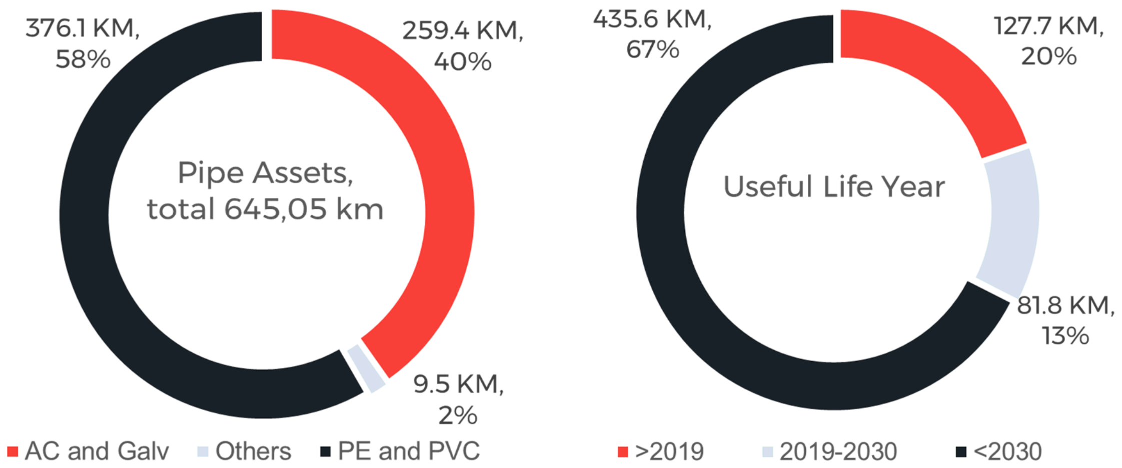


Figure 4.3: TDC Pipe Materials and Estimated End of Useful Life

4.3 Asset Confidence Rating

The asset valuation assigns confidence ratings to the source data and unit cost rates and to other items as appropriate (refer objective A1349065). The overall confidence rating for the water asset is **B-.**

Table 4.10: Key to Asset Confidence Rating

Grade Score	Grade	Description	Accuracy
1-2	A	High Accuracies, data based on reliable documents	±5%
2-3	B	Data based on some supporting documentation	±10%
3-4	C	50% Estimated, data based on local knowledge	±15%
4-5	D	Significant Data Estimated / No Data, data based on best estimate of experienced person	±30%

Table 4.11: Summary of Asset Confidence Ratings

Attribute	Confidence Grade			
	D	C	B	A
Asset data				
Physical properties (length/size/materials)				
Location				
Age				
Condition				
Performance				
Deterioration rate				
Financial data				
Opex				
Operation costs				
Maintenance costs				
Asset management costs				
Interest rates				
Depreciation				
Renewals				
Unit rates				
Project scope				
Cost estimates				
Capital works				
Demand forecast				
Project timing				
Project scope				
Project costs				
Project prioritisation				

Additional support to data confidence of network assets was provided for within an assessment completed by WSP in 2018 (TDC Ref: A2276691). In this assessment, greater than 95% of Council pipeline data set (assessed by both length and number) were given a confidence rating of Grade 1 (Very High Confidence). Typically, a data set that exceeds 90% of Grade 1 (Very High Confidence) is viewed as excellent.

5.0 LEVELS OF SERVICE

5.1 Introduction

A key objective of this Asset Management Plan is to match the level of service provided by the asset with the expectations of customers. This requires a clear understanding of customers' needs, expectations and preferences.

The levels of service defined in this section will be used:

- to inform customers of the proposed type and level of service to be offered
- to enable customers to assess suitability, affordability and equity of the services offered
- as a focus for the AM tactics proposed to deliver the required level of service
- to measure the effectiveness of this AM plan
- to identify the costs and benefits of the services offered

The target levels of service for water supply and current industry standards are based on:

Community Outcomes: Provide guidelines for the scope of current and future services offered and manner of service delivery and define general levels of service which the community wishes to receive.

Customer Expectations: Information gained from customers on expected quality and price of services.

Statutory Requirements: Legislation, regulations, environmental standards and Council By-laws that impact on the way assets are managed (i.e.: resource consents, building regulations, health and safety legislation). These requirements set the minimum level of service to be provided.

Strategic and Corporate Goals: Provide guidelines for the scope of current and future services offered and manner of service delivery and define specific levels of service which the organisation wishes to achieve.

Consultation Process and Strategic Linkages: The following Figure 5.1 identifies the consultation process and reporting requirements for levels of service. It also incorporates the links to strategic documents and gap analysis and how this links into the Annual Plan and Long-Term Plan.

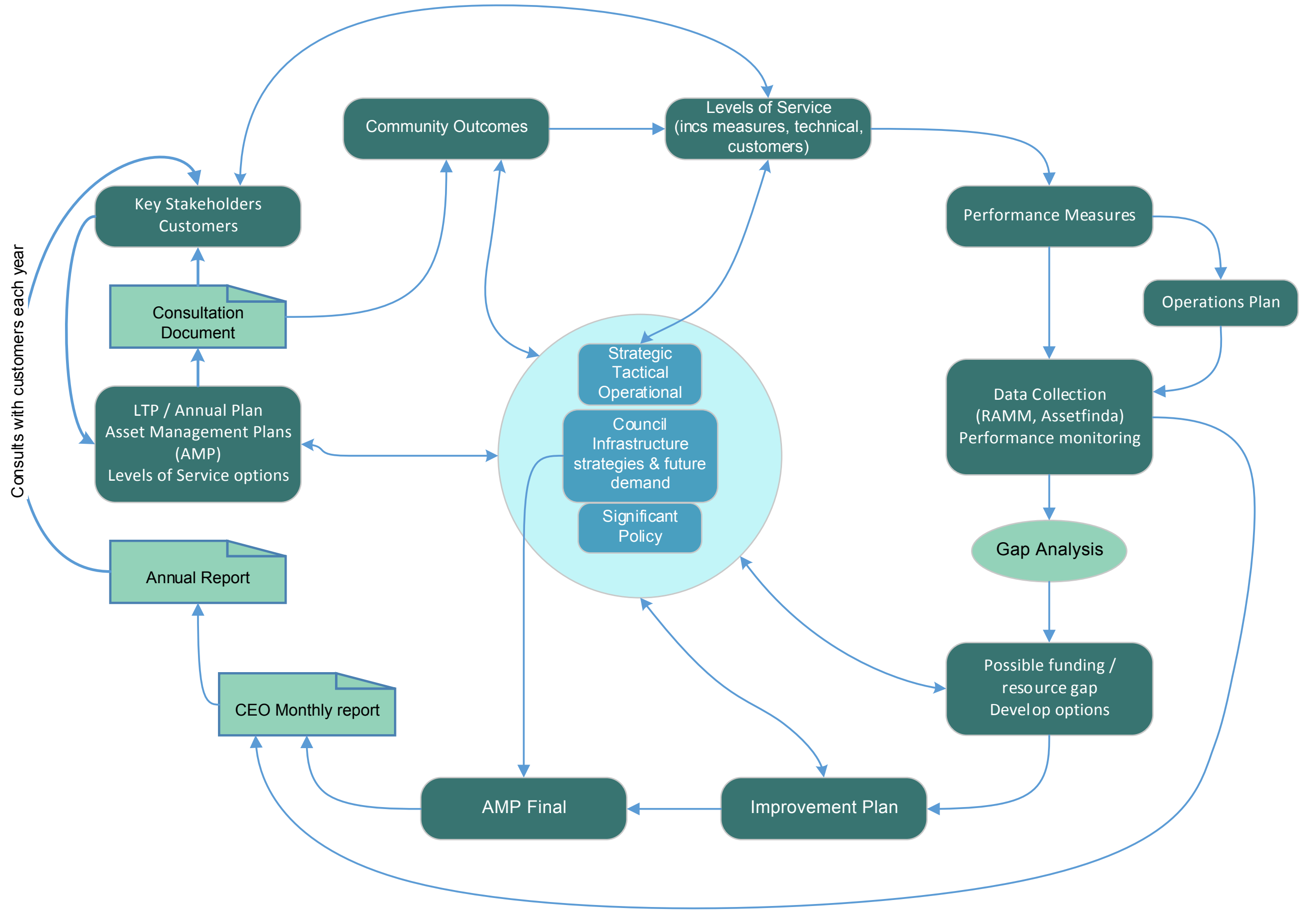


Figure 5.1: Consultation Process and Strategic Linkage Diagram

Within Councils Significance and Engagement Policy 2016, water assets are considered significant assets. This applies to the water storage, treatment and reticulation systems, including the land, buildings, treatment plant, tanks and structures for all networks within the district. The policy determines from the beginning of a decision-making process, the extent, form and type of engagement with the community that is required.

5.2 Types of Levels of Service

5.2.1 OPERATIONAL

Desired Levels of Service

The targets currently set are those carried over from the previous version Water AMP with adjustment where capital programmes have move forward. These have been broadly developed as:

- Compliance with the DWSNZ and resource consent requirements; these are minimum targets set by legislation and reflect maintaining the current level of service through existing abstraction, treatment and distribution systems. It must be noted that the current levels of service of graduated in relation to DWSNZ compliance as not all sites are currently capable of meeting all aspects of the standards.

- Fault response times; set at levels achievable through available resources and current level of service

- Customer satisfaction; these are the minimum targets set by legislation and reflect maintaining the current level of service through existing abstraction, treatment and distribution systems

- Demand management

Current operational levels of service for water are scheduled in Table 2. The levels of service are "how we maintain our existing assets" for our customers.

Operational levels of service fall into two categories:
Technical (asset/product related) measures, which relate to the outputs the customer receives in terms of:

- Quality
- Capacity
- Quantity
- Health /Environmental impacts
- Availability
- Cost/ affordability
- Legislative requirements
- Maintainability
- Safety
- Reliability and performance
- Criticality

Service Quality (service process related) measures, which relate to how the customer receives the service in terms of:

- Tangibles (information sheets etc.)
- Responsiveness
- Courtesy
- Empathy (understanding, individual attention)
- Assurance (knowledge, courtesy, trust, confidence)

5.2.2 TACTICAL

The levels of service stated within Table 5.1 are "why we build new assets". These are thresholds which warrant the creation of a new asset in order to maintain an optimum level of service for the asset.

5.2.3 IMPLEMENTATION

The implementation levels of service stated within Table 5.2 are "the standard we build a water asset to".

5.3 Current Levels of Service

Objective: To safeguard the community and to provide treated /palatable water to ensure public health is maintained for all users connected to council's supply.
Note: An asterisk* identifies the performance measure in LTP **(Non-financial performance measures)**

Table 5.1: Tactical Levels of Service

Sr. No.	Community outcome	Level of Service	How we measure it (customer)	How we measure it (technical)	Current LoS Performance	How We Monitor Performance	Target LoS Medium Term (1-3 years)	Target LoS Long Term (4-10 Years)
Safety of Drinking Water Performance measure **T1**	Economy	<u>Safe drinking water</u> We provide a safe and continuous supply of water that will over time meet New Zealand's drinking water standards for communities THIS IS A DIA MANDATORY MEASURE.	No public health incidents related to drinking water quality	The extent to which Councils drinking water supply complies with: (a) Part 4 of the drinking-water standards (bacteria compliance criteria), and (b) Part 5 of the drinking-water standards (protozoal compliance criteria). (c) Part 8 of the drinking-water standards (chemical compliance criteria). This measure applies to all Council water supplies where required under the Health Act. Note that measurement against part 8 is not a DIA mandatory measure, however given the occurrence of naturally occurring arsenic in many of the districts water supplies part 8 has been included.	Currently the water supplies in the Taupo District are capable complying with part 4 (bacteria) of the DWSNZ. Taupo, Turangi, and Mangakino schemes are capable of achieving compliance with Part 5 (protozoa compliance). Taupo, Turangi, Mangakino, Atiamuri, Waihaha, Tirohanga, River Road, Whareroa and Whakamaru schemes are capable of compliance with Part 8 (chemical compliance).	Annual compliance with DWSNZ. Report issued to DWA. Any E Coli transgressions are managed inline with the DWSNZ with notification to DWA. Note: Currently all our water supply schemes are equipped with continuous monitoring instruments for measurement of flow, pH, Chlorine and turbidity. Any failure of equipment / process triggers an operational response untill the system is back to normal. A water quality monitoring programme as per DWSNZ is in place for the water networks. This water quality information is used to demonstrate part 4 of the DWSNZ (bacterial compliance criteria).	Our water supplies have adequate data to demonstrate compliance with DWSNZ at Mangakino, Turangi and Taupo. Capital projects will enable compliance within 3 years at: • Kinloch • Hatepe • Omori • Motuoapa Compliance will no longer be demonstrated for the Acacia Bay, Whakamoenga Point and Bonshaw Park treatment plants as these schemes will be connected to Taupo. Tranche 1 water reform funding will enable compliance at: • Atiamuri • River Road • Tirohanga • Waihaha • Whakamaru • Whareroa	All council water supplies meet part 4, 5 and 8 of the drinking-water standards New Zealand.
System and adequacy **T2**	Economy	Sufficient capacity to meet current demands and future growth	If a connection is possible within existing network and or new growth areas	Capacity of pipework relative to capacity required. That all new development is able to be connected immediately, if previously identified under the growth model, LTP and or District Plan.	LTP includes projects to enable future subdivisions as predicted by the revised growth model to connect to network.	Through the ability to allow subdivisions within specified development areas to occur	Capacity of pipework relative to capacity required. That all new development is able to be connected immediately, if previously identified under the growth model, LTP and or District Plan.	Same as short term.

Table 5.2: Operational Levels of Service

Sr. No.	Community outcome	Level of Service	How we measure it (customer)	How we measure it (technical)	Current LoS Performance	How We Monitor Performance	Target LoS Medium Term (1-3 years)	Target LoS Long Term (4-10 Years)
Maintenance of Reticulation Network Performance measure **O1**	Environment & Financial Prudence	Water loss Level of real water loss from the Council's networks reticulation system. State and operation of the water reticulation network infrastructure. THIS IS A DIA MANDATORY MEASURE.	Uninterrupted water supply	Methodology in line with Water NZ "Water Loss guidelines.	Initial water loss measurement gave the following results. Taupo Current Annual Real Loss = 206 l/connection/day Turangi Current Annual Real Loss = 677 l/connection/day Average of other urban networks Current Annual Real Loss = 147 l/connection/day Average of rural networks Current Annual Real Loss = 6.5 m3/km watermain/day Targets were set as part of the water supply strategy.	Annual water loss calculations. Water balance measurement methodology in line with Water NZ "Water Loss guidelines	Completion of annual water loss measurements.	Urban Schemes – Target Current Annual Real Loss = 160 l/connection/day Rural Schemes – Target Current Annual Real Loss = 4.2 m3/km watermain/day
Fault Response Times Performance measure **O2**	Economy	**Urgent call outs**[i1] Fault response time Attendance for urgent call-outs: from the time that Council receives notification to the time that the service personnel reach the site is ≤1hr. Fault resolution time Resolution of urgent call-outs: from the time that the local authority receives notification to the time that the service personnel confirms resolution of the fault or interruption is within 4 hrs.	Percentage of failure responded within the specified time	Response time from Council receiving notification of the fault to the time that service personnel reach the site of the water supply fault.	Response and resolution times in 2019/20 were not recorded accurately.	Analysis of service requests and contactors KPIs. This measure has not been able to be recorded because of issues relating to the recording of after-hours call outs. We are putting systems in place to ensure that this issue is rectified for the future.	Response time for service personnel reach the site of the fault is ≤1hr (90%) Time to resolve the problem is ≤ 4 hrs (85% of times).	Response time for service personnel reach the site of the fault is ≤1hr (>91%) Time to resolve the problem is ≤ 4 hrs (90% of times).
Performance measure		**Urgent call out** Fault response time (median) Attendance for urgent call-outs: from the time that Council receives notification to the time that the service personnel reach the site. Fault resolution time (median) Resolution of urgent call-outs: from the time that the local authority receives notification to the time that the service	Median response time for attendance and resolution	Response time from Council receiving notification of the fault to the time that service personnel reach the site of the water supply fault.	Response and resolution times in 2019/20 were not recorded accurately.	Analysis of service requests and contactors KPIs. This measure has not been able to be recorded because of issues relating to the recording of after-hours call outs. We are putting systems in place to ensure that this issue is rectified for the future.	Less than 1 hours Less than 4 hours	Less than 1 hours Less than 4 hours

[1] An urgent call-out is one that leads to a complete loss of supply of drinking water.

Sr. No.	Community outcome	Level of Service	How we measure it (customer)	How we measure it (technical)	Current LoS Performance	How We Monitor Performance	Target LoS Medium Term (1-3 years)	Target LoS Long Term (4-10 Years)
		personnel confirms resolution of the fault or interruption. THIS IS A DIA MANDATORY MEASURE.						
Fault response Times Performance measure	<u>Economy</u>	**Non Urgent call outs**[ii2] <u>Fault resolution time</u> Resolution of non-urgent call-outs: from the time that the local authority receives notification to the time that the service personnel confirms resolution of the fault or interruption is within 7 days.	Percentage of failure responded within the specified time	Response time from Council receiving notification of the fault to the time that service personnel reach the site of the sewerage overflow resulting from a blockage.	Response and resolution times in 2019/20 were not recorded accurately.	Analysis of service requests and contactors KPIs. This measure has not been able to be recorded because of issues relating to the recording of after-hours call outs. We are putting systems in place to ensure that this issue is rectified for the future.	Time to resolve the problem is ≤ 7 days (85% of times).	Time to resolve the problem is ≤ 7 days (90% of times).
Performance measure **O3**		**Non Urgent call out** <u>Fault response time (median)</u> Attendance for non-urgent call-outs: from the time that Council receives notification to the time that the service personnel reach the site. <u>Fault resolution time (median)</u> Resolution of non-urgent call-outs: from the time that the local authority receives notification to the time that the service personnel confirms resolution of the fault or interruption. THIS IS A DIA MANDATORY MEASURE.	Median response time for attendance and resolution	Where Council attends to water supply fault in the sewage system,	Response and resolution times in 2019/20 were not recorded accurately.	Analysis of service requests and contactors KPIs. This measure has not been able to be recorded because of issues relating to the recording of after-hours call outs. We are putting systems in place to ensure that this issue is rectified for the future.	Less than 4 hours. Less than 6 days.	Less than 4 hours. Less than 6 days.
Customer Satisfaction Performance measure **O4**	<u>Economy</u>	<u>Customer satisfaction</u> (a) Drinking water clarity (b) Drinking water taste (c) Drinking water odour (d) Drinking water pressure or flow (e) Continuity of supply (f) Council response to these issues THIS IS A DIA MANDATORY MEASURE.	Complaints by customer on (a) Drinking water clarity (b) Drinking water taste (c) Drinking water odour (d) Drinking water pressure or flow (e) Continuity of supply (f) Council response to these issues	Total complaints reported as a whole of district. Calculate as per 1000 connections	Number of complaints in 2018/19 – Not achieved (9.8 complaints per 1000 connections) 2019/20 –Not achieved (10.5 complaints per 1000 connections)	Total number of complaints / 1000 connections. Number of faults from the service request system. Number of connections from the rates database.	Target number of complaints per 1000 connections ≤ 8	Target number of complaints per 1000 connections ≤ 8

[2] An urgent call-out is one that leads to a complete loss of supply of drinking water.

Sr. No.	Community outcome	Level of Service	How we measure it (customer)	How we measure it (technical)	Current LoS Performance	How We Monitor Performance	Target LoS Medium Term (1-3 years)	Target LoS Long Term (4-10 Years)
Demand Management Performance measure **O5**	All	Demand Management Sustainable use of potable water. We use our water efficiently.	Drinking water is always available	Average summer consumption per day per household equivalent unit within district. Take total water supplied for urban water supply schemes and divide this by the total household equivalent units (connected) for these areas. We include the following schemes: Acacia Bay / Mapara, Atiamuri, Bonshaw Park, Hatepe, Kinloch, Mangakino, Motuoapa, Omori, River Road, Taupo, Turangi, Waitahanui, Whakamaru, Whakamoenga, Whareroa.	2018/19 – Achieved (1.01 m^3/day/HEU) 2019/20 – Achieved (1.04 m^3/day/HEU)	We take monthly water consumption data and divide by the HEU for each water supply area.	Summer peak household water consumption less than or equal to 1.5 m^3/day/HEU.	Summer peak household water consumption less than or equal to 1.5 m^3/day/HEU.
Fire water flows O6	Economy	We provide adequate water for firefighting in urban schemes.	Fire hydrant will have adequate water flow and pressure.	Minimum of FW2 fire water classifications are met in urban hydrants or exception agreed with NZ Fire service.	2019/20 – Achieved (5.2 per cent of hydrants tested and 94% passed)	By testing at least 5 % fire hydrants during peak seasons for coincident demands. If inadequate water flow / pressure, we either upgrade the network or if it is cost prohibitive then advise fire services the limitations.	Our water pressure in urban areas meets FW2 firefighting code of practice standards	Our water pressure in urban areas meets FW2 firefighting code of practice standards

5.4 Consultation

The most recent level of service consultation was undertaken in 2016 as part of the preparation for the 2018-28 LTP. The most recent Levels of Service Survey conducted by TDC was in November 2016 and the survey asked for satisfaction. Ratepayers from the district were highly satisfied with the Council's provision of water services. Overall, 79 % were satisfied, while only 5 % were dissatisfied.

In preparation for the 2021 LTP, no specific levels of service consultation has occurred, however Council carried out pre-consultation for the 2021 LTP in August 2020 this year from which the community mentioned levels of service where they felt it was important. Specific feedback included:

- Support to the tactical level of service T1: Safety of Drinking Water
  - Water needs to be safe and compliant with the DWSNZ
- Support to the tactical level of service T2: System and adequacy
  - Council needs to make sure that development is catered for with the appropriate provision of drinking water. This includes catering for the peak population.

5.5 Change to Level of Service

There are no proposed changes to levels of service.

There are still a few areas that are not meeting the current levels of service. These include:
- DWSNZ compliance
- Response times
- Water complaints
- Water loss

Capital expenditure to improve the level of service includes;
- Construction of new treatment plants, upgrade of existing treatment plants and connection of water supply schemes to enable full compliance with the DWSNZ
- Improvement to control system and SCADA for better monitoring and reporting
- Reticulation renewals and upgrades to reduce water loss and reduce complaints

Potential impacts on level of service could be: water reform, local government amalgamation, long term funding constraints, regional delivery of water services, expiry of resource consents, funding changes, water takes limits, environmental effects, loss of access to land and treaty settlements.

5.6 Monitoring and Reporting Process

Levels of service are monitored on a monthly basis by the Asset Manager and reported via the CEO report which is presented to elected members at Council meetings. Annual performance is prepared by the Asset Manager for reporting in the Annual Plan document, and every 3 years the AMP document.

6.0 FUTURE DEMAND

6.1 Factors Affecting Demand

There are several factors that influence demand for the water asset within the Taupō District. These are described below and include:

- Growth in population and the number of houses
- Climate impacts such as increasing dry weather and/or rainfall
- Community expectations
- Regulation changes and pressure

Other factors which influence the demand on the water asset however not described in detail are usage efficiency, tourism/events, and leisure trends.

Council has developed a network model for the Taupo, Acacia Bay, Mapara, Kinloch and Whakaroa schemes. Growth projections are modelled to identify where upgrade works might be required to meet demand. Council has not undertaken detailed modelling of the other smaller network due to the cost and the simplicity of these networks, and the lower levels of growth that is occurring.

The main growth areas in Taupo are residential areas in Wharewaka and Nukuhau. Kinloch is continuing to see strong growth within the Kinloch Structure Plan boundary areas.

Examples of recent climate impacts on demand include:

- A flood in the River Road area during the 2018/19 summer scoured a stream that provided water to several private supplies. Following this event council received numerous requests for connection to the Council supply.
- The 2019/20 summer included a significant dry spell that resulted in drought conditions for much of the upper North Island. Water demand during this period was higher than normal throughout the Taupo District and water restrictions were required.

Managing community expectations regarding water demand can be challenging. Part of the challenge in the Taupo District relates to the perception of water availability due to relatively abundant natural water resources including rainfall averaging 1,100 mm/yr, the country's largest lake, significant rivers and easily tapped groundwaters and springs.

From a regulation perspective, there is growing regional and central government focus on efficient use of water resources. The responsibility falls on local authorities to demonstrate prudent management. TDC has seen this with recent advance review of the Rainbow Point water take consent.

Changes to the regulation and enforcement of standards relating to drinking-water supply are also increasingly impacting demand. In the Wairakei area connection requests have been received by Council due to private suppliers determining the risks are too great to continue to supply third parties.

6.2 Demand Management

Demand management is:

Future Demand

"……the modification of customer demands for services in order to maximise use of existing assets or to reduce or defer the need for new assets."

TDC has a current Water Demand Management Plan which is written for the purpose of managing the water supplies to the community to ensure that:

- Water sources are used in a sustainable manner;
- Infrastructure is planned, constructed and managed;
- Growth, consumption and water quality trends are monitored;
- Address the demand challenges through an action plan, which considers the specific environmental, cultural, economic, and social framework of our district.

A summary of demand management initiatives from the plan include:

- Water metering – currently planned for smaller schemes to support water loss management
- Pricing strategies – will be reviewed following the District wide rating project
- Incentivising technology e.g. low flow fittings – to be considered as part of district plan review
- Restrictions – currently applied in advance of peak summer periods and elsewhere if demand necessitates
- Water loss management – projects currently underway and more planned in 2021 LTP
- Education initiatives – to be requested via operational budgets
- Rainwater harvesting – to be considered as part of District plan review

6.3 Plans Related to Growth

In addition to general council planning documents such as the District Plan there are other planning documents that relate to demand in relation to the water asset. These include:

- Growth Management Strategy – Taupo District 2050
- Taupo Town Centre Structure Plan
- Taupo Commercial & Industrial Structure Plan
- Kinloch Structure Plan
- Mapara Valley Structure Plan
- Southern Settlements Structure Plan

6.4 Growth

6.4.1 GROWTH MANAGEMENT STRATEGY

In June 2006 the Council adopted Taupō District 2050 (TD2050), the Growth Management Strategy for the District. The growth management strategy identifies where urban growth is anticipated so that land use and infrastructure planning can be aligned. TD2050 has been incorporated into the District Plan by way of plan changes, particularly Plan Change 21 which identifies the future urban growth areas.

This strategic approach to integrating land use and infrastructure is intended to be supported by subsequent structure planning of the urban growth areas to identify the detailed settlement pattern and infrastructure servicing. Council has prepared structure plans for:

- Kinloch
- Mapara Valley
- South-western Bays Settlements (including Turangi); and
- Commercial and industrial areas within Taupō Township.

6.4.2 GROWTH MODEL REVIEW (2020)

A *Taupō District Growth Model* has been in place since 1 July 2004 and was initially developed with the projected growth identified in TD2050. The *Taupō District Growth Model* and *Growth Model Review* have been updated and included in the current *Development Contributions Policy*, to reflect changes in the economy and the timing of key infrastructure. A growth model was developed based on the anticipated population increase and associated residential lot increases in TD2050. The growth model is generally reviewed and updated every three years prior to the review of the asset management plans and development of the long-term plan.

However, no update has been made this LTP. Updated census data was not available in a timely manner, and the effects of the Covid-19 pandemic created uncertainty. The growth rate at Kinloch continued to strongly exceed the growth model. Therefore, timing of future growth projects in Kinloch are based on a greater growth rate than the growth model suggests.

Based on Census 2018 figures, Taupō District is home to 37,203 people who usually live here.

There are 20,844 private dwellings in the district 68% are occupied and 32% are unoccupied (likely holiday homes).

Recent Census Data	**2013**	**2018**
Population	32,907	37,203
Occupied dwelling	13,395	14,094
Unoccupied dwelling	6,171	6,588
Dwelling under construction	78	159
Total private dwellings	19,644	20,844

Demand is affected by a mixture of economic and population growth factors, including:

- Demographics
  - The 2018 census has seen Taupō's population grow by 13% since 2013.
  - Taupō's population is likely to continue to grow with it peaking at 2035.
- Community expectations – Council sets the communities levels of service has part of its 10-Year Plan process based on community feedback and the decision-making processes.

It is dangerous from a financial aspect to overestimate the level of future growth. Where growth is overestimated the requirement for capital expenditure is overstated, essentially elevating costs to the ratepayer with limited ability to collect development contributions.

Taupo water supply growth planning has been completed while considering future connection of outlying communities and peak water demand variance. The treatment plant was upgrade in 2020 to enable production of up to 30MLD of treated water. A further upgrade to 35MLD is currently planned for 2040 inline with a peak demand of 2.0m3 per household. With improvements to demand management to reduce the peak demand, the upgrade will be able to be deferred further. The Figure below displays current demand forecasts for Taupo including the Acacia Bay connection.

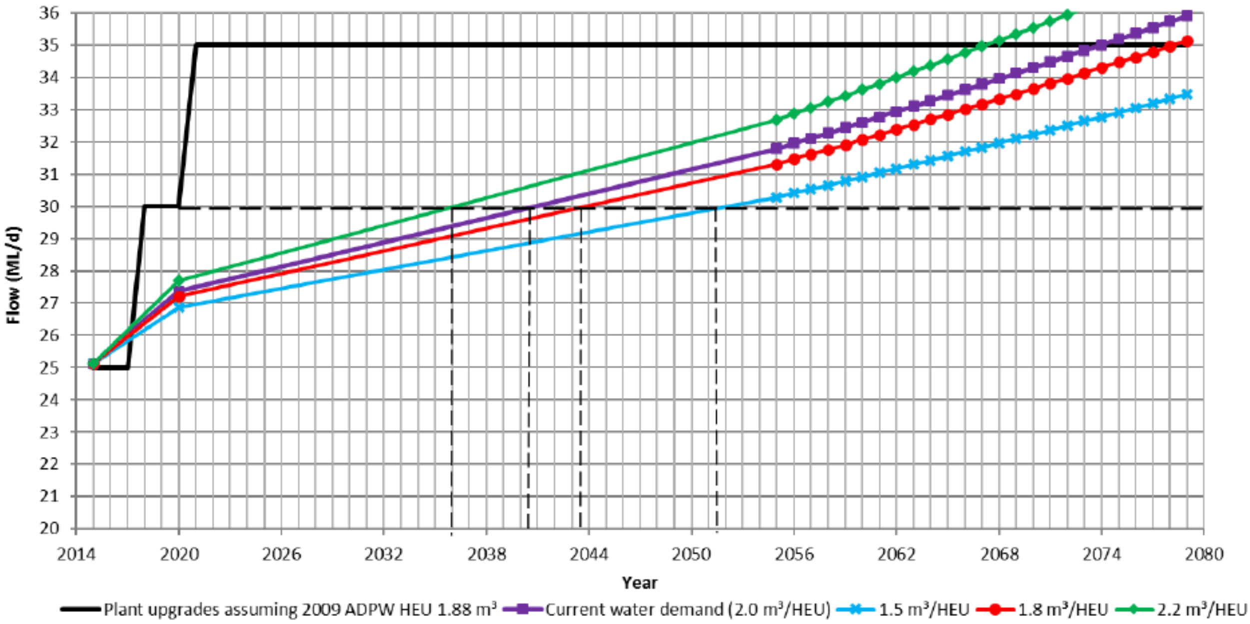


Figure 6.1: Taupo Water Supply Demand Forecasts and WTP Upgrade Planning

Growth planning in Kinloch has centred around low, medium and high growth scenarios. The structure plan defines ultimate development, but the speed of the development is very much up to market conditions. The Figure below presents potential upgrade timeframes against the peak day flow for each growth scenario. Demand management tools will be able to be utilised to further defer plant upgrades if desired.

Future Demand

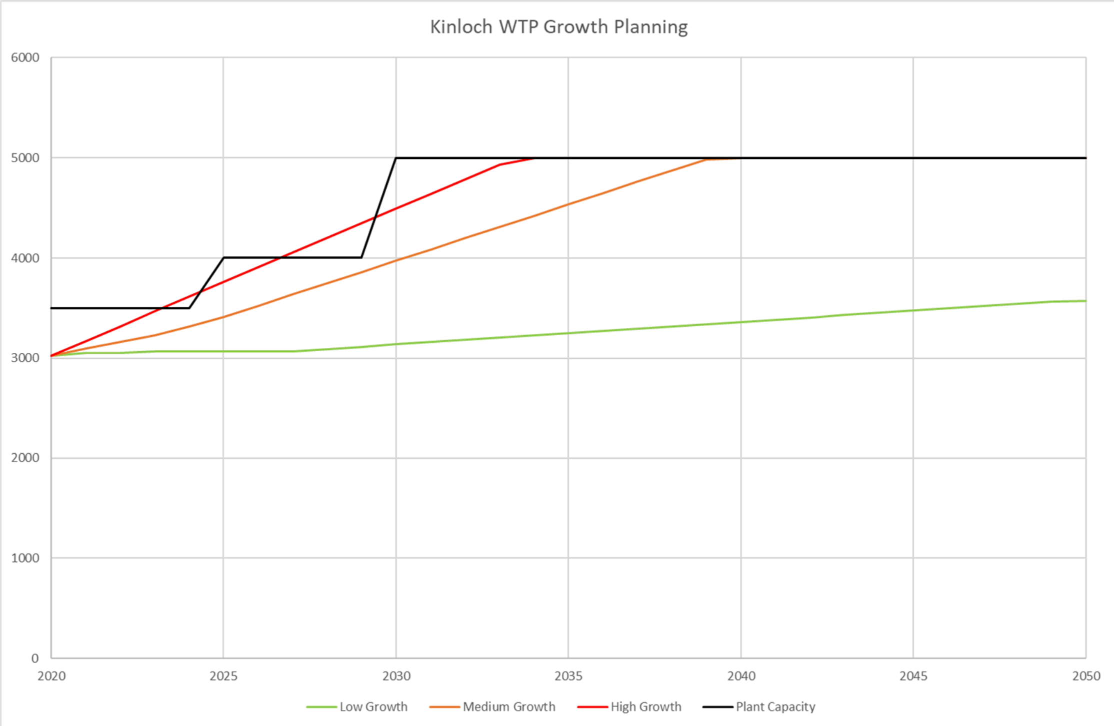


Figure 6.2: Kinloch Water Supply Demand Forecasts and WTP Upgrade Planning

6.4.3 DEVELOPMENT CONTRIBUTIONS (DC) POLICY

Council's method for collecting funding for growth projects is outlined in detail in its DC Policy. This is determined in conjunction Under the DC Policy the cost of growth-related infrastructure is the responsibility of the developer. If the development does not occur as projected but the project still proceeds, the cost of the growth-related capital expenditure is transferred onto the rate payer, therefore ultimately increasing rates.

Growth in the number of lots and dwellings in the district has impacts on infrastructure demand. Growth Council's decision-making processes and planning documents such as the 10-Year Plan, the Asset Management Plans, and others.

It is dangerous from a financial aspect to overestimate the level of future growth. Where growth is overestimated the requirement for capital expenditure is overstated, essentially elevating costs to the ratepayer with limited ability to collect development contributions.

6.4.4 NEW LOTS TO BE CREATED

Consideration has been given to the optimistic discussions with developers, actual consent numbers over the past three years, demographic considerations[1] and officers' estimates when estimating the potential lot numbers outlined in the DC Policy and the Growth Model.

The table below outlines those estimates for the next ten years. The areas that are not predicted to have any growth are not shown.

Table 6.1: Estimated Lot Creation 2021 - 2031

WATER

Taupo District Growth Model 2018 - 2050

Financial Year Starting	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31
Taupo South	55	55	55	55	55	30	30	0	20	0
Taupo North West	35	30	30	30	30	30	30	23	0	23
Taupo Town	20	20	20	20	20	20	20	17	20	17
Total Lots Created	110	105	105	105	105	80	80	40	40	40
Building Consents Issued	110	105	105	105	105	80	80	40	40	40
Acacia Bay (including lower Mapara Rd)										
Total Lots Created	2	2	2	2	2	2	2	2	2	2
Building Consents Issued	2	2	2	2	2	2	2	2	2	2
Kinloch Area										
Total Lots Created	12	0	7	0	0	0	0	10	10	10
Building Consents Issued	12	0	7	0	0	0	0	10	10	10
Mapara/Blue Ridge Area										
Total Lots Created	5	5	5	5	5	5	5	2	2	2
Building Consents Issued	5	5	5	5	5	5	5	2	2	2
Five Mile Bay/Waitahanui										
Total Lots Created	0	0	0	0	0	0	0	0	0	0
Building Consents Issued	0	0	0	0	0	0	0	0	0	0
Turangi										
Total Lots Created	2	2	2	2	2	2	2	2	2	2
Building Consents Issued	2	2	2	2	2	2	2	2	2	2
Hatepe										
Total Lots Created	0	0	0	0	0	0	0	0	0	0
Motuoapa										
Total Lots Created	0	0	0	0	0	0	0	0	0	0
Building Consents Issued	0	0	0	0	0	0	0	0	0	0
Pukawa/Omori/Kuratau										
Total Lots Created	0	3	0	3	0	3	0	0	0	0
Building Consents Issued	0	3	0	3	0	3	0	0	0	0
Whareroa										
Total Lots Created	15	0	0	0	15	0	0	0	0	0
Building Consents Issued	15	0	0	0	15	0	0	0	0	0

The estimated growth of the district; and water, wastewater, and transportation catchments; models are found in the DC Policy and Taupō Growth Model.

Note that the growth assumption used for Kinloch water and wastewater are greater than in shown in the current growth model.

6.4.5 OCCUPANCY PER DWELLING

The long-term trend for more than fifty years has been for a decrease in the number of people per dwelling however this has reversed slightly as shown by the 2018 census data.

Council uses a Household Equivalent Unit (HEU) to convert between population figures and the number of dwellings. Current Census data shows the HEU is approximately 2.6 people per household.

In Taupō District, this figure is complicated by holiday homes which form approximately 34 %[2] of the district's dwellings based on Census data. This figure is difficult to fully determine due to the difference between out-of-town ratepayers and what is likely to be deemed a holiday home.

[1] Jackson, N., "*Taupō District, Demographic Trends and Projections, National Institute of Demographic and Economic Analysis*", June 2014.

[2] Statistics NZ data

Future Demand

However, because of this high number of possibly empty homes for a significant part of the year Council needs to consider peak usage and populations when determining demand. This peak demand is particularly relevant when considering demand on infrastructure, such as water and wastewater outlined in detail in the *DC Policy* and *Taupō Growth Model*.

The following Figure displays water use per household (HEU) over the last 5 years. It shows a steadily increasing trend of water use which may be linked to the increase in occupancy. It should be noted that peak use is dramatically impacted by weather conditions, for instance the very high use during the 2019/20 summer.

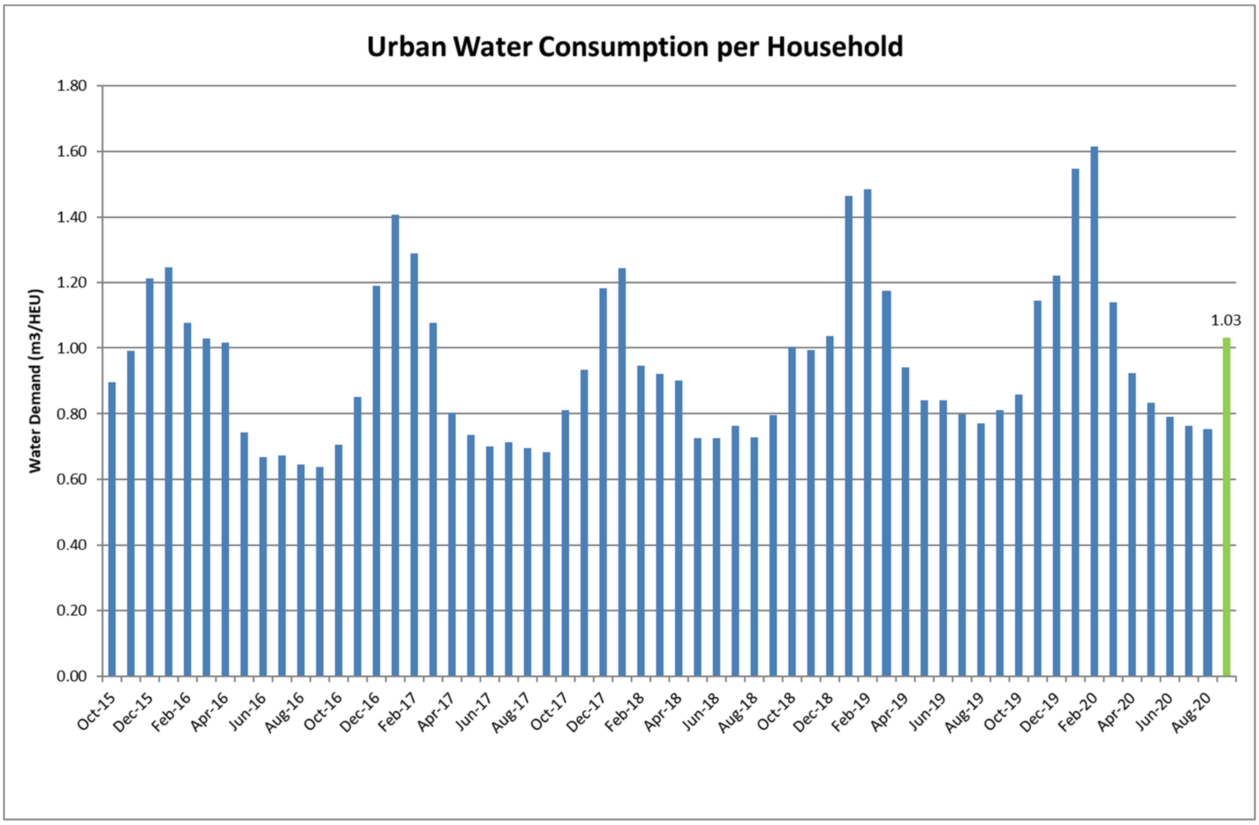


Figure 6.3: Urban Water Consumption Trend

6.4.6 ESTIMATE - SCALE - SMOOTH

New lot projections are estimated on a development basis and then aggregated into catchments[3]. The data was then reviewed and amended in an officer discussion process which moderated the estimates with the aim to avoid reactive to the unpredictable upturns and downturns is growth.

6.5 Meeting increased/changing demand

Increased/changing demand can be met by using a number of methods including;

- Other non-asset-based methods e.g. education for the business community regarding water conservation.

[3] Water, Wastewater and Transportation, Taupō Growth Model.

Future Demand

- Capital Expenditure – building new assets e.g. upgrading treatment plants, pump stations, reservoir and pipes to cater for growth.
- Operational/maintenance expenditure – there may be a change to the cost to operate or maintain due to growth or to changes in demand. There may also be increased operations and maintenance due to new assets created. These includes; increased maintenance costs of planned maintenance, telemetry, instruments for continuous monitoring, increased power costs, new AMS systems, and new water pipes built to cater for growth.

6.5.1 OTHER NON-ASSET BASED SOLUTIONS DEMAND MANAGEMENT TOOLS TO MANAGE CHANGES IN DEMAND

A unique feature of demand management in Taupō District is the managing of the fluctuating demand. Taupō has a large percentage of unoccupied dwellings which means that the base demand as compared to dwelling numbers is low. However, this demand increases significantly during peak holiday periods, tourist seasons and when there are large events in town.

TDC currently uses the following techniques to manage demand for water:

- Bylaws and legislation (including the District Plan).
- Water supply restrictions using Water Demand Management Plan

Other areas which may be used in future are:

- Education through increased customer consultation.
- User charges.

6.5.2 CAPITAL EXPENDITURE DUE TO CHANGES IN DEMAND

The development of additional water connections in the district in the coming ten years will require new infrastructure as well as necessitating the upgrading of the existing assets. The table below outlines the infrastructure required, the cost of this infrastructure and the timing of the provision of components with a Council cost share.

TABLE 6.2: Capital Projects Required to Service Taupō District

Project	Project Cost	Construction timing
Kinloch water DWSNZ upgrade	$5.2M	2021-2023
Omori water DWSNZ upgrade	$2.8M	2021-2023
Taupo WTP Taste Odour and Cyanotoxin Treatment Upgrade	$1.4M	2026-2028
Taupo water Taupo WTP capacity upgrade to 35 MLD	$0.5M	2040-2041
Whareroa Water Treatment Capacity Upgrade	$0.5M	2038-2040
Taupo water Poihipi reservoir	$9.36M	2031-2034
Taupo water Poihipi reservoir - land purchase	$0.05M	2021-2022
Taupo water Brentwood reservoir	$3.0M	2033-2035
Taupo water Tauhara Ridge reservoir - land purchase	$0.35M	2021-2022
Taupo water Tauhara Ridge Reservoir and Airport Connection	$2.4M	2022-2024
Taupo water Napier Road reservoir	$4.7M	2032-2034
Taupo water Napier Road reservoir - Land purchase	$0.05M	2021-2022
Kinloch Low Zone Reservoir Land Purchase	$0.55M	2021-2022
Kinloch Low Zone Reservoir Construction	$4.68M	2021-2024

Taupo Water Wairakei reservoir upgrade and renewal	$1.2M	2031-2033
Centennial Treated Timbertank Reservoir Replacements	$1.2M	2033-2035
Whareroa Timbertank Reservoir Replacements	$0.72M	2034-2036
Taupo Water - Control Gates Bridge Pipeline Upgrade	$0.2M	2021-2022
Taupo Water - Low Pressure Project	$0.9M	2021-2022
Taupo Water - Wairakei Rising Main Upgrade	$0.849M	2023-2024
Mapara Scheme Capacity Increase	$1.557M	2032-2034
Upgrade to Unserviced Residential Land in Acacia Bay	$1.0M	2044-2046

6.5.3 OPERATIONAL EXPENDITURE DUE TO CHANGES IN DEMAND OR LOS

Operational budgets are increased in order to operate and maintain new assets. Funding of this expenditure is discussed in the financial section of this asset management plan (section 9) and strategies for operation and maintenance of assets in Section 4. Operational budgets have been adjusted inline with the growth projects listed above.

6.6 Community Expectations

Customers are primarily concerned with expansion of existing network services such as:

- Ability to connect to the current network
- Adequate flow and pressure
- Water safety
- Cost of service

Customer opinion is to be gauged more thoroughly as part of increased consultation, as detailed in the improvement plan.

6.7 Tourism

The effect of tourism is to increase the population and perceived growth over short periods. The 2018 census indicated that the Taupō District had a population of 37,207. However, the number of people staying in the Taupō district during the peak tourism season of the Christmas/New Year school holiday period has been estimated to be up to 2 times that number. Hence, we design assets for peak demand based on historical data and we base this on lots rather than permanent population.

7.0 RISK MANAGEMENT

7.1 Introduction

Risk management is an important element in the development and management of assets. For asset management planning to be robust it must be integrated with other corporate risk management processes and that this encompasses strategies for Council's most critical assets, provide for the effects of asset failure and be integrated with disaster recovery plans and business continuity plans.

7.1.1 BACKGROUND

Council has reviewed and adopted in 1999 a Risk Management Charter. In 2013 Council's Audit & Risk Committee reviewed and adopted a revised Risk Management Charter. Council determined its overall policy would be to continually develop a Risk Management System that reflects best practice. Key objectives are:

- "to provide a logical and systematic method for identifying and managing risk within the organisation that will assist the organisation to meet its goals and objectives efficiently and effectively. This achieved by aligning key organisational objectives, risks and mitigating controls,
- to minimise losses and maximise opportunities – Risk Management is a much about defining opportunities as avoiding and mitigating losses
- to improve the decision-making capabilities of staff recognising that the greatest knowledge and capacity for management of risks often rests with those"

Overarching strategies for managing risk within Council are:

- Council's Chief Executive Officer will establish and implement a Risk Management system that is relevant to the organisation and which reflects the provisions of Council's Charter. The overarching objective of that Risk Management system will be to identify, and where feasible, mitigate risk factors that might prevent Council achieving its objectives. Risk Management systems established within Council will reflect prevailing best practice including relevant industry standards – especially AS/NZS Risk Management Standard 4360 and AS/NZS ISO 31000.
- The ongoing effectiveness of Councils Risk Management systems and compliance with them by employees will be demonstrated by appropriate reporting to Council and its appropriate Committees. Currently this is achieved by programmed reporting to Council's Audit & Risk Committee who meets 3-4 times per annum.

7.1.1.1 Current Risk Management Status

Council has an Audit & Risk Committee which oversees the governance of a Risk Management Programme within the Taupō District Council. Risk Management is continuously being integrated into Councils culture, philosophy, practices, activities and plans rather than being viewed or practised as a separate programme.

The accountability for the management of risk is not removed from the specific activity managers and the Senior Leadership Team or those responsible for the management of assets and this is viewed as a collaborative process between governance and management.

The high-level assessment of critical assets is done and now needs to be coordinated with the other assets to determine true criticality; this work is an improvement task and will be completed over the next couple of years.

Business Continuity Plans (BCP) have been developed to maintain continuity of operations and service delivery as part of the implementation of Councils Risk Management Charter. Additionally, Council had adopted a Disaster Recovery Plan in 2013 which also addresses aspects of asset management during emergencies.

It is envisaged that BCPs will assist council in the following advantages

- To reduce the cost of disruptions.
- To be more resilient
- To mitigate business risks and financial exposures
- To meet compliance
- To enhance health and safety
- To benefit from insurance premium discounts, reduced excesses and doors opening to new insurance markets.

TDC is also a member of the Waikato Utility Lifelines group and the wider Waikato Civil Defence and Emergency Management Group.

The Three waters maintenance contracts include an after-hours emergency response for network issues and customer complaints. After hours staff (the Palmerston North call centre) receives calls and forward emergency calls directly to the contractor who are required to respond in a certain time. The treatment plant operations team also has on call staff to attend to all treatment plant related emergencies.

7.2 Risk Management Process

The risk management process is an integral part of good management practice. It is an iterative process of continuous improvement that is embedded into existing practices or business improvement.

The main elements of the risk management process to be used at the Taupō District Council are as follows and reflect the risk management standards ISO 31000.2009 and AS/NZS 4360:2004.

a) Communicate and consult

Communicate and consult with internal and external stakeholders of Council as appropriate at each stage of the risk management process and concerning the process as a whole.

b) Establish the context

Establish the external, internal and risk management context in which the rest of the process will be undertaken. Criteria against which risk will be evaluated should be established and the structure of the analysis defined.

c) Identify risks

Identify where, when, why and how events could prevent, degrade, delay or enhance the achievement of asset's objectives.

d) Analyse risks

Identify and evaluate existing controls. Determine consequences and likelihood and hence the level of risk. This analysis should consider the range of potential consequences and how these could occur.

e) Evaluate risks

Compare estimated levels of risk against pre–established criteria and consider the Balances between potential benefits and adverse outcomes. This enables decisions to be made about the extent and nature of treatments required and about priorities.

f) Treat risks

Develop and implement specific cost-effective strategies and action plans for increasing potential benefits and reducing potential costs

g) Monitor and review

It is necessary to monitor the effectiveness of all steps of the risk management process. This is important for continuous improvement. Risks and the effectiveness of treatment measures need to be monitored to ensure changing circumstances do not alter priorities. To ascertain that, the condition assessment of the above ground assets was done regularly by operating staff and planned and preventive maintenance are done to manage identified risk.

7.3 Council Funding for Risk

Council looks to provide funding for disaster recovery through a separate reserve. It appropriates funding each year to a Disaster Recovery Fund reserve to enable access to ready cash in the event of a natural disaster. This is intended to assist reinstatement and to finance any short term needs in the time between any disaster and the recommencement of services.

As at June 2020, the reserve fund had a balance of approximately $2 million. Council has chosen not to insure its below ground assets given the position of its reserves.

Secondly the TEL Fund was established in September 1995 when TDC sold its investments in Taupō Electricity Ltd and Taupō Generation Ltd. The use of that sale capital and subsequent investment income generated each year are included in Council's Treasury Management Policy. One requirement of that policy is that the portfolio and funds are managed in a manner that reflects their potential utilisation as a disaster recovery fund in the event of a natural disaster within the Taupō district. The value of the fund as at 30th June 2020 is approximately $61.3m.

Thirdly Council maintains headroom within its Debt covenants with the Local Government Funding Agency (LGFA) that would allow it to borrow significant amounts in the event that Council needed to fund a disaster recovery programme.

With these three funding mechanisms in place Council considers it is prudently and effectively managing the risk of being able to fund both short and long term needs with respect to potential natural disaster and subsequent recovery operations in the district.

7.4 Insurance

Council only insurers above ground infrastructure assets as specifically identified by the finance team. This includes treatment plants, pumps stations and reservoirs. Underground assets are not insured as Council self-insure for these on the basis that in the event of damage caused by a natural event, essential infrastructure recovery programme funding will be utilised, see Section 7.3 above.

7.5 Dangerous and Insanitary Buildings Policy

Section 131 of the Building Act 2004 requires territorial authorities to adopt a policy on dangerous buildings and of insanitary buildings. The definition of insanitary buildings is included in the Building Act. A building is considered dangerous if,-

- in the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause injury or death (whether by collapse or otherwise) to any persons in it or to persons on other property; or damage to other property; or
- in the event of fire, injury or death to any person in the building or to persons on other property is likely because of fire hazard or the occupancy of the building.

The Council Policy applies equally to water facilities and buildings as it does to other buildings around the District.

7.6 Lifelines Risk Assessment

TDC is a member of Waikato utility Lifelines Group. This process aims to identify components within the TDC water network that may be vulnerable to seismic, flood or volcanic events and the impact of failure of these assets.

7.7 Risk Register

The specific asset risk register (see following) identifies risks, the consequence of the risk, the existing controls in place, treatment options and the level of risk to the asset as assessed and updated by Council Officers. A possible improvement to the register is to provide each treatment options with an associated cost and added to the risk register; however, these are yet to be costed by TDC.

7.8 Risk Classification Matrices

7.8.1 LIKELIHOOD

Likelihood scale for consideration based on **ANZS 4360** is as follows.

Table 7-1: Risk Likelihood

Level	Descriptor	Damage / Failure Indicative Frequency
A	Almost Certain	Once per year or more frequently
B	Likely	Once every three years
C	Possible	Once every ten years
D	Unlikely	Once every thirty years
E	Rare	Once every 100 years
N	Almost Impossible	Once in 10,000 years

7.8.2 CONSEQUENCE

A consequence scale as a result of a risk event occurring based on **ANZS 3460** is shown for consideration as follows.

Table 7-2: Risk Consequence

Level	Descriptor	Description
5	Catastrophic	Extreme Impact of damage or failure
4	Major	High impact of damage or failure
3	Moderate	Medium impact of damage or failure
2	Minor	Low impact of damage or failure
1	Insignificant	Very little impact of damage or failure
N	Negligible / Nil	Assessment is Nil

7.8.3 RISK RATING MATRIX

With both likelihood and consequence scales in place a qualitative risk analysis matrix/level of risk can be determined.

Likelihood	Consequences					
	N	**1**	**2**	**3**	**4**	**5**
A	N	L	M	H	E	E
B	N	L	M	M	H	E
C	N	L	L	M	M	H
D	N	L	L	L	M	H
E	N	L	L	L	L	M
N	N	N	N	N	N	N

Table 7-3: Risk Matrix

The rating legend for the matrix, in this example, can be summarized as follows

E = Extreme risk
H = High risk
M = Moderate risk
L = Low risk
N = Negligible risk approaching nil / no risk

7.8.4 RISK MITIGATION MEASURES

High to Extreme risk would normally involve more detailed studies, action plans and management responsibility specifically assigned.

Moderate risk would be managed by monitoring or response procedures and management responsibility specified.

7.8.4.1 Summary of Identified High Risks

This is a summary of the high risks; the complete list is included as Table 7-5.

Table 7-4: Identified High Risks

Asset Risk	The Risk	Mitigation Measures
Earthquake	Damage to treatment system and water supply network	Generators, operating procedures and a list of known local contractors.
Fire	Damage to the intake pump stations, WTP and reticulation because of structural/electrical system damage of the WTP or computer system damage.	Generators, operating procedures and a list of known local contractors.

Asset Risk	The Risk	Mitigation Measures
Flooding/ high stormy winds on lake shore	Wastewater /Stormwater finding its way through to WTP and or damaged water pipes due to water supply pipes movement.	Health & Safety standards, for WTP / pump stations that are built on low-lying land near the lake shore / riverbed, particularly if a volcanic /seismically unstable area lies just offshore.
Tomo’s	Damage to the reticulation system due to pipe fracture, disconnection of joints and/or pump failure	List of local contractors’ details for easy access to a work force
Contractual Obligations not fulfilled external parties	Failure in the reticulation system due to pipe burst for failure to address new connections, capacity and maintenance issues.	Contract monitoring, performance measures.
Contractual Obligations not fulfilled external parties	Failure to comply with DWSNZ, HDWAA and resource consents	Contract monitoring, performance measures. Continuous monitoring. Sampling of reticulation samples.
Excessive costs to maintain, renew or create assets	Failure to comply with DWSNZ	Improved planning and investigation. Continuous monitoring of water leaving the WTP.
Public safety non-compliance / occupational health and safety non-compliance	Public safety and workers’ safety are put at risk due to, Exposure to open manholes, Leaking pipes, Inadequate water treatment, Contaminant discharges to the environment (immediate environs and the Lake), Inadequate training on operation of machines and other devices or Inadequate occupational health and safety trainings	Public Health Risk Mgt Plans, appropriate signage on hazard areas, upgrade of the WTP and NETWORK, spill to environment procedure in place for both river and lake, adequate training provided, adequate PPE for staff)
Water Treatment	Excessive or low chlorine residuals	The Telemetry is upgraded to continuously monitor FAC and the alarm is communicated to duty operator. There are adequate spare Chlorine gas bottle and skilled staff to manage the situations.
Water Distribution	Watermain breaks and leaks, sediment being stirred up with pressure fluctuations.	Highly skilled repair technicians and network engineers, following standard repair procedures. Network dead-end flushing schedules. Water network model review update and calibration for optimisations.

Following failure of the truck sewer main at Lake Terrace in 2019, following a water main burst TDC have developed to GIS based tool to assist with identification of risk. The tool allows the user to test certain scenarios to identify potential risks to assets by adjusting different parameters. Whilst the tool has been developed it has not yet been used to aide with any risk assessments.
https://transbig.shinyapps.io/TDC_3Waters_Risk_Assessment_Portal_V4

GREAT LAKE TAUPŌ
Taupō District Council

7.9 Critical Assets

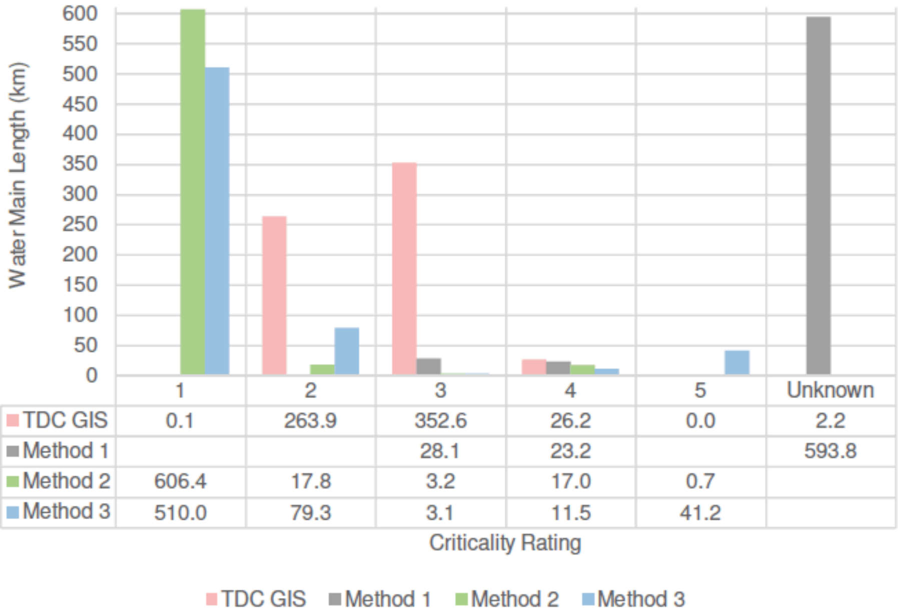
Asset criticality work was completed for all water supply assets in 2016. This work provided all major assets including treatment plants, pump stations, reservoirs and reticulation infrastructure a criticality rating. An example screen shot of the criticality work completed for reservoirs is included below in Figure 7.1. While valuable, this work required some improvement in the reticulation area where pipelines were given higher criticality based on pipe size only.

In 2018, the water reticulation renewals strategy project, improved the criticality analysis for reticulation assets. In this project three methodology's were considered, namely the Project Max report (July 2016), Metadata method (residential population rating), and a customised method developed in conjunction with TDC staff that uses as a combination of pipe diameters and facility importance ratings to determine the pipe criticality, see Figure 7-2. The customised method was taken forward as the preferred methodology and has been used to provide criticalities for all TDCs reticulation assets to enable improved renewals planning to occur.

Prioritisation of watermain renewals utilised the criticalities and condition grade of pipes to determine an order. This was then adjusted based on local knowledge, engineering judgment, other factors (e.g. road sealing), and to ensure appropriate bundling of work for a renewals contract.

Asset Group	Assessment of Criticality			Criticality
Reservoirs	Reservoirs are a fundamental risk reduction asset within a water supply system by providing a source of treated water while other assets are restored. Small systems that be readily supplied by tanker and which frequently have multiple tanks could potentially be ranked as Low criticality. However, given that they can typically be readily inspected and significant failures foreseen it is better to allocate a Moderate Criticality to align with the regular inspections that should occur. Any single reservoir system should be regarded as High Criticality unless it is possible to bypass and operate effectively directly from the source. Turangi has a single reservoir but can be bypassed and the system operated directly off the pumps for a period of time. Reservoirs have a minimum rating of Moderate. This reflects their importance in the system and the disruption inevitably associated with any major repair or refurbishment. Such a grading also aligns with the expectation that they would be regularly inspected to ensure their operational condition and security. It also aligns with an expectation that they would be subject to more rigorous structural and water tightness assessment on regular basis. Appendix 9.8.4 provides more information on this. While the Criticality of the Taupo reservoirs sits at Moderate, or higher, there is some ranking within this that may be of use when assigning priority. This is detailed in Appendix 9.2 and summarised below			Moderate Non-Taupo Schemes Many of the smaller schemes (< 200 connections) could be serviced by tanker if a reservoir failure occurred but with significant community disruption. High (Major) Turangi, Kinloch and Acacia
	Taupo Reservoir	**Relative Ranking**	**Criticality Ranking**	Taupo reservoirs – see table
	Tamatea	Highest	High (Extreme)	
	Titoki	Highest	High (Major)	
	Tauhara	Moderate	High(Major)	
	Botanic Gardens	Moderate	Moderate	
	Hinehura	Lowest	Moderate	
	Airport	Moderate	Moderate	
	Landfill	Lowest	Moderate	
	Wairakei (twin reservoirs)	Lowest	Moderate	

Figure 7-1: Reservoir Criticality Analysis



	1	2	3	4	5	Unknown
TDC GIS	0.1	263.9	352.6	26.2	0.0	2.2
Method 1			28.1	23.2		593.8
Method 2	606.4	17.8	3.2	17.0	0.7	
Method 3	510.0	79.3	3.1	11.5	41.2	

Figure 7-2: Criticality Analysis and Length Distribution (Method 3 Adopted)

Table 7-5: Water Risk Register

Asset Management Plan

Risk Register

Division:	Infrastructure	Compiled by:	Tom Swindells, Asset Manager	Date:	October 2020
Asset:	Water	Reviewed by:	Denis Lewis, Infrastructure Manager	Date:	October 2020

NATURAL RISKS

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
Earthquake	Damage to reticulation system due to: - Pipe fracture - Disconnections in joints - Pump failure - Earth slip - Land subsidence causing changes of grade in pipe network	Major	Unlikely	E (list of local Contractors' details available when needed)	4	D	M	
	Damage to treatment system due to: - Electrical system failure - Telemetry failure - Earth slip failure - Mechanical failure - Structural failure (e.g. Building, Control Room, contact tanks, screen filters, process treatment unit, etc.) - Pipe fracture	Catastrophic	Unlikely	E (built-in/ portable generators, staff trained for servicing, list of local Contractors' details available when needed)	5	D	**H**	
	Lake /Groundwater contamination due to: - Earth slips in source intake / treatment plants with huge storage of chemicals	Major	Unlikely	NC	4	D	M	
	Inaccessibility to network due to footpath/road system failure	Minor	Unlikely	E (emergency road repair)	2	D	L	
Volcanic Eruption/ Ash fall	Damage to treatment system due to: - Clogging of open pipes/ pumps with ash in the WTPs - Increased solid biomass on the pumps and tanks due to ash fall - Corrosion of equipment due to acid content of the ash	Moderate	Unlikely	E (water blasting, vacuum trucks, adequate capacity of the grit chamber in the WTP,	3	D	L	
	Inaccessibility of the WTP and inability to operate the plant	Minor	Unlikely	E (water blasting of access way)	2	D	L	
Lahar	Damage to the treatment system due to: - Increased solid biomass on the tanks - Potential corrosion of pipes and machines	Moderate	Rare	E (water blasting, vacuum trucks)	3	E	L	

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
	Inaccessibility of the WTP and inability to operate the plant.	Minor	Rare	E (water blasting of entrance)	2	E	L	
Flooding	Inaccessibility of the WTP and inability to operate the plant	Minor	Unlikely	E (use of big trucks)	2	D	L	
	Damage to the treatment system due to: - Silting of tanks - Tank overflow	Moderate	Unlikely	E (vacuum truck, WTP has 1-day storage capacity for dry-weather flow, pump out to the NETWORK which has max of 2-day irrigation capacity)	3	D	L	
	Wastewater /Stormwater finding its way through to damaged water pipes due to: - Retic pipes movement	Major	Unlikely	NC	4	D	**H**	
Tsunami	Damage to reticulation network due to: - Scouring and damage to footpath/road system - Destruction of pump stations and other structures	Major	Rare	E (pond the area and suck with vacuum truck)	4	E	L	
	Inaccessibility of the WTP and inability to operate the plant	Minor	Rare	E (water blasting of access way)	2	E	L	
Fire	Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Catastrophic	Possible	E (list of local Contractors' details available when needed)	5	C	**H**	
	Damage to the treatment system due to: - Structural/electrical system damage of the WTP - Computer system damage	Catastrophic	Possible	E (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	5	C	**H**	
Lightning	Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Rare	E (list of local Contractors' details available when needed)	4	E	L	
	Damage to the treatment system due to: - Structural/electrical system damage of the WTP - Computer system damage	Major	Rare	E (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	4	E	L	
High winds	Damage to the reticulation network due to: - Structural/electrical system damage of pump station	Major	Unlikely	E (list of local Contractors' details available when needed)	4	D	M	
	Damage to the intake pump station / treatment system due to: - Stormy winds flooding the pump station and Structural/electrical system damage of the WTP - Computer system damage	Major	Unlikely	E (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	4	D	M	

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
Landslide/Slip	Damage to reticulation system due to: - Pipe fracture - Disconnections in joints - Pump failure - Earth slip - Land subsidence causing changes of grade in pipe network	Major	Possible	E (list of local Contractors' details available when needed)	4	C	M	
	Damage to treatment system due to: - Electrical system failure - Earth slip failure - Mechanical failure - Structural failure (e.g. Building, Control Room, contact tanks, screen filters, WTP process equipments, etc.) - Pipe fracture	Major	Unlikely	E (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	4	D	M	
	Groundwater contamination due to: - Earth slips in NETWORK	Major	Possible	NC	4	C	M	
	Inaccessibility to network due to footpath/road system failure	Minor	Possible	E (emergency road repair)	2	C	L	
Tomos	Damage to reticulation system due to: - Pipe fracture - Disconnections in joints - Pump failure - Land subsidence causing changes of grade in pipe network and loss of support for pipe system	Major	Likely	E (list of local Contractors' details available when needed)	4	B	**H**	
	Damage to treatment system due to: - Structural failure (e.g. Building, Control Room, contact tanks, screen filters, WTP process equipment, etc.) - Pipe fracture	Major	Possible	E (built-in generators, staff trained for servicing, list of local Contractors' details available when needed)	4	C	M	
	Groundwater contamination due to: - Land subsidence in NETWORK	Major	Possible	NC	4	C	M	
	Inaccessibility to network due to footpath/road system failure	Minor	Possible	E (emergency road repair)	2	C	L	
Geothermal activity	Damage to the reticulation system due to: - Potential corrosion of pipes	Major	Possible	E (water blasting, ceramic pipes are used in high-risk areas)	4	C	M	
	Damage to the treatment system due to: - Potential corrosion of pipes and machines	Moderate	Possible	E (immediate water blasting on-site for surfaces and engage Contractors for water blasting of pipes every 3 months)	3	C	M	
	Inaccessibility of the WTP and inability to operate the plant	Minor	Unlikely	E	2	D	L	

EXTERNAL RISKS

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
War	Damage to reticulation system due to: - Pipe fracture - Disconnections in joints - Pump failure	Major	Almost impossible	NC	4	N	N	
	Damage to treatment system due to: - Electrical system failure - Mechanical failure - Structural failure (e.g. Building, Control Room, contact tanks, screen filter, WTP process equipments, etc.) - Pipe fracture - Inability to operate the WTP	Major	Almost impossible	NC	4	N	N	
	Inaccessibility to the network	Minor	Almost impossible	NC	2	N	N	
Terrorism	Damage to reticulation system due to: - Destruction by terrorists	Major	Rare	E (list of local Contractors' details available when needed)	4	E	L	
	Damage to treatment system due to: - Destruction by terrorists - Inaccessibility of the WTP and inability to operate the plant	Major	Rare	E (list of local Contractors' details available when needed, staff trained for servicing)	4	E	L	
	Inaccessibility to the network	Minor	Rare	NC	2	E	L	
Protests/Riots	Damage to reticulation system due to: - Destruction by protesters	Major	Unlikely	E (list of local Contractors' details available when needed)	4	D	M	
	Damage to treatment system due to: - Destruction by protesters - Inaccessibility of the WTP and inability to operate the plant	Major	Unlikely	E (list of local Contractors' details available when needed, staff trained for servicing)	4	D	M	
	Inaccessibility to the network	Minor	Unlikely	NC	2	D	L	
Vehicle Accident	Damage to reticulation system due to: - Ramming into the pipes, manholes and pump stations	Moderate	Possible	E	3	C	M	
	Inaccessibility of the network along the footpath/road after an accident	Minor	Possible	E (immediate clearing)	2	C	L	
	Inability to address operational issues in the network and WTP if accident involves staff	Moderate	Possible	E (enough staff to cover operations)	3	C	M	
	Damage to treatment system due to: - Ramming of buildings and other structures - Inability to operate the WTP	Moderate	Possible	E (list of local Contractors' details available when needed, staff trained for servicing)	3	C	M	

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
Contractual obligations not fulfilled by external parties	Failure in the reticulation system due to: - Pipe bursts/ failure to address capacity and maintenance issues	Major	Likely	E (scoring system monitored closely, termination of contract for non-compliance and tendering new one)	4	B	**H**	
	Failure to undertake network maintenance and maintain the required network performance standard	Moderate	Likely	E (scoring system monitored closely, termination of contract for non-compliance and tendering new one)	3	B	M	
	Failure to comply with HDWAA / DWSNZ and Resource Consents	Major	Likely	E (scoring system monitored closely, termination of contract for non-compliance and tendering new one)	4	B	**H**	
	Failure to implement required works due to lack of feasibility and design works	Minor	Likely	E (scoring system monitored closely, termination of contract for non-compliance and tendering new one)	2	B	M	
Excessive costs to maintain, renew or create assets	Failure to maintain the required network performance standard	Moderate	Likely	E (Will allow for unplanned costs)	3	B	M	
	Failure to comply with DWSNZ / HDWAA, Resource Consents	Major	Likely	E (Will allow for unplanned costs)	4	B	**H**	
	Failure to address service demand	Moderate	Likely	E (Will allow for unplanned costs)	3	B	M	
Lack of contractors to carry out works	Failure in the reticulation system due to: - Pipe bursts for failure to address capacity and maintenance issues	Major	Possible	NE	4	C	M	
	Failure to undertake network maintenance and maintain the required network performance standard	Moderate	Possible	NE	3	C	M	
	Failure to comply with Resource Consents	Major	Possible	NE	4	C	M	
	Failure to implement required works	Moderate	Possible	NE	3	C	M	

OPERATIONAL RISKS

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
Public health risk from Water Source	Contamination of source water i.e. lake, river, underground streams, springs and bores.							
	▪ By animal and human waste							
	▪ Algae bloom and associated bio-	Moderate	Almost certain	NFE	3	A	**H**	5
	toxins	Major	Likely	NFE	4	B	**H**	5
	▪ Geothermal contaminants							
	▪ By oil, petroleum by-products	Moderate	Almost certain	NC	3	A	**H**	8
	▪ Water quality to poor to treat	Minor	Unlikely	NC	2	D	L	9
	▪ Volcanic activity	Major	Likely	N	4	B	H	5
	▪ Heavy rainfall event	Catastrophic	Rare	NC	5	E	M	6
	▪ Heavy wind	Moderate	Possible	NFE	3	C	M	6
	▪ Industrial waste	Moderate	Almost certain	NFE	3	A	H	7
	▪ Hazardous substances	Major	Possible	NC	4	C	M	8
	▪ Agrichemicals	Major	Possible	NC	4	C	M	9
		Major	Unlikely	NC	4	D	M	9
Source water unable to match demand	Unable to abstract enough water	Moderate	Rare	NC	3	E	L	11
Water Treatment	Not having enough Free available Chlorine (FAC) to eliminate bacteria.	Major	Likely	E (The Telemetry is upgraded to continuously monitor FAC and the alarm is communicated to duty operator. There are adequate spare Chlorine gas bottle and skilled staff to manage the situations.)	4	B	**H**	-
	Over chlorinating – too much FAC	Moderate	Almost certain	E	3	A	**H**	-
	Total Organic Carbon increases forming chlorination by-products	Moderate	Possible	E	3	C	M	-
Fluoridation	Overdosing of fluoride ▪ Due to wrong preparation of dosing solution with powder / liquid. ▪ Incorrect monitoring instrument ▪ Calibration issues	Moderate	Likely	E (The Fluoride monitoring standard solutions are maintained and reliable monitoring instrument is	3	B	M	-

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
				sourced with warranties and service agreements)				
Pump Operations	Changes in pressure or water hammer	Major	Almost certain	NFE	4	A	E	3
Plant failure	Power failure Natural disaster	Major Catastrophic	Almost certain Possible	E NC	4 5	A C	E **H**	- 6
Post Treatment Storage Risks	Not enough water to meet demand • Contaminating material getting into reservoir • Development or re-suspension of sediment • Material failure of reservoir • Natural disaster • Vandalism or sabotage	Major Major Moderate Catastrophic Catastrophic Major	Likely Possible Almost certain Possible Possible Possible	E E E E NC E	4 4 3 5 5 4	B C A C C C	**H** M **H** **H** **H** M	- - - - -
Telemetry Monitoring	Incorrect water quality data used for water supply management	Major	Possible	E	4	C	M	-
Water Distribution Risks	Contaminated material gets into main ▪ Mains breaks and leaks ▪ Sediment being stirred up with pressure fluctuations ▪ Inadequate backflow prevention ▪ Poor hygiene practices during maintenance ▪ Poor construction materials and practices	Moderate Moderate Major Major Moderate	Almost certain Almost certain Almost certain Almost certain Possible	NFE NFE NFE NFE E	3 3 4 4 3	A A A A C	**H** **H** E E M	4 6 2 1 -
	Low flow or No flow ▪ Unable to meet demand ▪ Power failure ▪ Pipe failure ▪ Pump failure ▪ Natural disasters or incidental damage	Major Major Major Moderate Catastrophic	Possible Almost certain Almost certain Likely Possible	E E E E NFE	4 4 4 3 5	C A A B C	M E E M **H**	- - - - 6
Staff training	Unskilled / untrained staff ▪ Poor water quality and distribution management. ▪ Water is contaminated	Moderate	Likely	NFE	3	B	M	1
Legislative non-compliance	Failure to achieve Levels of Service due to: - Non-compliance to Resource Consents - Unlawful discharges (without Consent) to the environment	Major	Possible	E (capital/renewal/maintenance works programmed)	4	C	M	

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
	Court subpoena for unlawful acts; specifically, violation to RMA	Major	Possible	E (to be addressed accordingly)	4	C	M	
In adequate asset condition assessment and valuation	Failures in the WTP/reticulation system due to: - Pump /motor / valve failure - Pipe bursts / fracture	Major	Possible	E (The qualified maintenance staff conducting condition assessment regularly and development of an in-house Asset Management System for proper planning)	4	C	M	
	Failure in the treatment system due to: - Electrical system failure - Mechanical failure - Structural failure (e.g. Building, Control Room, contact tanks, screen filters, WTP process equipment, etc.) - Pipe fracture	Major	Possible	E (Acquisition of proprietary AMS to replace in-house Asset Management System for proper planning)	4	C	M	
	Failure in the disposal system due to: - Saturation of the field as a result of insufficient capacity	Major	Possible	E (Acquisition of proprietary AMS to replace in-house Asset Management System for proper planning)	4	C	M	
	Failure to come up with robust capital works, renewal and operational programmes	Moderate	Possible	E (Acquisition of proprietary AMS to replace in-house Asset Management System for proper planning)	3	C	M	
	Expenditures are not optimised	Minor	Possible	E (Acquisition of proprietary AMS to replace in-house Asset Management System for proper planning)	2	C	L	
Incorrect financial projections to create, renew or maintain assets	Delayed project completion	Moderate	Possible	E (Plan Improvement)	3	C	M	
	Over- or under spent budget creating impact on rates and development contributions	Moderate	Possible	E (Plan Improvement)	3	C	M	
Not meeting community expectations	Loss of ratepayers' faith and trust to Council due to: - Failure to maintain network performance standard - Failure to deliver the target levels of service	Major	Possible	E (Plan Improvement)	4	C	M	
Public safety non-compliance/ Occupational Health and safety non-compliance	Public safety and workers' safety are put at risk due to: - Exposure to open manholes - Leaking pipes - Inadequate water treatment - Contaminant discharges to the environment (immediate environs and the Lake)	Major	Likely	E (Water Safety Plans, appropriate signage on hazard areas, upgrade of the WTP and network, spill to environment procedure in place for both river and lake, adequate training	4	B	**H**	

Asset Risks	The risk: What can happen and how it can happen	The consequences of an event happening		Adequacy of existing controls	Consequence rating	Likelihood rating	Level of risk	Risk priority
		Consequences	Likelihood					
	- Inadequate training on operation of machines and other devices - Inadequate occupational health and safety trainings.			provided, adequate PPE gears for staff)				
Loss of asset data/information on assets	Failure to maintain network performance standard due to: - Potential delay in work programmes - Unreliable asset management planning	Moderate	Unlikely	E (Robust database and Asset Mgt. System)	3	D	L	
	Increased expenditure to recollect the data. Failure of in-house AMS	Minor	Unlikely	E (Robust database and Asset Mgt. System)	2	D	L	
High staff turnover and absence of staff to undertake water asset management	Failure to maintain network performance standard due to: - Loss of historical and current knowledge base - Planned programmes tend not to be sustainable - Learning periods consume significant work time as new staff comes in - Institutional/Organisational development is not sustained.	Moderate	Likely	E (Organisation restructured to ensure Network Engineers have the capability to address issues across disciplines)	3	B	M	
Lack of management support to the required work programmes	Failure to maintain network performance standard due to: - Disapproval of required work programmes - Insufficient justification to support the program proposals	Moderate	Likely	E (Proper investigations and scoping to justify the planned works)	3	B	M	

8.0 LIFECYCLE MANAGEMENT PLAN

Prior to 1950, the district was largely undeveloped and sparsely populated. Since that time, population has increased rapidly to approximately 37,203 (2018 census). It is noted that there is an increase of 4,296 people, or 11.5 percent, since the 20013 Census. Urban growth has focused on Taupo Township and various lakeshore settlements, whilst rural land development has been dramatic with the conversion of scrub wastelands to productive farmlands and vast exotic forest plantations and future conversion to lifestyle properties.

