Infrastructure Strategy 2018 - 48

Long Term Plan 2018-2028

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1.0 PURPOSE

1.1 The purpose of this Infrastructure Strategy (IS) is:

(a) To identify significant infrastructure issues for Waitomo District Council (WDC) over the period covered by the strategy, and

(b) To identify the principal options for managing those issues and the implications of those options.

This IS addresses the above purpose by outlining how WDC intends to manage its assets for the 30 year period 2018-2048, in the following four groups of activities:

i. Water Supply

ii. Sewerage (Wastewater)

iii. Stormwater

iv. Roads and Footpaths

The key issues impacting on future management of WDC's infrastructure assets have been highlighted in this IS taking account of asset renewal or replacement needs, impacts of changes in demand for services reliant on those assets, changes to levels of service (e.g. as a result of new resource consents), consideration of public health and environmental outcomes, and managing risks impacting on the resilience of the assets to natural hazards.

For the first 10 years of the planning period, this strategy represents a culmination of the asset management planning underpinning WDC's 2018-28 Long Term Plan.

2.0 STRATEGIC CONTEXT

2.1 FORMATION OF WAITOMO DISTRICT COUNCIL

The Borough of Te Kuiti was constituted in 1910. In 1922 the Awakino County was amalgamated with a newly created Waitomo County Council (in an area of the then Otorohanga County) to form a new separate local authority. Part of the Kawhia County was subsequently added to Waitomo County in 1956 while the balance of the former Kawhia County was incorporated with the neighbouring Otorohanga County. The Te Kuiti Borough and Waitomo County Councils were amalgamated to form the Waitomo District Council on 1 April 1976, and although minor changes to boundaries occurred with the 1989 re-organisation of local government in New Zealand, the District remains largely unchanged today. The present Waitomo District Council (WDC) was reconstituted on 1st November 1989.

2.2 GEOGRAPHY

Waitomo District encompasses 354,649 hectares of predominantly rural land on the west coast of the Central North Island. The western boundary is the Tasman Sea. It is adjacent to the Otorohanga District to the north, Taupo District to the east and Ruapehu and New Plymouth Districts to the south.

Te Kuiti is the administrative and main trading centre in the Waitomo district, with approximately 45% of the District population residing in this town. There are

several other smaller settlements located throughout the district, including the popular beach settlements of Mokau, Awakino, Marokopa, Te Waitere and Taharoa. The main rural communities are Benneydale, Piopio and Waitomo Village.

While the district is predominantly contained within the Waikato Region, the south-eastern corner of the District is within the Manawatu-Wanganui (Horizons) Regional Council's jurisdiction.

2.3 POPULATION PROJECTIONS

Rationale Limited was engaged to review and develop growth projections for WDC in June 2017. The purpose of the review was to provide population, dwelling and rating unit projections out to 2048. The projections consider elements such as historical and current trends, relevant land-use policies, and relevant national, regional and local level drivers. Council adopted the medium growth scenario from these growth projections.

Regarding the population structure, the district has a similar age profile to the rest of New Zealand. In 2013 the proportion of people aged 20 to 44 was lower than the rest of New Zealand however the proportion of people aged below 15 was higher. The proportion of people aged over 65 is projected to increase from 13% in 2013 to over 25% in 2048 and the number of people aged between 15 and 64 years of age is projected to decrease. This may have a flow-on effect to the make-up of the work force in the district. Factors such as the aging population contribute to a decline in the average household size, decreasing from around 2.6 residents per household in 2013 to under 2.3 in 2048.

In terms of geographic spread of growth, the Te Kuiti Ward is expected to experience a population decline and only small growth in dwellings. The population and number of dwellings is projected to grow in the Waitomo Rural Ward. The number of unoccupied dwellings increases significantly in Te Kuiti due to the declining population.

Population and dwelling growth flows through to rating units. The district's rating units are predominantly Residential and Residential Lifestyle, with nearly two thirds of the total rating units falling under these two categories. Therefore, any rating unit growth is heavily dependent on dwelling growth. The number of Commercial and Industry rating units is projected to increase in Mokauiti, Piopio, and Te Kuiti with no growth elsewhere.

Medium growth scenario

Population -Under this scenario, the district's population decreases at a lower rate than over the past 12 years, around 26 people or -0.3% per year. The population is projected to peak in 2018 but decline from there at increasingly greater rates. The population in the Waitomo Rural Ward increases by 2 people per year with the population in the Te Kuiti Ward declining by 28 people or -0.7% per year.

- Dwellings -The dwelling growth that flows from the above population is approximately double the dwelling growth under the low scenario. It is also 20% higher than the historical growth rate. The proportion of occupied dwellings decrease from 82% in 2013 to 74% in 2048. The number of dwellings in the Waitomo Rural Ward is projected to increase at a higher rate than the Te Kuiti Ward, at 16 and 2 dwellings per year respectively.
- Rating units -The impact on the rating units is again slightly lower than the dwelling growth, around 0.2% per year. While most of this is due to residential related rating unit growth, Commercial and Industry rating units increase by

six units by 2048 or 0.1% per year. Most of this business-related rating unit growth occurs in the Waitomo Rural Ward.

- Overall -This scenario is the closest to recent trends and is therefore considered to be the most realistic. It provides a conservatively optimistic midpoint between the construction boom of the mid 2000s and the general economic uncertainty following the global financial crisis.

A summary of the key results is shown in Table 1 below for the medium growth scenario. The change to 2048, average annual change and average annual growth rate is included. These cover the period from 2013 to 2048 for resident population and dwellings. For total rating units, these cover the period from 2018 to 2048.

Output	2013	2018	2028	2038	2048	Change (to 2048)	Average annual change	Annual average growth rate
Resident Population	9,340	9,810	9,650	9,120	8,420	-920	-26	-0.3%
Total Dwellings	4,224	4,377	4,522	4,644	4,863	639	18	0.4%
Total Rating Units	n/a	5,907	6,022	6,118	6,289	382	13	0.2%

Table 1 – Waitomo district population and dwelling forecasts 2013-48

The projected dwelling and rating unit growth rate is higher than for population due to flow-on effects of changes in population structure. Most of the growth is forecast to occur in the first ten to fifteen years before the rate of growth slows down towards 2038.

Current Pattern of Building and Subdivisional Development

The population growth for the District is projected to be in decline, while the dwelling and rating units is projected to grow slightly. Historic trends of pockets of sub divisional and building activity in the form of modest lifestyle development around Te Kuiti, Waitomo Village, Mokau, and Awakino are slowing. The sub divisional activity that was occurring in and around the Te Waitere area has also slowed in recent years.

Future Development Activity

The graph below shows the projected growth in rating units within the district sorted by category. As mentioned above, this shows the district's reliance on residential rating units - nearly two thirds of the total rating units are in the Residential or Residential Lifestyle category. Rural Industry rating units are around 20% of the total rating units. The remainder is spread between Commercial and Industry, Mixed Use, and Other rating units, each making up less than 10% of the total.

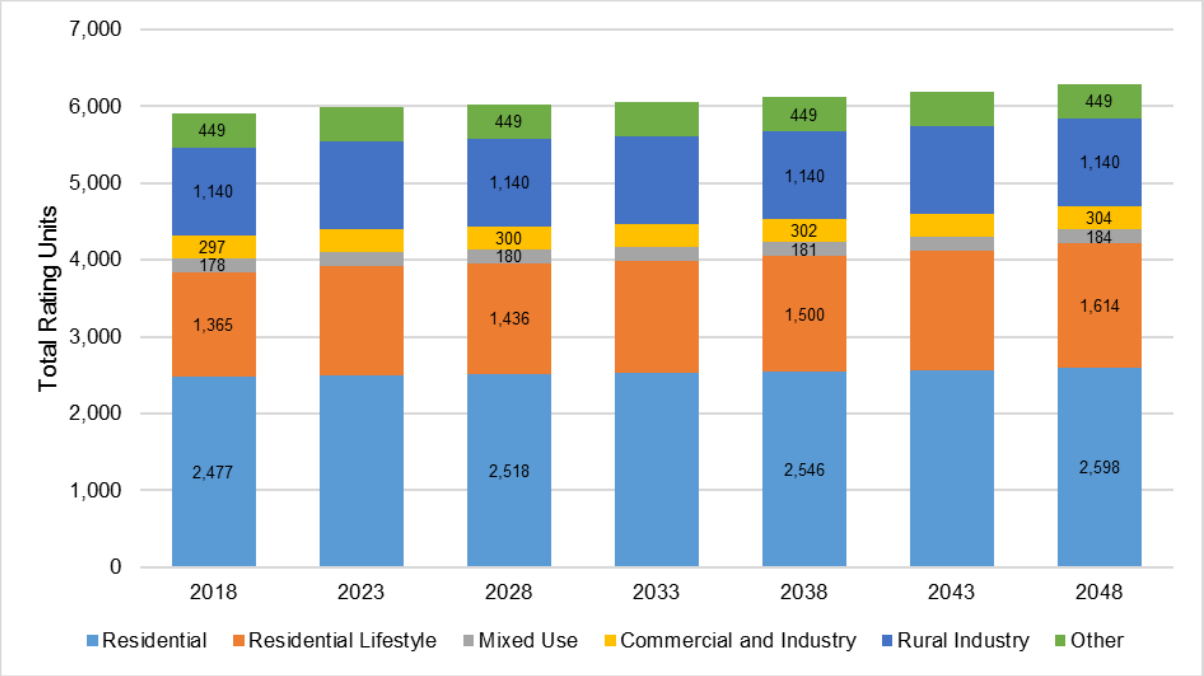

Figure 1 Projected growth in rating units sorted by category

The demographic and development trends show that there is no demand for growth related infrastructure at the present time or in the foreseeable future.

Previous (pre 2015) trends of pockets of sub divisional and building activity in the form of modest lifestyle development around Te Kuiti, Waitomo Village, Mokau, Te Waitere and Awakino have slowed.

From a recent, informal, desktop planning exercise, drawing from development proposals which are known to officers and/or are in the early stages of consent processing, it has been identified that further growth is unlikely to place pressure on the provision of Council services. Indications are the recent trends of relatively slow development are likely to continue into the foreseeable future. An indication of that is the modest number of building consents issued for new dwellings in the district over that past three years (i.e. since 2014) – a total of 33. While the majority of these (approx. 10) were located in and around Te Kuiti, the distribution is otherwise diffuse. Figure 2 below illustrates this.

