

SECTION 5: Infrastructure strategy | Rautaki hangarau

Executive summary

Waikato Regional Council's vision is:

The mighty Waikato: Caring for our place, empowering our people.

Waikato mārohirohi: Manaaki whenua, whakamana tāngata

The infrastructure we manage as a council exists to protect communities across the region from the effects of flooding after storm events and the future impacts of climate change.

Our flood protection schemes have been developed over the last 80 years and primarily consist of assets like stopbanks, pump stations, and floodgates. The assets span eight management zones and have a replacement value of \$643 million (December 2019 values). These assets are also supported by over 2400km of drains across the region.

This Infrastructure Strategy outlines council's approach to managing and maintaining these assets over the next 50 years. This work is crucial to support the council's purpose: *working together for a Waikato region that has a healthy environment, a strong economy and vibrant communities.*

Our approach to infrastructure management is guided by the following principles:

- decisions are aligned with council's 10-year strategy
- established infrastructure and levels of service are maintained
- the best possible data and information is collected and maintained
- replacement of existing infrastructure (renewals) is appropriate
- account is taken of climate and morphological change
- responding to the demands for new capital
- service sustainability.

Regarding the management of council's flood management and land drainage assets, the following issues have been identified:

- economic conditions and affordability
- land use change
- climate change
- risk of natural disasters, and residual risk
- environmental and regulatory performance expectations
- business and knowledge capability.

The preferred approach for addressing these issues is presented here as well as the alternative strategies and actions that were considered.

The council's forecast expenditure, accounting for inflation, in relation to the management of flood management and land drainage assets over the next 50 years, is as follows:

- Capital expenditure: **\$1026.4 million**
 - \$813.1 million on renewals
 - \$213.3 million on new capital
- Operational expenditure: **\$2239 million**
 - Includes ongoing operating, maintenance and labour costs, and depreciation.
 - The total annual expenditure is shown below from 2021/22 to 2031/32. The average spend over subsequent five-year periods is shown between 2031 and 2071.

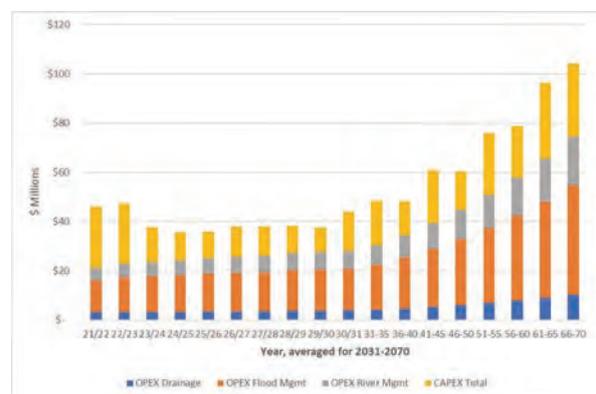


Figure 1: Total expenditure summary (forecast inflation included)

For the first 10 years, confirmed works programmes and project estimates are the dominant influence on the forecast expenditure associated with asset renewals. There are large amounts of capital expenditure in the first two years of the programme, relating to the \$23.8 million of central government funding which was recently awarded to ten flood management and catchment projects, as part of the available shovel ready project funding.

Beyond the 10-year horizon, the combination of current asset values (determined through asset revaluation⁽¹⁵⁾) and remaining asset lives are used to estimate longer term renewal forecasts out to 50 years in the future. There is an ongoing requirement to make decisions on renewals expenditure on a cyclical basis as part of the processes associated with council's LTP.

This strategy comes during a transitional phase in council's flood management and land drainage approach. This transitional period will be a challenging time as the council and affected communities explore the key issues and seek to achieve the right balance between conflicting priorities while still meeting legislative requirements. The council's

primary ambition is to support communities by providing the relevant information via the right communication channels as we look to develop our infrastructure approach.

This 50 Year Infrastructure Strategy refresh is to be adopted as part of council's 2021-2031 Long Term Plan and needs to also be considered in the context of the other council documents and processes it references, including our Financial Strategy, Regional Asset Management Plan, and zone/asset plans.