Taupo District Council provides water services to many urban & rural areas within the district including Taupo, Turangi, Tokaanu, Acacia Bay, Mapara Road, Bonshaw Park, Centennial Drive including Rakanui Road, Hatepe, Kinloch, Motuoapa, River Road, Tirohanga, Waihaha, Whakamoenga, Whakaroa, Waitahanui, Omori, Kuratau, Pukawa, Whareroa, Whakamaru, Atiamuri, Mangakino and Motutere motor camp.

This section contains life cycle management plans for the following water asset components:

- Treatment plants, reservoirs and pump stations
- Reticulation (pipes, valves, fire hydrants, water meters etc)

Many of these assets are seen as critical assets where failure could have a dramatic impact. This has been discussed in further detail in the Risk Management section.

Background data for the asset type including asset description, capacity, performance, condition and valuations is included in the Asset Data section.

This section contains the general *management strategies,* to achieve the levels of service defined in Level of Service section. These strategies are divided into four main work categories (routine maintenance, renewal, capital and disposal) as illustrated in the following figure.
A management strategy for each of the schemes is included in the appendices.

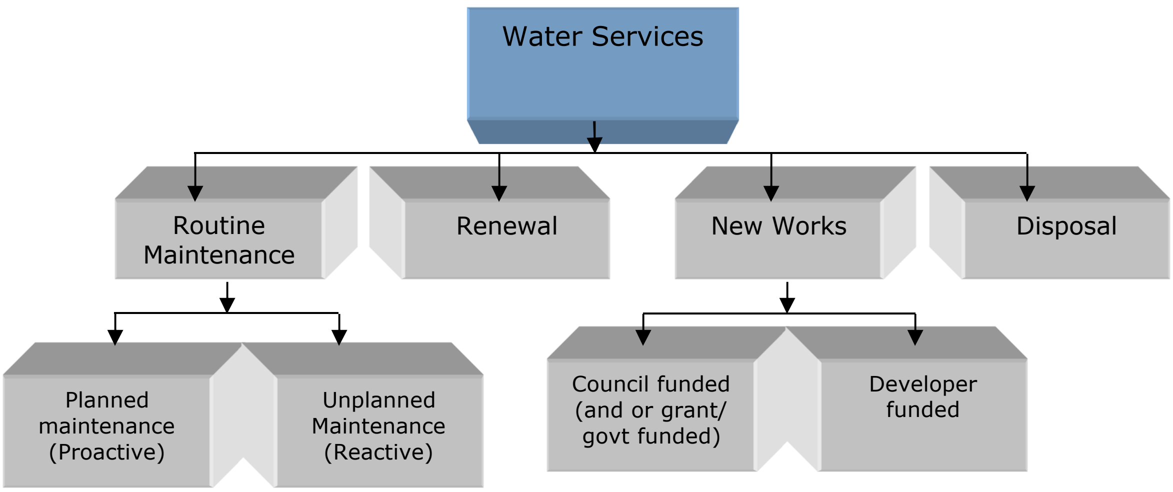


Figure 8-1: Asset Works Categories

The work categories are defined as follows:

Routine Maintenance

Routine maintenance falls into two broad categories as follows:

- Planned (Proactive) Maintenance: Proactive inspection and maintenance works planned to prevent asset failure.

- Unplanned (Reactive) Maintenance: Reactive action to correct asset malfunctions and failures on an as required basis (i.e. emergency repairs).

A key element of asset management planning is determining the most cost-effective blend of planned and unplanned maintenance as illustrated in the following figure.

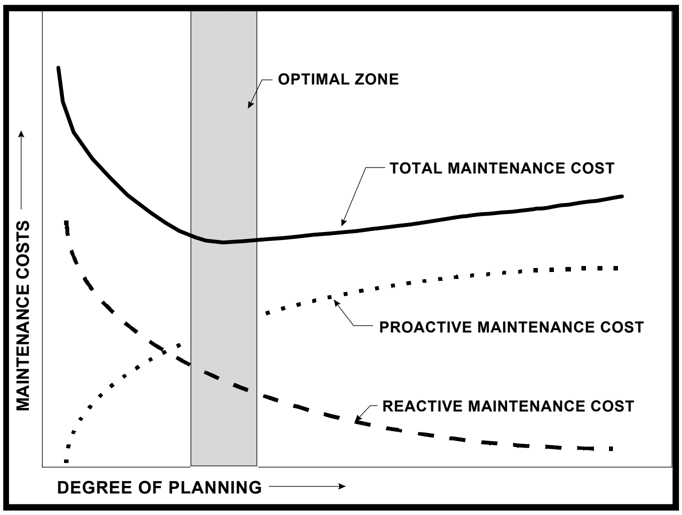


Figure 8-2: Balancing Proactive and Reactive Maintenance

Renewals
This includes replacement and rehabilitation of existing assets to their original condition and capacity.

New Works
Creation Works: New works which extend or upsize assets, which are required to cater for new development and growth. Creation works fall into two separate categories as follows:

- Council funded - Works funded and constructed by TDC (or through other government funding schemes e.g. MoH Funding, CIP Funding, Water Reform Funding).
- Developer funded - Works funded by developers as part of sub divisional development or by way of contributions that are then vested in Council.

Asset Disposal
Retirement or sale of surplus assets.

A forecast of the 10-year expenditure for each asset group in each of the categories outlined above has been provided in the Financial Summary section.

8.1 Overarching issues/ strategies for water supply

Council updated and adopted a new Water Supply Strategy in 2019, available at the following link https://www.taupodc.govt.nz/council/plans-and-strategies/district-strategies/water-supply-strategy. The purpose of the Water Supply Strategy is for Council to set a direction on how we intend to manage drinking water supplies for the coming 20 years. This strategy aims to clearly set out how the Water Supply Strategy will help to achieve the Council vision, the outcomes that we want to achieve for our drinking water supplies, and goals and responses which describe how we will achieve the outcomes.

The 5 key outcomes from the strategy are presented below, in relation to how they have been utilised in the asset management planning process to resolve to the overarching issues in the management of our water supply service.

1. We ensure the protection of public health

Public health protection is considered the first and foremost requirement of Council as a drinking-water supplier. The major issue Council faces is the significant non-compliance of Councils supplies with the DWSNZ. The issue is largely a lack of treatment capability to remove protozoa and arsenic which is present in Lake Taupo and some groundwater in the District. The challenge for 100% compliance may be considered greater in Taupo due to the number of operating treatment plants, 18 of, and the small communities they service. This has likely impacted investment decisions historically.

The major goals and responses in this area of the strategy focus on a commitment to compliance with the DWSNZ and to accelerate where possible LTP projects related to public health. For these reasons, the asset management planning process has scheduled LTP projects that are expected to enable DWSNZ compliance for all water supplies within a 4-year period. This is an accelerated programme compared to the previous LTP which had the projects spread across 10 years. A four-year period was chosen with consideration to deliverability of the projects required.

The Motutere campground upgrade is planned for bacteria and protozoa treatment only. This supply is currently considered a self-supplier and is therefore not required to meet the DWSNZ. From a risk perspective Council does not considered arsenic removal necessary due to the extremely low permanent population. Risk may be further reduced through point of use arsenic treatment for permanent residents.

In addition to these projects, cyano-toxin treatment at Taupo is scheduled beyond year 4 and Water Safety Plan updates are scheduled from operational budgets on a 5 yearly basis as required by legislation.

2. We recognise Te Mana o Te Wai

Council has committed within the strategy to recognising the te reo Maori concept of Te Mana o te Wai, or to ensuring the integrated and holistic health and well-being of a water body. Council has a strong relationship with local Iwi and recognise and respect the importance of, and connection between, iwi and freshwater (wai Maori).

Council is committed to continuing the strong relationships formed and recognises and respects Tangata Whenua's rights and interests in Water. The premise of the Water Supply Strategy and Asset Management Planning process in relation to Iwi is to act as a mechanism to open up dialog on the matters facing Council and to develop methods by which Iwi and Council can work together to ensure Te Mana o te Wai is achieved.

3. We use water responsibly and sustainably

The growing regional and central government focus on efficient use of water resources is of high importance for Taupo District due in part due to our location at the start of the Waikato River catchment which serves so many water users downstream. Historically and currently water use in the District is high (Water NZ Benchmarking Surveys), and this is compounded by high levels of water loss from the system. Low lake levels and/or drought conditions can result in enforced water restrictions and reduction in consented take levels.

With a strategy goal to reduce overall water use in the District, asset management planning in this area has focussed on improving our asset data and performance knowledge to support improved decision making, and improving our networks to reduce leakage and failures. Current and future projects include that will support this goal include:

- Stage 1 Water Loss Strategy Implementation, funded from Tranche 1 of the Water Reform Government funds.
- SCDADA 2030 funded from Tranche 1 of the Water Reform Government funds.
- Stage 2 Water Loss Strategy implementation, 2021 LTP
- Water Reticulation Renewals, 2021 LTP
- Water Reticulation Renewals Strategy Planning, operational budget 2021 LTP
- Water Loss Calculations, operational budget 2021 LTP
- Water Demand Management Plan update, operational budget2021 LTP

All of the above projects will also help support levels of service items including; water loss, pipework capacity, customer satisfaction and demand management.

4. We support the Communities Growth aspirations

As presented in Section 6, the Taupo District is seeing considerably growth which can put pressure on delivery of services. The challenge of estimating peak demand in tourist hot spots can be difficult. The water strategy includes goals to better understand our population demographics and trends, which is directly related to asset management planning, as well as ensuring we provide sufficient water for growth aspirations which has driven many of the projects included for within the 2021 LTP (set out in Section 6).

Asset management plans for the upcoming LTP also include ongoing update and calibration of water supply models in Taupo, Acacia Bay and Kinloch where growth is the greatest. Future model builds have been allowed for on the remaining large schemes and rural schemes where growth and management of demand is the most challenging.

5. We ensure that our water supply system is financially sustainable

The strategy stresses the importance of robust forward planning process to ensure we continue to deliver value for money to our community.

One of the larger challenges faced by our communities at present is the potential for large rate hikes due to capital investment on schemes that are ring fenced from a rating perspective. A key decision has been made to consult on a change to this rating policy as part of the 2021 LTP process, with an aim to move towards a district wide water rating model. This will improve affordability and equity for our customers.

8.1.1 CLIMATE CHANGE

Recent scientific data shows that the globe is warming and this is starting to impact on the climate. What this means long-term is hard to specifically pinpoint, but indications are that rainfall events will worsen, droughts will occur more often and seas will rise. While sea level rise isn't a major concern for the Taupō District we need to be acutely aware of what the other impacts might be. These impacts are likely to include:

- Increased frequency of droughts will increase the demand for our drinking water supplies, while at the same time there will be less water available to take.
- Warmer, drier days, with less wind are likely to result in increased number of algal bloom events. This may require the installation of additional treatment methods.
- Increasing rain events may require the installation of additional treatment, where our supplies are taken from drinking water.
- Changes to the make-up of our freshwater ecosystems as a result in temperature change. This could threaten native species and make conditions more attractive to pest species.

By ensuring our asset management planning delivers on each of our water strategy outcomes, the climate change impacts above will be considered. For example the risk of increasing drought events will be considered within outcome 3, we use water responsibly and sustainably.

8.2 Service delivery & rationale

The water supply services are carried out by a number of providers both internal and external.

Table 8-1: Service Delivery Rationale

Service	Provider	Rationale (Why?)
Asset Management	Council	We retain in-house knowledge
WTP Operation and Maintenance	Council	We retain in-house knowledge Confidence in critical treatment safety aspects of water supply
Concept Design	Council with support from External Consultants	We retain in-house and local knowledge Concept work often requires public consultation
Detail Design	External Consultants	To capitalise on external expertise resource/ experience and due to specialised nature of service.
Network Operation and Maintenance	External Contractors	To capitalise on external specialist resource/ experience at a competitive market rate.
Management of Maintenance Contracts	Council Business unit	Control of cost

Construction Contracts	External Contractors	To capitalise on external specialist resource/ experience at a competitive market rate
Management of Construction Contracts	Council Business unit or External Consultants	Control of cost External consultants utilised to balance resource peaks

The following table shows a summary of all TDC maintenance and renewals contracts

Table 8-2: Maintenance, Operations and Renewal Contracts

Contract Name	Contract No.	Approx. Value ($)	Term (yrs)	Comments	Maintenance/Renewal / Creation
Three Waters Network Maintenance Contract	TDC/1516/155	Downer	$11,399,600 (Total for 5 years)	Start date: 1 July 2016 Term: 5 +2 +2	Mostly reactive mechanical and electrical maintenance but includes some proactive maintenance activities, renewal and new works. Includes water wastewater and stormwater.
SCADA Systems Integrator Contract	TDC/1819/266	CR Automation	Approximately $300,000 p.a.	Start date: 1 July 2019 Term: 3	Operational and maintenance Water and Wastewater
Laboratory Testing Services	TDC/1920/300	Eurofins	Approximately $550,000 p.a.	Start date: 8 Jun 2020 Term: 5 +2 +2	Operational Water and Wastewater

Contract types

TDC has a Procurement Policy and procurement guide that sets out how TDC procures the products and services it needs. Refer the Procurement Policy for details.

Asset Type

8.2.1 TREATMENT PLANTS, PUMP STATIONS AND RESERVOIRS

Overall Asset Objectives:	To provide safe and clean water that meets the requirements of the drinking water standards for New Zealand, at the quantity required. To pump Water from WTP's and within the network to reservoirs and users at adequate flow and pressure. To provide sufficient treated water storage for contact time, demand management, and emergency requirements.

Key treatment pump station and reservoir issues are:

- Variations in source water quality e.g. due to rainfall, wind action, or algae growth
- Treatment plant capability and capacity
- Communications systems failures impacting the ability to demonstrate compliance
- The costs of providing treatment

- Managing asset failures e.g. instruments, equipment, structures
- Demand variation and impacts on contact time and emergency storage levels
- Ageing asset base e.g. reservoirs
- Asset redundancy
- Specific information on each scheme is included in Appendix A to U.

8.2.1.1 Treatment Plant, Pump Stations and Reservoirs Operations and Maintenance

Maintenance is carried out on treatment plants, pump station and reservoirs to ensure that the levels of service outlined in the Level of Service section of this document are met. A summary of the changes to operations & maintenance budgets over the course of the LTP is included within the full financial summary in Section 9.

The treatment plants, pump stations and reservoirs are operated by TDC operators and the maintenance is mostly carried out internally by either the TDC operators or maintenance staff. Specialist maintenance such as equipment calibration, reservoir cleaning, instrumentation maintenance and calibration, electrical and telemetry works are carried out by specialist contractors.

Council operates an electronic service request system to record and manage responses issues raised by the public. Assetfinda provides this function for the three waters services. Service requests can be sent directly to Council staff (e.g. to the operations or maintenance team), or externally to the three waters maintenance contractor. The three waters maintenance contractor will respond to any electrical maintenance work at treatment plants, pump stations and reservoirs, and may also be called to support the internal treatment team with reticulation type issues on their treatment sites, such as a leaking pipe. Service requests have response times and ramp through the Council hierarchy if not completed on time.

Each treatment plant has operational manuals and management plans. These can be found in the council's objective filing system as folders with files as below:

Table 8-3: Operational Manual and Management Plans

Sr. No.	***Description of file folder***	***Objective Reference no.***
1	*Standard Operating Procedures*	*fA32241*
2	*Standard Maintenance Procedures*	*fA69218*
3	*Health & Safety Policies & Procedures*	*fA32238*
4	*Emergency Management Procedures*	*fA32237*

Table 8-4: Historical and Projected Treatment Operation and Maintenance

	Actuals 2017/ 18	Actuals 2018/ 19	Actuals 2019/ 20	Annual Plan 2020/ 21	2021/ 22	2022/ 23	2023/ 24	2024/ 25	2025/ 26	2026/ 27	2027/ 28	2028/ 29	2029/ 30	2030/ 31
Treatment Expenses	1,046,820	1,133,238	1,106,204	1,322,430	1,265,955	1,372,777	1,346,815	1,359,753	1,338,621	1,389,337	1,344,908	1,375,352	1,356,417	1,363,503

Note: Opex expenditure does not include, overhead cost, financial cost, interest – loans, depreciation etc.

8.2.1.2 Treatment Plant Renewal

Renewal expenditure is work that restores an existing asset to its original capacity or required condition. By renewing plant equipment as required the quality level of service is met. Where assets become surplus to requirements or no longer meet the required level of service, they are renewed and the existing asset either used in other schemes, sold as surplus where possible, or disposed of, which occurs normally at the end of useful life.

Over the last three years more information has been obtained which in term enables a more detailed renewals programme to be developed. Undertaking renewals at the identified time due to loss of condition will ultimately reduce the reactive maintenance and renewal spending enabling better budget planning with reduced unbudgeted expenditure.

The renewal programme is prepared through condition rating of the assets by operational staff. This information is currently stored in an excel file in objective (TDC Ref No. A309067) and is updated as required with no more than three years between condition rating and review. TDC is in the process of transferring all the assets recorded in this excel file into Assetfinda, which will in future store all asset details, condition assessment records and will be used to support renewal planning. At the stage of writing this AMP, the process is not yet complete.

Large renewals work, over $50,000 is listed individually for the first three years of the LTP. The remaining work for each plant is grouped together for the respective financial year. Business cases for these works are included in the appendices. If an unexpected renewal is required the lesser prioritised renewal (or renewals) is deferred till the next year. Renewals that are grouped together include analysers, VSDs, dosing equipment, pump replacements, valve or bearing replacements, seals, small motors etc. A summary of the renewals is given in the following table:

Table 8-1: Future Treatment Plant Renewal Expenditure from 2021-31

Project	Annual Plan (2020/21) Spend	Year 1 (2021/22) Spend	Year2 (2022/23) Spend	Year3 (2023/24) Spend	Year4 (2024/25) Spend	Year5 (2025/26) Spend	Year6 (2026/27) Spend	Year7 (2027/28) Spend	Year8 (2028/29) Spend	Year9 (2029/30) Spend	Year10 (2030/31) Spend
Renewal											
10138 - 1718 WS Operations / treatment renew als - KS	585,600	599,000	769,000	570,000	812,000	385,000	500,000	475,000	465,000	400,000	475,000
10139 - 1718 WS Operations / treatment renew als - KS	5,088	15,000	50,000	20,000	22,000	30,000	10,000	16,000	22,000	10,000	5,000
10140 - 1718 WS Operations / treatment renew als - KS	35,456	75,000	5,000	15,000	10,000	3,000	25,000	15,000	82,000	16,000	10,000
10142 - 1718 WS Operations / treatment renew als - KS	2,432	15,000	5,000	3,000	16,000	5,000	15,000	18,000	25,000	18,000	3,000
10143 - 1718 WS Operations / treatment renew als - KS	8,704	40,000	3,000	3,000	20,000	0	2,000	3,000	2,000	0	2,000
10144 - 1718 WS Operations / treatment renew als - KS	71,680	20,000	3,000	40,000	12,000	9,000	20,000	0	67,000	7,000	10,000
10145 - 1718 WS Operations / treatment renew als - KS	78,464	32,000	10,000	4,000	16,000	0	10,000	46,000	23,000	15,000	10,000
10146 - 1718 WS Operations / treatment renew als - KS	9,344	75,000	7,000	25,000	40,000	32,000	95,000	40,000	49,000	53,000	9,000
10147 - 1718 WS Operations / treatment renew als - KS	1,280	35,000	60,000	12,000	10,000	8,000	60,000	7,000	5,000	10,000	3,000
10148 - 1718 WS Operations / treatment renew als - KS	41,344	42,000	25,000	56,000	30,000	34,000	42,000	12,000	33,000	25,000	27,000
10149 - 1718 WS Operations / treatment renew als - KS	11,520	52,000	2,000	28,000	30,000	5,000	42,000	42,000	5,000	2,000	5,000
10150 - 1718 WS Operations / treatment renew als - KS	25,984	38,000	15,000	61,000	13,000	53,000	36,000	43,000	65,000	52,000	70,000
10151 - 1718 WS Operations / treatment renew als - KS	82,496	5,000	12,000	42,000	32,000	57,000	33,000	16,000	7,000	16,000	62,000
10152 - 1718 WS Operations / treatment renew als - KS	20,864	3,000	60,000	13,000	22,000	14,000	5,000	22,000	56,000	150,000	5,000
10153 - 1718 WS Operations / treatment renew als - KS	11,840	33,000	50,000	16,000	14,000	16,000	115,000	0	8,000	0	36,000
10154 - 1718 WS Operations / treatment renew als - KS	10,336	22,000	39,000	78,000	43,000	70,000	16,000	60,000	34,000	35,000	35,000
10155 - 1718 WS Operations / treatment renew als - KS	4,992	18,000	2,000	35,000	2,000	32,000	62,000	8,000	25,000	12,000	0
10156 - 1718 WS Operations / treatment renew als - KS	13,504	7,000	48,000	0	14,000	5,000	6,000	13,000	20,000	3,000	5,000
10164 - 1718 WS Operations / treatment renew als - KS	61,440	27,000	55,000	12,000	8,000	12,000	15,000	3,000	96,000	20,000	0
11005 - 21-31 Taupo Water V ehicle Renew als	0	46,000	76,000	121,000	76,000	46,000	148,000	46,000	76,000	76,000	0
11201 - Taupo Water Reservoir Refurbishment - Taupo WTP Treated Water Tank	0	0	0	40,000	100,000	0	0	0	0	0	0
11392 - Water Treament Renew als	0	80,000	58,000	16,000	62,000	47,000	56,000	87,000	10,000	20,000	37,000
Total Renew al	**1,082,368**	**1,279,000**	**1,354,000**	**1,210,000**	**1,404,000**	**863,000**	**1,313,000**	**972,000**	**1,175,000**	**940,000**	**809,000**

8.2.1.3 Treatment Plant Creation

The section covers strategies for the creation of new assets (including those created through subdivision and other development) or works which upgrade or improve an existing asset beyond its existing capacity/performance in response to changes in capacity requirements, legislation or influent quality.

Table 8-2: Future Treatment Plant Asset Creation Expenditure

ProjectNumber	ProjectName	Plan2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
10627	Kinloch water DWSNZ upgrade	3,800,000	3,700,000	1,500,000	0	0	0	0	0	0	0	0
10851	Centennial Treated Water DWSNZ Upgrade	0	0	100,000	1,000,000	2,150,000	0	0	0	0	0	0
10960	Mangakino Reservoir Stormwater Management	25,000	0	0	0	0	0	0	0	0	0	0
11112	Omori water DWSNZ upgrade	0	800,000	2,000,000	0	0	0	0	0	0	0	0
11113	Motuoapa water DWSNZ upgrade	0	0	800,000	1,800,000	0	0	0	0	0	0	0
11114	Hatepe water DWSNZ Upgrade	0	0	700,000	2,000,000	0	0	0	0	0	0	0
11130	Whakamaru Water DWSNZ Bore Head Upgrade	0	25,000	0	0	0	0	0	0	0	0	0
11136	Whareroa Water DWSNZ Bore Head Upgrade	0	20,000	40,000	0	0	0	0	0	0	0	0
11137	Atiamuri Water DWSNZ Bore Head Upgrade	0	20,000	0	0	0	0	0	0	0	0	0
11182	Taupo water Taupo WTP capacity upgrade to 35 MLD	0	0	0	0	0	0	0	0	0	0	0
11183	Taupo WTP Taste Odour and Cyanotoxin Treatment Upg	0	0	0	0	0	0	140,000	1,260,000	0	0	0
11187	Turangi Water Treatment Improvements	0	0	0	100,000	0	0	0	0	0	0	0
11188	Mangakino Water Treatment Improvements	0	0	0	75,000	0	0	0	0	0	0	0
11229	Taupo Water Decommisioning Programme	0	85,900	115,100	75,400	42,600	0	0	0	0	0	0
11231	Whareroa Water Treatment Capacity Upgrade	0	0	0	0	0	0	0	0	0	0	0
Total Capex		3,825,000	4,650,900	5,255,100	5,050,400	2,192,600	0	140,000	1,260,000	0	0	0

8.2.1.4 Treatment Plant Asset Disposal

In general where assets become surplus to requirements or no longer meet the required level of service, they are renewed and the existing asset is removed for use on other schemes, sold as surplus where possible, or disposed of, which occurs normally at the end of useful life.

A treatment plant decommissioning programme is planned as part of the 2021LTP due to both historic and future connection of water facilities. The project scope will be confirmed following the completion of a water supply resilience study which is to be funded in year 1 from operational budgets. This study will confirm which assets should be retained and which should be disposed. The study will consider the following assets:

- Mapara pump station and reservoir site (redundant)
- Waitahanui WTP, bores and reservoir sites (redundant)
- Rainbow Point intake and WTP site (currently retained for emergency use)
- Bonshaw Park WTP and bore sites (redundant after connection to Taupo scheme)
- Whakamoenga Point intake and WTP site (redundant after connection to Taupo scheme)
- Airport pump station and reservoir site (redundant after connection to medium zone)
- Acacia Bay intake and WTP site (redundant after connection to Taupo scheme)

Table 8-7: Future Treatment Plant Asset Disposal Expenditure

Project	Annual Plan (2020/21) Spend	Year 1 (2021/22) Spend	Year2 (2022/23) Spend	Year3 (2023/24) Spend	Year4 (2024/25) Spend	Year5 (2025/26) Spend	Year6 (2026/27) Spend	Year7 (2027/28) Spend	Year8 (2028/29) Spend	Year9 (2029/30) Spend	Year10 (2030/31) Spend
Capex											
11229 - Taupo Water Decommisioning Programme	0	85,900	115,100	75,400	42,600	0	0	0	0	0	0
Total Capex	**0**	**85,900**	**115,100**	**75,400**	**42,600**	**0**	**0**	**0**	**0**	**0**	**0**

8.2.2 *RETICULATION SYSTEM*

Overall Asset Objective:	To safely supply throughout the pipeline network to the users at adequate flow and pressure, under all demand conditions, including providing water for firefighting capabilities.

The purpose of the WTP is to remove contaminants in the water or reduce the concentration of contaminants so the water becomes fit for its desired end-use. The reticulation system delivers this water to the end user.

Key issues relating to the reticulation system are:

- Pipeline failures due to:
  - condition and age
  - pressure surges or water hammer
  - ground instability
  - third party damage
  - tree roots
- Impact of pipeline failures
  - Property damage, flooding
  - Contamination risks
  - Negative pressures and backflow risks
  - Loss of service
- Capacity during peak flow periods
- Water loss from the system
- Backflow into system
- Stagnant areas during low demand periods
- Blockages of screens, strainers or filters
- Failure of key equipment within pump stations, treatment plants, or reservoirs and corresponding impact to the network
- Ageing asset base and major renewals backlog
- Scheme specific information is included as Appendix A to U

8.2.2.1 Reticulation Operations & Maintenance

Reticulation network maintenance is carried out by a specialist maintenance contractor. Planned work is issued by Council Network Engineers. Maintenance plans are included at the following link (TDC Ref: A2743711). Maintenance expenditure includes;

- Reactive (i.e. response to breakages, leaks, no water, taste, odour, smell complaints etc)
- Proactive (i.e. valves, hydrants, pressure reducing valves inspections / service work)
- Performance based (i.e. hydrant flow tests, backflow tests, PRV tests)

Table 8-8: Reticulation Operation and Maintenance Expenditure

	Actuals 2017/18	Actuals 2018/19	Actuals 2019/20	Annual Plan 2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
Network Expenses	1,432,778	1,762,685	1,611,336	1,931,738	2,144,078	2,219,535	2,172,738	2,161,504	2,147,912	2,106,863	2,139,416	2,160,497	2,243,757	2,206,317

Note: Opex expenditure does not include, overhead costs, financial costs, interest – loans, depreciation etc.

8.2.2.2 Reticulation Renewals

As presented in Section 4, water reticulation age and condition across the District is variable. There remains significant quantities of asbestos cement and galvanised pipelines estimated to be beyond their useful life. The current construction backlog value is estimated at in excess of $30M. Every year more pipelines reach end of life, and with no or insufficient renewal spending the construction backlog will increase. As the construction backlog increases, so do pipeline failure numbers, disruption to customers, and risks of contamination within the network.

Operational budgets have been utilised to develop renewals strategies for the LTP. This work was completed between 2018 and 2020 with outputs including:

- Data cleansing, data confidence rating, condition assessment grading and criticality rating of each piped asset within Councils AMS
- Identification of the appropriate water supply pipelines for renewal for the next three years, ensuring those identified are selected using robust and practical processes and principles, (e.g. pipe age, material, operating pressure, criticality, other asset upgrades etc.);
- Development recommendations for renewal spending profile for the next LTP period.

The work has enabled the successful delivery of 2018 LTP reticulation renewal budgets ($2M per year). This has included an initial 1-year renewals contract (2018/19) and later 2-year renewals contract (2019/20 to 2020/21) that will be completed by June 2021. Both contracts incorporated wastewater renewals to improve delivery efficiency.

The strategy work also enabled justification of future renewals budgets for the LTP, briefly summarised below.

A major increase in renewals spending is planned for the coming LTP period, including the following spend profile:

- Years 1 to 3 $4.5M per year
- Years 4 to 20 $3.5M per year
- Years 21 to 22 $2.5M per year
- Years 23 to 30 $1.5M per year

Table 8-9: Reticulation Renewal Expenditure

Project	Annual Plan (2020/21) Spend	Year 1 (2021/22) Spend	Year2 (2022/23) Spend	Year3 (2023/24) Spend	Year4 (2024/25) Spend	Year5 (2025/26) Spend	Year6 (2026/27) Spend	Year7 (2027/28) Spend	Year8 (2028/29) Spend	Year9 (2029/30) Spend	Year10 (2030/31) Spend
Renewal											
10162 - 1718 Reticulation / network renewals - RS	53,504	0	0	0	0	0	0	0	0	0	0
10604 - Taupo water reticulation renewals	2,000,000	0	0	0	0	0	0	0	0	0	0
11225 - Water Network Renewals - District Wide	0	4,500,000	4,500,000	4,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
Total Renewal	**2,053,504**	**4,500,000**	**4,500,000**	**4,500,000**	**3,500,000**	**3,500,000**	**3,500,000**	**3,500,000**	**3,500,000**	**3,500,000**	**3,500,000**

The aim of the programme is to reverse the current upward trend in pipeline failure numbers, and to catch up to the backlog of renewals within a 30-year period. The figure below depicts the proposed reticulation renewals budget for the LTP against the construction backlog for each year from 2020 to 2050. It should be noted that the current construction backlog is forecast at in excess of $30M.

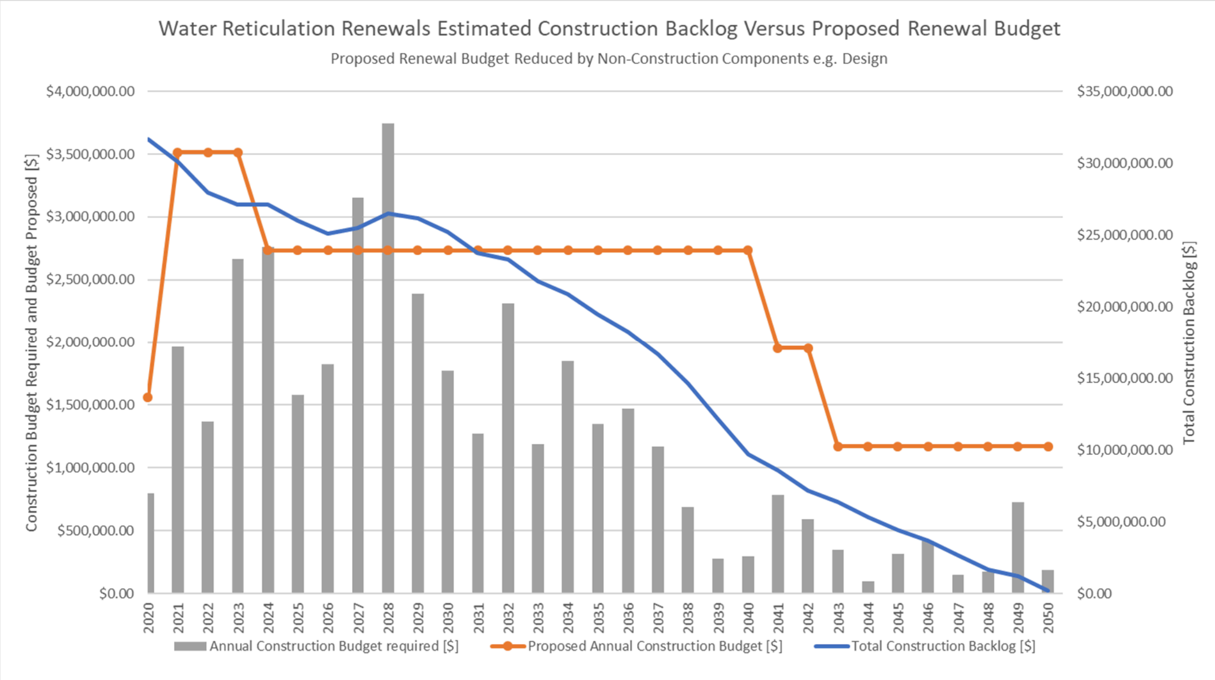


Figure 8-3: Construction Backlog and Impact of Renewals Spending

The following figure compares pipeline failure numbers and length of aged main (pipeline forecast as beyond its useful life) for two scenarios;

- no pipeline renewals spend, and
- the proposed LTP renewals programme.

With no renewals spend, failure numbers increase from approximately 200 per year to 800 per year by 2030. The proposed renewals spend scenario results in steadily reducing pipeline failure numbers and corresponding reduction in aged pipeline length.

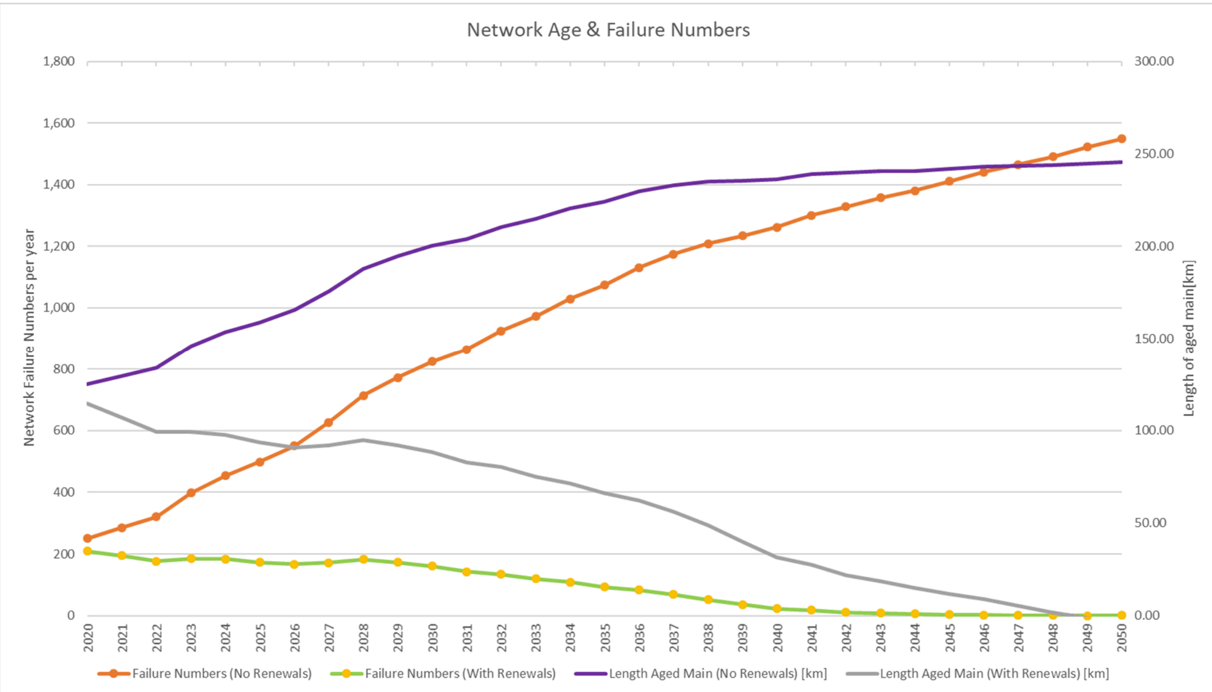


Figure 8-4: Impact of Renewals Spending on Network Age and Failure Numbers

Operational budget is now being utilised on the next phase of this planning exercise with outputs including:

- Data set update, cleansing, and update of confidence ratings, condition assessment grading and criticality rating of each piped asset within Councils AMS.
- Identification of the appropriate water supply pipelines for renewal for the next three years and ten years, ensuring those identified are selected using robust and practical processes and principles, (e.g. pipe age, material, operating pressure, criticality, other asset upgrades etc.);
- Development of a piped asset data collection strategy, including sample recovery recommendations to allow further refinement of useful life values of the network, update the pipeline prioritisation list and dataset.

Further operational budget has been set aside within 3 years to allow similar strategy work to feed into the 2024 LTP.

8.2.2.3 Future Asset Creation

Future reticulation asset creation is constructed by Council or land developers. Land developers create assets as new subdivisions are constructed, with assets then becoming vested in Council.

Council has included some growth-related reticulation projects that will create new assets in the LTP. Growth-related information is included in Section 6.

Council is currently extending the Taupo network to service the communities of 5 Mile Bay, Acacia Bay and Mapara (2018 LTP Projects). This will create a significant amount of new reticulation infrastructure. The 5 Mile Bay project will provide reticulated water to a community that was previously on private water supplies. These projects are due for completion in June 2021.

Extension of the Taupo network to Bonshaw Park and Whakamoenga Point, extension of the Turangi network to Waihi Village, and extension of the Whakamaru network, are projects planned in the 2021 LTP to enable DWSNZ compliant to be provided to these communities. This will also create a significant amount of new reticulation infrastructure.

Council will also create new reticulation infrastructure with the Water Loss Implementation project planned for delivery in the 2021 LTP. This will include new zone flow meter installations, pressure reducing valves and residential metering installations on rural schemes. This project will vastly improve knowledge of water movement within the Council reticulation systems with numerous potential benefits in both the short and long term.

Table 8-10: Future Reticulation Asset Creation Expenditure

ProjectNumber	ProjectName	Plan2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31
10616	Taupo water Brentwood reservoir - land purchase	500,000	0	0	0	0	0	0	0	0	0	0
10621	Taupo water Tauhara Ridge Falling main to WEL	700,000	0	0	0	0	0	0	0	0	0	0
10626	Acacia Bay water DWSNZ Upgrade	2,100,000	0	0	0	0	0	0	0	0	0	0
10801	Taupo water reticulation of Five Mile Bay	480,000	0	0	0	0	0	0	0	0	0	0
10961	Airport Pump Station Water Safety and Continutiy Improvements	35,000	0	0	0	0	0	0	0	0	0	0
11184	Bonshaw Park DWSNZ Project	0	230,000	2,070,000	0	0	0	0	0	0	0	0
11185	Whakamoenga Point DWSNZ Project	0	150,000	1,270,000	0	0	0	0	0	0	0	0
11190	Taupo water Poihipi reservoir - land purchase	0	50,000	0	0	0	0	0	0	0	0	0
11192	Taupo water Tauhara Ridge reservoir - land purchase	0	350,000	0	0	0	0	0	0	0	0	0
11193	Taupo water Tauhara Ridge Reservoir and Airport Connection	0	0	1,220,000	2,600,000	0	0	0	0	0	0	0
11195	Taupo water Napier Road reservoir - Land purchase	0	50,000	0	0	0	0	0	0	0	0	0
11196	Kinloch Low Zone Reservoir Land Purchase	0	550,000	0	0	0	0	0	0	0	0	0
11197	Kinloch Low Zone Reservoir Construction	0	1,200,000	3,280,000	200,000	0	0	0	0	0	0	0
11198	Water Reservoir Emergency Storage	0	70,000	0	0	0	0	0	0	0	0	0
11218	Taupo Water - Control Gates Bridge Pipeline Upgrade	0	200,000	0	0	0	0	0	0	0	0	0
11220	Waihi Village water supply	0	1,219,812	0	0	0	0	0	0	0	0	0
11221	Taupo Water - Low Pressure Project	0	900,000	0	0	0	0	0	0	0	0	0
11222	Taupo Water - Wairakei Rising Main Upgrade	0	0	0	849,000	0	0	0	0	0	0	0
11223	Whakamaru Water Network Extension	0	238,000	0	0	0	0	0	0	0	0	0
11226	Water Loss Strategy Implementation	0	550,000	550,000	330,000	0	0	0	0	0	0	0

8.2.2.4 Reticulation Asset Disposal

Pipeline assets are generally disposed of due to renewal or upgrade projects. Standard practice is to cap old pipelines and leave them in the ground. These assets remain on the AMS and GIS mapping system to aid future queries. Valves, hydrants and other infrastructure is generally removed and disposed of. If these assets have high remaining life, then will be reused.

8.2.3 RESOURCE CONSENTS

TDC have acquired numerous resource consents for the water abstraction and treatment. Copies of these consents are filed in document management system (Objective). The table below summarises the consented water abstraction volumes for each scheme, along with the date that the consent expires.

TDC have recently adjusted consenting strategy for those water takes relating to Lake Taupo. Instead of applying for multiple water take consents, Council has applied for a global consent to cover multiple take sites. An application is currently being processed by WRC for the first of these consents which includes water take from Lake Terrace, Rainbow Point, Kinloch, Motuoapa and Whakamoenga Point. Council intends to add additional takes to this consent over time. This approach will reduce the number of consents that Council need to manage, while improving flexibility for short and long term variations in demand at each take point.

8.2.3.1 Resource Consenting Cost

The annual resource consent and monitoring costs are included in the operations budget. Any costs associated with applying for new consent (or replacements consents) are given in Section 9, Financial Summary, financial tables.

Table 8-11: Summary of Water Resource Consents

Consent Type	Consent No	File No	Objective ID	Description	Location	Issue Date	Expiry Date	Status of Application with WRC
Water	104296	60 55 22A	A466031	Take up to 6300 m^3/day from a tributary of the Tokaanu Stream for public water supply.	Turangi	12/03/2002	28/02/2017	Application Made - S37 Extension for Consultation
Water	970485	60 55 30A	A518554	Discharge filter backwash into the ground	Motuoapa	14/08/1997	1/05/2017	Application Made - S37 Extension
Water	970484	60 55 30A	A466039	Take up to 750 m^3/day from Lake Taupo for public water supply purposes	Motuoapa	14/08/1997	1/09/2017	Application Made - S37 Extension
Water	102792	60 01 75A	A464959	Take water from unnamed tributary of Waikato River for Mangakino town supply	Mangakino - Maraetai	30/11/2019	30/11/2049	Current
Water	102752	60 24 90A	A779458	Take up to 520 m^3/day from and place an associated inlet structure on the bed of Lake Taupo at Whakamoenga Point for water supply	Whakamoenga Point	13/12/1999	30/11/2019	Application Made - S37 Extension
Water	105576	60 55 05A	A518607	Take up to 37,000 m^3/day of water from the Uanui Stream for Tirohanga Rural Water Supply Scheme,	Tirohonga - Atiamuri - Pokuru Rd	2/10/2001	1/09/2021	Current
Water	105580	60 55 05A	A518601	Discharge, up to 35 000 m^3/day of water to the Uanui Stream and discharge backwash associated with the cleaning of the filters	Tirohonga - Atiamuri - Pokuru Rd	2/10/2001	1/09/2021	Current
Water	105864	60 91 72A	A465977	Take up to 440 m^3/day for municipal supply from Lake Taupo,	Hatepe	19/02/2002	1/01/2022	Current
Water	116661	60 55 24A	A465007	Take up to 280 m^3/day of ground water for Waitahanui Community water supply purposes	Waitahanui	3/10/2007	1/07/2022	Current
Water	109046	60 06 77A	A466025	Take up to 600 m^3/day at a max rate of 10 litres/second from Kaiwhitiwhiti Spring for water supply purposes	Tiverton Downs Rd (River Rd)	29/05/2003	1/06/2023	Current
Water	127393.01.01	60 55 28A	A1572683	Take surface water from Lake Taupō - up to 130 m3/day	Motutere Camp Ground	19/10/2015	31/08/2023	Current
Water	107514	60 55 49A	A465009	Take up to 9439 m^3/day of water from Lake Taupo for public water supply purposes	Rainbow Point - Oregan Drive	15/09/2003	31/08/2023	Application Made
Water	124398	60 54 63A	A983449	Filter backwash discharge into the Waihora Stream	State Highway 32 Waihora	30/08/2012	30/04/2027	Current
Water	950565	60 55 49A	A464949	Allow a public water supply pipeline across Waikato river	Taupo and Taupo South	2/10/1995	1/07/2030	Current
Water	950556	60 55 06A	A464781	Conduct works Taupo Lake bed for extending intake pipe	Acacia Bay	2/10/1995	1/08/2030	Current
Water	121300	60 54 64A	A1063505	Take up to 682 m3/day of groundwater for community water supply	Whareroa	31/01/2013	31/01/2033	Current
Water	126712	60 01 86A	A1140849	Take up to 225 m3/day of groundwater for minicipal supply	Atiamuri - Moana Ave	23/07/2013	31/07/2033	Current
Water	126710	60 01 88A	A1140835	Take up to 200 m3/day of groundwater for minicipal supply	Whakamaru - Mountview Close	23/07/2013	31/07/2033	Current
Water	135505.01.01	61 66 11A	A1515061	Take up to 3000 m3/day from Lake Taupō for municipal water supply in the vicinity of Acacia Bay	Acacia Bay	31/07/2015	31/07/2035	Current
Water	105572	60 55 05A	A466023	Dam and occupy the bed of the Uanui Stream, to supply the Tirohanga Rural Water Supply Scheme,	Atiamuri - Pokuru Rd	2/10/2001	1/09/2036	Current
Water	132689.01.01	60 54 63A		Take and use water from the Waihora Stream	Waihaha- Waihora Stream	30/05/2014	6/11/2036	Current
Water	120056	60 30 41A	A644410	Take groundwater for rural water supply purposes	Bonshaw Park	29/03/2010	29/03/2045	Current
Water	121069	60 30 41A	A644409	Use groundwater for rural supply purposes	Bonshaw Park	29/03/2010	29/03/2045	Current
Water	113405	60 55 10A	A692820	Take up to 2,168 m^3/day of water from Lake Taupo for municipal water supply purposes	Kinloch	13/08/2010	1/07/2045	Application Made
Water	121023	60 55 10A	A692823	use surface water for public supply purposes	Kinloch	13/08/2010	1/07/2045	Application Made
Water	137026.01.01	60 55 08A	A1936351	To take water from the Waikato River	Centennial Drive Taupō	20/04/2017	21/04/2047	Current
Water	122974	60 55 49A	A1575690	To take and use water from Lake taupo in the vicinity of Lake Terrace, Taupō	Lake Terrace	27/11/2015	31/10/2047	Application Made
Water	125016	60 55 49A	A1015888	To install 12m of pipework with associated support structures on bed of Lake Taupō and enlarge a structure for replacement water intake screen	Lake Terrace - Taupō	31/10/2013	31/10/2047	Current
Water	125017	60 55 49A	A1015888	Discharge filter backwash from town water supply	Lake Terrace - Taupō	31/10/2013	31/10/2047	Current
Water	121770	60 54 71A	A1707848	Take water from Lake Taupo at Omori	Omori - Kuratau Lakeshore Reserve	8/07/2016	7/07/2051	Current

9.0 FINANCIAL SUMMARY

9.1 Process of Determining Financial Forecast

The provisional 30-year financial forecast for water was determined by identifying new works, and the continuation/evaluation of current maintenance and renewal strategies within each of the components, i.e. reticulation and treatment plants. Changes to the operations (OPEX) and capital projects (CAPEX) expenditure for items within each of the asset types were generally due to maintaining current level of services, legislation (DWSNZ) and increased contract rates.

Council uses the following strategy for financial forecasting:

- assign realistic timing to projects given the resources available under Councils current funding sources and in relation to impacts in other Asset Management Plans.
- optimise timing of projects.
- generate consistent budgeting philosophies across all Council divisions.
- align expenditure with growth predictions.

Consultation on the final 10-year financial forecast has been carried out via the 2021-2031 LTP process.

9.1.1 IMPLICATIONS OF CHANGES BETWEEN DRAFT AND FINAL BUDGETS

The following changes have been made to the draft Asset Management Plan following the public consultation process and subsequent Council deliberations.

- Inclusion of $30,000 operational funding in Year 1 for a scoping exercise relating to providing Motutere Point, Waitetoko and Tauranga Taupō to Council water supplies.
- Inclusion of $50,000 for a scoping exercise on connecting unconnected marae to Council water supplies.

9.2 Funding of Expenditure

9.2.1 FUNDING STRATEGY

The focus of this AMP is to identify the optimum (lowest lifecycle) cost for water supply and to identify the cost for each asset group necessary to produce the desired level of service. How this cash flow will be funded is outlined in Council's long-term financial strategy.

Current funding sources available for water supply include:

- Rates – income generated by the collection of general, separate and differential rates.
- One off capital contribution – contributions made by individual developers for projects that are of particular benefit to them that are being constructed by TDC
- Development Contributions – contributions made by developers under the Local Government Act 2002.
- Private (developer) funded works – projects completely built and funded by developers where ownership is handed over to TDC on completion (vested assets).
- Connection Fees
- Interest on general funds.
- Fees and charges (ref Annual Plan for current Fees & Charges).

9.2.2 ALLOCATION OF FUNDS

The process of allocating funds is generally based on:

- Maintenance and operations are funded from General Rates.
- Renewal works are funded by Depreciation. Depreciation is calculated using either the straight line or the diminishing value method to allocate their cost or revalued amounts, net of their residual values, over their useful lives.
- New Works are funded by either or a combination of Development Contributions, Loans, Individual Contributions (e.g. underground power) and Depreciation (if it has not all been used for Renewal Works).

The funding strategy can be found within the Long-Term Plan (LTP).

9.3 Historical and Forecast Expenditure

9.3.1 HISTORICAL EXPENDITURE

Detailed historic expenditure for each asset group is included within the lifecycle section for each water supply scheme. Budgeted Water expenditure for the next 10 and 30 years is summarised on the following pages.

9.3.2 OPEX: OPERATING AND MAINTENANCE EXPENDITURE

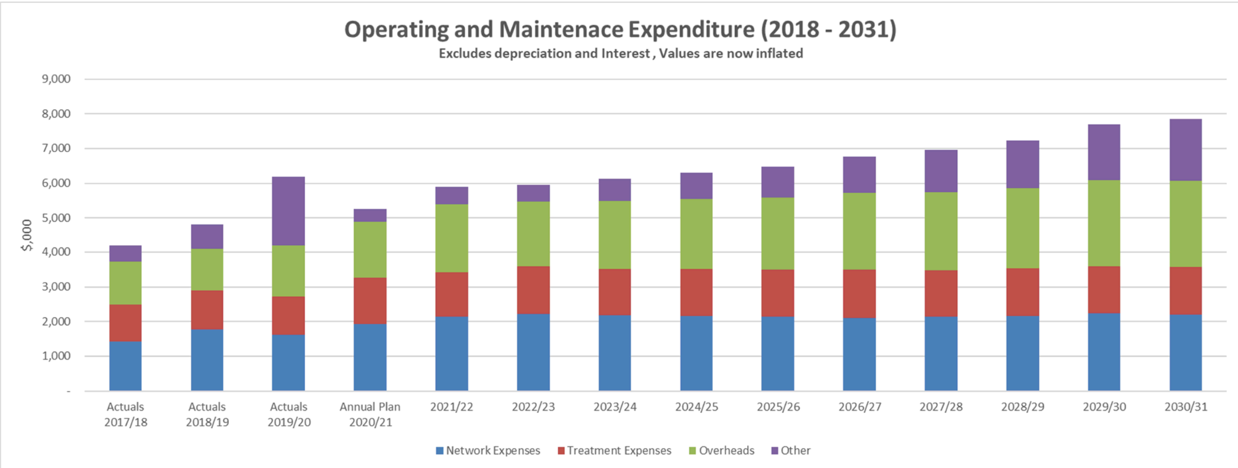


Figure 9-1: Operating and Maintenance Expenditure

Operation and maintenance costs average approximately $6.5 M/year (uninflated cost). This is an increase on previous years due to additional treatment costs associated with operating and maintaining new plants, and additional network expenses due to growth in our networks, inclusion of backflow testing, increased valve and hydrant maintenance, and network flushing.

Refer to Objective file reference # A326441 for spread sheet detailing how the operational and maintenance cost have been determined.

9.3.3 RENEWAL EXPENDITURE

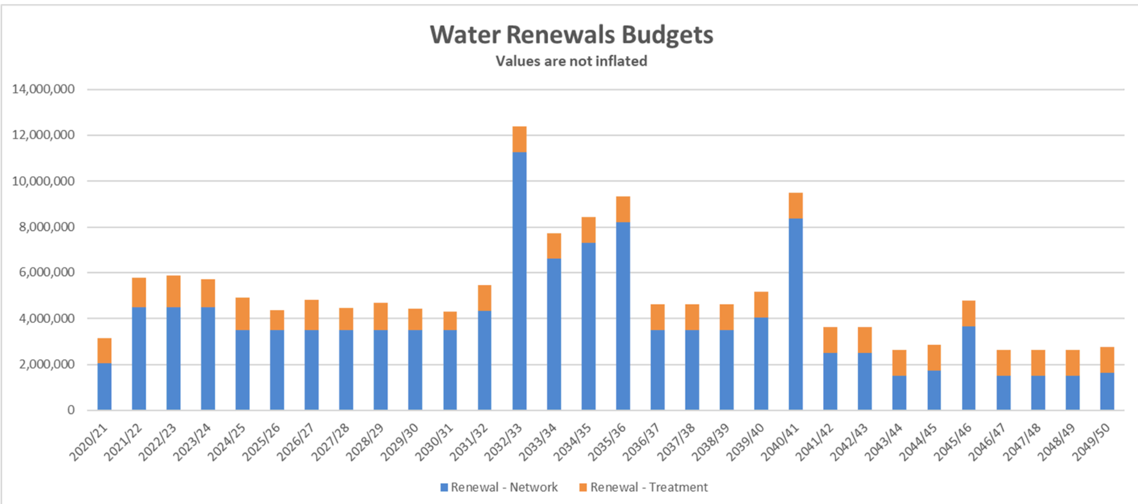


Figure 9-2: Renewals Expenditure

There is significant renewals spending predicted for the next 30 years as AC and galvanized pipework is replaced, and ageing reservoirs are replaced.

Renewals include any items where an existing asset is replaced for example pumps, meters, valves, or filter rehabilitation etc. Renewal costs fluctuate year to year as assets with different expected lives reach the end of their useful lives or condition assessment or performance measurement determines that an asset need renewing or replacing.

Generally, the timing of renewal for an asset is based on assessment as the asset is nearing the end of its useful life. Loss in service potential is calculated by straight-line depreciation with the exception of land which is not depreciated. The depreciation rates are applied at a component level and are dependent on the remaining useful life of each component. The total useful lives have been updated and are assumed as follows as per Asset Valuation report (August 2017).

Component	Useful Life (years)
Membranes Filter	10
Water meter	20
Pipe – Asbestos Concrete	50
Pumps	30
Valves	25 to 60
Reservoir (Concrete)	50 to 80
Reservoir (Timber)	25
Reservoir (steel glass lined)	80
Fibre glass tanks	65
GI pipe	50
Pipe – PVC	PVC = 60 PVCO = 100 uPVC = 100
Pipe – Concrete	90
Control & telemetry Equip/ instruments	5 to 20

Table 9-1: Water Asset Useful Lives

A summary of the depreciation of Water assets is presented in the Taupo District Council Annual Report. Refer to business cases in the appendices for detailed renewals plans.

9.3.4 CAPEX: NEW WORKS EXPENDITURE

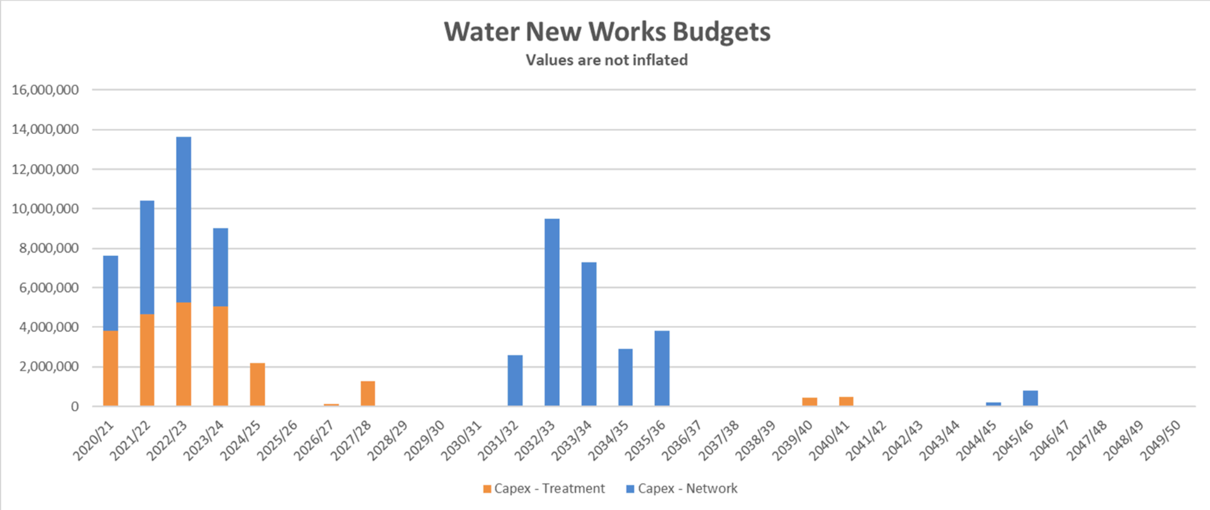


Figure 9-3: New Works Expenditure

New works over the first 4 years are predominantly related to meeting drinking water standards compliance and supporting growth and level of service achievement through network upgrades and reservoir installations. There are fewer capital projects over the following 6 years due to funding constraints. From year 11 onwards to year 30, several reservoir upgrades and strengthening projects are included, and specific growth projects are scheduled e.g. Taupo WTP Capacity Upgrade.

For a list of new works projects refer to Section 8 and for full details refer to the business cases in the appendices.

9.3.5 CAPEX: DISPOSAL

The water decommissioning project is planned for years 1 to 5 of the LTP. Details are included in the business cases in the appendices

9.3.6 EXPENDITURE LINKAGES TO LEVEL OF SERVICE

The expenditure links to the levels of service are detailed on the individual business cases.

9.4 Total Expenditure and Funding

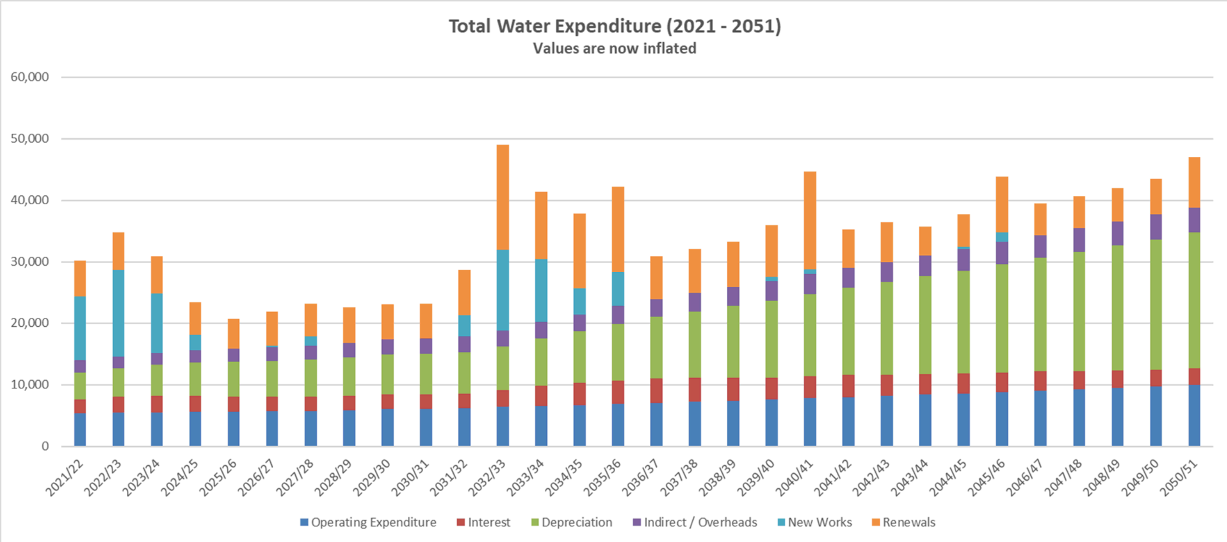


Figure 9-4: Total Expenditure

Overall, the total budget fluctuates depending on the capital projects which are more significant in the first 4 years and from year 11. Total water expenditure averages $25 million per year for years 1 to 10 and $35 million for year 11 to 30.

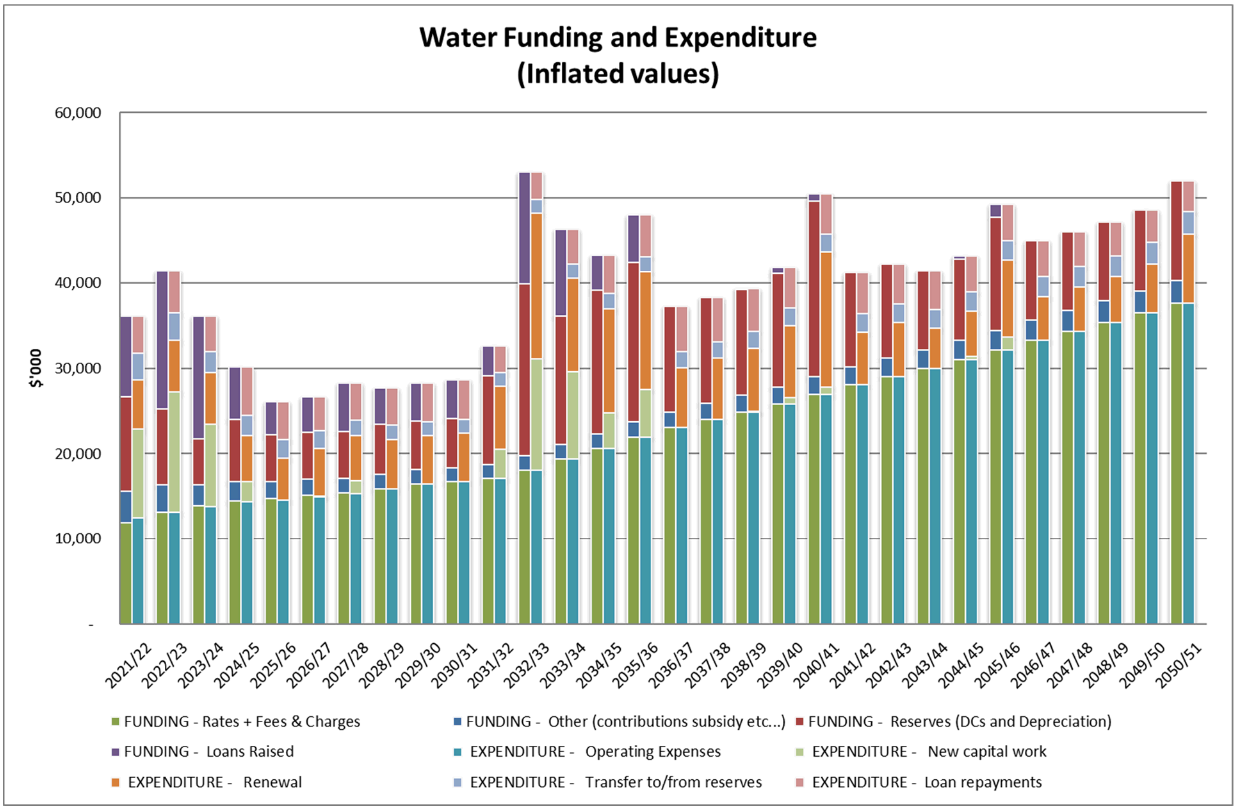


Figure 9-5: Water Funding

Valuation of Water Assets
Water assets provide a continuing service to the community and are not generally regarded as tradable. The cost to replace an asset with the Modern Equivalent Asset (MEA) is used as a basis to determine replacement value. This AMP is being updated with the latest Asset valuations of August 2017 and adjusted annually to 2019.

Refer to Section 4 (Asset Data), for a summary of the valuation of Water assets. A full valuation report is available on request.

9.5 Financial Assumptions

The following financial assumptions have been made. Further information can be found in the LTP document.

- Asset valuation are as at August 2017 have been used as the basis for asset values.
- The revenue received from Rates meets the expectation.
- Development Contributions Income is assumed to eventuate as predicted.
- Investment Returns eventuate as predicted.
- Interest Rate on borrowings remains as predicted within the financial model.
- Expenditure of capital projects occurs, and estimated debt levels are as predicted.
- No allowance has been made for inflation adjustment within this AMP. The source of funds for the future replacement of significant assets is stated in the revenue and Financing Policy.
- The useful lives of significant assets are as per the accounting policies documented in the LTP. Depreciation is charged at 50% for the first year and 100% in subsequent years.

9.6 Financial Confidence Levels

The confidence in the asset data used as a basis for the financial forecasts has been assessed using the following grading system from the International Infrastructure Management Manual – Australia/New Zealand Edition, 2011.

Table 9-1: Confidence Grading Table

Confidence Grade	General Meaning
A	Highly reliable. Data based on sound records, procedure, investigation and analysis, documented properly and recognised as the best method of assessment
B	Reliable. Data based on sound records, procedures, investigation and analysis, documented properly but has minor shortcomings, for example the data are old, some documentation is missing, and reliance is placed on unconfirmed reports or some extrapolation.
C	Uncertain Data based on sound records, procedure, investigation and analysis which is incomplete or unsupported, or extrapolated from a limited sample for which grade A or B data are available
D	Very Uncertain. Data based on unconfirmed verbal reports and/or cursory inspection and analysis.

The confidence level is B+ overall. The financial cost within the first 3 years is seen as reliable with reliability decreasing with time. Also, reliability depends on the phase of project with reliability increasing as project moves from scoping to construction.