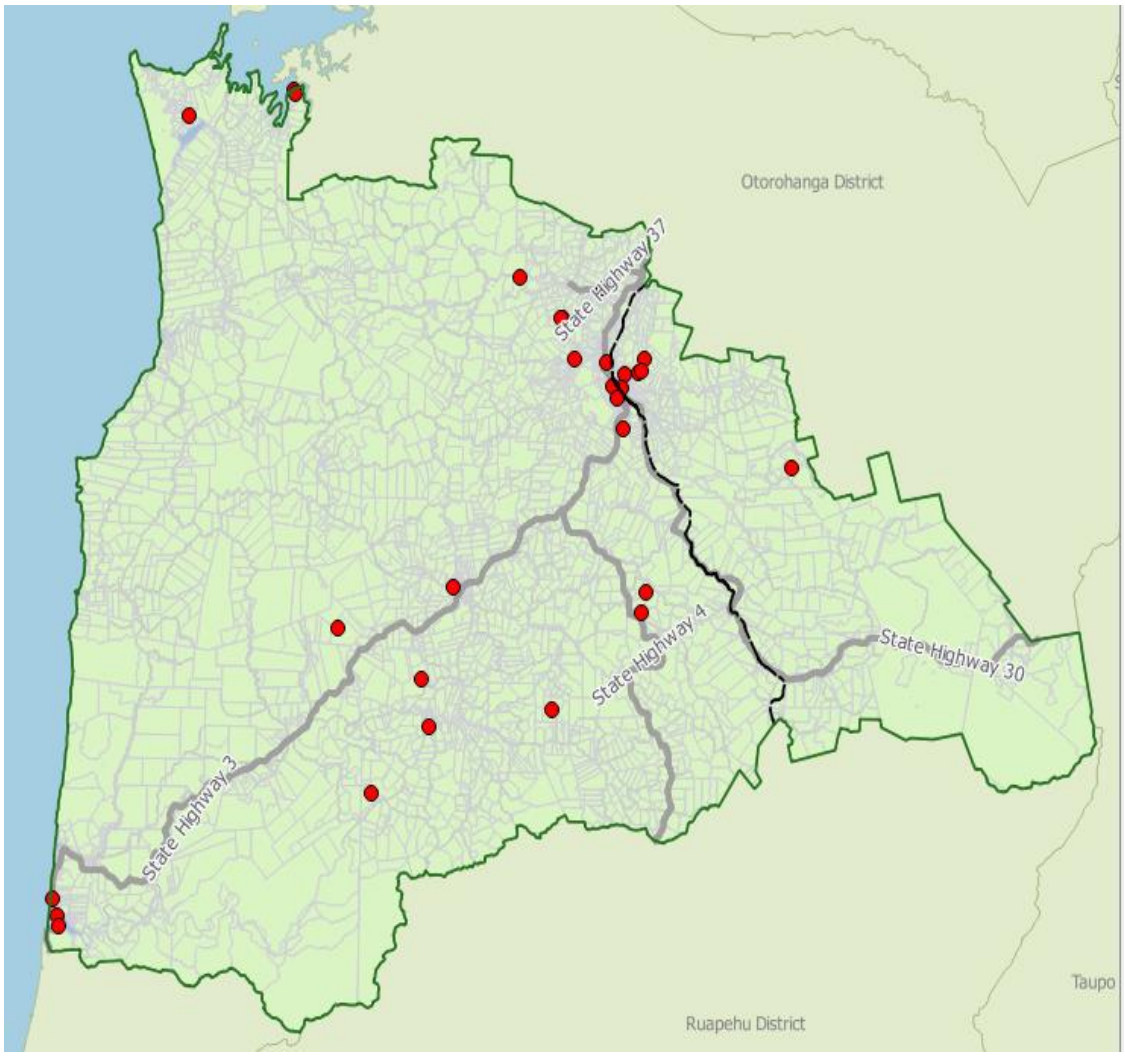

Figure 2 – Waitomo district distribution of building consents 2014 - 17

2.4 INFRASTRUCTURE CONTEXT

Council's asset management strategy over the past 10 years, particularly in respect of WDC's water supply and wastewater infrastructure, has been to focus on improving asset condition and performance in support of the community's public health and environmental outcomes, whilst at the same time taking a prudent approach to financial management. The declining demographic trend projected for the next 30-years will continue to impose pressure on the financial sustainability of levels of service beyond the minimum required to meet its resource consent and other legislative requirements.

In the 10-year period since 2007/08, WDC has invested approximately $80 million on various capital projects within the four groups of activities covered by this IS in meeting the infrastructure needs consistent with the above approach. Some of the key projects completed over this period include:

- Construction of raw water storage dam at Mokau
- Disinfection upgrades completed for Mokau and Benneydale water supplies
- Te Kuiti Wastewater Treatment Plant re-build

- Te Kuiti water treatment plant upgrade
- Benneydale water and wastewater treatment plants upgrade
- Piopio sewerage system installation
- Piopio water treatment plant upgrade
- Critical renewal work to stormwater network tem (Ngati Street, George Street and Duke Street)
- 4000 linear metres of stormwater reticulation system cleaned and surveyed
- Three Rora Street upgrades
- Structural metal placed on unsealed roads
- Road safety improvements
- Bridge replacements
- Footpath replacements
- Upgrading Waitomo Caves Road.

Whilst a projected decline in population is of concern in terms of affordability, there is little or perhaps no scope to scale back Council's involvement in the provision of core infrastructure as historic and future investment is aligned to complying with minimum environmental and public health standards.

In summary, the projected reduction in population, and static new development, is forecast to have minimal or no impact on Council's delivery of core infrastructure over time. Within that, however, is the need to focus on managing core infrastructure in a manner that ensures compliance with minimum standards and provides early identification of future investment needs so that all options can be carefully considered.

3.0 STRATEGIC APPROACH TO MANAGING INFRASTRUCTURE ASSETS

Council takes a strategic approach to managing its infrastructural assets and has planned that such assets must, at a minimum, be able to deliver existing service levels for the foreseeable future. This approach means that decisions around operation and maintenance, renewal and upgrade, demand and growth, service levels etc are taken in the context of optimising overall asset lifecycle costs and the provision of service in perpetuity.

3.1 ASSET RENEWAL

Asset renewal is a key driver in respect of the infrastructural assets within this IS, as the majority of Council's significant infrastructure has been upgraded to minimum service levels legislatively required in recent years. Council's approach is largely based on the need for timely and effective asset renewal over time, especially for reticulation assets.

Asset renewal profiles (particularly for the three water assets) are based on theoretical useful lives, material type, length, age etc. A strictly clinical approach to developing asset renewal programmes results in projections for renewal funding fluctuating year to year as assets reach the end of their nominal useful lives and become due for replacement. This long term IS takes into account sound engineering judgment, actual asset condition, the optimisation of lifecycle costs and community affordability to ensure that renewal programs are prioritised according to in-situ asset condition and failure history, over theoretical asset lives. This approach results in a financial provision for asset renewal that is not only considered consistent, appropriate and affordable but that can be applied according to more robust asset condition data as it improves over time.

3.2 MANAGING GROWTH AND DEMAND

The main drivers of growth and demand for infrastructure assets are:

- Land use activities
- Changes in population and demographics
- Community needs

Changes in demand over the life of the IS are expected to be no more than minor. Possible exceptions include peak summer demand for services where capacity for certain services is already marginal and where large seasonal variations in population occur. With the exception of addressing specific capacity (storage) issues, it is expected that any additional demand concerns over the life of this strategy will be addressed through a reduction in usage (either voluntarily or through regulation) in the first instance.

Planning assumptions for growth and demand will be monitored on a regular basis so to ensure that any changes are reflected in the IS as and when they occur.

3.3 LEVELS OF SERVICE

Levels of service for both the current and future are largely dominated by regulatory and technical considerations. Generally, service levels have been improved in recent times, but only to maintain alignment with those considerations and are expected to be continued over the strategy period. Customer service levels

are more discretionary and are considered in the context of the current planning assumptions which project a static or declining population, and the impact of that on ratepayer affordability.

Recent upgrades of WDC's infrastructural assets have been designed to address issues regarding public health and environmental protection. Council's long term approach is to maintain and improve its infrastructural assets as required to ensure compliance with the appropriate standards wherever possible. This also means ensuring that all infrastructural assets perform to current resource consent standards at all times.

3.4 RISK AND RESILIENCE

The main natural hazards potentially impacting on WDC's infrastructure assets include earthquake, flooding and the effects of climate change. The district is characterised by significant variations in climatic condition, from sub-alpine to coastal. The terrain is dominated by soft volcanic sediments prone to instability in wet conditions. River and coastal environments are sensitive to erosion.

Critical assets are those having the highest consequence of failure. The strategy identifies mitigation actions including risk assessments, establishing the required level of resilience, and programme implementation of identified risk mitigation to increase the resilience of critical assets to natural hazards.

In general a pragmatic approach is taken to risk management in individual asset management plans, with identified risk events grouped into:

- Natural events, where there is no real control over the timing or extent of the event, although probabilities may be understood, e.g. floods, lightning strikes, earthquakes.
- External impacts, where other service providers are providing services which impact on WDC, e.g. power supply failures, material supply failures.
- Physical failure risks, where the condition of the asset or third party damage could lead to failure.
- Operational risks, where maintenance and/or management of the asset or asset management activities may impact adversely on the service.

Part of WDC's asset management practices includes risk management decision making tools used to prioritise long term renewal, upgrade and development expenditure for infrastructure.

4.0 SIGNIFICANT INFRASTRUCTURE ISSUES FOR WAITOMO DISTRICT

The tables on the following pages summarise the significant wastewater, water supply, stormwater drainage and roads and footpaths infrastructure issues facing WDC, the proposed response to those issues, and the implications of taking or not taking the action proposed by the response. In many instances, the same principal response option is capable of addressing several infrastructure issues.

4.1. WDC WASTEWATER SCHEMES

WDC owns and manages four separate wastewater schemes in the district; at Te Kuiti, Piopio, Benneydale, and Te Waitere. The largest of these is at Te Kuiti. All schemes have been upgraded over the past nine years and reconsented. The Piopio wastewater scheme is the most recently constructed, commissioned in 2012.

Scheme	Consent expiry date
Te Kuiti	2040
Piopio	30 June 2028
Benneydale	1 May 2025
Te Waitere	31 July 2042

Table 2 – WDC wastewater consents

4.1.1 Te Kuiti Wastewater Scheme

The Te Kuiti wastewater scheme comprises approximately 52km of reticulation of varying pipe diameters and materials, four secondary pump stations, a terminal pump station and a tertiary treatment plant. Features of the treatment plant include a stormwater bypass, clarifier, reactor, oxidation pond, sludge processing, sand filtration and UV disinfection. The final treated effluent is discharged to Mangaokewa Stream above Te Kuiti airfield.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	Much of the pipe assets are now dated. High infiltration rates entering pipe network indicate poor asset condition. SCADA and electrical assets due for renewal at least once every 30 years. Certain treatment plant mechanical and material components will require renewal/replacement within the 30 year period.	Condition assessment of pipe network followed by prioritised repair and renewal programme. Replacement expenditure "smoothed" to avoid significant variations in expenditure from one year to the next. SCADA replacement scheduled for 2029-2033 ($900k). Electrical assets scheduled for replacement 2034-38 ($1.8M). Treatment plant reactor liner scheduled for replacement in 2032/33.	The financial impacts of deferred maintenance and renewals have been balanced against levels of service, consent compliance and ratepayer affordability. High inflow during storm events can result in surcharge of raw sewage onto residential property, with potential for serious health impacts.
Response to demand	Recent treatment (2014) upgrade provides for up to 4,500m^3/day average, peak 7,000m3/day. Current average flow is 2,850m3/day, peak 8,500m3/day. Includes inflow from two major wet industries. The population projection for Te Kuiti is for a decline over the term of this IS. Future capacity increase will be necessary to limiting treatment process before additional demand can be accommodated.	On-going I & I investigation and prevention programmes targeted to worst areas of reticulation will effect reduction to peak inflow and average wet weather flows. Plant treatment capacity can be increased through increasing power supply and duplication of the clarifier/reactor process stream. The latter is scheduled for 3033/34 at an estimated cost of $550k Monitoring and enforcement of trade waste discharges.	Deferring further investment aimed at increasing plant capacity can be realised by reducing unnecessary inflow sourced from groundwater infiltration and direct inflow. Control of industrial discharges is critical to managing capacity and performance of WWTP.
Levels of service (LoS)	LoS is dominated by resource consent compliance for all discharges from treatment plant – air, water, groundwater etc. Customer LoS	Continuation of current LoS achieves an effective balance between regulatory compliance, resident satisfaction, and cost. Modest increases in technical LoS	Increasing current technical LoS will improve consent compliance and operational performance of treatment plant.

