ATTACHMENT 4

2021 -51

Draft Infrastructure Strategy

Waitomo District Council

Waitomo
District Council

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1 SECTION | 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.

1.2 The IS addresses the above purpose by outlining how WDC intends to manage its infrastructural assets for the 30 year period 2021 - 2051, within the following four groups of activities:

i. Water Supply
ii. Wastewater (Sewerage)
iii. Stormwater
iv. Roads and Footpaths

1.3 The key issues impacting on future management of WDC's infrastructure assets have been highlighted 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.

1.4 This strategy represents an accumulation of the corresponding asset management planning underpinning WDC's 2021 -31 Long Term Plan (LTP).

2 SECTION | BACKGROUND

2.1 Clause 101B of the Local Government Act 2002 (LGA) requires Council to prepare and adopt an infrastructure strategy as part of its Long Term Plan (10YP).

2.2 WDC's first Infrastructure Strategy was prepared and adopted in 2015.

2.3 The second infrastructure strategy was adopted by Council in 2018.

2.4 This updated infrastructure strategy will form part of the 2021–31 LTP in accordance with Section 101B(1) and Schedule 10 of the LGA.

2.5 The strategy is required to provide an outline of "the most likely scenario" of how WDC intends to manage its infrastructure assets, taking account of the need to:

- renew and replace existing assets
- respond to growth or decline in demand for services reliant on those assets
- allow for planned increases or decreases in levels of service provided through those assets
- maintain or improve public health and environmental outcomes or mitigate adverse effects on them
- provide for resilience of infrastructure assets by identifying and managing risks relating to natural hazards and by making appropriate financial provision for those risks.

3 SECTION |STRATEGIC CONTEXT

3.1 CENTRAL GOVERNMENT POLICY

The following, updated, strategic environment has been taken into account in the 2021-51 Infrastructure Strategy.

3.1.1 THREE WATERS REFORM PROGRAMME (3-WRP)

In the case of drinking water, additional regulatory measures will apply consequent to adoption of the Water Services Regulator Act in July 2020. The Act implements a new regulatory body – Taumata Arowai – which will be responsible for:

- administering and enforcing a new drinking water regulatory system
- complementary functions relating to improving the environmental performance of wastewater and stormwater networks.

A complementary Bill, the Water Services Bill, will contain all the details of the new drinking water regulatory system, provisions relating to source water protection, and Taumata Arowai's wastewater and stormwater functions. This latter Bill is due to be introduced in the second half of 2021, depending on the post-election Parliamentary timetable.

A Government led Three Waters Review has been considering solutions to wider affordability and capability challenges facing the three-waters sector. It has partnered with local government to consider options for transitioning councils to new service delivery arrangements, hopefully achieving safer, more affordable and reliable three waters services across the country. The Government's preference is for a much smaller number of new water entities of a multi-regional scale, to replace the current number (75) of territorial authority (TA) based providers.

A 3-year, 3-tranche reform programme has been developed, with Tranches 1 and 2 optional. Tranche 3 will be compulsory for territorial authorities opting-in to Tranche 2. All 75 TAs, plus Watercare and Wellington Water, have opted-in to Tranche 1, at least because of the generous stimulus funding made available by the Government, to be expended on water and wastewater projects over the period 1 November 2020 to 31 March 2022. In the case of WDC, the stimulus funding is worth $3.5M.

Tranche 1 (2020/21) of the 3-WRP involves detailed information sharing, to be followed by pre-establishment of multi-regional groupings under Tranche 2 (2021/22). Tranche 3 (2022/23), for those TAs that participated in Tranche 2, will entail formation and operationalising the new water entities.

The anticipated but yet to be developed new drinking water standards will impact on all water authorities regardless of the delivery entity.

The above changes will impact on the delivery of water services over the early years of the 2021-31 LTP and Infrastructure Strategy.

3.1.2 NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT

Central Government is committed to improving the quality of freshwater so that it is materially improving within five years, and to a healthy state within a generation.

To achieve the above it is proposing changes to the Resource Management Act, an updated National Policy Statement for Freshwater Management, an updated National Environmental Standard for sources of Human Drinking Water, and new national environmental standards for freshwater and wastewater.

For wastewater and stormwater discharges, management plans will be required to ensure that appropriate systems and practices are in place to protect water quality standards in the receiving waters.

A regional freshwater management strategy is in place, consistent with the GPS. A special feature of that relates to water resource allocation, giving the competing demands for and impacts on water bodies across parts of the Waikato Region.

3.1.3 GOVERNMENT POLICY STATEMENT (GPS) FOR LAND TRANSPORT

The final Government Policy Statement on Land Transport 2021-31 (GPS 2021) was released in September 2020. It will come into effect from 1 July 2021.

GPS 2021 provides stronger guidance on what Central Government is seeking from land transport investments.

GPS 2018 was based on four strategic priorities, with safety and access the key priorities. The Government has maintained the priorities of GPS 2018, but:

- updated them to reflect policy work that has taken place since GPS 2018 was published, such as the development of Road to Zero (road safety strategy including speed management)
- separated access into better travel options and improving freight connections
- expressed value for money as a principle that applies to all investments, rather than a strategic priority that could change as Government changes
- no longer has a split between key or supporting priorities

The changes from GPS 2018 to GPS 2021 are summarised in the table below:

Table 1: Summary of changes between GPS 2018 and GPS 2021 for Land Transport

GPS 2018 Priorities	GPS 2021 Priorities	Notes
Safety • a safe transport system, free of death and serious injury.	**Safety** Develop a transport system where no-one is killed or seriously injured.	*Safety remains a priority, with the wording updated to reflect the Road to Zero strategy.*
Access • providing increased access to economic and social opportunities • enabling transport choice and access • resilient	**Better travel options** Provide people with better travel options to access places for earning, learning, and participating in society. **Improving freight connections** Improve freight connections to support economic development.	*Access remains a priority but is now covered in two parts to provide clearer guidance. GPS 2021 continues to support better urban transport options and well-connected freight routes. The detailed descriptions of these priorities explain the role of choice, access and resilience.*
Environment • reduces greenhouse gas emissions, as well as adverse effects on the local and public health.	**Climate Change** Transform to low carbon transport system that supports emissions reductions, aligned with national commitments, while improving safety and inclusive access.	*The environment remains a priority, with a focus on investments that align with Government's greenhouse gas reduction targets. Improvements to public health will be a co-benefit of investment decisions that support the transition to a low carbon transport system. There is no longer separation into 'key' and 'supporting' priorities.*
Value for money • delivers the right infrastructure and service to the right level at the best cost.	*GPS 2021 embeds value for money throughout the GPS as a principle that should always be expected from investments. GPS 2021 encourages co-benefits to be considered when developing business cases (e.g. for health, resilience, or environmental sustainability).*	

3.2 POPULATION PROJECTIONS

Rationale Limited was engaged by WDC 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 considered 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.

Updated population forecasts covering the period 2021 – 51 will not be available ahead of adoption of Council's 10YP, and will be based on a different statistical meshblock from the database used in 2017. In any event, there is unlikely to be significant variation from the 2017 planning scenarios, with the overarching long term forecast of a declining, usually resident population, prevailing. The variation between medium and high growth/low growth population forecasts is only modest – in the order of +/- 200 people, so the updated growth forecasts corresponding to the 2021-51 planning period are likely to be within the range of the 2017 growth projections and consistent the overarching, long term trend.

The 2017 medium growth projection scenario prepared by Rationale Ltd has therefore been used for planning assessment purposes in this Infrastructure Strategy.

3.2.1 MEDIUM GROWTH SCENARIO

Population - under the medium growth 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.

Since then, the 2018 Census (6 March 2018, amended 5 March 2020 by Statistics NZ) usually resident population for the district was 9,303, down 507 on the above 2017 projection for 2018.

Dwellings - the dwelling growth that flows from the above population is approximately 20% higher than the historical growth rate. The proportion of occupied dwellings decreases 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 - 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 will be heavily dependent on dwelling growth. The number of Commercial and Industrial rating units was projected to increase in Mokauiti, Piopio, and Te Kuiti, with no growth elsewhere.

The impact on 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.

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 towards 2038.

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.

Table 2:Waitomo District Population and Dwelling Forecasts 2013-48

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%

3.2.2 POPULATION STRUCTURE

The district population structure in 2017 was found to have 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 was 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 eventually have a flow-on effect to the make-up of the work force in the district. Factors such as an 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 the number of dwellings. The population and number of dwellings is projected to grow in the Waitomo Rural Ward. The number of unoccupied dwellings is projected to increase significantly in Te Kuiti due to the declining population.

3.2.3 CURRENT PATTERN OF BUILDING AND SUBDIVISIONAL DEVELOPMENT

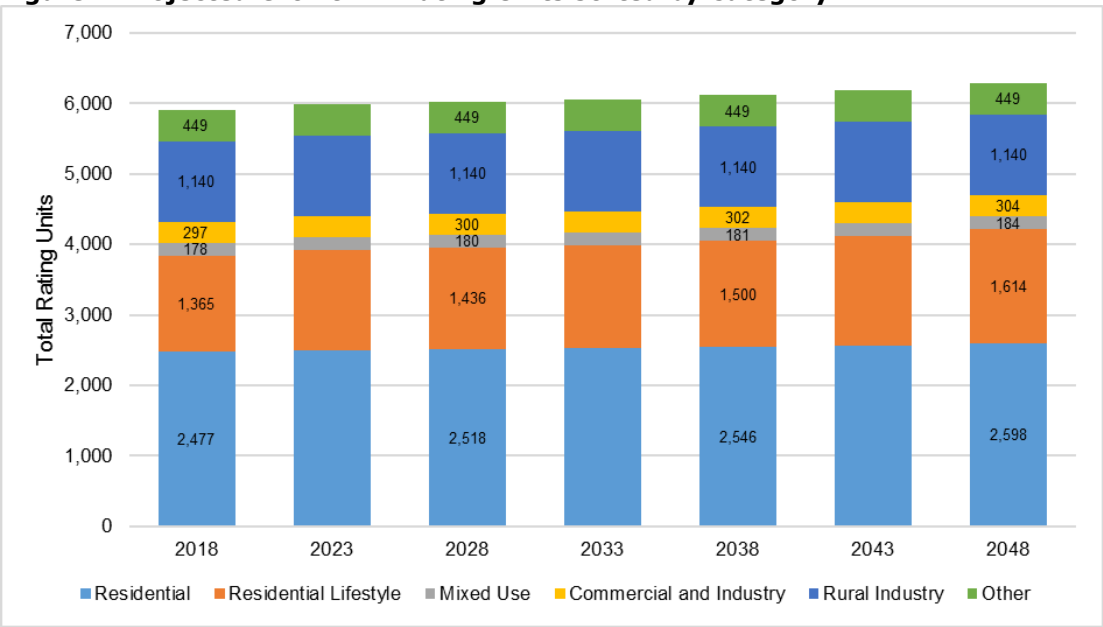
Population growth for the district is projected to decline, while the number of dwelling and rating units is projected to grow slightly. Historic trends of pockets of land subdivision and building activity in the form of modest lifestyle development around Te Kuiti, Waitomo Village, Mokau, and Awakino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

Recent work on WDC's Proposed District Plan has confirmed the availability of surplus land for future residential development, contiguous with existing urban and rural residential settlement areas. In other words, land availability for future growth is not a limiting factor over the term of this Infrastructure Strategy.