Scoping	Increasing Reliability ↓
Investigation	
Design	
Construction	

	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36
Operating Income																
General rates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Targeted rates	-11,069	-11,819	-13,038	-13,729	-14,367	-14,604	-14,974	-15,267	-15,724	-16,347	-16,619	-16,933	-17,873	-19,201	-20,410	-21,718
Capital subsidies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Development and/ or financial contributions	-771	-2,146	-1,843	-1,338	-1,165	-1,108	-971	-852	-912	-826	-809	-829	-850	-871	-893	-915
Vested assets	-596	-1,547	-1,334	-1,136	-1,069	-934	-945	-875	-840	-787	-794	-814	-835	-855	-877	-899
Fees and charges	-111	-111	-115	-118	-121	-125	-128	-132	-137	-141	-146	-149	-153	-157	-161	-165
Total Income	**-12,547**	**-15,623**	**-16,330**	**-16,321**	**-16,722**	**-16,771**	**-17,018**	**-17,126**	**-17,613**	**-18,102**	**-18,368**	**-18,725**	**-19,710**	**-21,084**	**-22,340**	**-23,697**
Operating Expenses																
Network Expenses	1,932	2,144	2,220	2,173	2,162	2,148	2,107	2,139	2,160	2,244	2,206	2,261	2,318	2,376	2,435	2,496
Treatment Expenses	1,322	1,266	1,373	1,347	1,360	1,339	1,389	1,345	1,375	1,356	1,364	1,398	1,433	1,468	1,505	1,543
Other Operating expenses	382	493	474	627	754	898	1,043	1,226	1,369	1,606	1,766	1,810	1,855	1,902	1,949	1,998
Interest	2,148	2,223	2,549	2,683	2,620	2,473	2,335	2,366	2,386	2,345	2,298	2,339	2,714	3,244	3,557	3,839
Depreciation	4,048	4,338	4,645	5,033	5,433	5,642	5,797	5,979	6,238	6,438	6,626	6,703	7,070	7,666	8,355	9,169
Overheads	1,627	1,987	1,883	1,975	2,025	2,094	2,233	2,258	2,321	2,489	2,508	2,571	2,635	2,701	2,769	2,838
Total Expenses	**11,459**	**12,450**	**13,142**	**13,837**	**14,353**	**14,594**	**14,904**	**15,314**	**15,851**	**16,478**	**16,768**	**17,082**	**18,025**	**19,357**	**20,571**	**21,883**
Net Deficit (Surplus) of Operations	**-1,088**	**-3,173**	**-3,187**	**-2,484**	**-2,368**	**-2,177**	**-2,114**	**-1,812**	**-1,763**	**-1,623**	**-1,600**	**-1,643**	**-1,684**	**-1,726**	**-1,770**	**-1,814**
Funded by:																
Operating deficit (surplus) from/ to reserves	-492	-2,126	-1,853	-1,348	-1,175	-1,118	-969	-862	-922	-836	-806	-829	-850	-871	-893	-915
Recognition of vested assets	-596	-1,547	-1,334	-1,136	-1,069	-934	-945	-875	-840	-787	-794	-814	-835	-855	-877	-899
Depreciation not funded	0	500	0	0	-125	-125	-200	-75	0	0	0	0	0	0	0	0
Total Funding	**-1,088**	**-3,173**	**-3,187**	**-2,484**	**-2,368**	**-2,177**	**-2,114**	**-1,812**	**-1,763**	**-1,623**	**-1,600**	**-1,643**	**-1,684**	**-1,726**	**-1,770**	**-1,814**
Renewals																
Network Renewals	2,054	4,500	4,658	4,779	3,819	3,931	4,039	4,169	4,305	4,452	4,589	5,826	15,530	9,346	10,603	12,161
Treatment Renewals	1,082	1,279	1,401	1,285	1,532	969	1,515	1,158	1,445	1,196	1,061	1,502	1,540	1,578	1,618	1,658
Total Renewals	3,136	5,779	6,059	6,064	5,350	4,900	5,554	5,326	5,750	5,648	5,649	7,329	17,070	10,924	12,220	13,818
CAPEX																
Network New Capital																
Taupo water Brentwood reservoir - land purchase	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Tauhara Ridge Falling main to WEL	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia Bay water DWSNZ Upgrade	2,100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water reticulation of Five Mile Bay	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Airport Pump Station Water Safety and Continutiy Improver	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bonshaw Park DWSNZ Project	0	230	2,142	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamoenga Point DWSNZ Project	0	150	1,314	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Poihipi reservoir	0	0	0	0	0	0	0	0	0	0	0	1,344	9,646	1,920	0	0
Taupo water Poihipi reservoir - land purchase	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Brentwood reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0	424	3,907	0
Taupo water Tauhara Ridge reservoir - land purchase	0	350	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Tauhara Ridge Reservoir and Airport Connec	0	0	1,263	2,761	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Napier Road reservoir	0	0	0	0	0	0	0	0	0	0	0	0	1,034	5,577	0	0
Taupo water Napier Road reservoir - Land purchase	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kinloch Low Zone Reservoir Land Purchase	0	550	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kinloch Low Zone Reservoir Construction	0	1,200	3,395	212	0	0	0	0	0	0	0	0	0	0	0	0
Water Reservoir Emergency Storage	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamoenga Timbertank Reservoir Replacements	0	0	0	0	0	0	0	0	0	0	0	0	38	351	0	0
Taupo Water - Control Gates Bridge Pipeline Upgrade	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waihi Village water supply	0	1,220	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water - Low Pressure Project	0	900	0	0	0	0	0	0	0	0	0	2,110	2,163	0	0	0
Taupo Water - Wairakei Rising Main Upgrade	0	0	0	902	0	0	0	0	0	0	0	0	0	0	0	0
Whakamaru Water Network Extension	0	238	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mapara Scheme Capacity Increase	0	0	0	0	0	0	0	0	0	0	0	0	207	1,987	0	0
Water Loss Strategy Implementation	0	550	569	350	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water Centennial Treated Connection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	289	5,635
Taupo Water Upgrades to Service Unserviced Residentia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Network Capital	**3,815**	**5,758**	**8,684**	**4,226**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3,454**	**13,088**	**10,259**	**4,196**	**5,635**
Treatment New Capital																
Kinloch water DWSNZ upgrade	3,800	3,700	1,553	0	0	0	0	0	0	0	0	0	0	0	0	0
Centennial Treated Water DWSNZ Upgrade	0	0	104	1,062	2,346	0	0	0	0	0	0	0	0	0	0	0
Mangakino Reservoir Stormwater Management	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Omori water DWSNZ upgrade	0	800	2,070	0	0	0	0	0	0	0	0	0	0	0	0	0
Motuoapa water DWSNZ upgrade	0	0	828	1,912	0	0	0	0	0	0	0	0	0	0	0	0
Hatepe water DWSNZ Upgrade	0	0	725	2,124	0	0	0	0	0	0	0	0	0	0	0	0
Whakamaru Water DWSNZ Bore Head Upgrade	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whareroa Water DWSNZ Bore Head Upgrade	0	20	41	0	0	0	0	0	0	0	0	0	0	0	0	0
Atiamuri Water DWSNZ Bore Head Upgrade	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Taupo WTP capacity upgrade to 35 MLD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo WTP Taste Odour and Cyanotoxin Treatment Upgr	0	0	0	0	0	0	162	1,501	0	0	0	0	0	0	0	0
Turangi Water Treatment Improvements	0	0	0	106	0	0	0	0	0	0	0	0	0	0	0	0
Mangakino Water Treatment Improvements	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water Decommisioning Programme	0	86	119	80	46	0	0	0	0	0	0	0	0	0	0	0
Whareroa Water Treatment Capacity Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Treatment New Capital	**3,825**	**4,651**	**5,439**	**5,364**	**2,392**	**0**	**162**	**1,501**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total New Capital	**7,640**	**10,409**	**14,123**	**9,589**	**2,392**	**0**	**162**	**1,501**	**0**	**0**	**0**	**3,454**	**13,088**	**10,259**	**4,196**	**5,635**
Total Capex & Renewals	**10,776**	**16,188**	**20,182**	**15,653**	**7,742**	**4,900**	**5,716**	**6,827**	**5,750**	**5,648**	**5,649**	**10,783**	**30,158**	**21,183**	**16,417**	**19,454**
Funded by:																
Loans Raised	9,640	9,476	16,109	14,340	6,211	3,931	4,201	5,669	4,305	4,452	4,589	3,454	13,088	10,259	4,196	5,635
Loan Repayments	-2,220	-4,290	-4,878	-4,130	-5,723	-4,463	-3,923	-4,301	-4,351	-4,504	-4,635	-3,089	-3,149	-4,090	-4,563	-4,926
Other Subsidy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer from reserve(s)	3,356	11,001	8,950	5,444	7,255	5,432	5,439	5,458	5,796	5,700	5,695	10,418	20,219	15,014	16,784	18,745
Total Funding	**10,776**	**16,188**	**20,182**	**15,653**	**7,742**	**4,900**	**5,716**	**6,827**	**5,750**	**5,648**	**5,649**	**10,783**	**30,158**	**21,183**	**16,417**	**19,454**

	2036/37	2037/38	2038/39	2039/40	2040/41	2041/42	2042/43	2043/44	2044/45	2045/46	2046/47	2047/48	2048/49	2049/50	2050/51
Operating Income															
General rates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Targeted rates	-22,861	-23,800	-24,707	-25,651	-26,757	-27,845	-28,805	-29,776	-30,780	-31,914	-33,043	-34,097	-35,163	-36,245	-37,377
Capital subsidies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Development and/ or financial contributions	-938	-961	-985	-1,010	-1,035	-1,061	-1,088	-1,115	-1,143	-1,171	-1,201	-1,231	-1,261	-1,293	-1,325
Vested assets	-921	-944	-968	-992	-1,017	-1,042	-1,068	-1,095	-1,122	-1,150	-1,179	-1,209	-1,239	-1,270	-1,302
Fees and charges	-169	-173	-177	-182	-186	-191	-196	-201	-206	-211	-216	-221	-227	-233	-238
Total Income	**-24,889**	**-25,879**	**-26,838**	**-27,834**	**-28,996**	**-30,140**	**-31,156**	**-32,187**	**-33,251**	**-34,446**	**-35,639**	**-36,757**	**-37,890**	**-39,040**	**-40,242**
Operating Expenses															
Network Expenses	2,559	2,623	2,688	2,755	2,824	2,895	2,967	3,041	3,117	3,195	3,275	3,357	3,441	3,527	3,615
Treatment Expenses	1,581	1,621	1,661	1,703	1,745	1,789	1,834	1,880	1,927	1,975	2,024	2,075	2,127	2,180	2,234
Other Operating expenses	2,048	2,099	2,152	2,206	2,261	2,317	2,375	2,434	2,495	2,558	2,622	2,687	2,754	2,823	2,894
Interest	3,950	3,852	3,714	3,591	3,607	3,597	3,453	3,315	3,195	3,164	3,121	2,996	2,877	2,766	2,697
Depreciation	9,983	10,797	11,613	12,445	13,296	14,147	14,997	15,848	16,707	17,600	18,493	19,386	20,279	21,171	22,064
Overheads	2,909	2,982	3,056	3,133	3,211	3,291	3,374	3,458	3,544	3,633	3,724	3,817	3,912	4,010	4,110
Total Expenses	**23,030**	**23,973**	**24,884**	**25,832**	**26,944**	**28,036**	**29,000**	**29,977**	**30,986**	**32,124**	**33,259**	**34,318**	**35,389**	**36,477**	**37,615**
Net Deficit (Surplus) of Operations	**-1,859**	**-1,906**	**-1,953**	**-2,002**	**-2,052**	**-2,103**	**-2,156**	**-2,210**	**-2,265**	**-2,322**	**-2,380**	**-2,439**	**-2,500**	**-2,563**	**-2,627**
Funded by:															
Operating deficit (surplus) from/ to reserves	-938	-961	-985	-1,010	-1,035	-1,061	-1,088	-1,115	-1,143	-1,171	-1,201	-1,231	-1,261	-1,293	-1,325
Recognition of vested assets	-921	-944	-968	-992	-1,017	-1,042	-1,068	-1,095	-1,122	-1,150	-1,179	-1,209	-1,239	-1,270	-1,302
Depreciation not funded	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Funding	**-1,859**	**-1,906**	**-1,953**	**-2,002**	**-2,052**	**-2,103**	**-2,156**	**-2,210**	**-2,265**	**-2,322**	**-2,380**	**-2,439**	**-2,500**	**-2,563**	**-2,627**
Renewals															
Network Renewals	5,320	5,453	5,590	6,613	14,028	4,300	4,408	2,711	3,222	6,947	2,918	2,991	3,066	3,419	5,771
Treatment Renewals	1,699	1,742	1,785	1,830	1,876	1,923	1,971	2,020	2,070	2,122	2,174	2,229	2,285	2,342	2,400
Total Renewals	7,019	7,195	7,375	8,443	15,904	6,223	6,378	4,731	5,293	9,068	5,092	5,220	5,351	5,761	8,171
CAPEX															
Network New Capital															
Taupo water Brentwood reservoir - land purchase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Tauhara Ridge Falling main to WEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia Bay water DWSNZ Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water reticulation of Five Mile Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Airport Pump Station Water Safety and Continutiy Improver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bonshaw Park DWSNZ Project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamoenga Point DWSNZ Project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Poihipi reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Poihipi reservoir - land purchase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Brentwood reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Tauhara Ridge reservoir - land purchase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Tauhara Ridge Reservoir and Airport Connec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Napier Road reservoir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Napier Road reservoir - Land purchase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kinloch Low Zone Reservoir Land Purchase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kinloch Low Zone Reservoir Construction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Reservoir Emergency Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamoenga Timbertank Reservoir Replacements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water - Control Gates Bridge Pipeline Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waihi Village water supply	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water - Low Pressure Project	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water - Wairakei Rising Main Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamaru Water Network Extension	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mapara Scheme Capacity Increase	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Loss Strategy Implementation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water Centennial Treated Connection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water Upgrades to Service Unserviced Residentia	0	0	0	0	0	0	0	0	370	1,518	0	0	0	0	0
Total Network Capital	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**370**	**1,518**	**0**	**0**	**0**	**0**	**0**
Treatment New Capital															
Kinloch water DWSNZ upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Centennial Treated Water DWSNZ Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mangakino Reservoir Stormwater Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Omori water DWSNZ upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Motuoapa water DWSNZ upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hatepe water DWSNZ Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whakamaru Water DWSNZ Bore Head Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whareroa Water DWSNZ Bore Head Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Atiamuri Water DWSNZ Bore Head Upgrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo water Taupo WTP capacity upgrade to 35 MLD	0	0	0	0	839	0	0	0	0	0	0	0	0	0	0
Taupo WTP Taste Odour and Cyanotoxin Treatment Upgr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Turangi Water Treatment Improvements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mangakino Water Treatment Improvements	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taupo Water Decommisioning Programme	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Whareroa Water Treatment Capacity Upgrade	0	0	80	737	0	0	0	0	0	0	0	0	0	0	0
Total Treatment New Capital	**0**	**0**	**80**	**737**	**839**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total New Capital	**0**	**0**	**80**	**737**	**839**	**0**	**0**	**0**	**370**	**1,518**	**0**	**0**	**0**	**0**	**0**
Total Capex & Renewals	**7,019**	**7,195**	**7,455**	**9,180**	**16,743**	**6,223**	**6,378**	**4,731**	**5,663**	**10,587**	**5,092**	**5,220**	**5,351**	**5,761**	**8,171**
Funded by:															
Loans Raised	0	0	80	737	839	0	0	0	370	1,518	0	0	0	0	0
Loan Repayments	-5,315	-5,222	-5,053	-4,854	-4,725	-4,896	-4,700	-4,512	-4,332	-4,191	-4,248	-4,078	-3,915	-3,758	-3,619
Other Subsidy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer from reserve(s)	12,334	12,417	12,428	13,298	20,629	11,119	11,078	9,243	9,624	13,259	9,340	9,298	9,266	9,519	11,790
Total Funding	**7,019**	**7,195**	**7,455**	**9,180**	**16,743**	**6,223**	**6,378**	**4,731**	**5,663**	**10,587**	**5,092**	**5,220**	**5,351**	**5,761**	**8,171**

Table 9-2: Financial Table for the 30 Years 2021-2051

10.0 ASSET MANAGEMENT PRACTICES

10.1 Current Asset Management Practices

This section outlines the decision-making tools Taupo District Council (TDC) currently uses to determine long term maintenance, renewal and creation expenditure for water assets.

Council has had a consultant undertake a review of the three waters asset management plans; this review has enabled asset managers to identify particular areas in the AMP that need to be refined. The refinement process has been placed into the improvement section of the AMP. Also, an asset management team has been established to provide group support to the development of AMPs going forward. The AMP Team collectively identify any changes/updates required to the main text and comments are made via spreadsheet before any changes are made to individual AMPS. Any changes to the text are made using track changes this is so for auditing purposes, the changes made can be easily seen between the draft and final documents. These are saved in Council's Objective filing system.

Asset Management Plans are compiled by individual asset managers responsible for their assets. Asset Managers are also part of the Asset Management Team who work together to ensure quality outcomes. The team has key relationships with the policy division to make sure that customer expectations are understood as well as key outcomes are achieved. The Finance team also assist in the preparation of finance section. Project information as well as overall budgeting is then passed to senior management to enable further analysis as well as support. Asset management plans are then presented to Council where further prioritisation occurs.

AM practices fall under three broad headings:

Processes: The necessary processes, analysis and evaluation techniques needed for life cycle asset management.

Information Systems: The information support systems used to store and manipulate the data. The Council now seeks a solution and planning to replace the existing AMS system that can meet needs of today and future proof asset management in the future.

Data: Data available for manipulation by information systems to produce the required outputs.

10.2 Asset Management Processes

10.2.1 ATTRIBUTE DATA COLLECTION AND VALIDATION

Data collection is completed by:

- Treatment Plant operations and maintenance staff
- Water maintenance contractors and Network Engineer(s) providing updated asset information as maintenance works are completed.
- Contractors supplying data where an asset is renewed or installed
- As built data from new subdivision works

Validation is completed in a number of ways:

- Auditing internal staff and contractor’s work sheets,
- Review of asset data provided in as builts by Contract Managers

- All data input into Assetfinda, and all changes made within Assetfinda can be fully tracked and traced for full quality assurance

10.2.2 NEW DEVELOPMENT APPROVALS/AS-BUILT RECORDS

The Development Engineer approves completed works and ensures that the following people are issued a copy of all final documents, e.g. plans, pipe and manhole testing results.

- GIS – via the GIS help desk email address
- Utility Asset Officer (who will discuss any issues with the Asset Manager if required).

10.2.3 PROCUREMENT

Council is currently in the process of developing a Procurement Manual for IPG. This document provides instruction regarding Council procurement and tender evaluation methods.

10.2.4 LEVEL OF SERVICE CONSULTATION

The level of service consultation provides feedback from residents and ratepayers of the Taupo District. The responses from this consultation provide input into how the asset is managed. More information can be found in section 5.

10.2.5 INFORMATION FROM CONTRACTORS

Processes for collection of data (maintenance, condition, new assets, renewals, performance etc.) clearly defined and efficiently administered through asset maintenance contracts.

10.2.6 STANDARD OPERATING PROCEDURES

Standard Operating Procedures are being developed to assist in the operation and maintenance of assets. This process is ongoing with new procedures being developed as the need arises and updates being made as required.

10.2.7 ASSET MANAGEMENT ACCOUNTING AND ECONOMICS

Council uses a renewal accounting system. The asset maintenance, renewal and capital expenditure policy is included in Appendix S.

Infrastructure assets are those public facilities which provide for the delivery of services and sustained standard of living. They primarily comprise the Council’s fixed utility systems including roads, streets and footpaths, the water and sewerage reticulation systems, the stormwater system, bridges and culverts.

Infrastructure assets are deemed to have the following attributes:

- they are large networks constructed over several generations;
- they have very long useful economic lives;
- they have a high initial cost;
- they provide a benefit and/or a social service rather than a commercial service, i.e. the assets are used by or for the community as a whole, servicing all the City’s residents and visitors The assets are not usually capable of subdivision for ready disposal, because of legal or other restrictions, and consequently are not readily disposable within the commercial marketplace;

- assets are not normally depleted as their service capability is fully maintained in perpetuity, i.e. they are expected to have an indefinite life if adequately maintained although portions of the network will be replaced from time to time.

Assets are systematically evaluated as required, approximately every three years.

Depreciated replacement cost is calculated having regard to an allowance for the expired portion of the expected useful economic life for each category of infrastructure asset.

TDC uses the principles of accrual accounting to measure costs of services provided and recognise revenues.

Renewal accounting treats all upgrading, reconstruction, renewal and renovation work which does not increase the capacity or service potential of assets as operating expenditure.

Operating expenditure can be divided into two broad categories; normal ongoing day to day routine maintenance works, and those other more infrequent larger projects that upgrade or renew the asset to its previous service potential.

Creation expenditure involves increases in an asset's service potential or the creation of new assets.

All expenditure on infrastructure assets will therefore fall into one of three categories:

10.2.7.1Routine Maintenance Expenditure

Routine maintenance projects can be expected to display some or all of the following characteristics:

- regular and ongoing annual expenditure necessary to keep the assets at their required service potential,
- day to day and/or general upkeep works designed to keep the assets operating at required levels of service,
- works which provide for the normal care and attention of the asset including repairs and minor replacements,
- minor response type remedial works i.e., isolated failures requiring immediate repair to make the asset operational again.

10.2.7.2Renewal Expenditure

Work displaying one or more of the following attributes, can be classified as renewal expenditure.

- works which do not increase the capacity or service potential of the asset, i.e. works which upgrade and enhance the assets restoring them to their original size, condition, capacity etc,
- the replacement component of augmentation works which increase the capacity of the asset, i.e. that portion of the work which restores the assets to their original size, condition, capacity etc.,
- the replacement component of a new work which replaces the redundant element of an existing asset,
- reconstruction or rehabilitation components of works involving improvements, realignment and re-grading,
- renewal and/or renovation of existing assets, i.e., restoring the assets to a new or fresh condition.

10.2.7.3 New Works Expenditure

New works expenditure projects displaying one or more of the following characteristics:

- Construction works which create a new asset that did not previously exist in any shape or form,
- Expenditure which purchases or creates a new asset (not a replacement) or in any way improves an asset beyond its original design capacity,
- Upgrade works which increase the capacity of the asset,
- Construction works designed to produce an improvement in the standard and operation of the asset beyond its current capacity.

To the extent that a project results in replacement of an asset caused by physical deterioration, and also provides capacity for increased demand, proportions should be allocated to both creation and renewals on the basis of marginal cost.

It is recommended that the split between creation and renewal expenditure is based on marginal cost. This recognises the full cost of renewing the existing asset to its original service potential is an expense as this expenditure cost does not contribute to improving the asset beyond its original design capacity.

10.2.8 THE LONG-TERM PLAN PROCESS

The Long-Term Plan (LTP) formerly known as the Long-Term Council Community Planning (LTCCP) process considers the community outcomes, statutory requirements, the headline indicators and external pressures to determine what Council can or should be doing to help the community work towards its desired future.

The LTP also contains an action plan that sets out how Council will undertake its strategic goals and details the specific activities, functions and initiatives undertaken in the short term (3 years) and long term (10 years).

The LTP draws on information from other documents including the Asset Management Plans and models it in financial terms over a ten-year horizon.

The LTP is updated every three years with the next LTP being currently developed for the 2021 to 2031 period.

10.2.9 THE ANNUAL PLAN PROCESS

The Annual Plan is an action plan that sets out how Council will undertake its strategic goals and details the specific activities, functions and initiatives undertaken. It is produced in the years when a LTP is not. It will also outline deviations from the LTP.

10.2.10 STANDARDS AND GUIDELINES

In all water works there are standards and guidelines that are available to ensure that Council is following 'best practice'. This includes national standards on pipe laying, water treatment, subdivision and development and the TDC Code of Practice for Land Development.

Whereas Acts and Regulations determine minimum levels of service, standards and guidelines provide the means of compliance with specific levels of service.

10.3 Asset Management Information Systems

10.3.1 ASSET MANAGEMENT SYSTEM

Council used Asset Finda Asset Management System that contains the data for Three waters (Water, Wastewater and Stormwater) Assets. This is a new system for TDC and asset data is being transferred into the system over time from various other sources.

10.3.2 TRACK 24

Track 24 is a project management software. The programme allows data to be entered on a project from initial conception through to final completion. All the data for the project is stored in one location. All project payments and project sign off procedures are completed using this system.

10.3.3 GIS

The GIS stores all the spatial data relating to the assets. The data is taken from the AMS.

10.3.4 SERVICE REQUEST SYSTEM

This is the system used by Council to record customer complaints, comments or compliments. The information is entered into the system when a customer calls and the call will be categorised depending the issue. Predetermined Council Staff are tasked with completing these requests in a predetermined timeframe.

The service request system is currently difficult to produce reports from. It is planned for update as part of Project Quantum when TDC will be installing a new solution from Tech One. Currently trending of complaints is undertaken using Assetfinda where service requests relating to assets are also logged. Complaints are trended every month for the CEO report and reported in the Annual Plan. Example below:

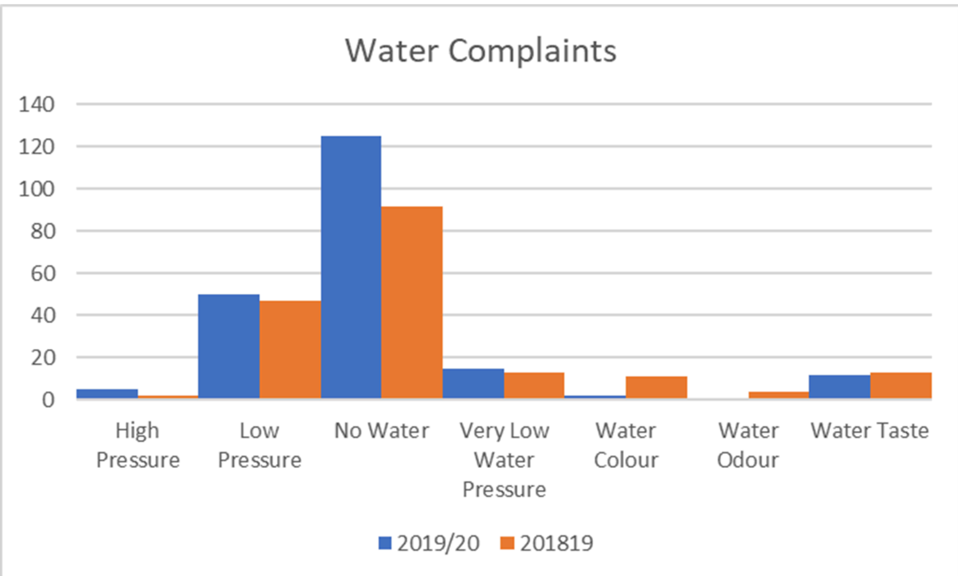


Figure 10-1: Annual Water Complaints Reporting from Assetfinda

10.3.5 ASSET VALIDATION BY CONTRACTORS

Data is collected on a daily basis by maintenance and capital works contractors. This information is then updated in the AMS.

10.3.6 SPM (DEVELOPMENT CONTRIBUTION CALCULATIONS)

Capital works project costing are inputted into SPM along with their respective breakdowns of cost e.g. proportion of the project that is growth, backlog or renewal. The level of Development Contribution (DC's) is then calculated for forward financial planning and income projections.

10.3.7 COUNCIL LABORATORY DATABASE

All results from Council laboratory are stored into one central laboratory database. This database is updated by Laboratory staff and includes data from in-house testing as well as testing carried out by external laboratories. Relevant data can be extracted as required.

10.3.8 PROMAPP

Promapp is a procedure development programme that is being used to develop standard operating procedures for all Council business.

10.3.9 OBJECTIVE

Objective is Council's electronic document management system. All information relating to Council business is saved in this system for easy retrieval when required. This includes incoming and outgoing correspondence especially emails and letters.

10.3.10 HISTORIAN

Historian is a data management programme that allows viewing of operational data such as daily flows or plant measurements.

10.4 Data

10.4.1 ACCOUNTING COST DATA

Cost data for the asset groups are identified in the accounting records.

The work category type (maintenance, renewals, and new works) is identified. Marginal costs are only separately identified for significant works. Minor asset expenditure (traffic controls, service lanes) may not be separately identified.

Visual inspection to verify quantities for payment for routine maintenance and renewal tasks is done by the professional services business unit.

10.4.2 GROWTH MODEL

The growth model is updated on an annual basis to reflect changes in development patterns. This model predicts the spread and level of growth within the Taupo District Council Area. This model assists Asset Managers in planning forward works for their respective assets.

10.4.3 ASSET VALUATION

The asset valuation provides a three-yearly update of the value of the Water Asset. The asset valuation for the water assets is undertaken every 3 years. New assets or disposal of assets are taken into account at this time. The valuation process is performed in accordance with generally accepted accounting standards and with NZ local authority asset management practice (NAMS). The process also takes into account reviewing the useful lives of each asset type.

10.4.4 CONDITION ASSESSMENT

Condition assessments are carried out by both contractors and council staff. This process is both formal and informal. Currently all condition assessment information for the water treatment plants is stored in objective as an excel file. Reticulation conditional information is contained within contractor reports that are also saved in objective.

10.4.5 OPERATIONAL DATA

Operational data is available on objective, on site and through Historian.

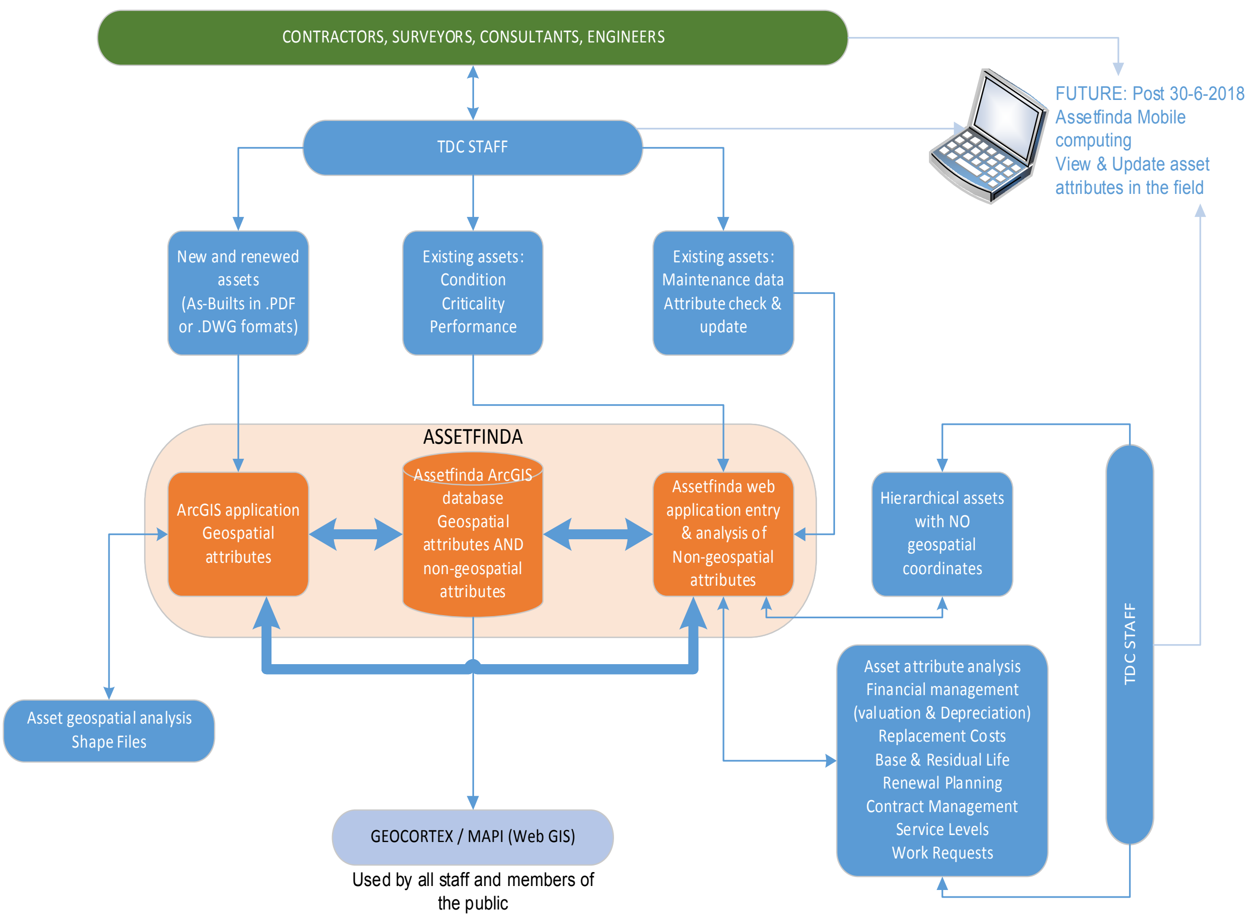


Figure 10-2: Asset Management System / GIS Data Recording Flow

10.4.6 DATA QUALITY ASSURANCE

The following are quality assurance regimes:

- Data Collection:
    - The contractor is responsible for GPS data collection following council standards (council doesn't accept any data with more than 0.3 m error in GPS coordinates).
    - TDC staff is continuously collecting data for historical assets which are updated after verification.
    - Project management team provides as built and field data and advice AMS team to update the information in asset register and or GIS.

- Data entry: Currently council is doing manual entry of the data using ArcGIS import capabilities CAD files and PDF files.

- Data maintenance: This is partially done by council staff whenever the contractor finds any variance in existing data and physical asset in the ground. As regards to the WWTP and pump stations operating staff and contractors' staff are continuously validating and updating the conditions of the asset and informing the AMS team. In future it is envisaged that some efficiency will be developed with upgrade of AssetFinda and field staff will be able to update asset attributes directly and it will be validated using quality assurance protocol developed at that time.

11.0 IMPROVEMENT PLAN AND MONITORING

11.1 Improvement Plan

Improving the management of Taupo District Council's water assets is a continual and on-going process. During the course of updating this plan, AM improvement tasks have been noted for follow-up over the next three years in conjunction with reviewing and improving this plan. This programme reflects the overall aim of improving asset management practices, which is to deliver the right level of service at the lowest long-term cost to TDC's customers.

The highest improvement tasks all focus on meeting that goal by:

- Ensuring the right level of funding is being allocated to maintain the asset service potential.
- Implementing predictive modelling techniques that will allow consideration of alternative long term cost scenarios.
- Consulting with customers to ensure that their views are considered when selecting the best scenario.
- On-going NAMs training is provided for staff involved in the production of the asset management plans to facilitate best management of the assets.
  Asset Managers participate in the Council's asset management planning team which facilitates improvements in planning for all categories of assets.

11.1.1 BACKGROUND

The Asset Management Plan (AMP) has been updated during 2007, 2008, 2010, 2014 and 2017 to reflect changes in national policy and local thinking.

Audit NZ completed audits on the 2009 and 2012 versions and the actions or recommendations for improvements have been incorporated into the document or have been included in the improvement register following.

The Water, Wastewater and Stormwater AMPs were independently peer reviewed in 2011 and 2018 by Waugh consultants. A number of improvements were identified from these reviews to raise these AMPs from core to advanced, where appropriate. The AMP group is collectively working through the Waugh report recommendations, to bring all AMPS up to the core level. Any other recommendations not completed during the updated AMP process cycle are added to the Improvement plan (section 11.2) with dates which can be monitored.

11.2 Improvement Programme

Resources (cost and time) have yet to be approved and are only estimates at the time of updating AMP. These may need to be reviewed when task is in progress to judge if timeframe and cost is realistic.

Section	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
						Cost $	Resource	
3 WATERS COMMON WEAKNESSES								
	Multiple Sections	Waugh Report 2018	A significant amount of information, data and actions are inferred within the AMPs, but the AMP documents does not provide demonstration of this information, data and actions. Including graphs showing asset age/installation year, materials, sizes, breaks/material, CCTV results/records, service request trends, satisfaction survey trends, will aid in telling the story. Identifying and discussing the 'Key Issues' for each asset group/service at the front of each AMP will aid reader understanding		2024	Internal time only	Asset manager	Ongoing. Included renewal graphs, material, condition graphs (network) Included water loss targets and 2020 results, included trend data for water use Included fire hydrant testing data
4.0 Asset Data								
	Data Confidence	Waugh Report 2018	Section 4.3 provides good description of data confidence i.e. asset data and financial data, but this can be improved upon by distinguishing between above/below ground or reticulation/treatment assets as generally there is a significant difference between data confidence of these asset sets		2024	Internal time only	Asset Manager	Paragraph included with detail of network asset confidence. No new calculation completed. Ongoing
	Asset Register	Improvement	Inventories and condition assessment to be completed for all water treatment plants, reservoir and pump stations (including toby, Fire hydrant, valves & meters). This was first noted in the peer review of the Asset Valuation completed in 2009.	1	2024	Internal time only	Information Manager / Asset Manager	Network complete. Treatment will be completed as assets move into Assetfinda. Ongoing
	Asset Register	Improvement	Continue to maintain, develop and improve the asset register. Continue to monitor new developments in AMS for any improvements in its asset valuation programme.		Ongoing	Internal time only	Information Manager / Asset Manager	Ongoing
5.0 Level of Service								
	Level of Service		Gauge customer opinion more thoroughly as part of increased consultation.	2	2021	Internal time only	Policy Team	To consider consultation to feed into 2024 LTP Ongoing
	Levels of Service	Audit NZ Review	Expanding the capital expenditure linkage detail within the AMPs to include linking capital expenditure to demand, maintenance or renewal, in addition to Levels of Service.		2024	Internal time only	Asset Manager	
6.0 Future Demand								
	Future Demand	TDC Identified Improvement	Update growth projections to resolve uncertainties in current data and forecasts	Added Nov 2020	2024	$50k Est	Policy Team	
7.0 Risk Management								
	Risk Management	Waugh report 2018	The risk section can be enhanced through discussion of resilience and referencing 100Resilient Cities website etc		2024	Internal time only	Risk Manager / Asset Manager	Nov 2020 Discussing with Risk Manager
8.0 Lifecycle Management								
	Asset Maintenance	Audit NZ Review	Asset maintenance activities within AMPs are at a very high level and would benefit from greater granularity.		2024	Internal time only	Asset Manager	

Section	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
						Cost $	Resource	
	Lifecycle Management	Audit NZ Review	The asset lifecycles and asset management processes within AMPs are at a very high level and would benefit from greater granularity.		2024	Internal time only	Asset Manager	
9.0 Financial Summary								
	General	Improvement	Consider devaluing assets based on condition rather than birthday life. Implement the necessary procedures for the revaluation. Include disposal strategies where appropriate.	2	Ongoing	Internal Time Only	Condition assessment and updating asset register is ongoing, after which we can review valuation processes.	Ongoing
10.0 Asset Management Practices								
	Condition Assessment	Audit NZ Review	Condition assessments are performed, however the condition grading model as per the NAMS IIMM manual is not detailed in the AMPs.		2024	Internal time only	Asset Manager	
11.0 Improvement Plan & Monitoring								
	Improvement Programme	Waugh Report 2018	The Improvement Programmes show resources (internal/outsource) but doesn't assign specific responsibility to items or estimated time and costs. This undermines the demonstration of commitment to completion of Improvement Items.		2021	Internal time only	Asset Manager	Complete – added owners and timeframes to all items
		Waugh Report 2018	There is no mention of any sensitivity analysis			Internal time only	Asset Manager	

Table 11-1: Improvement Plan

11.2.1 COMPLETED IMPROVEMENT PLAN TASKS

Following is a list of Improvement Plan Tasks that have been completed since the development of the 2018 Asset Management Plan.

Task ID	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
GENERAL WEAKNESS								
	Multiple Sections	Waugh Report 2018	There are significant references to the wastewater service within the Water AMP: - Section 1.1.3 under the Health Act - provide 'sanitary works', the definition of which includes wastewater disposal and includes all lands, buildings, machinery, reservoirs, dams, tanks, pipes and appliances used in connection with any such works. - ensure the provision in any dwelling house of an adequate and convenient method for the disposal of wastewater. - Section 10.2.10 "In all wastewater works there are standards and guidelines that are available to ensure that Council is following 'best practice'."		2021	Internal time only	Removed references May 2019	Complete
Executive Summary								
	Water Supply Assets	Waugh Report 2018	The Executive Summary under Water Supply Assets states on page 2 that there are 19 water schemes whereas Section 4.2.1.1 states there are 21 water supply schemes causing reader confusion.		2021	Internal time only	Clarified 18 schemes with explanatory note in asset section, Aug 2019	Complete
1.0 Introduction								
	Key Stakeholders	Waugh Report 2018	Section 1.2 identifies all the key stakeholders, but the document would be enhanced with the inclusion of large users and potential agreements		2021	Internal time only	Included users greater than 50m3/day, Nov 2020	Complete
	Significant Negative Effects	Waugh Report 2018	Section 1.5 identifies significant negative effects, but mitigation of each negative effect is lacking e.g. pump station noise is mitigated by containing pumps within structures with appropriate sound proofing where required		2021	Internal time only	Included table with mitigations, Aug 2019	Complete
	Relationship with Planning & Strategic Documents	Yes – Audit NZ Review	Include within the AMPs a description of process to ensure AMP's link to, and are consistent with, other planning information.		2021	Internal time only	Included section 1.1.5	Complete
	Relationship with Planning & Strategic Documents	Yes – Audit NZ Review	Include within the AMPs a description of AMP linkages to specific council policies and the reason and impact of such linkages.		2021	Internal time only	Included section 1.1.5	Complete
	AMP review by Council	Yes – Audit NZ Review	Detailing in the AMPs involvement by councillors, including the reviewing and approving of the AMPs.		2021	Internal time only	Complete May 2019. Added to Section 1.1.1.	Complete
	Background, Legislative Requirements and Legislative Documents	Waugh Report 2018	The AMPs are silent on: - The Govt 3Waters Review - WorkSafe NZ Act 2013 - Heritage Pouhere Taonga Act 2014 - Utilities Access Act 2010 - NZ Metadata Standards		2021	Internal time only	Complete May 2019. Added to Section 1.1.3 and 1.1.4.	Complete
	Background, Legislative Requirements and Legislative Documents	Waugh Report 2018	The AMP refers to the Health and Safety in Employment Act 1999 and not the Health and Safety at Work Act 2015		2021	Internal time only	Complete May 2019. Change made in Section 1.1.4.	Complete
	Background, Legislative Requirements and Legislative Documents	Waugh Report 2018	The AMP does not identify that the Fire Service Act 1975 has been repealed. The Fire and Emergency New Zealand Bill received Royal assent on 11 May 2017 to become the Fire and Emergency New Zealand Act. It establishes Fire		2021	Internal time only	Complete May 2019. Added to Section 1.1.4.	Complete

Task ID	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
			and Emergency New Zealand as of 1 July 2017, and marks the most significant change to the fire sector for 70 years					
	Background, Legislative Requirements and Legislative Documents	Waugh Report 2018	The Water AMP is silent on: - Havelock North incident, risks identified as a result and potential implications - LGA Section 17A Delivery of Services review - Section 10 of the LGA, although efficient & effective service provision is dispersed throughout the document		2021	Internal time only	Complete May 2019. Test added to section 1.1.2, and 1.1.4, and a new section added (1.1.3).	Complete
4.0 Asset Data								
	Asset Summary and Valuation	Waugh Report 2018	There is adequate description of assets, but reader understanding will be enhanced if Figure 1 (Table) included scheme, assets, population and replacement value		2021	Internal time only	Updated table, Nov 2020	Complete
	Reticulation	Waugh Report 2018	There is no demonstration of asset hierarchy and Section 4.2.2.2 states data collected include asset age and materials, but this is not demonstrated. Including graphs showing age, material, diameters will provide great demonstration of asset data held		2021		Nov 2020 - Included examples of hierarchy for water pump station and pipe data including figures	Complete
	Asset Register	Yes	Asset condition and asset performance data in addition to asset age and physical description to be included in the AMP.		2018	Internal Time Only	Complete sections on each item as requested.	Complete
	Valuation Process	Yes – Audit NZ Review	Though the Council has valuations performed and use the data to inform asset planning, the AMPs do not detail the valuation process.		2021		Included in 4.1.1	Complete
5.0 Level of Service								
	Level of Service	Waugh Report 2018	The AMP provides discussion on fire hydrant testing and this is included as a Level of Service and measured. However, a graph showing actual annual recorded flows (min & max) against FW2 (12.5 L/s) would demonstrate this		2021		Included in section 4.2.2.3 Retic Performance	Complete
	Consultation Process and Linkages Diagram	Waugh Report 2018	Figure 5.1 identifies the Significance and Engagement Policy but doesn't discuss the Policy or identify whether the Water service is a significant service		2021		Included explanation under Figure 5.1	Complete
	Level of Service		Set up deficiency database & include customer complaints/issues.		2018		All customer complaints logged in service request system and where relating to an asset, Assetfinda.	Complete
	Level of Service	Yes – Audit NZ Review	Detailing within the AMPs the process for monitoring and reporting performance against the levels of service, beyond customer feedback processes.		2021		Additional section (5.6) included detailing monitoring and reporting	Complete
6.0 Future Demand								
	Future Demand	Waugh Report 2018	Section 6 Future Demand provides good discussion on Taupō District 2050 (TD2050), the Growth Management Strategy. However, reader understanding would be significantly enhanced if graphs showing forecast population & dwelling growth were included.		2021		Updated table and graphs for Taupo and Kinloch included	Complete
	Demand Management	Waugh Report 2018	The AMP refers to the Water Demand Management Plan, but does not provide a summary of demand management strategies from the Water Demand Management Plan Consideration should be given to inclusion of demand management strategies like response times, renewals, codes of practice. technical standards, standard materials &		2021		Included in 6.2	Complete

Task ID	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
			quality audits					
7.0 Risk Management								
	Risk	Yes	Consider the costing of risks for major, strategic and critical assets	1	2018	Staff time	The improvement plans are scheduled based on WSP and condition assessment by operations staff.	Business continuity plan finalised (Obj ref A1009551)
	Critical Assets	Yes – Audit NZ Review	Further work is required to identify and classify the criticality of all assets and their significance to planning.		2021		Section 7.7 expanded with supporting info.	Complete
	Critical Assets	Waugh report 2018	Section 7.1.1.1 States a high level criticality assessment has been done but true criticality is still to be completed. Section 7.7 indicate this has only been done for wastewater		2021		Section 7.7 expanded with supporting info.	Complete
	Critical Assets	Waugh report 2018	The Water and Wastewater AMP state that criticality assessment is in its early stages and only partially done for wastewater assets. The Stormwater AMP (Section 7.6) indicate that the criticality assessment for Three Waters assets was completed and its inclusion into Asset Finda has enabled increased inspection, and maintenance of critical assets. As a result the Stormwater AMP will score higher in various categories such as Risk etc		2021		Section 7.7 expanded with supporting info.	Complete
	Risk Management	Waugh report 2018	The AMP does not discuss any insurance, risk sharing arrangements or which assets are insured		2021	Internal time only	Nov 2020 Added Insurance section (7.4)	Complete
7.0 Risk Management								
	Risk Management	Waugh report 2018	There is no mention of Council's Policy on Dangerous, Earthquake prone and Insanitary Buildings Policy and how it impacts on water facilities and buildings		2021		Added section 7.5, Nov 2020	Complete
8.0 Lifecycle Management								
	Resource Consents	Waugh report 2018	Table 8.4 Resource Consents show a code rather than issue & expiry dates making it hard to determine which consent expire during the next 10 years		2021		Updated	Complete
	Climate Change	Waugh report 2018	There is no reference to climate change and its impacts on the water service		2021		Included as new section (8.1.1)	Complete
	Condition & performance	Yes	Show how the information is being fed into decision making	3	Ongoing		Information included with treatment renewal and retic renewal processes and relation with condition	Complete
	Reticulation and Pump Stations	Improvement	Model Water Networks and preparation of upgrade programme particularly for Taupo, Acacia bay and Kinloch.	2	2018	150k	Taupo, Acacia Bay and Kinloch networks modelled. Completed 2018/19	Completed
	Reticulation and Pump Stations	Improvement	Incorporate predictive modelling outcomes from InfoWorks water model for growth areas and or complex distribution zones.	3	2020	30k	Modelling of future growth completed across Taupo / ABay / Kinloch to feed into LTP planning	Complete
10.0 Asset Management Practices								
	Asset Management Processes	Waugh Report 2018	Section 10.2.1 refers to wastewater maintenance contractors		2021	Internal Time Only	Revised section	Complete
	Asset Management Processes	Waugh Report 2018	There is no trending of service requests discussion or demonstration		2021	Internal Time	Added comments to service request section	Complete

Task ID	Area for improvement	Identified by:	Action/task description	Priority	Target date	Cost/resources		Status
						Only	and example trend	
	Data Quality Assurance	Audit NZ Review	The AMPs detail regarding the Council's asset management quality assurance processes to ensure integrity of asset data is too brief in the AMPs.		2021		Section 10.4.6 updated Additional info also in 10.2.1	Complete
11.0 Improvement Plan & Monitoring								
Improvement Programme	Waugh Report 2018	The Improvement Programmes show resources (internal/outsource) but doesn't assign specific responsibility to items or estimated time and costs. This undermines the demonstration of commitment to completion of Improvement Items.		2021	Internal time only	Asset Manager	Complete – added owners and timeframes to all items	

Table 11-2: Completed Improvement Plan Actions

11.3 Monitoring & Review Procedures

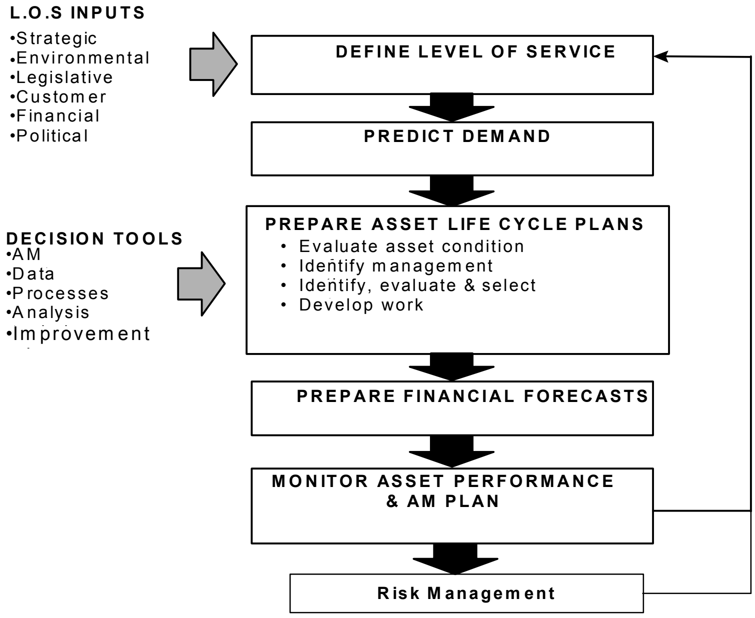
The most important review procedure is the 3-yearly review of the AMP that takes into account asset performance during the previous 3 years and identifies future trends and input into Council's strategic planning process. The 3 yearly cycle of TDC strategic planning is as shown in below.

Figure11-1: TDC Three Yearly Planning Cycle

Year	2019	2020	2021	2022	2023	2024
Activity	Structure planning	Review of asset management plans	LTP amendment	Structure planning	Review of asset management plans	LTP amendment

The framework for the 3-yearly review of the AMP in terms of the breadth of considerations is illustrated in the following figure.

Figure 11-2: Asset Management Plan Review Procedure



Lifecycle Management Plans

Appendix A
Acacia Bay / Mapara

ACACIA BAY / MAPARA SCHEME

Background

The Acacia Bay Water supply area was constituted on 10/3/87. The small Acacia Bay water supply pump station and treatment plant was built in the 1960's and upgraded in 1997. The legal description of the intake is given as Taupō Lakebed, Hiruharama - Ponui Block, Tuhingamata E. SD. Map reference NZMS 260 U18:733 723. Water is pumped from the intake to the reservoir from where it gravitates into the network where it is individually supplied to urban lots (full flow connections) and to fire hydrants across the urban area.

The original 401 m^3 reservoir was constructed using precast concrete wall panels and required strengthening in the 1970's and 2002. The reservoir has since been decommissioned and a new reservoir (2,000 cubic metres) constructed at Cherry Lane. The Acaica Bay plant also includes the Mapara Valley water supply scheme. This supply is fed by pump from the Cherry lane Reservoir site and supplies the higher Mapara land to the west and south (see Figures on page 5 & 6). The pump station feeds the network and the small Blue Ridge Drive Reservoir which operates more as a balance tank.

The Mapara water supply was commissioned in 1982 to supply farms and rural-residential properties lying on both sides of Mapara Road and immediately to the west of the Acacia Bay urban area. During the development stage the scheme was expanded and since 1984 considerable subdivision has been carried out. The Mapara scheme is a restricted, metered water supply and consumers are required to provide 24 hour on-site storage.

A limited firefighting supply is available from fire hydrants on the Mapara scheme

In September 1992, there were 432 properties with 552 dwellings on residential lots. At November 2017 there were 634 lots connected of the 742 with the right to connect in Acacia Bay with a further 387 properties connected in the Mapara water supply. This includes both the Acacia Bay residential dwellings and the Mapara area.

Asset Description

The intake pipe is 375 mm diameter and extends 60 m into the Lake. The intake draws water from Lake Taupō and three submersible pumps each capable of delivering 30 L/s, pump water via a 300 mm dedicated rising main to existing Cherry Lane reservoir. The gravity mains from the reservoir to the community reticulation includes 225 mm and 150 mm diameter mains while the distribution network consists of 100 mm and 40 mm diameter mains. The water is treated with gas chlorine.

The following table provides the most recent asset replacement value (2019/20):

Scheme	**Acacia Bay/Mapara Road**
Reticulation Replacement Cost	$ 7,456,670.38
Water Source, Treatment, Replacement Cost	$ 2,308,117.21
Total	$ 9,764,787.59

Asset Condition

The treatment plant is a simple one. Raw water is abstracted from Lake Taupō using submersible pumps and transferred to a storage reservoir located at an elevated position. Chlorine gas is injected into the raw water at the intake. This reservoir also acts as a contact tank.

The dedicated 300 mm rising main was installed from intake to the reservoir in 2009-10.

The reticulation system was largely built in 1987 is largely still in operational condition based on breakages and maintenance records as well as pipe useful life calculations.

Due to severe leaks, the Acacia Bay Reservoir was isolated in 2007, since then the water has been pumped to Cherry lane reservoir (located at elevation 440 m above MSL), where a new pump station delivers water into the Mapara scheme to a 46 m^3 reservoir in Blue Ridge Drive at level 602 m above MSL.

The Mapara Road network continues beyond Blue Ridge Drive over the hill and the gravity section extends into the Whakaipo Valley and supplies Whakaipo Bay and Tukairangi Road. Two pressure reducing valves at Kaipo Road service the properties in the low-lying areas.

Asset Capacity/Performance

(a) Capacity

A summary of the water demand and supply capacity for the scheme is given below:

Scheme	Acacia Bay
Total rateable properties as of June 2020	Included in Taupo$^+$
Total connected properties as of June 2020	Included in Taupo$^+$
Average Day Water Demand (last 5 years), m^3/day	623*
Peak Day Water Demand (last 5 years), m^3/day	1,800*
Resource Consent, m^3/day	3,000
Supply Capacity, m^3/day	3,000
Reservoir Capacity, m^3	4,500

* Includes Mapara Valley water consumption which is approximately 285 m^3 per day on average.

$^+$ Acacia Bay/Mapara scheme rating was recently merged with Taupo due to the upcoming connection of these schemes (expected completion June 2021).

Mainly minor growth is expected in the Mapara supply area for which upgrade of the Cherry lane PS is allowed for in the AMP. A major growth block in the Mapara area that is zoned residential will need significant investment to allow appropriate servicing. A project has been allowed late in the AMP to account for this growth however no feasibility work has yet been completed.

(b) Water Quality

The water quality does not meet the DWSNZ.

Protozoa compliance, (3 log) is not achieved. Giardia and Cryptosporidium has not been detected in the system but has been detected elsewhere in the Lake.

Arsenic is present in the Lake water and it is approximately the limit of 0.01 mg/L.

The bacteria tests and chlorine test are carried out in the distribution zone according to DWSNZ sampling and monitoring protocol. The source water (pump station) has flow and chlorine monitoring system/ alarms which is continuously transmitted to the operations team. The continuous monitoring for pH, Chlorine, turbidity and flow monitoring is located at the outlet of reservoir for compliance monitoring prior to reticulation.

Cyanobacteria and cyanotoxins have previously been identified in within Lake Taupō near the Acacia Bay intake. A cyanobacteria management plan is in place and regular sampling is undertaken to monitor potential events.

(c) Water Pressure

Reticulation pressure is adequate to meet the FW2 Fire Service Code of Practice requirements in the majority of areas. Several lots in the Brunette Drive cul-de-sac experience very low pressures due to elevation compared to reservoir level. Similarly, some property owners on the west side of Wakeman Road knowingly built very high and consequently have low pressure water in their homes, unless boosted on site. These are existing known low pressure areas and residents generally have their own tanks and pumps to improve water pressure. The reticulation system is large enough to supply the remainder of the developed lots at a pressures above level of service levels.

The Mapara rural supply is restricted and metered. The reticulation system was not designed to meet firefighting flow requirements. Onsite storage and adequate fire flow and pressure is required by each property. Fire hydrants are progressively being installed to support emergency response.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Renewal Plans

There is approximately 11km of pipeline of Asbestos or Galvanised that will form part of renewals programmes over the next 30 years. The Cherry lane reservoir is also planned for strengthening to bring it up to current earthquake codes.

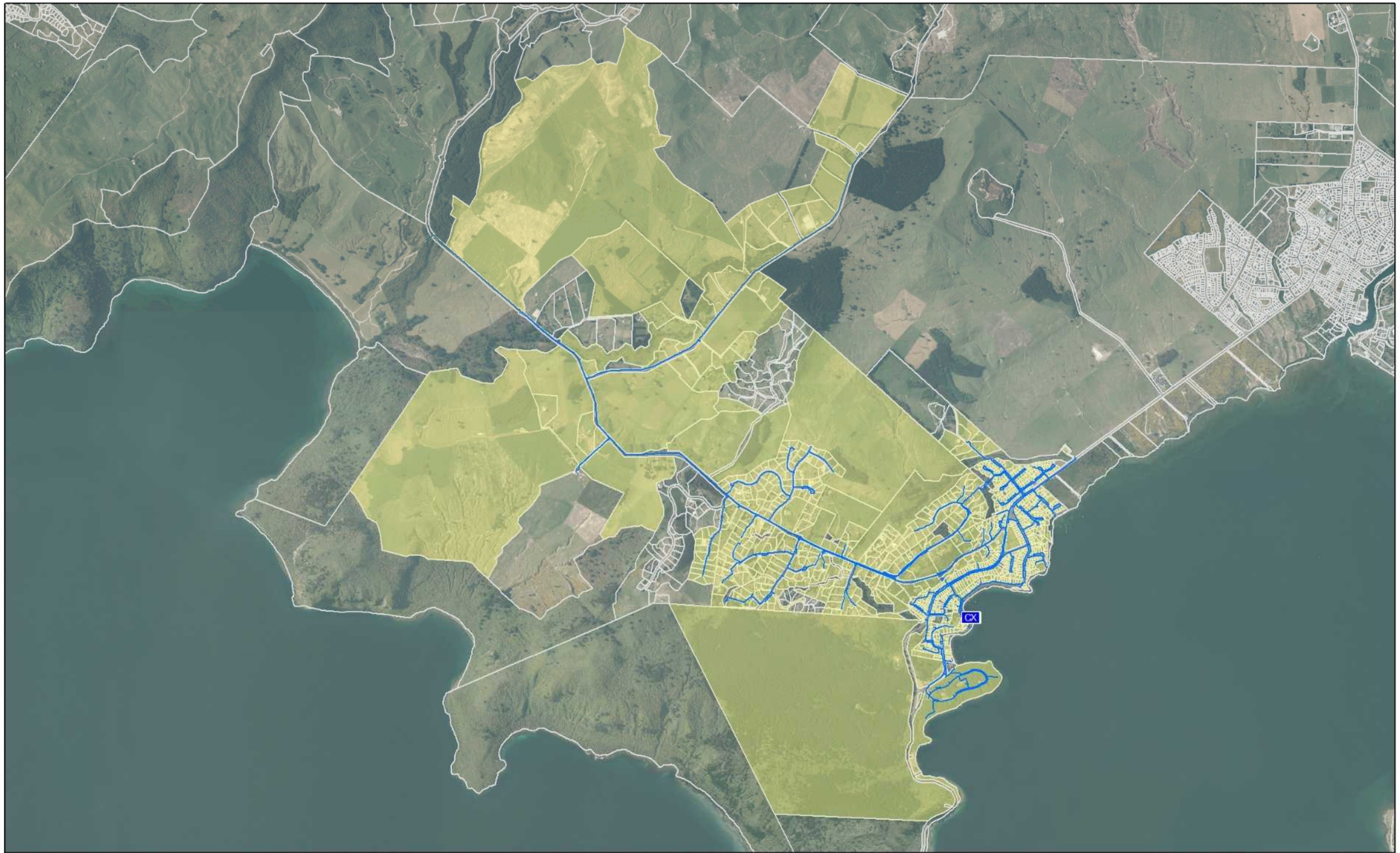
Development Plan

The Acacia Bay/Mapara Schemes are planned for connection to the Taupo scheme during the 2020/21 financial year. After this point the schemes including Taupo will be considered one scheme. A resilience study will be completed in year 1 of the LTP to determine whether the Acacia bay intake will be retained for emergency use.

The LTP Capex projects specifically relating to the Acacia Bay or Mapara schemes are as follows:

Project	Description	Timing	Value
Mapara Scheme Capacity Increase	Add third duty pump to Mapara PS, upgrade Blueridge rising main, and reservoir to cater for growth	2032/34	$1,557,000
Taupo Water Upgrades to Service Un-Serviced Residential Zoned Land in Acacia Bay	Pipelines and pump stations to deliver water to 100 Loch Views and surrounding residentially zoned lots. (May be developer funded)	2044/46	$1,000,000
Decommissioning Programme - Mapara Reservoir	Decommissioning of no longer used water treatment, pump station and reservoir sites.	2021/22	$47,900
Decommissioning Programme - Acacia Bay WTP	Decommissioning of no longer used water treatment, pump station and reservoir sites.	2022/23	$35,100
Reservoir Strengthening – Cherry Lane	Strengthening of Cherry Lane Reservoir to meet earthquake codes – part of programme	2033/25	$2,475,000

GREAT LAKE TAUPŌ
Taupō District Council



GREAT LAKE TAUPŌ
Taupō District Council

Water Service Area - Acacia Bay/Mapara Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	23/11/2020
TRACED		
APPROVED		

N W E S

0 500 1,000 Metres

NZTM 2000 Scale (A3) - 1:30,000

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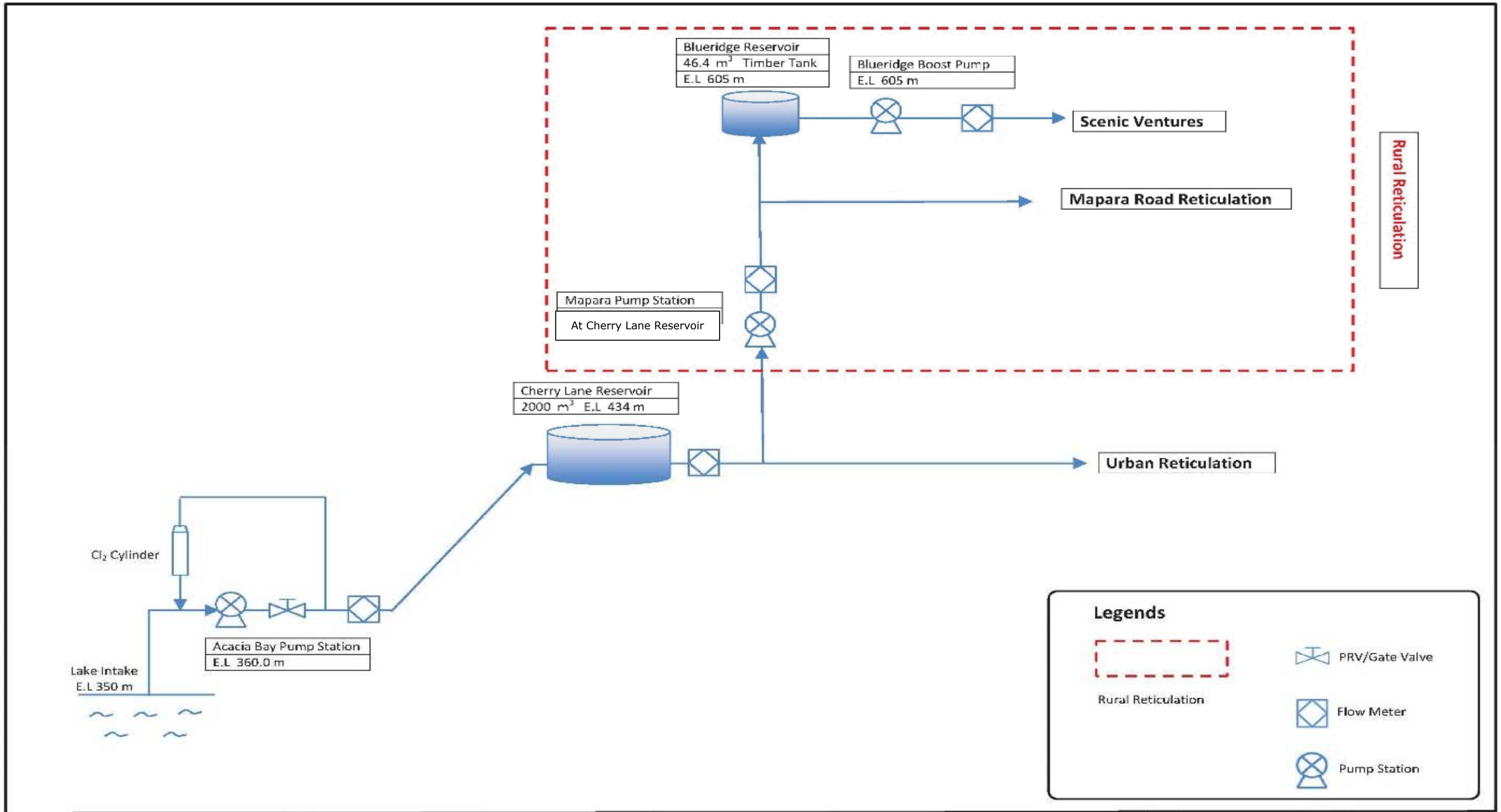


GREAT LAKE TAUPŌ Taupō District Council	Water Schematic Plan for Acacia Bay	Date : April 2014	Drawn : Szhu
		Checked By: Jock Prescott	Approved By: Ramesh Sharma
		ObjectiveID:	Scale : Not To Scale

Appendix B
Atiamuri Scheme

ATIAMURI SCHEME

Background

The Atiamuri village was developed for the Waikato River Hydro schemes by the Crown for the former Electricity Department. Atiamuri consists of two villages, namely the Atiamuri Village and the Atiamuri Hydro Village. Atiamuri Hydro Village consists of 29 residential lots and a hostel which was constructed to serve adjacent hydro electrical development. The standard of the infrastructure in the village is good and a further 31 lots can be developed in the future. The old Atiamuri village comprises residential and commercial lots and a large area that can be developed into 100 residential lots. The quality of the infrastructure in the old village is poor. In 1992 the scheme was upgraded to Taupō District Council standards and transferred to Council ownership. There is no growth predicted according to growth model.

The legal description of the asset is given as Pt II DPS 11436 Blk VI Atiamuri SD. Map reference is NZMS 260 U17: 748 077.

Asset Description

The system is a fully developed public water supply system with reservoir storage. Water is pumped from two bore holes with a maximum yield of 160 m^3/day to a chlorine contact tank. From the contact tank, water is pumped to a 230 m^3 reservoir and then gravity fed to the villages. The bore pumps (Grundfos SP8a-25 and NE62-12-M4-30) can deliver 3.38 and 2.5 l/s and the supply pumps (Make: Lowara, SV 3304/2F75, 7.5kw) can deliver up to 7.6 l/s. The rising main consists of a 150 mm diameter PVC line while the distribution lines are 100 mm reducing to 40 mm diameter cast iron, PVC, and asbestos lines. See plan and schematic on page 5 and 6).

The following table provides the most recent asset replacement value (2019/20):

Scheme	Atiamuri
Reticulation Replacement Cost	$ 521,036.39
Water Source, Treatment, Replacement Cost	$ 537,750.37
Total	$ 1,058,786.76

Asset Condition

There are no major issues reported with network leaks / breakages, however much of the network network has reached or will reach estimated useful life during the next 30 years. The reservoir and contact will both be structurally assessed during the upcoming LTP to determine a maintenance or renewal plan.

Asset Capacity/Performance

(a) Capacity

A summary of the water demand and supply capacity for the scheme is given below:

Scheme	Atiamuri
Total rateable properties as of June 2020,	75
Total connected properties as of June 2020	72
Average Day Water Demand (last 5 years), m^3/day	69*
Peak Month Water Demand (last 5 years), m^3/day	~460*
Resource Consent, m^3/day	225
Supply Capacity, m^3/day	160
Reservoir Capacity, m^3	230

*There has been some flow meter issues over the past 5 years.

The Hydro Village was designed for one dwelling per lot and the water supply system can supply the village plus 30 houses, the school and the Dam located outside the village. No spare capacity exists for future development and no provision has been made for infill houses.

(b) Reliability

There are very few shutdowns and the systems are generally reliable.

(c) Water Quality

- The water supply has no official P2 determinands but it is being monitored in reticulation for Arsenic, which is below 50 % of MAV (MAV for arsenic is 0.010 ppm).
- The minimum chlorine contact time is adequate.
- The supply has in the past met the requirements of section 10 of the drinking water standards however provision of a protozoa barrier is recommended.

(d) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

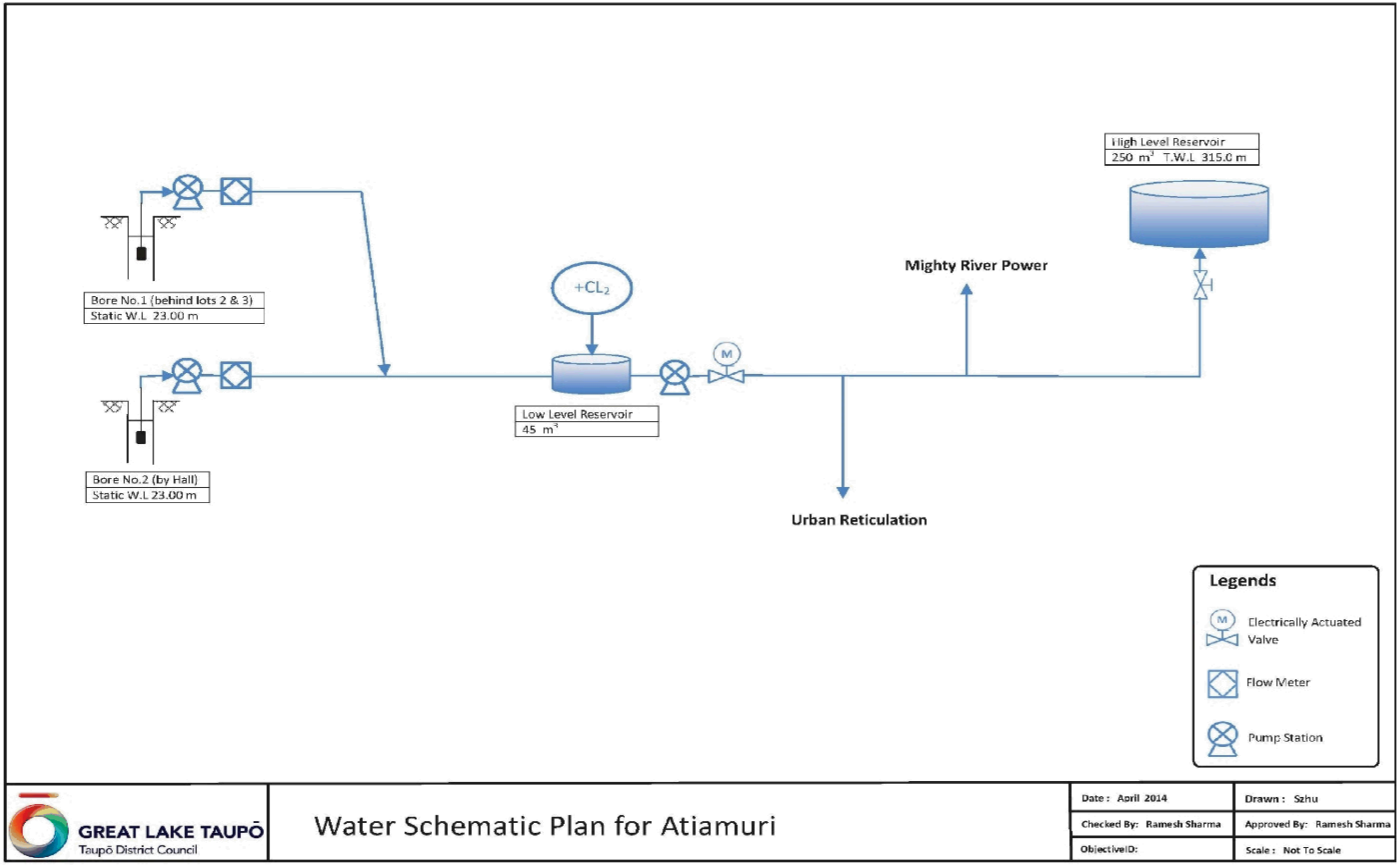
Renewal Plan

The water supply was upgraded to Taupō District Council standards in 1992 when the water supply was taken over by the Council from MRP. The pump station was taken over, and the rising main and reservoir added. Old high lift pumps have been replaced during 2011. Pipeline renewals will be completed over the coming LTP period.

Development Plan

The following capital works projects are planned for Atiamuri.

Project	Description	Timing	Value
Atiamuri Water Reservoir Renewals	Renewal of concrete reservoir and concrete contact tank. Replace at 75 years old = 2033/34 330k	2033/34	$330,000
Atiamuri Water DWSNZ Bore Head Upgrade	Bore head upgrade at Atiamuri bores as required by DWSNZ and Water Safety Plans	2021/22	$20,000


High Level Reservoir
250 m³ T.W.L 315.0 m
Mighty River Power
+CL₂
Bore No.1 (behind lots 2 & 3)
Static W.L 23.00 m
M
Low Level Reservoir
45 m³
Bore No.2 (by Hall)
Static W.L 23.00 m
Urban Reticulation
Legends
Electrically Actuated Valve
Flow Meter
Pump Station
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Atiamuri
Date : April 2014
Drawn : Szhu
Checked By: Ramesh Sharma
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

GREAT LAKE TAUPŌ
Taupō District Council

Water Service Area - Atiamuri Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	5/10/2020
TRACED		
APPROVED		

N W E S

0 100 200 Metres

NZTM 2000 Scale (A3) - 1:4,000

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Appendix C
Bonshaw Park Scheme

BONSHAW PARK SCHEME

Background

Bonshaw Park is a 'lifestyle', rural residential development. The subdivision started in 1987 and successive stages were added in 1990 and 1993. The Bonshaw Farm-let Water Supply is a rural supply and was constituted by Council on 30/10/1990.

The water supply area encloses the full development comprising rural residential farm-let lots covering a total area of 320 hectares. Section 2.4.4 of the District Plan provide for the minimum areas, subdivision and land use for which the development had been designed. In-filling or additional lots have not been provided for in the development plans.

The Bonshaw Park water supply is a restricted, metered rural water supply and consumers are required to provide 24 hours on-farm storage. The water supply is from a council operated and maintained bore supply.

The Legal description of the intake is given as Lot 75, DPS 39535, Pt Tauhara Middle 4A2B2B Blk, Blks VII and VIII, Tauhara SD.

Asset Description

The system consists of a bore field, a contact tank, a pump station and a reticulation system. Originally, three bores where developed to supply water to the community. One bore has failed and there are now two bores in operation; one of 150 mm and one 100 mm diameter. A new bore has been drilled but due to low output and quality it will remain offline except for emergency supply.

All customers are required to provide their own 24 hours storage capacity and all supply points are metered, restricted with twin non-return backflow preventer valves. Treatment is by means of chlorine gas only.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Bonshaw Park
Reticulation Replacement Cost	$ 444,759.47
Water Source, Treatment	$ 517,167.05
Total	$ 961,926.52

Asset Condition

The scheme was built between 1987 and 1993. Due to geothermal ground the bore water is hot and the bores and distribution network life is comparatively less than other schemes. Approximately 1/3 of the pipe network was renewed in 2020 due to repeated failures of the pipelines.

Original three bores existed. The 'right of way bore' dried up and the replacement bore was also dry. A second bore 'roadside bore' is in decline. Attempts to find a new bore water supply have included drilling of a bore Caroline Drive, which after several attempts established enough flow of water but high arsenic at 8 times the maximum allowable value and hence was abandoned. Another bore was drilled at Bonshaw Park closer to Michaels Way which also showed high arsenic and was abandoned.

A final bore was drilled near the original 'right of way' bore and a cold low arsenic water source has been found. The volume of production appears low however the bore has been developed to act as a backup if required.

Asset Capacity/Performance

The Right of Way bore was re-drilled in 1999 but is only capable of producing 20 L/min so is no longer operating. Of the remaining bores, one operates well, and the second bore is operating but in declining performance. Only one bore is needed over the winter but over summer both of the remaining bores operate. Therefore, there is no redundancy in the system in case of bore or pumps failure and if continued decline in bores draw down capacity occurs the peak summer capacity will not be able to be met.

There are three pumps in the pump station each capable of pumping 120 L/min. The capacity of the contact tank is 23 m^3 and the reticulation system consists of 100 mm diameter mains reducing down to 40 mm diameter pipes.

The installed plant can supply the specific requirement to all the lots in the present planning period. If all lots are developed to their full potential and demand their full water supply entitlement, a new supply will be required to meet the demand. The pump stations can meet the full development demand with two pumps on duty 84% of the day.

Peak demand has gradually risen to nearly 4,500 m^3 per month. The average 24-hour pump rate would be 104 LPM. The capacity of the pump station is 150 LPM. The properties have only one dwelling, although ultimately around two dwellings per lot can be permitted.

(a) Capacity

A summary of the water demand and supply capacity for the scheme is given below:

Scheme	Bonshaw Park
Total rateable properties as of June 2020	69
Total connected properties as of June 2020	69
Average Day Water Demand (last 5 years), m^3/day	114
Peak Day Water Demand (last 5 years), m^3/day	694
Resource Consent, m^3/day	245

A summary of the supply capacity and demand have been included in the previous table. The following chart provides a historical water flow volumes and number of connected properties:

Firefighting capacity is not provided to this rural scheme.

(b) Water Quality

The water supply does not comply with the DWSNZ. The water supply has no official P2 determinants; however, arsenic is elevated, and treatment will be required to meet the drinking water standards.

The bore water temperature is warm and is being stored in the reservoir at the treatment plant as well as being a rural supply; every dwelling also has a 24 hours storage capacity. The minimum chlorine contact time is adequate.

Upgrade of the water treatment plant would be required before the water supply could comply with the provisions of this standard.

(c) Water Pressure

The scheme is rural with restricted trickle feed supply; this requires every property to have onsite storage. Water pressure is adequate to supply the storage tanks on each farm/ property.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

LTP Capex projects related to Bonshaw park are summarised below:

Project	Description	Timing	Value
Bonshaw Park DWSNZ Project	Connection of Bonshaw Park to the Taupo water supply	2021/23	$ 2,300,000

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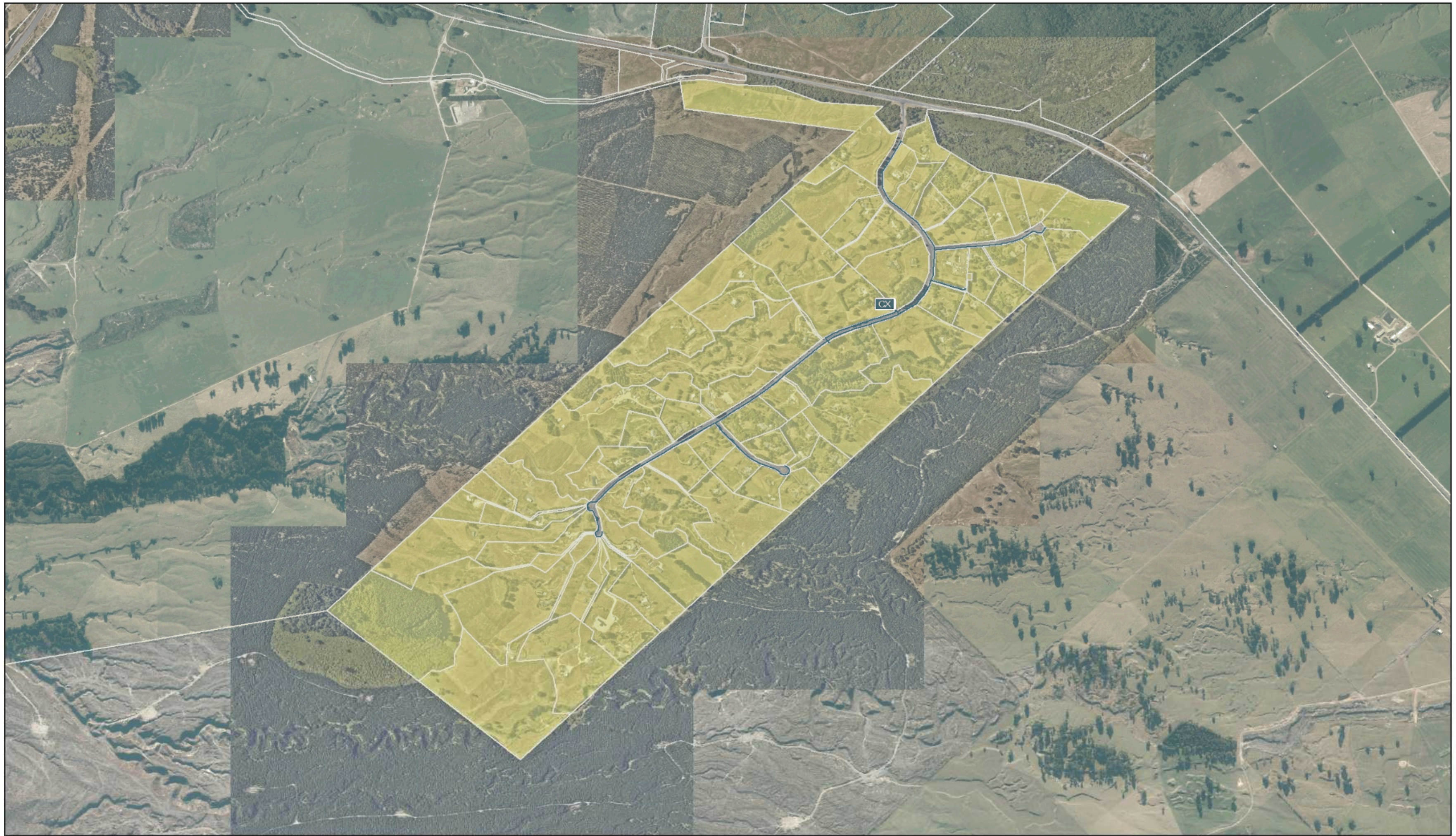
Taupō District Council



Water Service Area - Bonshaw Park Scheme		INITIAL	DATE
	SURVEYED		
	DESIGNED		
	DRAWN	JK	5/10/2020
	TRACED		
	APPROVED		

GREAT LAKE TAUPŌ
Taupō District Council

N W E S

0 500 1,000 Metres

NZTM 2000 Scale (A3) - 1:15,000

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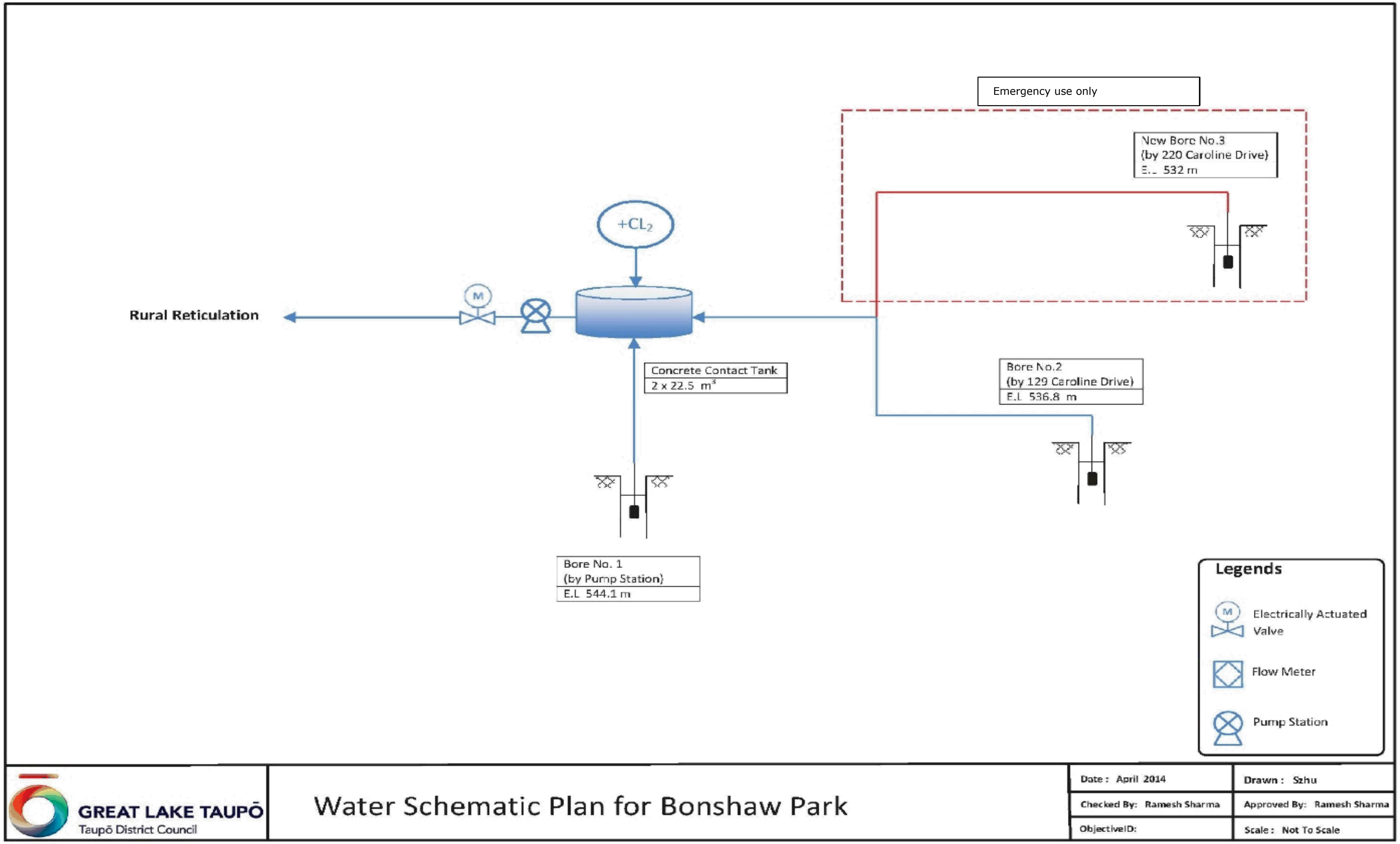
Emergency use only
New Bore No.3
(by 220 Caroline Drive)
E.L 532 m
+CL2
Rural Reticulation
M
Concrete Contact Tank
2 x 22.5 m3
Bore No.2
(by 129 Caroline Drive)
E.L 536.8 m
Bore No. 1
(by Pump Station)
E.L 544.1 m
Legends
Electrically Actuated Valve
Flow Meter
Pump Station
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Bonshaw Park
Date : April 2014
Drawn : Szhu
Checked By: Ramesh Sharma
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix D
Centennial Drive Scheme

CENTENNIAL DRIVE SCHEME

Background

The Centennial Drive Supply (sourced from the Waikato River) services industrial properties, sports fields, pool complexes and a golf course.