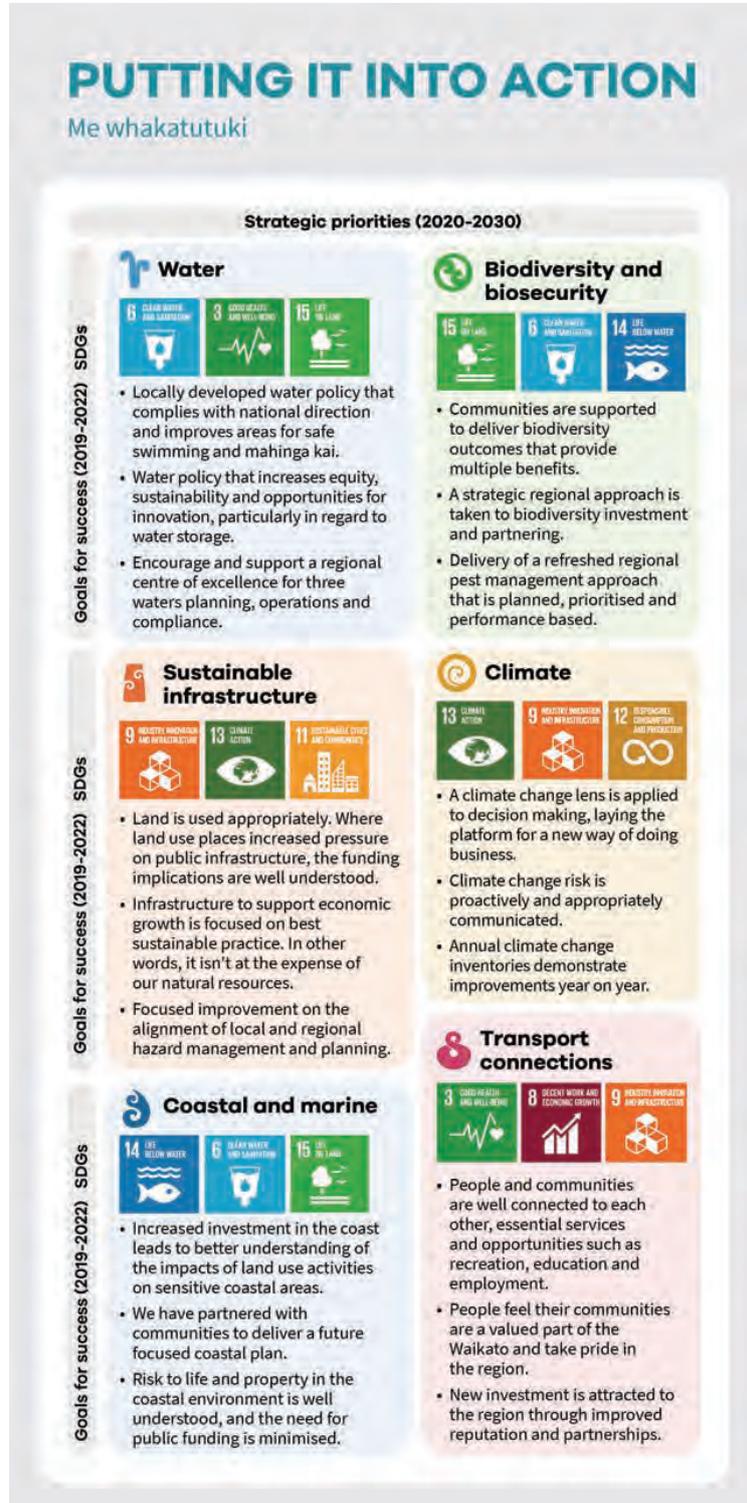


Figure 2 Strategic priorities of the council 2020-2030

1 Purpose of the Infrastructure Strategy

The purpose of the infrastructure strategy is to:

- identify significant infrastructure issues for the council over the next 50 years
- consider and assess potential management options
- identify a preferred way to manage these issues

- outline the associated service and financial implications of managing these issues
- help our communities understand the long term investment needs associated with our flood management assets over this timeframe.

The strategy sits within other internal and external legislation and policy frameworks, as shown in Figure 3.



Figure 3: Overview of the council's strategic framework for flood management and land drainage infrastructure

1.1 Scope

This strategy has been prepared as required under Local Government Act 101B 6 (a) (iv). It covers the following infrastructure assets:

- flood management schemes
- river management where there is a relationship to flood management assets
- land drainage schemes
- catchment management assets owned by the council.

In preparing this strategy non-asset solutions to address significant infrastructure issues have also been identified and discussed where appropriate. Within the renewals programme discussed in Section 5, several assets have been excluded, including:

- dams
- powerlines
- bridges
- monitoring sites
- resource consents
- plant and equipment (including the Tamahere barge)
- depots and offices
- fleet
- software.

2 Strategic context

2.1 Achievements since the 2018 strategy

This is the council's third updated infrastructure strategy and builds on the two previous iterations. Updates have been made to incorporate elements of best practice in the local government sector, identified through various reviews, and to reflect the fact that infrastructure management and the evolution of this strategy is ongoing.

The main achievements from the previous strategy include the following.

- Inclusion of sustainable infrastructure as a strategic priority in our 10-year strategy, launched in 2020. This priority has goals for success which are aligned to the UN's Sustainable Development Goals.
- Creation of a new Climate Action Committee in 2020. Councillors now meet regularly to focus specifically on climate change. It has been agreed that all future Waikato Regional Council decisions will reflect a consideration of climate change implications.
- Publication of the Climate Action Roadmap in November 2020. The roadmap details nine pathways to reduce emissions and adapt to the changing climate the Waikato region is already experiencing.
- Setting of the target to reduce carbon emissions by a minimum of 25 per cent by 2030 as an interim step on the path to net zero by 2050. This target was set as part of the collective Waikato wellbeing targets for achieving a more environmentally sustainable, prosperous and inclusive Waikato by 2030.
- Developing a sustainable infrastructure decision making framework help guide an integrated approach to the sustainable management of the council's land drainage and flood management infrastructure.
- Launching the 'come high water' campaign In 2019 to raise community awareness of flood risk and the benefits of our flood management assets.

- Launching the Waikato Regional Hazards Portal to improve access to hazard information and help the public, local authorities and others make informed decisions about their exposure to natural hazards.
- Improving our project framework, implementing monthly zone project control groups, and creating a stop-go approval process to prevent overspend on projects and improve quality management.
- Review and audit of project costs and suppliers to ensure quality and cost expectations are being met by suppliers.
- Taking the whole life cost of an asset renewal option into consideration when making decisions.

2.2 Geographic and historical context

The Waikato region is the fourth largest region in New Zealand, accounting for 22 per cent of land on the North Island (25,000km²). It stretches from the Bombay Hills and Port Waikato in the north to the Kaimai Ranges and Mt Ruapehu in the south, and from Mokau on the west coast across to the Coromandel Peninsula in the east.

The region has 11 territorial authorities, three of which lie across the regional boundary. The territorial authorities within the region are:

- Hamilton City Council
- Hauraki District Council
- Matamata-Piako District Council
- Ōtorohanga District Council
- Rotorua Lakes Council
- South Waikato District Council
- Taupō District Council
- Thames-Coromandel District Council
- Waitomo District Council
- Waipā District Council
- Waikato District Council.