ISSUE	Description	Principal options for response	Implications
	principally relate to sewer blockages, overflows, odour, and responsiveness to service requests. 2017 resident satisfaction survey identifies that 94% of respondents were satisfied with current LoS.	are necessary to improve effectiveness of sludge handling and chemical dosing at the treatment plant.	
Public Health and Environment	The upgraded treatment plant (circa 2014) has improved the effects of the activity on the receiving environment.	Routine monitoring and interpretation of plant operation and performance, followed by timely interventions, will ensure public health and environmental outcomes are maintained. The effects of the activity on the environment are controlled through the resource consent. Consent renewal is due in 2040 (estimated cost $1.1M).	Managing the complete wastewater system from reticulation to disposal is fundamental to mitigation of adverse effects on public health and environmental outcomes. The resource consent provides the legal right to operate the Te Kuiti WW treatment plant.
Risk and Resilience[1]	Wastewater service continuity and public health is threatened by the poor condition of sections of the wastewater network. Older pipes are brittle and prone to breakages and leaks with natural ground movement, or in the event of ground movement caused by a seismic event.	Rolling replacement of wastewater pipes in poor condition and at the end of their effective life with new, flexible, pipe materials.	Failure to complete this work will increase the risk of overloading the treatment plant during flood events, and the risk of pipe failure due to end of lifecycle or following an earthquake event. Such failures have the potential to breach the discharge consent and contaminate surrounding groundwater with untreated waste. The probability of this risk occurring is considered to be low to moderate within the term of this strategy but the consequences are high.

Table 3 - Te Kuiti Wastewater infrastructure issues

[1] *Note: The risk management processes used by the Waitomo District Council are consistent with Australian/New Zealand Standard AS/NZ 4360 which defines risk assessment and management. A fuller description of the risks identified in the tables can be found in Waitomo District Council asset management plans for each activity area.*

4.1.2 Piopio Wastewater Scheme

The Piopio wastewater scheme was installed in 2012 and comprises approximately 10.8km of reticulation of varying pipe diameters, 207 domestic pumps, one community pump station, and a packed-bed reactor treatment plant. A feature of the scheme is the use of small diameter, MDPE pipes to collect effluent from individual septic tanks from where it is pumped to the treatment plant. The final treated effluent is discharged to Mokau Stream via a rock filter.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	The infiltration rates entering pipe network are low, corresponding to the recent construction of the scheme (in 2012). Inflow during heavy rain occurs due to surface flooding entering through tank access covers. SCADA and electrical assets due for renewal at least once every 30 years.	Condition monitoring of pipe network followed by prioritised repair and renewal programme. Extension of discharge structure Replacement expenditure "smoothed" to avoid significant variations in expenditure from one year to the next.	Scheme capacity and consent compliance relies on condition of network. The current scheme has been operating for only 5 years so remaining life of assets is high. Routine condition assessments are an effective method of monitoring the rate of condition decay, and to inform planning processes.
Response to demand	Scheme designed for 250 residential units equivalent. Residual capacity is 23 units. Residential population projection for Piopio is for a decline in the medium to long term.	Increased capacity could be achieved by adding the maximum number of treatment modules to the existing plant to accommodate an additional 50 residential units, or construct an additional treatment plant on a separate site to give capacity for a further 180 residential units. Monitoring of plant load and performance over time will provide earliest indication of the need for additional capacity. Monitoring and enforcement of trade waste discharges.	The cost of increasing capacity by 50 residential units would be in the order of $2.7M. The cost of increasing capacity by 180 residential units would be in the order of $5M, including land purchase. There is no projected need for either option at the present time, but will form part of the consent renewal in 2028. Control of industrial discharges is critical to managing capacity and performance of WWTP.

ISSUE	Description	Principal options for response	Implications
Levels of service	LoS is dominated by resource consent compliance for all discharges from treatment plant – air, water, groundwater etc. Customer LoS principally relate to sewer blockages, overflows, odour, and responsiveness to service requests. Customer service requests indicate dissatisfaction with the frequency of system blockages.	The need for increased routine maintenance of individual tanks and the treatment plant has been identified. Also, regular education of scheme users to encourage avoidance of disposal of fats and other wastes that have been a contributing factor to pipe blockages.	Increased levels of service in the form of increased routine maintenance of the scheme will be necessary to achieve improved customer satisfaction and consent compliance.
Public Health and Environment	The Piopio WW scheme has addressed previous public health and environmental issues associated with high groundwater during winter months adversely impacting on ground soakage of effluent from the original private septic tanks.	Increased routine maintenance of the scheme and monitoring of plant operation and performance will ensure public health and environmental outcomes are maintained. The effects of the activity on the environment are controlled through the resource consent. Consent renewal is due in 2028.	Failure to achieve improved scheme performance could compromise the 2028 consent renewal. The resource consent provides the legal right to operate the Piopio WW treatment plant. Extension of discharge consent has been allowed in 2027/28 at a cost of $283k
Risk and Resilience	Wastewater service continuity and community health is protected by the modern age and type of construction of the network.	The network is already designed to provide high resilience to natural hazards through the use of small diameter, flexible pipes.	The probability of system failure occurring due to natural hazards is considered to be low within the term of this strategy.

Table 4 – Piopio Wastewater infrastructure issues

4.1.3 Benneydale Wastewater Scheme

The Benneydale scheme comprises approximately 2.2 km of reticulation, predominantly AC pipe, and one pump station. The treatment plant consists of an old Imhoff tank and trickling filter, followed by a small constructed wetlands from where the final effluent discharges to a soakage field during November – April, and the Mangapehi Stream during the wetter months of the year.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	Approximately 50% of the reticulation has reached its theoretical design life. Condition assessment of the pipes comprising this portion of the network indicates that there is approximately 15 years of effective life remaining. The treatment plant was upgraded in 2009 and is now in good condition. A small wetland system was added. SCADA and electrical assets due for renewal at least once every 30 years.	Condition assessment of pipe network followed by prioritised repair and renewal programme. Replacement expenditure "smoothed" to avoid significant variations in expenditure from one year to the next.	The financial impacts of renewals have been balanced against condition assessment, levels of service, consent compliance and ratepayer affordability. Current LoS will be maintained.
Response to demand	The scheme has spare capacity for an additional 27 residential connections, or the equivalent thereof. The population projection for Benneydale is for a decline in the medium to long term.	Monitoring of actual demand on the Benneydale scheme over time will provide the basis for future capacity upgrade decisions. In the meantime, current capacity is expected to be sufficient over term of this IS. Monitoring and enforcement of trade waste discharges.	While there are no apparent demand related implications for the Benneydale wastewater scheme in the foreseeable future, routine monitoring of actual demand will provide early indication of the need to respond to any change to that assumption. Control of industrial discharges is critical to managing capacity and performance of WWTP.
Levels of service	LoS is dominated by resource consent compliance for all discharges from the treatment plant – air, water, groundwater etc. Customer LoS	Continuation of current LoS achieves an effective balance between regulatory compliance, resident satisfaction, and cost.	Maintaining current levels of service will achieve high customer satisfaction and consent compliance. The scheme is sensitive to increased expenditure

ISSUE	Description	Principal options for response	Implications
	principally relate to sewer blockages, overflows, odour, and responsiveness to service requests. 2017 resident satisfaction survey identifies that 94% of respondents were satisfied with current LoS.		
Public Health and Environment	The upgraded treatment plant (circa 2009) has improved the effects of the activity on the receiving environment.	Continuation of routine maintenance of the scheme and monitoring of plant operation and performance will ensure public health and environmental outcomes are maintained. The effects of the activity on the environment are controlled through the resource consent. Consent renewal is due in 2025.	Failure to continue current routine maintenance levels could result in consent non-compliance. The resource consent provides the legal right to operate the Benneydale WW treatment plant.
Risk and Resilience	Wastewater service continuity and community health is threatened by the poor condition of sections of the wastewater network. Older pipes are brittle and prone to breakages and leaks with natural ground movement or in the event of ground movement caused by a seismic event.	Rolling replacement of wastewater pipes in poor condition and at the end of their effective life with new plastic pipes and flexible joints.	Failure to complete this work will increase the risk of overloading the treatment plant during flood events, and the risk of pipe failure due to end of lifecycle or following an earthquake event. Such failures have the potential to breach the discharge consent and contaminate surrounding groundwater with untreated waste. The probability of this risk occurring is considered to be low to moderate within the term of this strategy but the consequences are high.

Table 5 - Benneydale Wastewater infrastructure issues

4.1.4 Te Waitere Wastewater Scheme

The scheme involves collection of septic tank effluent from approximately 11 properties through a reticulated system comprising approximately 500m of small diameter pipe, from where it is pumped to a community soakage field located on private land. The rising main from terminal pumping station was recently renewed.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	The community soakage field is showing signs of failure. Most of the reticulation has been replaced over the past 3-years, including the rising main. SCADA and electrical assets due for renewal at least once every 30 years.	Replacement or refurbishment of the soakage field with an expanded facility is required.	An amount of $15,000 has been allowed in 2019/20 of the LTP for investigating or upgrading the soakage field.
Response to Demand	While the population projection for Te Waitere is for static growth, the wastewater discharge from the current population already takes up most of the capacity of the existing soakage field	Replacement or refurbishment of the soakage field with an upgraded and extended facility with capacity for modest additional demand	While there are no growth related implications for the Te Waitere wastewater scheme, current demand already takes up the existing capacity.
Levels of Service	Levels of service focus on reliability of service, capacity, public health and environmental protection.	Environmental and public health protection consistent with the operative resource consent.	Current levels of service relating to system capacity and environmental protection will potentially need to be enhanced early in the strategy period.
Public Health and Environment	The extended reticulation has addressed previous public health and environmental concerns associated with the scheme.	Replacement or refurbishment of the soakage field with an upgraded facility is required. Renewal of the resource consent for the Te Waitere discharge was completed in 2017. Consent renewal is due in 2042.	Environmental and public health protection will probably need to be enhanced consequent to the imminent resource consent renewal process in 2017. The resource consent is fundamental to the legal right to operate the Te Waitere WW treatment plant

ISSUE	Description	Principal options for response	Implications
Risk and Resilience	Wastewater service continuity and protection of the environment is threatened by the condition and capacity of the current soakage field.	Replacement or refurbishment of the soakage field with an upgraded facility is required.	Failure to complete this work will increase the risk of overloading the soakage field during normal operating conditions. Such system failure has the potential to breach the discharge consent and contaminate the surrounding environment with treated waste. The probability of this risk occurring is high and the consequences are significant in the context of the imminent consent renewal process.

Table 6 – Te Waitere Wastewater infrastructure issue

4.1.5 Waitomo Village Wastewater Scheme

The wastewater infrastructure at Waitomo Village is privately owned and operated. WDC has extensively investigated options for future WDC ownership/management of the Village wastewater (and water supply) services. Discussion with representatives of the two ownership trusts and private owners of this infrastructure has been inconclusive. The potential for a possible pathway forward is unknown at the present time, due to land tenure, asset ownership and funding issues remaining unresolved.

Given the level of uncertainty around the timing of resolution of these issues, this IS does not include any financial provision for WDC assuming responsibility for managing these assets.

4.1.6 Mokau

There is currently no wastewater scheme at Mokau, with individual properties fitted with privately owned and maintained septic tanks. The risk of cross-contamination between septic tanks and groundwater used for drinking water is alleviated through the existence of WDC's reticulated water supply. The impact of increased hydraulic loading consequential to the impact of the reticulated water supply on the performance of individual septic tanks may, however, need to be addressed in the future through the provision of a reticulated wastewater scheme for Mokau/Awakino. Protection of public health and the environment are the main drivers for this proposal.

There are four parts to the project; the treatment plant, reticulation of Mokau village, reticulation of Awakino village and reticulation of the residential area upriver from Mokau. The total cost of the project is estimated to be $23,600,000.

The next step entails design investigations, leading to a preliminary design report on options and costings. This has been scheduled for 2030/31-32 at a budgeted cost over the two years of $110,000.