The original bore supply was constructed in 1980 while the reticulation was extended, and timber tank reservoirs were installed in 1982. A supply from the Waikato River was installed in 1986.

In 2012 TDC abandoned the bore supply in favour of the Waikato river supply. The bores required significant maintenance expenditure, and the resource consent was also due for renewal. Overall, the benefit of keeping the bores was not justified when the river supply had ample capacity to meet full and future demands.

An intake structure (opposite Huka Lodge) and filter chamber was built to minimise profile and impact in the scenic reserve land administered by the Department of Conservation. The submerged pumps suck the water through screens on the intake structure and pump through to a high-level station where there are coarse filters and holding tanks.

The high-level pump station is east of the reserve and accessed across Landcorp farmland from the Landcorp nursery access road. The high lift pump station delivers water to the treatment site where treated and un-treated water is split and distributed to customers.

The resource consent to abstract water from Waikato River is as below:

Period	Abstraction limit	
Nov- Feb	10,000	m^3/day
March- April	7,000	m^3/day
May- Sept	5,000	m^3/day
October	7,000	m^3/day

The legal descriptions of the assets are as follows.

Location	Legal description	Use	Valuation Number
Off Waikato River	Pt Sec 1, Sec 2, Blk XI, XIV and XV Tauhara SD. Map Ref. NZMS1 N94 559414	Water Supply intake	
Aratiatia Rd	SEC 21 BLK XIV TATUA SD	Water supply high lift pump station	738800200
Aratiatia Rd	SEC 14 BLK XIV TATUA SD	Water supply reservoir	738802600
Off Centennial Drive	PT TAUHARA Middle no.1 Blk, Blk XV, Tatau SD and Blk II Tauhara SD. SO 57321, Map ref. NZMS 260 U18:801 778	Water supply intake high lift pump station	738803802

Asset Description

The river water is pumped at the low lift pump station to the high lift station where it passes through a coarse filtration plant and then on to the treatment plant. Three pumps, one capable of pumping 84 m^3/hr and two capable of 108 m^3/hr, are located at the low lift pump station. Two pumps, one capable of pumping 51 m^3/hr and one capable of running 144 m^3/hr are located in the high lift pump station. The rising main is a 200 mm diameter uPVC pipeline.

Raw water from this supply is supplied directly to the bulk water users who do not require treated water and is also supplied to a contact tank where chlorine is added prior to pumping to the industrial area and reservoirs off Aratiatia Road.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Centennial Dr
Reticulation Replacement Cost	$ 3,085,741.04
Water Source, Treatment, Reservoir Related Replacement Cost	$ 2,396,581.89
Total	$ 5,482,322.93

Asset Condition

The system is about 22 years old and an upgrade was completed in 2010 including the river intake, low lift pumps and new filtration system. The Low lift pump number 2 (Aramex KRTD 80-315/552UG-S) was replaced in January 2015 due to some operational issues.

Asset Capacity Performance

(a) Capacity

There is sufficient capacity supplied from the river source to meet the current demand and also to meet the demands of some additional growth.
The following table summarizes the supply and capacity:

Scheme	Centennial Drive
Total rateable properties as of June 2020	70
Total connected properties as of June 2020	70
Average Day Water Demand (last 5 years), m^3/day	430
Peak Day Water Demand (last 5 years), m^3/day	1560
Supply Capacity, m^3/day (at River intake LL pumps)	5100
Supply Capacity, m^3/day (at HL pump station)	3800
Reservoir Capacity, m^3	450

(b) Reliability

If Mighty River Power maintain adequate river flow levels the water supply is adequate. The river supply can be deprived of water if the Waikato River flow is lowered to less than 50 m^3/s. River levels less than 0.3 m above the inlet screen may cause blockages due to algae accumulation on the screens which lowers wet well levels causing the low level cut-out to activate.

The three pump stations and four reservoir sites are monitored by SCADA and telemetry systems, providing base station surveillance for pump operation, power supply, reservoir level, flow, pressure and security.

(c) Water Quality

The water supply does not meet the New Zealand Drinking-Water Standards due to absence of a protozoa barrier and due to the presence of arsenic at levels higher than the MAV (0.010 mg/L). The chlorine contact time to enable bacterial compliance is also insufficient for the closest connections.

(d) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW3 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

A full DWSNZ upgrade is planned for in years 2 – 4 of the LTP. Renewal and upgrade of the treated water reservoirs is planned after the first 10 years and a connection between the Taupo and Centennial schemes is scheduled to be completed by 2036 to improve water supply resilience across the area.

The proposed LTP Capex projects are summarised below:

Project	Description	Timing	Value
Centennial Treated Water DWSNZ Upgrade	New Treatment plant or pipeline to provide DWSNZ compliant water to Centennial Treated scheme users	2022/25	$3,250,000
Centennial Treated Timbertank Reservoir Replacements	Renewal timber tank reservoirs to IL4 structures, and upgrade with additional volume	2033/35	$1,200,000
Taupo to Centennial Treated Connection	Resilience project to connect Taupo and Centennial Schemes	2034/36	$4,000,000

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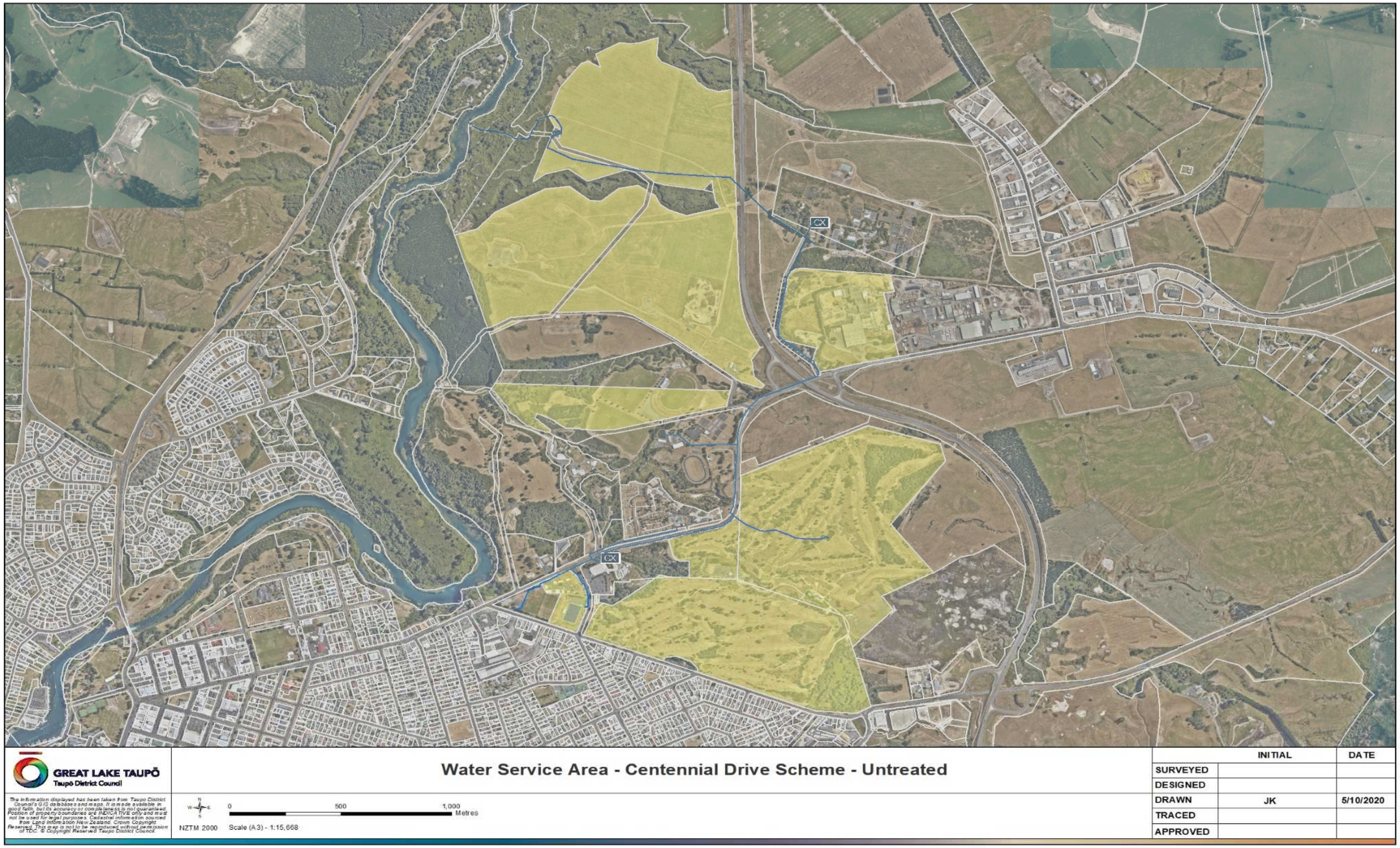
Taupō District Council



GREAT LAKE TAUPŌ
Taupō District Council

GREAT LAKE TAUPŌ
Taupō District Council

Water Service Area - Rakaunui Road Scheme

N W E S

0 500 1,000 Metres

NZTM 2000 Scale (A3) - 1:15,000

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	5/10/2020
TRACED		
APPROVED		

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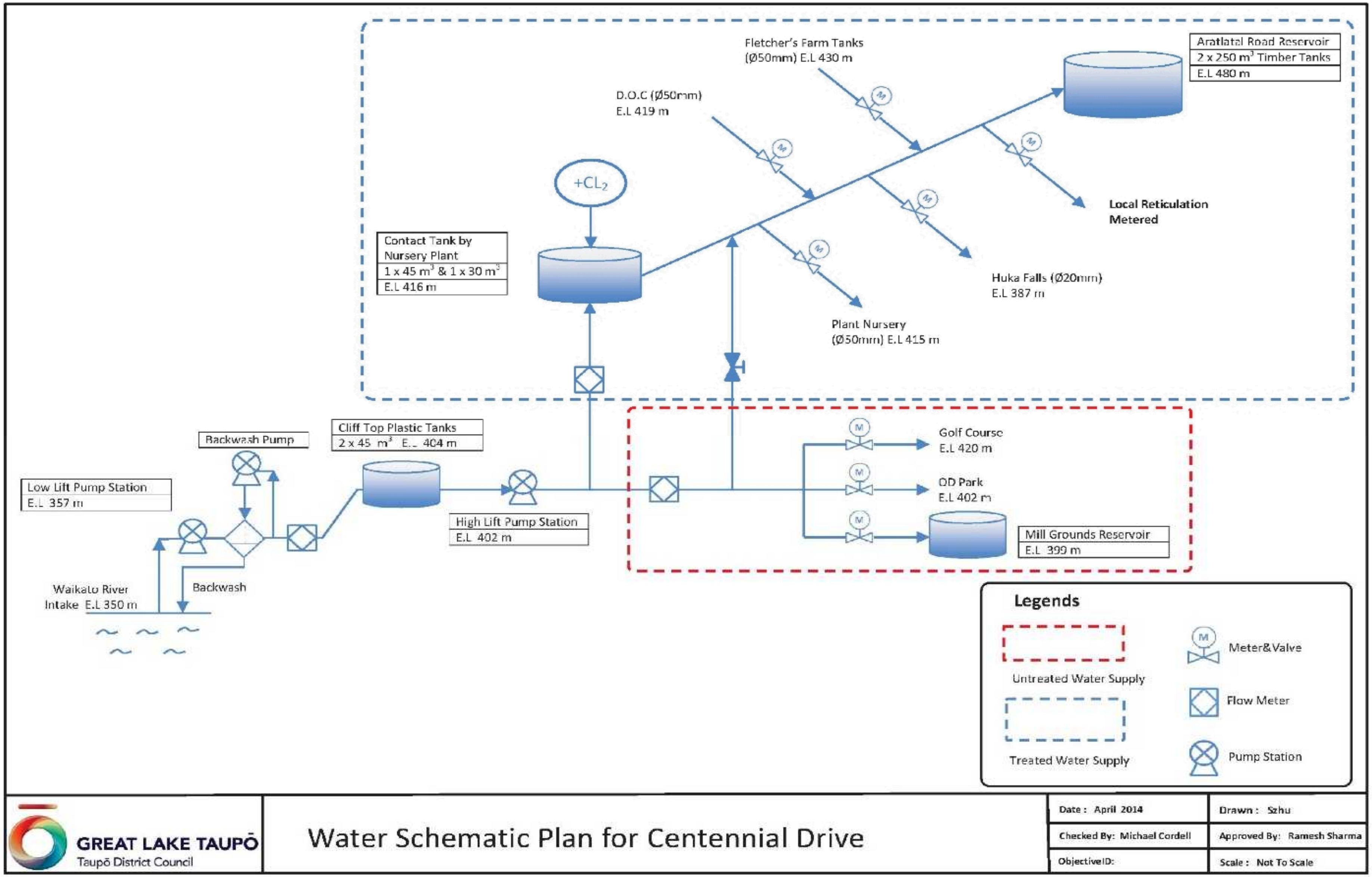
Fletcher's Farm Tanks
(Ø50mm) E.L 430 m
Aratiatia Road Reservoir
2 x 250 m³ Timber Tanks
E.L 480 m
D.O.C (Ø50mm)
E.L 419 m
+CL2
Local Reticulation
Metered
Contact Tank by
Nursery Plant
1 x 45 m³ & 1 x 30 m³
E.L 416 m
Huka Falls (Ø20mm)
E.L 387 m
Plant Nursery
(Ø50mm) E.L 415 m
Backwash Pump
Cliff Top Plastic Tanks
2 x 45 m³ E.L 404 m
Golf Course
E.L 420 m
Low Lift Pump Station
E.L 357 m
OD Park
E.L 402 m
High Lift Pump Station
E.L 402 m
Mill Grounds Reservoir
E.L 399 m
Waikato River
Intake E.L 350 m
Backwash
Legends
Meter&Valve
Untreated Water Supply
Flow Meter
Treated Water Supply
Pump Station
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Centennial Drive
Date : April 2014
Drawn : Szhu
Checked By: Michael Cordell
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix E
Hatepe Scheme

HATEPE SCHEME

Background

The water supply system was constituted by Council on 31/8/83 and serves residential dwellings. Most lots are now occupied but the type of dwelling varies from small holiday baches to full sized residential houses. The Community hall which can accommodate 40 visitors a day is the only other non-residential building in the town.

The water intake is in shallow water and the inflow can be contaminated by sediment and organic matter from the Hinemaiaia Stream or stirred by the prevailing southwest winds. Some property occupiers are paying a water supply improvement loan rate, as well as the UA rate and land lease rates to the owners.

The legal description of the pumps station in Rapera Road is given as Lot 72 DPS 12698 BLK I Waitahanui SD and the valuation number is 740111200.

Asset Description

The water supply system supplies an urban area and consists of a 3.5 L/s and a 7.7 L/s pumps. Each may pump water via a rising-falling main (100 mm /150 mm diameter) to 6 off 22.5 m^3 fibre glass and plastic tanks. The intake is a 168-metre long 150 mm diameter pipeline. The distribution network consists of 100 mm diameter fire mains and 50- or 40-mm rider mains. Treatment consists of filtering through a 80 μ (micron) filter and sterilisation with chlorine gas. (See Schematic Page 6).

A chlorine contact tank was added in 2017.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Hatepe
Reticulation Replacement Cost	$ 513,827.15
Water Source, Treatment, Replacement Cost	$ 484,771.38
Total	$ 998,598.53

Asset Condition

The system is ageing but is still in operational condition. Water reservoir tanks that were in poor condition have recently been replaced.

Asset Capacity/Performance

(a) Capacity

The installed plant can supply the area of benefit with domestic requirements all year.

The system demand and capacity are given below:

Scheme	Hatepe
Total rateable properties as of June 2020	107
Total connected properties as of June 2020	106
Average Day Water Demand (last 5 years), m^3/day	*71
Peak Day Water Demand (last 5 years), m^3/day	*282
Resource Consent, m^3/day	440
Supply Capacity, m^3/day	660
Reservoir Capacity, m^3	180

*There have been some flow meter problems over the past few years and data accuracy is not robust.

(b) Reliability

The intake screen and pipe are in shallow water and problems can develop because of air entrapment and sedimentation. The source water is also prone to algal bloom and high turbidity. A project to investigate an alternative source, rather than the shallow lake intake was completed. The shallow bores developed tested above the MAV for various metals. The focus has now moved to a treatment solution using the existing source water.

(c) Water Quality

The water quality does not meet the DWSNZ for protozoa or chemical (arsenic) compliance.

(d) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The major plan for development is the construction of a new treatment plant to provide full DWSNZ compliance. This LTP Capex project is summarised below:

Project	Description	Timing	Value
Hatepe water DWSNZ Upgrade	New Treatment plant to meet DWSNZ including new plant location and associated infrastructure.	2022/24	$ 2,700,000

GREAT LAKE TAUPŌ
Taupō District Council

GREAT LAKE TAUPŌ
Taupō District Council

Water Service Area - Hatepe Scheme

N W E S

0 100 200 Metres

NZTM 2000 Scale (A3) - 1:3,000

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	5/10/2020
TRACED		
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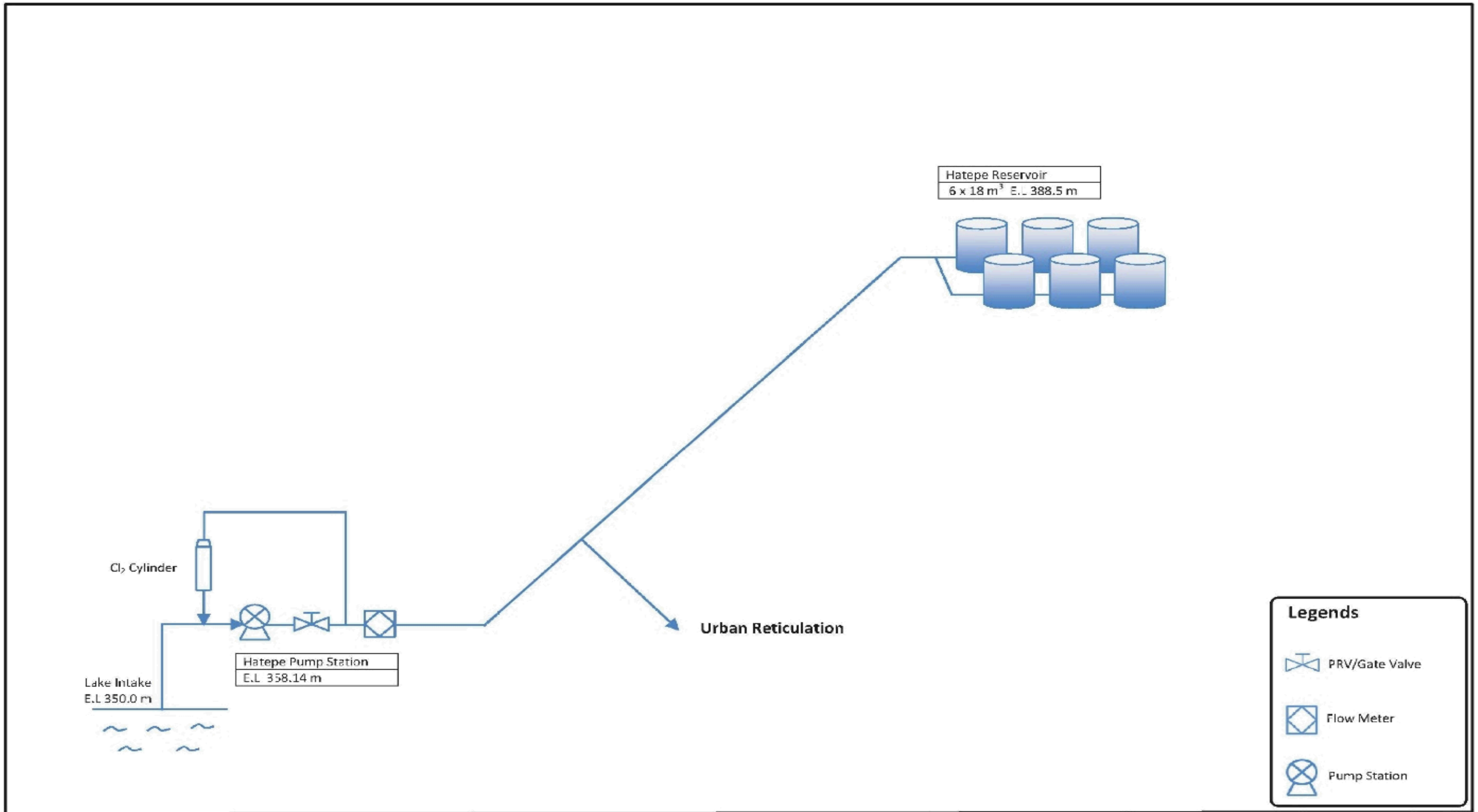


GREAT LAKE TAUPŌ Taupō District Council	Water Schematic Plan for Hatepe	Date: April 2014	Drawn: Szhu
		Checked By: Ramesh Sharma	Approved By: Ramesh Sharma
		ObjectiveID:	Scale: Not To Scale

Appendix F
Kinloch/Whakaroa Scheme

KINLOCH SCHEME

Background

Kinloch village is about 40 kilometres from Taupō, with about 50 % permanent residents. The long-term development of the Kinloch basin provides for development right up to Whangamata Road and from the eastern ridgeline to the western foothills, as per the Kinloch Structure Plan. The density of development will vary but it is planned that the majority will have reticulated water and wastewater.

The Whakaroa rural water supply has purchased an entitlement from the Kinloch water supply scheme and pumps from the current Kinloch low zone reservoir to supply farms on the high lands in the east.

Each farmer made capital contributions to the scheme in proportion to their required quantity over 24 hours. Since the scheme was commissioned, considerable subdivision has been carried out to convert the 16 farms to the current 64 properties. The scheme is designed to service 3393-hectare farming land at 128 L/ha/d.

The Lake shoreline is exposed and the Whangamata Stream drains agriculturally farmed land. Natural events can result in deterioration In source water.

The legal description of the intake is given as Esplanade Reserve, DPS 14561, Whangamata No 3 and 4 Taupō District Council. Map reference is NZMS 260T18:645 776.

Asset Description

A 40-metre-long 300 mm diameter pipe serves as the intake in Lake Taupō. Two pumps capable of delivering 26 L/s individually pump water to a 450 m^3 reservoir via a 150 mm diameter rising main.

The distribution network consists of trunk mains and smaller mains ranging in size from 150 mm to 32 mm rider mains. The Locheagles pump station draws from within the distribution network and lifts water into the Kinloch high zone. A 2,000m3 reservoir sits at the top of this zone at RL 502m.

Chlorine gas is used for sterilising the water. Water is also pumped, from the reservoir, at a maximum daily average rate of 5.5 L/s, to the Whakaroa Water Supply system. (See schematic page 5 & 6).

The Whakaroa rural water supply scheme is supplied from the Kinloch Low Zone Reservoir located at elevation 434 m above MSL. The water is pumped from the reservoir up an 80 mm diameter rising main to the low-level reservoir at level 638 m MSL. From there the high-level pump station pumps the water to the high-level reservoir at level 721 m MSL. The gravity main distributes the supply through the reticulation and utilises 3 Council owned reservoirs and 13 privately owned reservoirs. Three pressure reducing valves on lateral mains ensure that pressures are not excessive. Each farm connection is metered and is a 24-hour restricted supply with non-return valves in accordance with the Water Supply Protection Regulations. Each farm is required to have 24 hours storage.

The farmland is very undulating and the supply has been affected by pump breakdown, power outages, air locks, pipe fractures, relay pump stoppages and supply limitations during high demand.

The Whakaroa reservoirs each have a capacity of 22 m^3. The low-level pumps comprise one pump of 2.7 L/s and two pumps of 6 L/s capacity. Each high-level pump also pumps 4.0 L/s (combined 7.0 L/s). The reticulation storage reservoirs E, D and B have capacities of 22, 22, 13.6 m^3 respectively.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Kinloch/Whakaroa
Reticulation Replacement Cost	$ 10,599,350.73
Water Source, Treatment Replacement Cost	$ 1,776,952.97
Total	$ 12,376,303.70

Asset Condition

The network is a mix of newly installed pipe and old ageing assets. Pipeline renewals are expected over the LTP period. The DWSNZ project includes review of the entire reticulation network and will result in some pipelines being renewed, upgraded and abandoned.

The existing low zone reservoir will be structurally assessed in year 1 to confirm the appropriate maintenance or renewal plan.

Asset Capacity/Performance

(a) Capacity

A summary of the consumption and supply capacity are tabulated below:

Scheme	Kinloch
Total rateable properties as of June 2020	1,282
Total connected properties as of June 2020	1,051
Average Day Water Demand (last 5 years), m^3/day	952
Peak Month Water Demand (last 5 years), m^3/day	2,053
Peak Day Water Demand (last 5 years), m^3/day	2,200+
Resource Consent, m^3/day	2,168
Supply Capacity, m^3/day	2,592
Reservoir Capacity, m^3	2,000m3 450m3 + Whakaroa

* There are known flow meter problems with the Kinloch intake flow meter and therefore the peak day volumes are approximated.

Volume used includes Whakaroa rural area which used approximately 250 m^3/day on average.

(b) Water Quality

The water supply doesn't meet the DWSNZ.

Bacterial compliance is sometimes achieved but the absence of solids removal processes means consistent compliance is difficult. Protozoa and chemical (arsenic) compliance are not achieved. Continuous turbidity monitoring is installed.

(c) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Whakaroa is a rural agricultural supply and the system was not designed to meet firefighting requirements. Every property is expected to have onsite storage to meet fire flow demands.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

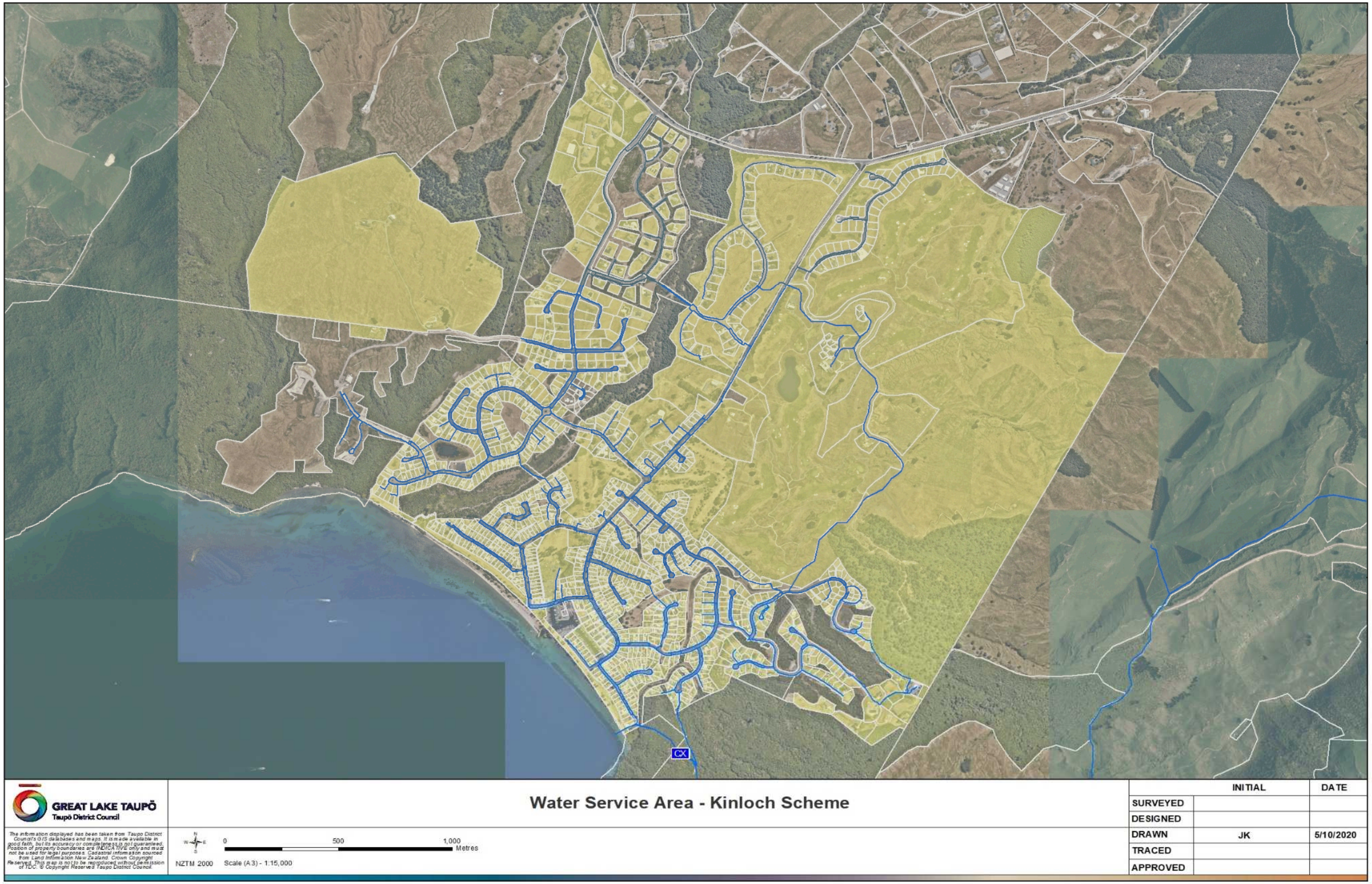
Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

Additional infrastructure is required to meet the growth in the area. Future planning includes an additional water storage reservoir in the low zone, new intake pump station, rising mains and water treatment plant to meet full compliance with the DWSNZ.

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Kinloch water DWSNZ upgrade	New Treatment plant to meet DWSNZ. New intake, pump station, pipelines and network renewals.	2021/23	$5,200,000
Kinloch Low Zone Reservoir Land Purchase	Purchase of land for the new 2,000m3 Kinloch low Zone water storage reservoir	2021/22	$550,000
Kinloch Low Zone Reservoir Construction	New 2ML reservoir construction, decommission old reservoir and construction of pump tank to feed Whakaroa scheme	2021/24	$4,680,000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Taupō District Council
Water Service Area - Kinloch Scheme
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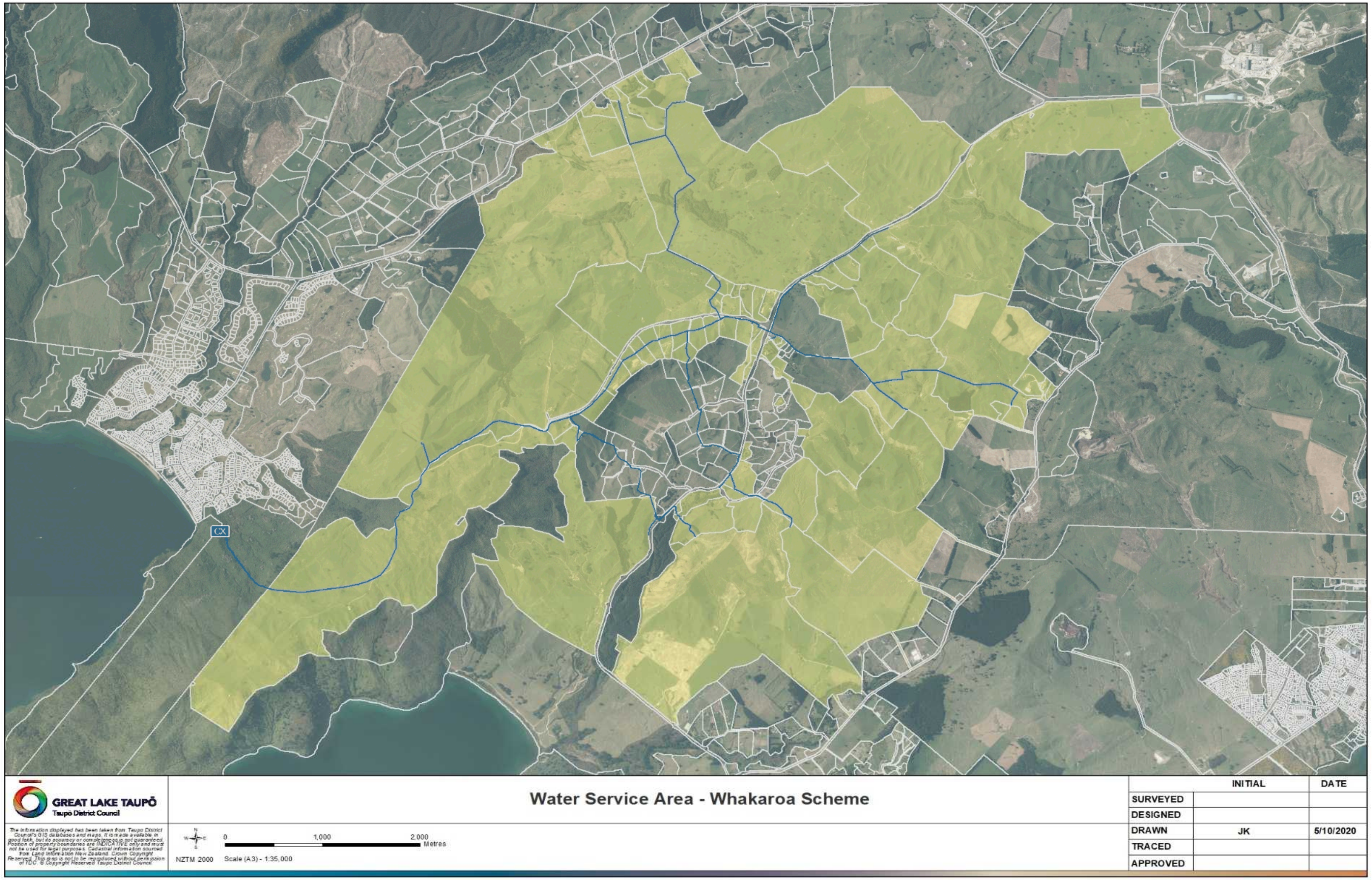
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Taupō District Council
Water Service Area - Whakaroa Scheme
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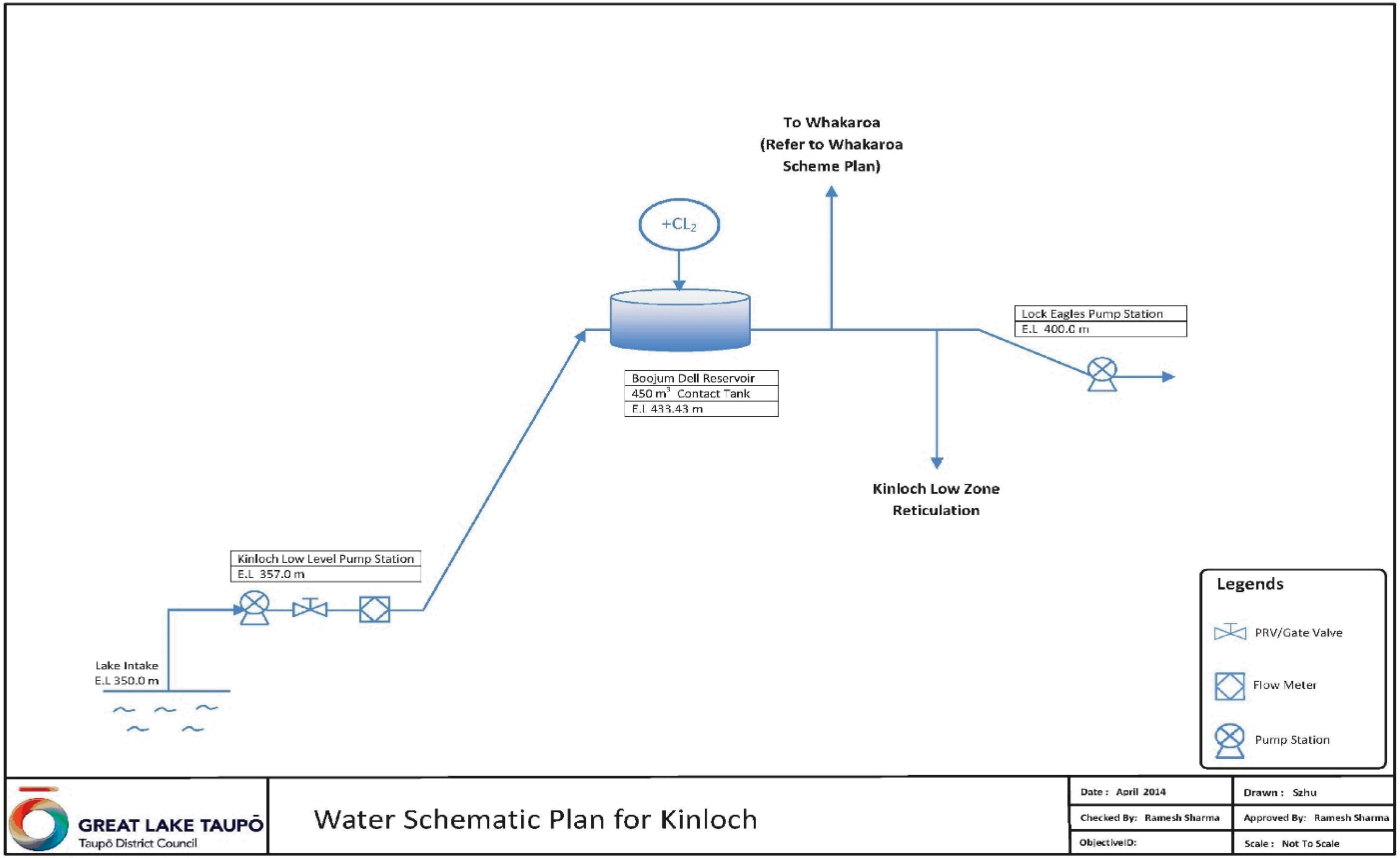
To Whakaroa
(Refer to Whakaroa
Scheme Plan)
+CL2
Boojum Dell Reservoir
450 m3 Contact Tank
E.L 433.43 m
Lock Eagles Pump Station
E.L 400.0 m
Kinloch Low Zone
Reticulation
Kinloch Low Level Pump Station
E.L 357.0 m
Lake Intake
E.L 350.0 m
Legends
PRV/Gate Valve
Flow Meter
Pump Station
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Kinloch
Date : April 2014
Drawn : Szhu
Checked By: Ramesh Sharma
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix G
Mangakino Scheme

Mangakino Scheme

Background

The Mangakino water supply system provides connections to 765 lots; however only 706 are connected. Some rural properties, covering 465 hectares, are supplied from this urban water supply system. Between 1965 and 1995 the supply to Mangakino was the subject of a Crown/Taupō County agreement which allowed for 109 m^3/hr supplied to Mangakino at no cost. In 1995 a new agreement has resulted in Taupō District Council responsible for all equipment and costs for the pumping and supply to Mangakino. Mercury still own the pump station but Taupō District Council is responsible for the pumps, treatment equipment and the necessary electrical equipment. When the Council assigned responsibility for the township, provision was made for an additional supply from Maraetai II up to 218 m^3/hr.

The source of the water is an underground spring at the Maraetai II Power Station. Permission for access across the power station floor has to be obtained from the Mercury Control room. The water pumped to the two Mangakino Reservoirs from which it is gravity fed to the township.

Chlorine is dosed at the reservoir site to provide adequate contact time for disinfection. The capacity of the reservoirs is approximately 2,160 m^3. The two intake pumps operate on a duty/standby basis and a chlorinator system is installed. There is a water meter at the inlet to the reservoir and a pH, chlorine and turbidity meters have been installed to continuously record the quality of the water. UV disinfection has also been installed and the water supply now has the ability to meet the DWSNZ.

Restricted rural connections at Rangatira Drive, for small adjoining farms covering an area of 365 hectares, draw water from the system at a flow rate of 90 m^3/day. The reticulation system comprises 150 mm and 100 mm AC mains and galvanized wrought iron (GWI) rider mains. Some of the reticulation has few connections, particularly where industries had closed and as such the reticulation is oversized in some areas.

At the peripheries of the system, which formerly served the properties, some sections of concrete lined and unlined steel pipe can be found.

The legal description of the intake and water reservoir at 30 State Highway is given as PT Poukani BLK II, Whakama SD. The property is leased. Map reference NZMS 260 T16: 498 131. (Source of information from W30 0005.001)

Asset Description

The source of the water is an underground spring at the Maraetai II Power station.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Mangakino
Reticulation Replacement Cost	$ 886,041.41
Water Source, Treatment Replacement Cost	$ 1,798,772.93
Total	$ 2,684,814.34

Asset Condition

The intake pump station is in good condition with electrical renewals in planning. The rising main to the treatment plant is in poor condition and is scheduled for renewal during the upcoming LTP. The treatment works is in good condition. The reservoirs will be structurally assessed in year 1 to confirm a maintenance or renewal/replacement plan. The reticulation is generally ageing, and considerable renewals can be expected through the LTP period.

Asset Capacity/Performance

(a) Capacity

Generally, the reticulation system is adequate to provide the demands of an expanded system to the end of the former industrial zone.

Scheme	Mangakino
Total rateable properties as of June 2020	765
Total connected properties as of June 2020	706
Average Day Water Demand (last 5 years), m^3/day	484
Peak Month Water Demand (last 5 years), m^3/day	650
Peak Day Water Demand (last 5 years), m^3/day	1,443
Resource Consent, m^3/day	2,000
Supply Capacity, m^3/day	3,200
Reservoir Capacity, m^3	2,000

(b) Water Quality

The water supply has been upgraded to enable compliance with the DWSNZ.

(c) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Mangakino Water Treatment Improvements	Duty/standby chlorine, run to waste and security improvements	2023/24	$75,000
Mangakino Reservoir Renewals	Renewal of Concrete Reservoirs		$2,400,000

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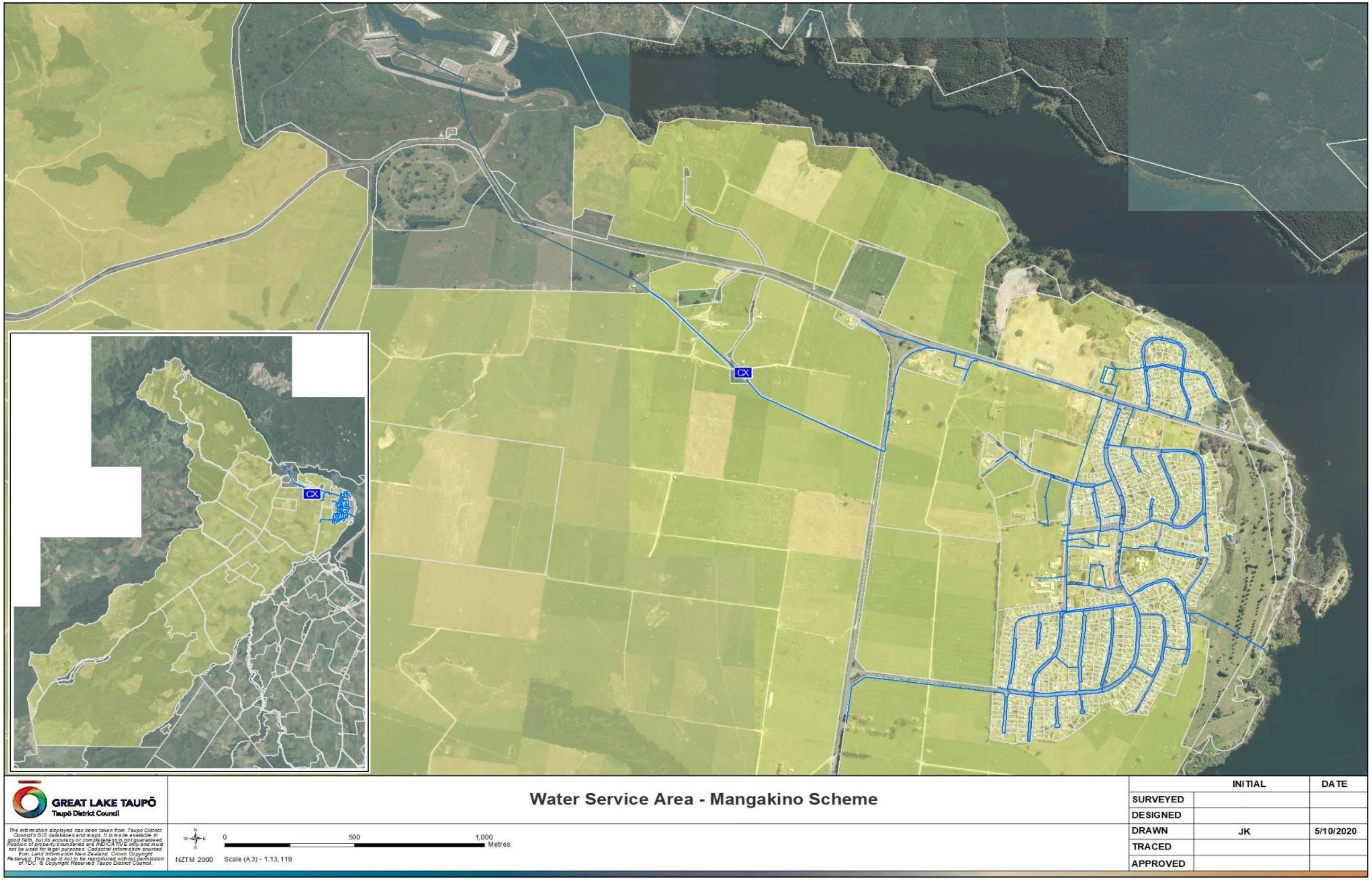
Taupō District Council



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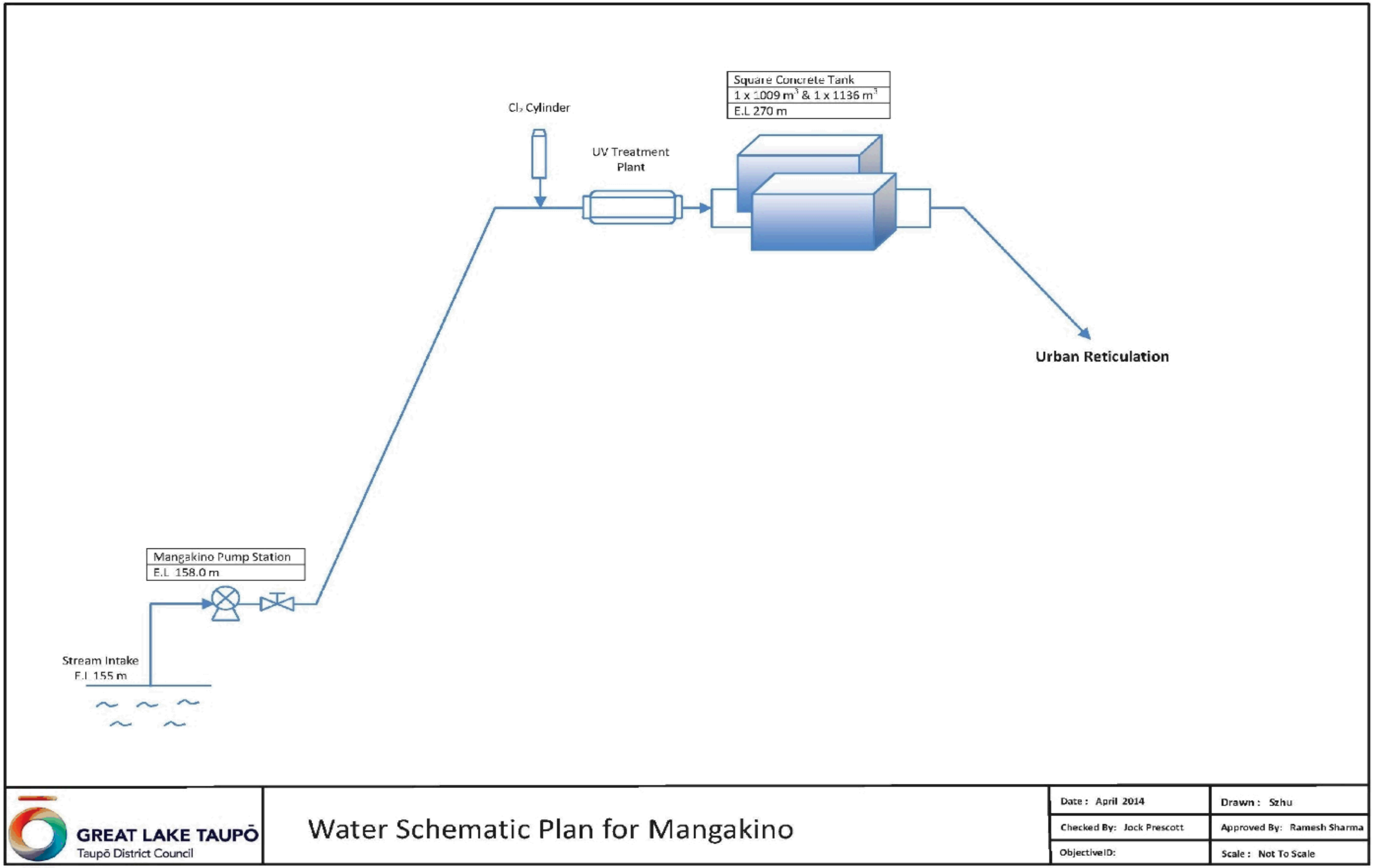
Square Concrete Tank
1 x 1009 m³ & 1 x 1136 m³
E.L 270 m
Cl₂ Cylinder
UV Treatment Plant
Urban Reticulation
Mangakino Pump Station
E.L 158.0 m
Stream Intake
E.L 155 m
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Mangakino
Date : April 2014
Drawn : Szhu
Checked By: Jock Prescott
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix H
Motuoapa Scheme

MOTUOAPA SCHEME

Background

The Motuoapa water supply area was constituted by Council on 08/02/1984 and provides potable water to the newer parts of the urban area. The motor camp and the old village, consisting of 72 lots, situated between Lake Taupō and the west frontage of State Highway 1 are not included in the water supply area. They rely on private bores for water. The service station, motel and properties on the east side of SH1 also receive water from the water supply scheme. The Marina and 2 lots of Maniapoto Street were connected in the last AMP period.

During periods of low lake level, or high wind conditions the water quality can deteriorate. The water intake may stop flowing because of an air lock, the screens become blocked, or organic matter enters through the shallow intake structure. The water supply is basic and prudent management of the intake source structure and risk consideration is necessary to provide a satisfactory and affordable service.

The legal description of the intake is given as SO 53681 (Pt Tauranga Taupō), Blk III, Tokaanu SD. Map reference is NZMS 260 T17:592 491

Asset Description

This urban water supply system consists of two, 11.8 L/s, automatic float operated pumps located in a pump station on the shore of Lake Taupō. A 440-metre-long, 150 mm diameter HDPE pipe serves as an intake in Lake Taupō. The water is pumped to two of 300 m^3 reservoirs via a 300 mm and 150 mm diameter rising/falling pipeline. From the reservoir a 150 mm diameter distribution pipeline connects a reticulation consisting of 100 diameter mains and 40 mm rider mains. The water is filtered through a 50 µ (micron) strainer and sterilised with chlorine gas before distribution. The following table provides the most recent asset replacement value (2019/20):

Scheme	Motuoapa
Reticulation Replacement Cost	$ 2,242,848.43
Water Source, Treatment, Reservoir Related Replacement Cost	$ 779,280.12
Total	$ 3,022,128.55

Asset Condition

The system is in operational condition. Reticulation renewals of asbestos and galvanised pipework will be completed over the coming LTP period. The reservoirs were newly installed in the last AMP.

Asset Capacity/Performance

(a) Capacity

It is noted that the reservoirs have sufficient storage (>24hours) currently but with the potential future connection of lower Motuoapa this may reduce to less than 24 hours at peak times. A summary of water demand and supply capacity is given below:

Scheme	Motuoapa
Total rateable properties as of June 2020	482
Total connected properties as of June 2020	386
Average Day Water Demand (last 5 years), m^3/day	194
Peak Month Water Demand (last 5 years), m^3/day	317
Peak Day Water Demand (last 5 years), m^3/day	760*
Resource Consent, m^3/day	750
Supply Capacity, m^3/day	1,000
Reservoir Capacity, m^3	600

* Data reliability is poor due to flow meter issues.

(b) Reliability

The shallow intake can result in problems due to screen blockages, air entrapment and sedimentation.

(c) Water Quality

The water supply does not meet the DWSNZ. Bacterial compliance is generally achieved, however, protozoa and chemical (arsenic) compliance is not. Continuous turbidity monitoring is installed.

(d) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Motuoapa water DWSNZ upgrade	New treatment plant to meet DWSNZ	2022/24	2,600,000

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Taupō District Council
Water Service Area - Motuoapa Scheme
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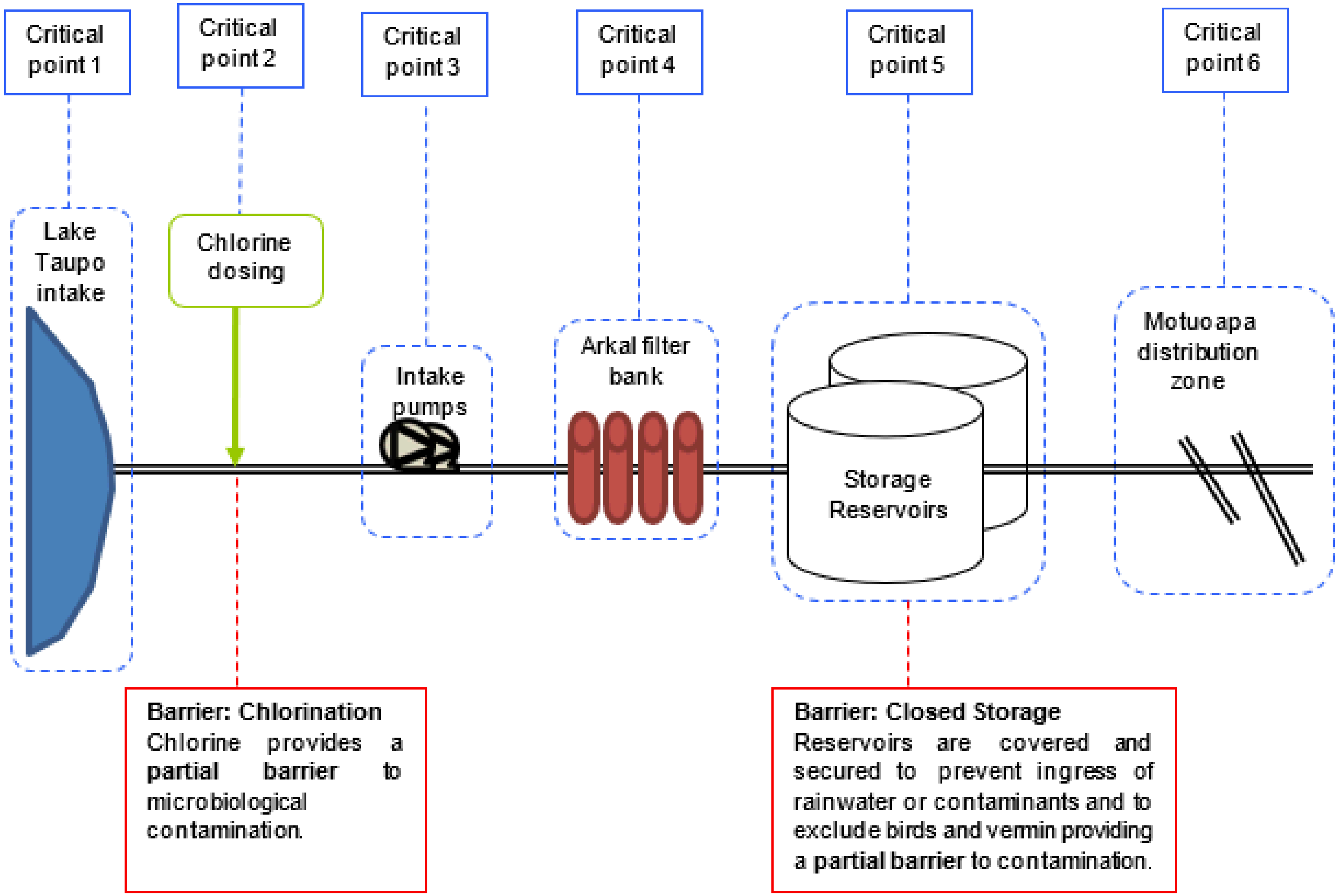

Water Schematic Plan - Motuoapa

Appendix I
Motutere Scheme

MOTUTERE SCHEME

Background

The Motutere water scheme supplies water to the Motutere campground only. Provision of water supply to the campground is a requirement of the lease in place between the campground and TDC.

Asset Description

Water is drawn out of Lake Taupo via a newly installed intake pipeline. A pump station located on the shore delivers water up to two storage tanks behind the campground where it is chlorinated before being gravity feed back into the campground network.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Motutere
Reticulation Replacement Cost ($)	$ 112,670.03
Water Source, Treatment, Replacement Cost ($)	$ 239,327.42
Total	$ 351,997.45

Asset Condition

Asset condition is generally good with the intake replaced during the last LTP period.

Asset Capacity/Performance

(a) Capacity

The capacity of the assets is shown in the following table:

Scheme	Motutere
Total rateable properties as of June 2020	1
Total connected properties as of June 2020	1
Average Day Water Demand (last 5 years), m^3/day	32
Peak Month Water Demand (last 5 years), m^3/day	61.5
Peak Day Water Demand (last 5 years), m^3/day	122
Resource Consent, m^3/day	130
Supply Capacity, m^3/day	150
Reservoir Capacity, m^3	45

(b) Water Quality

The water supply does not meet the DWSNZ however as the scheme only serves the one customer (the campground), it is currently considered a self-supply under the Health Act and compliance is not required. From a water safety perspective, Council treats the scheme no different to any other and attempts to achieve compliance with the DWSNZ. Bacterial compliance is generally achieved, however, protozoa and chemical (arsenic) compliance is not. Continuous turbidity monitoring is installed.

(c) Water Pressure

The reticulation system is generally owned by the campground. Water pressure is governed by the height of the storage tanks.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Motutere Campground DWSNZ Upgrade	New treatment plant to enable protozoal compliance against the DWSNZ	2023/24	$300,000

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Taupō District Council

Water Service Area - Motutere

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Appendix J
Omori Scheme

OMORI SCHEME

Background

The Omori water supply system was upgraded in 1997 to supply the settlements of Pukawa, Omori and Kuratau with water taken from Lake Taupō. The combined settlements of Pukawa, Omori and Kuratau comprise approximately 1200 lots. Land is zoned and available for subdivision and additionallots are expected over the coming years. All existing lots are connected to the water supply.

The 1997 upgrade of the water supply involved combining the Pukawa and Omori-Kuratau supplies, which both had poor quality and inadequate source. The Pukawa and Omori reservoirs were at different levels so Pukawa needed a high zone pump station to supply the higher area and reservoir. A new Lake intake was built with a lake side low level pump station and rising main. Filtration, chlorination and high-level pumping is carried out at the high-level pump station at the Omori depot, Omori road. An additional high zone rising main was built and the Pukawa supply pipe connected.

The legal description is given in the following Table.

Address	Legal Description	Use	Valuation number
Pihanga Rd, Kuratau	Rec Res. Lot 7, DPS 23996, Blk III, Puketi SD.	Water intake	
Omori Rd, Kuratau	SECS 9-12 BLK 11	Water supply depot	743007601
Hauraki Terrace	Lot 214 DP 53105	Water supply pump station	743259058

Asset Description

The supply consists of 110 mm, 150 mm, 200 mm and 250 mm diameter AC, uPVC and grade 40 steel pipes. The low-level pump station has two 180 m^3/hr Dinflow, 30 kW, sump pumps. The 760 m long rising main is 225 mm diameter uPVC pipe. The high-level pump station has 5 banks of 3-80 mm Spin Klin filters, Wallace and Tiernan 4 ppm chlorinators with automatic flow adjustment and a contact tank. The high lift pumps are 2 off Dinflow 125 m^3/hr 37 kW pumps with a 200 mm diameter rising/gravity main interconnected to the existing reticulation. Pukawa has a 150 mm pipe connecting from the Omori gravity main. The Pukawa high zone has a pump station with two booster pumps. A pressure-reducing valve is fitted to the Pukawa 150 mm connecting pipe and the Kuratau low zone area.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Omori/Kuratau/Pukawa
Reticulation Replacement Cost ($)	$ 5,592,395.18
Water Source, Treatment, Replacement Cost ($)	$ 987,126.59
Total	$ 6,579,521.77

Asset Condition

This reticulation system was installed in 1970 and renewals can be expected in the upcoming LTP. The pump stations are new systems and in operational condition. The reservoirs include a timbertank and concrete reservoir which will be structurally assessed in the upcoming LTP to confirm maintenance, renewal or replacement plans.

Asset Capacity/Performance

(a) Capacity

The capacity of the assets is shown in the following table:

Scheme	Omori/Kuratau/Pukawa
Total rateable properties as of June 2020	1,239
Total connected properties as of June 2020	1,192
Average Day Water Demand (last 5 years), m^3/day	448
Peak Month Water Demand (last 5 years), m^3/day	714
Peak Day Water Demand (last 5 years), m^3/day	1,644*
Resource Consent, m^3/day	2,500
Supply Capacity, m^3/day	2,592
Reservoir Capacity, m^3	1,100

* Data reliability is poor due to flow meter issues.

(c) Water Quality

The water supply does not meet the DWSNZ. Bacterial compliance is generally achieved, however, protozoa and chemical (arsenic) compliance is not. Continuous turbidity monitoring is installed.

(c) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Omori water DWSNZ upgrade	New treatment plant at current location, existing intake, PS and main remain.	2021/23	$2,800,000
Omori Water Reservoir Renewals	Renewal of concrete and timbertank reservoirs	2049/51	$1,320,000


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Pukawa
GREAT LAKE TAUPŌ
Taupō District Council
Water Service Area - Omori Scheme
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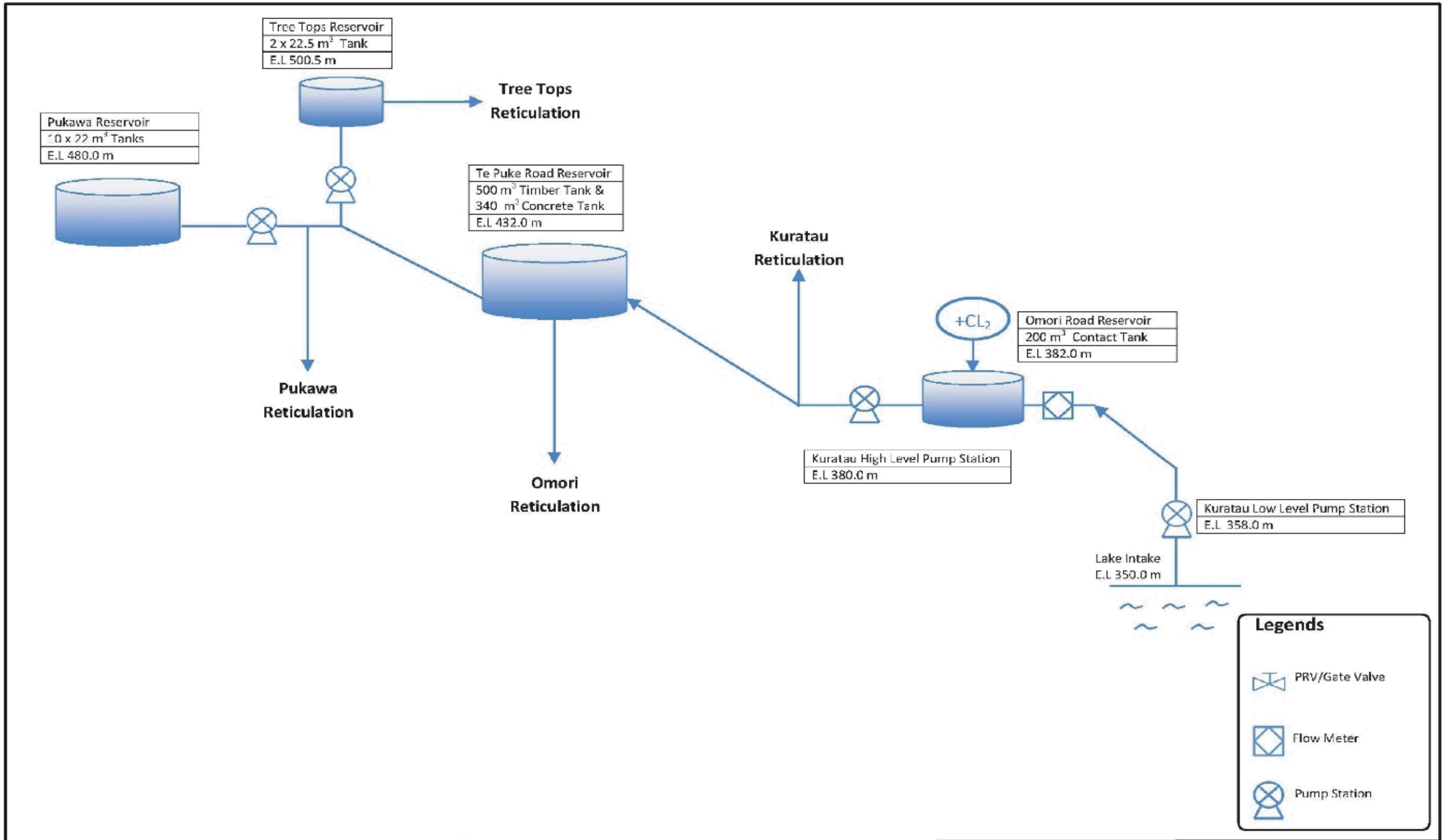


	Water Schematic Plan for Omori		
		Date : April 2014	Drawn : Szhu
		Checked By: Jock Prescott	Approved By: Ramesh Sharma
		ObjectiveID:	Scale : Not To Scale

Appendix K
River Road Scheme

RIVER ROAD SCHEME

Background

The River Road community (situated on the eastern side of the Waikato River about one kilometre off Broadlands Road and 22 kilometres north of Taupō) was first subdivided in 1953. The farmers' share of the capital costs was paid as a once only lump sum contribution and annual operating charges are chargeable by a rate per cubic metre. The urban consumers pay their share of the operating costs as a uniform annual charge. The scale of the capital contributions for the farm-let properties has been determined to range between the one large farm contribution and the urban dwelling charge.

The rural water supply area is served with restricted, metered connections with testable double check backflow preventer valves. Rural consumers are required to have 24 hours on site storage. The urban area demand for irrigation water supply may necessitate upgrade of the reticulation and the future upgrade of the pumps.

The settlement is located on the bank of the Waikato River therefore a limited fire flow of 10 litres/sec is available in the urban area from fire hydrants (sufficient for 90% of dwelling fires). This fire flow does not meet the requirements of the NZ Fire code of Practice SNZ PAS 4509:2008.

The legal description of the water supply pump station in Tiverton Downs Road is given as Lot 1 SD 93/108 and the valuation number is 739039002. The Legal description of the intake is given as Pt Lot 5 DPS 4985 Blk X, XIV Takapau SD. The map reference is NZMS U17:988 821.

Asset Description

Water is supplied through a 100 mm pipe from the Kaiwhitiwhiti Spring. From the spring the main traverses for 1.8 km across farms to feed the Tiverton Downs Road pump station where two pumps each capable of delivering 6.6 L/s are located. At the station the water is sterilised and distributed for a further 3 kilometres in 100 mm reduced to 80 mm to the end of River Road. 40 mm, 32 mm and 25 mm lateral mains supply water to the farm-lets in Tiverton Downs and Broadlands Road. The water is strained at source and sterilised in three 22 m^3 contact tanks before final distribution. All farms are required to have 24 hr on site storage facilities.

The following table provides the most recent asset replacement value (2019/20):

Scheme	River Road
Reticulation Replacement Cost	$ 917,425.77
Water Source, Treatment, Replacement Cost	$ 361,944.05
Total	$ 1,279,369.82

Asset Condition

The scheme was built in 1994. The intake main suffered a number of washouts in 2018/19 and reliance work is still in planning. The treatment plant is in good condition. An additional contact tank/ reservoir was installed in 2018/19.

Capacity/Performance

(a) Capacity

When the scheme was first developed some property owners indiscriminately irrigated their properties. This resulted in low main pipe pressure and poor supply to others. The supply was not built for irrigation. Water demand is now more uniform, and irrigation is carried out under control and with consideration to others.

The scheme capacity is limited to 10 L/s by the 100 mm diameter falling-main between the Kaiwhitiwhiti Spring and the Pump Station. Future development will have to contribute to duplication of the gravity raw water pipeline and resource consent.

The boosting pump was considered necessary to meet fire flows and pressures for urban supply (FW2 Class). There are three storage tanks 22 m^3 each, which act as Chlorine contact tank. Additional storage may be required in future depending upon the quality of source water particularly during high turbidity events. The system is designed to meet the following demands:

Scheme	River Road
Total rateable properties as of June 2020	69
Total connected properties as of June 2020	68
Average Day Water Demand (last 5 years), m^3/day	150
Peak Day Water Demand (last 5 years), m^3/day	363
Resource Consent, m^3/day	600
Supply Capacity, m^3/day	389

System Demand

The water demand has not increased significantly over the recent years. In 1999, a 100 mm diameter falling-main was constructed from Broadlands Road to the River Road urban area to strengthen the 80 mm diameter pipe supply.

The reticulation has been pipe flow analysed and supply capacity is adequate. However, the 100 mm diameter pipe between Tiverton Downs Road and Broadlands Road will have to be duplicated to accommodate further growth. The existing pumps can satisfy demand and the infrastructure is adequate for the current demand. Any additional lots will affect flow and pressure unless the reticulation and pumps are upgraded.

(b) Water Quality

The water supply does not comply with the DWSNZ. Protozoa has not been detected; however, the source is considered unprotected in terms of the DWSNZ and an upgrade of WTP is proposed to meet this standard. This upgrade is being completed utilising water reform funding in 2021/21.

(c) Water Pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

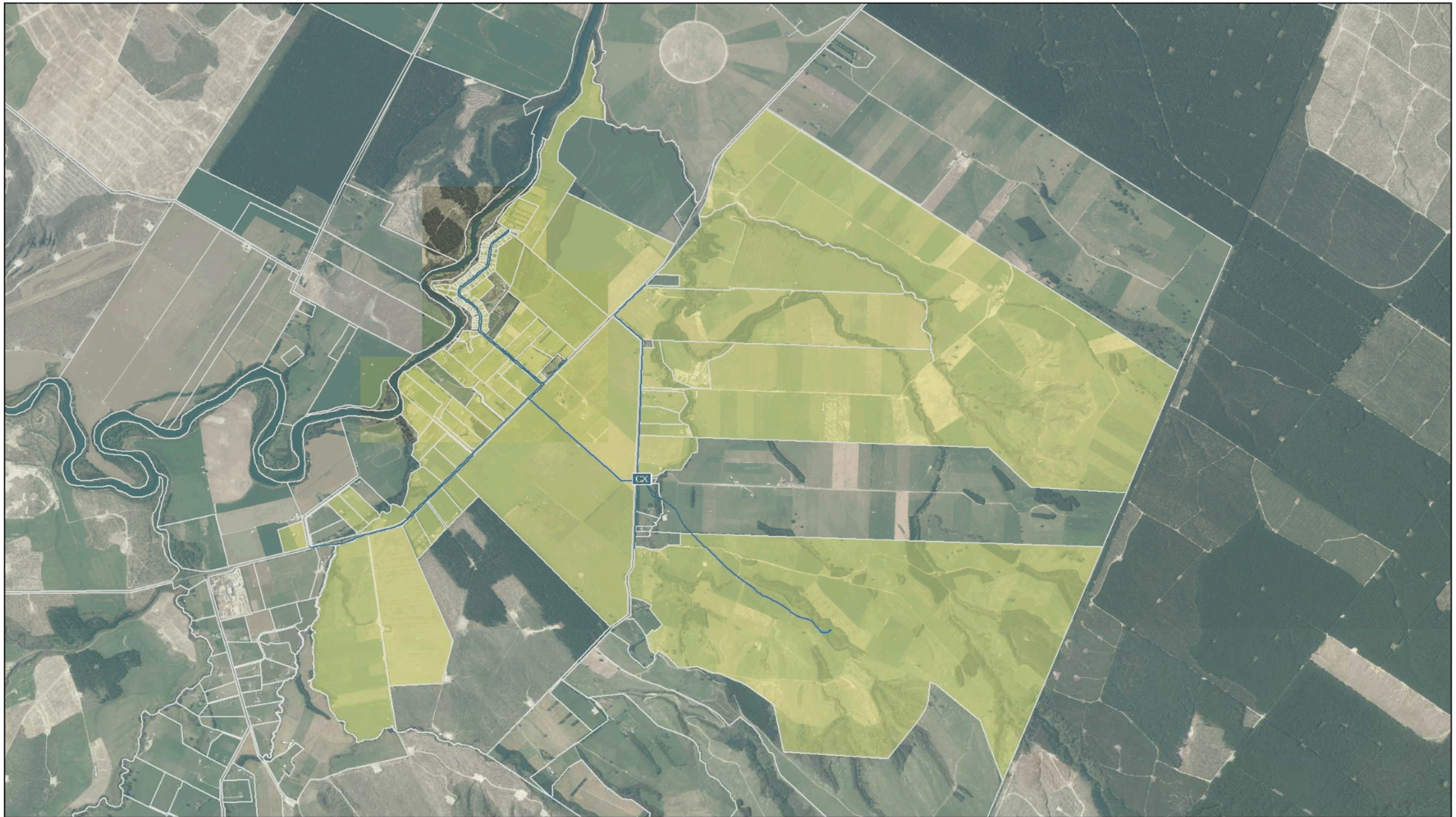
Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

No capex projects are planned for the upcoming LTP.