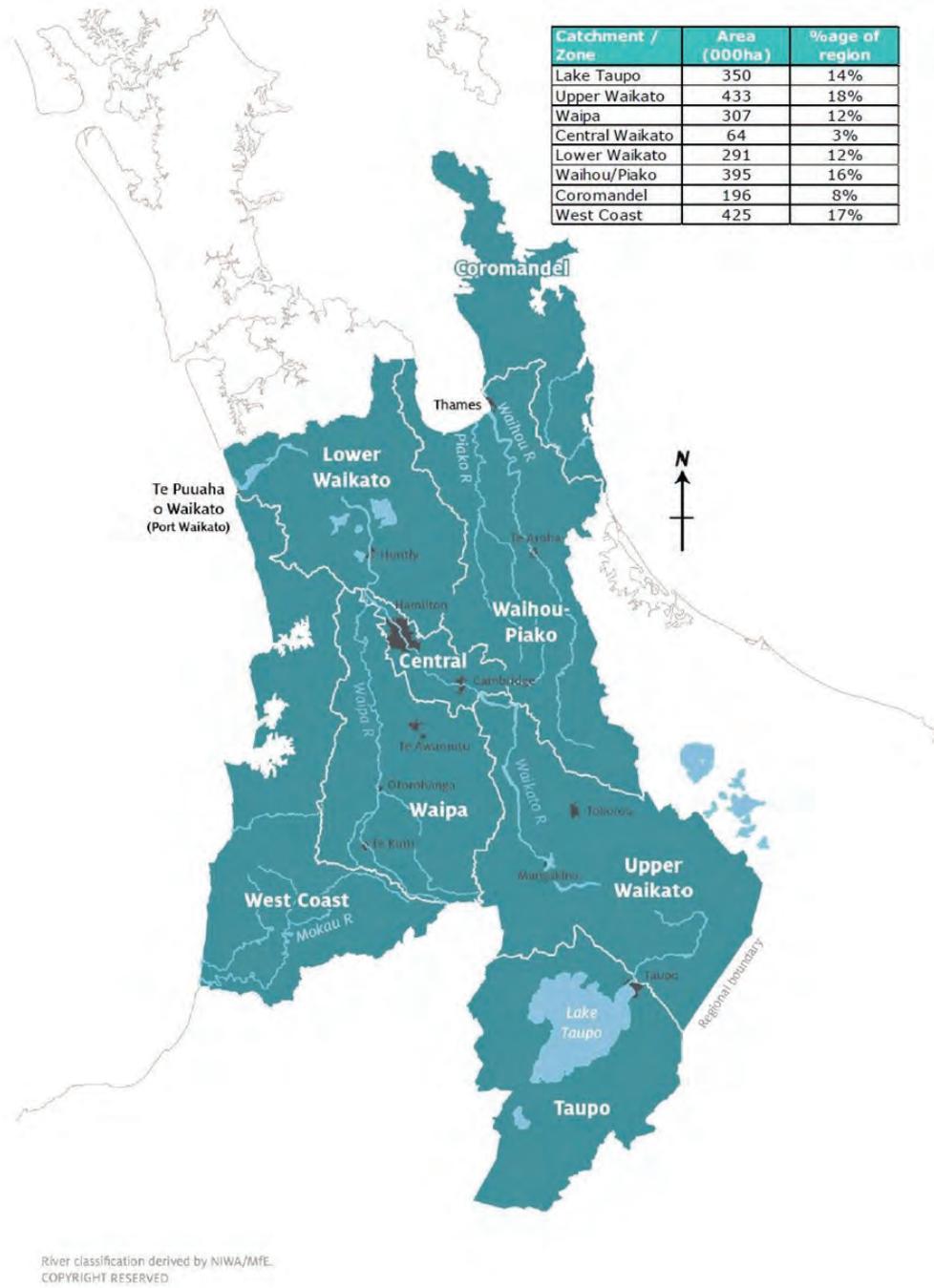


Figure 4: Waikato region and sub catchments

2.3 Demographic context

The population of the Waikato region is expected to keep growing over the next 50 years, as shown in Figure 3 (source: Waikato region projection working group, specifically, the University of Waikato medium growth projection based on the 2018 Census). Current forecasts suggest that the region will be home to over 600,000 people by 2065.

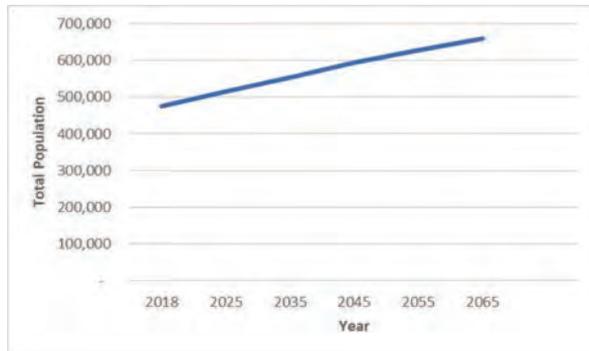


Figure 5: Waikato region population 2018-2065

The majority of the regional population growth is forecast to occur in the Hamilton City surrounds. The corridor of land between Hamilton and Auckland is also forecast to have considerable growth, with population expected to nearly double over the next 50 years. Modest growth or small declines are expected across the more outlying provincial areas of the region. The forecast population changes over the next 50 years, by catchment zone, are shown below in Figure 6.

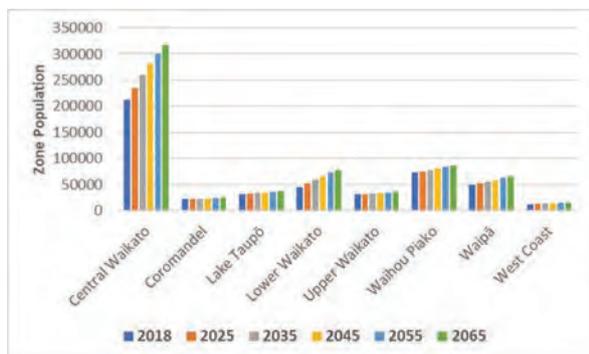


Figure 6: Catchment zone population forecasts ⁽¹⁶⁾

It is important to consider population projections as they provide insights into future challenges:

- Where development pressures are expected to accommodate population growth. This results in a need to liaise and collaborate with the relevant territorial authorities to ensure that developments are appropriately located, and that infrastructure needs and pressures are understood in advance
- Declining populations have the potential to signal long term infrastructure affordability and sustainability issues.

Understanding them will help support key decisions about infrastructure renewals.

The council has taken an active role in managing growth across the Waikato through collaborative involvement in a number of strategies, including:

- **Coromandel Blueprint** – a combined planning approach to create a common direction for the Coromandel Peninsula for the next 20 to 50 years
- **Future Proof | Te Tau Titoki** – set up to manage growth in the Hamilton, Waipā and Waikato District Council sub-region
- **Shore Futures** – a framework to manage the long-term future of communities within the Kawhia and Aotea catchments.

While population is an important consideration, the demand for and management of flood management and river management assets is also driven by the following.

- **Location of growth and land use** – for example, growth outside flood-prone areas is unlikely to drive additional infrastructure requirements. However, increasing urbanisation may have an impact on infrastructure requirements as increasing the amount of impervious surface within mature flood management schemes may trigger the need for upgrades or improvements.
- **Tourism and recreational use** – ensuring that both visitors and residents continue to be able enjoy the many environments that Waikato has to offer.
- **Connections with other key infrastructure** – such as transportation networks which are crucial to both the region and country.
- **Changing climatic conditions** – more frequent storm and flood events and rising sea levels will change the requirements for flood management assets and services.

All of these drivers have a relationship to flood management and river management assets and services.

2.4 Economic context

The Waikato region has the fourth largest regional economy in New Zealand, with the latest official estimates showing a regional gross domestic product (GDP) of \$25.8 billion in 2019. ⁽¹⁷⁾ Agriculture is one of the main sectors that benefits from the services provided by our flood management and land drainage assets, and is estimated to have contributed 9 per cent of total regional GDP in 2019 ⁽¹⁸⁾ (\$2.3 billion). ⁽¹⁹⁾

Growth over the period 2014-19 has been driven primarily by construction, manufacturing, and retail trade, which together accounted for approximately 40% of GDP growth

¹⁶ Based on University of Waikato medium growth projections

¹⁷ Statistics NZ, GDP by region (provisional)

¹⁸ Infometrics estimates

¹⁹ Statistics NZ, GDP by region (provisional)

over that period. Agriculture grew by an average of 0.9% per year (4.6% in total over 5 years), contributing only around 3% of New Zealand's total GDP growth since 2014.