4.2. WDC WATER SUPPLY SCHEMES

WDC owns and manages four water supply schemes, at Te Kuiti, Piopio, Benneydale and Mokau. The largest supply is at Te Kuiti. Higher levels of service, driven by the Public Health (Drinking Water) Amendment Act and security of supply, have been the key areas of focus over the past five years across all schemes. Resource consents to take water are critical to maintaining adequate, all year, supply quantities for domestic and commercial/industrial use. Table 7 below summarises current consent expiry dates:

Scheme	Key Consent Expiry Dates
Te Kuiti	30 September 2040
Piopio	1 August 2023
Benneydale	7 April 2031
Mokau	September 2026

Table 7 – WDC water supply consents

4.2.1 Te Kuiti Water Supply Scheme

The Te Kuiti water supply scheme comprises a surface take from the Mangaokewa Stream from where raw water is treated and disinfected following a process of coagulation/flocculation, carbon dosing, sand filtration, pH correction and chlorine disinfection. Treated water is simultaneously pumped to five storage reservoirs and the reticulation network, i.e. there is no separate rising main to the reservoir, resulting in pressure surges within the network. The network totals some 49.5km of pipework of varying diameters, and is predominantly older asbestos cement and PVC material type. There are three pumping stations – at Tonga Street, Rata Street and Awakino Road.

Over the past three years, the focus has been on reconsenting the water take and upgrading the treatment plant to mitigate the risks of contamination from pathogenic organisms commonly found in stream water sourced from an open catchment where the predominant land use is agricultural.

With the current supply relying on a single stream source, its vulnerability to declining minimum stream flows due to climate change, the consequential increasingly adverse effects of the take on stream habitat, and an unstable upstream catchment, are high. The next phase will therefore address the resilience of the supply. Seismic strengthening of the existing storage reservoirs, a supplementary water source and/or raw water storage, and increased treated water capacity, all form part of this strategy.

The strategy entails, firstly, undertaking investigations into availability of a suitable groundwater source, followed by a reassessment of future supply arrangements aimed at mitigating the above risks. The final configuration may well involve a combination of all three components – the existing surface take supplemented by an alternative source and raw water storage

Specific infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	Large parts of reticulation are near the end of their useful lives. Increasing incidence of mains failure, leaks, etc.	Accelerated mains replacement programme based on actual pipe condition.	Replacement programme of $120,000 per year average over the next 10 years.
	SCADA and electrical assets due for renewal at least once every 30 years.	Replacement expenditure "smoothed" to avoid significant variations in expenditure from one year to the next.	Delaying the pipe replacement programme would leave the network vulnerable to failure or complete severance in the event of earthquakes or other ground movement. The probability of this risk occurring is considered to be low to moderate within the term of this strategy but the severity of the consequences are expected to be high
Response to demand	Treatment plant design capacity has been increased to 6,600m^3/day. Average demand is 3,035 m^3/day. Peak demand is 4,700 m^3/day. New (2015) consent limit is 4,800 m^3/day. The long term population projection for Te Kuiti is for decline.	Monitoring of actual demand on the Te Kuiti scheme over time will provide the basis for future capacity upgrade decisions. In the meantime, current capacity is expected to be sufficient over the term of this IS. Demand management techniques can be applied to curb peak summer demand. On-going leak detection and mains replacement programmes will help reduce water losses.	While there are no apparent demand related implications for the Te Kuiti water supply in the foreseeable future, routine monitoring of actual demand will provide early indication of the need to respond to any change to that assumption. Failure to monitor and plan could lead to consent non-compliance and/or imposition of water restrictions.
Levels of Service	Levels of service for colour, taste and odour are not met due to presence of residual iron and manganese in reticulation and algal growth on rocks during low flow stream conditions. Iron and manganese concentrations are in part due to corrosion inside old steel pipes in the reticulation. Protection of public health remains a higher priority over taste and odour issues.	Upgrade of treatment plant to include a flow proportional, carbon dosing system to remove "taste" from source water.	There will be additional costs of water treatment to improve the taste and odour characteristics of the supply. These are included in the LTP budget forecasts.

ISSUE	Description	Principal options for response	Implications
	Direct pumping to the reticulation results in pressure fluctuations, leading to premature mains failure and damage to water fittings, particularly in the low lying commercial area of Te Kuiti.	Construction of a dedicated rising main from the treatment plant to reservoirs would eliminate pressure fluctuations.	No budget provision has been made for construction of a dedicated rising main because of the cost implications.
Public Health & Environment	The Te Kuiti supply will soon (2018/19) be fully compliant with NZ Drinking Water Standards for protection against potentially pathogenic giardia and protozoa.	Implementation of a 3 -stage upgrade of the water treatment plant including sterilisation, relocation and reconfiguration of the raw water intake, and a new clarifier, is due for completion in 2018/19, with additional treated water storage to come later. This has addressed previous deficiencies in public health risk management for the supply. The current backflow prevention programme will be extended through to 2023/24 to remove the risk of cross-contamination of the potable supply from household appliances.	The potential risks to public health from pathogenic organisms in the raw water supply will be mitigated following completion of the current improvements to the Te Kuiti water treatment plant.
	The current take represents nearly 25 % of stream flow during low flow conditions, with potential impacts on in-stream habitats. This is significant. The effects of the take on Mangaokewa Stream Stream are allowed for in the resource consent.	Renewal of the resource consent is due in 2040.	Renewal of the resource consent is fundamental to the legal right to take water for the Te Kuiti community supply.
Risk and Resilience Issues	The supply relies on a single source that is currently under pressure during low glow conditions, when demand is typically greatest. Climate change predictions suggest a worsening of these conditions. Also, parts of catchment have been shown to be unstable, with risk of supply being cut-off due to slips.	Raw water storage, involving harvesting of winter stream flows, has been identified as a potential means of mitigating these risks. Alternatively, a supplementary supply from groundwater resource is a possibility. If the programmed	The preliminary estimate of a raw water storage reservoir is $30-50M. Investigations into potential sites have been programmed for 2018/19. Construction of a large raw water storage reservoir has been provisionally

ISSUE	Description	Principal options for response	Implications
		groundwater investigations are successful, the raw water storage volume requirement may be reduced or substituted by an alternative groundwater supply. The next step is to investigate options for an alternative source or construct raw water storage. Construction of a new treated water reservoir to improve storage capacity across the network.	programmed for 2040-42 at an estimated budget of $30M. Groundwater supply investigations have been programmed over three years beginning in 2018/19. If successful, a production bore has been programmed for completion in 2021/22 at a preliminary budget estimate of $100,000. Construction of a new 3,000 m^3 treated water reservoir is programmed for 2029/30 at an estimated cost of $1.5M. This will increase the current storage volume available within individual zones and assist supply continuity during treatment plant shutdown.
	The four water storage reservoirs are critical assets, each approximately 40-years old. Resilience of these reservoirs to a major seismic event is key to the integrity of the supply.	Assessment and implementation of seismic strengthening of the existing reservoirs is scheduled to take place over 2018/19 - 2019/20	Seismic strengthening of the four treated water reservoirs is critical to the resilience of the water supply.

Table 8 – Te Kuiti water supply infrastructure issues

4.2.2 Piopio Water Supply Scheme

The Piopio water supply is sourced from the Kurutahi Stream, to the west of SH3. During 2012/13, the treatment plant was rebuilt. It now consists of the floating intake pump that pumps into a horizontal flow concrete clarifier from where it is gravitationally piped through two 400 micron roughing filters. The settled water is then forced through a membrane ultra-filtration filter to five 25,000 litre plastic tanks. The treated water is chlorinated and pumped to the existing reservoir.

The reticulation comprises some 6.5km of various diameters and is predominantly asbestos cement. Water is pumped to a 450m^3 concrete reservoir located above the treatment plant via the reticulation i.e. there is no separate rising main to the reservoir, resulting in pressure surges within the network.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	Large sections of the reticulation is nearing the end of its useful life. The age-based renewal profile is misleading, suggesting a longer residual life than has been evidenced by actual operational experience, the latter indicative of poor pipe condition. SCADA and electrical assets due for renewal at least once every 30 years.	Accelerated mains replacement programme based on actual pipe condition, using modern pipe materials with flexible joints, with expenditure "smoothed" to avoid significant variations in expenditure from one year to the next. Replacement of old treated water storage reservoir is programmed – see Risk and Resilience issues.	Regular annual replacement programme continued over the next 30 years. An extended renewal programme would result in reduced levels of service due to increased mains failure, loss of water pressure and potential loss of supply, with associated higher maintenance costs.
Response to Demand	The treatment plant has a design capacity of 600m^3/d. Current demand is approx. 307m^3/d. Peak demand is 527m^3/d. Consented take is 450m^3/d. The long term population projection for Piopio is for decline.	Monitoring of actual demand on the Piopio scheme over time will provide the basis for future capacity upgrade decisions. In the meantime, current capacity is expected to be sufficient over the term of this IS. Demand management techniques can be applied to curb peak summer demand. On-going leak detection and mains replacement programmes will help reduce water losses.	Close match between current demand and consent limit reinforces need for efficient use of water.

ISSUE	Description	Principal options for response	Implications
Levels of Service	Levels of service for colour, taste and odour are acceptable to most residents. Pressure fluctuations in lower lying areas is a cause of pipe failure. Current supply copes with demand. Water supply safety protection measures are in place and maintained.	Construction of a dedicated rising main from treatment plant to town reservoir is scheduled for 2019/20.	A dedicated rising main will address water pressure spikes and help protect ageing pipes from premature failure. Estimated cost is $135,000.
Public Health & Environment	The absence of back-flow preventers is a potential health risk for Piopio water supply consumers. Effects of take on Kurutahi Stream are allowed for in resource consent.	Provision of back-flow prevention devices is scheduled as an annual programme. Resource consent expires in 2023. Allowable take will be addressed then.	The estimated cost of a back-flow prevention programme is $5,000 per year for the next 10 years. The absence of back-flow preventers exposes water consumers to the risk of cross contamination between the water supply and "greywater" from automatic household appliances. Renewal of the resource consent is fundamental to the legal right to take water for Piopio community supply.
Risk and Resilience Issues	In Piopio, the old concrete treated water reservoir and asbestos cement reticulation are at risk of damage from a major seismic event	Replacement of the old concrete supply reservoir with a modern structure. Use of flexible pipes and joints for mains replacements will reduce the risk of pipe failure in the event of earthquakes or other ground movement. The probability of this risk occurring is considered to be low to moderate within the term of this strategy but the severity of the consequences would be high .	The existing reservoir has been assessed and a replacement scheduled for 2020/21 at an estimated cost of $250,000. Provision for increased resilience of the Piopio water supply reticulation has been built into LTP replacement programmes.

Table 9 – Piopio water supply infrastructure issues

4.2.3 Benneydale Water Supply Scheme

The Benneydale water supply treatment plant is located to the east of Benneydale township. The whole system was replaced in 2008, including an upgrade of the intake and treatment plant and the addition of automation. Benneydale now has a modern water supply system. Earlier work done on the system was embedded into the new system which now meets the requirements of the Health (Drinking Water) Amendment Act 2007 (amending the Health Act 1956).

The supply is sourced from a surface take and a groundwater bore. The latter can be used as a back-up during dry stream conditions.

The head works for the surface take comprise a weir across an unnamed tributary of Mangapehi Stream and a new overflow. Water feeds through a uPVC gravity main 100m long to the water treatment plant. The water then gravitates through coarse settling tanks to an adsorption clarifier and on into a concrete sump from where it is pumped by a submersible pump through a diatomaceous earth (DE) filter to a contact tank. From the contact tank it is pumped to a $100m^3$ reservoir at the top of a nearby hill, from where it is gravity fed to the reticulation. Disinfection is by hypochlorite solution which is injected into the pump line between the DE filter and the contact tank.