Water Service Area - River Road Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	5/10/2020
TRACED		
APPROVED		

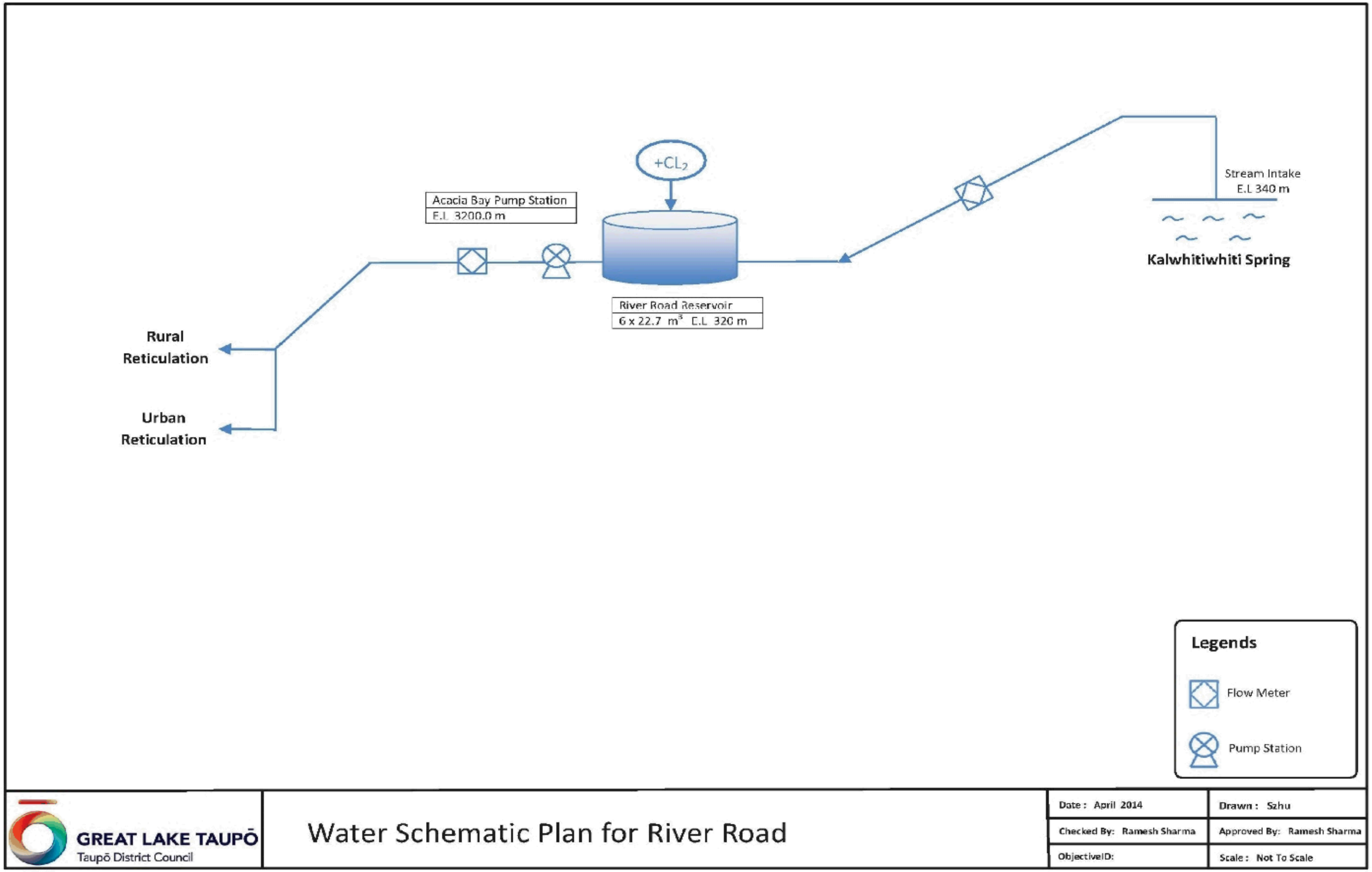
GREAT LAKE TAUPŌ
Taupō District Council

N W E S

0 500 1,000 Metres

NZTM 2000 Scale (A3) - 1:28,000

S:\Infrastructure\Jacob\Water_Schemes\River_Road\04 Map Documents\River_Road_Scheme.mxd


+CL₂
Acacia Bay Pump Station
E.L 3200.0 m
River Road Reservoir
6 x 22.7 m³ E.L 320 m
Stream Intake
E.L 340 m
Kalwhitiwhiti Spring
Rural
Reticulation
Urban
Reticulation
Legends
Flow Meter
Pump Station
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for River Road
Date : April 2014
Drawn : Szhu
Checked By: Ramesh Sharma
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix L
Taupō Supply

TAUPŌ (& WAIRAKEI) SUPPLY

Background

Until recently Taupō had two water supplies; one on Lake Terrace that supplied the northern area including Wairakei and a Rainbow Point water treatment plant that supplied the southern areas.

The Lake Terrace Zone (supplying central and west Taupō), and the Rainbow Point Zone (supplying south Taupō) were developed independently by adjacent territorial authorities who subsequently amalgamated.

In 2013 the Lake Terrance treatment plant underwent a major rebuild and now supplies the full Taupō area. The Rainbow Point WTP is now offline but remains available for emergency use.

Historical Background

Taupō North

The public water supply became possible after the Borough developed its hydroelectric generating station as water could then be pumped from Lake Taupō.

The central supply was commissioned in 1958 with 50 L/sec capacity at Lake Terrace, a 225 mm diameter rising distribution main, a 1600 m^3 reservoir at Hinekura Avenue and a network of 100- and 150-mm diameter water mains. In 1961 the pumping capacity was increased to 150 L/s and supply to higher elevations made possible through a 17 L/s booster pump station at Hinekura Avenue.

The Lake Terrace Zone was upgraded in the 1970s. Firstly, the system was upgraded to provide adequate water to the area south of the Waikato River stretching east to the arterial roadway. The second phase developed the supply to the north and west and included the replacement of the interim western zone booster station. The improvements during the 1970's saw Lake Terrace station enlarged to 325 L/s, Gillies Avenue station at 108 L/s replaced the Hinekura booster station and the principal network was overlain with mains up to 375 mm diameter. Gillies Avenue has subsequently been enlarged and the principal network has been expanded and upgraded.

Lake Terrace pump station was expanded in 1996 and has a current capacity of 390 L/s. This includes standby power generation. A booster station for the west high zone was established in Woodward Street in the early 1970's. In 1992 two pumps were added and a rising main to supply the Wairakei Geothermal Station Village. In 1997 the west high zone was increased to 40 L/s and a standby electrical generator added.

Taupō South

The southern supply was established in 1968 to serve County areas that were transferred to the Borough in 1978. The Rainbow Point or Taupō South scheme was upgraded in 1992 and the area extends south of Shepherd Road and State Highway 5 and including the Wharewaka Point and the Airport.

Asset Description

The newly constructed Taupō Water Treatment Plant utilizes a membrane filtration water treatment process; bacteria, protozoa and arsenic are removed.

The old Taupō North and Taupō South Zones are now merged into a single water supply system. The new treatment plant pumps via dedicated rising mains to the Tamatea and Titoki reservoirs. The network is gravity fed from these locations.

The Gillies Ave pump station draws from the reticulation and maintains/fills the Tauhara reservoir which supplies the Taupō high zone.

The Titoki pump station lifts water from the Titoki reservoir to the Botanical Gardens reservoir.

Seven other pump stations (Broadlands Road, Ashwood Park, Woodward Street/Wairakei, Nukuhau, Arrowsmith, Taupō Airport, and Waitahanui) distribute water to the extents of the water supply network.

Rainbow Point Water treatment plant is maintained as an emergency supply.

Diesel generator sets are available for emergencies purposes.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Taupō/Wairakei/Waitahanui
Reticulation Replacement Cost	$ 46,630,909.89
Water Source, Treatment, Replacement Cost	$ 13,133,671.35
Total	$ 59,764,581.24

Asset Condition

The Taupo Water Treatment Plant was commissioned in 2012 and is in very good condition although the treated water tank requires some repairs to the internal concrete surface which planned in this LTP.

There is a significant amount of AC and galvinised pipe that is nearing end of life, installed in the 1950s and 1960s (Itallic/Everite pipe sourced from Italy). A renewal program is in place with a focus on this area over the next 30 years.

Asset Capacity/ Performance

(a) Capacity

The Taupo WTP originally had a capacity of 25 ML/d, expandable to 30 and 35 ML/d. The 30ML/d upgrade was completed in 2019 and the future 35ML/d upgrade is currently planned for 2040/41.

A hydraulic model is used to assess network performance and is used to analyse growth areas and impacts on the network.

Rainbow point pump station is retained and is maintained for reliability check to meet an emergency.

Scheme	Taupō
Total rateable properties as of June 2020	12,942
Total connected properties as of June 2020	12,339
Average Day Water Demand (last 2 years), m^3/day	11,892
Peak Month Water Demand (last 2 years), m^3/day	17,740
Peak Day Water Demand (last 2 years), m^3/day	22,260
Resource Consent, m^3/day	29,153
Supply Capacity, m^3/day	25,000
Reservoir Capacity, m^3	24,200

(b) Reliability

The Taupō Water supply is generally very reliable; however, as the AC pipes get closer to end of life, we expect the number of breakages will increase.

(c) Water Quality

The water supply generally meets the DWSNZ although in the 2019/20 year problems with communications failures meant compliance was not achieved.

(d) Water Pressure

Most consumers receive their supply with a pressure of at least 210 KPa (30 psi).

Approximately 5 % of fire hydrants are tested annually to assess compliance with the fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

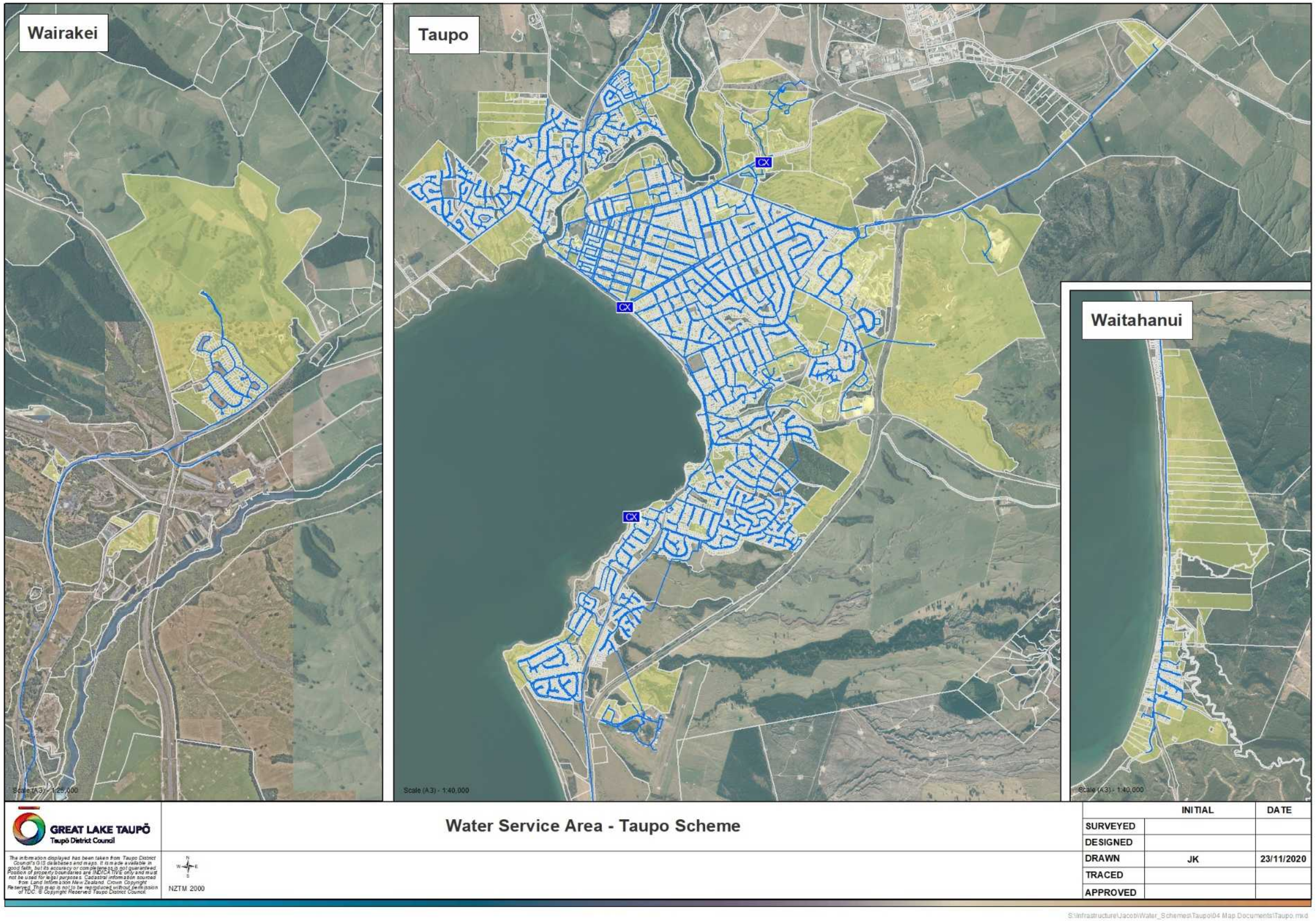
Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The Acacia Bay/Mapara schemes will soon be part of Taupō water network – construction beginning 2021.

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Taupo WTP Taste Odour and Cyanotoxin Treatment Upgrade	Installation of Powdered Activated Carbon Dosing System at the Taupo WTP	2026/28	1,400,000
Taupo water Taupo WTP capacity upgrade to 35 MLD	Additional membranes and control works to increase the Taupo WTP capacity from 30 to 35MLD	2040/41	500,000
Taupo water Poihipi reservoir	Construction of a new 4,750m3 water storage reservoir to service Taupo residents living North of the Waikato River.	2031/34	9,360,000
Taupo water Poihipi reservoir - land purchase	Purchase of land for the new 4,750m3 Poihipi water storage reservoir	2021/22	50,000
Taupo water Brentwood reservoir	Construction of a new 2,000m3 water storage reservoir to service Taupo residents living North of the Waikato River.	2033/35	3,000,000
Taupo water Tauhara Ridge reservoir - land purchase	Purchase of land for the new 2,000m3 Tauhara Ridge water storage reservoir	2021/22	350,000
Taupo water Tauhara Ridge Reservoir and Airport Connection	Tauhara Ridge reservoir 2ML, Greenwich St rising / falling main. Connection to airport.	2022/24	3,820,000
Taupo water Napier Road reservoir	Napier Road reservoir 2.5ML, arrowsmith PS upgrade, Arrowsmith rising and falling mains, Taupo by-pass main.	2032/34	4,700,000
Taupo water Napier Road reservoir - Land purchase	Purchase of land for the new 2,500m3 Napier Road water storage reservoir	2021/22	50,000
Water Reservoir Emergency Storage	1 of 100m3 bladder and one of 500m3 bladder for emergency storage, plus shed for storage at Taupo WWTP.	2021/22	70,000
Taupo Water Reservoir Strengthening	Strengthening of the Tamatea, Tauhara, Cherry Lane & Turangi reservoirs to ensure it meets curent earthquake codes	2031/36	12,925,000
Taupo Water Reservoir Refurbishment - Taupo WTP Treated Water Tank	Refurbsihment of the Taupo WTP Treated Water tank due to poor condition	2023/25	140,000
Taupo Water Titoki Reservoir renewal	Renewal of concrete reservoir. Replace at 70 years old, due to criticality = 2040/41	2039/41	5,400,000
Taupo Water Botanical Reservoir renewal	Renewal of concrete reservoir. Replace at 75 years old = 2045/46	2044/46	2,400,000
Taupo Water Wairakei reservoir upgrade and renewal	Renewal of concrete reservoir. Replace at 75 years (cant due to funding) so earliest possible time = 2031/33	2031/33	1,200,000
Taupo Water Hinekura Reservoir renewal	Renewal of concrete reservoir. Replace at 80 years old = 2031/32	2035/37	1,200,000
Taupo Water - Control Gates Bridge Pipeline Upgrade	Upgrade of pipeline across control gates bridge to service growth. Alternative is $440k pipe renewals plus future renewal of bridge pipeline.	2021/22	200,000
Taupo Water - Low Pressure Project	Richmond Ave Falling Main, Botanical, Shepherd, Hyde, Victoria Upgrades, Pressue Zone Changes and Renewal of AC pipes	2021/22	4,040,000
Taupo Water - Wairakei Rising Main Upgrade	Upgrade of pipeline due to high headlosses, corresponding risk of failures, and ongoing growth in catchment	2023/24	849,000
Taupo to Centennial Treated Connection	Resilience project to conenct Taupo and Centennial Schemes	2034/36	4,000,000
Taupo Water Upgrades to Service Unserviced Residential Zoned Land in Acacia Bay	Pipelines and pump stations to deliver water to 100 Loch Views and surrounding residentially zoned lots. Very high level estimate.	2044/46	1,000,000
Decommissioning	Decommissioning of no longer used water treatment, pump station and reservoir sites.	2021/25	319,000


Wairakei
Taupo
Waitahanui
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Scale (A3) - 1:40,000
Water Service Area - Taupo Scheme
GREAT LAKE TAUPŌ
Taupō District Council
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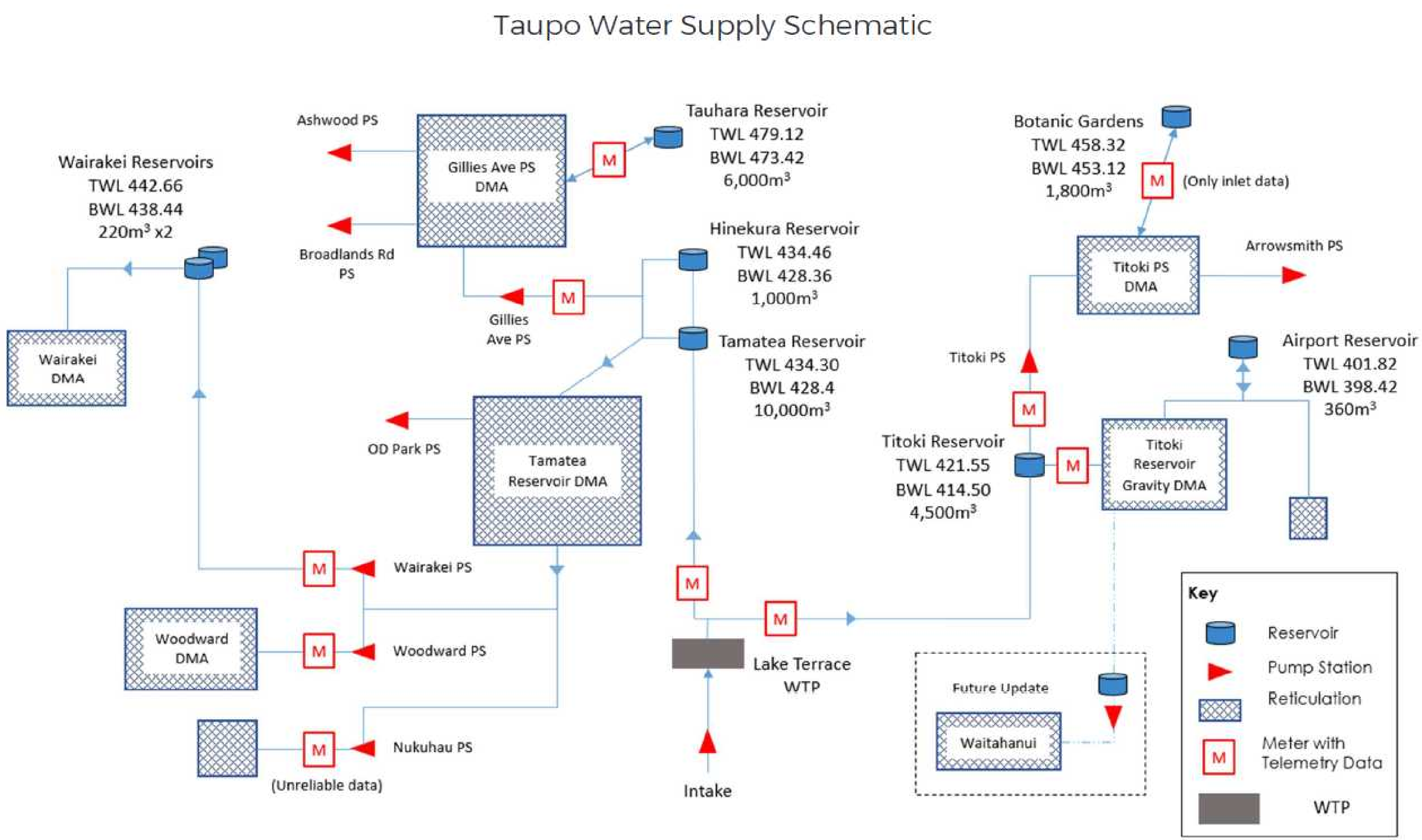

Taupo Water Supply Schematic
Ashwood PS
Gillies Ave PS DMA
Tauhara Reservoir
TWL 479.12
BWL 473.42
6,000m³
Wairakei Reservoirs
TWL 442.66
BWL 438.44
220m³ x2
Broadlands Rd PS
Hinekura Reservoir
TWL 434.46
BWL 428.36
1,000m³
Gillies Ave PS
Tamatea Reservoir
TWL 434.30
BWL 428.4
10,000m³
Wairakei DMA
OD Park PS
Tamatea Reservoir DMA
Botanic Gardens
TWL 458.32
BWL 453.12
1,800m³
(Only inlet data)
Titoki PS DMA
Arrowsmith PS
Titoki PS
Airport Reservoir
TWL 401.82
BWL 398.42
360m³
Titoki Reservoir
TWL 421.55
BWL 414.50
4,500m³
Titoki Reservoir Gravity DMA
Wairakei PS
Woodward DMA
Woodward PS
Lake Terrace WTP
Nukuhau PS
(Unreliable data)
Intake
Future Update
Waitahanui
Key
Reservoir
Pump Station
Reticulation
Meter with Telemetry Data
WTP
M

Appendix M
Tirohanga Scheme

TIROHANGA SCHEME

Background

The Tirohanga water supply system is a rural system serving approximately 70 developed farms and 50 rural-residential lots. The scheme was constituted on 08/02/84 and covers an area of 5,400 hectares. The supply elevations range from 260 to 730 metres above mean sea level and changes in elevation of 210 metres occur on individual properties.

The system was designed in conjunction with the Ministry of Agriculture and Fisheries. Farmers made a capital contribution to the scheme in proportion to their required quantity over a 24-hour period.

The legal description of the water supply area off Tirohanga Rd is given as Lot 1 DPS 11188, SEC 21 BLK XII TE Atiamuri SD. The intake works is described as Sec 22, Blk XI, Whakamaru SD - Map reference NZMS 260 T17: 591 022.

Asset Description

Adequate, good quality water is obtained from the Uanui Spring to supply the scheme and to drive the continuously operating turbine pump. A second electrical pump is available for operation during peak draw off periods (September to March). A third electrical pump is available for standby purposes.

The pump station pumps water 345 metres in elevation and 2.6 km in length over a hill. The gravity main is 26 km long and passes through four pressure reducing valves.

The turbine pump can deliver 11 L/s while the two electrical pumps can deliver 11.5 L/s each. Any two pumps combined can deliver 19.9 L/s. The small Spencer Road pumps delivers 1.1 L/s each. The reticulation system consists of 150 mm diameter main reducing to 125, 100, 80, 50- and 40-mm diameter. There is 110 m^3 of reservoir in the system and the only treatment is sterilisation with chlorine gas. Property connections are metered, 24-hour restricted supplies with twin non-return valves and test cocks. Each farm is required to provide its own 24-hour storage.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Tirohanga
Reticulation Replacement Cost	$ 3,680,349.04
Water Source, Treatment, Replacement Cost	$ 1,257,635.46
Total	$ 4,937,984.50

Asset Condition
The scheme is in operational condition.

Asset Capacity/Performance

(a) Capacity

There is adequate water supply to service the existing demand. The capacity of the reticulation is very limited. Any expansion of the area of benefit would require capital investment. The system capacity is shown below:

Scheme	Tirohanga
Total rateable properties as of June 2020	107
Total connected properties as of June 2020	104
Average Day Water Demand (last 5 years), m^3/day	777
Peak Month Water Demand (last 5 years), m^3/day	834
Resource Consent, m^3/day	37,000
Supply Capacity, m^3/day	1,728
Reservoir Capacity, m^3	131

(b) Reliability

Regular maintenance of the pressure reducing values is critical to control and manage the network in a reliable manner and to avoid pipe breakages.

(c) Water Quality

The water supply does not meet the DWSNZ. Bacterial compliance is generally achieved; however, protozoa compliance is not. Funding gained through water reform is planned to be used to provide UV treatment at the site which will provide for protozoa compliance.

(d) Water Pressure

The system was not designed to provide firefighting protection. Pressure is generally very good and pressure reduction is required. PRVs are used to prevent damage to the system. Operation and maintenance of the pressure reducing valves on the four gravity mains is critical to the operation of the system.

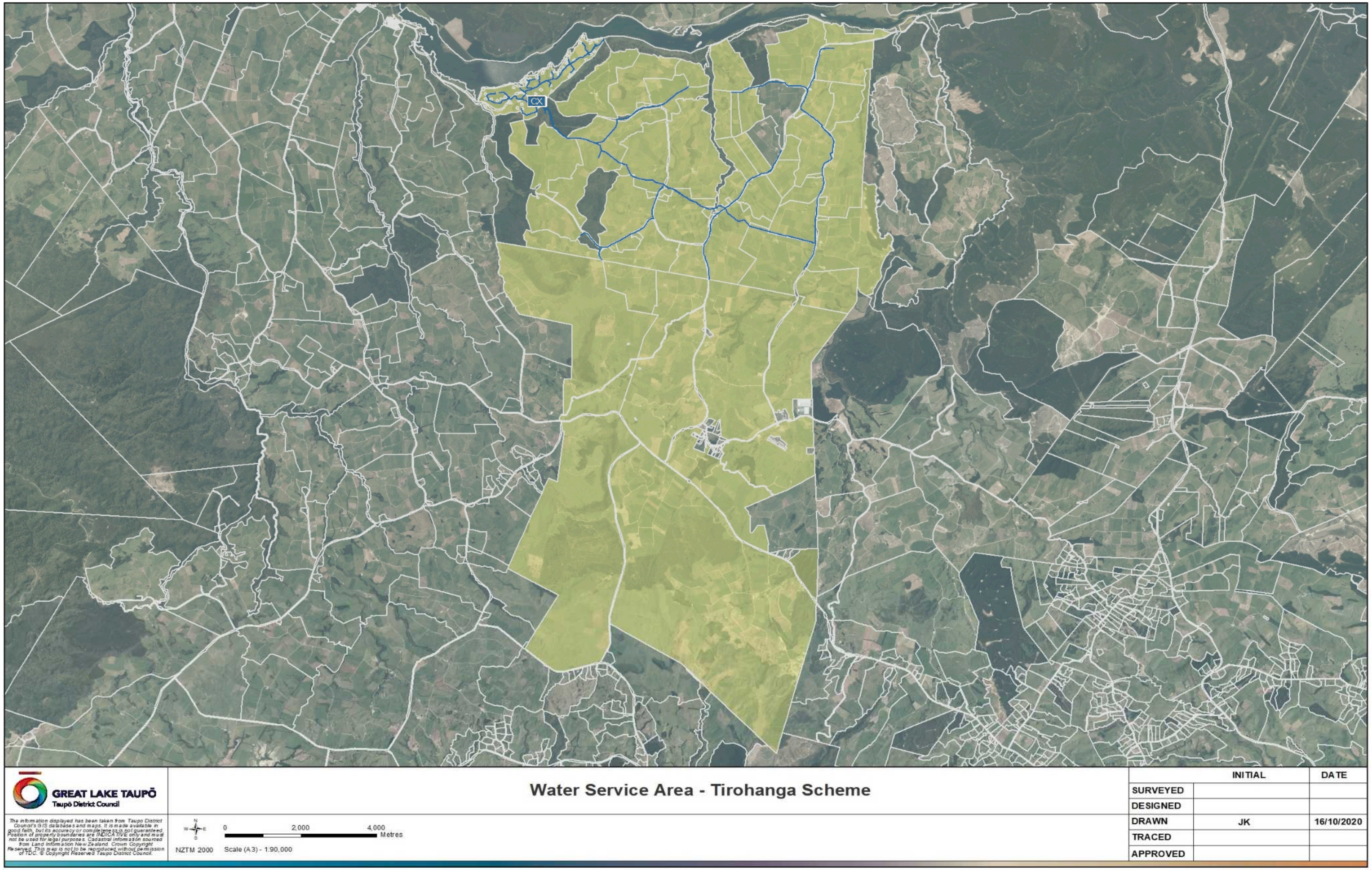
Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

A WTP upgrade is in planning 2020/21 to meet protozoa compliance as per the DWSNZ utilising government funding associated with water reform. No other LTP Capex projects are planned.


CX
GREAT LAKE TAUPŌ
Taupō District Council
Water Service Area - Tirohanga Scheme
The information displayed has been taken from Taupo District Council's GIS databases and maps. It is made available in good faith, but its accuracy or completeness is not guaranteed. Position of property boundaries are INDICATIVE only and must not be used for legal purposes. Cadastral information sourced from Land Information New Zealand. Crown Copyright Reserved. This map is not to be reproduced without permission of TDC. © Copyright Reserved Taupo District Council.
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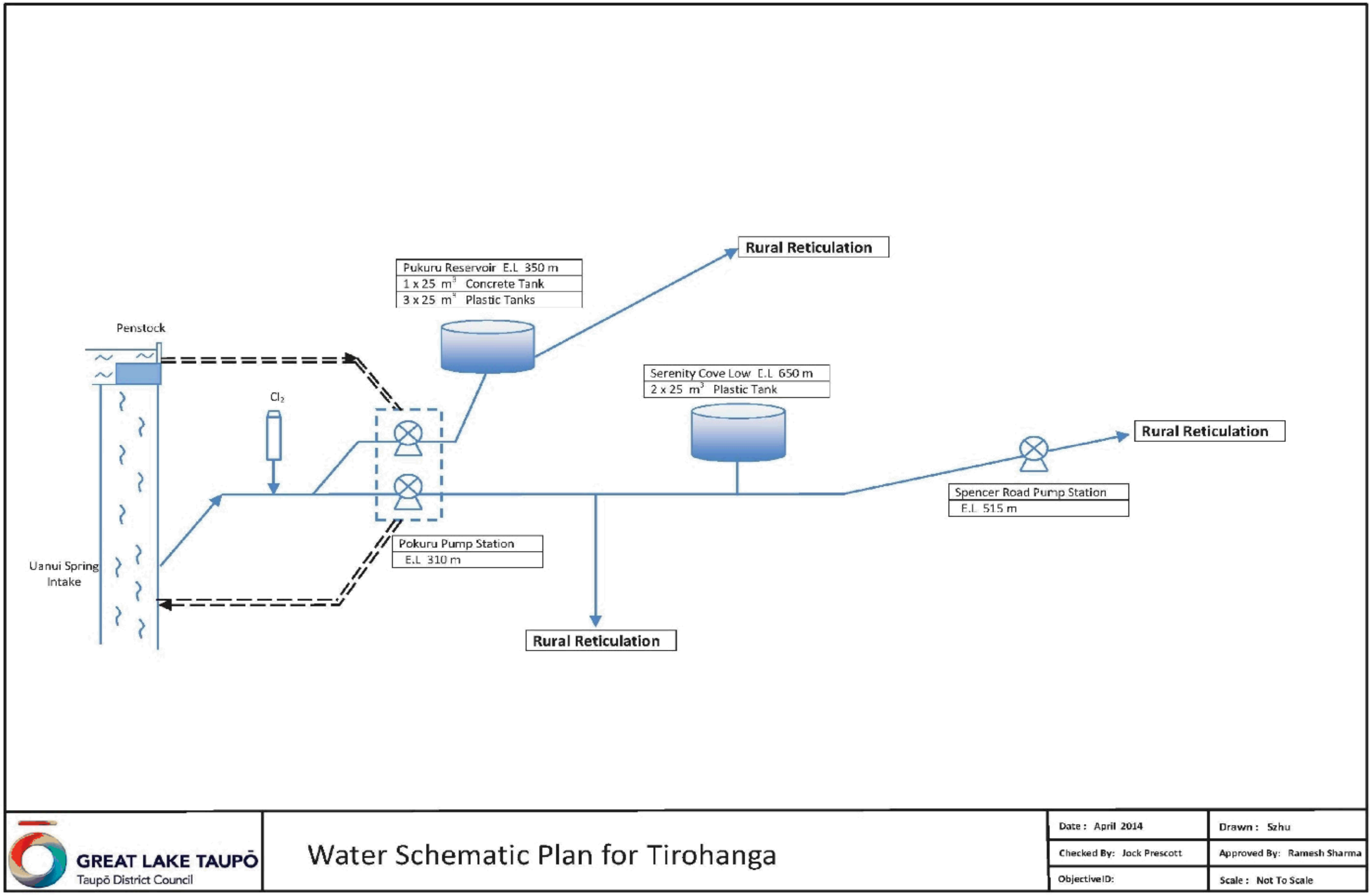

Rural Reticulation
Pukuru Reservoir E.L 350 m
1 x 25 m³ Concrete Tank
3 x 25 m³ Plastic Tanks
Penstock
Cl₂
Serenity Cove Low E.L 650 m
2 x 25 m³ Plastic Tank
Rural Reticulation
Spencer Road Pump Station
E.L 515 m
Uanui Spring
Intake
Pokuru Pump Station
E.L 310 m
Rural Reticulation
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Tirohanga
Date: April 2014
Drawn: Szhu
Checked By: Jock Prescott
Approved By: Ramesh Sharma
ObjectiveID:
Scale: Not To Scale

Appendix N
Turangi Scheme

TURANGI SCHEME

Background

The Turangi water supply system was constructed in 1965-67 by the Ministry of Works to serve the old part of the town, located between State Highway 1 and the Tongariro River and the new part of the town, built for the Tongariro Power Development. This included the industrial area south of State Highway 41. During the construction of the Power Project (between 1968 to 1974), the town's population was approximately 20 % greater than in the early 1990's.

Subsequently the water works were vested to the Taupō County Council in an agreement signed in March 1980. These land vestings were the subject of various disputes between the Crown and the original landowners. The land was taken in 1974 for the water works and was vested to Council on 15 January 1985. In 2000 a 150 mm diameter pipe was constructed from Turangi to connect Tokaanu Village. The Tokaanu water source was discontinued. The Tokaanu Village comprises a hotel, commercial properties, motels, Marae and community hot pool complex.

Turangi draws its water from a spring which is fed by an aquifer. The aquifer catchment area is protected by a 'water supply reserve' to which access is restricted. The spring is enclosed in a sheet pile and iron roofed enclosure. From the spring water is carried in a 762 mm concrete conduit to a channel which then feeds into the Tokaanu Stream.

The water supply draws water from a weir on this concrete conduit. The water is then pumped by two electric motor-powered centrifugal pumps to a 4500 m^3 pre-stressed concrete reservoir located west of Turangi on a ridge known as Kohatu Kaioraora, from where it reticulates to Turangi Township by a gravity fed pipe network.

The water supply area is a restricted area and access can be gained across private road at the end of Tukehu St. However, the area is frequently entered by trespassers and attempts to gate the areas have met with persistent vandalism. The water supply pump house and spring area is security fenced. The downstream area of the spring is a popular 'watercress' gathering spot.

Land Ownership

The water supply land was taken by the Crown for the Turangi Township in 1968. The taking was the subject of prolonged dispute and passed to the ownership of the Taupō County Council in 1985. Details of these actions are recorded in the Turangi Township Report 1995, Waitangi Tribunal Report Pg 1 13-120, see Appendix 9. This grievance did not stop with the Crown and in early 1990's Taupō District Council met with various block owners who were requesting return of title to the land. It was agreed that these negotiations would be suspended pending the outcome of the Wai 84 Turangi Township Claim I 994 lodged with the Waitangi Tribunal. In 1998 the Crown met with Taupō District Council who agreed to assist in the settlement of the Township Claim by agreeing to the return of a number of reserves including the 'Water Reserve' to the claimants. The Ngati Turangitukua Deed of Settlement 1998 was duly completed, and the Ngati Turangitukua Claims Settlement Act 1999 returned the ownership of the Water Reserve to Ngati Turangitukua Charitable Trust who represented the claimant families. The Taupō District Council was given the right in perpetuity to control and manage the area for a water supply.

The Turangi water supply area is shown in Appendix I Plan I TDC Plan WI 544 000 002. The legal description of the intake is given as part Waipapa1L Blk Waipapa 1 m Block, Block X Puketi BIk Ill Pihanga SD. Map reference NZMS 1-N102:267 006. The street address is 280 Tukehu Street, Turangi. Valuation No. 07480 10300 The water reserve land area is 215.4040ha.

Tokaanu Stream Effects

Data on the Tokaanu Stream (dated 1978) has remained largely unchanged and has been used in assessing the effects on stream flow. The minimum observed discharge of the stream is 1230 m^3 and the maximum take would represent 10 % of this minimum stream flow. This take does not substantially change the existing use, nor will it change the current environment of the stream.

Asset Description

This system is an urban water supply system. Water flows from an underground spring, which forms part of the headwaters of the Tokaanu stream, through a 750 mm diameter pipe through the pump station wet well and into an open channel. The 200 mm diameter inlet pipes rise from the inlet chamber through the water treatment plant.

The treatment process provides UV disinfection, chlorination and fluoride is added. Pumps lift the water 94 metres to the Turangi water reservoir. The 1,120 m long 300 mm diameter AC rising main discharges into the 4,500 m^3 concrete reservoir at elevation 441 m MSL. The 900-metre-long by 375 mm diameter AC gravity main extends from the reservoir to the Turangi reticulation.

The gravity main feeds a reticulation consisting of 200, 150- and 100-mm diameter AC/PVC mains.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Turangi Township/Tokaanu
Reticulation Replacement Cost	$ 8,147,150.72
Water Source, Treatment, Related Replacement Cost	$ 3,479,536.25
Total	$ 11,626,686.97

Asset Condition

The system was installed in 1965 when the new part of town was constructed and is generally in good condition. Capital assistance was received by council from MOH, for upgrading the WTP, pumps and buildings to meet protozoa compliance as per DWSNZ. The reticulation is in moderate condition however, recent condition assessments completed suggests that most of the GI rider mains are in poor conditions and there is a history of failure.

Renewals programmes have been completed over the last LTP period and more are planned including a current programme utilising water reform funding, that will include installation of zone metering to help understand the worst leaking areas for renewal.

Asset Capacity/Performance

(a) Capacity

The spring flow is several times greater than draw off during dry weather. The rising main has the capacity to deliver 440 m^3/hr i.e. two pumps can operate simultaneously and efficiently. The gravity main has the capacity to deliver 600 m^3/hr without significant loss of pressure.

The 4,500 m^3 reservoir provides 16 to 36 hours water retention. The reservoir was strengthened in 2000 for structural integrity in terms of current earthquake codes.

The present intake pumps and storage are adequate for future demands and one pump can cope with the peak summer demands.

The flowing table provides the basic demand and capacity information:

Scheme	Turangi Township/Tokaanu
Total rateable properties as of November 2020	2,416
Total connected properties as of November 2020	2,247
Average day water demand (last 5 years), m^3/day	3,876
Peak month water demand (last 5 years), m^3/day	4,906
Peak day water demand (last 5 years), m^3/day	6,829#
Resource consent, m^3/day	6,300*
Supply capacity, m^3/day	6,480
Reservoir capacity, m^3	4,500

* New resource consent has been applied for.
# Daily flow data is less reliable, and review is needed.

(b) Reliability

The primary risk to the water supply is loss of power for pumping. The treatment plant has the ability to be connected to a portable generator if the loss of power is prolonged. Reservoir storage capacity provides resilience for the loss of power.

(c) Water Quality

The water treatment plant has been upgraded to meet the DWSNZ.

(d) Water pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

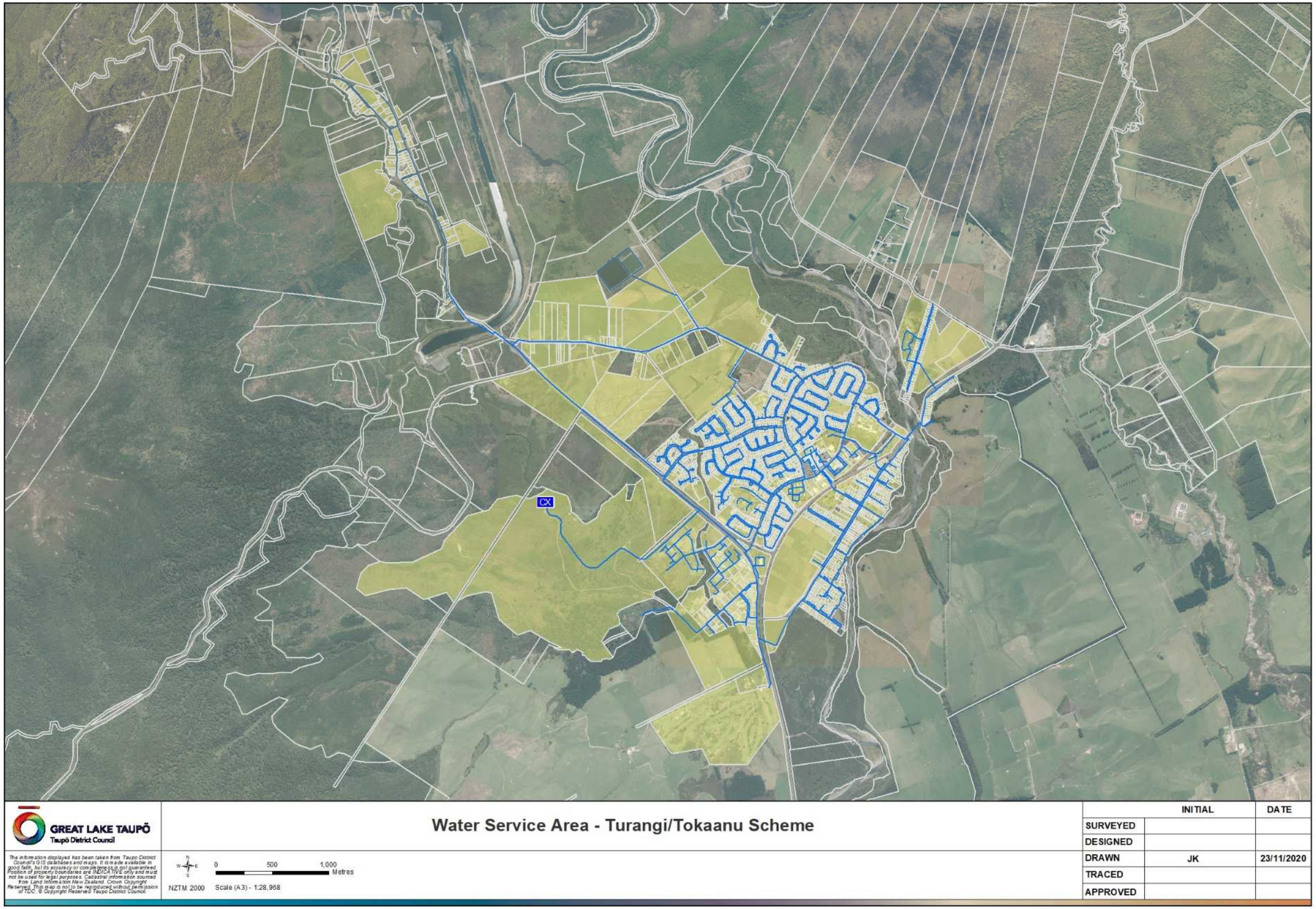
Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Turangi Water Treatment Improvements	Duty/standby chlorine dosing, automated run to waste and security improvements	2023/24	100,000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GREAT LAKE TAUPŌ
Taupō District Council
Water Service Area - Turangi/Tokaanu Scheme
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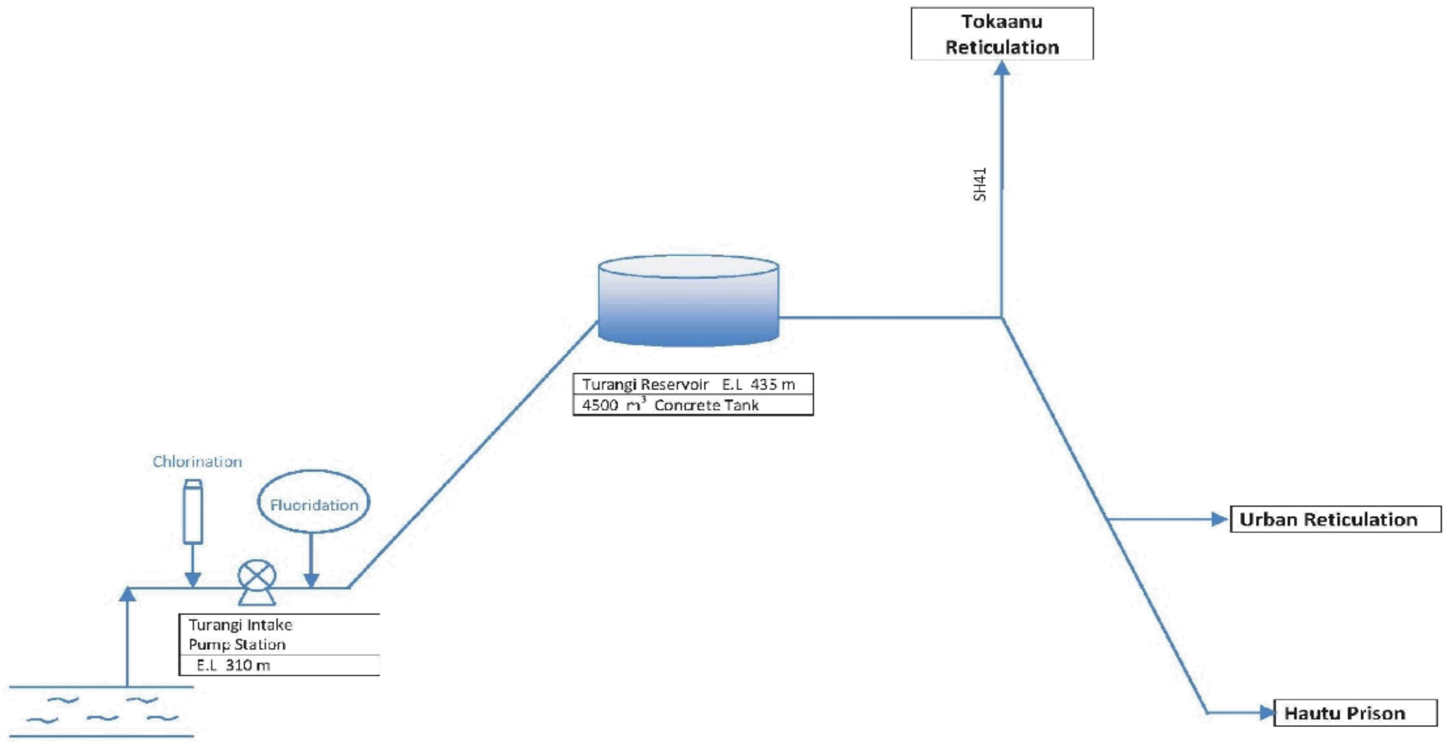


GREAT LAKE TAUPŌ
Taupō District Council

Water Schematic Plan for Turangi

Date : April 2014	Drawn : Szhu
Checked By: Jock Prescott	Approved By: Ramesh Sharma
ObjectiveID:	Scale : Not To Scale

Appendix O
Waihaha Scheme

WAIHAHA SCHEME

Background

This rural water supply system serves 9,926 hectares of land of which 6,000 is developed. The area encloses 8 developed farms and 2 development blocks that are equivalent to 13 developed farm blocks. The water supply system was built in 1983. The water supply and on-farm distribution were designed in conjunction with the Ministry of Agriculture and Fisheries. The water supply needs of the 23 farm units were assessed for a typical farm unit receiving a supply of 29 m^3/day. In addition, provision was made for supplying a further 2 units each requiring 13 and 29 m^3/day. An allowance was made for leakage and the effective peak flow was assumed to be restricted to 18 hours per day. The maximum allowable demand for each fully developed farm unit was assumed to be 1.6 m^3/dwelling plus 128 L/ha/day. Other design parameters used were: - 61/34 sheep to cattle ratio, 45 L/day for cattle, 5 L/day for sheep and irrigation was allowed for 2 hours per day @ 900 L/h. No allowance was made for fire flow.

The Department of Lands and Survey covered the cost of building the off-farm works before the farm units were sold to settlers. The settlers covered half the cost of the on-farm work and the other half was subsidised. The farm connections are not metered but properties do have provision to restrict supply if required.

The farms have been fitted with meters and in the future costs may be recovered using a metered rate.

Asset Description

The source of the water is an 890-hectare protected catchment in the Pureora State Forest. From a weir on the Waihora stream, raw water gravitates 900 metres to the filter station through a 200 mm diameter pipe. Post filtration, two 22 m^3 storage tanks exist and filtered water gravitates 2.9 km to the chlorine addition point before it flows into a 22 m^3 capacity contact tank. From the tank it again gravitates for 1.3 km to State Highway 32 and into the network.

At the west corner of the reticulation a small pump station with two Ajax pumps capable of delivering 3 L/s, serves six farms in the Motere Block via a 22 m^3 community tank. Each farm has two 22 m^3 storage tanks. The treatment plant equipment consists of a 12 L/s MacEwans Qua-flow automatic gravity sand filter and a gas chlorinator. A 150 mm diameter pipe feeds the Otaipuhi Block D while a 100 mm diameter pipe supplies the Motere pump station. Lateral mains are 80, 50, 32- or 25-mm diameter. Each connection consists of a low-pressure bronze ballcock complete with floats with adjustable limiting hydraulic valves.

In the recent past several farm were converted into forestry and the demand on the scheme has reduced.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Waihaha
Reticulation Replacement Cost	$ 2,931,844.38
Water Source, Treatment, Related Replacement Cost	$ 746,913.34
Total	$ 3,678,757.72

Asset Condition

The water supply scheme is nearing 30 years old and is in good operational condition.

Asset Capacity/Performance

(a) Capacity

This is a 24-hour water supply for domestic and farming purposes. The system can adequately supply the demands of the community it serves.

The following table provides the basic demand and capacity information:

Scheme	Waihaha
Total rateable properties as of November 2020	31
Total connected properties as of November 2020	31
Average Day Water Demand (last 5 years), m^3/day	479
Peak Month Water Demand (last 5 years), m^3/day	532
Peak Day Water Demand (last 5 years), m^3/day	670
Resource Consent, m^3/day	800
Supply Capacity, m^3/day	1,036
Reservoir Capacity, m^3	50

(b) Water Quality

The water supply does not meet the DWSNZ.

Bacterial compliance is achieved; however, protozoa compliance is not. Continuous turbidity monitoring is installed.

(c) Water Pressure

This is rural water supply scheme and the system is not designed to provide firefighting protection. The property owners are required to have adequate storage to meet their daily demand and also fireflows.

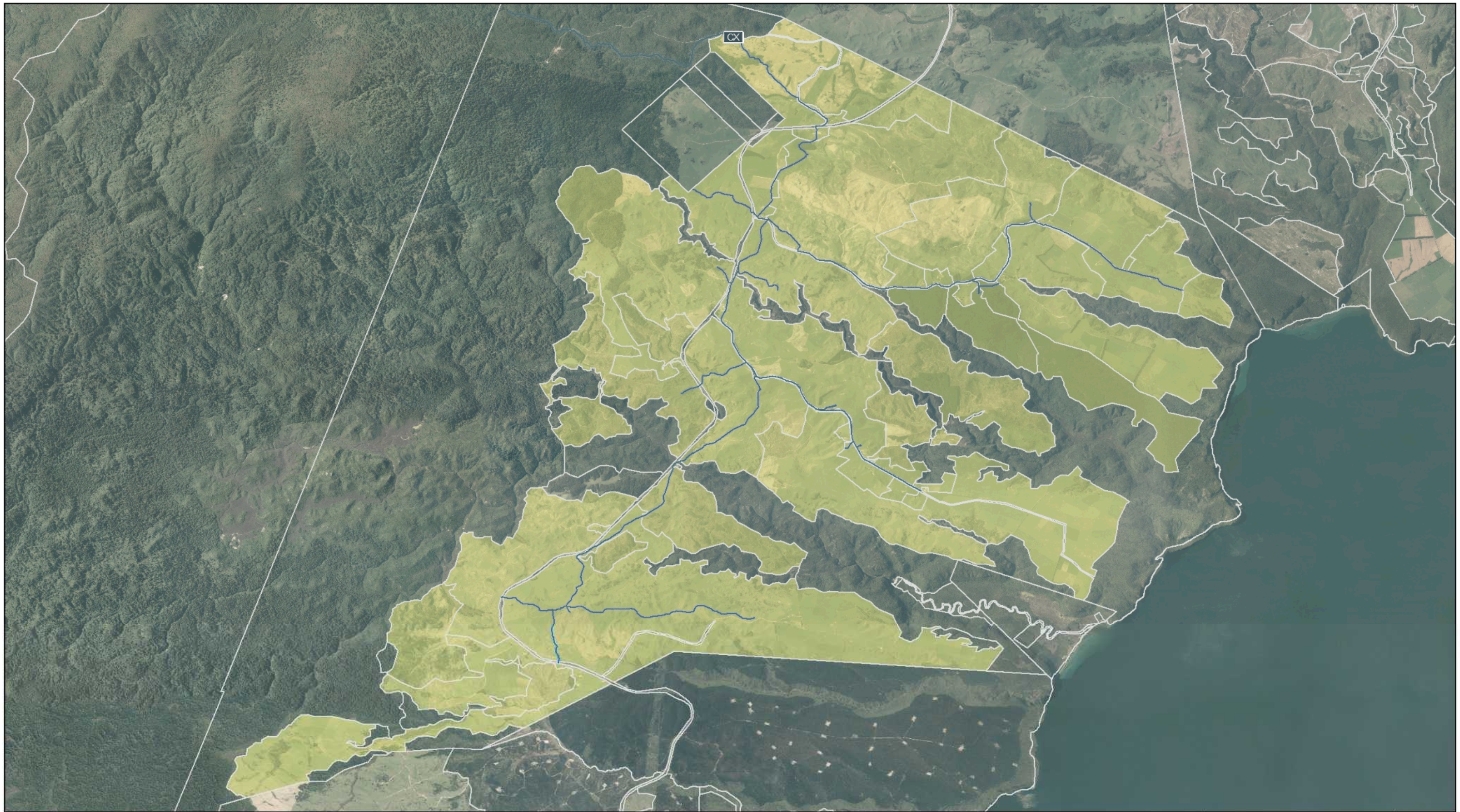
Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

There are no LTP projects planned although water reform funding from the government is being utilised currently (2020/21) to provide UV disinfection at the treatment plant.



Water Service Area - Waihaha Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	19/10/2020
TRACED		
APPROVED		

NZTM 2000

0 500 1,000 Metres

Scale (A3) - 1:50,000

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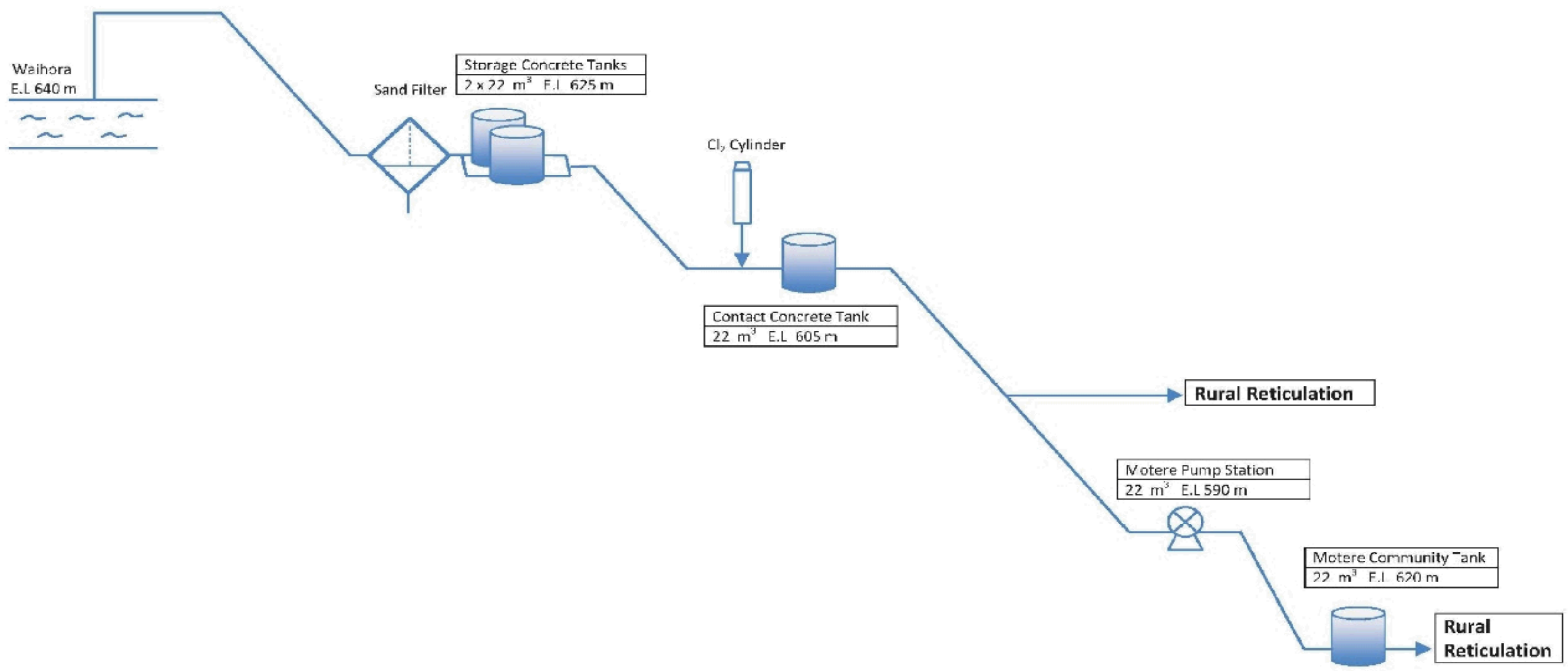
Taupō District Council



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Taupō District Council

Water Schematic Plan for Waihaha

Date : April 2014	Drawn : Szhu
Checked By: Jock Prescott	Approved By: Ramesh Sharma
ObjectiveID:	Scale : Not To Scale

Appendix P
Whakamaru Scheme

WHAKAMARU SCHEME

Background

The Whakamaru Hydro village was developed for the adjacent Waikato River Hydro scheme by the Crown for the former Electricity Department. The scheme has 69 domestic dwellings and 2 commercial properties, and 4 lots has right to connect. Though there is a potential to develop a further 32 lots, but growth model predicts that there will be no growth in this scheme for next 10 years or so. The village is fully serviced with water and supplies water to the school and power company facilities outside the village. The water supply was upgraded in 1992 to Taupō District Council standards and ownership transferred to Council. All properties in the hydro village are connected to the treated water supply which has sufficient capacity to serve the hydro village, its external consumers and some future development.

The Whakamaru (Forest Road) old village has been partly reticulated to two fire hydrants. Two properties in Forest Road have gained domestic water connections and shall be included in the constituted Whakamaru Water Supply area.

The legal description is given as Pouakani Blk, Pt B10 Blk XI Tuhingamata SD. Map reference is NZMS 260 T17: 550 048.

Asset Description

The supply consists of a bore field, a pump station, a 220 m^3 reservoir, a 22 m^3 high level balancing tank, a 100 mm diameter cast iron rising main and reticulation consisting of 100 mm and 40 mm diameter CI, AC and PVC pipelines. Sterilisation is carried out with chlorine gas. There are three bore holes in the field although one has been abandoned. The other two 150 mm diameter bores produce 7.75 and 6.9 L/s individually but deliver a total of 240 m^3/day when operating for 16 hours. New supply pump has been installed during September 2014 and their capacity can now deliver fire flows of 25 L/s.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Whakamaru
Reticulation Replacement Cost	$ 485,667.29
Water Source, Treatment Related Replacement Cost	$ 895,860.92
Total	$ 1,381,528.21

Asset Condition

The 1992 upgrade has left the scheme in good condition. Water network renewals will be required in the comping LTP period to remove asbestos mains from the village.

Asset Capacity/Performance

The installed plant can supply the hydro village area of benefit with all domestic requirements.

(a) Capacity

The system can support an additional 77 houses before resource conditions will limit further growth. Without the resource consent restrictions, the infrastructure could support an additional 88 houses. No provision has been made for infill housing.

The following table provides the basic demand and capacity information:

Scheme	Whakamaru
Total rateable properties as of June 2020	77
Total connected properties as of June 2020	76
Average Day Water Demand (last 5 years), m^3/day	103
Peak Month Water Demand (last 5 years), m^3/day	141
Peak Day Water Demand (last 5 years), m^3/day	155
Resource Consent, m^3/day	200
Supply Capacity, m^3/day	423
Reservoir Capacity, m^3	220

(b) Water Quality

The water supply does not meet the DWSNZ.

Bacterial compliance is achieved; however, protozoa compliance is not. Continuous turbidity monitoring is installed.

(c) Water pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Renewal Plan

Section 8 outlines the current indicative renewal schedule and or budget over the 10-year planning period based on the estimated effective life of the assets. This will be refined and developed as asset condition and data confidence improves. Renewals shall be prioritized based on failures, leaks/ burst, LoS over asset age.

Development Plan

The WTP upgrade is being funded by government water reform money during 2020/21 through installation of UV disinfection to meet protozoa compliance as per DWSNZ. In the LTP bore head upgrades to improve source water security are proposed and the extension of the network to include reticulation of the full Forest View Road area is planned.

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Whakamaru water DWSNZ bore head upgrade	Bore head upgrade as required by DWSNZ and water safety plans	2021/22	$ 25,000
Whakamaru water network extension	Extension of water network in Forest View Road area	2021/22	$238,000

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GREAT LAKE TAUPŌ
Taupō District Council

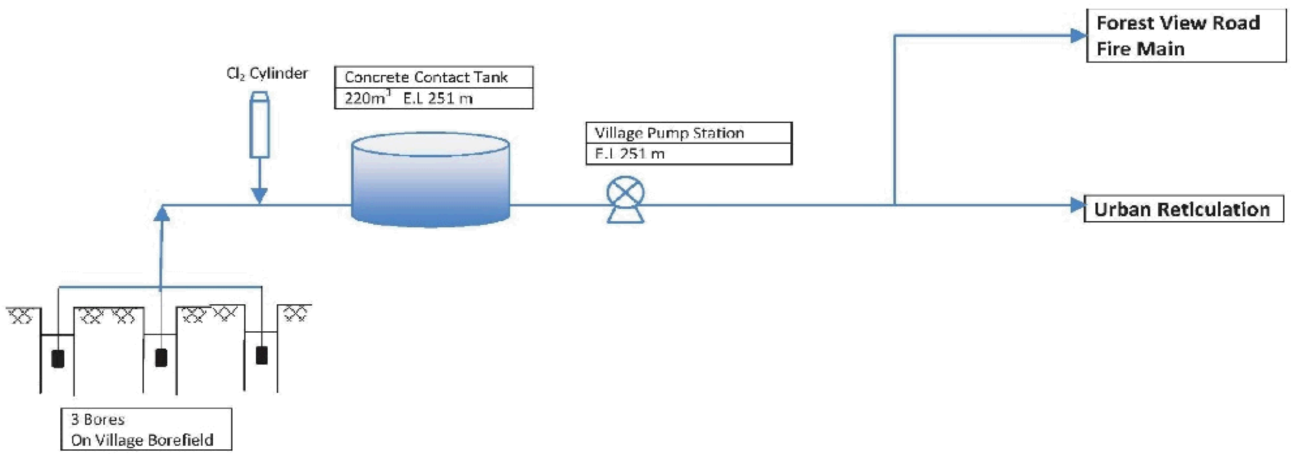
Water Service Area - Whakamaru Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	19/10/2020
TRACED		
APPROVED		

N W E S

0 200 400 Metres

NZTM 2000 Scale (A3) - 1:6,000



Water Schematic Plan for Whakamaru	Date : April 2014	Drawn : Szhu
	Checked By: Jock Prescott	Approved By: Ramesh Sharma
	ObjectiveID:	Scale : Not To Scale

Appendix Q
Whakamoenga Point Scheme

WHAKAMOENGA POINT SCHEME

Background

The Whakamoenga Point Development was established in 1992 and is a finite entity containing 46 house sites within a vegetated access lot. There was also provision made for a proposed 30 bed capacity lodge.

The Legal description of the intake is given as Lots 1 and 2 DPS 10066 and Lots I and 2 DPS 12047 being Pt Rangatira No6 Blk V, Tauhara SD. The map reference is NZMS U18:717 698.

Asset Description

This urban system consists of a lake intake work, a pump station with two pumps capable of pumping 2.1 L/s individually or 2.6 L/s combined, a 50 mm rising main, a 200 m^3 reservoir, a distribution system consisting of 100mm and 40mm diameter pipes, a chlorine gas sterilising system and a 40 micron strainer.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Whakamoenga
Reticulation Replacement Cost	$ 468,457.24
Water Source, Treatment, Replacement Cost	$ 304,803.03
Total	$ 773,260.27

Asset Condition

The water supply is 20 years old and is in operational condition.

Asset Capacity/Performance

(a) Capacity

The water supply meets current demand following an upgrade in 2008 and increase of the water take consent following. It is worth noting that per property water demand in the area is the highest in the District. The table below provides the basic demand and capacity information:

Scheme	Whakamoenga Point
Total rateable properties as of June 2020	53
Total connected properties as of June 2020	53
Average Day Water Demand (last 5 years), m^3/day	90
Peak Month Water Demand (last 5 years), m^3/day	162
Peak Day Water Demand (last 5 years), m^3/day	255
Resource Consent, m^3/day	520
Supply Capacity, m^3/day	220
Reservoir Capacity, m^3	190

(b) Compliance

The water supply does not meet the DWSNZ.

Bacterial compliance is achieved; however, protozoa compliance is not. Continuous turbidity monitoring is installed.

(c) Water pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

Connection of the community to the Taupo water supply to enable compliance with the DWSNZ, and replacement of the existing timbertank reservoirs with more resilient structures is planned. The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Whakamoenga Pt water DWSNZ upgrade	New pipeline and pump station from Taupo scheme to Whakamoenga reservoirs	2021/23	1,420,000
Whakamoenga Timertank Reservoir Replacement	Renewal of timbertank reservoirs to IL4 structures and upgrade with additional volume.	2032/34	276,000

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Taupō District Council

Water Service Area - Whakamoenga Point Scheme

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	5/10/2020
TRACED		
APPROVED		

N W E S
0 100 200 Metres
NZTM 2000 Scale (A3) - 1:3,000

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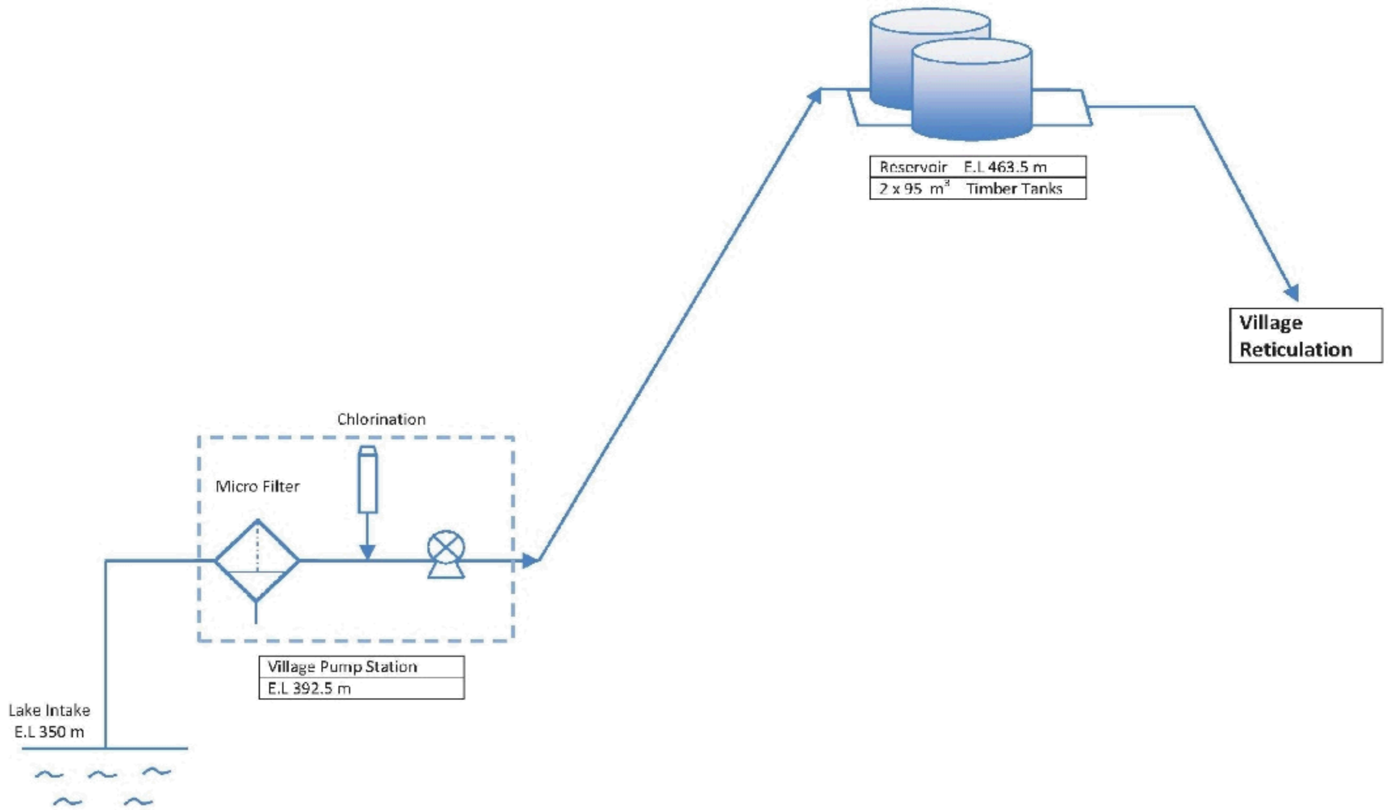

GREAT LAKE TAUPŌ Taupō District Council	Water Schematic Plan for Whakamoenga Point	Date : April 2014	Drawn : Szhu
		Checked By: Jock Prescott	Approved By: Ramesh Sharma
		ObjectiveID:	Scale : Not To Scale

Appendix R
Whareroa Scheme

WHAREROA SCHEME

Background

Whareroa Village comprises 7 completed stages of development. Further development may occur north of the stream but that would be a separate development unit, for which full infrastructure will have to be provided. When completed the Whareroa village, south of the stream will contain 205 residential lots. According to rate data base, 146 lots have been created of which 4 are commercial, 142 contain batches or dwellings and 59 lots are vacant.

The service is reliable, adequate for supply and irrigation, fire service protection is available, and the water is disinfected but does not meet the DWSNZ. The legal description of the intake structure site is given as local reserve, Lot 500 DPS 46631, Blk XIV, Hauhungaroa SD. Map reference NZMS 260 T18:513 563.

Asset Description

This urban scheme consists of a bore field, pump station, two 150 m^3 timber reservoirs, chlorine gas sterilisation and reticulation. Two 150 mm diameter, 11 metre deep bore hole with pumps each capable of pumping 3.3 L/s draw bore water and pump to the adjoining contact tank for disinfection by gaseous chlorine. The water is then pumped by two pumps capable of pumping 2.1 and 2.3 L/s to a 150 m^3 reservoir via a 150 mm AC rising main. It is then distributed through pipe work consisting of 100 mm or smaller diameter PVC or AC pipes.

The following table provides the most recent asset replacement value (2019/20):

Scheme	Whareroa
Reticulation Replacement Cost	$ 830,494.04
Water Source, Treatment, Reservoir Replacement Cost	$ 367,798.88
Total	$ 1,198,292.92

Asset Condition

The scheme was developed in 1989 and is in operational condition. The bore pumps were renewed during 2011.

Asset Capacity/Performance

The capacity of the distribution pumps is inadequate for summer peak and can supply average consumption to 170 lots. There is a potential for total 201 residential lots in the area. The system would not be able to cater for further development or infill housing, which is permissible under the District Scheme for lots greater than 700 m^2 in area.

(a) Capacity

The distribution pumps are adequate to meet summer peak demands. Reservoir capacity is adequate to meet fire demands.

The following table provides the basic demand and capacity information:

Scheme	Whareroa
Total rateable properties as of June 2020	198
Total connected properties as of June 2020	162
Average Day Water Demand (last 5 years), m^3/day	72
Peak Month Water Demand (last 5 years), m^3/day	117
Peak Day Water Demand (last 5 years), m^3/day	307
Resource Consent, m^3/day	682
Supply Capacity, m^3/day	362
Reservoir Capacity, m^3	300

(b) Water Quality

The water supply does not meet the DWSNZ. Upgrade of the plant to include UV disinfection is planned during 2020/21 using government funding due to water reform.

Bacterial compliance is achieved; however, protozoa compliance is not. Continuous turbidity monitoring is installed.

(c) Water pressure

The reticulation system is assessed according to Fire water supply Code of Practice SNZ PAS 4509:2008 for FW2 class.