3.2.4 FUTURE DEVELOPMENT ACTIVITY

The graph below shows the 2017 projected growth in the number of 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



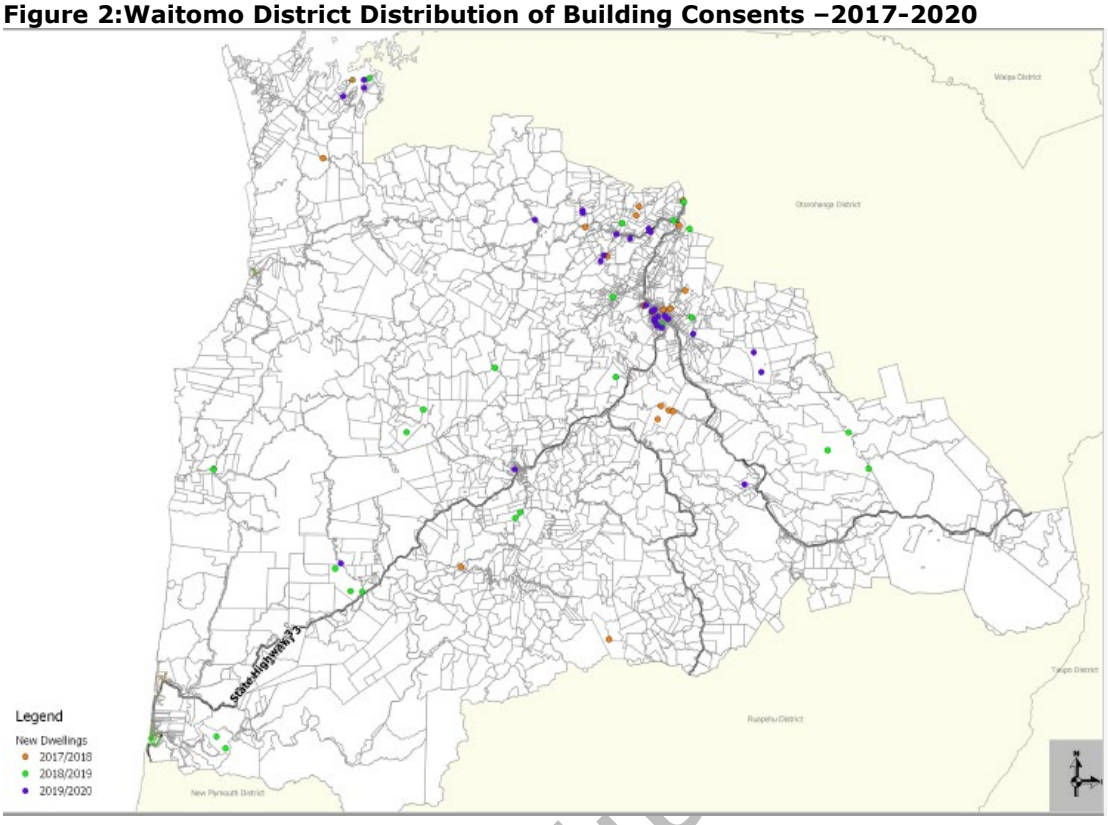
From an infrastructure planning perspective, particularly in respect of the three water services provided to the larger residential communities in the district, demographic and development trends will not impact on the demand for these services at the present time or in the foreseeable future.

For roads and footpaths, there is a relationship between population and traffic volumes, but not linear due to the impact of age profile, incidence of car ownership and fuel prices. More relevant to roading infrastructure planning will be land use activities, and the numbers of heavy commercial vehicles attaching to that.

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 the past three years (i.e. since 2017) – a total of 74 (compared to 33 over the 3-year period 2014 – 17). While the majority of these (approx. 40) 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 –2017-2020



3.3 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 Maniaiti/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.

3.4 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 affordability of levels of service beyond the minimum required to meet its resource consent and other legislative requirements.

In the 10-year period between 2007/08 and 2017/18, WDC 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 included:

- Construction of raw water storage dam at Mokau
- Bacteriological treatment systems completed at Mokau and Maniaiti/Benneydale water supplies
- Te Kuiti wastewater treatment plant re-build
- Te Kuiti water treatment plant upgrade
- Maniaiti/Benneydale water and wastewater treatment plants upgrade
- Piopio sewerage system installation
- Piopio water treatment plant upgrade
- Critical renewal work to stormwater network (Ngati Street, George Street and Duke Street)
- 4,000 metres of stormwater reticulation system cleaned and surveyed
- 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. For the three waters, the strategic back-drop for that includes increasing drinking water standards and improved environmental performance as a result of Central Government's Three-Waters Reform Programme, the Taumata Arowai - Water Services Regulator Act 2020, and National Policy Statement for Freshwater Management. For roading, the Government Policy Statement for Land Transport 2020, increasing vehicle weights and an increased number of heavy commercial vehicle loads on selected local roads as forestry plantations become due for harvest.

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.

4 SECTION |STRATEGIC RESPONSE TO MANAGING INFRASTRUCTURE ASSETS

Council has taken a strategic approach to sustainable management of its infrastructural assets to ensure, as a minimum, existing service levels are maintained for the foreseeable future. This approach means that decisions around operation and maintenance, renewal and upgrade, demand and growth, etc. are taken in the context of optimising overall asset lifecycle costs and the provision of services, in perpetuity.

In respect of its three-waters infrastructure, it is important that Council continues to plan and deliver water services to agreed customer and technical levels of service irrespective of the Central Government led review of water service delivery. Any future changes to the current delivery model will be expected to maintain Councils aspirations for those services. This Infrastructure Structure will be an important mechanism for documenting those current and future expectations and planning needs.

4.1 ASSET VALUES

Revaluation of WDC's infrastructure assets included in this IS is completed on a 3-yearly cycle, with roading and solid waste assets revalued a year ahead of the 3-waters to help spread the cost and workload.

The value of roads and footpath assets far outweighs the value of any other asset group, being some 3.9 times the combined value of the 3-waters assets. Wastewater assets have the second highest value. Table 2 below summarises the respective and total asset values of the four asset groups comprising this IS.

Table 3: Asset values

Activity	Valuation Date	ORC*	ODRC**	Accumulated Depreciation	Annual Depreciation
Water Supply	30 June 2018	$28.6M	$19.2M	$9.4M	$488.2k
Wastewater	30 June 2018	$41.5M	$29.6M	$11.9M	$810.7k
Stormwater	30 June 2018	$16.9M	$9.8M	$7.2M	$189.5k
Roads and Footpaths	30 June 2020	$335.4M	$253.9M	$81.5M	$3.3M
TOTAL		**$422.4M**	**$312.5M**	**$110.0M**	**$4.76M**

***** = Optimised Replacement Cost
****** = Optimised Depreciated Replacement Cost

Of interest is the comparative value between water supply assets and wastewater assets. While there are four wastewater and four water supply schemes across the district, with similar lengths of pipework, but daily wastewater discharge volumes nominally 70% of water consumption volumes, the wastewater asset value reflects the high level of investment required for treatment and storage of effluent before it is to an acceptable environmental standard before discharge to freshwater streams. Pipe sizes required for gravity wastewater reticulation pipes are also typically larger than for pressurised water supply reticulation.

In all cases, the annual and accumulated depreciation is an indicator of decline in asset condition, offset by annual renewals programmes.

4.2 ASSET RENEWAL STRATEGY

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 required by regulation or resource consents in recent years. Council's approach is largely based on the need for timely and effective asset renewal over time, especially for reticulation assets, to ensure levels of service are maintained.

Asset renewal profiles, particularly for the three water assets, are based on theoretical useful lives, material type, length, age etc. A strictly theoretical approach to developing asset renewal programmes would result 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 IS takes into account a long term asset management approach to renewals programming including sound engineering judgment, actual asset condition where available, the optimisation of lifecycle costs, and community affordability to ensure that renewal programs are prioritised according to in-situ asset condition, asset criticality and failure history, over theoretical asset lives. This approach results in financial provision for asset renewals that is not only considered appropriate and affordable but can be refined according to more robust asset condition data as it improves over time.

Asset renewals programmes also take into account asset performance. Where additional capacity is required, asset upgrading work is combined with asset renewals.

4.3 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 demand management) 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.

4.4 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.

4.5 RISK AND RESILIENCE

The natural hazards potentially impacting on WDC's infrastructure assets include earthquake, land slippage, inundation 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 and rising sea level.

The approach taken to mitigating the risk of asset damage and interruption to the delivery of essential services due to the potential impact of natural hazards, involves identifying and managing risks relating to those hazards and making appropriate financial provision for managing those risks. Council is in the early stages of identifying hazard prone assets and this information will be used to inform future infrastructure strategies. The proposed district plan requires an adaptive management approach to both private property and Council infrastructure in areas prone to coastal erosion and coastal inundation.

4.5.1 CLIMATE CHANGE

Current predictions of the effects of global warming on coastal of New Zealand point to increased frequency and duration of high intensity rainfall events, with longer drought periods during summer months more likely to occur on the east coast. These are long-run predictions, with localised variations on the overall trend expected to continue at least over the term of the current planning period. Higher intensity rainfall has been recorded in recent years with a greater incidence of short duration heavy rain spells occurring.

Relevant examples include the vulnerability of Te Kuiti's single water source to soil instability within the wider catchment, the Mokau storage dam's susceptibility to stratification and algae blooms, and exposure of the roading network to damage and closures due to undersized culvert capacity, bank instability and stream and coastal erosion.

Recent modelling work done on the impacts of natural hazards for the Proposed District Plan has identified that in the Te Kuiti central business district area and in the coastal communities along the West Coast, there is infrastructure that is vulnerable to the effects of climate change. In Te Kuiti, the water treatment plant is located in a high risk flood zone and parts of the wastewater treatment plant are subject to inundation in major flood events. Along the west coast, the district roading network is at risk from storm surge inundation. In Awakino and Te Kuiti there is some risk to the stormwater systems. In Waitomo Caves Village, the privately owned and operated wastewater infrastructure is located in a flood prone area.

In some cases, the risk to Council's infrastructure from natural hazards is a pre-existing condition, pre-dating the effects of climate change. For instance, the Te Kuiti piped stormwater network has a nominal design capacity equating to a 1 in 2-year storm event. Some parts of the network do not even achieve that. The Te Kuiti water treatment plant and wastewater treatment plant are already vulnerable to inundation in a less than 100-year flood event, irrespective of climate change.

In some latter instances, e.g. the urban piped stormwater network, Council is accepting of the level of risk and hence, the attendant level of service that Council has agreed to and can afford. The impacts of climate change will exacerbate the incidence of those situations, but in reality, the impact is academic.

Moving forward, Council plans to gain better information regarding the location, age and condition of its infrastructure in order to address the potential effects of climate change. This

may affect capital expenditure forecasts but it is difficult to predict at this early stage what the impact will be without fully understanding the risk, the vulnerability of infrastructure to that risk, and the level of service Council is prepared to accept and fund.

The AMPs and the Infrastructure Strategy give consideration to matters relating to resilience in respect of climate change. At this stage, however, there is limited understanding (and a lack of wider guidance) of the longer term financial and non-financial effects that climate change may cause.

Nevertheless, the proposed district plan review work, that has modelled the impacts of climate change on Council utilities, has identified a number of critical Council assets that are potentially at risk or vulnerable to longer term climate change effects. The Piopio wastewater treatment plant and Te Kuiti water treatment plant are two examples of that. Provision has been made within and beyond the term of this strategy for improving the resilience of those installations.

4.5.2 CRITICAL ASSETS

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 has been 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.

5 SECTION| 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 can address several infrastructure issues.

5.1 WDC WASTEWATER SCHEMES

WDC owns and manages four separate wastewater schemes in the district; at Te Kuiti, Piopio, Maniaiti/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.

A snapshot of the key design parameters for each scheme is shown in the table below:

Table 4:WDC Wastewater Schemes - Key Features

Scheme	Pipe length (km)	Consented discharge volume (m^3/d)	Avg. DWF (m^3/d)	Max. WWF (m^3/d)	Discharge consent expiry date
Te Kuiti	51.0	7,000.0	2,395.0	6,951	30-Jan-40
Piopio	10.8	135.4	92.2	127	30-Jun-28
Maniaiti/Benneydale	3.1	85.0	48.0	122	01-May-25
Te Waitere	0.8	10.3	3.0	-	31-Jul-42
Total	**65.7**	**7,230.7**	**2,538.2**		

5.1.1 TE KUITI WASTEWATER SCHEME

The Te Kuiti wastewater scheme comprises approximately 51km of reticulation of varying pipe diameters and materials, four secondary pump stations, a terminal pump station and a tertiary treatment plant. The treatment plant was subject to a major upgrade, completed in 2014. 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 upstream of Te Kuiti airfield.

The upgraded treatment plant capacity is limited by the design flow of the reactor and clarifier of 4,000 and 4,500 m3 per day respectively. Flows of up to 7,000 m3 per day can be handled for short periods during winter months, to the required consent standards.