The reticulation was totally replaced in 2008 apart from about 800m of MDPE installed in 2003. It consists of 5.8km of uPVC, PE and MDPE materials with an expected remaining life of 100 plus years. All connections have backflow preventers and are metered.

A SCADA and telemetry system allows remote monitoring and limited control to further improve the service at this comparatively remote location.

Infrastructure management issues include:

ISSUE	Description	Principal options for response	Implications
Asset renewal and replacement	The treatment and reticulation has been renewed and upgraded since 2008. SCADA and electrical assets due for renewal at least once every 30 years.	Future replacement expenditure "smoothed" to avoid significant variations in expenditure from one year to the next.	Apart from normal operation and maintenance and renewal of mechanical and electrical components, this scheme should not require further capital investment over the next 10-15 years. Beyond that, an increased requirement for pipe renewals can be expected.
Response to Demand	The water treatment plant has a design capacity of $140m^3$/day. Current average demand is $68m^3$/day.	Monitoring of actual demand on the Benneydale scheme over time will provide the basis for future capacity upgrade decisions. In the meantime,	The close match between current peak demand and the surface water consent limit reinforces need for efficient use of water.

	Peak demand is 132m^3/day. Consent limit is 360m^3 per day split equally between the bore and surface takes. The long term population projection for Benneydale is for decline.	current capacity is expected to be sufficient over the term of this IS. Demand management techniques can be applied to curb peak summer demand. On-going leak detection and mains replacement programmes will help reduce water losses.	
Levels of Service	Levels of service for colour, taste and odour are acceptable to most residents. Automated control allows remote monitoring of treatment plant 24x7. Current supply copes with demand. Water supply safety protection measures are in place and maintained.	Continuation of routine monitoring and maintenance plan.	Regular monitoring and routine preventative maintenance is key to the on-going success of the Benneydale scheme.
Public Health & Environment	Effects of take on the stream and groundwater are allowed for in resource consents.	Back-flow prevention devices are in place. Groundwater bore consent expires on 15 May 2022. Allowable take will be addressed then. Consent renewal due in 2031.	The existence of back-flow prevention units safe-guards water consumers from the risk of cross contamination between the water supply and "greywater" from automatic household appliances. Renewal of resource consent is fundamental to legal right to take water for Benneydale community supply.
Risk and Resilience Issues	The Benneydale water supply scheme has been renewed and upgraded since 2008. The issues regarding security of supply, health protection, reticulation condition i.e. loss of water and cross - contamination, have been addressed.	Maintain monitoring and routine maintenance and inspections of assets. Strengthening of the old concrete reservoir.	Seismic strengthening of the old concrete reservoir, has been scheduled for 2039/40 at an estimated cost of $300,000.

Table 10 – Benneydale water supply infrastructure issues

4.2.4 Mokau Water Supply Scheme

The Mokau urban water supply collects water from two earth dams located on an escarpment above the township fed by two small springs. One is within the front dam basin itself and one at the top end of the catchment. This is supplemented by local runoff off from private farmland property. Storage was doubled to 20,000m^3 when an 11,000m^3 raw water storage reservoir was completed in early 2014. The water is treated by an absorption clarifier and diatomaceous earth filter and was built in 2003/04. In 1996/97 a timber reservoir was added to the system and installed in town with a booster pump station to maintain pressure at about 650kPa.

The reticulation comprises approximately 11 km's of pipe work of various sizes and materials. The predominant pipe material in the urban area is asbestos cement pipe most of which was laid in 1972. Most of this has been replaced over the last three years. There is also an "alkathene" pipe to Awakino supplying water to some of the properties along the way, including the Marae and a few properties in Awakino.

Infrastructure management issues for the Mokau scheme include:

ISSUE	Description	Principal options for response	Implications
Asset renewal or Replacements	Most (90%) of the Mokau water supply reticulation has been replaced since 2015 due to a high incidence of mains failures in recent times, in part due to the increased hydraulic pressure now available following construction of elevated treated water reservoirs, and the then predominance of brittle AC pipes. The existing treatment plant building will require replacement within the next 10 years due to its deteriorating structural condition. There is no SCADA available at the Mokau scheme.	Future replacement expenditure has been "smoothed" to avoid significant variations in expenditure from one year to the next. Use of modern pipe materials with flexible joints for all pipe replacements.	Replacement programme of $96,000 in 2018/19 to complete the remaining Mokau pipes. Replacement of the Awakino water main (2025/26) and miscellaneous pipes is scheduled from 2025/26 to 2031/32. Replacement of the treatment plant building has been scheduled for 2027/28 at a budget of $50,000.
Response to demand	Treatment plant design capacity is 400m^3/day. Current average demand is 120 m^3/day. Peak demand is 350m^3/day. Consented take is 1,000m^3/day. The long term population projection for Mokau is for decline.		
Levels of service	Levels of service for colour, taste and odour are acceptable to most residents. Current supply comfortably meets demand.	Continuation of routine monitoring and maintenance plan. Implementation of remote monitoring technology, namely SCADA, would improve control over storage, treatment	Regular monitoring and routine preventative maintenance is key to the on-going success of the Mokau scheme. Investigation of proposed SCADA for the scheme has been scheduled for 2019/20 at a cost estimate of $5,000, with

ISSUE	Description	Principal options for response	Implications
	Water supply safety protection measures are in place and maintained. Distance factor negatively impacts on response times and servicing costs.	and supply enhance responsiveness, and reduce servicing costs.	installation scheduled for 2019/20 at an estimated cost of $55,000.
Public Health and Environment	Effects of take on the natural resource are allowed for in resource consents. The absence of back-flow preventers is a potential health risk for Mokau water supply consumers.	Resource consent to take water expires in 2026. Allowable take will be addressed then. Annual programme for installation of back-flow prevention devices has been scheduled to continue on a steady basis.	Back-flow preventers will remove the risk of cross contamination between the water supply and "greywater" from automatic household appliances. An annual installation programme of $2,420 per year for 2018-28 has been provided in the LTP. Renewal of resource consent is fundamental to legal right to take water for Mokau community supply. Consent renewal is scheduled for 2025/26 at an estimated cost of $20,000.
Risk and Resilience Issues	Asbestos water mains are vulnerable to breakage or complete severance in the event of earthquakes or other ground movement.	Continue to replace remaining water mains with flexible pipe materials and pipe joints.	The probability of this risk occurring is considered to be low to moderate within the term of this strategy but the severity of the consequences are expected to be high.
	The recent-past issues of water shortage and quality during summer drought conditions, have largely been addressed. The construction of additional raw water storage in 2014 and treatment plant improvements, have improved security of the supply and water quality since 2015. Seismic strengthening required.	Increased raw water storage was completed during 2015/16. Seismic strengthening of the reservoir.	The risk of water shortage during drought conditions has been addressed. Seismic strengthening of the reservoir has been scheduled for 2038/39 at a cost of $300k.

Table 11 – Mokau water supply infrastructure issues

4.2.5 Waitomo Village Water Supply

Refer to Clause 4.1.5 above.

4.3 WDC STORMWATER DRAINAGE

WDC's stormwater infrastructure comprises two components. The primary component consists of 31km of stormwater pipes, open drains and discharge structures in urban areas, predominantly Te Kuiti. The secondary component consists of overland flow paths, including the roading network. The multiple Te Kuiti stormwater discharges are consented through a district wide comprehensive consent. The consent expires in July 2024.

Infrastructure issues include:

ISSUE	Description	Principal options for response	Implications
Asset renewal or Replacements	Ageing pipe assets some of which are in poor condition. Information on pipe condition is mostly anecdotal. Approx. 4km of pipe has been inspected. A large section of pipe network in Te Kuiti is partially silted up.	Implement stormwater pipe condition assessment programme. Undertake renewals on a prioritised basis, "smoothed" across the 30 year planning period to avoid peaks and troughs in expenditure.	Continued stormwater renewal programme of $110k per year.
Response to demand	The current network provides a modest response to SW drainage requirements, principally in the Te Kuiti urban area. Future land development in the urban area would impose greater pressure on the existing capacity, particularly the downstream sections of the network. The long term population and land subdivision projection for the district is for decline.	Preparation of catchment management plans, initially for Te Kuiti, are required to develop an understanding of primary and secondary flow paths.	Future planning of SW management is required to understand and prioritise future demand and service levels.

ISSUE	Description	Principal options for response	Implications
Levels of Service	The SW reticulation has been designed to cope with a very modest, 1 in 2 year storm event. Beyond that, the SW system relies on secondary, overland flow paths to drain excess surface water. Current LoS include reducing the threat of flooding of property, high responsiveness to customer services during flood events and managing the adverse effects of SW on the quality of the receiving water.	Continuation of CCTV inspection and repair programmes to restore capacity of existing network.	Budget provision for annual inspection and clearing and repair of SW pipes.
Public Health and Environment	Public health issues can arise in residential areas of Te Kuiti where there is no reticulated SW network. The impact of that can be overloading of the sewerage network due to surface run-off. WDC holds a comprehensive SW Discharge Consent to capture the numerous SW point discharges. There is no SW treatment provided.	Extension of drainage network to unserviced urban areas to mitigate the risk of SW inflow to sewerage network. Effects of SW discharge on the natural resource are controlled via resource consents. Make application to renew current SW discharge consent by 1 January 2024	The current SW discharge consent expires on 1 July 2024 – half way though the 2018-28 LTP planning period. Renewal of the resource consent is fundamental to the legal right to discharge urban SW to the environment. Provision has been made for pre-treatment of stormwater prior to discharge at an estimated cost of $110k per year over six years beginning 2026/27, precede by a catchment assessments in 2018/19 and 2023/24 (ie prior to consent renewal).

ISSUE	Description	Principal options for response	Implications
Risk and Resilience Issues	Current risks include pipe failure, flooding of property due to impaired stormwater capacity and blocked secondary flow paths. A major flood event could overtop the banks of Mangaokewa Stream with consequential flooding of property. The increased frequency of high rainfall events, over time, exacerbated by the very limited capacity of the existing network, will potentially increase resident expectations for an effective stormwater drainage system. There is an overlap between SW and wastewater services. It is not unusual for roofwater downpipes to be connected to sewer laterals, or gully traps to be used as sumps on residential properties, especially where ponding is a problem. Rising sea level could impact negatively on the district's beach communities, mainly through impeded stormwater drainage due to rising sea levels and surcharging of stormwater outlets.	Identification and protection of secondary flow paths through catchment management plans. A prioritised programme of works to address any identified capacity/protection shortfall, including protection of secondary flow paths and environmental protection works to mitigate adverse effects at the points of discharge, would be derived from this work Repair and replacement of damaged stormwater pipes using seismic resistant pipe materials and flexible joints, sized to future demand projections. Extension of drainage network to unserviced urban areas to mitigate the risk of SW inflow to sewerage network.	Failure to complete catchment management plans will increase the risk of flooding and damage to property.

Table 12 – WDC stormwater infrastructure issues

4.4 ROADS AND FOOTPATHS

WDC's road and footpath infrastructure assets comprise 1,014km of roads of which approximately 461km are sealed and 553 are unsealed. In addition, there are 159 bridges including large culvert structures, and 50 km of footpaths.

Associated assets include pavements, small culverts, kerb and channel, carparking, road signage, retaining structures, and street lighting.