Operation and Maintenance Plan

Standard operation and maintenance procedures can be found in objective as per table below:

Sr. No.	Description of file folder	Objective Reference No.
1	Standard Operating Procedures	fA32241
2	Standard Maintenance Procedures	fA69218
3	Standard Leadership Procedures	fA72326
4	Health & Safety Policies & Procedures	fA32238
5	Emergency Management Procedures	fA32237

Development Plan

The draft LTP Capex projects are summarised below:

Project	Description	Timing	Value
Whareroa water DWSNZ bore head upgrade	Bore head upgrade as required by DWSNZ and water safety plans	2021/23	60,000
Whareroa Timertank Reservoir Replacement	Renewal of timbertank reservoirs to IL4 structures and upgrade with additional volume.	2034/36	720,000

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Taupō District Council

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Taupō District Council

Water Service Area - Whareroa Scheme

N W E S
0 100 200 Metres
NZTM 2000
Scale (A3) - 1:3,500

	INITIAL	DATE
SURVEYED		
DESIGNED		
DRAWN	JK	29/10/2020
TRACED		
APPROVED		

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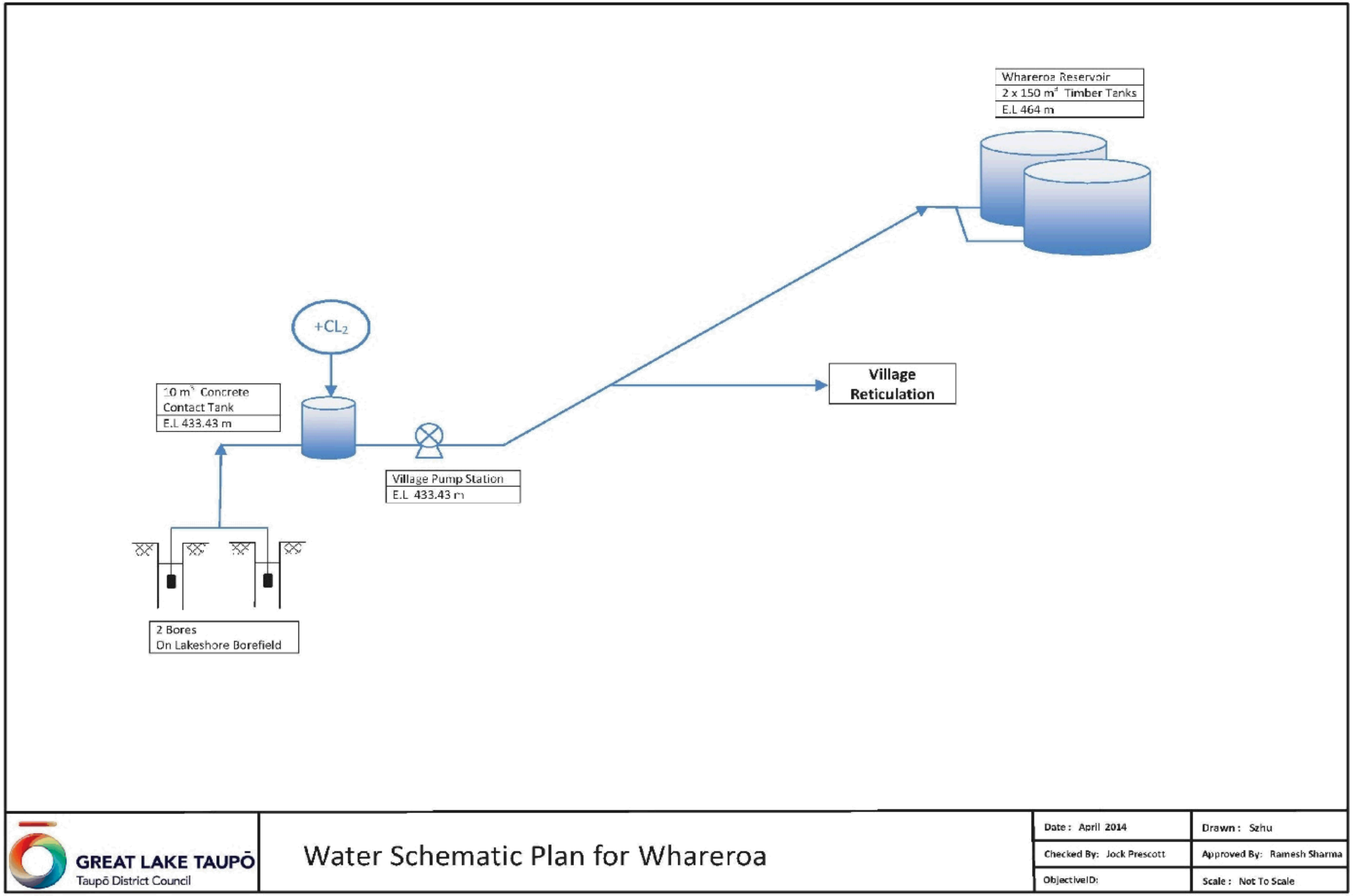
Whareroa Reservoir
2 x 150 m³ Timber Tanks
E.L 464 m
+CL2
Village
Reticulation
10 m³ Concrete
Contact Tank
E.L 433.43 m
Village Pump Station
E.L 433.43 m
2 Bores
On Lakeshore Borefield
GREAT LAKE TAUPŌ
Taupō District Council
Water Schematic Plan for Whareroa
Date : April 2014
Drawn : Szhu
Checked By: Jock Prescott
Approved By: Ramesh Sharma
ObjectiveID:
Scale : Not To Scale

Appendix S

ASSET MAINTENANCE, RENEWAL AND CAPITAL EXPENDITURE POLICY

PURPOSE

The Asset Management Policy is aligned with Council's vision "To be the most prosperous and liveable district in the North Island by 2022" and the long-term strategic goals found in the 2018 LTP of:

- Ensure that the Taupo District remains a great place to live
- Promote economic development
- Protect our water resources and use them wisely
- Maintain the quality infrastructure that we have
- Keep rates and debt affordable

OBJECTIVE

The objective of Council's Asset Management Policy is to:

- ensure service delivery is optimized to deliver agreed community outcomes and levels of service for both residents, visitors and the environment
- optimize expenditure over the life cycle of the assets
- risks and opportunities are identified and managed appropriately
- provide a
- service delivery that is sustainable for today and future generations

PRINCIPLES

The following principles will be used by Council to guide asset management planning and decision making:

- effective consultation with the community to determine appropriate levels of service
- Integration of asset management within Council's strategic, tactical and operational planning frameworks including corporate, financial, and business planning
- Informed decision making using lifecycle cost and risk management and the inter-generational approach
- Transparent and accountable asset management decision making
- Sustainable management of assets for present and future needs

CORPORATE FRAMEWORK

This Asset Management Policy links to Council's LTP, Infrastructure and Financial Strategy and Asset Management Plans. It builds on Council's strategic goals by promoting an integrated approach to the management of service delivery and across all asset classes.

STRUCTURED ASSESSMENT of ASSET MANAGEMENT PRACTICE

Council has undertaken a structured assessment of the appropriate level of asset management practice for each of the asset classes. This structured assessment follows the guidelines provided in Section 2.1.3 of the International Infrastructure Manual (IIMM 2011v4). The level of maturity determined for each asset class can be found in Section 1 - Introduction of the respective Asset Management Plan.

REVIEW of POLICY

This Asset Management Policy has informed the development of the 2018 asset management plans. It will be reviewed prior to undertaking asset management plan updates to support the 2021 LTP.

MATURITY ASSESSMENT

In the first quarter of 2015 the maturity level of each of the Asset Management Plans was assessed through an external review process to determine the actual level of maturity. This review formed the basis for the further refinement of each of the AMP's Improvement plans.

Further assessments will be undertaken every three years to determine the progress of improvements to the maturity level of the AMP's.

APPENDIX T
PROJECT BUSINESS CASES

LTP Business Case 1 to 3 years

Project Name	**Water Supply DWSNZ Membrane Programme**		
Description	Construction of new water treatment facilities to enable Arsenic, Protozoa and Cyanobacteria treatment.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Paint by Numbers
Programme	DWSNZ Membrane Programme	**Location**	Hatepe, Kinloch, Motuoapa, Omori, Centennial Drive

Strategic Objectives (*see appendix below to help score Strategic Objectives*)			
		Score	**Project Score Total**
Primary	Looking after Public Health and Safety	4	8
Secondary	Being Legislatively Compliant	4	
Background	The following Council water supply schemes have been identified as needing additional treatment to ensure the water is safe to drink and to enable compliance with the NZ Drinking-water Standards (DWSNZ) and the Health Act 1956. • Hatepe • Kinloch • Motuoapa • Omori • Centennial (option to connect to Taupo scheme still to be explored) • Motutere (see separate business case) The treated water at these sites do not meet the compliance requirements of the Drinking Water Standards New Zealand (DWSNZ). This is largely because the supplies do not provide a barrier to protozoa, and because the level of arsenic in the source water exceeds the DWSNZ maximum acceptable value. Cyanobacteria have also been identified in Lake Taupo waters and these can pose a health risk to consumers through the release of toxins into the water. It is proposed to upgrade each of these water treatment plants by the installation of chemical coagulation, membrane filtration, and cyanotoxin treatment (advanced oxidation or powdered activated carbon dosing) processes that will remove sediment, organic matter, arsenic, microbiological contaminants and cyanotoxins. Waste product treatment processes will be needed at Hatepe due to the absence of a wastewater treatment plant to discharge to. At all other sites, waste products will be thickened through clarification before discharge to the sewer. The Centennial plant includes a long pump main to the Taupo sewer. The primary driver for this business case is Looking after Public Health and Safety. This includes the long-term effects of those drinking water containing low levels of Arsenic, and the risk of widespread illness from a water contamination event such as that caused by Cyanotoxins, Giardia or Cryptosporidium which currently the treatment plant has no barrier to remove. The secondary driver for this business case is regulatory compliance with the Health Act 1956, which requires water supplied to take all practical steps to comply with the DWSNZ.		
Business Need	To upgrade 5 of Councils existing water treatment plants to provide safe water to our communities and to ensure compliance with the Health Act and the DWSNZ. A District wide water supply safety risk review completed in December 2019 rated this programme as the highest risk and priority. This programme is recommended for completion in year 1 to 3 of the new LTP.		

Benefits and Wellbeings (see appendix)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**

Providing high quality drinking water that complies with the DWSNZ.	Compliance of the treatment plants with the DWSNZ - measured and reported annually.	Legislative Compliance	Social
Providing high quality drinking water that prevents public health issues.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Improved Public Health	Social
Reliable water supply that is not prone to shut down due to poor water quality.	Monitor troubleshooting actions and call outs by operational staff to deal with source water quality issues.	Improve level of service	Social
Improved customer satisfaction with water supply quality.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Customer satisfaction	Social

Opportunity	Packaging of multiple treatment plant upgrades to allow streamlined procurement and to take advantage of efficiencies in delivery.		
Scope	**In**	**Out**	
	• Planning & feasibility works for each site. • Design and construction of new or upgraded treatment plant. • Design and upgrade of existing intake pump stations where required. • Design and construction of network upgrades where required. • Treatment of arsenic, bacteria, protozoa and cyanotoxins • Treatment of waste streams as required. • Connection to WWTP for discharge of wastes where possible. • Electrical, control and automation upgrades associated with the treatment plants. • Land acquisition where needed for the new or expanded treatment sites. • Review of option for Centennial scheme to confirm if a new plant or a pipeline is the best option.	• Upgrade of existing Reservoirs for additional storage. • Upgrade of WWTP to process membrane waste	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	• Sufficient site area or additional land able to be leased for new equipment • Maximum growth forecasts are accurate. • Source water quality remains the same as current
Dependencies	None		
Stakeholders	Senior management, Councillors, Residents/Customers, TMTB, Local Hapu, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	Yes, change management is required.		
Risk of Doing	Increased operational costs Increased operational complexity Community pushback on the costs of the project	**Commentary**	The plant upgrades will cost more to run from a power and chemicals perspective and will be more demanding operationally. However, the plants will be robust and easier to run during all source water conditions.
Risk of Not Doing	Non-compliance with the DWSNZ Non-compliance with the Health Act Public health risks Community complaints due to poor water quality, loss of supply or sickness	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health and meeting the minimum standard set out by the DWSNZ and Health Act.

	Fines, legal action, enforced upgrade costs. Ongoing operational challenges and reactive operational costs Negative publicity and impact on economic development		

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two – Connect Schemes via Pipelines**	**Option Three – Construct new treatment plants**
Overview	• The 'do nothing' option means Council will continue to provide water to the community via the current treatment facilities.	Pipe water supply from the nearest existing TDC reticulation. With the exception of Centennial, this option is not considered feasible for the following reasons: • Capital and Operational Costs All reasonable options for extension of existing schemes has been explored. The capital and operational costs of piping between these remaining schemes is far in excess of the membrane upgrade costs. • Growth Horizons Reduced Connecting schemes reduces the growth horizon of existing plants. For the Taupo/Centennial example this may mean upgrades for the Taupo scheme are needed sooner and a new facility needed to supply Taupo with water to service future growth. • Water Take Consent Revision In most cases, new water take consents would be required to allow a single site to feed two schemes. This would present a high level of risk and uncertainty to this option.	Upgrade the treatment plant to meet all requirements of the DWSNZ.
Advantages	• No capital cost to TDC.		• Significantly improved and DWSNZ compliant Water supply. • Reduced health risks as the community will receive high quality treated water • Independent water supply provides additional resilience.
Disadvantages	• Continuation of non-compliant water supply. • Legislative non-compliance with risk of fines or other legal action • Potential health risks to the community because of consuming potentially contaminated source water. • Reduced or negative community perception of TDC. • Other as detailed under risk of not doing		• High capital costs of upgrade. • Additional treatment processes to achieve DWSNZ requirements require additional ongoing operating costs.
Costs	Capex $0 Opex $No change		Capex $16.75M Opex $TBC
Achievability	This option is achievable but not acceptable from a public health and legislative perspective.		This option is highly achievable.
Recommendation	Proceed with option 3 as this provides the best outcome for the communities.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• To be delivered as programme of works. • Process plant design and procurement is underway and expected in year 0 (2020/21). • Civil works design and procurement will follow once process contractor is selected. • Construction planned to start in year 1 (2021/22) • Kinloch begins Year 0 as part of previous LTP, Omori construction Year 1, Hatepe and Motuoapa Year 2 and Centennial in Year 3 and 4.

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Planning and Design	Detailed design and cost estimate from engineers
WTP Upgrade	Upgrading the current WTP to meet minimum requirements set by DWSNZ
Hand over documentation	Asbuilt records, O&M manuals, Operator Training

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Lack of project planning at LTP submission stage means there is high uncertainty in the project estimates.	Moderate	Moderate	Medium
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Land area is not enough for the new plant	Unlikely	Moderate	Medium
Existing buildings require renovation/ upgrade or new buildings required	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Sponsor	Ensure benefits realisation.	Internal	0.01	36
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.10	36
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.30	36
Project Manager	Project Management	External	1.00	36
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	1.00	24
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.50	12
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	6

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Kinloch	$5.2M	Capital Years 1 and 2
Omori	$2.8M	Capital Years 1 and 2
Motuoapa	$2.6M	Capital Years 2 and 3
Hatepe	$2.7M	Capital Years 2 and 3
Centennial	$3.25M	Capital Years 3 and 4
Operational expenditure	$TBC	Operational
Total Estimated Capital Cost	$16.55M	
Total Estimated Operational Cost/year	$TBC	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan, Execute	Initiate, Plan, Execute	Initiate, Plan, Execute	Execute						
Cost of phase and year spent	$4.5M	$5.1M	$4.8M	$2.15M						

Approval *If there's been a significant change in scope or change in cost/benefit*			
Author – Tom Swindells	*TS*	Date	*25/01/21*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years

Project Name	Bonshaw Park DWSNZ Project		
Description	Provision of a DWSNZ compliant water supply to the community of Bonshaw Park.		
Business Owner	Tom Swindells	BC Author	Tom Swindells
Project Size	Medium	Project Complexity	Paint by Numbers
Programme		Location	Bonshaw Park

Strategic Objectives (*see appendix below* to help score Strategic Objectives)			
		Score	Project Score Total
Primary	Looking after public health and safety	4	8
Secondary	Being legislatively compliant	4	
Background	The Bonshaw Park drinking-water supply serves a small population of approximately 152 people (67 connections). Water is currently abstracted from two bores before it is chlorinated and distributed to the community. The treated water does not meet the compliance requirements of the Drinking Water Standards New Zealand (DWSNZ). This is largely because the supply does not provide a barrier to protozoa, and because the level of arsenic in the source water exceeds the DWSNZ maximum acceptable value. In addition, the water from the two bores is influenced geothermally and thus varies in quality and quantity, with supply often affected by the high temperature of the water. A recent project to drill a third bore has been problematic due to ongoing water quality issues. The proposed plan is to connect Bonshaw Park to the Taupo scheme via a pipeline, reservoir and pump station in order to feed DWSNZ compliant water to the community. The primary driver for this business case is Looking after Public Health and Safety. This includes the long-term effects of those drinking water containing low levels of Arsenic, and the risk of widespread illness from a water contamination event such as that caused by Cyanotoxins, Giardia or Cryptosporidium which currently the treatment plant has no barrier to remove. The secondary driver for this business case is regulatory compliance with the Health Act 1956, which requires water supplied to take all practical steps to comply with the DWSNZ.		
Business Need	To provide a safe drinking-water supply to the Bonshaw Park community and to ensure compliance with the Health Act and the DWSNZ. A District wide water supply safety risk review completed in December 2019 highly recommended that this project is completed in year 3 of the new LTP. However, due to the risk of loss of service that may be caused by water quality, temperature or other bore failures, it is proposed that this project is brought forward to years 1 and 2 of the new LTP.		

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Providing high quality drinking water that complies with the DWSNZ.	Compliance of the treatment plant with the DWSNZ - measured and reported annually.	Legislative Compliance	Social
Providing high quality drinking water that prevents public health issues.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Improved Public Health	Social
Reliable water supply that is not prone to shut down due to poor water quality.	Monitor troubleshooting actions and call outs by operational staff to deal with source water quality issues.	Improve level of service	Social

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Improved customer satisfaction with water supply quality.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Customer satisfaction	Social

Opportunity	The project can be delivered in conjunction with the Napier Road reservoir project. Decommissioning project including decommissioning of Bonshaw Park		
Scope	**In**	**Out**	
	• DN125 pipeline to new pump station site on corner of Crown and Napier Rd • New possibly transportable pump station (containerised) with power supply, communications and all ancillaries built to TDC standards • DN315 pipeline from pump station to Napier Rd reservoir site • DN125 pipeline from Napier Rd reservoir site to Bonshaw Park • DN125 pipeline along Caroline drive to existing treatment plant • During detail design stage, the ability to pump direct into the Bonshaw network will be explored. This would allow disconnection of the Bonshaw Park treatment plant connection into the existing network, and decommissioning of the treatment facility all together.	• Upgrade of existing Reservoirs for additional storage. • Removal/decommissioning of the existing water treatment plant. • Connections to rural properties on route to Bonshaw Park or other properties not currently connected to either the Taupo or Bonshaw park water supply. • Upgrade from Deborah Rise to treatment plant tanks	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	• Maximum growth forecast is accurate.
Dependencies	Napier Road Reservoir Project (although can proceed prior with good planning) Development above Botanical Heights area (although can proceed prior with good planning)		
Stakeholders	Senior management, Councillors, Residents of Bonshaw Park, Tūwharetoa Maori Trust Board, Local Hapu, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	Non-compliance with the DWSNZ Non-compliance with the Health Act Public health risks Community complaints due to poor water quality, loss of supply or sickness Fines, legal action, enforced upgrade costs. Ongoing operational challenges and reactive operational costs Negative publicity and impact on economic development	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health and meeting the minimum standard set out by DWSNZ.

Options Analysis *(add more options if applicable)*

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	Option One: Change Nothing	Option Two – Pipeline from Taupo via new Pump Station	Option Three – Pipeline from Taupo via Botanical Heights Pump Station
Overview	The 'do nothing' option means Council will continue to provide water to the community via the current treatment plant.	New pump station on corner of Crown and Napier Roads, pumping direct to Bonshaw Park.	New pipelines from Botanical Heights PS to Napier Rd reservoir site. New water tanks and pump station located at Napier Rd site to pump to Bonshaw Park.
Advantages	• No capital cost to TDC.	• Significantly improved and DWSNZ compliant water supply. • Land purchase can be deferred until Napier Rd reservoir is built. • Only minor aspects cannot be reused in future • Pump station can be moved to Napier Rd reservoir site in future. • Cheaper than option 3.	• Significantly improved and DWSNZ compliant water supply. • Napier Rd Reservoir site secured early for future use.
Disadvantages	• Continuation of non-compliant water supply. • Legislative non-compliance with risk of fines or other legal action • Potential health risks to the community • Reduced or negative community perception • Risk of loss of supply • Other as detailed under risk of not doing	• Capital Cost, although cheaper than option 3. • Additional demand on Tamatea/Tauhara zone – preference to add demand to Titoki/Botanical zone.	• Capital Costs, highest. • Land purchase needed. • Significant pipeline from Botanical Heights must be built through undeveloped land and may be rerouted or disused in future. • Water tanks not needed in future.
Costs	Capex $ 0 Opex $ No change	Capex $ 2.3M Opex $ Similar to Existing	Capex $ 2.8M Opex $ Similar to Existing
Achievability	This option is not considered achievable due to the risks associated with public health, legislation and potential loss of supply.	This option is highly achievable.	This option is highly achievable.
Recommendation	Proceed with option 2 as this provides the best value for the community.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Hydraulic modelling and concept design • Planning, consents and consultation • Detail design, tendering, construction via normal construction project • Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**

Planning and Design	Detailed design and cost estimate from engineers
PS Installation	New pump station to meet future growth flows
Pipeline	New pipeline to TDC CoP requirements with as-builts provided.
Hand over documentation	Asbuilt records, O&M manuals, Operator Training

Key Risks – things that provide uncertainty in the project, focus on High risks if possible [(see risk matrix in the appendix)]()			
Risk	**Likelihood**	**Impact**	**Score**
Risk of bore failure prior to project completion	Moderate	Moderate	Medium
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Consultation challenges through resource consent process	Unlikely	Major	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	24
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	24
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.20	18
Project Manager	Project Management	External	0.50	18
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	9
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.50	1
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	3
Communications Staff	Comms plan and support	Internal	0.01	3

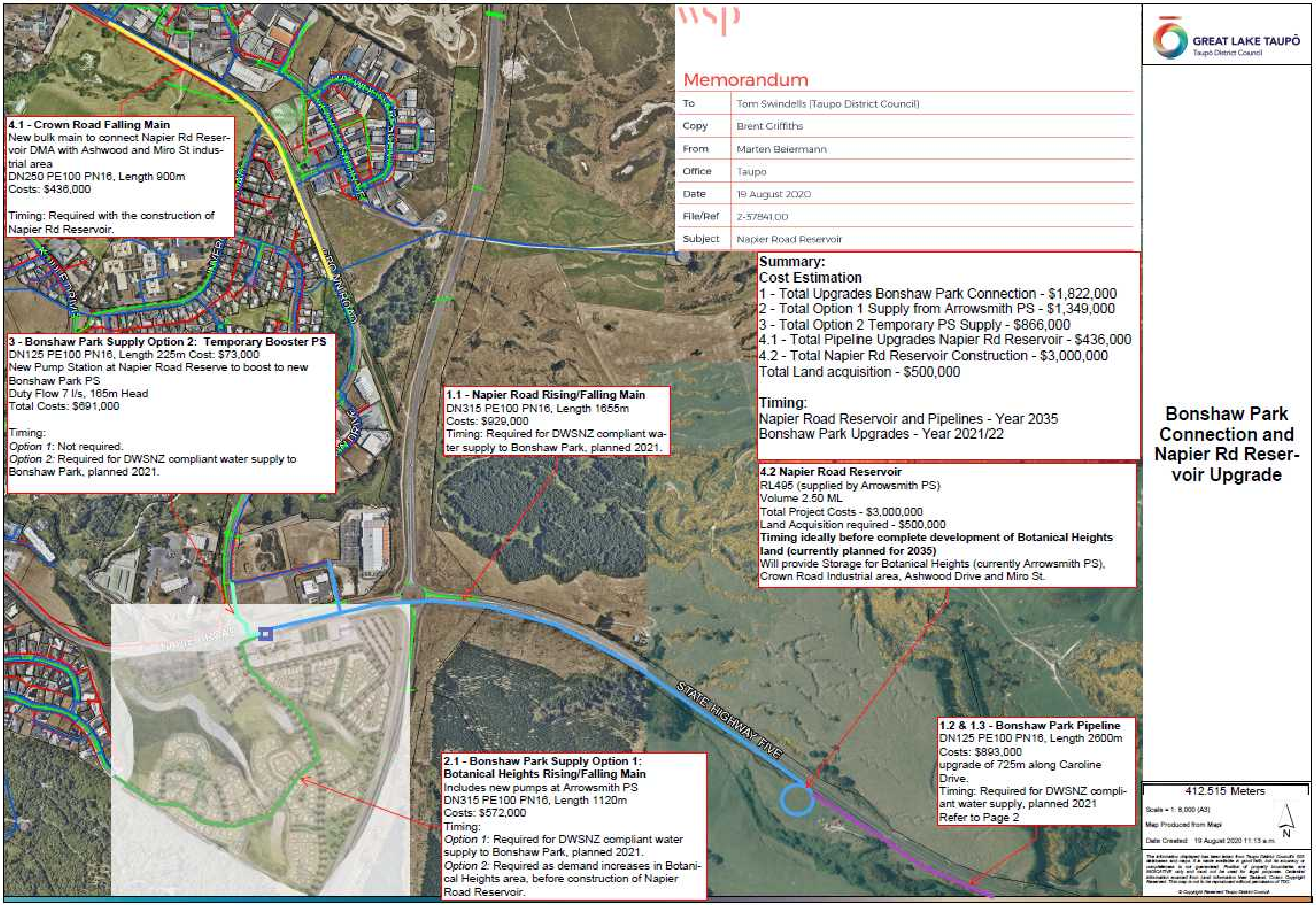
Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
DN125 pipeline to new pump station site on corner of Crown and Napier Rd	$ 75,000	Capital
New transportable pump station (containerised) with power supply, communications and all ancillaries built to TDC standards	$ 300,000	Capital
DN315 pipeline from pump station to Napier Rd reservoir site	$ 930,000	Capital
DN125 pipeline from Napier Rd reservoir site to Bonshaw Park	$ 698,000	Capital
DN125 pipeline along Caroline Drive to Deborah Rise	$ 195,000	Capital
DN125 pipeline Deborah Rise to WTP	$ 102,000	Capital
Total Estimated Capital Cost	$2,300,000	

Total Estimated Operational Cost/year	Similar to Existing	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan	Execute								
Cost of phase and year spent	$230,000	$2,070,000								
It is highly recommended this project is completed in years 1 and 2 of the new LTP.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Author – Tom Swindells	*TS*	**Date**	*25/01/2021*
Approval – Denis Lewis		**Date**	

LTP Business Case 1 to 3 years



LTP Business Case 1 to 3 years

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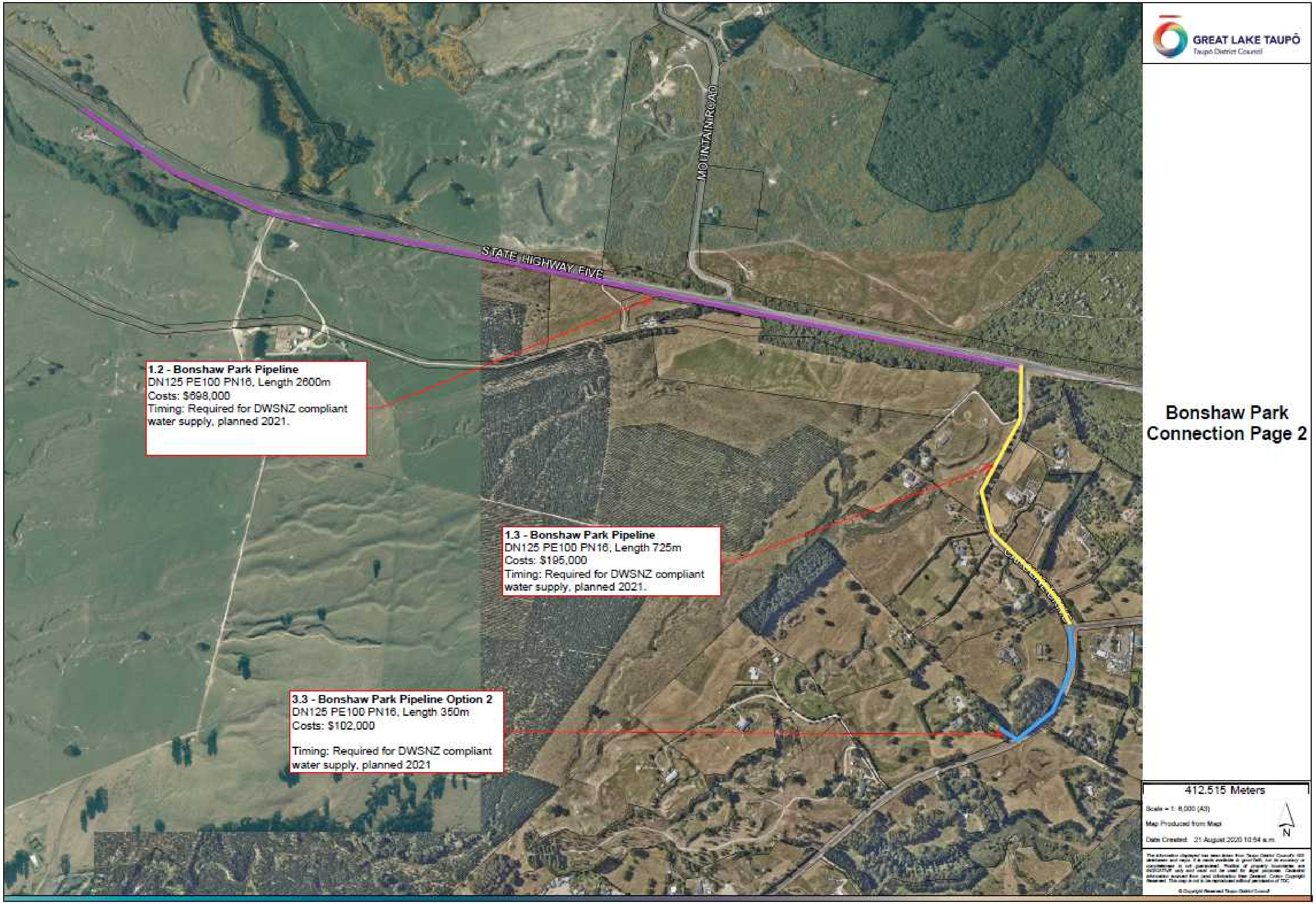


LTP Business Case 1 to 3 years

Project Name	Whakamoenga Point DWSNZ Project		
Description	Provision of a DWSNZ compliant water supply to the community of Whakamoenga Point.		
Business Owner	Tom Swindells	BC Author	Tom Swindells
Project Size	Medium	Project Complexity	Paint by Numbers
Programme		Location	Whakamoenga Point

Strategic Objectives (*see appendix below* to help score Strategic Objectives)			
		Score	Project Score Total
Primary	Looking after public health and safety	4	8
Secondary	Being legislatively compliant	4	
Background	The Whakamoenga Point drinking-water supply serves a small population of approximately 87 people (48 connections). Water is currently abstracted directly from Lake Taupo adjacent to the boat ramp at Whakamoenga Point. It is pumped to a reservoir where treatment consist of chlorine disinfection. Treated water is then gravity fed from the storage tank to Whakamoenga Point residents. The treated water does not meet the compliance requirements of the Drinking Water Standards New Zealand (DWSNZ). This is largely because the supply does not provide a barrier to protozoa, and because the level of arsenic in the source water exceeds the DWSNZ maximum acceptable value. Cyanobacteria have also been identified in Lake Taupo waters and these can pose a health risk to consumers through the release of toxins into the water. It is proposed to install a pump station and pipeline from Acacia Bay to Whakamaonega Point in order to feed DWSNZ compliant water from the taupo scheme to the community. The primary driver for this business case is Looking after Public Health and Safety. This includes the long-term effects of those drinking water containing low levels of Arsenic, and the risk of widespread illness from a water contamination event such as that caused by Cyanotoxins, Giardia or Cryptosporidium which currently the treatment plant has no barrier to remove. The secondary driver for this business case is regulatory compliance with the Health Act 1956, which requires water supplied to take all practical steps to comply with the DWSNZ.		
Business Need	To provide a safe drinking-water supply to the Whakamoenga Point community and to ensure compliance with the Health Act and the DWSNZ. A District wide water supply safety risk review completed in December 2019 highly recommended that this project is completed in year 1 and 2 of the new LTP.		

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Providing high quality drinking water that complies with the DWSNZ.	Compliance of the treatment plant with the DWSNZ - measured and reported annually.	Legislative Compliance	Social
Providing high quality drinking water that prevents public health issues.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Improved Public Health	Social
Reliable water supply that is not prone to shut down due to poor water quality.	Monitor troubleshooting actions and call outs by operational staff to deal with source water quality issues.	Improve level of service	Social

Improved customer satisfaction with water supply quality.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Customer satisfaction	Social

Opportunity	To provide a safe drinking-water supply to the Whakamoenga Point community and to ensure compliance with the Health Act and the DWSNZ.		
Scope	**In**	**Out**	
	• Planning & feasibility works. • Hydraulic modelling of upgrade • Land acquisition if required for pump station • Design and construction of new booster pump station to feed to existing reservoirs, including power supply, communications and all ancillaries • Design and construction of new pipeline from pump station to Whakamoenga Point, connecting into rising main that feeds the reservoirs •	• Upgrade of existing Reservoirs for additional storage. • Removal/decommissioning of the existing water treatment plant. • Network upgrades within Acacia Bay	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	• Growth forecasts are accurate. • Council land available to site new pump station.
Dependencies	Acacia Bay connection to Taupo - project currently underway (2020/21) Could be delivered as a package with other pipeline projects such as the Bonshaw Park connection, the low pressure project, or water network renewals projects.		
Stakeholders	Senior management, Councillors, Residents of Whakamoenga Point, Acacia Bay and taupo, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	Non-compliance with the DWSNZ Non-compliance with the Health Act Public health risks Community complaints due to poor water quality, loss of supply or sickness Fines, legal action, enforced upgrade costs. Ongoing operational challenges and reactive operational costs Negative publicity and impact on economic development	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health and meeting the minimum standard set out by DWSNZ.

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two – Replacing the existing water treatment plant**	**Option Three – Pipeline connection to Taupo reticulation**

Overview	The 'do nothing' option means Council will continue to provide water to the community via the current treatment plant.	Upgrade the existing water treatment plant to meet all requirement of DWSNZ.	Construct new pipeline and pump station to connect to the Taupo water supply thus meet all requirements of the DWSNZ.
Advantages	• No capital cost to TDC.	• Significantly improved and DWSNZ compliant water supply. • Additional resilience achieved by retaining existing source.	• Significantly improved and DWSNZ compliant water supply. • Reduced health risks as the community will receive high quality treated water. • Lower complexity solution that is easier to maintain and operate.
Disadvantages	• Continuation of non-compliant water supply. • Legislative non-compliance with risk of fines or other legal action • Potential health risks to the community because of consuming potentially contaminated source water. • Reduced or negative community perception of TDC. • Other as detailed under risk of not doing	• High capital cost associated with upgrading a new treatment plant for a small community. • Additional land needed for treatment plant location. • High operating cost to run and maintain the new plant as well as the existing intake. • High complexity solution, difficult to operate and maintain.	• Capital cost of constructing new pipeline and pump station • Additional operating cost of running and maintaining a new pump station. • Land needed for new pump station.
Costs	Capex $ 0 Opex $ No change Total $	Capex $ 2M Opex $ Significant Increase Total $ 2M+	Capex $ 1.42M Opex $ Similar to Existing Total $ 1.42M
Achievability	This option is achievable but not acceptable from a public health and legislative perspective.	This option is achievable	This option is highly achievable.
Recommendation	Proceed with option 3 as this is the lowest OPEX and CAPEX solution and provides the best outcome for the Whakamoenga Point community.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Land acquisition, planning, consents and consultation • Detail design, tendering, construction – normal construction project approach

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High

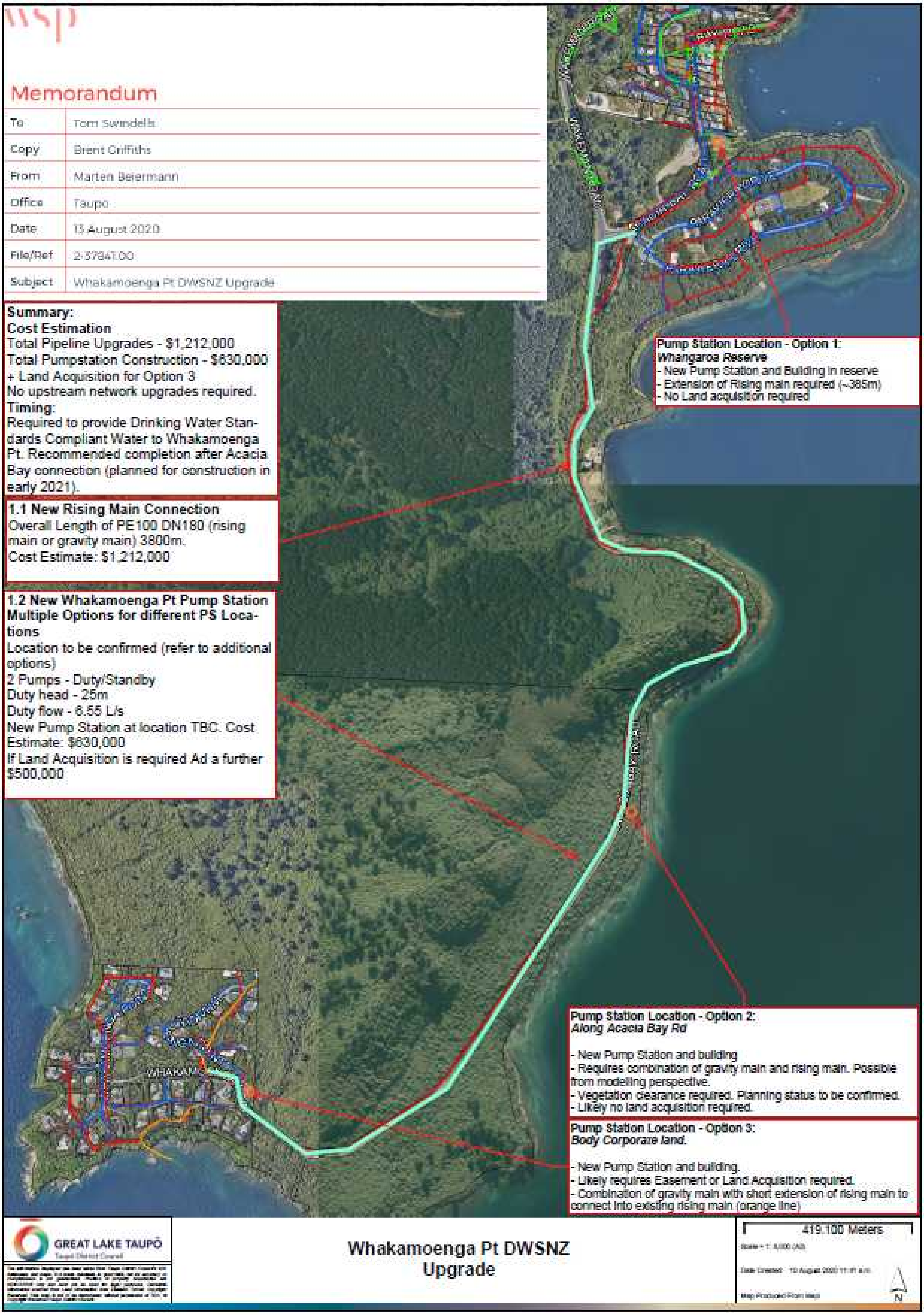
Pump station location can be secured	Unlikely	Major	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	18
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	18
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.20	12
Project Manager	Project Management	External	0.50	12
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	6
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.50	1
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	3
Communications Staff	Comms plan and support	Internal	0.01	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Pump Station 6.55l/s at 25m head	$200,000	Capital
DN180 Pipeline 3.8km	$1,220,000	Capital
Total Estimated Capital Cost	$1,420,000	
Total Estimated Operational Cost/year	$ similar to existing	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate/Plan	Execute								
Cost of phase and year spent	$150,000	$1,270,000								
It is highly recommended this project is completed in years 1 and 2 of the new LTP.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells		**Date**	
Approval – Denis Lewis		**Date**	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Memorandum
To Tom Swindells
Copy Brent Griffiths
From Marten Beiermann
Office Taupo
Date 13 August 2020
File/Ref 2-37841.00
Subject Whakamoenga Pt DWSNZ Upgrade
Summary:
Cost Estimation
Total Pipeline Upgrades - $1,212,000
Total Pumpstation Construction - $630,000
+ Land Acquisition for Option 3
No upstream network upgrades required.
Timing:
Required to provide Drinking Water Standards Compliant Water to Whakamoenga Pt. Recommended completion after Acacia Bay connection (planned for construction in early 2021).
1.1 New Rising Main Connection
Overall Length of PE100 DN180 (rising main or gravity main) 3800m.
Cost Estimate: $1,212,000
1.2 New Whakamoenga Pt Pump Station Multiple Options for different PS Locations
Location to be confirmed (refer to additional options)
2 Pumps - Duty/Standby
Duty head - 25m
Duty flow - 6.55 L/s
New Pump Station at location TBC. Cost Estimate: $630,000
If Land Acquisition is required Ad a further $500,000
Pump Station Location - Option 1:
Whangaroa Reserve
- New Pump Station and Building in reserve
- Extension of Rising main required (~385m)
- No Land acquisition required
Pump Station Location - Option 2:
Along Acacia Bay Rd
- New Pump Station and building
- Requires combination of gravity main and rising main. Possible from modelling perspective.
- Vegetation clearance required. Planning status to be confirmed.
- Likely no land acquisition required.
Pump Station Location - Option 3:
Body Corporate land.
- New Pump Station and building.
- Likely requires Easement or Land Acquisition required.
- Combination of gravity main with short extension of rising main to connect into existing rising main (orange line)
GREAT LAKE TAUPŌ
Whakamoenga Pt DWSNZ Upgrade
419.100 Meters
N

LTP Business Case 1 to 3 years

Project Name	**Motutere Water Supply DWSNZ Upgrade**		
Description	Upgrade of the Motutere Water Treatment Plant to meet the DWSNZ.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Paint by Numbers
Programme		**Location**	Motutere

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	Looking after public health and safety	4	5
Secondary	Placemaking	1	
Background	The Motutere Campground water supply scheme serves a varied population from as low as 10 people out of season, to in excess of 400 during peak holiday periods. Water is currently abstracted directly from Lake Taupo. Treatment consists of coarse filtration to remove solids and chlorine disinfection. Treated water is fed to the campground who are the only customer. The treated water does not meet the compliance requirements of the Drinking Water Standards New Zealand (DWSNZ). This is largely because the supply does not provide a barrier to protozoa, and because the level of arsenic in the source water exceeds the DWSNZ maximum acceptable value. Cyanobacteria have also been identified in Lake Taupo waters and these can pose a health risk to consumers through the release of toxins into the water. As this water scheme serves a single customer (the campground), TDC as water supplier is considered a self-supplier under the Health Act 1956. For this reason, the supply does not legally have to comply with DWSNZ. However, the supply is managed no different to any other Council supply and an upgrade to DWSNZ compliance is considered necessary to reduce the health risk of all consumers. There is also the possibility of future extension of the scheme to include the properties at Motutere Point. Should this occur, the scheme would legally be required to meet the DWSNZ. The options for upgrade of the water treatment plant involve either installation of a UV system which will provide partial compliance with the DWSNZ or installation of chemical coagulation, carbon dosing, and membrane filtration processes (well-known and tested technologies) that will remove sediment, organic matter, arsenic, microbiological contaminants and cyanotoxins, and achieve full compliance with the DWSNZ. The primary driver for this business case is Looking after Public Health and Safety. Failure to upgrade the plant could have an impact on the health of those drinking the water. This includes the long-term effects of those drinking water containing low levels of Arsenic, and the risk of widespread illness from a water contamination event such as that caused by Cyanotoxins, Giardia or Cryptosporidium which currently the treatment plant has no barrier to remove. The secondary driver for this business case is Placemaking as a safe water supply will improve the attractiveness of the campground. Notes: - There is currently no mechanism to bill the campground for water use. - Recent developments at the campground have increased the water usage. - Peak usage exceeded the consented take volume in the 2019/20 summer. - Treaty settlements / ownership of land and assets currently being worked through			
Business Need	To construct a water treatment plant capable of providing safe water to the Motutere campground. A District wide water supply safety risk review completed in December 2019 gave this scheme a high-risk rating and therefore it is recommended this project is completed in year 2 of the new LTP.		

Benefits and Wellbeings (see appendix)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**

Providing high quality drinking water that complies with the DWSNZ.	Compliance of the treatment plant with the DWSNZ - measured and reported annually.	Legislative Compliance	Social
Providing high quality drinking water that prevents public health issues.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Improved Public Health	Social
Reliable water supply that is not prone to shut down due to poor water quality.	Monitor troubleshooting actions and call outs by operational staff to deal with source water quality issues.	Improve level of service	Social
Improved customer satisfaction with water supply quality.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Customer satisfaction	Social

Opportunity	The project may be packaged with a several other treatment plant upgrades to allow streamlined procurement and to take advantage of efficiencies in delivery.		
Scope	**In**	**Out**	
	• Planning & feasibility works. • Land acquisition within the campground for increase in plant size • Design and construction of new treatment plant. • Treatment of bacteria and protozoa for option 2 and in addition, arsenic and cyanotoxins for option 3. • Pipework to and from plant location. • Intake pump station improvements as required. • Power upgrades if required.	• Upgrade of existing Reservoir for additional storage. Not likely to be required. • Upgrade of Reticulation network not required or included. • Upgrade of the wastewater treatment plant is not included.	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Land availability	**Assumptions**	• Maximum growth forecast is accurate. • Allow for Motutere point connection in the overall plant expansion.
Dependencies	Land acquisition. Resource consent may be required for the construction of a new building to house the treatment processes.		
Stakeholders	Senior management, Councillors, Campground owner, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), Motutere Point Trust, Motutere Campground Iwi Trust, TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	• Land / asset ownership issues. • Currently there is no ratepayers to fund this project. • Increased operational costs • Increased operational complexity	**Commentary**	The new plant will cost more to run and will be more demanding from an operational perspective.

	• Community pushback on the costs of the project • Campground do not currently pay water rates and so Council will need to fund the upgrade through other means.		
Risk of Not Doing	• Non-compliance with the DWSNZ (future risk) • Non-compliance with the Health Act (future risk) • Public health risks • Community complaints due to poor water quality, loss of supply or sickness • Fines, legal action, enforced upgrade costs. • Ongoing operational challenges and reactive operational costs • Negative publicity and impact on economic development	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health.

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two – Upgrade to partial DWSNZ compliant**	**Option Three – Upgrade the existing plant to full DWSNZ compliant**
Overview	The 'do nothing' option means Council will continue to provide water to the community via the current treatment plant. Advise campground of decision and recommend lack of compliance is communicated to all customers.	Construct plant to provide treatment for bacteria, and protozoa, but not arsenic and cyanotoxins. Advise campground of decision and recommend lack of compliance is communicated to all customers.	Construct a new treatment plant to meet all requirements of the DWSNZ.
Advantages	• No capital cost to TDC.	• Compliance with protozoa and bacteria components of the DWSNZ. • Acute microbiological health risks dealt with. • Low capital cost to upgrade. • Most consumers not normally resident, therefore arsenic risk is low. • Cyanotoxin risk can be dealt with by tanker supply.	• Significantly improved and DWSNZ compliant Water supply. • Reduced health risks as the campground will receive high quality treated water • Independent water supply provides additional resilience.
Disadvantages	• Potential health risks to the community because of consuming potentially contaminated water. • Legislative non-compliance with risk of	• Further upgrade will be needed if Motutere Point is connected. • Small operating cost increase.	• High capital cost. Approximately $1.5M • Large operating cost increase.

	fines or other legal action (future risk) • Reduced or negative community perception of TDC. • Other items as listed in risk of not doing	• Arsenic exposure remains for permanent residents at campground.	
Costs	Capex $ 0 Opex $ No change	Capex $ 0.3M estimated	Capex $ 1.5M
Achievability	This option is achievable but may not be considered acceptable from a public health and legislative perspective.	This option is highly achievable, but may not be considered acceptable.	This option is highly achievable.
Recommendation	Proceed with option 2 as determined by SLT and Councillors.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Plan, consult, design • Procurement • Construct off site • Install commission in year 2

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Planning and Design	Detailed design and cost estimate from engineers
Land Aquisition	Agreed location / lease alteration documents with campground.
WTP Upgrade	Upgrading the current WTP to meet minimum requirements set by DWSNZ
Hand over documentation	Asbuilt records, O&M manuals, Operator Training

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Inability to agree location of new plant	Unlikely	Major	Medium
Lack of project planning at LTP submission stage means there is high uncertainty in the project estimates.	Moderate	Moderate	Medium
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	18
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	18

Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.10	12
Project Manager	Project Management	External	0.20	12
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	6
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.50	1

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Total Estimated Capital Cost	$0.3M	
Total Estimated Operational Cost/year	$TBC	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex – No ratepayers to pay for this.		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)		Initiate, Plan, Execute								
Cost of phase and year spent		0.3M								

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*25/01/21*
Approval – Denis Lewis		Date	

Project Name	**DWSNZ Bore Head Upgrade Programme**		
Description	Upgrade of water supply bores at Atiamuri, Whakamaru and Whareroa to improve bore head protection inline with the requirements of the DWSNZ.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme	DWSNZ Bore Head Upgrade Programme	**Location**	Atiamuri, Whakamaru and Whareroa

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	Looking after Public Health and Safety	4	8
Secondary	Being Legislatively Compliant	4	
Background	The water supply bores at Atiamuri, Whakamaru and Whareroa have been identified as needing improvement to meet bore head protection requirements of the NZ Drinking-water Standards (DWSNZ). Inadequate bore head protection can lead to contaminants entering groundwater through the bore head. Inadequate bore head protection has led to water safety outbreaks including the year 2000, Walkerton, Canada E.coli event which killed 6 people following animal waste entering ground water through a bore head. At the three sites there is inadequate set back distance to prevent animals and humans accessing the bores, and the design does not divert surface water away from the bore head. Bore head protection is included as an improvement item in the Water Safety Plans (WSP) for Whakamaru with an implementation date of end 2021. Similar improvement actions can be expected in the Atiamuri and Whareroa WSPs as these are updated. The primary driver for this business case is Looking after Public Health and Safety. Failure to complete this project could have an impact on the health of those drinking the water. This includes the risk of widespread illness from a water contamination event such as that caused by Giardia or Cryptosporidium which currently the treatment plants have no barrier to remove. The secondary driver for this business case is regulatory compliance with the Health Act 1956, which requires water supplied to take all practical steps to comply with the DWSNZ.		
Business Need	To upgrade the water supply bores at Atiamuri, Whakamaru and Whareroa to improve bore head protection inline with the requirements of the DWSNZ. Water Safety Plan improvement action timeline is end of the 2021 calendar year and therefore this project needs to be delivered in year 1 of the new LTP.		

Benefits and Wellbeings (see appendix)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Providing high quality drinking water that complies with the DWSNZ.	Compliance of the treatment plants with the DWSNZ - measured and reported annually.	Legislative Compliance	Social
Providing high quality drinking water that prevents public health issues.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Improved Public Health	Social
Reliable water supply that is not prone to shut down due to poor water quality.	Monitor troubleshooting actions and call outs by operational staff to deal with source water quality issues.	Improve level of service	Social

Improved customer satisfaction with water supply quality.	Monitoring of complaints relating to water supply quality - measured and reported annually.	Customer satisfaction	Social

Opportunity	Upgrade the water supply bores at Atiamuri, Whakamaru and Whareroa to improve bore head protection inline with the requirements of the DWSNZ.		
Scope	**In**	**Out**	
	• Planning & feasibility works. • Design of bore head protection works. • Consultation as required. • Construction – fencing, concreting, drainage, signage, raising of bore heads if required.	• Upgrade of treatment plants • Drilling new bores • Land purchase	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Existing bore head assets and land availability • Whareroa land area is reserve	**Assumptions**	• Sufficient existing site area or additional land available around bore heads
Dependencies	None		
Stakeholders	Senior management, Councillors, Residents/Customers, TMTB, Local Hapu, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	Yes, change management is required.		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	Non-compliance with the DWSNZ Non-compliance with the Health Act Public health risks Community complaints due to poor water quality, or sickness Fines, legal action, enforced upgrade costs. Ongoing operational challenges and reactive operational costs Negative publicity and impact on economic development	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health and meeting the minimum standard set out by DWSNZ.

Options Analysis *(add more options if applicable)*		
	Option One: Change Nothing	**Option Three – Improve Bore Head Protection**
Overview	• The 'do nothing' option means Council will not improve bore head protection at the sites	Upgrade of water supply bores at Atiamuri, Whakamaru and Whareroa to improve bore head protection inline with the requirements of the DWSNZ.
Advantages	• No capital cost to TDC.	• DWSNZ compliant Water supply • Reduced health risks as the community will receive high quality treated water • Improved community perception of TDC.
Disadvantages	• Continuation of non-compliant water supply. • Legislative non-compliance with risk of fines or other legal action	• Capital cost

	• Potential health risks to the community because of consuming potentially contaminated source water. • Reduced or negative community perception of TDC.	
Costs	Capex $0 Opex $No change Total $0	Capex $105k Opex $0 Total $105k
Achievability	This option is achievable but not acceptable from a public health and legislative perspective.	This option is highly achievable.
Recommendation	Proceed with option 2 as this provides the best outcome for the communities.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• To be delivered as programme of works • Design, tender, construct

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Design	Detailed design and cost estimate from engineers
Planning	Consultation documents, land boundary agreements
Construction	Bore head protection sign off by DWA
Hand over documentation	Asbuilt records, O&M manuals, Operator Training

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Land area is not enough for improvements	Unlikely	Moderate	Medium
Upgrade on Whareroa reserve area is opposed	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	6
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	2
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.10	6
Project Manager	Project Management	External	0.20	6
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.10	2
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.10	1

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Atiamuri	$20k	Capital

Whakamaru	$25k	Capital
Whareroa	$60k	Capital
Total Estimated Capital Cost	$105k	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded?		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan, Execute	Execute								
Cost of phase and year spent	$65k	$40k								
This project must be completed in year 1 and 2 due to legislative requirements.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*25/01/21*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years

Project Name	**Turangi and Mangakino Treatment Improvements**		
Description	Upgrades including duty, standby chlorine dosing, run to waste automation, and improved security at Turangi and Mangakino WTPs.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Turangi, Mangakino

Strategic Objective *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	BEING RESILIENT AND PREPARED	3	6
Secondary	MAINTAINING LEVELS OF SERVICE	3	

Background	A water supply risk review completed in 2019 recommended improvements at the Turangi and Mangakino water treatment plants to reduce water supply risks for these communities. The improvements recommended include: • Installation of duty/standby chlorine dosing equipment to provide redundancy following equipment failure and so ensure water supply continuity • Installation and automation of run to waste facilities at each site to allow operations flexibility when dealing with source water variations that could impact safe water supply • Security improvements to the spring head at Turangi to prevent vermin access Key outcomes include improved resilience, maintaining level of service, and improving public health.
Business Need	Upgrades including duty, standby chlorine dosing, run to waste automation, and improved security at Turangi and Mangakino WTPs.
Option/s	1. Do Nothing 2. Upgrade as planned

Benefits and Wellbeings *(see appendix)*		
Benefit	**Benefit Type**	**Wellbeing**
Improved system reliability	Social	Customer Satisfaction
Improved resilience	Social	Improved Resilience and Preparedness
Improved treated water quality	Social	Improved Public Health

Opportunity	Upgrades including duty, standby chlorine dosing, run to waste automation, and improved security at Turangi and Mangakino WTPs.		
Scope	**In**	**Out**	**Maybe**
	Turangi • Duty, standby chlorine dosing, • New automated run to waste system • Spring head security improevments to prevent vermin access Mangakino • Duty, standby chlorine dosing, • Automation of existing run to waste system	• Treatment improvements not listed	•
Constraints	• Resources. External project management is recommended.	**Assumptions**	

	• Project funding may be a constraint as the project will likely be rates funded.		
Dependencies		**Stakeholders**	Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.
Potential Issues with the preferred option			
Risk of Not Doing	Loss of service more likely, reduced resilience, increased public health risks		

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Project Resources – Role Name	**Primary Responsibility**	**Internal/External**
Sponsor	Ensure benefits realisation.	Internal
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External
Project Manager	Project Management	External
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External
Treatment Team Leader	Interface with treatment plant, design reviews, training commissioning, handover	Internal

Cost Summary		
Item	**Estimated Cost**	**Capital or Operational**
Turangi	$100k	Capital
Mangakino	$75k	Capital
Total Estimated Capital Cost	$175k	
Total Estimated Operational Cost/year	$ 0	

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)			Initiate, Plan, Execute							
Cost of phase and year spent			175k							
Approval *This is the initial approval of the Business Case. It may be further prioritised against other projects*										
Approvers Name										
Date										

LTP Business Case 4 to 6 years

Project Name	**Taupo Taste, Odour and Cyanotoxin Treatment Upgrade**		
Description	Installation of Powdered Activated Carbon Dosing System at the Taupo WTP		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Paint by Numbers
Programme		**Location**	Taupo

Strategic Objective *(see appendix below to help score Strategic Objectives)*

		Score	Project Score Total
Primary	BEING RESILIENT AND PREPARED	5	10
Secondary	MAINTAINING LEVELS OF SERVICE	5	

Background

The Taupo WTP does not currently provide treatment for taste or odour compounds or cyanotoxins. Cyanotoxins are toxins that are harmful to humans and animals and are produced by bacteria called cyanobacteria that are known to live in Lake Taupo. Under the right growth conditions for these bacteria, blooms can form, and toxins can be released. In addition to cyanobacteria, other bacteria and algae in the lake water can react with treatment chemicals to form taste and odour compounds that are intolerable to some consumers, leading to complaints.

Councils cyanobacteria management plans are based around monitoring and testing for bacteria and toxins so that the water supply can be shutdown should toxins be found to be present. Shutting down the Taupo WTP would have major implications for the community, and so this project has been proposed to avoid the situation.

Currently there is little that can be done for genuine taste and odour complaints caused by the lack of treatment. This project would resolve this issue.

The strategic objectives are chosen on the basis that it is critical to provide water services for Taupo to operate

Business Need

Installation of Powdered Activated Carbon Dosing System at the Taupo WTP to ensure water service provision is maintain for customers in Taupo.

Option/s

1. Do Nothing
2. Install PAC Dosing as planned

Benefits and Wellbeings *(see appendix)*

Benefit	Benefit Type	Wellbeing
Treatment for taste and odour compounds will reduce customer complaints	Social	Customer Satisfaction
Maintains ability to provide water supply to customers during n cyanobacteria event	Social	Customer Satisfaction Improved Public Safety Improved Resilience and Preparedness
Reduces major cost implications should the Taupo water supply need to be shutdown during a cyanobacteria event	Economic	Cost Avoidance

Opportunity

Installation of Powdered Activated Carbon (PAC) Dosing System at the Taupo WTP to ensure water service provision is maintain for customers in Taupo.

Scope

In	Out	Maybe
• Below ground 60m3 PAC contact tank • Containerised PAC dosing plant • Relocation of coagulant dose point and new static mixer	• Additional membranes • Other alterations to membrane plant not listed	• Online chlorophyll sensor

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Taupō District Council

	• Civil, mechanical, electrical, instrumentation and control enabling works • Consents/approvals from TMTB		
Constraints	• Resources. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Existing site boundaries. • Lake level may impact construction timeframes • Peak water demand may limit time for cut ins.	**Assumptions**	
Dependencies	•	**Stakeholders**	Senior management, Councillors, residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.
Potential Issues with the preferred option	• Additional H&S risks created with handling of PAC • Construction challenges working within existing plant boundaries		
Risk of Not Doing	Cyanobacteria bloom leading to toxin release that requires the Taupo WTP to be shut for an extended period. This would result in loss of water service for the community. Customer dissatisfaction due to water supply taste and/or odour.		

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Project Resources – Role Name	Primary Responsibility	Internal/External
Sponsor	Ensure benefits realisation.	Internal
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External
Project Manager	Project Management	External
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External
Treatment Team Leader	Interface with treatment plant, design reviews, training commissioning, handover	Internal

Cost Summary		
Item	**Estimated Cost**	**Capital or Operational**
P&G	$132k	Capital
Civil	$70k	Capital
PAC Dosing System Tank & Pipework	$745k	Capital
EI&C	$45k	Capital
Testing & Commissioning	$20k	Capital
Professional Fees	$100k	Capital
Contingency	$288k	Capital

Total Estimated Capital Cost	$1,400k	
Total Estimated Operational Cost/year	$ Increase when dosing PAC only	

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)						Initiate, Plan	Execute			
Cost of phase and year spent						140k	1260k			

Approval *This is the initial approval of the Business Case. It may be further prioritised against other projects*	
Approvers Name	
Date	

Project Name	Taupo Water Poihipi Reservoir		
Description	Construction of a new 4,750m3 water storage reservoir to service Taupo residents living North of the Waikato River.		
Business Owner	Tom Swindells	BC Author	Tom Swindells
Project Size	Medium	Project Complexity	Paint by Numbers
Programme	New Reservoir Build Programme	Location	Taupo

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	Project Score Total
Primary	BEING RESILIENT AND PREPARED	5	8
Secondary	MAINTAINING LEVELS OF SERVICE	3	
Background	The Taupo water scheme delivers water from the Lake Terrace Water Treatment Plant to developments north of the river via two water mains over and under the Waikato river. The area North of the River is split into five pressure zones as follows: - Low Zone – fed via gravity from Tamatea Reservoir located south of the river, no storage in area north or river - High Zone – fed via direct online pump stations, no storage in zone - Wairakei – fed via pump stations to the Wairakei Reservoirs (440m3 storage) - Acacia Bay – fed by pump station to Cherry Lane Reservoir (4,500m3 storage) - Mapara – fed by pump station to Blue Ridge Reservoir (45m3 storage) The total water storage available at peak in these areas north of the river is 12 hours. The low and high zone areas have no storage available. Best practice for resilience planning is to ensure 24 hours storage is available under peak flows. The growth plan for the Northern side of the Waikato River is to establish two new reservoirs; one in the low zone, Brentwood (2,000m3) and one in the high zone, Poihipi Road area (4,750m3). The priority is to build the larger Poihipi Road reservoir first, as it will improve emergency storage levels to in excess of 24 hours and reduces the risk of pump failures impacting the high zone customers. The Brentwood reservoir is planned to be built in 2035 when growth increases demand to a point that emergency storage drops to 21 hours. The project will include upgrade of the existing Woodward Street Pump Station including new Poihipi and Wairakei pump sets, pipelines to the reservoir from the pump station and from the reservoir to the Brentwood area, and construction of a new reservoir. The primary driver for this business case is being resilient and prepared. Doing this project reduces the chances of losing water services to a significant area of Taupo including the communities of Wairakei, Rangatira Park, Nukuhau, Brentwood, Acacia Bay and Mapara. The secondary driver is maintaining levels of service as the project will enable the continuation of water service delivery to Taupo water users on the North side of the Waikato River.		
Business Need	Meet emergency treated water storage requirements of 24 hours through construction of a new 4.75 ML water storage reservoir to service Taupo residents living North of the Waikato River.		

Benefits and Wellbeings (see appendix)			
Benefit	How will you quantify and track	Benefit Type	Wellbeing
Emergency storage levels improved	24 hours emergency storage to be achieved for North side of river.	Improved Public Safety	Social

<table>
<tr><td colspan="2">Reduced service interruptions as no longer reliant on pumps to provide pressure to consumers.</td><td colspan="2">Annual low pressure, and no water complaints before and after</td><td>Customer Satisfaction</td><td>Social</td></tr>
<tr><td colspan="2">Improved flow to Wairakei area following pump station upgrade.</td><td colspan="2">Increase in flow capacity at pump station.</td><td>Enabling Sustainable Growth</td><td>Economic</td></tr>
<tr><td>Opportunity</td><td colspan="5">Construction of a new 4,750m3 treated water reservoir that will increase emergency storage in Taupo, North of the Waikato to in excess of 24 hours. It will also enable gravity feed to the Nukuhau and Brentwood pumped zones which in turn removes two pump stations from operation. It will cater for growth in the Wairakei area following pump station upgrade.</td></tr>
<tr><td rowspan="2">Scope</td><td colspan="2">In</td><td colspan="3">Out</td></tr>
<tr><td colspan="2">Planning & feasibility works
Hydraulic modelling
Consultation
Land acquisition
Land easements
Pump station upgrade at Woodward Street including:
New Poihipi Pumps and upgraded Wairakei pumps
Power upgrade
New generator
Upgrade of all electrical panels and telemetry
Pipelines
Rising falling main from Woodward to Reservoir
Falling main from reservoir to Brentwood
Reservoir
4.75ML IL4 reservoir
Site access /fencing /signage etc
Power to site
Communications
Burst control
PRV to enable direct feed to Wairakei rising main</td><td colspan="3">Network upgrades</td></tr>
<tr><td>Constraints</td><td>Depending on project timing, resources would be a constraint. External project management is recommended.
Project funding may be a constraint as the project will likely be rates funded.
Land acquisition and easements</td><td>Assumptions</td><td colspan="3">Growth profiles</td></tr>
<tr><td>Dependencies</td><td colspan="5">Opportunity exists to deliver this project as a programme of works including the following new reservoirs: Tauhara Ridge, Brentwood, Napier Road, Kinloch Low Zone and potentially other reservoir renewals.</td></tr>
<tr><td>Stakeholders</td><td colspan="5">Senior management, Councillors, Residents, Land Owners including Landcorp, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.</td></tr>
<tr><td>Change Mgmt.</td><td colspan="5">No</td></tr>
<tr><td>Risk of Doing</td><td>Community pushback on the costs of the project</td><td>Commentary</td><td colspan="3"></td></tr>
</table>

	Land acquisition and easement process may cause delays		
Risk of Not Doing	Loss of service on the North side of the river during an emergency. Woodward Street Pump Station Failure	**Commentary**	

Options Analysis *(add more options if applicable)*			
	Option One: Change nothing	**Option Two: Construct Brentwood reservoir first, followed by Poihipi reservoir**	**Option Three: Construct Poihipi reservoir followed by Brentwood reservoir**
Overview	• No change to network.	• Brentwood reservoir constructed in 2021/22 to bring emergency storage up to 22 hours • Poihipi Reservoir still constructed asap to increase prevent storage dropping as low as 14hrs by 2025.	• Poihipi Reservoir constructed in 2021/22 and 2022/23. • Brentwood reservoir constructed in 2035, or when growth requires.
Advantages	• No capital cost to TDC.	• Brentwood reservoir can be constructed quickly as site is available. • Fast improvement to emergency water storage availability	• Emergency storage improved to in excess of 24 hours. • Brentwood and Nukuhau areas no longer on pumped supply. • Brentwood reservoir not needed for 10+ years.
Disadvantages	• High risk of loss of service on the north side of the river.	• Capital cost • 24 hours storage will not be achieved until Poihipi reservoir is built. • Brentwood and Nukuhau areas still reliant on pumps • Poihipi reservoir still needs to be built quickly to alleviate storage issue.	• Capital cost • 2 year design and construct timeline
Costs	Capex $ 0 Opex $ No Change Total $ 0	Capex $ 2.4M Opex $ Similar to Existing Total $ 2.4M	Capex $ 9.86M Opex -$ 20k (1 pump station no longer in use) Total $ 9.86M
Achievability	This option is highly achievable.	This option is highly achievable.	This option is highly achievable.
Recommendation	Proceed with option 3 which provides the best outcome. Note: Timing adjusted due to financial limitations. Poihipi reservoir will be constructed between years 11 and 13.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

• Land acquisition up front
• Standard construction programme – likely split into pipelines/pump station and reservoir projects
    o Pipeline/Pump Station – design, tender, construct
    o Reservoir – design build project

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible [(see risk matrix in the appendix)]			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Land acquisition and/or easements cannot be agreed	Unlikely	Major	Medium
If project not delivered Woodward St pump station will be at risk of failure. $50k upgrade will be required as a minimum to mitigate risk.	Likely	Major	High

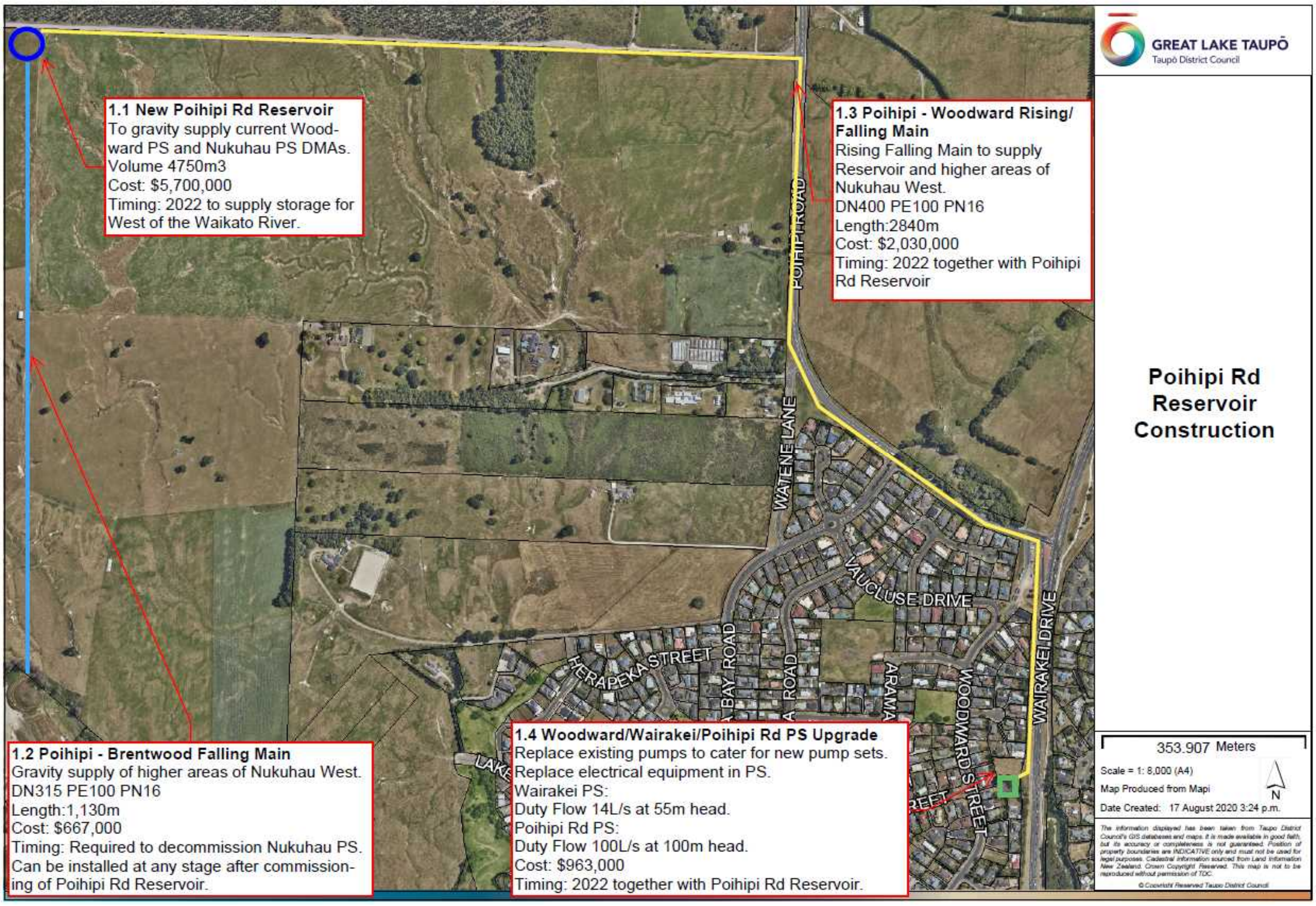
Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	24
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	24
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.20	24
Project Manager	Project Management	External	0.50	24
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	12
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.10	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Reservoir	$5.7M	Capital
Poihipi Woodward Rising Falling Main	$2.03M	Capital
Poihipi Brentwood Falling Main	$0.67M	Capital
Pump Station	$0.96M	Capital
Land Acquisition	$0.05M	Capital
Total Estimated Capital Cost	$9.41M	
Total Estimated Operational Cost/year	Minimal change	
Total Estimated cost	$9.41M	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex Project		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Land Purchase									
Cost of phase and year spent	$0.05M									
It is recommended this project is delivered as soon as possible in the new LTP due to the existing lack of emergency treated water storage on the North side of the Waikato River. Land purchase to proceed in year 1. Reservoir construction planned for years 11 to 13.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Author – Tom Swindells	*TS*	Date	*26/01/2021*
Approval – Denis Lewis		Date	

Supporting Information:



LTP Business Case 4 to 6 years

GREAT LAKE TAUPŌ
Taupō District Council

Project Name	**Taupo Water Brentwood Reservoir**		
Description	Construction of a new 2,000m3 water storage reservoir to service Taupo residents living North of the Waikato River.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Paint by Numbers
Programme	New Reservoir Build Programme	**Location**	Taupo

Strategic Objective *(see appendix below to help score Strategic Objectives)*

		Score	Project Score Total
Primary	BEING RESILIENT AND PREPARED	5	8
Secondary	MAINTAINING LEVELS OF SERVICE	3	

Background	The Taupo water scheme delivers water from the Lake Terrace Water Treatment Plant to developments north of the river via two water mains over and under the Waikato river. The area North of the River is split into five pressure zones as follows: - Low Zone – fed via gravity from Tamatea Reservoir located south of the river, no storage in area north of river - High Zone – fed via direct online pump stations, no storage - Wairakei – fed via pump stations to the Wairakei Reservoirs (440m3 storage) - Acacia Bay – fed by pump station to Cherry Lane Reservoir (4,500m3 storage) - Mapara – fed by pump station to Blue Ridge Reservoir (45m3 storage) The total water storage available at peak in these areas is 12 hours. The low and high zone areas have no storage available. Best practice for resilience planning is to ensure 24 hours storage is available under peak flows. The growth plan for the Northern side of the Waikato River is to establish two new reservoirs; one in the low zone, Brentwood (2,000m3) and one in the high zone, Poihipi Road area (4,750m3). The priority is to build the larger Poihipi Road reservoir first, as it will improve emergency storage levels to in excess of 24 hours and reduces the risk of pump failures impacting the high zone customers. The Brentwood reservoir is planned to be built in 2035 when growth increases demand to a point that emergency storage drops below 21 hours. The primary driver for this business case is being resilient and prepared. Doing this project will ensure treated water storage remains above targeted levels of 24 hours for communities north of the Waikato River. The secondary driver is maintaining levels of service as the project will enable the continuation of water service delivery to Taupo water users on the North side of the Waikato River.
Business Need	Maintain emergency treated water storage requirements of 24 hours through construction of a new 2ML water storage reservoir to service Taupo residents living North of the Waikato River.
Option/s	1. Do Nothing 2. Build 2ML Brentwood reservoir in 2035 3. Increase size of Poihipi reservoir by 2ML, planned for construction in 2034

Benefits and Wellbeings *(see appendix)*

Benefit	Benefit Type	Wellbeing
Emergency storage levels improved	24 hours emergency storage to be achieved for North side of river.	Improved Public Safety
Reduced service interruptions as no longer reliant on pumps to provide pressure to consumers.	Annual low pressure, and no water complaints before and after	Customer Satisfaction

<table>
<tr><td>Opportunity</td><td colspan="4">Construction of a new 2,000m3 treated water reservoir that will maintain emergency storage in Taupo, North of the Waikato to in excess of 24 hours.</td></tr>
<tr><td rowspan="2">Scope</td><td colspan="2">In</td><td colspan="1">Out</td><td>Maybe</td></tr>
<tr><td colspan="2">• Planning & feasibility works
• Hydraulic modelling
• Consultation
• Design and construction including:
  o Pipelines
  o Reservoir
  o Site access /fencing /signage etc
  o Communications
  o Burst control
  o Site landscaping</td><td>• Land acquisition - planned for completion 2021</td><td>• Pump station upgrade</td></tr>
<tr><td>Constraints</td><td>• Depending on project timing, resources would be a constraint. External project management is recommended.
• Project funding may be a constraint as the project will likely be rates funded.</td><td>Assumptions</td><td colspan="2">• Growth profile determines timing for reservoir
• Land purchase occurs in 2020/2021</td></tr>
<tr><td>Dependencies</td><td>• Opportunity exists to deliver this project as a programme of works including the following new reservoirs: Tauhara Ridge, Poihipi, Napier Road, Kinloch Low Zone and potentially other reservoir renewals.</td><td>Stakeholders</td><td colspan="2">Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.</td></tr>
<tr><td>Potential Issues with the preferred option</td><td colspan="4">If growth is slower than forecast, the project may be deferred.</td></tr>
<tr><td>Risk of Not Doing</td><td colspan="4">Loss of service on the North side of the river due to lack of emergency storage.</td></tr>
</table>

Project Outputs – the things the project is going to deliver

Output	**Output Quality Details**
As per scope	

Project Resources – Role Name	**Primary Responsibility**	**Internal/External**
Sponsor	Ensure benefits realisation.	Internal
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External
Project Manager	Project Management	External
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal

Cost Summary		
Item	**Estimated Cost**	**Capital or Operational**
Reservoir	$2.4M	Capital
Pipelines	$0.5M	Capital
Pump Station	$0.1M	Capital
Total Estimated Capital Cost	$3.0M	
Total Estimated Operational Cost/year	$No Change	
Total Estimated cost	$3.0M	

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)										
Cost of phase and year spent										
Planned for delivery in years 13 and 14.										