The Te Kuiti wastewater scheme is somewhat unique in that there are two major wet industries (in this case, abattoirs) discharging to the system. The total load on the WWTP is significantly impacted by the discharge from these two industries, even after the on-site pre-treatment that is in place at both premises (approx. 20% of total inflow, 45% BOD, 50% phosphorous, and 40 % total nitrogen).

Infrastructure management issues include:

Table 5:Te Kuiti Wastewater infrastructure issues

Description	Principal options for response	Implications
ISSUE: Asset renewal or replacements		
Much of the pipe reticulation is now dated, although infiltration rates entering network are relatively low. Direct inflow is more of an issue, impacting on peak inflow at the WWTP. SCADA and electrical assets due for renewal at least once every 15 years. Certain treatment plant mechanical and material components will require renewal/replacement within the 30 year period. Several pump stations become due for renewal over the period, including the terminal pump station. The latter is a critical asset. The existing sand filter at the Te Kuiti WWTP is generating additional wear and tear on the downstream UV plant.	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. Pump station renewal work includes pump, valve and guide rail replacements, and upgrading of switchboards. Options for replacing the current sand filter at the WWTP are to be explored. Alternatively, the UV plant renewal will need to be brought forward to Year 10.	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 public health impacts. Reticulation renewals programme of $290k per year identified for Years 1-3 of LTP, reducing to $190k on average per year from Year 4. From Year 4 of LTP, a mechanical and electrical replacement budget of $90k on average per year has been allowed. Electrical assets scheduled for replacement 2034-38 ($2.4M). Treatment plant reactor liner scheduled for replacement in 2032/33 ($262k) Routine pump station renewals totalling $91k over the first 10 years have been scheduled, increasing to $52k per year thereafter. In addition, two significant pump station renewals have been scheduled for Years 4 and 8 at a combined cost of $186k. An accelerated renewal programme for critical pump stations has also been scheduled for Year 1 ($158.4k), funded from the Three Waters Reform Programme. The two UV units at the WWTP will require replacement by Year 10 of the LTP at an estimated cost of $131k.
ISSUE: Response to demand		
Recent treatment (2014) upgrade provides for up to 4,500m^3/day average, peak 7,000m3/day. Current average flow is 2,910m^3/day, with average DWF of 2,395m^3/d and WWF of 3,740 m^3/d. Peak inflow was 6,951m^3/day in July 2019. Includes inflow from two major wet industries. The population projection for Te Kuiti is for a decline over the term of this IS.	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. Future, modest, capacity increase could be achieved through a dedicated, on-site monitoring and control regime. Larger scale capacity increases would require significant additional capital investment at the WWTP. Control of industrial discharges is critical to managing capacity and performance of WWTP. Regular monitoring and enforcement of trade waste discharges is key to that. Larger scale treatment plant capacity can be achieved by	Deferring further investment aimed at increasing plant capacity can be realised by reducing unnecessary inflow sourced from groundwater infiltration and direct inflow. Duplication of clarifier/reactor is scheduled for 2033/34 at an estimated cost of $722k.

Description	Principal options for response	Implications
	increasing power supply and duplication of the clarifier/reactor process stream. It will also increase the resilience and operational contingency for this critical asset.	
ISSUE: Levels of service (LoS)		
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. 2017 resident satisfaction survey identifies that 94% of respondents were satisfied with current LoS.	Continuation of current LoS achieves an effective balance between regulatory compliance, resident satisfaction, and cost. Modest increases in technical LoS are necessary to improve effectiveness of sludge handling and chemical dosing at the treatment plant.	Increasing current technical LoS will improve consent compliance and operational performance of treatment plant.
ISSUE: Public Health and Environment		
The upgraded treatment plant (circa 2014) has improved the effects of the activity on the receiving environment. Mitigating adverse effects on the environment is achieved through effective operation of the WWTP.	Routine monitoring and analysis 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 Effective WWTP performance relies on timely, routine maintenance and operation of mechanical and electrical equipment	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. The estimated cost of the 2040 renewal process is $1.4M. Additional sludge management operational capacity has been provided in Year 1 ($104k)
ISSUE: 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 infiltration with natural ground movement, or in the event of ground movement caused by a seismic event. Most of the Te Kuiti CBD and parts of the residential area adjoining and to the west of Mangaokewa Stream are located within the 100–year flood plain. Climate change impacts will exacerbate the extent of flooding. Direct	Rolling replacement of wastewater pipes in poor condition and at the end of their effective life with new, flexible, pipe materials. Routine property inspections to identify and remove illegal stormwater connections/stormwater runoff to the wastewater system. Raised pond embankments, effluent storage and elevated	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. Wastewater overflow during a severe, 1 in 100 year, rainfall event is unavoidable due to the inundation of property gully traps and parts of the WWTP.

[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.

Description	Principal options for response	Implications
inflow to the wastewater network and inundation of parts of the WWTP will overload the hydraulic capacity of the reticulation and treatment plant, leading to widespread wastewater overflows.	manhole risers at the WWTP, bypass pipework and high stormwater dilution during flood conditions are mitigating factors.	
The five pump stations servicing the reticulation rely on continuity of energy supply to avoid wastewater overflow.	Standby power generation is required to maintain continuity of service during power outages	Standby power generation has been provided in Year 1 at a budget cost of $150k, funded from the Three Waters Reform Programme.

5.1.2 PIOPIO WASTEWATER SCHEME

The Piopio wastewater scheme was installed in 2012 and comprises approximately 10.8km of reticulation of varying pipe diameters, 207 182 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:

Table 6: Piopio Wastewater Infrastructure Issues

Description	Principal options for response	Implications
ISSUE: Asset Renewal or Replacements		
The infiltration rates entering the 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 15 years. Septic tank and pump maintenance costs escalating	Condition monitoring 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. Increased routine maintenance of the scheme and monitoring of plant operation and performance will ensure public health and environmental outcomes are maintained. Higher routine maintenance required.	Scheme capacity and consent compliance relies on condition of network. The current scheme has been operating for only 9 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.
ISSUE: Response to demand		
Scheme is designed for 250 residential units equivalent. Residual capacity is approximately 20 residential units. Current average discharge measured over 2017-20 period was 92.2m^3/d. Peak discharge was 127 m^3/d. Consent discharge limit is 135.4 m^3 /d.	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	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,

Description	Principal options for response	Implications
Residential population projection for Piopio is for a decline in the medium to long term.	provide earliest indication of the need for additional capacity. Monitoring and enforcement of trade waste discharges is critical to managing capacity and performance of WWTP.	but will form part of the consent renewal considerations in 2028. Control of industrial discharges.
ISSUE: 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 has been necessary to achieve improved customer satisfaction and consent compliance.
ISSUE: 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.	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.
Prolonged heavy rain events can result in non-compliance as there is no additional storage capacity available to manage the discharge rate within consent conditions.	Increased maintenance of septic tank units may help reduce peak discharge flow rates. In addition, buffer storage is required to accommodate peak discharge during heavy rain events.	Funding for renewal of discharge consent has been allowed in years 6 and 7 at a total cost of $59k. Provision for additional buffer storage has been made in Year 5 at an estimated cost of $112k.
ISSUE: Risk and Resilience		
Wastewater service continuity and community health is protected from seismic damage modern 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.
The treatment plant is located within the outer limits of a high risk, 1 in 100 year, flood zone under a climate change scenario (RCP 8.5). Majority of reticulated residential area unaffected but would not be able to be serviced while WWTP inundated and discharge flow-path contaminating southern end of township. WWTP would not be accessible by road.	Site contours and flood depth at WWTP to be confirmed. Stop banking may be practicable, or relocation of the WWTP to higher ground. The latter timed to coincide with renewal of existing WWTP in approx. 40 years' time. Affected properties would require evacuation during flood event. Mokau River will burst its banks during storm event. High dilution factor will help mitigate health risk.	Study of risk mitigation options has been allowed for in Year 11 ($27k). Timing of WWTP replacement will fall outside this IS planning period, in 2060. The preliminary cost estimate to relocate the WWTP is $2.5M. Interim construction of stop banks and an earthen access causeway at the WWTP has been allowed for in Year 11 ($262k including inflation)

5.1.3 MANIAITI/BENNEYDALE WASTEWATER SCHEME

The Maniaiti/Benneydale scheme comprises approximately 3.1km 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:

Table 7:Maniaiti/Benneydale Wastewater infrastructure issues

Description	Principal options for response	Implications
ISSUE: 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 last upgraded in 2009. A small wetland system was added for winter discharge. Some components now require replacement, namely the trickling filter and Imhoff tank SCADA and electrical assets due for renewal at least once every 15 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. Align treatment plant replacement programme with outcome of consent renewal in May 2025. Replacement components to be consistent with new discharge quality standards.	The financial impacts of renewals have been balanced against condition assessment, levels of service, consent compliance and ratepayer affordability. Current LoS will be maintained. $10k per year has been allowed in Years 2 and 3 to complete I & I investigations, followed by an average of $144k every three years commencing in Year 5 for pipe replacements. Tank and filter replacements have been allowed for in Year 5 at an estimated cost of $449k.
ISSUE: Response to demand		
Average plant inflow is 51 m^3 per day. Average DWF is currently 48 m^3 per day. The consented discharge volume is up to 85 m^3/day. Treatment plant capacity is nominally 165 m^3/day. The scheme has spare capacity for an additional 27 residential connections, or the equivalent thereof. The population projection for Maniaiti/Benneydale is for a decline in the medium to long term.	Monitoring of actual demand on the Maniaiti/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 Maniaiti/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.
ISSUE: Levels of service		
LoS is dominated by resource consent compliance for all discharges from the treatment plant – air, water, groundwater etc. Customer LoS principally relate to sewer blockages, overflows, odour, and responsiveness to service requests. The 2020 resident satisfaction survey identified that 93% of respondents were satisfied with current 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: Public Health and Environment		
The upgraded treatment plant (circa 2009) has improved the effects of the activity on the	Continuation of routine maintenance of the scheme and monitoring of plant operation and	Failure to continue current routine maintenance levels could result in consent non-compliance.

Description	Principal options for response	Implications
receiving environment. The next consent is likely to require additional environmental protection standards in light of the Governments NPS for Freshwater Management and the new Water Services Regulator – Taumata Arowai.	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 May 2025.	The resource consent provides the legal right to operate the Maniaiti/Benneydale WW treatment plant. A budget of $75k has been provided over Years 3 and 4(2024-25) to prepare and submit the next consent application, followed by $449k in Year 5 (2025/26) for treatment plant upgrade works (see renewals section above).
ISSUE: 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. Replacement of the trickling filter and Imhoff Tank will improve resilience of the WWTP.	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.

5.1.4 TE WAITERE WASTEWATER SCHEME

The scheme involves collection of septic tank effluent from approximately 11 properties through a reticulated system comprising approximately 800m 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:

Table 8:Te Waitere Wastewater Infrastructure Issue

Description	Principal options for response	Implications
ISSUE: Asset Renewal or Replacements		
The community soakage field theoretically overloaded. Most of the reticulation has been replaced over the past 4-years, including the rising main. The pump station was refurbished in 2018. SCADA and electrical assets due for renewal at least once every 15 years.	Replacement or refurbishment of the soakage field with an expanded facility is required.	Budget provision of $75k has been made in Year 1 of the 2021-31 LTP for land acquisition and soakage field development.
ISSUE: Response to Demand		
Current capacity of the disposal field is designed for 13 properties. 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 to include an upgraded and extended facility with capacity for modest additional demand.	See above.

Description	Principal options for response	Implications
ISSUE: 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.
ISSUE: 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.	The resource consent is fundamental to the legal right to operate the Te Waitere WW treatment plant
ISSUE: 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 medium to high in the long term.

5.1.5 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. Discussions with representatives of the two ownership trusts and private owners of this infrastructure have 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 ownership or management of these assets.

5.2 WDC WATER SUPPLY SCHEMES

WDC owns and manages four water supply schemes, at Te Kuiti, Piopio, Maniaiti/Benneydale and Mokau. The largest supply is at Te Kuiti and the smallest at Maniaiti/Benneydale. Higher levels of service, driven by the Public Health (Drinking Water) Amendment Act and the associated Drinking Water Standards for New Zealand (Revised 2018) that came into force on 1 March 2019, and security of supply, have been the key areas of focus over the past five to ten years, across all schemes. Resource consents to take the required volumes of water provide the legal mandate for maintaining adequate, all-year supply quantities for domestic and commercial/industrial use.