2.4.1 Covid-19 recession

The nation's recovery from our COVID-19-induced recession is the dominant driver of economic conditions at present. The lockdown in the June quarter resulted in the largest shock in New Zealand's recent economic history. But, the success of the lockdown in eliminating the virus, along with government policies to support jobs, enabled a reopening that saw a similarly large bounceback in the September quarter.

Nevertheless, our recovery remains both fragile and patchy with the December quarter seeing another fall in GDP. While the worst case scenarios for employment and household incomes were avoided, the outlook remains highly uncertain.

One feature of the early stages of the recession has been the stability of New Zealand's agricultural exports. While many other sectors have been severely affected (notably the tourism and hospitality sectors), the agriculture sector has continued to operate, and maintained a crucial core level of activity. The robustness of this sector provides a solid base for the regional economy, although its dependence on uncertain export markets remains a risk.

The future beyond the short-term also remains uncertain. This includes high-levels of uncertainty about the duration of economic weakness (and consequently, ratepayers' incomes). While the deflation (falling prices) seems to have been avoided, there are concerns about the potential for disruptions to supply chains to drive increasing prices, which then become embedded in expectations for ongoing price rises. If this does occur, it may lead to higher levels of inflation. This will have important implications for the expected costs of the council's infrastructure expenditure, and for the cost of capital (if higher inflation results in the Reserve Bank raising interest rates).

2.4.2 Climate change and policy

Over the last decade, there has been a move away from focusing solely on economic factors and an increased focus on land use sustainability and improving the natural environment. These changes are affecting legislation at a national level and decision making at a council level and require additional investments by councils across the country.

As our understanding of climate change improves, its primary and secondary effects and the costs they will create are beginning to be explored in greater depth. Who will need to fund these costs and who will be liable for damages caused by the changing environment remains an unknown. Although it is noted that the New Directions for Resource Management in New Zealand Report 2020 (the Randerson review) recommended that central government develop a Managed Retreat and Climate Change Act.

2.4.3 Infrastructure support for the economy

The services provided through our flood management and land drainage schemes have a variety of quantifiable benefits that contribute to the region's economy. By protecting land and infrastructure, our flood management assets:

- reduce associated potential flood damage and increase the value of the land
- improve the productivity of land, adding value to the regional economy
- protect regionally and nationally important infrastructure associated with activities such as transport (e.g. road and rail) and electricity transmission.

Schemes within the two major catchment zones of Lower Waikato (the area between Ngāruawāhia and Port Waikato) and Waihou-Piako (all of the Hauraki plains between the firth of Thames and Matamata) provide protection to land and property which has a combined value of approximately \$19 billion.

The annual value-added to the regional economy by land protected by the schemes in these two zones is estimated to be approximately \$1 billion (nearly 85 per cent from the Waihou-Piako schemes, with the remainder from the Lower Waikato scheme), based on current prices and value-added multipliers. This value added ⁽²⁰⁾ can be interpreted as the contribution of this land to regional GDP (gross domestic product) that is enabled through the provision of the infrastructure. ⁽²¹⁾

Since it is the flood management and land drainage assets that enable this land to be utilised, the importance of these two schemes alone is clearly of significant benefit to the regional economy. To put it into context, the replacement value of these two schemes is \$596 ⁽²²⁾ million – approximately half the contribution to the regional GDP that they enable from land productivity improvements alone.

20 The different methodologies used to determine regional GDP by Statistics NZ and the value-add by the council may mean the two figures are not directly comparable, and the value-add may be wider than agriculture only.

21 This should not, however, be interpreted as the value added by the scheme. The expected value of additional production, or damage avoided will be less than this.

22 December 2019 Waikato Regional Council Asset Revaluation Report

The value of other infrastructure protection or avoided damages are not estimated at this time. Previous studies have identified a variety of benefits of flood management and drainage in addition to the above, which could, in principle, be valued.⁽²³⁾ These include:

- a more secure investment environment for land adjacent to the flood control area, leading to increased intensification of that land
- the regional economic impact of changes in the sub-catchment
- social benefits associated with peace of mind, recreation, reduced risk and security of access to schools and hospitals.

These assets and schemes also have some negative economic impacts that are not included in the overall economic context at this time. These include their environmental impacts. For example, main channel plantings and stability control represent benefits of management but there are also environmental impacts, such as the drainage of wetlands (which typically have high ecosystem service values)⁽²⁴⁾ and the subsidence of peat soils (requiring increasing costs to pump), which reduce the benefits provided.

It is intended that, over time, additional information will be incorporated to enable the inclusion of the wider benefits (and costs) of the services that flood management and land drainage assets provide.

2.5 Environmental context

Greater awareness of the need to deliver increased environmental protection whilst supporting sustainable development and adopting a more mātauranga Māori influenced approaches is leading to changes in regulatory requirements and community expectations. Decisions relating to the council's infrastructure need to factor in societal elements in addition to their basic purpose of providing safety and security to people and property.

2.5.1 Water resources

Current trends are placing greater importance on the social, cultural, and environmental values of water resources. This is evidenced by new initiatives and legislative changes, notably co-management arrangements with tangata whenua, three waters reform and the National Policy Statement (NPS) for Freshwater Management 2020. The NPS will require councils to set a long term vision that is informed by the aspirations of tangata whenua and their wider communities for what waterbodies should look like in the future. It will also require more investigation of our options for increasing tangata whenua involvement.

2.5.2 Climate change

Since the Infrastructure Strategy 2018, the need to take more action to mitigate against the impacts of climate change has become increasingly salient. Central government has developed a number of programmes and legislative changes. The most significant of these is the introduction of a new domestic emissions reduction target by 2050. This was set into law with the Climate Change Response (Zero Carbon) Amendment Act in November 2019. Then, in August 2020, the Ministry for the Environment released the first National Climate Change Risk Assessment, this assessment will give us more information on the potential impacts of climate change.

The flood management and drainage schemes in the Waikato region support current land uses. There are, however, more external factors that may also affect our ability to sustain these land uses (and therefore, the benefits attributable to these schemes). The National Policy Statement for Freshwater Management and associated regulations and treaty settlements may limit the discharges from land uses to freshwater, and hence the future viability of particular land uses.

Anticipated changes in the region's climate are expected to affect land uses too, as well as affecting the optimal level of service provision. Sea level rise, an increase in rainfall events (and associated flood risks), and more frequent and/or extended dry periods will affect the profitability of land-based industries (principally agriculture) and the use and cost of flood and drainage infrastructure.