Approval *This is the initial approval of the Business Case. It may be further prioritised against other projects*	
Approvers Name	
Date	

LTP Business Case 1 to 3 years

Project Name	**Taupo Water Tauhara Ridge Reservoir and Airport Connection**		
Description	New 2,000m3 Medium Pressure Zone Reservoir at Tauhara Ridge, Taupo and connection of the Airport Development to Medium Zone Water Supply.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Paint by Numbers
Programme	New Reservoir Build Programme	**Location**	Taupo

Strategic Objectives (*see appendix below to help score Strategic Objectives*)			
		Score	**Project Score Total**
Primary	BEING RESILIENT AND PREPARED	5	8
Secondary	MAINTAINING LEVELS OF SERVICE	3	
Background	The Taupo water scheme delivers water from the Lake Terrace Water Treatment Plant to the Southern Taupo residential areas. The Southern area is split into five pressure zones as follows: - Low Zone – fed via gravity from Titoki Reservoir (4,500m3) - Medium Zone – fed by pump station to Botanical Reservoir (1,800m3) - High Zone – direct pump fed, no storage - Airport Zone – fed by pump station from the Airport Reservoir (360m3) - Waitahanui Zone – fed by pump station from the Waitahanui Reservoir (600m3) The total water storage in the low and medium zones is declining as growth occurs. Best practice for resilience planning is to ensure 24 hours storage is available under peak flows. By the year 2025, storage in the Medium Zone will have reduced to 16 hours and therefore a new reservoir is proposed to improve storage levels. The Tauhara Ridge reservoir is also part of a masterplan to enable ongoing growth in the Wharewaka area supplied by the medium zone. This includes installing new pipelines to connect the airport development area to medium zone water, removing the need for the current pump station and reservoir at the airport, upgrading the Titoki pump station, and improving current low pressure issues. This medium zone connection will improve water pressure and security of supply to the airport area including drastically improving fire flows. If this reservoir, pump station and pipelines are not built, areas of Wharewaka and Richmond Heights will begin to experience low pressure water supply as growth continues including in the airport development areas. The primary driver for this business case is being resilient and prepared. Doing this project reduces the chances of losing water services to a significant area of Taupo. The secondary driver is maintaining levels of service as the project will enable the continuation of water service delivery to Taupo water users as growth occurs in the catchment. It will also maintain/improve levels of service to current and future customers in the airport area.		
Business Need	Maintain emergency treated water storage of 24 hours to service existing and new Taupo residents in the Titoki and Botanical pressure zones. Provide a new treated water reservoir of volume 2,000m3 to connect with the Tauhara Ridge bulk main so as to enable further development in the Southern areas of the Taupo township. Enable the direct feed of water from the medium pressure zone into the airport development reticulation to maintain and improve levels of service in this area, including improved fire flow.		

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Emergency storage levels improved	24 hours emergency storage to be maintained	Improved Public Safety	Social
Maintaining service levels to all customer as growth occurs.	Annual low pressure, and no water complaints before and after	Customer Satisfaction	Social
Improved fire flows at the airport area	Annual fire flow testing	Improved Public Safety	Social

<table>
<tr><td>Opportunity</td><td colspan="3">To construct a new 2,000 m3 treated water reservoir to service the southern Taupo medium zone area. To connect the airport area to the improved medium zone water supply, to improve fire flow and supply security, allowing the existing pump station and reservoir at the airport to be decommissioned.</td></tr>
<tr><td rowspan="2">Scope</td><td colspan="2">In</td><td>Out</td></tr>
<tr><td colspan="2">• Planning & feasibility works
• Hydraulic modelling
• Consultation
• Design and construction including:
  ○ Titoki pump station upgrade
  ○ Rising/falling main Titoki PS to Reservoir
  ○ Reservoir 2ML
  ○ Burst control
  ○ Power to site
  ○ Communications
  ○ Site access /fencing /signage etc
  ○ Upgrade of pipeline feeding airport and within airport</td><td>• Airport pump station and reservoir removal
• Land purchase
• Decommissioning of airport PS and reservoir</td></tr>
<tr><td>Constraints</td><td>• Resources. External project management is recommended.
• Project funding may be a constraint as the project will likely be rates funded.
• Land acquisition and easements</td><td>Assumptions</td><td>• Growth plans are accurate
• Land has already been purchased</td></tr>
<tr><td>Dependencies</td><td colspan="3">Tauhara Ridge Falling Main construction (tendered July 2020)
Water Reform Government Funding to extend Tauhara Ridge Pipeline to reservoir site and to airport connection location on ETA.
Opportunity exists to deliver this project as a programme of works including the following new reservoirs: Poihipi, Brentwood, Napier Road, Kinloch Low Zone and potentially other reservoir renewals.</td></tr>
<tr><td>Stakeholders</td><td colspan="3">Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, NZTA, Project Team (TDC staff and Consultants), TDC Treatment Operations Team, TDC Network Engineers</td></tr>
<tr><td>Change Mgmt.</td><td colspan="3">No</td></tr>
<tr><td>Risk of Doing</td><td>Community pushback on the costs of the project</td><td>Commentary</td><td></td></tr>
<tr><td>Risk of Not Doing</td><td>Emergency storage levels insufficient resulting in loss of service.
Failure of reservoir could result in large water outage.
Increase in water low pressure complaints as growth continues.</td><td>Commentary</td><td></td></tr>
</table>

Options Analysis *(add more options if applicable)*		
	Option One: Change nothing	**Option Two: Construct Tauhara Ridge Reservoir and Airport Connection**
Overview	• No change to network.	• Tauhara Ridge reservoir and pipelines constructed in 2023/24 and 2024/25
Advantages	• No capital cost to TDC.	• Improvement to emergency water storage availability • System resilience improved with reservoir built to current earthquake codes • Medium pressure water fed direct to the airport and Southern growth areas, improving fire flows. Level of service maintained as Taupo growth occurs.
Disadvantages	• Emergency storage levels below expected levels • Resilience levels should an earthquake damage Botanical Reservoir • Low pressure issues increase as growth continues and significant network upgrades likely to be needed to ensure levels of service maintained.	• Capital cost
Costs	Capex $ 0 Opex $ No Change	Capex $ 4.17M (including TDC owned land) Opex - $ 20k estimated (1 pump station and reservoir decommissioned, 1 new reservoir)
Achievability	This option is highly achievable.	This option is highly achievable.
Recommendation	Proceed with option 2 which provides the best outcome.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

• Standard construction programme – likely split into pipelines and reservoir projects
  ○ Pipelines – design, tender, construct
  ○ Reservoir – design build project

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Pipeline laying through undeveloped land. May result in need to relay pipe in future.	Unlikely	Moderate	Medium
Unsuitable ground conditions on reservoir site	Unlikely	Major	Medium

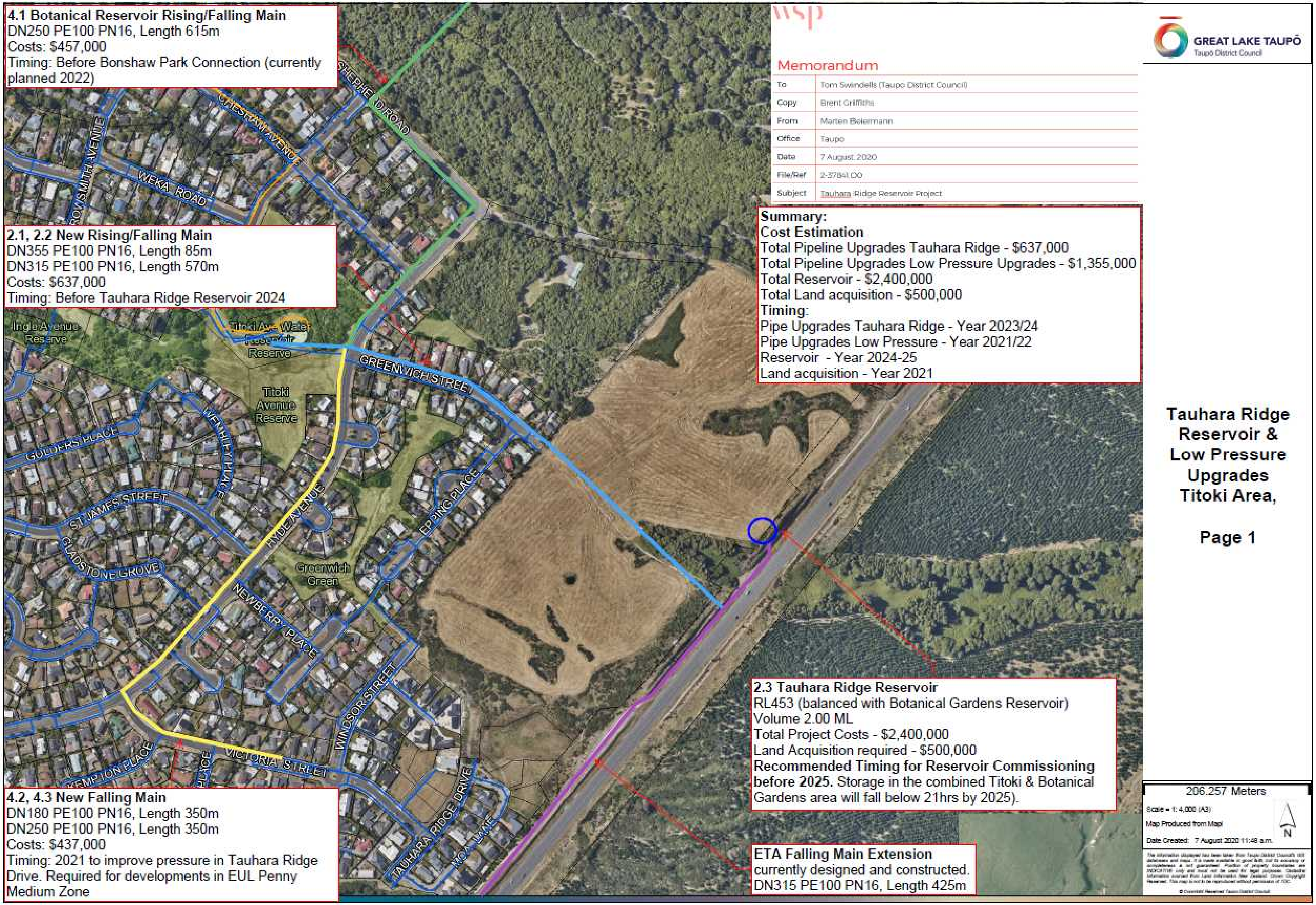
Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	36
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	36
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.10	36
Project Manager	Project Management	External	0.50	36
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	12
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.10	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Reservoir	$2.4M	Capital
Rising Falling Pipelines	$0.64M	Capital
Airport Connection Pipelines	$0.45M	Capital
Titoki Pump Station Upgrade	$0.33M	Capital
Pump Station Maintenance	-$20k	Operational saving
Land Purchase (TDC owned)	$350k	Capital
Total Estimated Capital Cost	$4.17M	
Total Estimated Operational Cost/year	-$20k	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex Project		

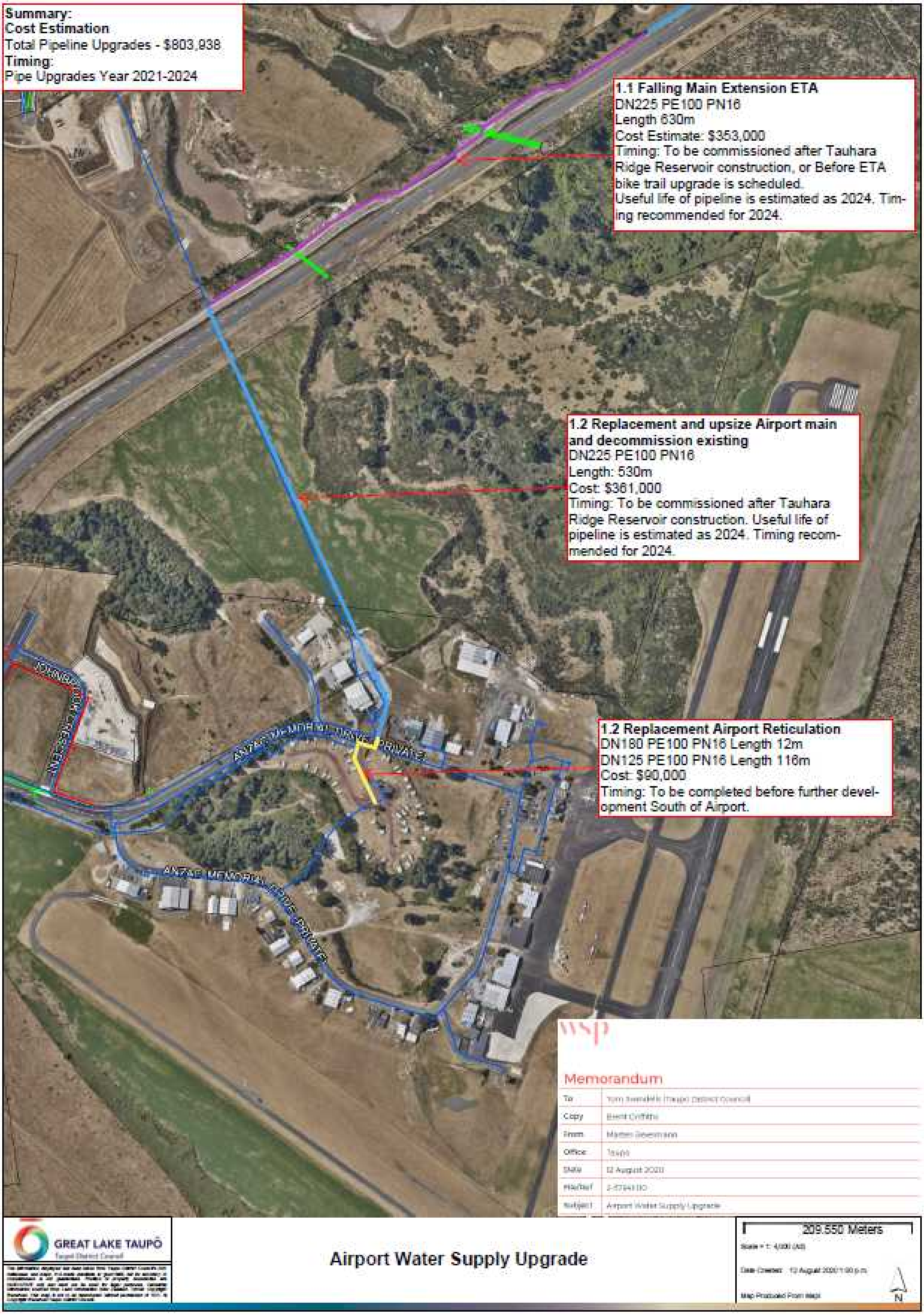
Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Land purchase	Initiate / Plan	Execute							
Cost of phase and year spent	$0.35M	$1.22M	$2.6M							
It is recommended this project is delivered in year 2 and 3 (by end of year 2024) to ensure treated water storage in the Medium zone remains within expected levels for resilience, and levels of service are maintained.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*26/01/2021*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years



LTP Business Case 1 to 3 years



LTP Business Case 1 to 3 years

Project Name	Kinloch Water Low Zone Reservoir		
Description	New 2ML reservoir construction, decommission old reservoir and construction of pump tank to feed Whakaroa scheme.		
Business Owner	Tom Swindells	BC Author	Tom Swindells
Project Size	Medium	Project Complexity	Paint by Numbers
Programme	New Reservoir Build Programme	Location	Kinloch

Strategic Objectives *(see appendix below to help score Strategic Objectives)*

		Score	Project Score Total
Primary	BEING RESILIENT AND PREPARED	5	8
Secondary	MAINTAINING LEVELS OF SERVICE	3	

Background

The Kinloch water scheme is split into three pressure zones.

- Low Zone – fed via gravity from 450m3 reservoir located at the end of Boojum Dell
- High Zone – fed via gravity from 2,000m3 reservoir located at the end of Locheagles Rise
- Whakaroa Rural Zone – fed via combination of pumps and gravity from small tanks.

Treated water storage in the Kinloch low zone is significantly below acceptable levels with only 6 hours of storage currently available. As development continues the available storage will further reduce to a worst case 4.5 hours following completion of the full Kinloch Structure Plan (KSP) development.

These storage levels are highly concerning when considering how to manage water supply outages, failures, or emergencies e.g. a large fire. Customers in the low zone are at high risk of loss of supply should an event occur at peak time that prevent supply to the reservoir. It should also be noted that the existing Kinloch low zone reservoir does not meet seismic resilience criteria and is at risk of failure in a seismic event.

This project includes construction of a new 2,000m3 reservoir in the Kinloch low zone, with the preferred location a block of land to the West of the Kinloch International Golf Course. Construction of this reservoir will improve storage levels to 24 hours at forecast peak flow for the full KSP development. Once complete the existing low zone reservoir will be decommissioned and a small tank installed in its place to enable the ongoing feed to the Whakaroa rural area.

The primary driver for this business case is being resilient and prepared. Doing this project reduces the risk of losing water services to the majority of Kinloch customers. The secondary driver is maintaining levels of service as the project will future proof the ongoing supply of water to Kinloch customers.

Business Need

Improve treated water storage requirements in the Kinloch low zone to 24 hours through construction of a new 2 ML water storage reservoir.

Remove risk of existing low zone reservoir failing through renewal of this tank.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Treated water storage levels improved	24 hours emergency storage to be achieved	Improved Public Safety	Social
Reduced risk of service interruptions	Annual low pressure, and no water complaints before and after	Customer Satisfaction	Social

Opportunity

To construct a new treated water storage reservoir in the Kinloch low zone to provide 24 hours storage in the low zone area.

	To decommission the existing low zone reservoir and install a new tank for the ongoing pumped supply to the Whakaroa rural area.		
Scope	**In**	**Out**	

	• Planning & feasibility works
	• Hydraulic modelling
	• Consultation
	• Land acquisition
	• Land easements
	• Design and construction of new 2ML res including:
	  ○ Pipelines including network upgrades
	  ○ Reservoir
	  ○ Site access /fencing /signage etc
	  ○ Power to site
	  ○ Communications
	  ○ Burst control valve
	• Design, decommissioning and construction of new pump tank:
	  ○ Install new pump tank (50-200m3 TBC)
	  ○ Reconfigure pipework,
	  ○ Decommissioning of existing reservoir		

Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Land acquisition and easements	**Assumptions**	• Land purchase can be negotiated.
Dependencies	Kinloch DWSNZ Treatment Plant Upgrade Opportunity exists to deliver this project as a programme of works including the following new reservoirs: Tauhara Ridge, Brentwood, Napier Road, Poihipi and potentially other reservoir renewals.		
Stakeholders	Senior management, Councillors, Residents, Land Owners including Kinloch Holdings Ltd, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project Land acquisition and easement process may cause delays	**Commentary**	
Risk of Not Doing	Loss of service in Kinloch, existing reservoir runs dry during emergency, operational error, or other outage.	**Commentary**	

Options Analysis *(add more options if applicable)*			
	Option One: Change nothing	**Option Two: Construct new reservoir**	**Option Three: Renewal and upgrade of reservoir at Boojum Dell.**
Overview	• No change to network.	• Construct new 2ML reservoir in low zone	• Renew and upgrade existing low zone reservoir from 450m3 to 2,000m3
Advantages	• No capital cost to TDC.	• Improves resilience • Lower capital cost than renewal and upgrade • Improves storage levels	• Renewal of existing tank • Improves storage levels • Existing site available

Disadvantages	• High risk of loss of service remains in Kinloch	• Capital cost • Land purchase needed	• Capital cost • Existing site too small • Surrounding land is DOC/Iwi land • Difficult site and access • Complex temporary works needed to maintain service to Kinloch Low and Whakaroa zones
Costs	Capex $ 0 Opex $ No Change	Capex $ 5.23M Opex $ Similar to Existing	Capex $ 6.8M Opex $ Similar to Existing
Achievability	This option is achievable but leaves the community with unacceptable risk.	This option is achievable.	This option is difficult to achieve due to land constraints.
Recommendation	Proceed with option 2 which provides the best outcome.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

- Land acquisition up front
- Standard construction programme – likely split into pipelines, reservoir and decommissioning projects
  - Pipeline – design, tender, construct
  - Reservoir – design build project
  - Decommissioning – design, tender, deconstruct

Project Outputs – the things the project is going to deliver

Output	Output Quality Details
Planning and Design	Detailed design and cost estimate from engineers
Land Acquisition	Sale and purchase agreement
Pipeline	New pipeline to TDC CoP requirements with as-builts provided.
Reservoir	New reservoir to TDC CoP requirements with as-builts provided.
Hand over documentation	Asbuilt records, O&M manuals

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)

Risk	Likelihood	Impact	Score
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Land acquisition and/or easements cannot be agreed	Unlikely	Major	Medium
Fault lines in the area, may push up construction costs	Unlikely	Major	Medium

Project Resource Requirements

Role	Primary Responsibilities	Internal or External	FTE Estimate	Duration (months)
Sponsor	Ensure benefits realisation.	Internal	0.01	24
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	24

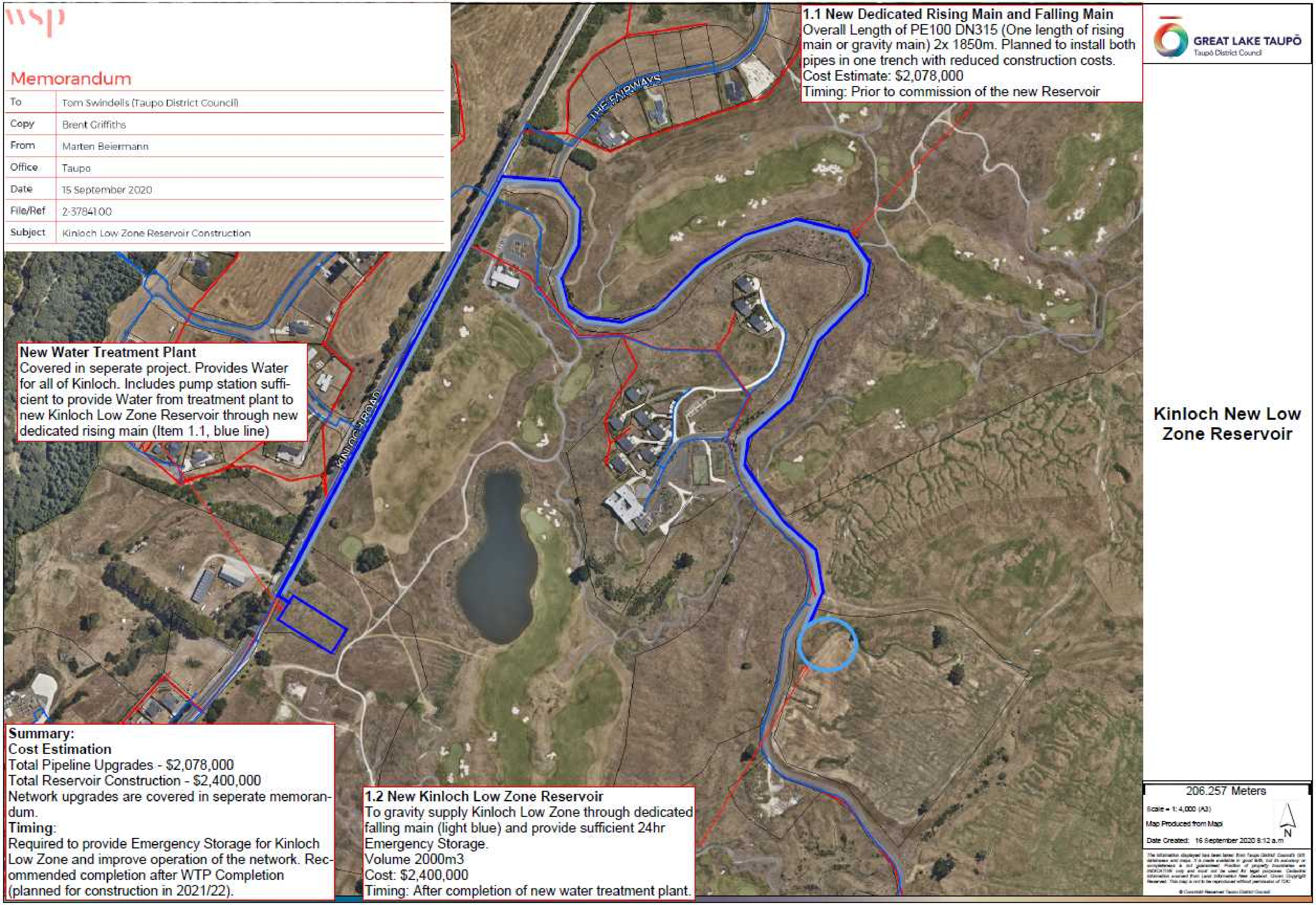
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.20	24
Project Manager	Project Management	External	0.50	24
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	12
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.10	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.10	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Reservoir	$2.4M	Capital
Pipelines	$2.08M	Capital
Existing reservoir renewal	$0.2M	Capital
Land Acquisition	$0.55M	Capital
Total Estimated Capital Cost	$5.23M	
Total Estimated Operational Cost/year	Minimal change	
Total Estimated cost	$5.23M	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex Project		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan	Execute	Execute							
Cost of phase and year spent	$1.2M	$3.28M	0.2M							
It is recommended this project is delivered as soon as possible in the new LTP due to the existing lack of storage in this zone and the resulting high consequence of a supply outage.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*26/01/21*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years



Project Name	**Water Reservoir Emergency Storage**		
Description	Purchase of two emergency water storage bladders		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	District

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	BEING RESILIENT AND PREPARED	5	10
Secondary	MAINTAINING LEVELS OF SERVICE	5	
Background	A review of water supply reservoir condition was completed in 2020 and this identified several Council concrete reservoirs that do not meet current seismic resilience criteria. A resilient reservoir is one that retains water following a major seismic event and minimises damage requiring repair during the recovery phase. In addition, Council has many timber tank reservoirs which are not designed to seismic resilience criteria. While plans are in place to improve resilience of our reservoirs across the district, this will take time. To support emergency planning in the short term, it is proposed to purchase two emergency storage bladders that can be quickly installed and put into operation upon reservoir failure. It has to be noted that the storage bladders will not be able to be used in all locations. A new storage shed will be built at the Taupo WWTP to store the units. It may also be possible to storage the units at the Civil Defence depot. The primary driver for this business case is being resilient and prepared. Doing this project will support emergency response and should reduce the loss of service time should a water reservoir fail. The secondary driver is maintaining levels of service as the project will ensure we can continue to deliver services which are critical for the district to operate.		
Business Need	Emergency water storage solution that can be used following reservoir failure.		

Benefits and Wellbeings (see appendix)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Prompt resolution of service following reservoir failure Water supply available following emergency Emergency prepardness	Loss of service time following emergency	Improved Public Safety Customer satisfaction Improved Resilience and Preparedness	Social

Opportunity	Emergency water storage solution that can be used following reservoir failure.	
Scope	**In**	**Out**

	• Design review to confirm optimal storage size to procure.
	• Purchase two emergency storage units. Suggested sizing:
	  ○ 1 of 100m3 water storage bladder
	  ○ 1 of 500m3 water storage bladder
	• New shed to store bladders at Taupo WWTP with appropriate access
	• Trial installation as part of Civil Defence activity
	• Bladders may be utilised during reservoir strengthening or renewal works
		• Forklift purchase or hire

Constraints	• Resources. External project management is recommended.	**Assumptions**	

	• Project funding may be a constraint as the project will likely be rates funded. • There is not sufficient room to fit emergency bladders at all reservoir sites.		
Dependencies	Reservoir condition assessment, strengthening and renewal projects		
Stakeholders	Senior Management, Councillors, Residents, Iwi, Project Team (TDC staff and Consultants), TDC Treatment Operations Team, TDC Network Engineers		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	Reservoir failure and resulting loss of supply to residents	**Commentary**	

Options Analysis *(add more options if applicable)*		
	Option One: Change nothing	**Option Two: Purchase emergency storage**
Overview	• No change.	• Purchase storage and construct shed for storage
Advantages	• No capital cost to TDC.	• Emergency preparedness
Disadvantages	• Risk of extended loss of water supply following reservoir failure.	• Capital cost • May never be needed
Costs	Capex $ 0 Opex $ No Change	Capex $ 70k Opex $ No Change
Achievability	This option is acheivable	This option is achievable.
Recommendation	Proceed with option 2 which provides the best outcome.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Design review to confirm optimal sizing • Procure bladders • Construct storage shed • Delivery • Trial run

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible [(see risk matrix in the appendix)]()			
Risk	**Likelihood**	**Impact**	**Score**
Failure of bladder during trial run	Unlikely	Moderate	Medium

Project Resource Requirements

Role	Primary Responsibilities	Internal or External	FTE Estimate	Duration (months)
Sponsor	Ensure benefits realisation.	Internal	0.01	6
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	6
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External		
Project Manager	Project Management	External	0.1	6
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External		
Operations Team Staff	Shed design, training commissioning, handover and trial run	Internal	0.2	2
Network Engineer	Design review, training commissioning, handover and trial run	Internal	0.2	2

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Design Review	$5k	Capital
Emergency Storage	$40k	Capital
Storage Shed and Access	$20k	Capital
Test Run	$5k	Capital
Total Estimated Capital Cost	$70k	
How accurate are your estimates? Costs fairly accurate (+/-10%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan, Execute									
Cost of phase and year spent	$70k									

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*26/01/2021*
Approval – Denis Lewis		Date	

Project Name	**Water Concrete Reservoir Strengthening Programme**		
Description	Strengthening of concrete reservoirs to meet seismic resilience criteria		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Medium	**Project Complexity**	Fog
Programme	Concrete Reservoir Strengthening Programme	**Location**	Taupo, Acacia Bay, Turangi

Strategic Objectives (*see appendix below to help score Strategic Objectives*)

		Score	Project Score Total
Primary	BEING RESILIENT AND PREPARED	5	10
Secondary	MAINTAINING LEVELS OF SERVICE	5	

Background

A review of water supply reservoir condition was completed in 2020 and this identified several Council concrete reservoirs that do not meet current seismic resilience criteria. A resilient reservoir is one that retains water following a major seismic event and minimises damage requiring repair during the recovery phase. To improve resilience the reservoirs of concern either need strengthening or renewal. The following reservoirs are proposed to be strengthened or refurbished:

- Tamatea Reservoir, Taupo – constructed in 2000, planned for strengthening as priority 1
- Turangi Reservoir, Turangi – constructed in 1962, planned for strengthening as priority 2
- Cherry Lane Reservoir, Acacia Bay – constructed in 2005, planned for strengthening as priority 3
- Tauhara Reservoir, Taupo – constructed in 2005, planned for strengthening as priority 4
- Taupo WTP Treated Water Tank – constructed in 2014, planned for refurbishment in Year 4.

The primary driver for this business case is being resilient and prepared. Doing this project reduces the chances of losing services which are critical for the town/district to operate. The secondary driver is maintaining levels of service as the project will ensure we can continue to deliver services which are critical for the town/district to operate.

Business Need

- Resilient reservoirs that retain water during a major seismic event (Importance Level 4 structure)

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Water retained during earthquake	Reservoir design must be signed off to meet seismic criteria	Improved Public Safety	Social

Opportunity

The strengthening of four concrete reservoirs across the District to ensure the reservoirs will meet seismic criteria for an Importance Level 4 structure and so retain water during a major seismic event.

Scope

In	Out
• Strengthening of the following reservoirs ○ Tamatea ○ Tauhara ○ Cherry Lane ○ Turangi • Refurbishment of the Taupo WTP Treated Water Tank • Design and construction including ○ Critical structural weakness improvements ○ Hoop response improvements ○ Operational improvements	• Initial seismic assessment to be completed in year 1 using operational budget. • Reservoir renewals • Wider network renewals

<table>
<tr><td></td><td colspan="3">

<li style="list-style:none">

Temporary works to maintain water supply during construction
Installation of burst control valves as required, including at Hinekura reservoir (link to Tamatea)
Pipework renewals in immediate vicinity of reservoir
Inspection, cleaning and refurbishment of the treated water tank

Engineering sign off for IL4 structures

</td></tr>
<tr><td>Constraints</td><td>

Depending on project timing, resources would be a constraint. External project management is recommended.
Project funding may be a constraint as the project will likely be rates funded.
Maintaining water supply during strengthening works

</td><td>Assumptions</td><td>

Reservoirs can be taken offline for sufficient time to complete the works.

</td></tr>
<tr><td>Dependencies</td><td colspan="3">

Detailed seismic assessments completed in year 1 operational budgets which will guide design process
Water demand at peak will reduce downtime availability
Contractor availability (specialist work)

</td></tr>
<tr><td>Stakeholders</td><td colspan="3">Senior Management, Councillors, Residents, Iwi, Project Team (TDC staff and Consultants), TDC Treatment Operations Team, TDC Network Engineers</td></tr>
<tr><td>Change Mgmt.</td><td colspan="3">No</td></tr>
<tr><td>Risk of Doing</td><td>Community pushback on the costs of the project
Water supply interruptions during works
Reservoir damage during works</td><td>Commentary</td><td></td></tr>
<tr><td>Risk of Not Doing</td><td>Reservoir failure and resulting loss of supply to residents</td><td>Commentary</td><td></td></tr>
</table>

Options Analysis *(add more options if applicable)*			
	Option One: Change nothing	**Option Two: Strengthen Reservoirs**	**Option Three: Renew Reservoirs**
Overview	• No change.	• Strengthen reservoirs	• Renew reservoirs
Advantages	• No capital cost to TDC.	• Resilient reservoirs	• Resilient reservoirs • Extension of reservoir life
Disadvantages	• Risk of loss of water supply during seismic events.	• Capital cost • Does not extend reservoir life	• Capital cost
Costs	Capex $ 0 Opex $ No Change Total $ 0	Capex $ 13.07M Opex $ No Change Total $ 13.07M	Capex $ 30M Opex $ No Change Total $ 30M
Achievability	This option is not acceptable due to risk.	This option is achievable.	This option is not achievable due to capital cost

Recommendation	Proceed with option 2 which provides the best outcome.

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Detailed seismic assessments completed in year 1 operational budgets which will guide design process • Implement operating level recommendations and corrosion repairs asap • Detail design to be completed by Structural Engineering experts • Detailed temporary works design to be completed by Hydraulic Engineering experts • Tender for construction works • Construction programme, delivering 1 reservoir strengthening each winter season.

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Detailed seismic investigations may determine reservoir strengthening is not possible, or is cost prohibitive.	Unlikely	Major	Medium
Maintain water supply during works is not able to be cost effectively completed.	Moderate	Major	High
Damage of reservoir during strengthening works	Unlikely	Major	Medium
Contractors not available	Unlikely	Moderate	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	48
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	48
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.30	48
Project Manager	Project Management	External	1.00	48
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	1.00	36
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.10	36
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.20	36
Comms Staff	Communications Plan	Internal	0.01	36

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Tamatea	$4.675M	Capital
Tauhara	$3.3M	Capital
Turangi	$2.475M	Capital
Cherry Lane	$2.475M	Capital
Taupo WTP Treated Water Tank	$0.14M	Capital
Total Estimated Capital Cost	$13.07M	
Total Estimated Operational Cost/year	Minimal change	
Total Estimated cost	$13.07M	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? Rates Funded		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)			Design Taupo WTP	Construct Taupo WTP						
Cost of phase and year spent			$40k	$100k						
It is recommended this project is delivered in year 1 to 5 due to impact if risk is not managed. NOTE: Funding for all sites except Taupo WTP moved outside 10 year period due to financial limitations. Delivery years now 11 to 15 of LTP.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*26/01/2021*
Approval – Denis Lewis		Date	

LTP Business Case 4 to 6 years

GREAT LAKE TAUPŌ
Taupō District Council

Project Name	**Water Reservoir Renewal Programme**		
Description	Renewal of Concrete and Timber Water Storage Reservoirs		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme	Reservoir Renewal Programme	**Location**	Mangakino, Whakamoenga, Centennial, Whareroa, Wairakei, Taupo, Whakamaru, Atiamuri, and Omori

Strategic Objective *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	BEING RESILIENT AND PREPARED	5	10
Secondary	MAINTAINING LEVELS OF SERVICE	5	
Background	Treated water storage reservoirs are critical items of infrastructure that enable supply of water to our communities. Across the District many of our reservoirs are reaching the age where renewal is required to prevent failure in service. Many of these reservoirs also do not meet current seismic resilience criteria. A resilient reservoir is one that retains water following a major seismic event and minimises damage requiring repair during the recovery phase. Planned dates for reservoir renewal have been prepared based on a District wide review of reservoir condition completed in 2020. The current planned renewal dates are as follows, noting that these have been adjusted due to financial limitations in the first 10 years of this LTP: • Mangakino Concrete Reservoirs 2031 to 2033 • Whakamoenga Timber Reservoirs 2032 to 2034 • Centennial Timber Reservoirs 2033 to 2035 (includes upsizing for growth) • Wairakei Concrete Reservoirs 2031 to 2033 (includes upsizing for growth) • Whareroa Timber Reservoirs 2034 to 2036 (includes upsizing for growth) • Taupo Hinekura Concrete Reservoir 2035 to 2037 • Atiamuri Concrete Reservoir and Contact Tank 2032 to 2034 • Whakamaru Concrete Reservoir 2032 to 2034 • Taupo Titoki Concrete Reservoir 2039 to 2041 • Taupo Botanical Concrete Reservoir 2044 to 2046 • Omori Concrete and Timber Reservoirs 2049 to 2051 Detailed structural assessments are planned for all reservoirs in year 1 of the LTP to allow these renewal planning dates to be refined. The primary driver for this business case is being resilient and prepared. Doing this project reduces the chances of losing services which are critical for the town/district to operate. The secondary driver is maintaining levels of service as the project will ensure we can continue to deliver services which are critical for the town/district to operate.		
Business Need	Renewal of treated water reservoirs to ensure Council can continue to supply water to customers across the District.		
Option/s	1. Do Nothing 2. Renew reservoirs as planned		

Benefits and Wellbeings *(see appendix)*		
Benefit	**Benefit Type**	**Wellbeing**
Prevents failure of reservoir and loss of service to town	Reservoir design must be signed off to meet seismic criteria	Legislative Compliance Customer Satisfaction Maintain LOS
Water retained during earthquake	Reservoir must be signed off to meet seismic criteria	Improved Public Safety

<table>
<tr><td>Opportunity</td><td colspan="4">Renewal of treated water reservoirs to ensure Council can continue to supply water to customers across the District.</td></tr>
<tr><td rowspan="2">Scope</td><td>In</td><td colspan="2">Out</td><td>Maybe</td></tr>
<tr><td>Planning & feasibility works
Temporary works design
Consultation
Reservoir design and construction including:
New reservoir on same site as existing
Demolish/dispose old reservoir
Site access /fencing /signage etc
Communications
Burst control
Site landscaping
Upsizing as determined by network models
IL4 seismic design</td><td colspan="2">New land acquisition</td><td>Existing reservoir strengthening if structural assessments recommend this approach</td></tr>
<tr><td>Constraints</td><td>Depending on project timing, resources would be a constraint. External project management is recommended.
Project funding may be a constraint as the project will likely be rates funded.</td><td>Assumptions</td><td colspan="2"></td></tr>
<tr><td>Dependencies</td><td>Opportunity exists to deliver this project as a programme of works including the following new reservoirs: Tauhara Ridge, Poihipi, Napier Road, Kinloch Low Zone, and Brentwood.</td><td>Stakeholders</td><td colspan="2">Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.</td></tr>
<tr><td>Potential Issues with the preferred option</td><td colspan="4">Temporary works design will be challenging on some sites.</td></tr>
<tr><td>Risk of Not Doing</td><td colspan="4">Loss of service to customers.</td></tr>
</table>

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Project Resources – Role Name	**Primary Responsibility**	**Internal/External**
Sponsor	Ensure benefits realisation.	Internal
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External
Project Manager	Project Management	External

Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal

Cost Summary		
Item	**Estimated Cost**	**Capital or Operational**
Mangakino	$2.4M	Capital
Whakamoenga (upgrade to 0.23ML storage)	$0.3M	Capital
Centennial (upgrade to 1ML storage)	$1.2M	Capital
Whareroa (upgrade to 0.6ML storage)	$0.7M	Capital
Wairakei (upgrade to 1ML storage)	$1.2M	Capital
Hinekura	$1.2M	Capital
Atiamuri	$0.3M	Capital
Whakamaru	$0.3M	Capital
Titoki	$5.4M	Capital
Botanical	$2.4M	Capital
Omori	$1.3M	Capital
Total Estimated Capital Cost	$16.7M	
Total Estimated Operational Cost/year	$No Change	
Total Estimated cost	$16.7M	

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)										
Cost of phase and year spent										
All reservoir renewals moved for delivery between years 11 and 30 due to financial limitations in years 1 to 10.										

Approval *This is the initial approval of the Business Case. It may be further prioritised against other projects*	
Approvers Name	
Date	

Project Name	**Control Gates Bridge Water Pipeline Upgrade**		
Description	Upgrade of water pipeline crossing Control Gates Bridge, Taupo.		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Taupo

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	BEING RESILIENT AND PREPARED	5	8
Secondary	MAINTAINING LEVELS OF SERVICE	3	
Background	The Taupo water scheme delivers water from the Lake Terrace Water Treatment Plant to developments north of the river via two water mains over and under the Waikato river. The pipeline that crosses over the Waikato River is attached to the Control Gates Bridge. This pipeline is a major pinch point in the network, causing high headloss due to its small diameter. This issue is accentuated under emergency scenarios, for instance during shutdown of the pipeline under the river. If a shutdown occurred during a high demand period, the headloss in the bridge pipeline would cause major low-pressure issues and loss of service for multiple consumers. In addition, the low pressure would prevent operation of any pump stations north of the river.  The proposed solution includes upgrade of the pipeline across the bridge from its current material and size (200mm steel), to a larger 300mm concrete lined steel pipeline. It includes upgrade of support structures and brackets as required to ensure future resilience of the pipeline. The pipeline will connect into the upgraded DN355 PE pipelines to be installed during 2021 as part of the Acacia Bay connection to Taupo project. The primary driver for this business case is being resilient and prepared. Doing this project reduces the chances of losing water services to a significant area of Taupo including the communities of Wairakei, Rangatira Park, Nukuhau, Brentwood, Acacia Bay and Mapara. The secondary driver is maintaining levels of service as the project will enable the continuation of water service delivery to Taupo water users on the North side of the Waikato River.		
Business Need	Upgrade of water pipeline crossing Control Gates Bridge, Taupo to provide system resilience and ensure levels of service are maintained for all customers north of the Waikato river.		

Benefits and Wellbeings [(see appendix)](#)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Improves available pressure to customers north of the river.	Pressure complaints before and after	Customer Satisfaction	Social
Provides resilience should a pipeline failure occur	Pressure complaints before and after	Customer Satisfaction	Social
Improved pumping efficiencies due to improved pressure	Operating cost of pump stations	Cost Reduction	Economic

Opportunity	Upgrade of water pipeline crossing Control Gates Bridge, Taupo to provide system resilience and ensure levels of service are maintained for all customers north of the Waikato river.		
Scope	**In**	**Out**	
	• 300mm internal diameter pipeline upgrade • Start and end points for upgrade are defined by renewals completed as part of Acacia bay project. (80m) • Design and construction of new pipeline • Removal and disposal of old pipeline • Expansion joints at either end • Design and construction of structural supports and brackets • Approvals by Mercury and Iwi • As built drawings	• Upgrade to bridge • Changes to walkway, access etc •	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Mercury bridge and existing easements	**Assumptions**	
Dependencies	Acacia Bay project – will renew/upgrade pipes either side of bridge Peak water demand – project should be timed for winter construction.		
Stakeholders	Senior management, Councillors, Residents, Mercury, Iwi, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	Low pressure complaints Resilience issues Pipeline failure leading to loss of supply to Taupo for extended period Health and safety risks associated with pipeline failure on bridge	**Commentary**	

Options Analysis *(add more options if applicable)*

	Option One: Do Nothing	Option Two – Upgrade Pipeline Across Bridge	Option Two – Upgrade Network Excluding Bridge
Overview	• No change to network.	Upgrade Pipeline across Bridge (80m)	A similar reduction in headloss can be achieved by upgrading approximately 400m of pipeline along norman Smith street.
Advantages	• No capital cost to TDC.	• Low pressure and resilience issues resolved • Reduced probability of failure	• Low pressure issue resolved • Part resolution of resilience issues •
Disadvantages	• Low pressure and resilience issues remain	• Capital cost • Challenging project from access perspective	• Capital cost • Bridge resilience issue remains. • Pipeline will still need to be renewed at some point.
Costs	Capex $ 0 Opex $ 0 Total $ 0	Capex $ 200k Opex $ Minimal change Total $ 200k	Capex $ 440k Opex $ Minimal change Total $ 440k
Achievability	This option is achievable.	This option is achievable.	This option is achievable
Recommendation	Proceed with option 2 which provides the best outcome.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Standard design, tender, construct approach. • Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Inability to achieve design sign off by Mercury	Unlikely	Moderate	Medium
Inability to agree construction methodology with Mercury	Unlikely	Moderate	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	12
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	12

Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.1	12
Project Manager	Project Management	External	0.15	12
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.25	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.1	6

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Project Overheads (Design, MSQA, PM, Contract Admin)	$ 35k	Capital
Construction	$ 121k	Capital
Contingency	$ 44k	Capital
Total Estimated Capital Cost	$ 200k	
Total Estimated Operational Cost/year	$ Minimal change	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate/Plan/Execute									
Cost of phase and year spent	$200k									

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*TS*	Date	*26/01/2021*
Approval – Denis Lewis		Date	

Project Name	**District Wide Water Network Renewals Project**		
Description	Water Network Renewals across the District		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	District Wide

Strategic Objectives (*see appendix below to help score Strategic Objectives*)			
		Score	**Project Score Total**
Primary	Maintaining Levels of Service	5	5
Secondary	Looking After Public Health and Safety	5	

Background

In 2020 there is in excess of 100 km of water network pipelines in operation across the district that have reached their useful life. Most of these pipelines are asbestos cement or galvanised steel. The risk of pipeline failure increases as these assets near and exceed their asset life. This current construction backlog can be valued at approximately $32M.

Without water pipeline renewal spending, the length of pipelines that reach end of life increases such that in 10 years the length of aged pipeline will have doubled. As the pipeline network ages, failures increase. It is estimated that without renewals spending, the number of pipeline failures will increase 3 times in the same 10 years.

Pipeline failures impact operational expenditure due both to the loss of valuable water, and due to the cost of repair, including damage to public or private property caused. Recent examples where significant property damage occurred include the 2018 Arrowsmith Avenue, and 2019 Lake Terrace water main failures.

Pipeline failures impact on our current levels of service including:

- System and Adequacy: Sufficient capacity to meet current demands and future growth
- Customer satisfaction: Drinking-water pressure, flow or continuity of supply complaints
- Fire Water Flows: We provide adequate water for firefighting in urban schemes

Pipeline failures can also lead to consent non-compliances, demand management issues, disruption to the community, negative community perception, and health and safety risks. For the reasons above, the main drivers for this business case are maintaining levels of service and looking after public health and safety.

Over the last LTP Council budgeted $2M/year for water network renewals spending. In the 2018 and 2019 calendar years, operational costs to repair water main bursts and water leaks was in excess of $200k/year. If the current $2M/year renewal budget is maintained, it is estimated that the increasing failure numbers will require operational expenditure increase to in excess of $0.6M/year by 2031. The construction backlog will increase from the current levels to a peak of $39M in 10 years. At the end of the 30 year LTP, the construction backlog will have reduced to $24M.

If the renewals budget is increased to $3.0M per year, the number of failures are still expected to increase. It is estimated that the increasing failure numbers will require operational expenditure increase to in excess of $0.4M/year by 2028. At this spend level, the construction backlog increases to 33M before being cleared by 2051.

The preferred option is to increase the renewals budget to $4.5M per year, reduced to $3M per year after 10 years, and further reduced to $1.5M per year for the remaining 10 years of the LTP. At this spend level, a clear downward trend in failure numbers are expected. Operational costs can be expected to reduce gradually from current levels to be below $200k/year within 10 years. In this scenario, the construction backlog will reduce to $19M in 10 years and will be wiped by 2050. An alternative is to maintain the $4.5M budget beyond year 10, which would mean the construction backlog could be wiped by year 2040.

In all scenarios, once the construction backlog is cleared, future years renewal budgets will be able to be set proactively to target pipelines that are nearing end of life, so as to further reduce pipeline failure numbers.

	Should further government funding be made available in coming years, it would make good sense to increase water network renewals budgets to accelerate the programme so as to reduce pipeline failure numbers, operational costs and community disruption. NOTE: Council decision made to set budgets as follows: • $4.5M for years 1 to 3 • $3.5M for years 4 to 20 • $2.5M for years 21 to 22 • $1.5M for years 23 to 30
Business Need	Renewal of ageing water network pipelines across the District.

Benefits and Wellbeings (see appendix)

Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Reduced pipeline failures, leading to community disruption through loss of water supply	Customer complaints Pipeline failure numbers	Customer satisfaction Improved public safety	Social
Reduced water safety risks Reduced property damage	Pipeline failure numbers	Improved public safety	Social
Reduction in operational expenditure due to lower pipeline failure numbers	Pipeline failure numbers Operational expenditure on pipeline failures	Cost avoidance Cost reduction	Economic

Opportunity	Renewal of ageing water network pipelines across the District.

Scope	**In**	**Out**

	• Pipeline renewal prioritisation works
	• Design including hydraulic modelling for large schemes
	• Renewal of:
	  ○ Raw water mains
	  ○ Bulk mains
	  ○ Water mains
	  ○ Rider mains
	  ○ Laterals and service connections
	  ○ Valves
	  ○ Hydrants
	  ○ Property connections including upgrade to meter ready as required
	  ○ Water meters if existing
	• Construction, and commissioning of new infrastructure to TDC standards
	• As built drawings
		• Reservoirs
		• Pump stations
		• Treatment plants
		• District wide metering

Constraints	• Resources. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	

Dependencies	Multiple crossovers with other business streams including wastewater, stormwater, roading, and parks. Multiple crossovers with other capital projects some of which include: • Kinloch DWSNZ • Bonshaw Park DWSNZ • Tauhara Ridge Reservoir and Airport Connection • Maraetai and Whakaroa Rising Mains • Control Gates Bridge Pipeline • Water Loss Strategy

	• Wairakei Resilience and Growth • Mapara Scheme Capacity Increase • Taupo Low Pressure Project
Stakeholders	Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.
Change Mgmt.	No

Risk of Doing	Community pushback on the costs of the project.	**Commentary**	
Risk of Not Doing	As covered in background	**Commentary**	As covered in background

Options Analysis *(add more options if applicable)*			
	Option One: $2M/year	**Option Two: $3.5M/year**	**Option Three: $4.5M/year**
Overview	• $2M/year renewals budget	• $3.0M/year renewals budget	• $4.5M/year renewals budget Years 1-10 • $3M/year renewals budget years 11-20 • $1.5M/year renewals budget years 21-30
Advantages	• Some renewals spending	• Renewals backlog caught up in 30 years	• Renewals backlog caught up in 30 years • Pipeline failures reduce • OPEX costs reduce
Disadvantages	• Pipeline failures and OPEX increase until 2036 • Increased disruption • High risks	• Pipeline failures and OPEX increase until 2028 • Increased disruption • High risks	• High capital cost
Costs	Capex $ 2M/year Opex $ 4.9M (Y1-10)	Capex $ 3.0M/year Opex $ 3.8M (Y1-10)	Capex $ 4.5M/year (Y1-10) Opex $ 2.5M (Y1-10)
Achievability	Yes	Yes	Yes
Recommendation	Proceed with option 3 which provides the best outcome. Noting that budget in years 4 to 30 has been adjusted due to financial limitations.		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Multi-year approach • Planning and designs through consultant panel • Construction via contractor panel arrangement

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**

Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Pipeline failures increase at higher rate than modelled	Unlikely	Moderate	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	120
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	120
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.20	120
Project Manager	Project Management	External	0.50	120
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	120
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.20	120
Communications Staff	Comms plan and support	Internal	0.01	120

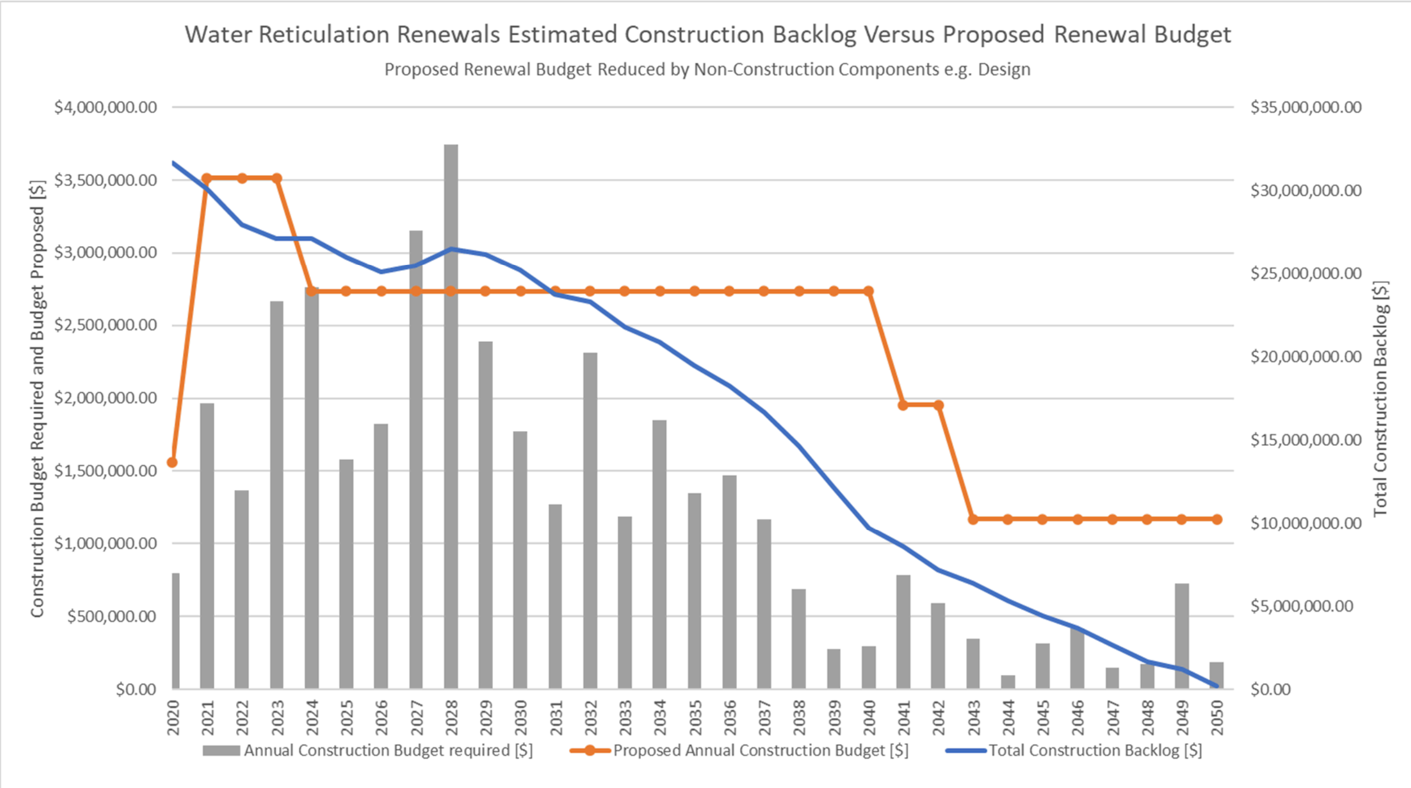
Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Design	10% of Capex	Capital
MSQA	4% of Capex	Capital
Project Management	6% of Capex	Capital
Contract Administration	3% of Capex	Capital
Contingency	10% of Capex	Capital
Construction	67% of Capex	Capital
Pipeline failure repairs	$2.5M	Operational
Total Estimated Capital Cost	$34.5M over 10 years - $4.5M/year for years 1-3 - $3.0M/year for years 4-10	
Total Estimated Operational Cost/year	$2.5M	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

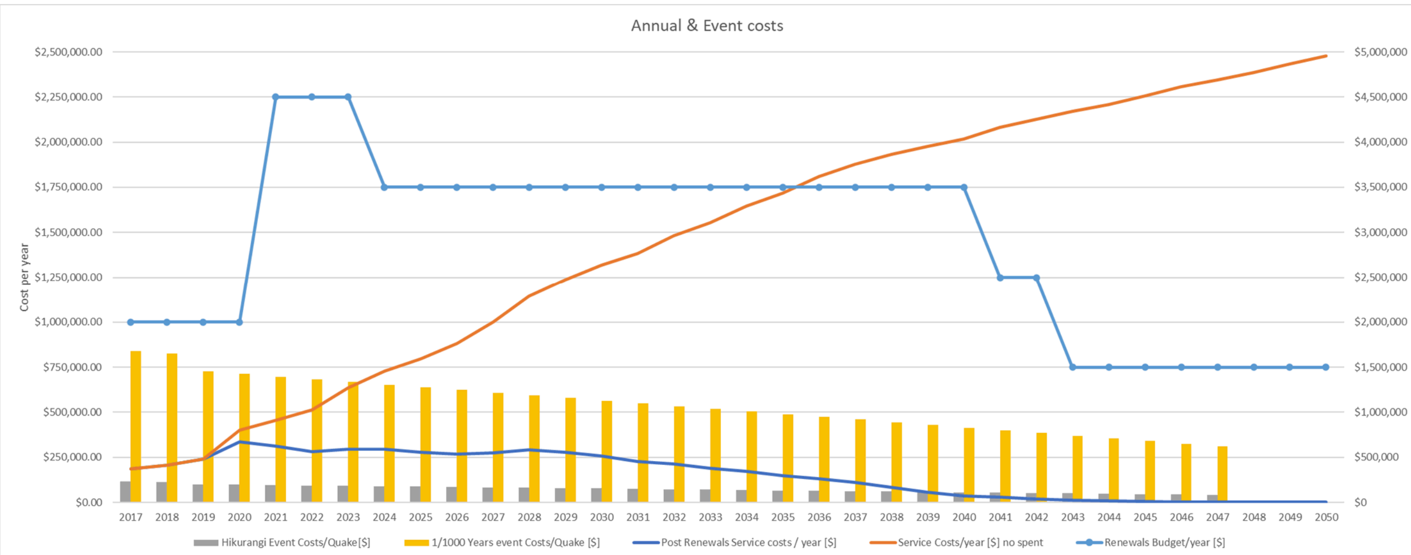
Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**

Phase (Initiate, Plan, Execute)	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute	Initiate, Plan / Execute
Cost of phase and year spent	$4.5M	$4.5M	$4.5M	$3.0M	$3.0M	$3.0M	$3.0M	$3.0M	$3.0M	$3.0M

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells		Date	*29/01/2021*
Approval – Denis Lewis			

SUPPORTING INFORMATION:





Project Name	**Waihi Village water and wastewater schemes**		
Description	Provision of water and wastewater services to the Waihi Village community.		
Business Owner	Tom Swindells	**BC Author**	James Aremu
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme	No	**Location**	Waihi Village

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	Looking after public health and safety	2	4
Secondary	Protecting our Environment	2	

Background

The Waihi Village community is a small community of about 75 people and is made up of 35 properties including a Marae. It is located on the shore of Lake Taupo about 2.5 km northwest of Tokaanu.

The existing water supply was installed by local residents some years ago and has not changed much since. The system has grown as more residents have been connected and small changes have been made to the system over the years. The reliability and water quality are poor. The extent of this network is confined to supplying the existing houses, Marae and hall (North of Convent Road). The existing supply is untreated and does not meet the current Drinking Water Standards for New Zealand 2005 (DWSNZ, Revised 2018). The supply is also vulnerable to microbiological contaminants from animals and birds and failure during wet weather due to damage to or blocking of the intake which also has poor access for maintenance.

At present, all lots (residences and Marae) are serviced for wastewater by on-site sewage disposal (i.e. septic tanks). Based on experience with communities established before the 1970's, it is likely that the tanks are smaller in size/volume than what current standards would require. No sewer reticulation exists in the immediate area to service the Waihi Village community.

This project includes the connection of the Waihi Village to the Turangi/Tokaanu water and wastewater schemes via construction of new pipelines and pumping stations.

This business case has been driven by a submission to Taupo District Council (TDC) from Waihi Kahakaharoa 1Z2B2B Maori Reservation Trust also known as Waihi Marae requesting funding to upgrade the existing Water Supply scheme and onsite septic tanks at Waihi Village. This Submission was made on behalf of the residents of Waihi Village, the Waihi Marae, Ngāti Turumakina & Te Mahau hapu of Waihi Village. Waihi Marae engaged WSP (when Opus) for the assessment of the existing water & wastewater infrastructure (not owned or operated by TDC), high level options assessment and cost estimates. This work is reported in the following documents and form the basis for this business case;

- Waihi Village Water Supply Preliminary Design Report dated February 2014
- Waihi Community Drinking Water Supply – Water Safety Plan
- Waihi Village Wastewater upgrade

Waihi Marae approached several other organisations to help fund this project but have had little success other than the Ministry of Health (MoH) who have committed to funding a portion of the water Supply scheme.

The primary driver for this business case is Looking after Public Health and Safety. This includes improving the drinking-water quality of those in Waihi and improving the lake and ground water quality by removing septic tanks. Similarly, the secondary driver is protecting our environment as the project will removed potentially leaky septic tanks from the area.

Business Need	• Achieving DWSNZ 2005 (Revised 2018) compliance. • Improving resilience of water supply and wastewater disposal systems.

Benefits and Wellbeings (see appendix)

Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Revenue gathering through water metering or targeted rates.	New connection number and increase in rating	Revenue Growth	Economic
Reduce likelihood of wastewater leaching into the Lake Taupo.	Lake monitoring before and after the projectcould be completed.	Protecting our Waterways	Environmental
Improved public health and safety due to improved treated water quality	Number of new connections to the scheme	Legislative Compliance, Public Safety	Social
Create a good working relationship with the local community and Iwi.	Improved iwi relationships	Improving community interaction	Cultural

Opportunity	Provision of water and wastewater services to the Waihi Village community.	
Scope	**In**	**Out**
	Water Supply Scheme; • New connection works at existing Turangi/Tokaanu water supply network. • New gravity feed pipe from above connection to Waihi Village network. • New reticulation network at Waihi Village including connection to occupied lots. Wastewater Disposal Scheme; • Collection system at Waihi Village • Pumping station • Rising Main from Waihi Village to Tokaanu Common • Land acquisition wastewater pump station(s) • Easements on private land for proposed water supply and wastewater schemes.	• Connection of Braxmere Lodge/Lakehouse Restaurant to the wastewater disposal system.

Constraints	• Resourcing and Procurement. • Funding and approval. • Pipe trench crossing a well-known land slip path. • Construction challenges due to high water table.	**Assumptions**	The proposed water and wastewater infrastructure will be vested with the council and subsequently owned, operated and maintained by TDC.

Dependencies	• Resource consent requirements as may be required for construction of the reticulation networks, and pump station. • Land acquisition and or establishment of easements on Maori/Iwi land.
Stakeholders	Senior management, Councillors, Residents of Waihi Village and Waihi Marae, Ngāti Turumakina and Te Mahau hapu of Waihi Village and Project Team (TDC staff and Consultants).
Change Mgmt.	No

Risk of Doing	Community unrest regarding costs of project. Future land slip may result in loss of service to community.	**Commentary**	
Risk of Not Doing	Safe water not provided to Waihi village	**Commentary**	

	Leaching of wastewater into Lake Taupo.		

Options Analysis *(add more options if applicable)*		
	Option One: Change Nothing	**Option Two – Complete Project**
Overview	Waihi Village remains self-sufficient.	Connection of Waihi Village to the Turangi/Tokaanu water and wastewater schemes via construction of new pipelines and pumping stations.
Advantages	• No cost to TDC.	• Improved iwi relationships • Improved water supply to the Waihi community • Significantly improved and reliable wastewater disposal. • Reduced health risks as the likelihood of sewage leaching will be reduced.
Disadvantages	• Water safety risks for Waihi community. • Potential for Sewage to leach into the Lake from aging nearby septic tanks.	• Significant capital cost to TDC. • Total finding commitment for TDC will be approximately $1.95M.
Costs	• No cost to Council	•
Achievability	• Achievable	• Achievable
Recommendation	Council approved the project in principle at the last LTP. Therefore, it is recommended this project proceeds in year 1.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Initial investigation, consultation, design and tendering • Standard construction contract delivery • Considerable amounts of stakeholder engagement likely to be needed.

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Landslip	Rare	Catastrophic	Medium
Inability to agree easements	Unlikely	High	Medium
Private plumbing failures	Likely	Minor	Medium
Project cost increases	Likely	Minor	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	12
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	12
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.1	12
Project Manager	Project Management	External	0.50	12
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.50	6

Stakeholder Engagement	Interface with operational plant, training commissioning, handover	Internal	0.25	12
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.25	3
Communications Staff	Comms plan and support	Internal	0.03	12

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Planning	$123,335	Capital
Design	$175,423	Capital
Construction	$1,666,516	Capital
Construction Monitoring	$123,335	Capital
Contingency	$333,303	Capital
Operational expenditure	$16,000/annum	Operational
Total Estimated Capital Cost	$2,2421,913	Water & Wastewater
Total Estimated Operational Cost/year	$16k/annum	Water & Wastewater
Water Project Cost	$1,219,812	
Ministry of Health (MoH) funding	-$471,420	
Water Project Cost – Council Funded	$748,392	
Wastewater Project Cost	$1,202,101	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex project		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Plan, Execute									
Water	1,219,812									
Wastewater	1,202,101									

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells		Date	*29/01/2021*
Approval – Denis Lewis			

LTP Business Case 1 to 3 years

Project Name	**Taupo Low Pressure Project**		
Description	Water Network Upgrades in Taupo to Maintain Levels of Service		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Taupo

Strategic Objectives (*see appendix below to help score Strategic Objectives*)

		Score	Project Score Total
Primary	Maintaining Levels of Service	3	5
Secondary	Looking After Public Health and Safety	2	

Background

Master planning work has been completed for the Taupo water scheme network to determine the upgrades necessary to maintain current service levels while meeting the ongoing growth in the catchment. Several areas of the network are already experiencing low pressure issues during the high demand periods, while other areas require immediate upgrade to prevent low pressure as growth continues. Low pressure in the network impacts on our current levels of service including:

- System and Adequacy: Sufficient capacity to meet current demands and future growth
- Customer satisfaction: Drinking-water pressure, flow or continuity of supply complaints
- Fire Water Flows: We provide adequate water for firefighting in urban schemes

The proposed improvements include:

- Renewal of ageing pipelines and movement of the low to medium pressure zone boundary in Taupo – required to alleviate low pressures in between Spa Rd and Taharepa Roads (map appended).
- Richmond Ave Falling Main Upgrade – required to alleviate low pressures in Wharewaka and to enable growth in the Taupo South Low Zone.
- Greenwich Street to Victoria Street Falling Main Upgrade – required to alleviate low pressure areas in Richmond Heights and to enable growth in the Taupo South Medium Zone.

The drivers for this business case are maintaining levels of service and looking after public health and safety.

Business Need

Upgrade of Taupo water network to providing system capacity for growth, and to ensure adequate water flow and pressure to meet levels of service, customer satisfaction and firefighting needs.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Improved water supply pressure to customers	Customer complaints	Customer satisfaction	Social
Improved firefighting capability	Fire flow tests	Improved public safety	Social
Ability to connect more customers to the scheme	Number of customers connecting to the new network.	Revenue Growth Enabling Sustainable Growth	Economic

Opportunity

Upgrade of Taupo water network to providing system capacity for growth, and ensuring adequate water flow and pressure for customer satisfaction and firefighting.

Scope

In	Out
• Planning & feasibility works. • Specific scope as follows:	• Other watermain renewals outside the specific scope • AC pipeline removal – price to leave in ground

	○ Renewal of ageing pipelines and movement of the low to medium pressure zone boundary in Taupo between Spa and Taharepa Roads, 1350m of DN180, 4455m of DN125, and 1805m of DN63 (split across 2 years) ○ Pressure management to control the increase in pressure and avoid private plumbing failures ○ Richmond Ave Falling Main Upgrade, 500m of DN315 pipe, required year 1 ○ Greenwich to Victoria Street Falling Main Upgrade, 350m of DN250 and 350m of DN180 pipelines • Design, construction, commissioning of new pipelines including valving, fire hydrants and new connections to TDC standards • As built drawings		
Constraints	• Resources. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	
Dependencies	Water network renewals project. Opportunity exists to renew and upgrade watermains that have reached their end of life within similar areas at the same time as the upgrade project to improve efficiency of contract delivery. Growth in WEL and EUL areas.		
Stakeholders	Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project. Increase in pressure to individual properties may cause failure of internal plumbing	**Commentary**	
Risk of Not Doing	Level of service not met resulting in customer complaints Insufficient fire flows and risk to health and safety Need for un-budgeted expenditure to resolve pressure issues as they arise Growth may need to be stalled.	**Commentary**	

Options Analysis *(add more options if applicable)*		
	Option One: Do Nothing	**Option Two – Complete project**
Overview	• No change to network.	Upgrade pipeline, and alter pressure zones to maintain levels of service
Advantages	• No capital cost to TDC.	• Levels of service maintained • Reduced complaints • Improved fire flows • Growth capacity achieved
Disadvantages	• Level of service not met resulting in customer complaints	• Capital cost

	• Insufficient fire flows and risk to health and safety • Need for un-budgeted expenditure to resolve pressure issues as they arise. Likely to be higher cost if not planned appropriately • Growth may need to be stalled.	• May result in private plumbing failures due to increased pressure
Costs	Capex $ Actual costs may be significant Opex $ No Change Total $ 0	Capex $ 4,040,000 Opex No Change Total $ 4,040,000
Achievability	This option is achievable.	This option is achievable.
Recommendation	Proceed with option 2 which provides the best outcome.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Standard design, tender, construct approach. • Potentially packaged with pipeline renewals projects. • Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Risk of private plumbing failures due to increased pressures	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	12
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	12
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.1	12
Project Manager	Project Management	External	0.20	12
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.40	6
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.1	3
Commmunicatio ns Staff	Comms plan and support	Internal	0.3	3

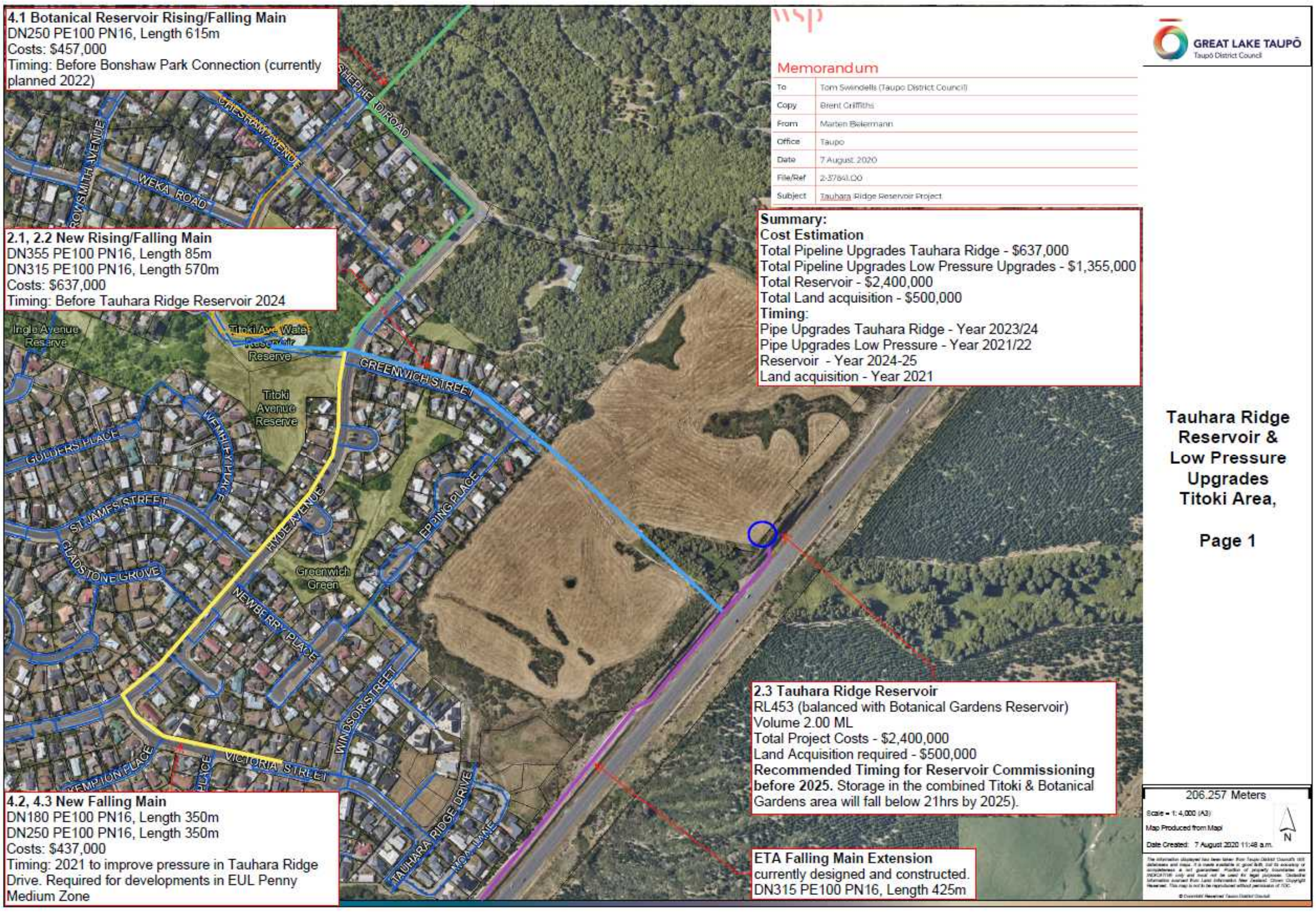
Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Zone Boundary Changes North Area	$ 2,498,000	Capital Year 11/12
Greenwich to Victoria Falling Main	$ 437,000	Capital Year 1
Richmond Ave Falling Main	$ 461,000	Capital Year 1
Zone Boundary Changes South Area	$ 644,000	Capital Year 11/12
Total Estimated Capital Cost	$4,040,000	
Total Estimated Operational Cost/year	No change	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

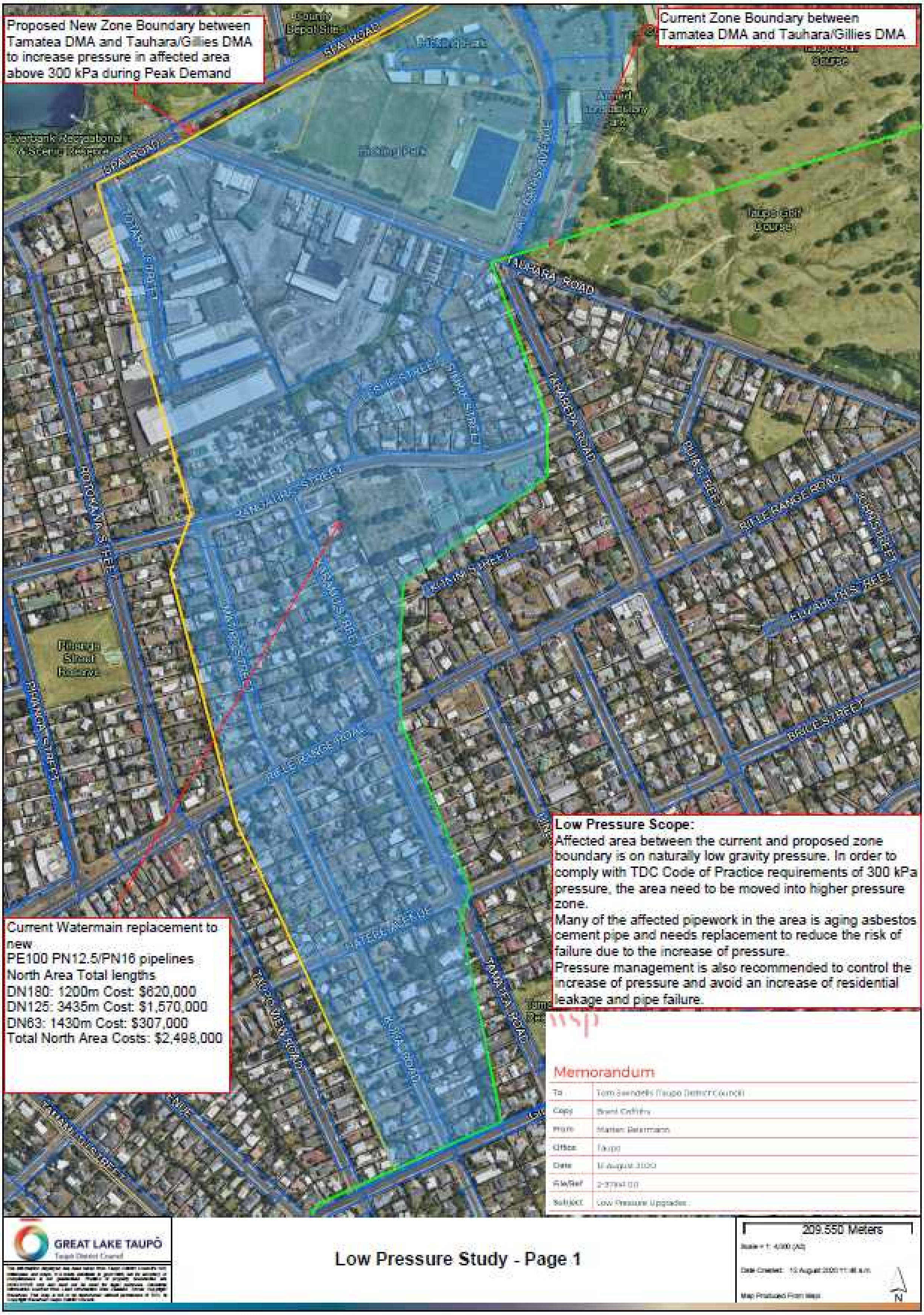
Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan, Execute									
Cost of phase and year spent	$0.9M									
Note: Financial limitations have resulted in the zone boundary changes moving from years 2 and 3 to years 11 and 12.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*Tom Swindells*	**Date**	*12/02/2021*
Approval – Denis Lewis		**Date**	

LTP Business Case 1 to 3 years

GREAT LAKE TAUPŌ
Taupō District Council




Proposed New Zone Boundary between Tamatea DMA and Tauhara/Gillies DMA to increase pressure in affected area above 300 kPa during Peak Demand
Current Zone Boundary between Tamatea DMA and Tauhara/Gillies DMA
SPA ROAD
TAUHARA ROAD
RIFLE RANGE ROAD
Low Pressure Scope:
Affected area between the current and proposed zone boundary is on naturally low gravity pressure. In order to comply with TDC Code of Practice requirements of 300 kPa pressure, the area need to be moved into higher pressure zone.
Many of the affected pipework in the area is aging asbestos cement pipe and needs replacement to reduce the risk of failure due to the increase of pressure.
Pressure management is also recommended to control the increase of pressure and avoid an increase of residential leakage and pipe failure.
Current Watermain replacement to new
PE100 PN12.5/PN16 pipelines
North Area Total lengths
DN180: 1200m Cost: $620,000
DN125: 3435m Cost: $1,570,000
DN63: 1430m Cost: $307,000
Total North Area Costs: $2,498,000
Memorandum
GREAT LAKE TAUPŌ
Low Pressure Study - Page 1
209.550 Meters
N


Proposed New Zone Boundary between Tamatea DMA and Tauhara/Gillies DMA to increase pressure in affected area above 300 kPa during Peak Demand
Current Watermain replacement to new PE100 PN12.5/PN16 pipelines
Total lengths in South Area
DN180: 150m Cost: $87,000
DN125: 1020m Cost: $446,000
DN63 375m Cost: 90,000
Southern Area Costs: $644,000
Current Zone Boundary between Tamatea DMA and Tauhara/Gillies DMA
Low Pressure Scope:
Affected area between the current and proposed zone boundary is on naturally low gravity pressure. In order to comply with TDC Code of Practice requirements of 300 kPa pressure, the area need to be moved into higher pressure zone.
Many of the affected pipework in the area is aging asbestos cement pipe and needs replacement to reduce the risk of failure due to the increase of pressure.
Pressure management is also recommended to control the increase of pressure and avoid an increase of residential leakage and pipe failure.
Memorandum
To
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From
Office
Date
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Subject
Low Pressure Upgrades
TAHAREPA ROAD
PATAKA ROAD
AYANU STREET
GREAT LAKE TAUPŌ
Low Pressure Study - Page 2
209.550 Meters
N

LTP Business Case 1 to 3 years

Project Name	**Wairakei Water Rising Main Upgrade**		
Description	Upgrade of 1.5km of water rising main feeding the Wairakei township and development areas		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Wairakei, Taupo

Strategic Objectives (*see appendix below to help score Strategic Objectives*)

		Score	Project Score Total
Primary	Maintaining Levels of Service	3	6
Secondary	Economic Development	3	

Background

Water from the Taupo water supply scheme is pumped from Woodward Street pump station in Nukuhau, along Wairakei Drive to the Wairakei reservoirs. The scheme feeds residential customers in Wairakei village as well as industrial and commercial customers between Taupo and Wairakei. Recent new connection requests have been received from customers along the pipe route including new developments, existing commercial enterprises and residential properties (Huka Lodge, Wairakei International Golf Course Development, Brewery, BP).