Current and short term focus remains on drinking water quality compliance, and the systems required to achieve that (including optimisation of Mokau water treatment plant). The implications of and response to the as yet unknown new drinking water standards,

compliance and service delivery proposals being developed as part of the three waters reform programme will impact over the next 2-3 years, but do not remove WDC's responsibilities for continuing to manage, plan and provide safe drinking water to its four scheme areas.

Table 9 below summarises current consent expiry dates and key asset data:

Table 9:WDC Water Supply Schemes

WATER SUPPLY SCHEME	Pipe Length (km)	Storage (m^3)	Pumping Stations	Consented Take (m^3/d)	Average Demand (m^3/d)	Take Consent Expiry Date
Te Kuiti	58.4	3,296	3	4,800 (4,200 when stream flow <0.7 cumecs)	3,336 (Peak 4,320)	30-Sep-40
Piopio	8.5	450	1	450	309	01-Aug-23
Maniaiti/ Benneydale	5.7	100	2	360	120 (50m3/d post leak repairs)	07-Apr-31
Mokau	13.2	20,000	1	1,000	120	15-Sep-26
Total	**85.8**	**23,846**	**7**	**6,610**	**3,530**	

5.2.1 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 58.4km 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 completing the water intake and 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. Additionally, the intake is located downstream of an industrial zone and wastewater pumping station. 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, completing investigations into availability of a suitable groundwater source (in 2020/21), 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.

Recent work completed on flood hazard modelling in parts of the district, including Te Kuiti, has identified an additional consideration adding to the importance of locating and securing

alternative water source. It has shown that the Te Kuiti water treatment plant will be subject to inundation, at least 1.0m deep, under a relatively modest 1 in 20 year rainfall event. At higher magnitude 1 in 100 year rainfall events, the depth and scale of inundation will increase, extending to the CBD and adjacent central residential areas. That hazard will be further exacerbated by the effects of climate change, in terms of scale, frequency and intensity. Further, while the water treatment plant will become inoperable during inundation conditions, the majority of the Te Kuiti residential area will remain elevated above flood level and reliant on limited treated water storage for supply.

The original concept of simply pumping groundwater from the alternative source to the existing treatment plant will therefore not be viable. A sealed borefield supply pumping to a smaller treatment plant constructed on elevated ground will need to be added to the concept in order to maintain a potable water supply during major flood events. Additional treated water storage is a further consideration for the town.

Specific infrastructure management issues for Te Kuiti water supply include:

Table 10:Te Kuiti water supply infrastructure issues

Description	Principal options for response	Implications
ISSUE: 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 $226k per year average. 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
SCADA and electrical assets are due for renewal at least once every 15 years.	Programmed renewal of electrical and control equipment on 15-year cycle.	SCADA and electrical assets replacement programmed for Years 12 and 27 of IS (included in renewals budgets).
Four storage reservoirs each approximately 70 years old will become due for replacement within the next 30 years.	Undertake condition assessment of oldest reservoir to ascertain best practicable option – refurbish or replace. If replace, increase reservoir storage capacity to improve supply resilience during flood hazards.	Programming of refurbishment or replacement of reservoirs will feature in the next review of the IS. In the meantime, $150k per reservoir (uninflated cost) has been allowed in Years 5, 10, 15 and 20
ISSUE: Response to demand		
Treatment plant design capacity has been increased to 6,600m^3/day. Average demand is 3,336 m^3/day. Peak demand is 4,320 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.
ISSUE: Levels of Service		
Colour, taste and odour are due to presence of residual iron and manganese in reticulation and	Regular flushing of dead end mains.	The additional costs of water treatment to improve the taste and

Description	Principal options for response	Implications
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 (completed)	odour characteristics of the supply are included in LTP budget forecasts.
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.
ISSUE: Public Health & Environment		
The Te Kuiti supply is 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, was completed 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 2051 to remove the risk of cross-contamination of the potable supply from household appliances. An accelerated programme of $437.5k has been budgeted for Year 1 funded from Central Government's Three Waters Reform Programme.	The potential risks to public health from pathogenic organisms in the raw water supply has been mitigated following completion of the current improvements to the Te Kuiti water treatment plant. Completion of the backflow prevention programme will provide a further level of public health risk prevention.
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 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.
ISSUE: Risk and Resilience Issues		
The supply relies on a single source that is currently under pressure during low flow 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, and the water supply intake is located downstream of an industrial zone and wastewater pumping station.	Raw water storage, involving harvesting of winter stream flows, has been identified as a potential means of mitigating these risks, but at an estimated cost of $30-40M is likely to be cost prohibitive. Alternatively, a supplementary supply from groundwater resource is a possibility. If current groundwater investigations are successful, the raw water storage volume requirement may be reduced or substituted	Construction of a large raw water storage reservoir has been provisionally programmed for 2040-42 at an estimated budget of $39M. Groundwater supply investigations have been programmed over three years. Stage 1 was completed in 2018/19. Stage 2, involving an investigation/production bore, is due for completion in 2020/21 at a budget estimate of $153.4k. Assuming the Stage 2 investigations are successful, completion of the

Description	Principal options for response	Implications
	by an alternative groundwater supply. The next step is to investigate the viability of a groundwater source to become an alternative source (2020/21) or consider alternative supply options. Construction of a new treated water reservoir to improve storage capacity across the network.	bore well head, electrics and pipework has been programmed for 2021/22 at a cost of $150k. Wellfield development and consenting, assuming successful investigation work at Stage 2, has been provided in years 2 ($517k) and 3 ($531k) respectively. Additional to that will be a new water treatment plant, designed for the bore water quality only, located above the predicted 100-year flood level. A very preliminary cost estimate for that of $131k in Year 12, followed by $3.9M in Year 13 (after allowing for inflation), has been allowed assuming minimum treatment required for the bore water.
The four water storage reservoirs are critical assets, each approximately 70-years old. Resilience of these reservoirs to a major seismic event is key to the security of the treated water supply.	Refer to Asset Renewal or Replacements section above.	Refer to Asset Renewal section above.

5.2.2 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 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 8.5km of various diameters and is predominantly asbestos cement. Water is pumped to a new 450m3 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:

Table 11:Piopio Water Supply Infrastructure Issues

Description	Principal options for response	Implications
ISSUE: 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.	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. Average renewal forecast aggregated into 3-yearly instalments.	Regular annual mains replacement programme continued over the next 30 years comprising an average of $116k every three years. In addition, provision has been made for minor treatment plant renewals and mechanical and electrical renewals totalling $34.6k per year. A reduced 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.
SCADA and electrical assets are due for renewal at least once every 15 years.	Programmed renewal of electrical and control equipment on 15-year cycle.	SCADA and electrical assets replacement programmed for renewal on 15-year cycle of the IS (included in renewals budgets).
ISSUE: Response to Demand		
The treatment plant has a design capacity of 600m^3/d. Current demand is approx. 309m^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: Levels of Service		
Rising main to reservoir also feeds town reticulation causing pressure fluctuations in lower lying areas and is a cause of pipe failure. Levels of service for colour, taste and odour are acceptable to most residents.	Construction of a dedicated rising main from treatment plant to town reservoir is scheduled for 2025/26.	A dedicated rising main will address water pressure spikes and help protect ageing pipes from premature failure. Budget provision of $337k included in Year 5 (2025/26).
ISSUE: Public Health & Environment		
The absence of back-flow preventers is a potential health risk for Piopio water supply consumers. It exposes water consumers to the risk of cross contamination between the water supply and "greywater" from automatic household appliances.	Provision of back-flow prevention devices scheduled as an annual programme.	Provision of a back-flow prevention programme, at an average of $6k per year for the next 12 years.
Effects of take on Kurutahi Stream are allowed for in resource consent.	Resource consent expires in 2023.	Renewal of the resource consent is fundamental to the legal right to take water for Piopio community supply. Budget

Description	Principal options for response	Implications
		provision allowed for in 2021/22 ($20k) and 2022/23 ($31k).
ISSUE: Risk and Resilience Issues		
In Piopio, asbestos cement reticulation are at risk of damage from a major seismic event	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.	Provision for increased resilience of the Piopio water supply reticulation has been built into LTP replacement programmes.

5.2.3 MANIAITI/BENNEYDALE WATER SUPPLY SCHEME

The Maniaiti/Benneydale water supply treatment plant is located to the east of Maniaiti/Benneydale township. The whole system was replaced in 2008, including an upgrade of the intake and treatment plant and the addition of automation. Maniaiti/Benneydale now has a modern water supply system which meets the requirements of the Drinking Water Standards for New Zealand 2005 (Revised 2018).

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 5.7km 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:

Table 12:Maniaiti/Benneydale Water Supply Infrastructure Issues

Description	Principal options for response	Implications
ISSUE: Asset renewal and replacement		
The treatment plant and reticulation has been renewed and upgraded since 2008.	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.
SCADA and electrical assets due for renewal at least once every 15 years.	Programmed renewal of electrical and control equipment on 15 year cycle.	SCADA and electrical assets replacements included in renewals budgets.

Description	Principal options for response	Implications
ISSUE: Response to Demand		
The water treatment plant has a design capacity of 140m^3/day. The recent average demand was 120 m^3/day. Peak demand was 245 m^3/day. Recent investigations have located and repaired a number of leaks, reducing the short term average demand to 50 m^3/day. Consent limit is 360m^3 per day split equally between the bore and surface takes. The long term population projection for Maniaiti/Benneydale is for decline.	Monitoring of actual demand on the Maniaiti/Benneydale 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.	The close match between current peak demand and the surface water consent limit reinforces need for efficient use of water.
ISSUE: 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 Maniaiti/Benneydale scheme.
ISSUE: 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. Surface take consent expires in 7 April 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 consents is fundamental to the legal right to take water for Maniaiti/Benneydale community supply. Budget provision has been made for $38k in Year 9 (2029/30).
ISSUE: Risk and Resilience Issues		
The Maniaiti/Benneydale water supply scheme has been upgraded since 2008. The issues regarding security of supply, health protection, reticulation condition i.e. loss of water and cross-contamination, have been addressed. The existing treatment plant includes a single UV disinfection unit. Operational failure of that unit would pose a reasonable significant public health risk to the Maniaiti/Benneydale community, requiring boil water protection before the supply was safe for drinking purposes.	Maintain monitoring and routine maintenance and inspections of assets. Strengthening of the old concrete reservoir. Installation of a second UV unit would provide operational protection to ensure continuity of safe water supply delivery.	Seismic strengthening of the old concrete reservoir has been scheduled for 2039/40 at an estimated cost of $394k. Provision has been made in Year 1 (2021/22) for alteration of the existing pipework at the Maniaiti/Benneydale water treatment plant to accommodate installation of a second UV unit. The budget estimate of $30k will be funded from Central Government's Three Waters Reform Programme.

5.2.4 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, sand filter and UV disinfection, 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, but has since been removed and substituted by three elevated storage tanks located above the treatment plant.

The reticulation comprises approximately 13km's of pipe work of various sizes and materials. The predominant pipe material in the urban area was originally asbestos cement pipe, most of which was laid in circa 1972. Most of this has been replaced over the last three – six years. There is also a MDPE (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 water supply scheme include:

Table 13:Mokau water supply infrastructure issues

Description	Principal options for response	Implications
ISSUE: 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 targeted maintenance treatments within the next 10 years due to its deteriorating structural condition. New SCADA and electrical assets due for renewal at least once every 15 years.	Replacement of rider mains has been scheduled. Programmed renewal of electrical and control equipment on 15-year cycle.	Replacement of the Awakino water main has been included in Year 5 (2025/26). Completion of the rider main renewals programme has been included in Year 1 (2021/22) at a cost of $62k, funded from the Three Waters Reform Programme. Provision for minor water treatment plant renewals of $20k on average per year from Year 4 (following completion of the optimisation project) SCADA and electrical assets replacements are included in renewals budgets. An average of $6k per year has been allowed over the 30-year term of this strategy.
ISSUE: Response to demand		
Treatment plant design capacity is 400m^3/day. Current average demand is 121 m^3/day. Peak demand is 350m^3/day. The consented take is up to 1,000m^3/day. The long term population projection for Mokau is for decline.	Current supply capacity meets and exceeds average and peak demand, with future population projected to decline in the long term. The 11,000m^3 lower raw water storage pond allows variations between average and peak demand to be buffered. Principal option is to routinely monitor the supply/demand balance to ensure early detection and intervention if that ratio changes. Demand management measures would be the first response over additional capital investment in supply capacity.	No immediate implications. Previous investment in water storage in 2014 will endure over the term of this strategy.