The rising standard of environmental outcomes that society and the community expect is something that needs to be considered, especially with regard to the impacts on the funding, depreciation, and renewals of river scheme assets. These changing requirements can mean increased expenditure is required or that asset lives are not fully utilised if upgrades are implemented before the assets would otherwise require investment.

2.5.3 Legislation changes

The council recognises that there are some significant changes to existing legislation to consider and that new legislation and national policy will be introduced, for example:

- A draft National Policy Statement for Indigenous Biodiversity was released in 2019 and is expected to be finalised in early 2021.
- The National Policy Statement on Urban development came into effect on 20 August 2020.
- The National Policy Statement for Freshwater Management came into force on 3 September 2020.

23 Covec (2018), *Economic value of river control, flood management and drainage*

24 For example, in 2013, the value of ecosystem services provided by wetlands was estimated to be from \$45,000 to \$60,000 per hectare (Patterson MG, Cole AO 2013. "Total economic value" of New Zealand's land-based ecosystems and their services. In Dymond JR ed. *Ecosystem services in New Zealand – conditions and trends*. Manaaki Whenua Press, Lincoln, New Zealand).

Councils are required to fully implement this NPS in their policies and plans by 31 December 2025.

- A replacement of the Resource Management Act 1991 (RMA) is expected following the New Directions for Resource Management in New Zealand Report 2020 (the Randerson review).
- There will be significant reform to Three Waters management in terms of funding and legislation.
- Emissions budgets will be set under the Climate Change Response (Zero Carbon) Amendment Act 2019, the first of which will be for the period 2022-2025.

The council is already responding these changes. Some of our key flood management assets are pumpstations and pumps, many of which are near the end of their usable life. Under the NPS for Freshwater Management there is a requirement to reduce the occurrence of fish loss as a result of pumping. Council have worked alongside central government in developing the Pathways to the Sea programme to help address this. This programme looks at the most practical and cost-effective methods available to reduce the occurrence of fish loss while maintaining levels of service. We have worked closely with the National Institute of Water and Atmospheric Research (NIWA) to allow greater

fish movement through floodgates. We have worked with pump suppliers to design a more energy efficient impellor for our existing pump housings that enables the safe passage of Tuna. And, we have worked with European suppliers to procure Archimedes screw pumps that allow for safe fish passage.

2.5.4 Peat soils

Drained peat soils, although altered from their original state, remain economically important. Approximately 60 per cent in the Waikato are used for dairy farming,^{*} (25) but they are subsiding at an average rate of about 2cm per year, based on current estimates. The loss of peat soils through subsidence occurs by processes of shrinkage, consolidation, and oxidation of the dewatered peat.

The negative effects of subsidence include the loss of ecosystem services, a need to upgrade flood management and drainage assets, damage to infrastructure, and impacts on farm productivity. In some areas, the effects of peat shrinkage will be compounded by sea level rise. This is particularly the case for already low-lying and near-coastal areas of drained peatland, such as the Hauraki plains. The spatial distribution of peat soils is shown in Figure 7.

25 *Refer to Figure 5 for an approximate location of the peat soils within the Waikato region

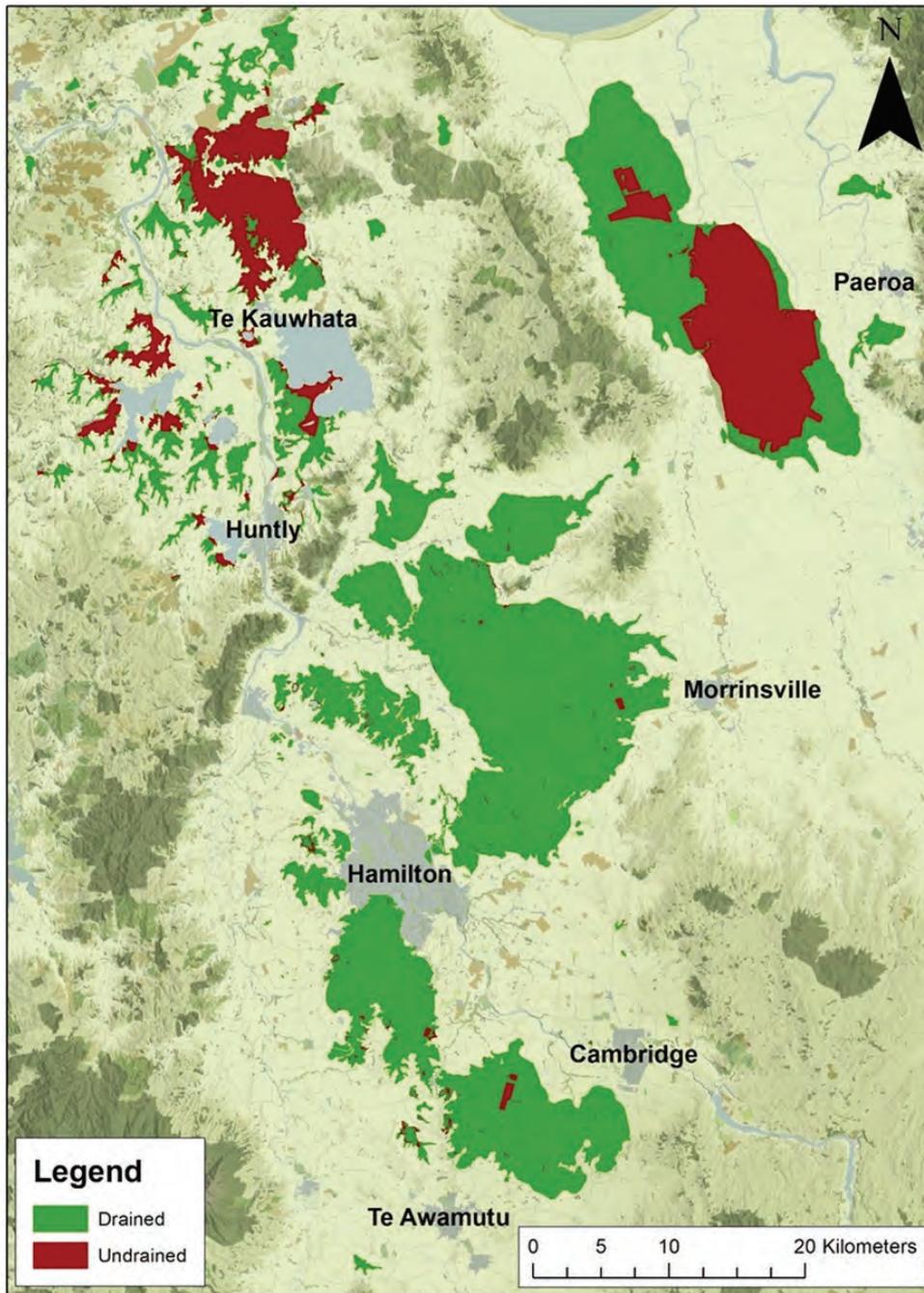


Figure 7: Map of the approximate extent of peat soils in the Waikato region.