A master planning project was undertaken to assess the water infrastructure upgrades needed to ensure levels of service are maintained as growth in connection continues. The master planning exercise found that a 1.5km stretch of pipeline, between Wairakei Resort and Wairakei Village is undersized. The pipeline currently experiences headloss twice that which is normally acceptable, which reduces the efficiency of pumping and increases the probability of pipe failure. The pipeline also limits future connections to the scheme.

It is proposed to replace this 1.5km section of pipeline with a new large pipeline as soon as possible. The drivers for this business case are maintaining levels of service and economic development.

Business Need

Upgrade rising main to improve pump efficiency, prevent failures and allow further growth in connections.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Improved pipeline resilience	Failure numbers and corresponding customer complaints	Customer satisfaction	Social
Ability to connect more customers to the scheme	Number of customers connecting to the new network.	Revenue Growth Enabling Sustainable Growth	Economic
Improved pumping efficiency	Power usage /m3 of water pumped	Cost reduction	Economic

Opportunity

Upgrade of 1.5km of the Wairakei rising main from 100mm PVC to 180mm PE to improve pump efficiency, prevent failures and allow further growth in connections.

Scope

In	Out
• Planning & feasibility works. • Design and construction of new pipeline including valving fire hydrants and connections to TDC standards • As built drawings	• Other watermain renewals in the area • New connections • Extending the pipe route

Constraints	• Resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded.	**Assumptions**	
Dependencies	Must be completed before the pump station upgrade planned for 2022/23 (Poihipi reservoir project). Opportunity exists to renew and upgrade watermains that have reached their end of life within Wairakei Village at the same time as the upgrade project to improve efficiency of contract delivery.		
Stakeholders	Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	No		
Risk of Doing	Community pushback on the costs of the project	**Commentary**	
Risk of Not Doing	High operating costs Pipeline failures Inability to connect future customers	**Commentary**	

Options Analysis *(add more options if applicable)*

	Option One: Do Nothing	**Option Two – Upgrade Pipeline**
Overview	• No change to network.	Upgrade 1.5km of pipeline
Advantages	• No capital cost to TDC.	• Improved pump efficiency • Reduced probability of failure • Improved growth capacity
Disadvantages	• Poor pump efficiency • Higher probability of failure • No growth capacity	• Capital cost
Costs	Capex $ 0 Opex $ 0 Total $ 0	Capex $ 850,000 Opex - $ 5,000 /annum (estimate) Total $ 850,000
Achievability	This option is achievable.	This option is achievable.
Recommendation	Proceed with option 2 which provides the best outcome.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

- Standard design, tender, construct approach.
- Potentially packaged with pipeline renewals in Wairakei.
- Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver

Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)

Risk	Likelihood	Impact	Score
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration (months)**
Sponsor	Ensure benefits realisation.	Internal	0.01	6
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal	0.05	6
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.1	6
Project Manager	Project Management	External	0.20	6
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.40	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.1	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Design, PM, MSQA, Admin	$ 159,048.59	Capital
Construction	$ 613,162.15	Capital
Contingency	$ 77,221.07	Capital
Total Estimated Capital Cost	$849,431.81	Capital
Total Estimated Operational Cost/year	-$5,000/annum	Savings in improved running cost of pumps and reduced water main bursts
Total Estimated cost	$850,000	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)			Initiate, Plan / Execute							
Cost of phase and year spent			$850k							
Moved from year 1 to 3 due to financial limitations.										

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*Tom Swindells*	Date	*12/02/2021*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years

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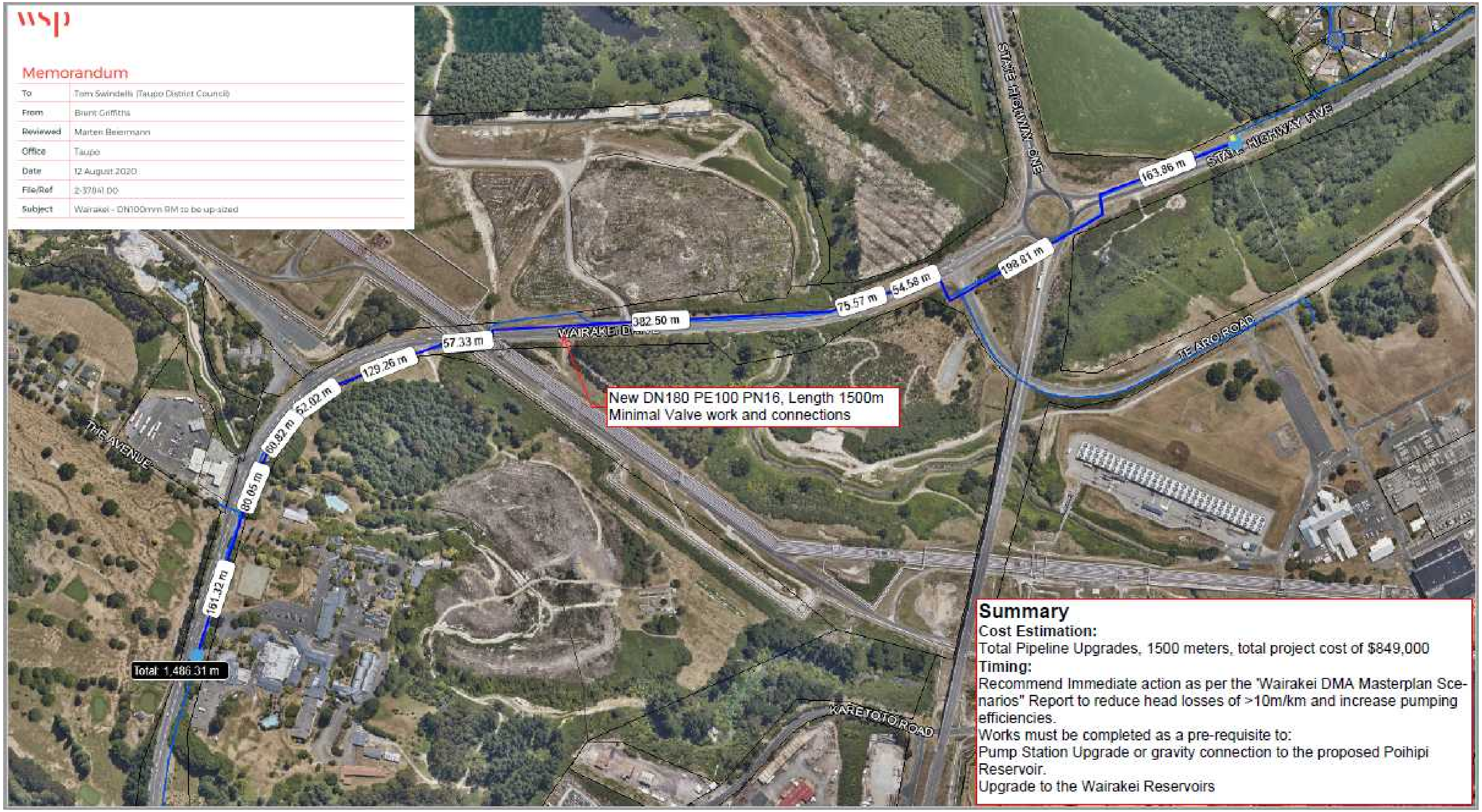

LTP Business Case 1 to 3 years

Project Name	**Whakamaru Water Network Extension**		
Description	Extension of the water supply network to Forest View Road, Whakamaru		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Whakamaru

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	Looking after public health and safety	2	3
Secondary	Placemaking	1	
Background	The Whakamaru water network does not currently supply water to residentially zoned parts of Forest View and Tihoi Roads. This project is to extend the water network so that all residents in this area can connect to the Council supply. The properties to be connected are shown below in yellow outline.  The primary driver for this business case is Looking after Public Health and Safety. This includes improving the drinking-water quality of those who currently supply their own water via rainwater tanks or bores. The secondary driver is placemaking as the project will enhance the attractiveness of the area.		
Business Need	To provide connection to the Council water scheme for residents of Forest View Rd and Tihoi Rd, Whakamaru. Council agreed during 2018-28 LTP consultations to include this project in year 4 of the plan. Therefore this project is recommended to be completed in year 1 of the new LTP.		

Benefits and Wellbeings (see appendix)			
Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Residents connect to the scheme	Number of customers connecting to the new network.	Improved public safety	Social

Opportunity	Extension of the water supply network to enable currently un-serviced residentially zoned properties in the Forest View Rd area to connect to the Whakamaru water supply.		
Scope	**In**	**Out**	
	• Planning & feasibility works. • Consultation with community regarding funding • Design and construction of new network including valving fire hydrants and connections to TDC standards	• Connection of properties outside of highlighted areas • Upgrade of network feeding area to improve fire flows	
Constraints	• Depending on project timing, resources would be a constraint. External project management is recommended. • Project funding may be a constraint as the project will likely be rates funded. • Fire flows not currently achieved in this area due to size of feeding mains.	**Assumptions**	
Dependencies	Opportunity exists to renew and upgrade 1.6km of old asbestos, galvinised steel and cast iron watermains that have reached their end of life, and to improve fire flows within the community at the same time as the network extension project to improve efficiency of contract delivery.		
Stakeholders	Senior management, Councillors, MPRG, Residents of Whakamaru, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.		
Change Mgmt.	Yes, change management is required.		
Risk of Doing	Community pushback on the costs of the project No one connects due to costs.	**Commentary**	Funding method will need to be determined up front, through LTP consultation.
Risk of Not Doing	Public health risks from private supplies remain Ongoing requests for connection by the community	**Commentary**	Providing potable drinking water for everyone is necessary in protecting the health and safety of people and the community. This is a fundamental requirement for public health and meeting the minimum standard set out by DWSNZ.

Options Analysis *(add more options if applicable)*		
	Option One: Change Nothing	**Option Two – Extend existing water supply network to provide water to currently un-serviced areas**
Overview	No change to network. Residents continue to provide their own water supplies.	Extend existing water supply network to provide water to Forest View Rd and Tihoi Rd residential area.
Advantages	• No capital cost to TDC.	• Residents have high quality water supply available.

		• Reduced public health risks from residents drinking from potentially unsafe private water supplies. • Improved fire protection for the community – additional fire hydrants
Disadvantages	• Public health risks from private supplies remain • Ongoing requests for connection by the community	• Capital cost
Costs	Capex $ 0 Opex $ 0 Total $ 0	Capex $ 238k Opex $ <1%/annum Total $ 238k
Achievability	This option is highly achievable.	This option is highly achievable.
Recommendation	Proceed with option 2 which provides the best outcome for the residents.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Standard design, tender, construct approach. • Potentially packaged with pipeline renewals in Whakamaru. • Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Planning and Design	Detailed design and cost estimate from engineers
Pipeline	New pipeline to TDC CoP requirements with as-builts provided.
Hand over documentation	Asbuilt records, O&M manuals

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High
Funding risk dependant how it is agreed to fund the capital costs	Likely	Moderate	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Sponsor	Ensure benefits realisation.	Internal	0.01	5 months

Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	5 months
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.1	5 months
Project Manager	Project Management	External	0.20	5 months
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.40	3 months
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.1	3 months

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Project Overheads (Design/PM/MSQA)	$40,000	Capital
Construction	$176,094	Capital
Contingency	$21,609	Capital
Total Estimated Capital Cost	$237,703	
Total Estimated Operational Cost/year	<1%/annum	
Total Estimated cost	$237,703	
How accurate are your estimates? Costs fairly accurate (+/-10%)		
How will this proposal be funded? Project will most likely be loan funded by Council and repaid by residents through a targeted rate applied to all residents that have potential to connect, spread over 25 years. Note: Same approach as recent 5 Mile Bay project.		

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Plan / Design / Construction									
Cost of phase and year spent	$237,703									

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*Tom Swindells*	Date	*12/02/2021*
Approval – Denis Lewis		Date	

LTP Business Case 1 to 3 years

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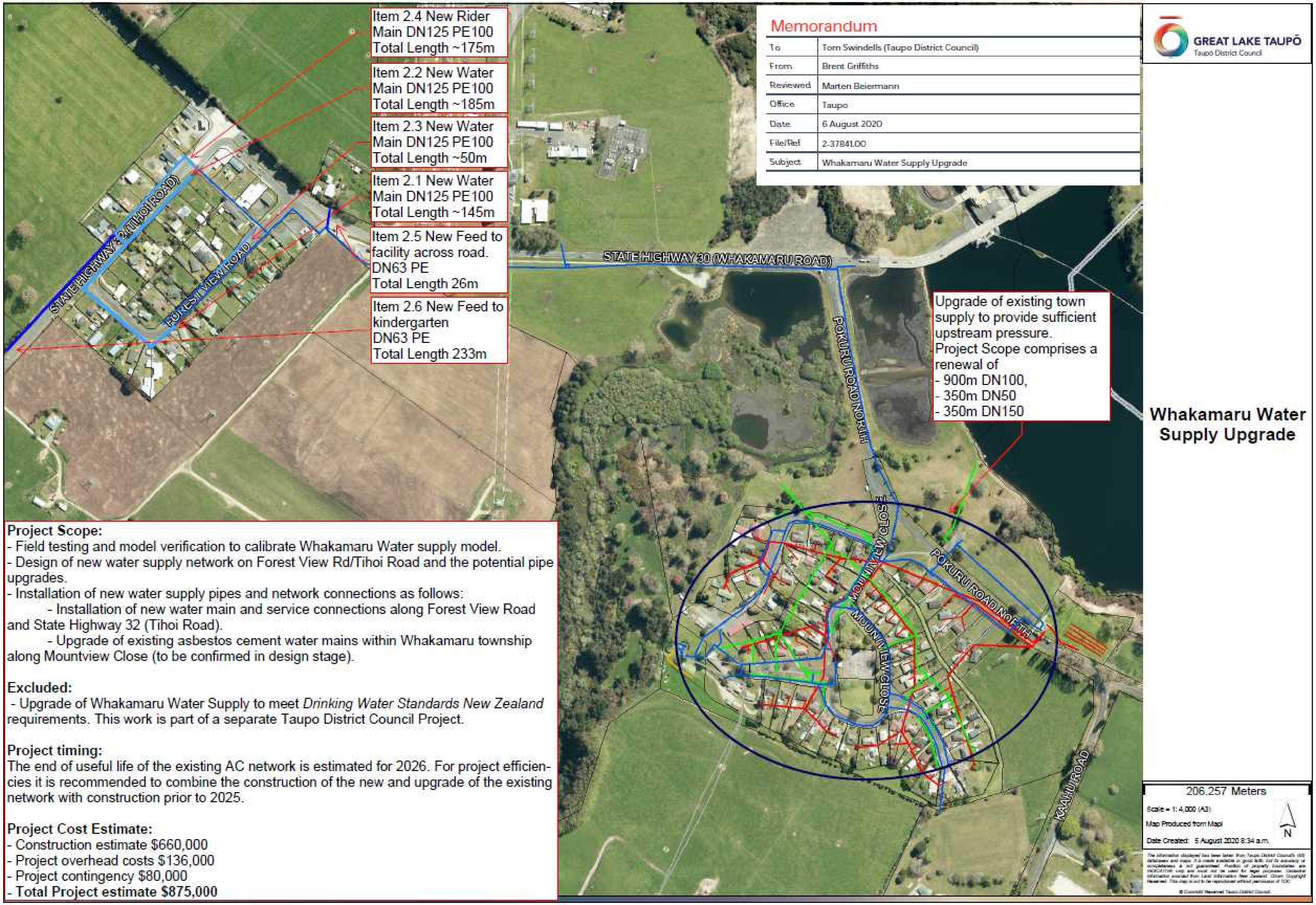

Project Scope:
- Field testing and model verification to calibrate Whakamaru Water supply model.
- Design of new water supply network on Forest View Rd/Tihoi Road and the potential pipe upgrades.
- Installation of new water supply pipes and network connections as follows:
  - Installation of new water main and service connections along Forest View Road and State Highway 32 (Tihoi Road).
  - Upgrade of existing asbestos cement water mains within Whakamaru township along Mountview Close (to be confirmed in design stage).

Excluded:
- Upgrade of Whakamaru Water Supply to meet *Drinking Water Standards New Zealand* requirements. This work is part of a separate Taupo District Council Project.

Project timing:
The end of useful life of the existing AC network is estimated for 2026. For project efficiencies it is recommended to combine the construction of the new and upgrade of the existing network with construction prior to 2025.

Project Cost Estimate:
- Construction estimate $660,000
- Project overhead costs $136,000
- Project contingency $80,000
- **Total Project estimate $875,000**

LTP Business Case 1 to 3 years

Project Name	Water Loss Strategy Implementation		
Description	Water Loss Strategy Implementation across the Taupo District		
Business Owner	Tom Swindells	BC Author	Tom Swindells
Project Size	Lite	Project Complexity	Paint by Numbers
Programme		Location	District

Strategic Objectives (*see appendix below* to help score Strategic Objectives)			
		Score	Project Score Total
Primary	Maintaining Levels of Service	3	6
Secondary	Being Legislatively Compliant	3	

Background

TDC completed a water loss strategy in 2019 with the aim of assessing and then reducing real water loss from the public water supply networks to acceptable levels. The benefits of managing real loss to acceptable levels are numerous including:

- Reduced environmental impact on water sources
- Demonstration of efficient water use, supporting resource consent renewal processes
- Financial benefits due to less power and chemicals required for treating water
- Financial benefits due to deferred capital expenditure for plant or network upgrades
- Capacity made available within existing plants or network for growth
- Avoidance of water restrictions and shortages
- Improved customer satisfaction, Council shown to be managing supply well

Water loss targets have been set and actions to achieve these targets identified. Water loss assessment completed in January 2020 allowed re-prioritisation of the actions. The highest priority actions are being implemented in year 0 utilising the government funding made available as part of the water reform process. The secondary priority actions are to be delivered as part of this project in year 1, 2 and 3 including:

- Input meter and zone meter design and installation across the District
- Pressure management installations
- Design and implementation of SCADA and Water Outlook monitoring and management systems
- Electronic water meter installations on small schemes
- Electronic water meter renewals on rural schemes.

Some of the specific benefits of these implementation actions include:

- Improvement in accuracy of water loss reporting,
- Minimum night flow monitoring will increase response to leakage changes in the network e.g. water main bursts may be detected before water is visible
- Targeted water renewals spending to areas of high leakage
- Reduction in water loss through pressure reduction
- Automated metering allows higher read frequencies and greater knowledge of water use trends
- Notification of private leaks via automated meters, reduces lost water and complaints due to high bills
- Reduction in water meter reading time

Business Need

Implementation of infrastructure to enable improved water loss performance across the District.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Improved water loss performance	Annual water loss calculations	Improved level of service	Social

Improved water loss performance	Annual water loss calculations	Legislative compliance	Social
Reduced operational costs for chemicals and power to treat wasted water	Operational cost monitoring	Cost reduction	Economic
Speed of response to leakage improved	Annual water loss calculations	Customer Satisfaction	Social
Avoidance of water restrictions	Days in water restrictions	Customer Satisfaction	Social
System capacity made available up for growth	System capacity	Enabling sustainable growth	Economic
Reduced time reading water meters. Including reduced health and safety risks	No. water meter reads before and after.	Cost Reduction	Economic

<table>
<tr><td>Opportunity</td><td colspan="3">Implementation of infrastructure to enable improved water loss performance across the District.</td></tr>
<tr><td rowspan="2">Scope</td><td colspan="2">In</td><td>Out</td></tr>
<tr><td colspan="2">• Input and zone meter installs/upgrades or renewals on the following water supply areas:
  ○ Atiamuri, Hatepe, Mapara, Motuoapa, Motutere, Omori, Tirohanga, Waihaha, Whakaroa, Whareroa
• All meters to installed with link back to Council historian system either via GSM unit or RTU
• Pressure management installations at four sites
• All electrical and control works including historian tags setup
• Update of scada and water outlook monitoring screens/reports
• New electronic water metering installations in the following water supply areas – water billing scope TBC:
  ○ Whakamoenga Point, Atiamuri, Hatepe, Whakamaru, Whareroa, Waihaha
• Consultation re new water meter installations
• Renewed electronic water metering installations in the following water supply areas:
  ○ Bonshaw Park, Centennial, River Rd, Tirohanga, Whakaroa
• Electronic metering to include base stations installs as required to enable drive by reading and/or reads direct to Tech 1
• Tech 1 integration of meter reads</td><td>• Watermain renewals
• District wide metering</td></tr>
<tr><td>Constraints</td><td>• Resources. External project management is recommended.
• Project funding</td><td>Assumptions</td><td></td></tr>
<tr><td>Dependencies</td><td colspan="3">Water network renewals project. Opportunity exists to renew and upgrade watermains that have reached their end of life within similar areas at the same time as the meter installs to improve efficiency of contract delivery.</td></tr>
<tr><td>Stakeholders</td><td colspan="3">Senior management, Councillors, Residents, Tūwharetoa Maori Trust Board, Project Team (TDC staff and Consultants), TDC Treatment Operations Team.</td></tr>
<tr><td>Change Mgmt.</td><td colspan="3">No</td></tr>
<tr><td>Risk of Doing</td><td>Community pushback on the costs of the project.
May lead to increased operational spending initially to resolve areas found to be causing high leakage.
Complaints regarding water meter installation.</td><td>Commentary</td><td></td></tr>
</table>

Risk of Not Doing	Leakage increases, operational cost increases Water take consents exceeded Water restrictions / supply interruptions Level of service not met resulting in customer complaints. Un-budgeted expenditure to resolve leakage issues as they arise. Renewals completed in areas where leakage is not an issue.	**Commentary**	

Options Analysis *(add more options if applicable)*		
	Option One: Do Nothing	**Option Two – Complete project**
Overview	• No change	• Input meter and zone meter design and installation across the District • Pressure management installations • Design and implementation of SCADA and Water Outlook monitoring and management systems • Electronic water meter installations
Advantages	• No capital cost to TDC.	• Many, as per background
Disadvantages	• As per risk of not doing	• Capital cost
Costs	Capex $ 0 Opex $ Actual cost due to increased leakage may be significant Total $ 0	Capex $ 1,430,000 Opex Reduced, but difficult to quantify Total $ 1,430,000
Achievability	This option is achievable.	This option is achievable.
Recommendation	Proceed with option 2 which provides the best outcome.	

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Standard design, tender, construct approach. • Potentially packaged with pipeline renewals projects. • Roles, internal/external detailed below

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Risk of price increases due to effects of global pandemic on supply chain.	Likely	Moderate	High

Project Resource Requirements

Role	Primary Responsibilities	Internal or External	FTE Estimate	Duration (months)
Sponsor	Ensure benefits realisation.	Internal	0.01	36
Asset Manager	Scoping, planning, handover to delivery team, tendr reviews, council paper.	Internal	0.05	36
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External	0.10	36
Project Manager	Project Management	External	0.10	18
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External	0.20	18
Operations Team Staff	Interface with operational plant, training commissioning, handover	Internal	0.1	3
Network Engineer	Interface with network, design reviews, training commissioning, handover	Internal	0.1	6
Communications Staff	Comms plan and support	Internal	0.1	3

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Input Meter and Zone Meter Installs	$ 430k	Capital Year 1
Pressure Management	$ 70k	Capital Year 1
Monitoring and Management	$ 50k	Capital Year 1
Electronic Meter Installs New	$ 550k	Capital Year 2
Electronic Meter Installs Renewals	$ 330k	Capital Year 3
Total Estimated Capital Cost	$ 1,430k	
Total Estimated Operational Cost/year	Reduced, but difficult to quantify	
How accurate are your estimates? Costs fairly accurate (+/-20%)		
How will this proposal be funded? New Capex		

Timescale/Cost – give a summary of how the project phases will be delivered.

LTP 2021-2031	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Phase (Initiate, Plan, Execute)	Initiate, Plan / Execute	Execute	Execute							
Cost of phase and year spent	$550k	$550k	$330k							

Approval *If there's been a significant change in scope or change in cost/benefit*			
Review – Tom Swindells	*Tom Swindells*	Date	*12/02/2021*
Approval – Denis Lewis		Date	

LTP Business Case 4 to 6 years

Project Name	**Water Site Decommissioning & Remedial Works**		
Description	Water Site Decommissioning & Remedial Works		
Business Owner	Tom Swindells	**BC Author**	Tom Swindells
Project Size	Lite	**Project Complexity**	Paint by Numbers
Programme		**Location**	Acacia Bay, Bonshaw Park, Mapara, Taupo, Waitahanui, Whakamoenga Point

Strategic Objective *([see appendix below](#) to help score Strategic Objectives)*

		Score	Project Score Total
Primary	Looking After Public Health and Safety	4	5
Secondary	Placemaking	1	

Background

The following water sites have been disused following infrastructure upgrades in recent years:

- Waitahanui treatment plant, bore field and reservoirs
- Mapara Road reservoir
- Rainbow point intake and treatment plant (currently operational for emeregency)

The following water sites are expected to be disused in the near future once infrastructure upgrades are completed:

- Acacia Bay intake and pump station
- Bonshaw Park bores, treatment building and reservoirs
- Whakamoenga Point intake and pump station

A resilience study is planned for year 1 of the LTP to confirm whether any sites should be retained to support resilience planning.

Disused assets can quickly become health and safety risks if not maintained appropriately, and therefore the primary objective of the project is looking after public health and safety. Many of the assets are located on the lakebed, reserve areas or other high-profile location and therefore placemaking is the important secondary objective.

Business Need

Decommissioning & remedial works at water sites including Acacia Bay, Bonshaw Park, Mapara, Taupo, Waitahanui and Whakamoenga Point.

Option/s

1. Do nothing
2. Decommission and remediate some sites, retain others for resilience
3. Decommission and remediate all sites

Benefits and Wellbeings *[(see appendix)](#)*

Benefit	Benefit Type	Wellbeing
Removal of infrastructure from reserve areas	Customer Satisfaction	Social
Removal of infrastructure from reserve and lakebed	Improve Community Engagement	Cultural
Reduced operational costs for maintenance of infrastructure	Cost reduction	Economic
Reduced health and safety risks at sites	Improved Public Safety	Social

Opportunity

Decommissioning & remedial works at water sites including Acacia Bay, Bonshaw Park, Mapara, Taupo, Waitahanui and Whakamoenga Point.

Scope

In	Out	Maybe
• Acacia Bay intake pump station, building and intake pipe removal	• AC pipe removal outside site boundaries. • Costs of property marketing / sale if required.	•

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	• Bonshaw Park buildings, tanks removal. 3 bores capped. Access track refurbishment. • Mapara reservoir and buildings removal, reinstate access road, remove AC pipes from section. • Rainbow Point, treatment plant, buildings, intake pipe removal, AC pipe removal from within site area. Reinstatement of site area. • Waitahanui treatment building and tank removal, bore capping and reservoir removal. Reinstatement of sites. • Whakamoenga Point intake pump station, building and intake pipe removal • Landscaping and planting each site.		
Constraints	• Resources • Project funding	**Assumptions**	
Dependencies	• Resilience Study Outputs • Connection of Acacia Bay to Taupo • Connection of Whakamoenga Point to Taupo • Connection of Bonshaw Park to Taupo • Tauhara Ridge Reservoir and Airport Connection	**Stakeholders**	Senior management, Councillors, Residents, Iwi, Land Owners, Project Team (TDC staff and Consultants)
Potential Issues with the preferred option	• Capital cost • Loss of resilience		
Risk of Not Doing	• Health and safety risks at sites • Maintenance costs • Customer complaints		

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
As per scope	

Project Resources – Role Name	**Primary Responsibility**	**Internal/External**
Sponsor	Ensure benefits realisation.	Internal
Asset Manager	Scoping, planning, handover to delivery team, tender reviews, council paper.	Internal
Programme Delivery Manager	Appoint project manager, consultation, tender reviews, reporting, handover.	External
Project Manager	Project Management	External
Engineers Rep / Site supervision	Site supervision, quality, H&S, witness tests etc	External
Network Engineer	Interface with network, approvals of alteration to existing network as required	Internal
Treatment Team Leader	Interface with treatment assets.	Internal
Communication Lead	Communication plan and implementation	Internal

Cost Summary		
Item	**Estimated Cost**	**Capital or Operational**
Mapara Rd Reservoir Site	$47,900	Capital Year 1
Waitahanui WTP, Bores and Tank Sites	$38,000	Capital Year 1
Rainbow Point WTP Site	$80,000	Capital Year 2
Acacia Bay Water Intake Site	$35,100	Capital Year 2
Bonshaw Park WTP and Bore Sites	$41,500	Capital Year 3
Whakamoenga Point Water Intake Site	$33,900	Capital Year 3
Airport Reservoir & PS Site	$42,600	Capital Year 4
Total Estimated Capital Cost	$319,000	
Total Estimated Operational Cost/year	$ Reduced Maintenance Unknown Amount	

Timescale/Cost – give a summary of how the project phases will be delivered.										
LTP 2021-2031	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	Initiate, Plan, Execute	Initiate, Plan, Execute	Initiate, Plan, Execute	Initiate, Plan, Execute						
Cost of phase and year spent	85,900	115,100	75,400	42.600						

Approval *This is the initial approval of the Business Case. It may be further prioritised against other projects*	
Approvers Name	
Date	

Project Name	**Water Network Maintenance Improvements**		
Description			
Business Owner	Kevin Sears	**BC Author**	**Paul Pettman**
Project Size	Lite	**Project Complexity**	Paint by numbers
Programme	Improve service delivery and reduce risk	**Location**	All Water Network Schemes around the Taupo District

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	**Being Resilient and Prepared** - By doing this project it reduces the chances of losing water services which are critical for the town/district to operate	5	10
Secondary	**Looking After Public Health and Safety** – Failure to do this project could have a severe impact on the public's health and safety and affect a large number of people	5	
Background	For many years' funds have been limited to carryout routine maintenance on our water reticulation networks throughout the district. To keep costs down TDC have run with a reactive water maintenance mentality, responding to level of service complaints and carrying out repairs when issues such as water leak / damage has arisen, or infrastructure has failed. Our understanding of the conditions of our infrastructure has relied heavily on manufactured advise and expected life set on more guess work than actual condition assessment. This method of maintenance has proven to save time and money in the short term but indefinably results in higher failure rates, repair costs and continually growing damage to our reputation with both customers and regional / national government bodies. While great progress has been made with water main renewals planning and undertaking (based on watermains material and expected life / regular failure records), accurate condition assessment of key infrastructure i.e. valves, hydrants, flow meters etc have not been carried out and many are either missing (not visible), inaccessible (chambers incorrectly positioned / full of soil) or inoperable (seized, broken, leaking etc). We are quite unique in the Taupo District as we have both clockwise and anti-clockwise closing sluice valves on throughout our networks. While we do try to identify the direction of closing through the colour of valve boxes, where the colour has worn away, unfortunately mistakes are easily made, and valves are left off. This has resulted in reduced pressures and flow, non-looped mains that end up with stagnant water and large areas of reticulation being affected during localised water shuts. Backflow prevention has been a legal requirement for several years now. Part of this requirement is to annually test backflow devises and hold records of such testing, ensuring we are doing everything we can for the safety of our water networks. While TDC have been pushing hard to get these devices installed, the follow up testing of testable backflow devices and replacement of non-testable backflows has not got underway. We run multiple water schemes throughout the district that rely on pressure management through pressure reducing / sustaining valves. Failure to maintain these results in an unreliable water delivery and reduced asset life of downstream infrastructure. We end up with more mains breaks, leaks, unplanned water outages and disruption to our networks. These valves are currently only repaired / serviced when either an increase in work related to the operation of the valves or failure occurs. These can be quite timely and expensive repairs and hard to budget for when waiting on failure. Flow restrictors are commonplace in many of our rural schemes. These are in place to distribute the available water fairly throughout the schemes, lower volumes all day long, and remove the need to have large infrastructure and pumping ability. As schemes have grown the demand for water has increased and the fair distribution of water intensified. If restrictors wear out or are tampered with more water is required and/or connections further downstream start to receive less water resulting in higher operational costs and unnecessary call outs for our three waters contractor.		

Business Need	Location, maintenance and good condition assessment need to be carried out on all the valves and hydrants throughout the district. This will allow us to be able to respond quickly to emergency shuts downs or flushing's etc. We will be able to locate any inoperable and missing infrastructure and plan the required works to ensure it is ready for use when required. If we can't turn mains off in adequate time extensive damage may occur and interruptions to supply will be lengthened and have the potential to effect larger areas. Hydrants should be clear and accessible and in good operational order for emergency services. Backflow protection is a major factor in maintaining the safety of our water network. If we can't prove we are annually testing and carrying out repairs when required on these devises we leave our self fully exposed should any water contamination occur. A draft contract has been written but has not been put out to tender until approval of this business case has been given. An engineer's estimate has been completed and it has been assessed to cost approximately $160,000/yr. Pressure management maintenance will allow us to manage future maintenance costs. Allow us to proactively ensure the valves operate as and when they should and reduce the likely hood of unplanned water leaks and water outages. Flow restrictor checks will ensure all consumers are able to receive their expected allocations. Should reduce operational costs of pump stations, reduce reactive response for our 3 Waters contractor and give us opportunity to test water meters are recording accurately.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Backflow protection of networks: Ensure we are doing all we can to protect the water network around contamination from private and commercial residence activity. Prove this when required legally	Record all reports in asset finder Records will be kept up to date on testing and repairs required.	Improved public safety / Health	Legislative Compliance
Valve and hydrant maintenance: Ensure valves and hydrants are accessible, operationally and detail around size, type and condition are correct. Locate any closed valves and allows us to open and improve circulations around networks. Reduce the response and repair times of repairs and effect on public.	Record all assets in Assetfinda with condition rating. Access and assess TDC assets and gain asset data to empower good decision making for renewal/relocation and or maintenance requirements. Reduced response times in both planned and unplanned works.	Improved Resilience and Preparedness	Improve levels of service
Pressure management valve maintenance: More controlled, consistent pressure management. Proactive Budgeting	Record all proactive maintenance in asset finder. Reduced failure, callout, resulting mains breaks / leaks. Reduce the unplanned costs	Improved levels of service	Cost Avoidance Customer satisfaction
Water restriction testing: Flow restrictor checks will ensure all consumers are able to receive their expected allocations. Should maintain operational costs of pump stations, reduce reactive response for our 3 Waters contractor and give us opportunity to test water meters are recording accurately. Allows us to manage unauthorised tampering of connections	Record all proactive maintenance in asset finder. More accurate water take recording allowing us to understanding water loss volume better and initiate leak detection more efficiently	Improved Efficiency	Reduce Water usage / Wastage

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<tr><td></td><td></td><td></td><td></td></tr>
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<table>
<tr><td>Opportunity</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Scope</td><td colspan="2">In</td><td colspan="2">Out</td></tr>
<tr><td colspan="2">• Condition Assessments
• Maintenance works
• Testing</td><td colspan="2">• Location of missing assets
• Replacement or renewal
• Works following assessment</td></tr>
<tr><td>Constraints</td><td>None</td><td colspan="2">Assumptions</td><td>Number of staff required to carry out works
Specialist staff available to carry out works</td></tr>
<tr><td>Dependencies</td><td colspan="4">Deeco - Supply of service kits for PRV</td></tr>
<tr><td>Stakeholders</td><td colspan="4">Internal
▪ Network Water infrastructure staff TDC
▪ 3 Waters Operations Management TDC
▪ Asset information team TDC
External
▪ DWA
▪ General public
▪ Private land owners
▪ Downer
▪ District Health Board
▪ External specialised contractor</td></tr>
<tr><td>Change Mgmt.</td><td colspan="4">Weekly / fortnightly communication with Downer and external specialist (If required)
Monthly reporting</td></tr>
<tr><td>Risk of Doing</td><td>Volume of missing or poor condition assets found.
Extra time required for TDC staff to manage and process findings</td><td colspan="2">Commentary</td><td>Spiralling cost of renewal or maintenance budgets in earlier years (7 years) until on top of networks again and real benefit felt</td></tr>
<tr><td>Risk of Not Doing</td><td>Failing compliance with Backflow prevention. Public health risk.
Further valves and hydrants in missing or poor condition and greater time and costs during emergency repairs.
Potential increase in operation costs of pump stations and WTP's
Incorrect meter recording and lost revenue</td><td colspan="2">Commentary</td><td>Will lead to prosecution eventually

Increased and expanded unplanned interruption to water supplies.
Increasing risk of losing Firefighting capabilities within operable hydrants</td></tr>
</table>

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<tr><td colspan="4">Options Analysis (add more options if applicable)</td></tr>
<tr><td></td><td>Option One: Change Nothing</td><td>Option Two</td><td>Option Three</td></tr>
<tr><td>Overview</td><td>In recent years we have not delivered any backflow prevention testing and if required to can't supply proof, if we don't get on top of things we are going to be hit with prosecutions. Public health is at risk.
Valve and hydrant maintenance has been non-existent for years. More and more time is needing to be taken to locate our infrastructure and when it is used we find lots of follow up works. Shut downs in some areas are</td><td>Get the backflow testing program in action

Start the valve and hydrant, flow testing maintenance and get better understanding of conditions (7 year cycles of entire district)</td><td>Get the backflow testing program in action

Start the valve and hydrant, flow testing maintenance and get better understanding of conditions (14 year cycles of entire district)</td></tr>
</table>

	becoming much larger than they should be. More and more confusion of valves being left off is happening.		
Advantages	• No additional budget required	• Be complaint with backflow testing, public health. • Get on top of maintenance in a manageable time, understand asset condition sooner and plan renewal works with better understanding. • Ability to respond faster to planned and emergency works • Have ability to stretch out the valve and hydrant maintenance over longer cycle once been through and asset conditions better understood	• As Option 2 but over twice as long period before better in control of what asset we have and there condition • Upfront cost on findings will not be as large as Option 2
Disadvantages	• Fines, imprisonment • Increasing reactive maintenance costs • Greater inconvenience to public	• Up front cost on findings is potentially greater over first round of district.	• Taking longer period of time to carryout maintenance has the potential for the networks to become a lot worse before we get better resulting in more reactive costs required and more infrastructure in poor states for longer.
Costs			
Achievability		As long as contractors are available	As long as contractors are available
Recommendation	Option 2		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• By our 3 waters contractor Downer and other specialised contractors where required

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Safer water networks	Backflow prevention testing / repair
Good condition assessments	Better renewals planning
Better water reticulation networks	Better control of networks and confidence that valves and hydrants are access able and work as designed.

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Availability of suitable contractors	2	3	Medium

Project Resource Requirements

Role	Primary Responsibilities	Internal or External	FTE Estimate	Duration Estimate
Network Engineer	Procure contractors, Audit work, record findings in Assetfinda	internal		On going

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Backflow protection of networks	$162,000/year	Opex
Valve and hydrant maintenance	$58,000/year	Opex
Pressure management valve maintenance	$15,000/year	Opex
Water restriction testing	$13,000/year	Opex
Total Estimated cost	$ 248,000/year	
How accurate are your estimates?	80%	
How will this proposal be funded? Opex budgets in LTP		

LTP 2021-2026	Y1	Y2	Y3	Y4	Y5
Phase (Initiate, Plan, Execute)	$247,600	$248,000	$221,200	$224,700	$207,400
Cost of phase and year spent					

LTP 2027-2031	Y6	Y7	Y8	Y9	Y10
Phase (Initiate, Plan, Execute)	$169,500	$176,600	$195,000	$273,800	$243,500
Cost of phase and year spent					

Approval *If there's been a significant change in scope or change in cost/benefit*
Kevin Strongman

Project Name	Water Treatment Civil/Structural Renewals		
Description	To successfully carry out the renewals program for all Taupo District Council's Water Treatment Civil/Structural assets		
Business Owner	Kevin Sears	BC Author	**Shannon McMillan**
Project Size	Lite	Project Complexity	Paint by numbers
Programme	Improve service delivery and reduce risk.	Location	Various around Taupo District

Strategic Objectives (*see appendix below* to help score Strategic Objectives)			
		Score	**Project Score Total**
Primary	**Maintaining levels of service** - This project ensures we can continue to deliver services which are Critical for the town/District to Operate	5	10
Secondary	**Being Resilient and Prepared** - Failure to do this project could have a severe impact on the public's health and safety and affect a large number of people	5	
Background	The Water Treatment Civil/Structural assets are part of the wider Water/Wastewater Treatment Renewals program. The purpose of the Renewals Program is to prevent or minimise the risk of assets reaching complete failure by renewing an asset to near new condition or, in some cases, by installing a full replacement. The renewal schedule is generated by completing condition assessments, tracking this captured data in the asset register Objective spreadsheet WTP Planned Renewals A1728450. As assets are condition assessed, they are re-evaluated and the asset's renewal date adjusted if required. In some cases, assets can be renewed sooner than originally scheduled if the condition has deteriorated sooner than expected or if the benefits outweigh the cost (such as technological advancements, improved efficiencies). The key elements of the renewals program are: ▪ Taking a lifecycle approach to managing assets ▪ Developing cost effective management strategies for the long-term ▪ Monitoring asset performance ▪ Understanding and meeting the impact of population growth through demand management and infrastructure investment ▪ Managing the risks associated with asset failures ▪ Continuous improvement in asset management practices with the introduction of AssetFinda The renewals program is intended to demonstrate the Council is managing the assets responsibly by utilising lifecycle management strategies and providing details of associated costs. Key benefits of the Renewals program are: ▪ Alignment with the Council Asset Management Policy and Infrastructure strategy ▪ Improved budget forecasting of assets and asset related renewal management and costs ▪ Managed risk of asset failures ▪ Improved decision-making based on costs and benefits of alternatives ▪ Improved accountability over the use of public resources ▪ Clear justification of forward works programmes and funding requirements for submission into the LTP ▪ Legislative compliance ▪ Cost savings by extending the life of assets through refurbishment and condition assessments One of the primary concerns with regard to asset management is the management and reduction of risk. The Asset Renewals Program manages risk in the following ways: ▪ Identifying Critical Points in treatment processes and preventing the risk of failure by managing these Critical Points which could lead to fines and/or prosecution		

	▪ Preventing interruptions to treatment processes leading to non-compliance with the Drinking Water Standards NZ 2005 (Revised 2018), Taumata Arowai-the Water Services Bill and Drinking-water Legislation under the Health Act (1956) ▪ Minimising the risk of drinking water contamination through asset failure increasing the risk to Public Health on a large scale which in turn will increase demand on health services and impact local business ▪ Minimise adverse public perception and damage to Council's through loss of water supply, contamination events resulting in boil water notices due to asset failure
Business Need	To continue to carry out the planned renewals schedule for Water Treatment Civil and Structural works as described in Objective document WTP Planned Renewals A1728450

Benefits and Wellbeings (see appendix)

Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Proactive renewals minimising the risk of process failure. Maintaining Critical spare stock	Condition assessments over life of the asset Recording reports in AssetFinda	Improved Resilience and Preparedness	Social
Proactively renewing assets to minimise the risk of equipment and/or process failure resulting in ineffective treatment of drinking-water	Plant performance reports Overflow reports Condition assessments in AssetFinda Treatment Operations Team feedback and reports Water Outlook Reports	Legislative Compliance	Economic Cultural
Renewing assets to extend the life and minimise the risk of process failure, getting more value from assets	Condition assessments in AssetFinda Treatment Operations Team feedback and reports Reductions in drinking-water transgressions and non-compliance with the DWSNZ Water Outlook Reports	Cost Avoidance	Economic
Renewing assets and replacing prior to failure to minimise the risk of process failures which can lead to drinking-water contamination or loss of supply	Equipment assessments – fit for purpose Condition assessments in AssetFinda Treatment Operations team feedback and reports Water Outlook reports	Improved Public Health / Safety	Social

Opportunity		
Scope	**In**	**Out**
	• Condition assessments and data recording • Proactive and planned renewal of assets including replacement • Reactive renewal of assets	• Routine maintenance • Staff time

Constraints	None	**Assumptions**	Adequate staffing/contractor numbers and skills to carry out the Renewals schedule
Dependencies	None		
Stakeholders	**Internal** ▪ Internal Water and wastewater staff. ▪ TDC Management and 3 Water Operations **External** ▪ Landowners ▪ Waikato Regional Council ▪ Te Toi Ora Lakes District Health Board		

	▪ Downer and other contractors ▪ Local Iwi ▪ General Public		
Change Mgmt.	Renewals staff weekly team meetings with management. Updating of the renewals schedule as tasks completed. Condition assessment reports loaded into AssetFinda. Monthly Infrastructure meetings. Asset Management Plan.		
Risk of Doing	▪ Unable to complete the renewals program in sufficient time or to an acceptable quality. ▪ Scope of work.	**Commentary**	▪ Insufficient skilled staff or contractor availability to carry out the renewals program ▪ Scope change – projects can snowball larger than budgeted for due to lack of previous investment/investigation
Risk of Not Doing	▪ Increase costs in reactive maintenance. ▪ Risk of interruption to treatment processes due to failing assets ▪ Non-compliance resulting in abatement notices and fines due to failing assets ▪ Loss of supply and/or contamination due to failed assets ▪ Inaccurate data on asset condition	**Commentary**	▪ Running equipment to failure interrupting processes and increased operational time/costs ▪ Contamination of drinking-water causing mass illness putting pressure on the health sector and local business due to staffing shortages. ▪ Potential prosecution and/or fines ▪ Adversely affecting public perception of Council ▪ Unknown costs associated to the renewal of the asset resulting in insufficient budget allowance

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two**	**Option Three**
Overview	Only replace equipment once it has failed.	Condition assess and carry out a proactive renewals program	Extend out condition assessments to reduce planned renewals
Advantages	• None	• Best lifecycle practise • Reduced failures and outages. • Reduced risk of noncompliance and overflows • Reduced operator call outs. • Increased staff satisfaction	• Would reduce renewals budget and expenditure
Disadvantages	• High risk of non-compliance and overflows • Increased equipment failures and delays in replacing. • Increased operator call outs and staff stress and dissatisfaction. • Increased overall cost	• None	• Increased risk of non-compliance • Increased equipment failures • Increased operator call outs and staff stress and dissatisfaction. • Increased overall cost
Costs	Estimated overall cost $5million per year including fines for non-compliance	Average cost per year across the ten years of the LTP $1.1millon	Estimated overall cost $2.5million per year including potential fines for non-compliance
Achievability	Not achievable	100% achievable	75% achievable
Recommendation	Option 2		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
• Renewals to be scheduled as per WTP Planned Renewals A1728450 into AssetFinda

• Work to be completed by a combination of TDC staff (Asset Renewals team and Treatment Operations) and preferred contractors • Condition assessments carried out by TDC and Registered Consulting Engineers (Internal and External)

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Reduced risk of asset failure	Reducing the risk of treatment plant failure and maintain treatment barriers
Financial accountability	Accuracy of budgeting and spending
Accurate asset trackability	Full life cycle monitoring of asset
Maintaining treatment barriers	Ability to remain compliant with Drinking Water Standards NZ 2005 (Revised2018), Taumata Arowai – the Water Services Regulator, The Health Act 1956 in relation to Drinking-water

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Insufficient funding to complete schedule	2	4	Medium
Unable to complete the schedule within timeframe	3	3	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Asset Renewals and Pools Team Lead	Supervise renewals team, implement renewals schedule, document completed tasks, coordinate contractors/engineers	Internal	1	Ongoing
Asset Renewals and Pools Team x3 staff	Carry out directives from Team Lead	Internal	2	Ongoing

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Assorted civil/structural renewals	Average $270,000/yr	Capital mrenewal
Total Estimated cost	$2,700,000 for ten years	
How accurate are your estimates?	70%	
How will this proposal be funded?	LTP budgets	

LTP 2021-2026	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**
Phase (Initiate, Plan, Execute)	$308,000	$238,000	$447,000	$234,000	$196,000
Cost of phase and year spent					

LTP 2027-2031	Y6	Y7	Y8	Y9	Y10
Phase (Initiate, Plan, Execute)	$290,000	$232,000	$276,000	$215,000	$257,000
Cost of phase and year spent					

Approval *If there's been a significant change in scope or change in cost/benefit*
Kevin Strongman

Project Name	**Water Treatment Electrical & Telemetry Renewals**		
Description	To successfully carry out the renewals program for all Taupo District Council's Water Treatment Electrical & Telemetry Assets		
Business Owner	Kevin Sears	**BC Author**	**Shannon McMillan**
Project Size	Lite	**Project Complexity**	Paint by numbers
Programme	Improve service delivery and reduce risk.	**Location**	Various around Taupo District

Strategic Objectives (*see appendix below to help score Strategic Objectives*)			
		Score	**Project Score Total**
Primary	**Maintaining levels of service** - This project ensures we can continue to deliver services which are Critical for the town/District to Operate	5	10
Secondary	**Being Resilient and Prepared** - Failure to do this project could have a severe impact on the public's health and safety and affect a large number of people	5	
Background	The Water Treatment Electrical & Telemetry assets are part of the wider Water/Wastewater Treatment Renewals program. The purpose of the Renewals Program is to prevent or minimise the risk of assets reaching complete failure by renewing an asset to near new condition or, in some cases, by installing a full replacement. The renewal schedule is generated by completing condition assessments, tracking this captured data in the asset register Objective spreadsheet WTP Planned Renewals A1728450. As assets are condition assessed, they are re-evaluated and the asset's renewal date adjusted if required. In some cases, assets can be renewed sooner than originally scheduled if the condition has deteriorated sooner than expected or if the benefits outweigh the cost (such as technological advancements, improved efficiencies). The key elements of the renewals program are: ▪ Taking a lifecycle approach to managing assets ▪ Developing cost effective management strategies for the long-term ▪ Monitoring asset performance ▪ Understanding and meeting the impact of population growth through demand management and infrastructure investment ▪ Managing the risks associated with asset failures ▪ Continuous improvement in asset management practices with the introduction of AssetFinda The renewals program is intended to demonstrate the Council is managing the assets responsibly by utilising lifecycle management strategies and providing details of associated costs. Key benefits of the Renewals program are: ▪ Alignment with the Council Asset Management Policy and Infrastructure strategy ▪ Improved budget forecasting of assets and asset related renewal management and costs ▪ Managed risk of asset failures ▪ Improved decision-making based on costs and benefits of alternatives ▪ Improved accountability over the use of public resources ▪ Clear justification of forward works programmes and funding requirements for submission into the LTP ▪ Legislative compliance ▪ Cost savings by extending the life of assets through refurbishment and condition assessments One of the primary concerns with regard to asset management is the management and reduction of risk. The Asset Renewals Program manages risk in the following ways: ▪ Identifying Critical Points in treatment processes and preventing the risk of failure by managing these Critical Points which could lead to fines and/or prosecution		

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<tr><td colspan="2">Business Need</td><td colspan="4">To continue to carry out the planned renewals schedule for Water Treatment Electrical & Telemetry assets as described in Objective document WTP Planned Renewals A1728450</td></tr>
<tr><td colspan="6">Benefits and Wellbeings (see appendix)</td></tr>
<tr><td colspan="2">Benefit</td><td colspan="2">How will you quantify and track</td><td>Benefit Type</td><td>Wellbeing</td></tr>
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TDC Management and 3 Water Operations
External
Landowners
Waikato Regional Council</td></tr>
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	▪ Te Toi Ora Lakes District Health Board ▪ Downer and other contractors ▪ Local Iwi ▪ General Public		
Change Mgmt.	Renewals staff weekly team meetings with management. Updating of the renewals schedule as tasks completed. Condition assessment reports loaded into AssetFinda. Monthly Infrastructure meetings. Asset Management Plan.		
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Costs	Estimated overall cost $5million per year including fines for non-compliance	Average cost per year across the ten years of the LTP $1.1millon	Estimated overall cost $2.5million per year including potential fines for non-compliance
Achievability	Not achievable	100%	75%
Recommendation	Option 2		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

- Renewals to be scheduled as per WTP Planned Renewals A1728450 into AssetFinda
- Work to be completed by a combination of TDC staff (Asset Renewals team and Treatment Operations) and preferred contractors
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Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
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Unable to complete the schedule within timeframe	3	3	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Asset Renewals and Pools Team Lead	Supervise renewals team, implement renewals schedule, document completed tasks, coordinate contractors/engineers	Internal	1	Ongoing
Asset Renewals and Pools Team x3 staff	Carry out directives from Team Lead	Internal	2	Ongoing

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Assorted Electrical & Telemetry renewals	Average $243,000/yr	Capital renewal
Total Estimated cost	$2,430,000 for ten years	
How accurate are your estimates?	70%	
How will this proposal be funded?	LTP budgets	

LTP 2021-2026	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**

Phase (Initiate, Plan, Execute)	$278,000	$215,000	$403,000	$212,000	$177,000
Cost of phase and year spent					

LTP 2027-2031	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	$262,000	$210,000	$249,000	$195,000	$232,000
Cost of phase and year spent					

Approval *If there's been a significant change in scope or change in cost/benefit*
Kevin Strongman

Project Name	Water Treatment Mechanical Renewals		
Description	To successfully carry out the renewals program for all Taupo District Council's Water Treatment Mechanical Assets		
Business Owner	Kevin Sears	BC Author	**Shannon McMillan**
Project Size	Lite	Project Complexity	Paint by numbers
Programme	Improve service delivery and reduce risk.	Location	Various around Taupo District

Strategic Objectives (*see appendix below to help score Strategic Objectives*)			
		Score	Project Score Total
Primary	**Maintaining levels of service** - This project ensures we can continue to deliver services which are Critical for the town/District to Operate	5	10
Secondary	**Being Resilient and Prepared** - Failure to do this project could have a severe impact on the public's health and safety and affect a large number of people	5	

Background

The Water Treatment Civil/Structural assets are part of the wider Water/Wastewater Treatment Renewals program. The purpose of the Renewals Program is to prevent or minimise the risk of assets reaching complete failure by renewing an asset to near new condition or, in some cases, by installing a full replacement.

The renewal schedule is generated by completing condition assessments, tracking this captured data in the asset register Objective spreadsheet WTP Planned Renewals A1728450. As assets are condition assessed, they are re-evaluated and the asset's renewal date adjusted if required. In some cases, assets can be renewed sooner than originally scheduled if the condition has deteriorated sooner than expected or if the benefits outweigh the cost (such as technological advancements, improved efficiencies).

The key elements of the renewals program are:

- Taking a lifecycle approach to managing assets
- Developing cost effective management strategies for the long-term
- Monitoring asset performance
- Understanding and meeting the impact of population growth through demand management and infrastructure investment
- Managing the risks associated with asset failures
- Continuous improvement in asset management practices with the introduction of AssetFinda

The renewals program is intended to demonstrate the Council is managing the assets responsibly by utilising lifecycle management strategies and providing details of associated costs. Key benefits of the Renewals program are:

- Alignment with the Council Asset Management Policy and Infrastructure strategy
- Improved budget forecasting of assets and asset related renewal management and costs
- Managed risk of asset failures
- Improved decision-making based on costs and benefits of alternatives
- Improved accountability over the use of public resources
- Clear justification of forward works programmes and funding requirements for submission into the LTP
- Legislative compliance
- Cost savings by extending the life of assets through refurbishment and condition assessments

One of the primary concerns with regard to asset management is the management and reduction of risk. The Asset Renewals Program manages risk in the following ways:

- Identifying Critical Points in treatment processes and preventing the risk of failure by managing these Critical Points which could lead to fines and/or prosecution

	▪ Preventing interruptions to treatment processes leading to non-compliance with the Drinking Water Standards NZ 2005 (Revised 2018), Taumata Arowai-the Water Services Bill and Drinking-water Legislation under the Health Act (1956) ▪ Minimising the risk of drinking water contamination through asset failure increasing the risk to Public Health on a large scale which in turn will increase demand on health services and impact local business ▪ Minimise adverse public perception and damage to Council's through loss of water supply, contamination events resulting in boil water notices due to asset failure
Business Need	To continue to carry out the planned renewals schedule for Water Treatment Mechanical assets as described in Objective document WTP Planned Renewals A1728450

Benefits and Wellbeings (see appendix)

Benefit	**How will you quantify and track**	**Benefit Type**	**Wellbeing**
Proactive renewals minimising the risk of process failure. Maintaining Critical spare stock	Condition assessments over life of the asset Recording reports in AssetFinda	Improved Resilience and Preparedness	Social
Proactively renewing assets to minimise the risk of equipment and/or process failure resulting in ineffective treatment of drinking-water	Plant performance reports Overflow reports Condition assessments in AssetFinda Treatment Operations Team feedback and reports Water Outlook Reports	Legislative Compliance	Economic Cultural
Renewing assets to extend the life and minimise the risk of process failure, getting more value from assets	Condition assessments in Assetfinder Treatment Operations Team feedback and reports Reductions in drinking-water transgressions and non-compliance with the DWSNZ Water Outlook Reports	Cost Avoidance	Economic
Renewing assets and replacing prior to failure to minimise the risk of process failures which can lead to drinking-water contamination or loss of supply	Equipment assessments – fit for purpose Condition assessments in Assetfinder Treatment Operations team feedback and reports Water Outlook reports	Improved Public Health / Safety	Social

Opportunity		
Scope	**In**	**Out**
	• Condition assessments and data recording • Proactive and planned renewal of assets including replacement • Reactive renewal of assets	• Routine maintenance • Staff time
Constraints		**Assumptions**: Adequate staffing/contractor numbers and skills to carry out the Renewals schedule
Dependencies	None	
Stakeholders	**Internal** ▪ Internal Water and wastewater staff. ▪ TDC Management and 3 Water Operations **External** ▪ Landowners ▪ Waikato Regional Council	

	▪ Te Toi Ora Lakes District Health Board ▪ Downer and other contractors ▪ Local Iwi ▪ General Public		
Change Mgmt.	Renewals staff weekly team meetings with management. Updating of the renewals schedule as tasks completed. Condition assessment reports loaded into AssetFinda. Monthly Infrastructure meetings. Asset Management Plan.		
Risk of Doing	▪ Unable to complete the renewals program in sufficient time or to an acceptable quality. ▪ Scope of work.	**Commentary**	▪ Insufficient skilled staff or contractor availability to carry out the renewals program ▪ Scope change – projects can snowball larger than budgeted for due to lack of previous investment/investigation
Risk of Not Doing	▪ Increase costs in reactive maintenance. ▪ Risk of interruption to treatment processes due to failing assets ▪ Non-compliance resulting in abatement notices and fines due to failing assets ▪ Loss of supply and/or contamination due to failed assets ▪ Inaccurate data on asset condition	**Commentary**	▪ Running equipment to failure interrupting processes and increased operational time/costs ▪ Contamination of drinking-water causing mass illness putting pressure on the health sector and local business due to staffing shortages. ▪ Potential prosecution and/or fines ▪ Adversely affecting public perception of Council ▪ Unknown costs associated to the renewal of the asset resulting in insufficient budget allowance

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two**	**Option Three**
Overview	Only replace equipment once it has failed.	Condition assess and carry out a proactive renewals program	Extend out condition assessments to reduce planned renewals
Advantages	• None	• Best lifecycle practise • Reduced failures and outages. • Reduced risk of noncompliance and overflows • Reduced operator call outs. • Increased staff satisfaction	• Would reduce renewals budget and expenditure •
Disadvantages	• High risk of non-compliance and overflows • Increased equipment failures and delays in replacing. • Increased operator call outs and staff stress and dissatisfaction. • Increased overall cost	• None	• Increased risk of non-compliance • Increased equipment failures • Increased operator call outs and staff stress and dissatisfaction. • Increased overall cost
Costs	Estimated overall cost $5million per year including fines for non-compliance	Average cost per year across the ten years of the LTP $1.1millon	Estimated overall cost $2.5million per year including potential fines for non-compliance
Achievability	Not achievable	100%	75%
Recommendation	Option 2		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?

• Renewals to be scheduled as per WTP Planned Renewals A1728450 into AssetFinda • Work to be completed by a combination of TDC staff (Asset Renewals team and Treatment Operations) and preferred contractors • Condition assessments carried out by TDC and Registered Consulting Engineers (Internal and External)

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Reduced risk of asset failure	Reducing the risk of treatment plant failure and maintain treatment barriers
Financial accountability	Accuracy of budgeting and spending
Accurate asset trackability	Full life cycle monitoring of asset
Maintaining treatment barriers	Ability to remain compliant with Drinking Water Standards NZ 2005 (Revised2018), Taumata Arowai – the Water Services Regulator, The Health Act 1956 in relation to Drinking-water

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Insufficient funding to complete schedule	2	4	Medium
Unable to complete the schedule within timeframe	3	3	Medium

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Asset Renewals and Pools Team Lead	Supervise renewals team, implement renewals schedule, document completed tasks, coordinate contractors/engineers	Internal	1	Ongoing
Asset Renewals and Pools Team x3 staff	Carry out directives from Team Lead	Internal	2	Ongoing

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Assorted Mechanical renewals	Average $533,200/yr	Capital renewal
Total Estimated cost	$5,332,000 for ten years	
How accurate are your estimates?	70%	
How will this proposal be funded?	LTP budgets	

LTP 2021-2026	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**

Phase (Initiate, Plan, Execute)	$610,000	$472,000	$885,000	$464,000	$388,000
Cost of phase and year spent					

LTP 2027-2031	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Phase (Initiate, Plan, Execute)	$575,000	$460,000	$546,000	$425,000	$510,000
Cost of phase and year spent					

Approval *If there's been a significant change in scope or change in cost/benefit*
Kevin Strongman

Project Name	**Water and Wastewater Treatment Radio Communications**		
Description	To provide a secondary form of communication to the cellular network for Water and Wastewater Treatment Staff		
Business Owner	Kevin Sears	**BC Author**	Shannon McMillan
Project Size	Lite	**Project Complexity**	Paint by numbers
Programme	Wider Service/Health and safety initiatives	**Location**	All Water and Wastewater Treatment Plants and Pump Stations in the Taupo District

Strategic Objectives *(see appendix below to help score Strategic Objectives)*			
		Score	**Project Score Total**
Primary	**Being Resilient and Prepared –** Doing this project reduces the chances of losing services which affect are critical for the town/district to operate	5	10
Secondary	**Looking After Public Health and Safety –** Failure to do this project could have a severe impact on the public's health and safety and affect a large number of people	5	
Background	In a disaster or a pandemic, Water and Wastewater Treatment Plants may undergo significant damage, with the possibility of the cellular network also being affected and/or overloaded. So, in order to respond affectively to post disaster emergency situations an alternative form of communication is needed in order to verify the safety of individuals and facilitate information gathering (situational reports) and co-ordinate the response. Due to the rugged geographical locations of the Taupo District and the lack of cellular coverage in many parts, Operators are left without a viable and reliable means of communicating with base. This is particularly relevant if: ▪ A substantial civil defence emergency where the ability to communicate and receive situation reports about the district's Water and Wastewater Treatment Plants is imperative. ▪ An operator finds them self in a dangerous situation. I.e. Armed robbery in rural sites. ▪ Staff are working alone in areas without cellular communication and there is a risk of injury/adverse health event. ▪ Undertaking hazardous works such as Confined Space Entry (CSE) where the ability to contact emergency services must be available. These points are based on actual historical events where cellular communication has been unavailable. For instance: ▪ Waihaha weir clean – requires a Confined Space Entry to fully complete. As there is no cellular signal to contact emergency services and management, a Confined Space permit cannot be issued, so the work cannot go ahead. This has led to blockages and interruption to supply of water. ▪ Several instances of communications failure including the fibre optic cable being severed by a contractor that services our main server at Taupo WTP. Multiple comms outages to water supplies required staff to visit Treatment Plants several times throughout the night for status reports and compliance. Cellular signal was maintained for cell phone communications, but lost connectivity to the cellular network as well would mean more staff required to be on the ground and manually conveying status reports, delaying the flow of information and the reaction time to any emergencies. ▪ The current Covid 19 pandemic when the Alert level was raised to 3 with a warning that it will go to level 4 within 48 hours the cell phone network was jammed up for a period of time.		
Business Need	Additional form of communication in order to maintain service levels and keep staff and the public safe, in this instance, radio base stations set up at the Taupo Water Treatment Plant (WTP), the Taupo Wastewater Treatment Plant (WWTP) and the Emergency Operations Centre (EOC) and RT's installed in all Water and Wastewater vehicles and connected to the radio network, the coverage of which, is the entire Taupo District. Installing these units in our vehicles and at the selected base		

	stations will enhance our preparedness and resilience in times of emergency, enhance our staff's personal security and has the added benefit of enabling hazardous maintenance works to be carried out in areas without cellular coverage, minimising process failure and interruption to services.

Benefits and Wellbeings (see appendix)

Benefit	How will you quantify and track	Benefit Type	Wellbeing
Increased communication at remote sites	Drinking Water Transgression response compliance. Monitoring continuation of supply. Comparison monitoring of daily plant logs during critical periods. Sewer Spill Reports, the amount of details of response and times.	Legislative compliance	Environmental Cultural
Increased feeling of personal safety for staff	Compliance with hazardous works procedures during work in isolated areas which require communication be accessible at all times to emergency services. Accident and incident register monitoring.	Improved Resilience and Preparedness	Social
Robustness as compared to cellular phones – more usability in extreme weather, water proof and chemical resistance	Tracking cell phone replacement numbers Amount of communication traffic	Improve process efficiency	Economic
Alternative form of communication during emergency situations	Treatment compliance reports and transgression responses. Continuation of supply reports and outage of supply reports. Amount of detail and timeframes in incident reports	Improved Level of Service	Social

Opportunity	None	
Scope	**In**	**Out**
	• Procurement and install of Radios into all Water and Wastewater vehicles including Water Crane Truck and Wastewater Crane Truck • Radio Mobile Microphone assigned to every member of the Water and Wastewater Treatment Team • Connection radio network – actual network to be determined based on coverage tests with chosen supplier • Changes to Job Safety Analysis forms • Changes to Emergency Response Procedures • Updates to Business Continuity Plans	• Wider TDC vehicle fleet • Wider TDC staff • Radio connection directly to Taupo District Council Civil Defence Department or others outside of Taupo District Council • Changes to Standard Operating Procedures

Constraints	None	**Assumptions**	Radio connectivity will be available at all areas as per the Radio provider's network coverage maps.

Dependencies	None
Stakeholders	**Internal** ▪ Water and Wastewater Treatment staff ▪ TDC primarily SLT and 3 Water Operations ▪ Civil Defence **External** ▪ Waikato Regional Council ▪ Te Toi Ora Lakes District Health Board

	▪ Downer ▪ Local Iwi ▪ General Public		
Change Mgmt.	Communication plan to staff delivered via weekly team meetings. Updates to Business Continuity Plans and Emergency Response Procedures. Update to staff training plan.		
Risk of Doing	Downtime of vehicle usage as vehicles are replaced and equipment changed over.	**Commentary**	Limited coverage of area during change over if not managed correctly.
Risk of Not Doing	Ineffective communication in times of emergency. Increased risk to staff members personal safety. Inability to adhere to compliance standards. Potential for increased risk to public and environmental health.	**Commentary**	

Options Analysis *(add more options if applicable)*			
	Option One: Change Nothing	**Option Two**	**Option Three**
Overview	In the current situation if a moderate district disaster were to occur, as we are reliant on cellular coverage only, we would have no direct contact with operators in the field. Our working alone procedure requires staff to be able to communicate remotely and check in with base every 2 hours. If the cellular network is down, this means we cannot send staff out to assess the situation throughout the district.	Installing vehicle mounted RT's, in each of the Water and Wastewater fleet vehicles.	Installing vehicle mounted RT's with an additional mobile wireless microphone that will enable staff to communicate when away from the vehicle. Installing 3 Radio Base Stations each located at the Taupo Wastewater Treatment Plant, Taupo Water Treatment Plant and the EOC
Advantages	• No financial outlay	• Alternative form of communication for staff if the cellular network is down or out of range	• Alternative form of communication for staff if the cellular network is down or out of range. With the capability to be able to communicate back to the base stations. • The added mobile wireless microphone acts as a personal safety device for staff without having to get back to a vehicle to radio for help. • The added mobile wireless microphone increases the usability, as staff can work away from the vehicle in situations such as Confined Space Entry.
Disadvantages	• No ability to check/maintain supply • Increase in personal safety risk to staff	• The vehicle mounted system limits it's usability i.e. a staff member having a medical event would have to make their way to the vehicle to radio for help.	• Increased cost • Range limited on the wireless microphone to approximately 200m

		• Vehicle mounted RT's do not allow for sufficient mobility for hazardous works to be carried out.	
Costs	The following costs may best be described not in monetary terms, though this would certainly come into play, but in terms of an adverse effect to relationships with key stakeholders particularly when dealing with unreportable sewage spills into the lake or failures on treatment of drinking water.	Purchase equipment option: $42,600.00 Network connection 36 month term commitment including safety option with panic button, man down, high priority alerts etc: $35,280.00 (total 36 month cost) Lease equipment option(36 month term): $1000.00 per month for 20 vehicles. Plus one off installation: $9,600.00 Plus network connection as listed above.	Purchase equipment option: $68,403.00exc Network connection 36 month term commitment including safety option with panic button, man down, high priority alerts etc: $39,492.00 (total 36 month cost) Lease equipment option(36 month term): $1000.00 per month for 20 vehicles. Plus one off installation: $9,600.00 Plus network connection as listed above.
Achievability	No other factors are required.	An RT would be installed into a vehicle as a test trial with the supplier to determine what radio equipment and network would provide the best coverage. If trial successful, vehicle plan rollout would begin with a training plan implemented. Procedural change update.	An RT would be installed into a vehicle as a test trial with the supplier to determine what radio equipment and network would provide the best coverage. If trial successful, vehicle plan rollout would begin with a training plan implemented. Procedural change update.
Recommendation	Option 3 – Installation of RT's into every vehicle in the Water and Wastewater Fleet, including both crane trucks and manager's vehicle including the purchasing of additional personal mobile microphones for all Water and Wastewater Treatment Staff. The addition of 3 Radio Base Stations each located at the Taupo Wastewater Treatment Plant, Taupo Water treatment plant and the EOC		

RECOMMENDED OPTION

Delivery Approach – How will this initiative be delivered?
As per Taupo District Council's procurement strategy. Time frames are estimated to be 4 – 6 weeks for installation, trial and training. • The procurement strategy, e.g. tender, RFP, quotes • Contract management arrangements (in-house delivery, outsourced, hybrid) • Timeframes, e.g. is this a multiyear project, is there a design phase etc…

Project Outputs – the things the project is going to deliver	
Output	**Output Quality Details**
Fixed Radios in every vehicle	Communication coverage for entire Taupo District as serviced by Water and Wastewater personnel
Mobile Microphones	Away from vehicle communication ability (minimum 50m, chosen unit has approximate range of 200m)
Updated Business Continuity Plan	Making the Business Continuity Plan relevant to the change
Updated Emergency Response Plan	Making Emergency Response Plan relevant to the change

Key Risks – things that provide uncertainty in the project, focus on High risks if possible (see risk matrix in the appendix)			
Risk	**Likelihood**	**Impact**	**Score**
Lack of staff buy-in	Unlikely	Major	Medium
Not all areas will be covered by the radio network	Moderate	Major	High

Project Resource Requirements				
Role	**Primary Responsibilities**	**Internal or External**	**FTE Estimate**	**Duration Estimate**
Supplier	Network connection, installation of equipment, equipment trials and procedural training.	External	<% of FTE>	Contracted for 5 days delivered over 4 – 6 weeks
Project Manager	Oversee project, implement vehicle installation plan, implement change management plan, oversee equipment trials.	Internal	20%	Equivalent of 1 day per week over 4 – 6 weeks
Team Leads	Training and procedural implementation	Internal	10%	Equivalent of 2 half days over 2 weeks

Cost Estimate Summary – for recommended option		
Item	**Estimated Cost**	**Capital or Operational**
Tait TM9355 DMR Tier 3 400 – 470 MHz x 20 units	$33,000.00exc	Capital
X10DR Pro Series Mobile Package x 20 units	$18,700.00exc	Capital
Installation x20 units	$9,600.00exc	Capital
Tait TM9355 Keypad Microphone x 3 units	$4,173.00exc	Capital
SEC1212 Power Supply x3 units	$840.00exc	Capital
Technician labour plus parts and installation for 3x Base Stations	$2,090.00exc	Capital
Total Estimated Capital Cost	$68,403.00exc	
Total Estimated Operational Cost/year	$13,164.00exc	based off a 36 month term at $49 per connection for 20 x vehicles and 3 x base stations at $39 month(base stations don't require Safety option) = $39,492.00 plus $9,6000.00 connection fee for 20 vehicles divided over years 4, 5 and 6
Total Estimated cost	$81,567.00	
How accurate are your estimates? **Costs fairly accurate (+/-10%)**		
How will this proposal be funded? Seeking Internal funding within the Long Term Plan		

LTP 2021-2026	Y1	Y2	Y3	Y4	Y5
Phase (Initiate, Plan, Execute)	I, P, E				
Cost of phase and year spent	$81,567.00	$13,164.00	$13,164.00	$16,364.00	$16,364.00

LTP 2027-2031	Y6	Y7	Y8	Y9	Y10
Phase (Initiate, Plan, Execute)					
Cost of phase and year spent	$16,364.00	$13,164.00	$13,164.00	$13,164.00	$13,164.00

Approval *If there's been a significant change in scope or change in cost/benefit*
Kevin Strongman