Description	Principal options for response	Implications
ISSUE: Levels of service		
Levels of service for colour, taste and odour are acceptable to most residents. Distance factor negatively impacts on response times and servicing costs.	Continuation of routine monitoring and maintenance plan. Implementation of remote monitoring technology, namely SCADA, would improve control over storage, treatment and supply enhance responsiveness, and reduce servicing costs.	Regular monitoring and routine preventative maintenance is key to the on-going success of the Mokau scheme. Investigation of proposed SCADA for improved management of the scheme has been scheduled for 2020/21 with installation scheduled for 2021/22.
ISSUE: 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.	Back-flow preventers will remove the risk of cross contamination between the water supply and "greywater" from automatic household appliances. An annual installation programme at an average of $9k per year over the 2021-51 planning period has been included. Stage 2 of the optimisation of Mokau water treatment plant has been scheduled for 2021/22 at a budget of $169k, funded from the Three Waters Reform programme. This follows stage 1 of the optimisation programme in 2020/21 of $106k. Renewal of the 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 $28k.
ISSUE: 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 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 $394k.

5.2.5 WAITOMO VILLAGE WATER SUPPLY

Refer to Clause 5.1.5 above.

5.3 WDC STORMWATER DRAINAGE

WDC's stormwater (SW) infrastructure comprises two components. The primary component consists of 44km of SW 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 (22) Te Kuiti SW discharges are consented through a district wide comprehensive consent. The consent expires 1 July 2024.

Table 14:Urban Stormwater Assets

Asset Type	Quantity
Manholes	521
Pump stations	Nil
Sumps	601
Stormwater piped reticulation	44,365 m
Open channels	12,461 m
Outlet structures	22

SW infrastructure issues include:

Table 15:WDC stormwater infrastructure issues

Description	Principal options for response	Implications
ISSUE: 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. Use findings from criticality assessment and network inspection programme to prioritise repairs/replacement programmes and optimise pipe replacement sizes taking account of catchment management plans.	Continued stormwater renewal and rehabilitation programme at an average of $151k per year. Inspection programme at an average of $34k per year over Years 1 – 10.
ISSUE: Response to demand		
The current network provides a modest response to SW drainage requirements, and principally in the Te Kuiti urban area. The nominal design capacity of the piped SW network is sized for a 1 in 2 year rainfall event. Parts of the piped network do not even achieve that. Roofwater drainage in the Te Kuiti residential area is required to discharge to on-site ground soakage or tank storage. If that was to change because of localised flooding, or if more intensive, residential land development was allowed to occur in future, greater pressure would be imposed on the existing limited SW drainage capacity, particularly the downstream sections of the network. The long term population and land subdivision projection for the district is for decline.	The current level of service for the SW activity is designed for a modest rainfall event occurring on average, once every two years. Future planning of SW services is required to understand and prioritise future demand, available capacity, and impact on required service levels. Preparation of catchment management plans, initially for Te Kuiti, are required to develop a better understanding of catchment flow rates and primary and secondary flow paths.	Any future increase in demand will be met by maintaining current LoS. While population growth is projected to decline in the medium term, climate change might increase the frequency and intensity of a 1 in 2 year rainstorm event.
ISSUE: 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 stormwater flooding of property, responsiveness to customer services during flood events and managing the adverse effects of SW on the quality of the receiving water.	Council's preferred option is to maintain current levels of service, except for potential requirement for higher environmental standards post the new resource consent. It will achieve that by ensuring that secondary flow paths are identified and protected (through catchment management plans), and that the existing SW infrastructure performs to capacity, by continuation of CCTV inspection and repair programmes to identify the condition of the existing network and to prioritise work programmes to restore capacity of damaged or blocked sections.	Budget provision ($34k per year average) for annual inspection and clearing/repair of blocked or damaged SW pipes. Budget provision of $50k - $52k pa in Years 1 and 2 for preparation of catchment management plans (see Public Health and Environment, below)

Description	Principal options for response	Implications
	Alternative options involving increased drainage capacity would entail significant investment due to extensive lengths of pipe replacements at increased pipe diameters.	
ISSUE: 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 result in 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 environment are controlled via resource consents. The application to renew the current SW discharge consent will be made by 1 January 2024	The current SW discharge consent expires on 1 July 2024 – i.e. at the beginning of Year 4 of the 2021-31 LTP planning period. A budget of $37k has been allowed in Year 3 (2023/24) for the renewal application. Increased sampling of the stormwater discharge has been provided from Year 1 (2021/22) at an average of $23k per year, increasing to an average of $37k per year from Year 5 in anticipation of additional consent monitoring and reporting requirements. Renewal of the resource consent is fundamental to the legal right to discharge urban SW to the environment. A budget of $102k spread over Years 1 and 2 has been provided to study the impact of the SW discharges on stream ecology of the receiving waters, in addition to the preparation of catchment management plans. Annual sampling and monitoring budget at an average of $23k per year (currently $17k per year) will be required from Year 1, increasing to an average of $39k per year from Year 5. Provision has been made for pre-treatment of stormwater prior to discharge, at an estimated cost of $91k per year in Years 5 (2025/26) and 6 (2026/27).
ISSUE: 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.	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	Failure to complete catchment management plans will increase the risk of flooding and damage to property.

Description	Principal options for response	Implications
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.	joints, sized for future demand projections. Extension of drainage network to unserviced urban areas to mitigate the risk of SW inflow to sewerage network.	

5.4 TOWNSHIPS CURRENTLY NOT SERVICED WITH WATER SERVICES

A high level review of demand for additional water services across the district has been planned for Year 25 (2046/47). This review will be coordinated with the then Water and Sanitary Services Assessment, as required from time to time under section 125 of the Local Government Act 2002. The budget estimate is $30,000.

For example, 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.

The preliminary estimated total cost of the project is in the order of $20 – 25M. No provision has been made in the Infrastructure Strategy for this specific project proposal, pending completion of the district wide review of demand for additional water services, scheduled for 2046/47.

The findings from the assessment will be used to inform the Infrastructure Strategy review in 2047.

5.5 ROADS AND FOOTPATHS

5.5.1 ROADING ASSETS

WDC's road and footpath infrastructure assets comprise 1,006km of roads of which approximately 459 km are sealed (46%) and 547 are unsealed (54%). In addition, there are 159 bridges including large culvert structures, and 48.7 km of footpaths.

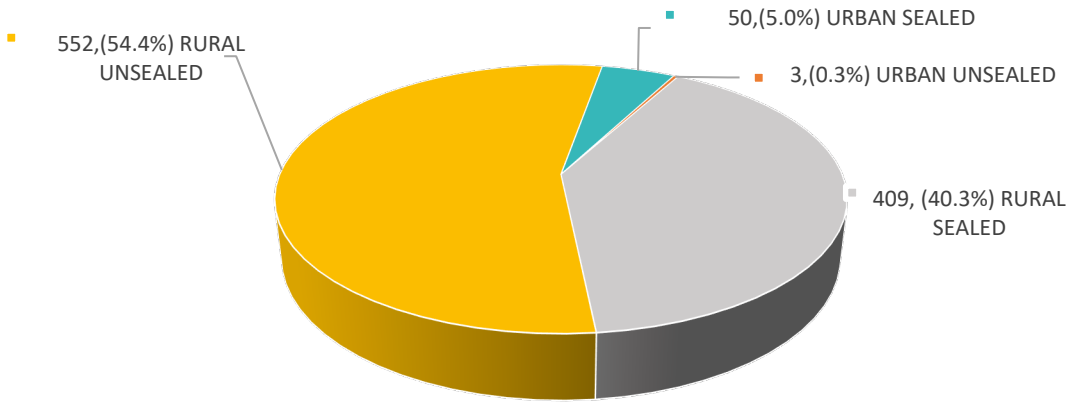


Figure 3: Road Length by Type -Km (Total length 1,014km)

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

For levels of service and NZTA funding purposes, the roading network is divided into six categories (known as the One Network Roading Classification (ONRC)), on a national basis, ranging from National to Access. Each category is primarily determined from traffic volumes, with over 73% of the WDC network defined by the lowest category – Access (urban roads less than 1,000 vpd, rural roads less than 200 vpd) and Low Volume Access – a subset of the Access category (urban roads less than 200 vpd, rural roads less than 50 vpd). There are no WDC roads classified in the top three categories (Regional, Arterial and National)

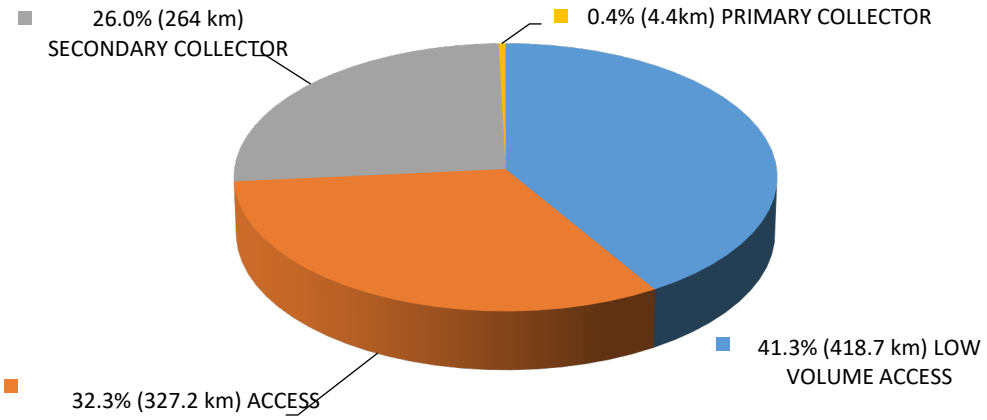


Figure 4: One Network Roading Classification (ONRC)- Total length 1014.4km

At a national level, the intention is that customer levels of service will be provided to a consistent level across each classification, irrespective of location in New Zealand. It follows that the lower road classifications will not require the same level of service as higher rated classifications. There is a potential funding implication attaching to this – levels of service expectations by local residents and ratepayers may be higher than those defined under ONRC.

5.5.2 BRIDGE ASSETS

WDC's bridge stock comprises the critical roading assets. While the bridge asset stock is ageing, and that is a factor in the equation, it is not the only determining factor for bridge replacement programming.

The previous 30 year bridge replacement plan was based on remaining useful life determined by a predetermined 'expected' service life for a particular class of structure This approach makes no allowance for actual deterioration rates of a structure, the level of maintenance intervention and changes to service level demands determine when a structure needs to be renewed. With appropriate maintenance intervention, it is practicable to obtain 20-25 years of extra useful life through measures such as invert lining of Armco culverts.

The change in total costs for the next 30 years reflects the state of the assets - Paraheka Road Suspension bridge is the highest risk structure due to its deterioration in condition and potential overload. Planning has therefore been made for a replacement structure or major upgrade within the next 10 - 12 years.

There are two other structures on high load demand routes where demand will increase in time from the primary industries serviced by these two structures (Bridge # 7 on Te Anga Road and Bridge # 32 on Mangarino Road). These bridges have been programmed for replacement in Years 15 and 27 respectively. While not necessary a condition based issue, they pose a service level issue. Business case review will determine if widening or duplication or full replacement would be the best long term option. In the meantime, they have been included on the 30-year programme for replacement.