Relevant factors impacting on the network management strategy include:

- The nature and influence of local geology on road subgrade strength and performance
- The severe nature of the operating environment including localised variations in climatic conditions, and the susceptibility of network to storm damage
- Modest to declining population growth
- High community deprivation and the associated constraints on affordability
- The high proportion of low strength pavement construction on sealed roads
- Increased vehicle dimensions and loads
- The high proportion of rural road carriageways constructed to less than minimum widths
- The high incidence of rural corner geometry that does not meet the access needs of modern vehicle truck and trailer configurations
- The impact of increased HCVs on pavement capacity of haulage routes due to the forecast forestry harvest over the next 12 years
- The impacts of increasing tourism based travel and quarry operations on road capacity and safety
- Contributing factors to road accident incidence and trends – loss of control, rear end/obstruction collisions, poor handling, excessive speed, fail to keep left, etc.

Infrastructure issues include:

ISSUE	Description	Principal options for response	Implications
Asset Renewal or Replacements	Bridge stock is in generally good condition. There are 39 bridges identified for renewal in next 30 year period with a replacement value of $10.75M. 11 of those bridges fall in the 2018 – 2028 period (value $2.8M). Additional rehabilitation and resurfacing required to achieve sustainable asset condition.	Monitoring of bridge condition and programme renewal of structural components. Increased length of sealed road rehabilitated to an average length of 4.5 km per year equivalent to a pavement life of 100 years. Increased length of road resurfaced to an average of 40 km each year consistent with a seal life of 10 years.	Bridges are a critical roading asset. Regular inspections, maintenance and structural repair/renewal is vital to protecting public safety. The sealed road rehabilitation budget will increase from $1.4M per year to $1.75M per year. The sealed road resurfacing budget will increase from $1.4M to $1.45M per year. At current funding levels, the network can be expected to deteriorate at a greater rate than repair work, and levels of service will decline. Deferred rehabilitation and resurfacing costs will exceed timely treatment costs.
Response to Demand	A recent survey of forestry owners in the district has identified an intense period of forest harvest operations scheduled to take place over the 2022-29, coincident with much of the 2018-28 LTP period. That together with the increasing incidence of 50MAX vehicles now accessing the network, suggests a consequential increased demand for expenditure on road maintenance and strengthening/rehabilitation programmes. The new maximum legal heavy vehicle gross weight increased from 44 tonnes to 45/46 tonnes from 1 February 2017, and this can be expected to place further stress on already under-strength	Planning and prioritising of road rehabilitation projects to ensure construction works are aligned with demand. Establishment of agreements with high impact road users for reimbursement of additional road maintenance and rehabilitation costs associated with road use activity. Restricting the use of roads not suitable or susceptible to excessive damage from high impact vehicle categories.	Additional demand in the form of increased numbers of HCV's on specified haulage routes will shorten pavement lives and advance the need for rehabilitation of some routes. Road widening and geometry will be addressed at the same time. See asset renewals response above.

ISSUE	Description	Principal options for response	Implications
	pavements. The scale of this has yet to be determined. Demand from population growth is projected to decline in the medium term. Demand from mineral extraction operations		
Levels of Service	Levels of service include road safety, reliability and accessibility, responsiveness and smoothness of ride. Approximately 274km of 555km of unsealed road network has a carriageway less than 4.0m wide; that is equivalent to 1.5 traffic lanes maximum or 3 wheel tracks. About 74km of the 274km unsealed roads is less than 3.0m wide. These are all Access (low volume) roads. The rugged terrain of large parts of Waitomo district has resulted in a roading network that has significant numbers of tight bends where the road geometry does not meet the dimensional requirements for large truck and trailer configurations (e.g. 50MAX HPMV). There are 226km of the sealed network and 270km of the unsealed network that do not meet these minimum TLOS.	Widening of narrow, unsealed rural roads to a minimum carriageway width of 5.0m, plus 0.75m shoulders, has been identified as an aspirational goal. A phased programme commissioned in 2015 for improving levels of service involves increasing the width of narrow unsealed roads to a minimum carriageway of 5.0m. Improve selected parts of the sealed and unsealed network that do not meet the existing TLOS over time. The first priority, after ensuring network resilience is upheld, will involve curve widening to reduce tight corners in the network. to a level suitable for modern truck configurations while maintaining a reasonable level of safety for other road users.	Any widening of narrow unsealed roads will be managed within the existing funding. Increased carriageway width and corner geometry will increase levels of safety and resilience on those roads. Improved access to a level suitable for modern truck configurations while maintaining a reasonable level of safety for other road users. Current levels of service for responsiveness, smoothness, amenity and reliability/resilience will be maintained through the strategy period.
Public Health and Environment	Road maintenance and construction activities can potentially involve discharge of contaminated material to the natural environment.	Controlling roading operations to avoid and mitigate adverse effects including dust and sediment discharge to water ways.	Resource consents are required for activities that may have an adverse effect(s) on the receiving environment(s).

ISSUE	Description	Principal options for response	Implications
Risk and Resilience	The district roading network is exposed to severe operating conditions with high incidence of flood damage and localised extremes in climatic conditions. Critical assets include bridges and large culverts Failure of bluff areas causing slips and dropouts could isolate rural communities. High incidence of traffic accidents involving excessive speed, loss of control and tail end collisions.	Bridge inspections are completed every two years and structural assessments completed every 5 years. Alternative routes are maintained for collector roads. Coordinate investigations, response and promotion of road safety through formation of a multi-agency, action group.	Current risk mitigation will be maintained through the strategy period. Greater community ownership of appropriate road safety behaviours.

Table 13 – WDC roads and footpath infrastructure issues

5.0 INFRASTRUCTURE INVESTMENT PROGRAMME - THE MOST LIKELY SCENARIO

5.1. TOTAL EXPENDITURE

In addressing the issues identified in the previous sections of this strategy, the Waitomo District Council expects to spend $325 million on new or replacement infrastructure between 2018 and 2048. Over the same period, $595 million is expected to be spent on operating costs, labour, depreciation, materials and maintenance. These figures are anticipated to be spread across the four infrastructures asset activity areas as shown below.

Infrastructure Activity	**Capital Expenditure (new and replacements)** *Inflated figures*	**Operational Expenditure** *Inflated figures*	**Total** *Inflated figures*
	$000's	**$000's**	**$000's**
Waste Water	15,559	117,575	133,134
Water Supply	55,654	102,411	158,065
Stormwater Drainage	5,750	13,676	19,426
Roads and Footpaths	248,317	361,289	609,606
TOTAL	**325,280**	**594,951**	**920,231**

Table 14 – Total infrastructure expenditure 2018-48

Table 14 above shows that expenditure across the four infrastructure activity areas will continue to be dominated by operational requirements (operating costs, labour, depreciation, materials and maintenance) between 2018 and 2048.

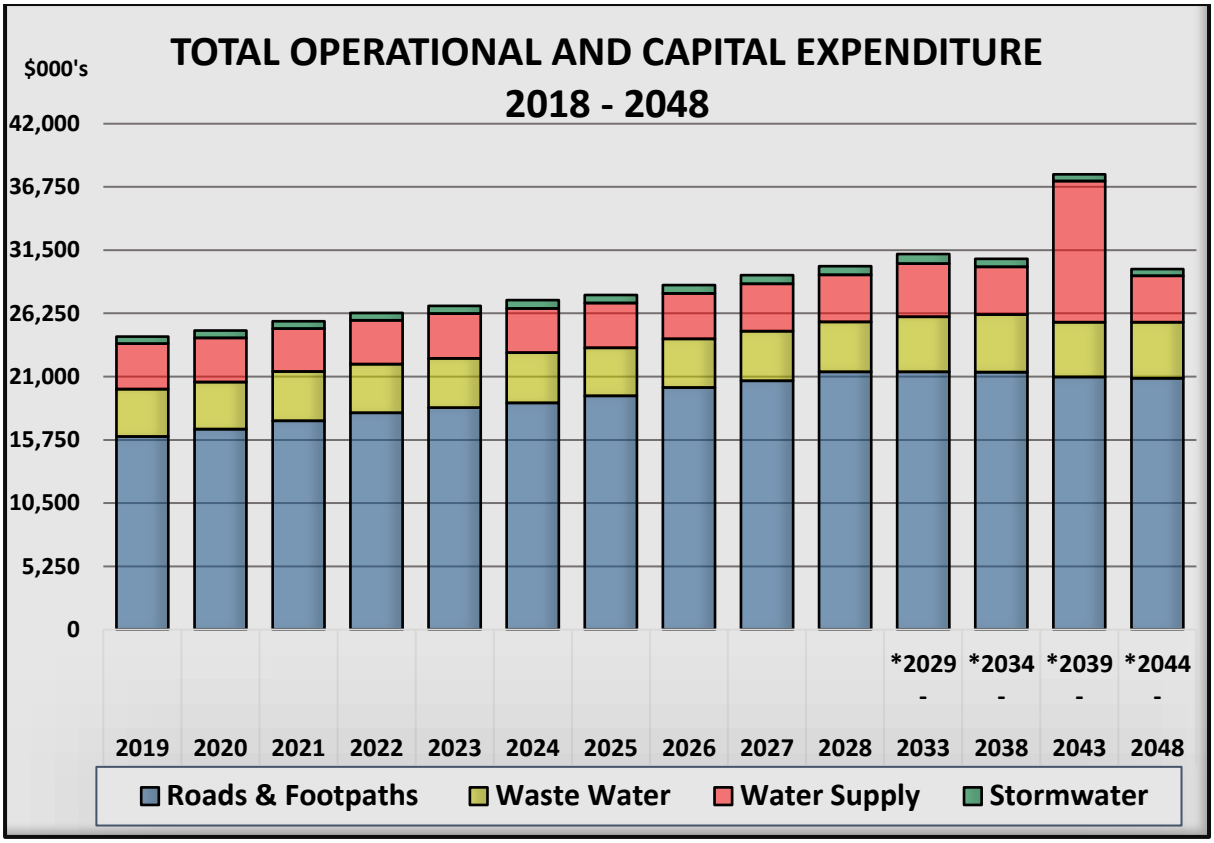

Figure 3 – Total infrastructure opex & capex expenditure 2018-48

The tables below show the indicative estimates of operational and capital expenditure up to 2045, by infrastructure asset type. The estimates are shown on an annual basis for the first 10 years, followed by annual average expenditure for the next 20 years in 5 year blocks:

5.2. OPERATING EXPENDITURE FORECASTS

(Note: All costs in $000's)

Year *Inflated figures*	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**Averaged on Annual Basis**			
											2029 – 2033	**2034 – 2038**	**2039 – 2043**	**2044 – 2048**
Wastewater	3,231	3,311	3,408	3,452	3,578	3,617	3,632	3,665	3,745	3,736	4,110	4,110	4,110	4,110
Water Supply	2,965	3,069	3,188	3,193	3,302	3,373	3,410	3,397	3,447	3,427	3,482	3,482	3,482	3,482
Stormwater	393	396	410	409	417	441	437	446	463	464	470	470	470	470
Roads & Footpaths	9,936	10,051	10,403	10,629	10,985	11,363	11,629	11,986	12,409	12,699	12,462	12,462	12,455	12,462
Total	**16,525**	**16,827**	**17,409**	**17,683**	**18,282**	**18,794**	**19,108**	**19,494**	**20,064**	**20,326**	**20,524**	**20,524**	**20,517**	**20,524**