*<https://www.waikatoregion.govt.nz/environment/environmental-information/environmental-indicators/land-and-soil/peat-subsidence-report-card/>

3 Infrastructure overview

3.1 Flood management and land drainage asset overview

Our infrastructure assets predominantly consist of stopbanks, pumpstations and floodgates and have a replacement value of \$643 million (see Table 1). They have been built and managed over time to provide the required outcomes and levels of service for past, present, and future generations.

The assets range in age from pumpstations originally built in the 1920's in the Hauraki Plains, to the newest schemes in the Coromandel built in the early 2000s. Levels of service vary across catchments as they were agreed with communities when the schemes were installed. The early

schemes (those prior to 1992) were largely funded by central government, which is different to current practice where the region is responsible for funding these protection scheme assets. Prior to the late 1990s, depreciation was not funded. This has placed a higher burden on current (and future) ratepayers, as many of the assets are now reaching the point where significant renewals are required.

While the schemes were implemented successively over time on a catchment-by-catchment basis, they now collectively provide extensive benefits to the region as a whole. It is for these reasons that the current funding model includes a regional rate component in addition to targeted rating (which reflects the direct beneficiaries).

Table 1 provides an overview of the flood management and river management assets that the council is responsible for.

Table 1: Catchment asset summary

Zone	Area (000 ha)	Stopbanks km	Pumpstations no.	Floodgates no.	Other	Replacement value (\$m)
Lake Taupo	350	7.5		25	✓	8.3
Upper Waikato	433				✓	0.3
Waipā	307				✓	1.4
Central Waikato	64				✓	0.05
Lower Waikato	291	248	63	279	✓	191.7
Waihou/Piako	395	350	52	136	✓	404.7
Coromandel	196	1.3		5	✓	3.1
West Coast	4					-
All drainage assets	n/a	11.2	3	32	✓	33.8
TOTAL	2,040	618	118	477	✓	643.35
*Other refers to assets such as retaining, control and miscellaneous structures, fencing, drains, culverts, bridges, floodwall and river training works.						

3.2 Infrastructure challenges

The assets involved in flood management and land drainage have long lives and are important to both the region and the national economy. Associated with these assets, there are significant costs, particularly in terms of maintenance and renewals, and we need to ensure that future expenditure is affordable. This presents a challenge for the region – ensuring that the required costs to maintain the infrastructure can be met.

3.2.1 Asset funding

Our assets are primarily funded through targeted rates from those who directly benefit from or contribute to the need for them. Targeted rates make up approximately 75 per cent to 80 per cent of the funding, with the remainder coming from general rates across the region. The balance of direct beneficiary versus regional contribution is intended to reflect both the direct benefits that landowners are provided but also the wider community benefits and environmental improvements that are delivered. From time to time there will be a need to revisit this funding split in determining appropriate funding policy.

3.2.2 Community affordability

For most catchment zones, the value of infrastructure assets is relatively small and the issue is not considered to be significant. However, as shown in Figure 8, the Lower Waikato catchment and Waihou-Piako river schemes have a considerable replacement value, for which the costs are largely borne by modest populations. Within the Waihou-Piako scheme, these populations are projected to shrink within the next 50 years. In the Lower Waikato, they are expected to increase.

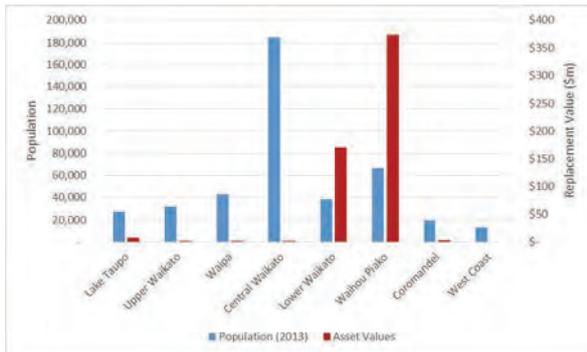


Figure 8: Catchment zone population and asset values

As noted above, these two schemes enable a significant contribution to the regional economy so, while the population may be small, the value-added (on average) should mean that their rates contributions are more affordable. Within the catchment area, this is likely to be variable. For example, properties on drained peat will have considerably higher costs.

This issue of affordability is one that the council is aware of and is seeking to better understand over the long term, particularly considering some of the significant issues that have been identified within Section 5.

Balancing the need to fund the increasing costs of these assets and other calls on spending against overall rates affordability is a key challenge. Ensuring that the funding of asset-related costs matches the period of benefit derived from the assets will continue to be important in managing the affordability of these services.

Another consideration is the national benefit that the council's assets provide and enable. For example, the protection that is provided to state highways (particularly State Highway 1) and the North Island Main Trunk enables both the regional and national movement of people and freight. As previously noted, the initial investment in most of the schemes was made by central government, but ongoing costs are now borne by the region, and, in particular, the direct beneficiaries (who are effectively subsidising the national beneficiaries). The wider range of beneficiaries are not necessarily accounted for or contributing at this time. This approach to funding is simplistic and is not consistent across all of our infrastructure schemes. It is an area that the council is working on to improve equity and transparency.

3.2.3 Asset condition

Asset condition data supports the prediction of remaining asset lives and allows the development of projections of long term asset renewal requirements. Asset condition is assessed on a five-point scale in accordance with the council's Regional Asset Management Plan.

Over 300 floodgates, 120 pumpstations, and 540km of stopbanks were recently assessed over the summer months of 2020/21 to assess their current condition. This data has been collected every year for the last five years, allowing trends in their changing condition to be measured and used to prioritise repair works.

There is a high level of confidence in that a) all infrastructure assets are recorded within the asset management system, and b) that condition is understood, and plans are developed to maintain those assets identified as either most at risk or with a very poor condition.

3.2.4 Asset performance

The performance of flood management and land drainage systems is recorded against level of service targets within the Regional Asset Management Plan.

Stopbank performance

Due to the nature of the underlying soils in the Waikato region, our stopbanks experience settlement over time. This is particularly common for stopbanks built on peat or marine mud. This settlement reduces the height (crest level) of the stopbank and can lead to the crest level falling below that required to protect against the design flood level. The performance grading for stopbanks and detention dams is explained in our Regional Asset Management Plan.