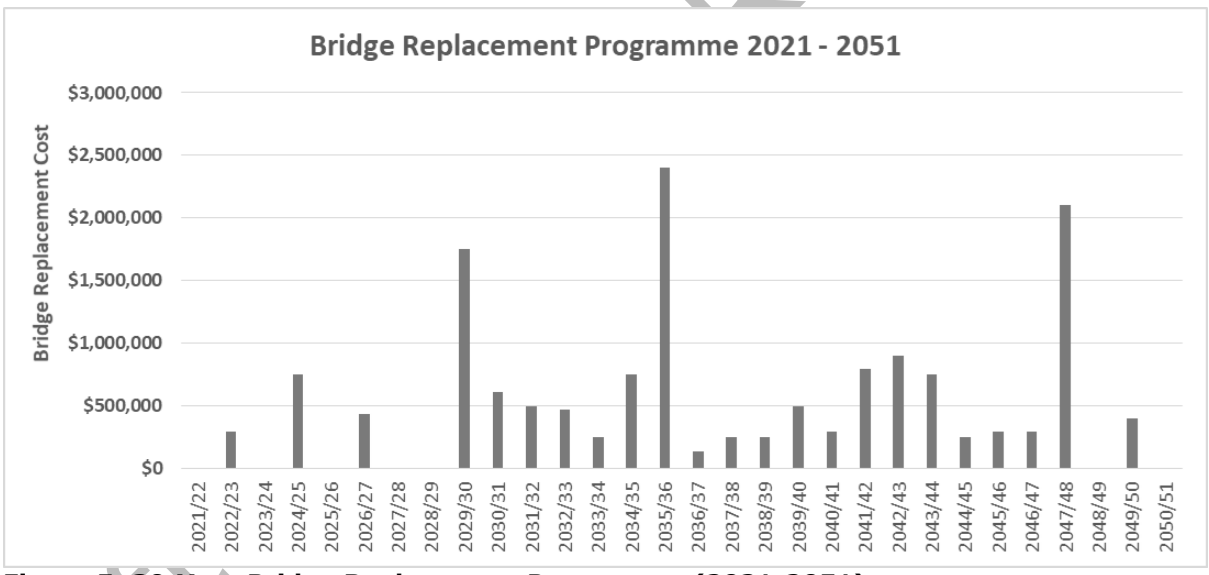


Figure 5: 30-Year Bridge Replacement Programme (2021-2051)

5.5.3 FOOTPATH ASSETS

WDC footpaths are confined to the urban areas, predominantly Te Kuiti. They are characterised by a high proportion of narrow widths – 36% less than 1.0m wide and 45% less than 1.2m (2018 data). The NZTA recommended width for footpaths on local roads is 1.5 m. On shared footpaths and high pedestrian volume areas (e.g. CBD, schools etc.), greater width is recommended.

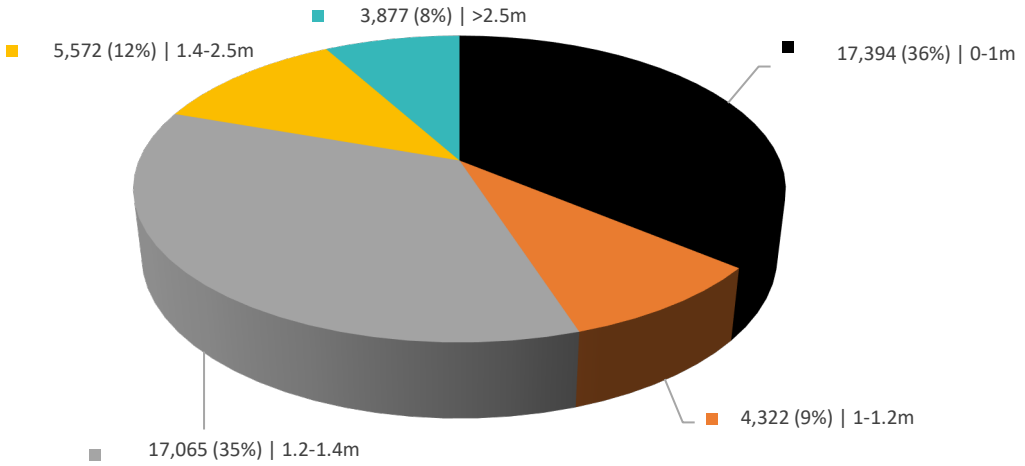


Figure 6: Footpath Lengths by Widths ((Total length 48,230 m)

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.

Road and footpath infrastructure issues include:

Table 16: WDC Roads and Footpath Infrastructure Issues

Description	Principal options for response	Implications
ISSUE: Asset Renewal or Replacements		
Bridge stock is in generally good condition. There are 26 bridges identified for renewal in next 30 year period with a replacement value of $15.5M. Six of those bridges fall in the 2021 – 2031 period (value $3.85M). Seven bridges have weight restrictions prohibiting their use	Monitoring of bridge condition and programme renewal of structural components.	Bridges are a critical roading asset. Regular inspections, maintenance and structural repair/renewal is vital to protecting public safety.

Description	Principal options for response	Implications
by 45/46 tonne vehicles that are now permitted "as of right" use over the network. A further seven bridges are unsuitable for HPMV vehicles resulting in parts of the District being inaccessible to these vehicles.	Determining what is required to upgrade bridge structures to HPMV standards. A priority list will be developed and one structure per year analysed.	
Bridge replacement costs for the next 30 years reflect the condition and age of the assets.		Budget allowance of an additional $25,000 per year for a full service analysis over Years 1 to 10 from the Network and Asset Management category. Resulting capital works will be programmed from year 4 onwards.
Additional rehabilitation and resurfacing required to achieve sustainable asset condition.	Paraheka Road Suspension bridge is the highest risk structure due to deterioration, and potential overload. A replacement or major upgrade has been scheduled for Year 9. Te Anga Road and Mangarino Road bridges are on high load demand routes where demand will increase in time from the primary industries serviced by these two bridge structures. Replacement has been programmed for Years 15 and 27 respectively. While not necessary a deterioration issue, they pose a service level issue. Business case review will determine if widening or duplication or full replacement will be the best long term option.	Bridge replacement programme totaling $19.2M over the next 30 years. Major bridge replacements include: Paraheka Road Suspension bridge replacement scheduled for Year 11 at a preliminary estimated cost of $2.3M. Te Anga Road Bridge replacement programmed for Year 15 at estimated cost of $3.1M. Mangarino Rd. Bridge replacement scheduled for Year 27 at budget of $2.7M
Pavement condition, surface condition and smooth travel are stable and compare well with national values.	On low traffic roads a combination of heavy maintenance and reseals might be more economic than a full rehabilitation treatment. The sealed roads carrying the lowest 10% traffic volume will be trialled for this option.	Reduced annual sealed pavement rehabilitations budget from $1.9M pa to $1.55M pa (uninflated figures), equating to approximately 2.8 km pa. Requires monitoring because of impacts of forestry harvesting. Those parts of the network impacted by forestry haulage can be expected to deteriorate at a greater rate than repair work, and levels of service could decline. Increasing road maintenance budget by 8% is expected to mitigate this.
Average annual resurfacing length of approximately 32 km required to maintain a current seal life of 12 years and avoid backlog occurring.	Maintain length of road resurfaced with seal and asphaltic concrete to an average of 32 km each year, consistent with a seal life of 12 years.	Road surfacings maintain water proofing and skid resistance. Reseals budget to increase from $1.4M per year to an average of $1.8M per year over 30 years.
ISSUE: 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 the 2021-31 LTP period. That together with the increasing incidence of 50MAX vehicles now accessing the network, suggests a consequential increased demand for expenditure on road	Planning and prioritising of road rehabilitation projects to ensure construction works are aligned with demand. In parallel, sealed and unsealed road maintenance activities will be increased to offset increased wear and tear from logging trucks. Unsealed road maintenance will include increased frequency of	Additional demand in the form of increased numbers of HCV's on specific forestry and mineral extraction 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.

Description	Principal options for response	Implications
maintenance and strengthening/rehabilitation programmes. The 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 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 is expected to increase, on selected roads, namely Tawarau Road and part of Ngapaenga Road.	metalling for roads with increased logging traffic. 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.	Sealed and unsealed road maintenance budgets increased by 8%.
ISSUE: Levels of Service		
Levels of service include road safety, bridge/pavement capacity, reliability and accessibility, responsiveness and smoothness of ride. Approximately 270 km of 547 km 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. Approximately 70km of this 270km of unsealed roads is less than 3.0m wide. These are all Access (low volume) roads. There are approximately 46km of sealed, secondary collector roads less than 6.5m wide. 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 technical levels of service (TLOS).	A phased work programme is to be commissioned for assessing improved levels of service on heavy traffic routes involving increased sight distances and width of narrow unsealed roads to a minimum carriageway of 5.0m plus 0.75m shoulders. Sealed roads to be a minimum of 6.5m wide comprising two traffic lanes, each 2.5 m wide, plus shoulders 750mm wide. Improvements to be completed to 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.	Increased carriageway width and corner geometry will increase levels of safety and resilience on those roads. Budget estimate of $185k pa over Years 1-3 inclusive has been provided for widening of narrow unsealed roads. Improved access for movement of primary sector goods to a level suitable for modern truck configurations, and ensuring 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.
ISSUE: Public Health and Environment		
Road maintenance and construction activities can potentially involve discharge of	Controlling roading operations to avoid and mitigate adverse effects	Resource consents will be required for activities that may

Description	Principal options for response	Implications
contaminated material to the natural environment. High incidence of traffic accidents involving excessive speed, loss of control and tail end collisions. Many of the local roads have a variety of road users such as tourists, heavy vehicles, school buses, young driver, cyclists, farm vehicles and residents, all with conflicting road use purposes and behaviours. Each of these users has different safety needs. The proportion of "Bend/Lost control" crashes occurring on secondary collector roads is high compared to other crash types. Five of the Waitomo District's urban areas are built along state-highways coincident with principal pedestrian routes: ○ Te Kuiti (SH3, SH30) ○ Piopio (SH3) ○ Mokau (SH3) ○ Waitomo Caves (SH37) ○ Maniaiti/Benneydale (SH30) Pedestrian danger zones are present due to the high traffic volumes, heavy vehicles and speeding traffic that travel through these areas	including dust and sediment discharge to water ways. Coordinate investigations, response and promotion of road safety through formation of a multi-agency, action group. A targeted programme of safety improvements at conflict points will be developed and funded as a part of the Low Cost, Low Risk work category. WDC's recently developed town centre concept plans involve improvements to pedestrian facilities to improve pedestrian access to destinations alongside the highway. It is proposed to progressively implement these improvements as part of the footpath renewal and upgrade programme.	have an adverse effect(s) on the receiving environment(s). A programme of signage and guardrail improvements on selected routes is proposed. Investment of an additional $75,000 capex over the next three years. The footpath renewal and upgrade programme includes provision of new footpaths where justified and improving the width of existing paths.
ISSUE: 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. Increasing weather extremes due to climate change are expected to increase maintenance costs and disruptions to the road network. Climate change is predicted to lead to a rise in sea levels that will affect several coastal roads in the District. By 2050 parts of the roads listed below will be below sea level. It will be necessary to either raise the level of these roads or re-route onto higher ground in order to preserve road access to the affected communities. ○ Kawhia Harbour Rd ○ Marokopa Rd ○ Soundy Rd ○ Te Mahoe Rd Critical assets include bridges and large culverts	Bridge inspections are completed every two years and structural assessments completed every 5 years. Alternative routes are maintained for collector roads. Years 1 – 3: WDC will continue its programme of culvert improvements to reduce the risk of road closures during extreme rainfall and complete structural maintenance on retaining walls to reduce risk of premature failure. It will develop a fully costed programme of works to raise the level of roads at risk of inundation due to sea level rise for implementation in future 10YP.	Current risk mitigation will be maintained through the strategy period. Greater community ownership of appropriate road safety behaviours. $1.3M preliminary budget allowed in Year 15 for capital investment on increased resilience of coastal roads to rising sea level under climate change modelling.

Description	Principal options for response	Implications
Failure of bluff areas causing slips and dropouts could isolate rural communities.		

6 SECTION| INFRASTRUCTURE INVESTMENT PROGRAMME - THE MOST LIKELY SCENARIO

6.1 TOTAL EXPENDITURE

In addressing the issues identified in the previous sections of this strategy, the Waitomo District Council expects to spend $331.9 million on new or replacement infrastructure between 2021 and 2051. Over the same period, $671.8 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.