Table 15 – Infrastructure operating expenditure forecasts 2018/19 - 48

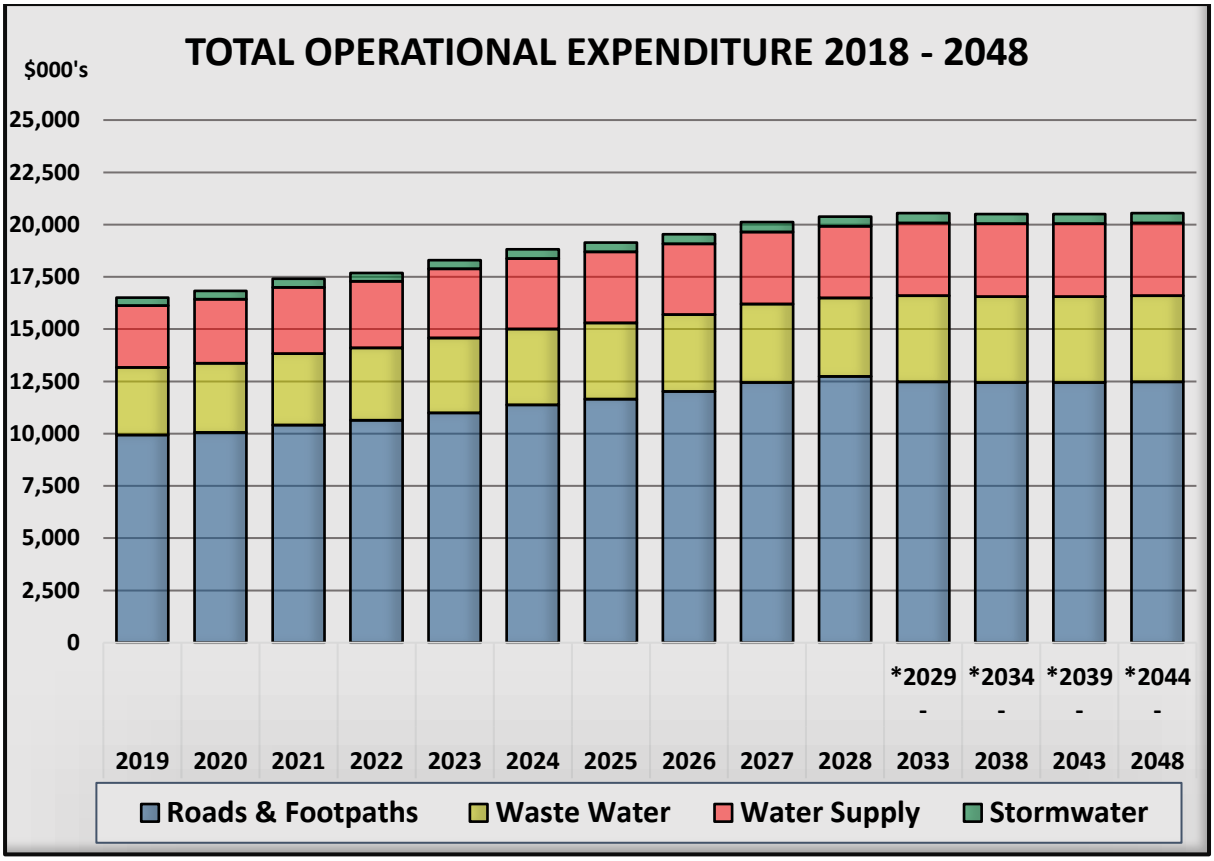

Figure 4 – Infrastructure operating expenditure 2018/19-48

As can be seen from the above graph, operating and maintenance[2] costs are forecast to be gradually increase over the life of the Infrastructure Strategy given the existing planning assumptions. Recent and proposed capital expenditure on the Te Kuiti Water Treatment plant has a resulting impact on forecast operating and maintenance costs due to increased interest and depreciation.

[2] **This graph uses estimates shown on an annual basis for the first 10 years, followed by annual average expenditure for the next 20 years in 5 year blocks.*

5.3. CAPITAL EXPENDITURE FORECASTS

Note: All amounts in $000's

Year *Inflated figures*	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**Averaged on Annual Basis**			
											2029 – 2033	**2034 – 2038**	**2039 – 2043**	**2044 – 2048**
Wastewater	694	587	675	573	521	535	369	355	365	400	470	658	437	533
Water Supply	863	677	441	505	482	359	368	430	487	479	923	505	8,277	408
Stormwater	199	204	208	213	218	240	229	235	242	248	335	197	86	86
Roads & Footpaths	6,095	6,581	6,923	7,357	7,413	7,448	7,749	8,076	8,220	8,656	8,902	8,936	8,536	8,387
Total Forecast Capital Expenditure	**7,851**	**8,049**	**8,247**	**8,648**	**8,634**	**8,582**	**8,715**	**9,096**	**9,314**	**9,783**	**10,630**	**10,296**	**17,336**	**9,414**

Table 16 – Infrastructure capital expenditure (renewals and improvements) forecasts 2018/19 - 48

The forecast capital expenditure profile, as indicated by table 16 above, is relatively static over the life of the Infrastructure Strategy with an emphasis on asset renewal. The exception to that occurs in the 2039-43 period when the proposed raw water storage reservoir for Te Kuiti is scheduled at an estimated cost of $38M.

This is further demonstrated by the series of graphs below that show that spread of renewal and minor improvement capital works (by activity type) over the life of the strategy. The graphs use estimates shown on an annual basis for the first 10 years, followed by annual average expenditure for the next 20 years in 5 year blocks.

5.3.1. Wastewater capex

Capital expenditure on WDC's wastewater schemes trends downwards over the next seven years, then upwards in response to renewals and new capacity related capital works at the Te Kuiti wastewater treatment plant during the 30 year planning period. That involves relining of the reactor and augmentation of the existing clarifier.

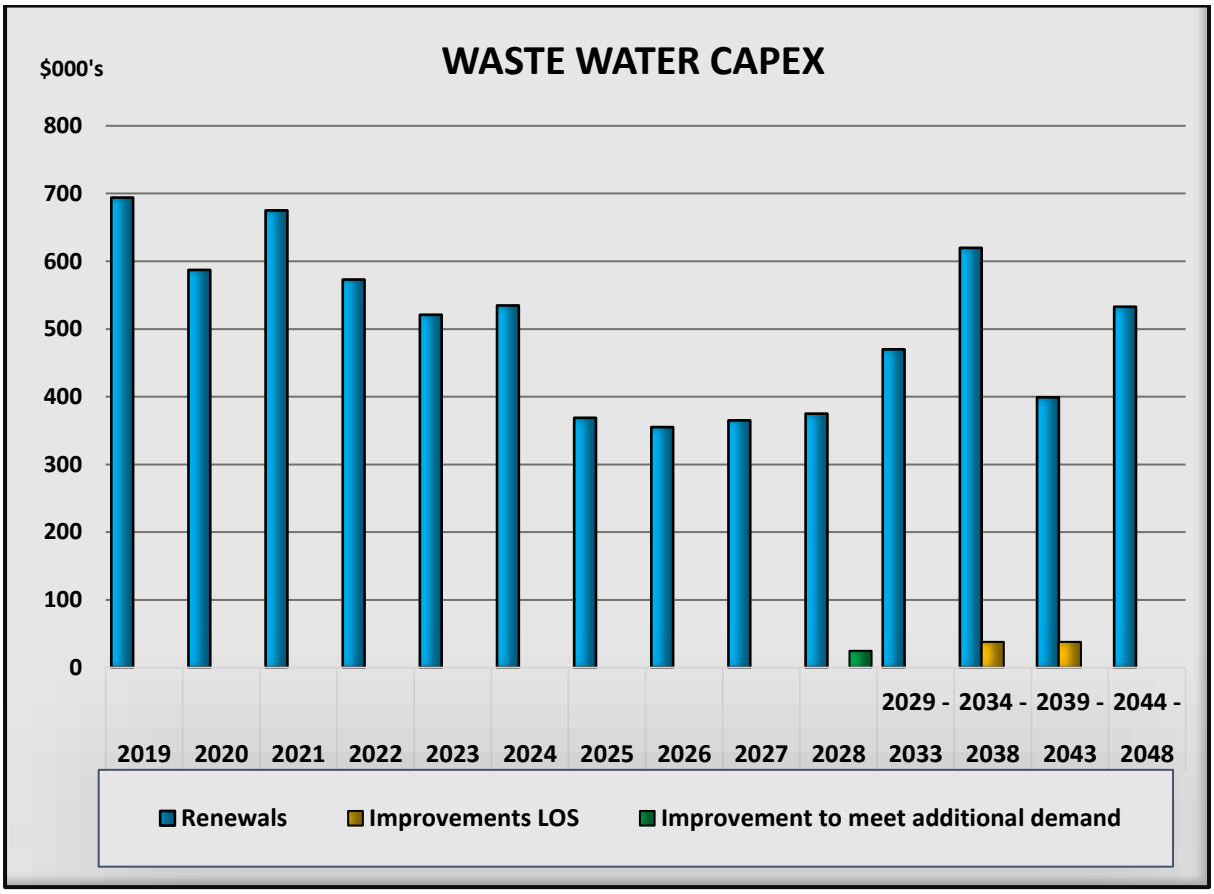

Figure 5 – Wastewater capital expenditure 2018/19 – 2048

5.3.2. Water supply capex

The water supply improvements are dominated by the proposed construction of a raw storage reservoir for the Te Kuiti scheme, at a preliminary estimate of $38M, over the period 2040-42. The necessity and quantum of this proposal will be better defined following the investigations into an alternative supply source for Te Kuiti, ostensibly groundwater.

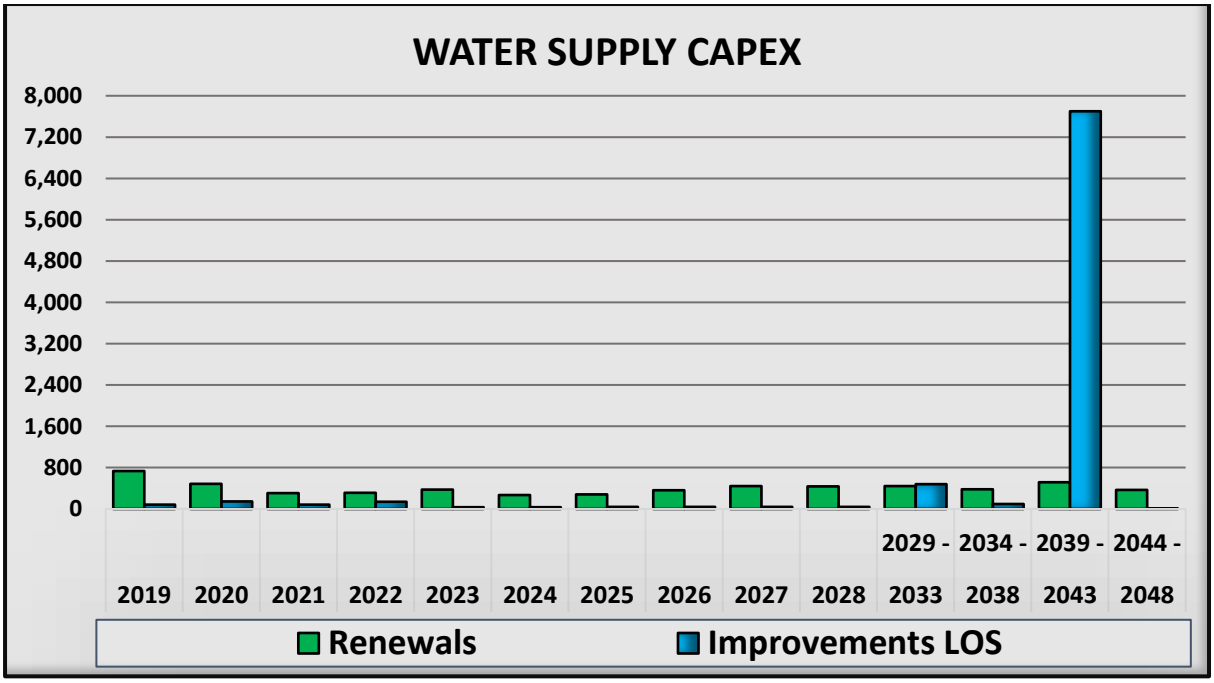

Figure 6 – WDC Water supply capital expenditure 2018/19 - 2048

5.3.3. Stormwater capex

The stormwater capital expenditure profile is shaped by a steady renewals programme through to 2028, followed by pre-treatment works post the consent renewal in 2024/25.