Performance is assessed by comparing the current crest level against the design crest level (DCL). In the last 10 years, 274km of 616km of stopbanks have been assessed through the ongoing Crest Level Survey project.

Stopbanks are defined in 100m sections, called links. The lowest height of any link of the stopbank represents the overall performance grade of the stopbank, whether it is a 50cm area or a 100m section. A three-year surveying programme is currently underway to gather information and update the stopbank performance measures for those most at risk of subsidence.

Table 2: Current actions underway to resolve performance issues

Area	Actions underway
Tuakau to Port Waikato reach	The two stopbanks in this area highlighted in red are not a concern. The long northern bank is made of river silt. It has never had a design height, so shows as red until it has been determined whether this bank is required as part of the Lower Waikato Scheme review currently underway.
North Huntly to Rangariri river reach	There are several sections along these banks where stock have caused low points beside fences, or where vehicle tracks have traversed the banks. Until the banks can be fixed, sandbags are available for the low areas.
Hauraki foreshore & Ngatea northern bank	Works are currently in the design stage to repair the low areas of the eastern and western foreshore banks.
Piako ponding banks	In the last floods, these banks were identified as being too high, so the ponding areas did not activate as expected. This is currently under investigation to determine the appropriate actions needed going forward.

The performance of the stopbanks in each of the relevant zones (as of May 2021) is shown in Figure 10.

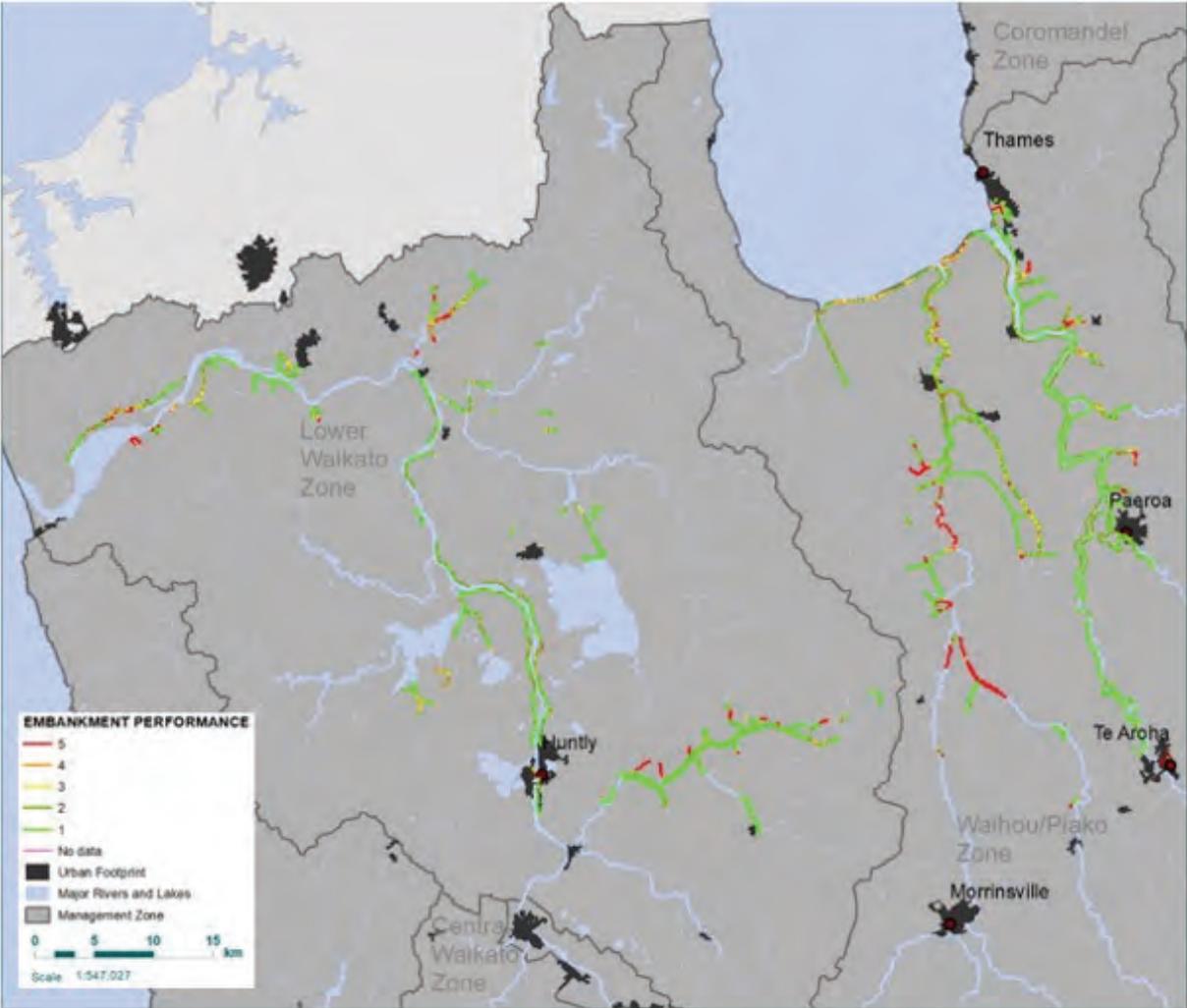


Figure 10: Stopbank current performance by location

As reported in the 2020 Annual Report ⁽²⁶⁾, 92.2 per cent of planned mandatory maintenance was completed over the 2019/20 period. The target of maintaining stopbanks above the designed flood height was achieved in part. A total of 93.5 per cent of rural stopbanks and 93.8 per cent of urban stopbanks were above the design flood level. Focus over the next three years will be on the Hauraki foreshore banks and repairing the low areas in stopbanks at Ngatea and Huntly.

3.2.5 Critical assets

The identification of critical assets is an important part of overall asset risk management. Critical assets are those assets that are likely to result in a more significant financial, environmental, or social costs or consequences if they fail. Critical assets have a lower threshold for action than non-critical assets.

A list of high and medium risk critical assets is maintained in the Regional Asset Management Plan based on consequences of them failing. Currently 6 per cent of assets have a high consequence score.

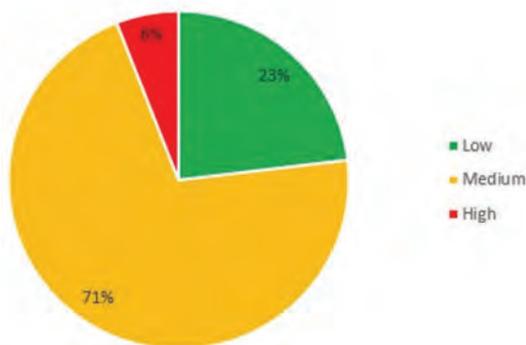


Figure 11: Overall criticality split of ICM assets

The risk analysis for each individual asset is maintained in the Conquest asset management database via the completed Risk Assessment and Criticality Assessment actions. A list of critical assets is available in Appendix B.