Table 17 below shows that expenditure across the four infrastructure activity areas will continue to be dominated by operational and maintenance requirements (operating costs, labour, depreciation, materials and maintenance) between 2021 and 2051.

Infrastructure Activity	Capital Expenditure (new and replacements) Inflated figures	Operational Expenditure Inflated figures	Total Inflated figures
	000's	**000's**	**000's**
Waste Water	$19,014	$116,654	**$135,668**
Water Supply	$62,872	$113,610	**$176,482**
Stormwater Drainage	$4,933	$16,210	**$21,143**
Roads and Footpaths	$245,050	$425,319	**$670,369**
TOTAL	**$331,869**	**$671,793**	**$1,003,662**

Table 17: Total Infrastructure Expenditure 2021-51

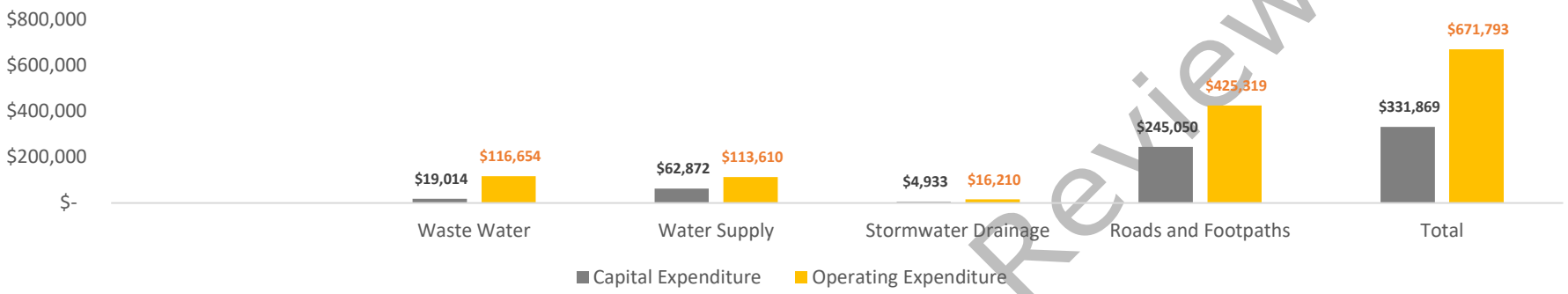


Figure 7: Total Capex and Opex 2021 – 51 by Infrastructure Category

Table 18 and Figure 8 below show the indicative estimates of total operational and capital expenditure up to 2051, 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.

Total Operational and Capital Expenditure	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Wastewater	4,042	3,597	3,726	4,008	4,675	4,084	4,165	4,487	4,297	4,487	4,993	4,938	4,428	4,461
Water Supply	4,760	3,976	4,180	3,916	4,580	4,536	4,306	4,222	4,520	4,572	5,277	9,840	7,045	4,421
Stormwater	582	603	623	600	745	751	693	745	738	756	715	716	715	716
Roads & Footpaths	17,219	18,337	18,089	19,038	19,649	20,331	20,935	21,612	22,382	23,034	24,404	22,929	23,334	23,282
Total	**26,603**	**26,513**	**26,618**	**27,562**	**29,649**	**29,702**	**30,099**	**31,066**	**31,937**	**32,849**	**35,389**	**38,423**	**35,522**	**32,880**

Table 18: Total Infrastructure Opex & Capex Expenditure 2021-51

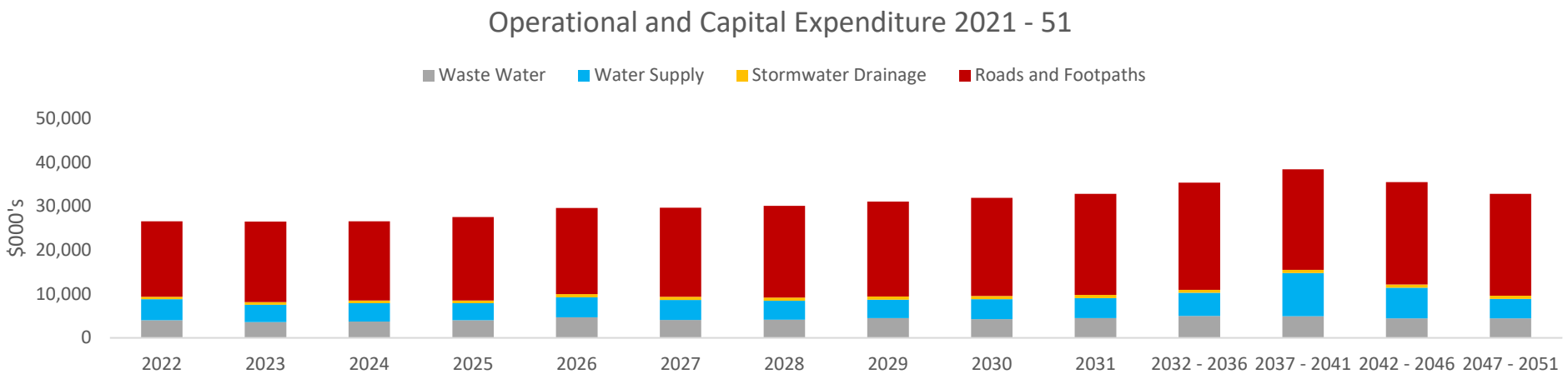


Figure 8: Total Operating and Capital Expenditure 2021 – 51

6.2 OPERATING EXPENDITURE FORECASTS

Operating Expenditure Forecasts	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Wastewater	3,159	3,258	3,309	3,558	3,679	3,752	3,817	3,924	3,963	4,011	4,011	4,011	4,011	4,011
Water Supply	3,152	3,053	3,160	3,496	3,538	3,641	3,738	3,788	3,877	3,913	3,913	3,913	3,913	3,913
Stormwater	457	473	453	464	515	514	544	592	579	592	551	552	551	552
Roads & Footpaths	10,969	11,431	11,797	12,140	12,549	13,029	13,418	13,875	14,417	14,843	14,843	14,843	14,843	14,843
Total	**17,737**	**18,215**	**18,719**	**19,658**	**20,281**	**20,936**	**21,517**	**22,179**	**22,836**	**23,359**	**23,318**	**23,319**	**23,318**	**23,319**

Table 19 – Infrastructure Operating Expenditure Forecasts 2021 – 51

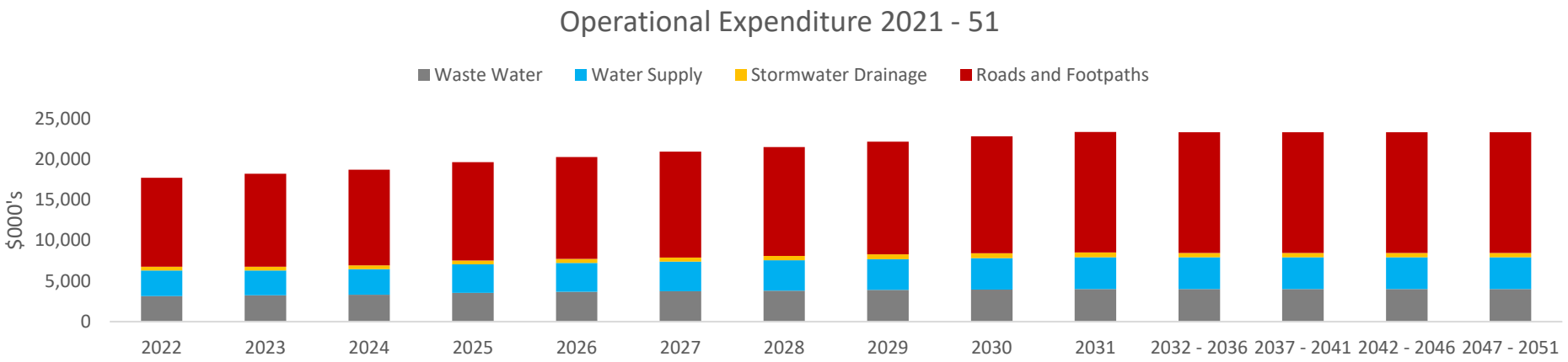


Figure 9: Operating Expenditure 2021 - 51

6.3 CAPITAL EXPENDITURE FORECASTS

Capital Expenditure Forecasts	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Wastewater	883	339	417	450	997	332	348	563	334	476	982	927	417	449
Water Supply	1,609	924	1,020	420	1,042	895	568	434	644	659	1,364	5,927	3,132	508
Stormwater	125	129	170	136	230	237	149	154	159	164	164	164	164	164
Roads & Footpaths	6,250	6,906	6,291	6,898	7,100	7,302	7,516	7,737	7,964	8,192	9,561	8,087	8,492	8,440
Total	**8,867**	**8,298**	**7,898**	**7,904**	**9,369**	**8,766**	**8,581**	**8,888**	**9,101**	**9,491**	**12,071**	**15,105**	**12,205**	**9,561**

Table 20 – Infrastructure Capital Expenditure (Renewals and Improvements) Forecasts 2021- 51

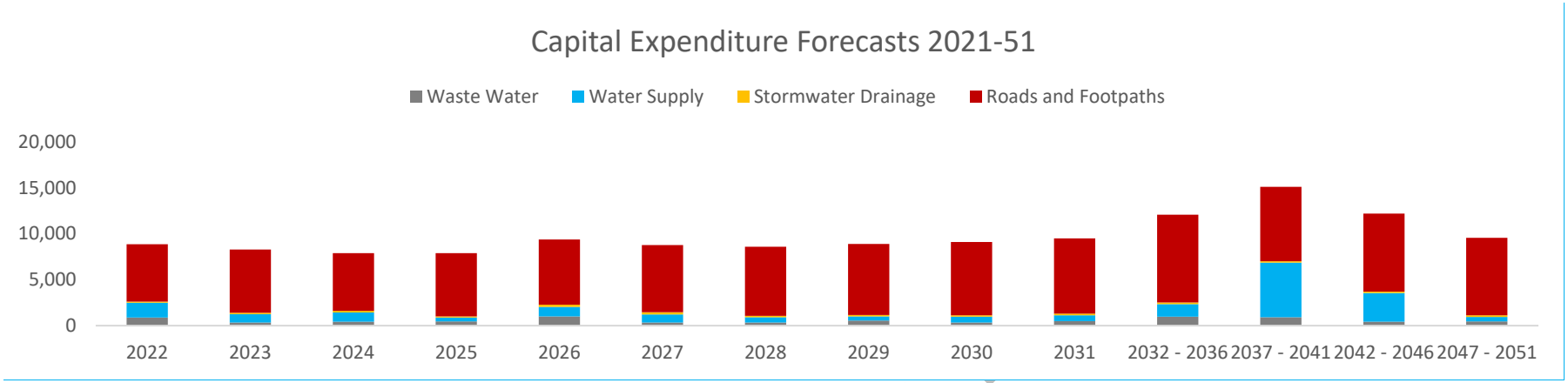


Figure 10: Capital Expenditure Forecasts 2021-51

The forecast capital expenditure profile, as indicated by Table 20 above, is relatively static over the life of the Infrastructure Strategy with an emphasis on asset renewal. This is further demonstrated in 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.

6.3.1 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.

Additional resilience of the Piopio wastewater treatment plant has also been allowed in 2060 at a preliminary estimated cost of $2M. The project involves relocating the WWTP to a more elevated site to protect against inundation during a 100-year rainstorm event.