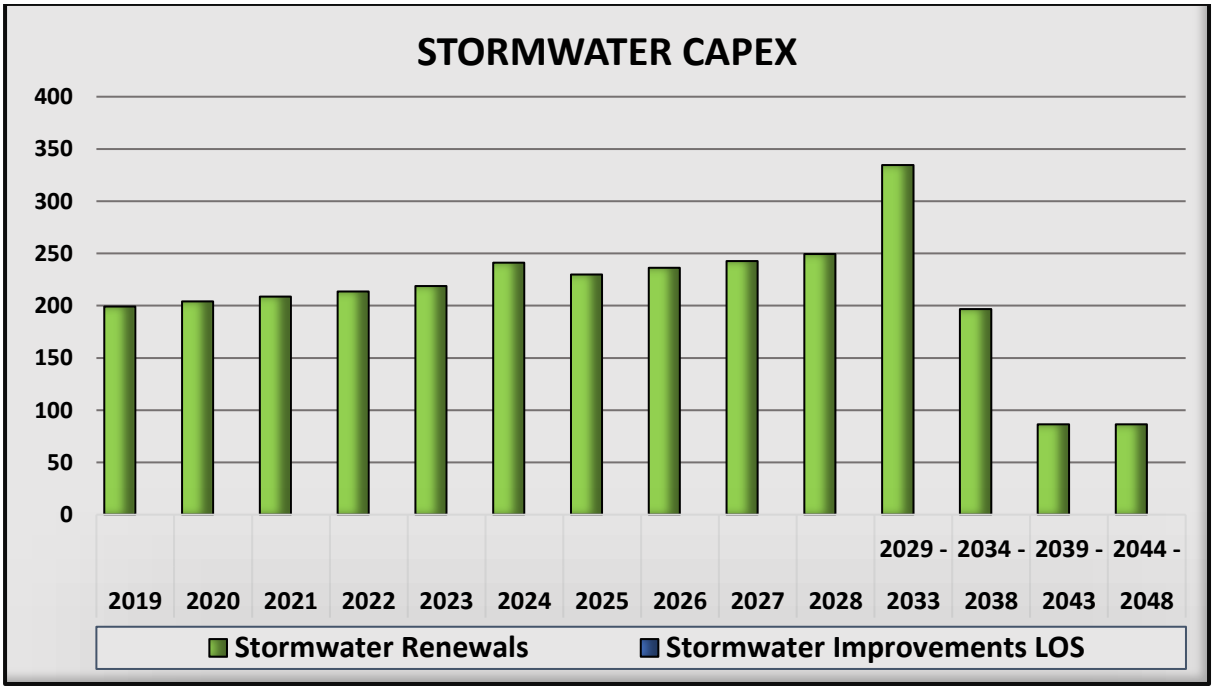

Figure 7 – WDC Stormwater capital expenditure 2018/19 – 2048

5.3.4. Roads and footpaths capex

The roads and footpaths capital programme is dominated by renewals over new works, and reflects a modest increase in reseals and rehabilitation works to a sustainable level.

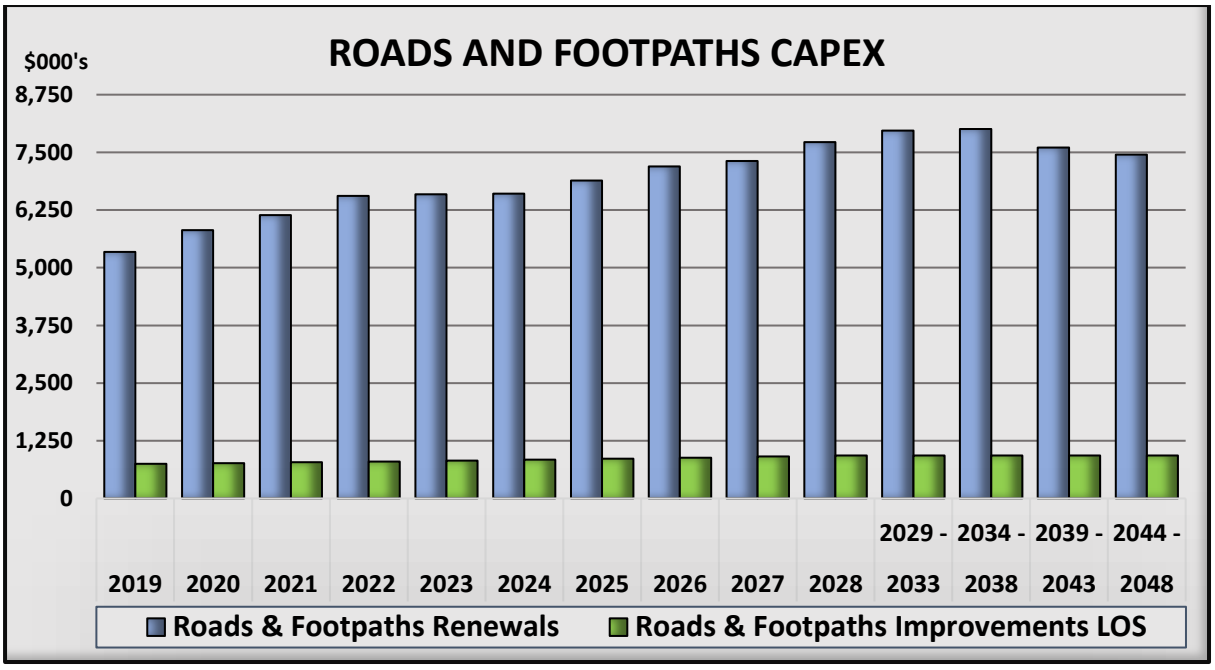

Figure 8 – Roads and footpaths capital expenditure 2018/19 - 2048

6.0 INFRASTRUCTURE STRATEGY – SPECIFIC ASSUMPTIONS

6.1 RELIABILITY OF ASSET CONDITION DATA

Asset condition data is one of several factors impacting on the accuracy of WDC's financial forecasts for its network infrastructure. Other factors relevant to forecasting maintenance and replacement programmes for asset components include data regarding the type of asset, the material it is made from, its size (e.g. larger pipe diameters tend to have longer effective lives than smaller pipe diameters, for the same type of material), its age, and categorisation/location (e.g. road pavements exposed to heavy traffic will have shorter lives than low traffic volume roads).

Taken together, the above factors are used to assess the remaining useful lives for each asset component, and from that, the forecast financial programmes for each activity. As part of that, an assessment is made of the accuracy of the data, expressed as a confidence grade, summarised below:

Confidence Grade	Label	Description
A	Accurate	Data based on reliable documentation
B	Minor inaccuracies	Data based on some supporting documentation
C	Significant data estimated	Data based on local knowledge
D	All data estimated	Data based on a best estimate of an experienced person

The results of the above assessment process are summarised in the table below:

Activity	Confidence Grade				
	Asset Type	Physical properties	Categorisation	Age	Condition
Waste water	B	B	C	B	B
Water supply	B	B	C	B	B
Urban stormwater drainage	B	B	C	B	B
Roads and footpaths	A	B	A	B	A-

The above confidence gradings are factored in the respective financial forecasts, overlaid with local knowledge of operational performance.

Looking ahead, future asset management improvement programmes reflect the areas where more effort is required to improve knowledge of asset condition. Where more recent

asset data suggests different condition from that earlier assumed, adjustments are made to financial forecasts through the three yearly review of the long term plan.

6.2 SPECIFIC ASSUMPTIONS

Whilst the 2018 – 28 Long Term Plan provides for global planning assumptions, there a number of detailed assumptions specifically relevant to the Infrastructure Strategy which are detailed below.

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
Construction costs No major changes relative to current cost structure.	Low	It is possible that the price of some components will change relative to others. Budgets are reassessed each year for the Annual Plan process to mitigate this risk. BERL inflation factors applied to the LTP also incorporate an element of price changes in different activity sectors.
Maintenance and operational costs These are largely based on historical rates and assume similar contract rates throughout the planning period.	Low	BERL inflation factors have been applied to the programmes and budgets in the LTP. Budgets for successive years of the Annual Plan will be based on the corresponding year of the LTP.
NZ Transport Agency subsidies Subsidy rates will continue at amended levels	Low	Reduced subsidy will impact on local affordability of WDC's contribution to road asset maintenance and renewals required to maintain current levels of service.
Depreciation Average asset lives at a project level for new works have been used to calculate depreciation.	Medium	Actual rate of asset depreciation is condition based and more accurately described as decline in service potential. Depreciation funding may be over or understated.
Vested Assets On average the same level of assets are gifted to the council as a result of subdivision as has occurred over the last 5 years	Low	Rate of sub divisional activity is low. Financial provision for increased lifecycle costs has been allowed for.
The vesting/transfer of Waitomo Village water and wastewater assets to WDC ownership will not occur during the 2018-48 planning period	Low	The potential for and a possible pathway forward for transfer of the Village water supply infrastructure to WDC's future ownership and management is unknown at the present time, due to land tenure, asset ownership and funding issues. Given the level of uncertainty around the timing of resolution of these issues, this IS does not provide for any financial forecasts for these assets.
Service Potential Service potential of the asset is maintained by the renewal programme.	Pipe networks – Medium. Roading & Footpaths - Low	There is medium risk that the service potential of the pipe network assets will not be maintained by implementation of the renewal programme since the latter is not based on reliable asset condition information.

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
Asset Lives Assumed lives for Council's assets will have minimum impact on financial estimates.	Pipe networks – Low to medium. Roads & Footpaths - Low	The risk that pipe network asset lives are inaccurate is medium. Lives are based on generally accepted industry values, modified by local knowledge and condition assessment. The condition of large sections of pipe networks has yet to be confirmed. The potential effect is that, for the unconfirmed pipe sections, the effective lives of pipe assets might be overstated, with a consequential impact on depreciation funding and the respective renewals programme.
Natural Disasters That there are no major natural disasters requiring additional funding for reinstatement of assets.	Medium	There is medium risk of a natural disaster occurring during the 30-year period requiring additional funds to repair or reinstate assets. Some provision for increasing the resilience of the assets has been built into this plan but there is still further work to be undertaken to determine the desired level of resilience and the further asset improvements to achieve this.
Climate Change The impacts of climate change will be minimal over the planning period.	Medium	The likely effects of climate change on the region have been documented. The extent to which these will impact on WDC's network infrastructure will be better understood over time and the strategy adapted accordingly.
Council Policy No significant change to Council policy that impacts on assets and services.	Low	Any significant change will require a full review of the Infrastructure Strategy and implications identified at the time.
Growth or Decline in Demand No significant change in demand.	Low	Potential changes in demand are not expected to change significantly over the period due to the population decline projected.
Changes to levels of service Except where specifically identified, changes to levels of service are minor.	Wastewater, water and stormwater assets – Low.	Levels of service due to increased regulatory requirements for drinking water and waste water discharges have been accommodated in the strategy. Uncertainty regarding new levels of service in future resource consents is low for WDC's wastewater schemes (excluding Te Waitere) because of the recent consent renewal processes. Uncertainty regarding technical levels of service for Te Waitere wastewater is medium due to current capacity issues and imminent consent renewal process in September 2017. Changes to technical levels of service for the Te Kuiti water supply take are expected due to the consent renewal process in January 2015.
	Roading assets – medium.	NZTA's current nation-wide move towards a common roading classification, and review of the associated customer levels of service, could result in a change to the level of funding received from NZTA over time. Prescribed levels of service and in turn the required level of investment will be monitored over time.

Table 17 – Infrastructure strategy assumptions