Wastewater	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Improvements LOS	480	0	0	0	0	0	0	0	0	0	52	0	0	0
Renewals	403	339	417	450	997	332	348	563	334	476	930	927	417	449
Total	**883**	**339**	**417**	**450**	**997**	**332**	**348**	**563**	**334**	**476**	**982**	**927**	**417**	**449**

Table 21: Wastewater Capital Expenditure 2021– 51

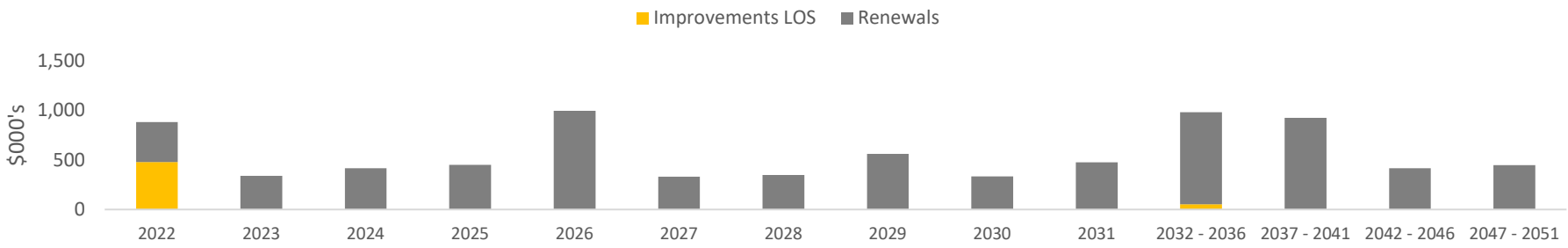


Figure 11: Wastewater Capital Expenditure 2021 - 51

6.3.2 WATER SUPPLY CAPEX

The water supply improvements are dominated by the proposed construction of raw storage reservoir for the Te Kuiti scheme, at a preliminary cost 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 during 2020/21, ostensibly groundwater. A separate water treatment plant has also been allowed in Years 12 and 13 as part of the alternative water source development to improve resilience of the supply during a 1 in 100 year rainstorm event.

Water Supply	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Improvements LOS	1,015	574	589	95	399	63	65	68	70	72	882	5,314	2,690	66
Renewals	594	349	431	325	643	831	503	366	573	587	482	613	443	443
Total	**1,609**	**923**	**1,020**	**420**	**1,042**	**894**	**568**	**434**	**643**	**659**	**1,364**	**5,927**	**3,133**	**509**

Table 22: WDC Water Supply Capital Expenditure 2021 – 2051

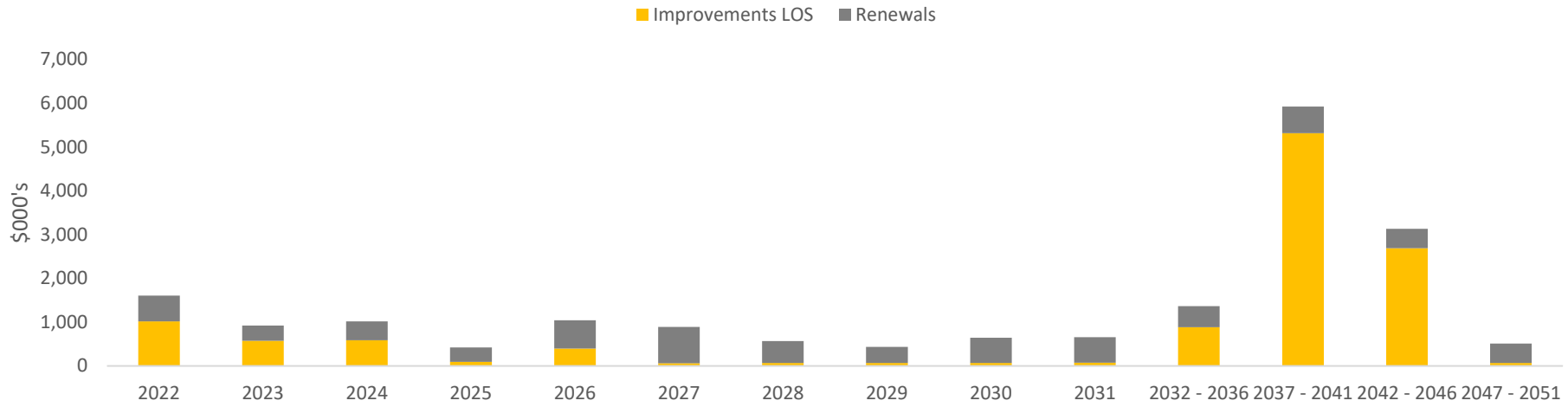


Figure 12: Water Supply Capital Expenditure

6.3.3 STORMWATER CAPEX

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

Stormwater	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Improvements LOS	0	0	0	0	90	92	0	0	0	0	0	0	0	0
Renewals	125	129	170	136	140	144	149	154	159	164	164	164	164	164
Total	**125**	**129**	**170**	**136**	**230**	**236**	**149**	**154**	**159**	**164**	**164**	**164**	**164**	**164**

Table 23: WDC Stormwater Capital Expenditure 2021 – 51

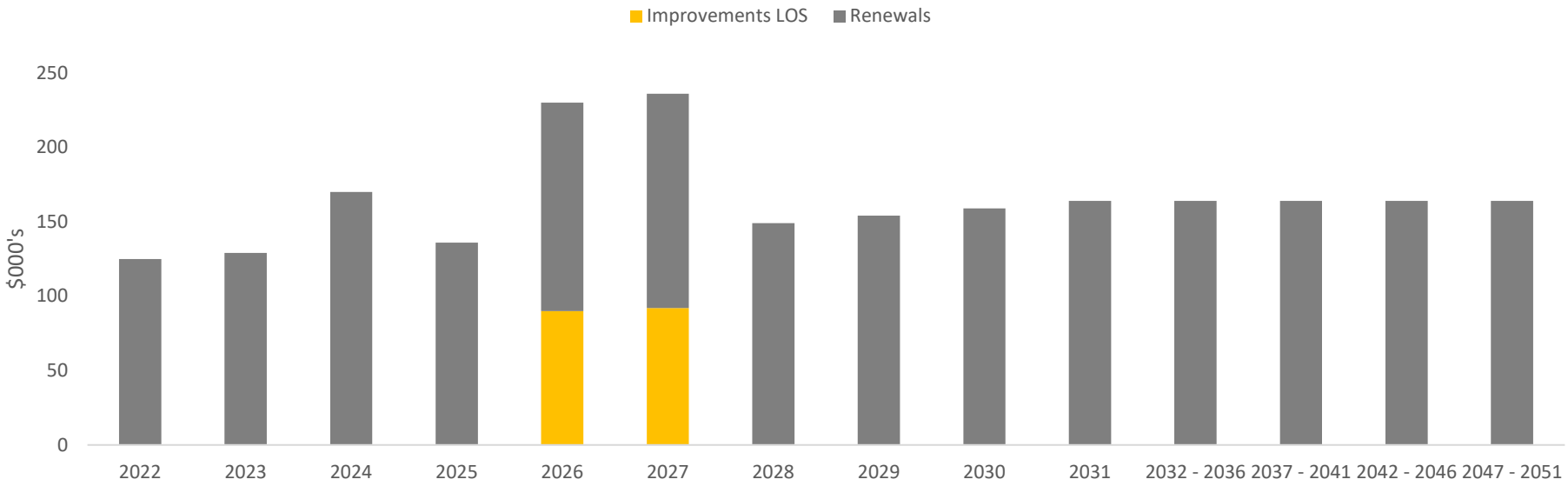


Figure 13: Stormwater Capital Expenditure 2021 - 51

6.3.4 ROADS AND FOOTPATHS CAPEX

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

Roads and Footpaths	Year 1 $000's	Year 2 $000's	Year 3 $000's	Year 4 $000's	Year 5 $000's	Year 6 $000's	Year 7 $000's	Year 8 $000's	Year 9 $000's	Year 10 $000's	Years 11 to 15 Average $000's	Years 16 to 20 Average $000's	Years 21 to 25 Average $000's	Years 26 to 30 Average $000's
Improvements LOS	299	309	318	327	336	346	356	367	377	388	648	388	388	388
Renewals	5,951	6,598	5,974	6,571	6,764	6,956	7,160	7,371	7,587	7,804	8,913	7,698	8,103	8,051
Total	**6,250**	**6,907**	**6,292**	**6,898**	**7,100**	**7,302**	**7,516**	**7,738**	**7,964**	**8,192**	**9,561**	**8,086**	**8,491**	**8,439**

Table 24: Roads and Footpaths Capital Expenditure 2021 - 51

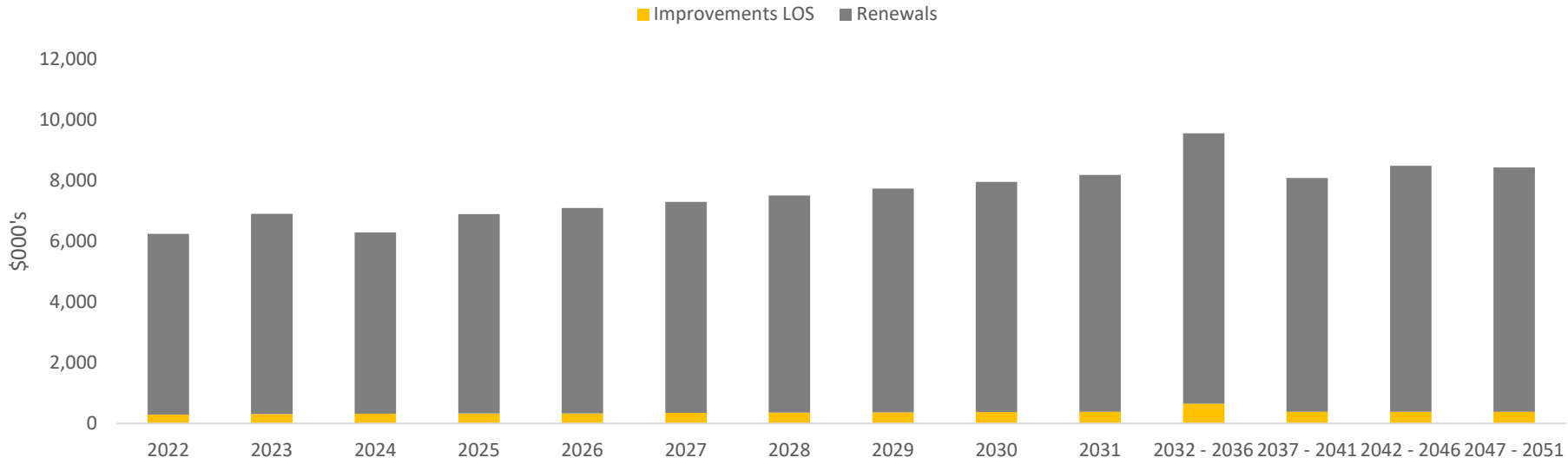


Figure 14: Roads and footpaths capital expenditure 2021 - 51

7 SECTION |INFRASTRUCTURE STRATEGY – SPECIFIC ASSUMPTIONS

7.1 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

Table 25 – Data Confidence Grades

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

Activity	Confidence Grade				
	Asset Type	Physical properties	Categorisation	Age	Condition
Wastewater	B	B-	B	B	C+
Water Supply	B	B-	B	B	C+
Urban Stormwater Drainage	B	C+	B	B	B
Roads and Footpaths	A	A	A	B	A-

Table 26 – Data Confidence Assessment

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 ratings from that earlier assumed, adjustments are made to financial forecasts through the three-yearly review of the long term plan.

7.2 SPECIFIC ASSUMPTIONS

Whilst the 2021 - 31 Long Term Plan provides for global planning assumptions, there are a number of detailed assumptions specifically relevant to the Infrastructure Strategy which are detailed below.

Table 27 – Infrastructure Strategy Assumptions

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
Construction Costs No major changes relative to current cost structure.	Low - medium	It is possible that the price of some components will change relative to others, depending on demand following COVID-19 and the level of stimulus funding injected into the economy. 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, increasing from 73% to 75% from 1 July 2021	Low	Reduced subsidy would 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 2021-51 planning period	Low	The potential for a possible pathway forward for transfer of the Village water supply and wastewater 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.
Asset Lives Assumed lives for Council's assets will have minimum impact on financial estimates.	Pipe networks – Low to medium.	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

Assumption	Level of Uncertainty	Potential Effects of Uncertainty
	Roads & Footpaths - Low	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 strategy but there is still further work to be undertaken to determine the desired level of resilience and the further asset improvements required 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 – Medium.	Levels of service increases due to increased regulatory requirements introduced by the new Water Services Regulator, Taumata Arowai, for drinking water and waste water discharges have not been accommodated in the strategy. Uncertainty regarding new levels of service in future resource consents is low for WDC's wastewater schemes because of the recent consent renewal processes.
	Roading assets – medium.	NZTA's current nation-wide move towards a common roading classification (One Network Roading Classification – ONRC), 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.