It is important to note that flood management assets were constructed to drive economic growth in the agriculture sector. Towns have since evolved around the flood management assets, and protecting these towns and their populations was not the primary driver of the works.

3.3 Future direction of the infrastructure management approach

Along with the rest of New Zealand, Waikato Regional Council is at a key stage in its journey to better understanding of climate change and how its impacts can be addressed. We recognise that various factors will impact the long-term future of asset condition and the demand for flood management in the Waikato region.

We are developing our understanding of the potential impacts of climate change and putting in place frameworks for adaptation and sustainable decision making. Over the next three years, council plans to define, design and develop a sustainable decision-making framework, ready for delivery within the 2024-2034 LTP. This work will include collaboration with stakeholders such as local iwi, territorial authorities, and the Waikato River Authority.

We recognise that the development of the current programme has assumed a business-as-usual approach to infrastructure and that there will still be demand for assets in their current locations. But this context is changing fast and there will be difficult decisions and conversations for the council and our communities regarding the levels of service provided and what is realistically achievable.

There has been significant movement within council and central government in the three years since the last Infrastructure Strategy and Long Term Plan. As knowledge and understanding of the challenges across the Waikato region has developed there, is a growing recognition that the current approach to flood management and land drainage will need to shift to meet predicted changes and bring greater transparency to the decision making process.

In 2018 council set a challenge to develop a Sustainable Infrastructure Decision-making Framework (SIDF) that could be used to assess drivers, issues and options and ensure long-term decisions regarding the Waikato’s critical flood management and land drainage infrastructure are evidence-based, transparent, and underpinned by robust logic.

We have designed an operable framework, built around Treasury’s Better Business case approach. The framework is still to be formally adopted but will provide a suite of tools to apply to regional, zone and local-scale planning and decision-making as part of a more holistic, wellbeing-focused approach. The implementation will mark a significant shift in approach to flood risk management within the Waikato, and will require considerable collaboration with other councils, iwi partners, landowners and communities. It is expected that the framework will be in place for the 2024 LTP.

Council are still developing their understanding of the changes required to meet future challenges and this Infrastructure Strategy iteration comes at a transitional phase while we work to develop the tools and approaches to build a clearer decision making framework. This transitional period will be a challenging time as the council and affected communities explore the relationships between different issues to achieve the right balance between conflicting priorities while meeting legislative requirements. We want to support communities during this process by making it as clear and transparent as possible.



Sustainable infrastructure

Hanganga tauwhiro

Because we need to build with nature in mind

Our flood schemes protect 3000km² of land, as well as critical services and infrastructure from the impact of floods. Being able to productively use this land boosts our regional economy by \$2.2b every year.

Most schemes were built in the 1960s and 70s. Expectations have changed and so have climate patterns. Urban areas are ever expanding too, meaning more stormwater runoff into our waterways. The challenge now is maintaining and upgrading these schemes in a way that meets future needs without impacting the natural environment. And it has to be affordable.

Takatū ake rā

Photo location: Paeroa

Figure 12: extract from the 10-year strategy

4 Approach to infrastructure management

Our approach to infrastructure asset management is based on the key principles outlined below.

- Council services and infrastructure assets provide appropriate, sustainable, and long-term levels of service.
- Council infrastructure assets are managed in accordance with statutory and regulatory requirements.
- A whole-of-life approach is taken for all decisions on infrastructure assets, incorporating asset lifecycles and condition ratings.
- An integrated catchment management approach is taken to the planning, delivery, operation, renewal and disposal of infrastructure assets.
- Council has regard to iwi, community and relevant stakeholders associated with the delivery of services and the management of infrastructure assets

4.1 Council's strategic direction and priorities

Waikato Regional Council has management responsibility for the delivery of flood management and land drainage services within the Waikato region. Infrastructure assets associated with these services that have a carrying amount of \$541.5 million (as at June 2020) and include stopbanks, flood gates, and pump stations.

Council seeks to meet the needs of the community and support the delivery of those services set out in the council's Long Term Plan. The council has reviewed its strategic direction and priorities for the period 2021-24. We will ensure that infrastructure services are managed in alignment with the council's 10-year strategy (appendix A).

4.2 Maintaining established infrastructure and levels of service

Our existing flood management and land drainage infrastructure has developed over the last 60 years and has contributed to and enabled regional population and

economic growth. This infrastructure underpins the regional economy by providing safety, certainty and protection from natural events.

Levels of service are not consistent across the Waikato Region. The primary driver for flood management infrastructure was to drive agricultural production. Levels of service were agreed on a when the defences were constructed, specifically with local communities at that point in time.

The level of service often relates to the Annual Exceedance Probability (AEP) storm event which the flood management infrastructure was designed to protect against while, for drainage assets, it relates to the length of time taken to remove flood waters from a paddock under a particular AEP.

There are differences in approach across the two largest catchments, owing to previous level of service agreements. While the Waihou-Piako catchment was developed across two main schemes, the Lower Waikato catchment contains a much greater number of smaller catchments. This has resulted in discrepancies in the management approach to the two catchments.

Council is guided by our communities on whether they want these levels of service to be maintained or changed. We will periodically consult with the community in regard to levels of service provision and provide appropriate emergency responses to ensure services are uninterrupted where possible.

4.3 Funding infrastructure investment

The cost of council services is funded through a combination of income sources, including:

- General and targeted rates
- Internal borrowing
- External borrowing
- Central government grants (e.g. for shovel ready projects)
- Investment income
- Participating landowners
- Sale of items e.g. harvested poplar logs
- Grazing licenses.

The budgeted income from the investment fund is treated as an offset to the general rate and does not directly fund any work programme. Internal borrowing is used to fund much of the river and catchment management works.

Specific debt repayment plans are in place with each affected catchment zone, funded from targeted rates, to ensure that this debt is repaid over an agreed time period (generally 10 years). Funds generated from the internal debt repayment are added into the council's general investment fund.

External borrowing is used where planned expenditure exceeds available depreciation funding.

Government grants and subsidies are being used to accelerate the work programme associated with shovel ready projects.

4.4 Data management

The council places high importance on regular river surveys, structural auditing and condition and performance surveys to inform work programmes and associated activities. This also enables us to identify and ensure appropriate management of the most critical assets.

Improving the data quality and accuracy that informs these decisions is an ongoing activity that the council is committed to.

4.5 Asset replacement (renewals)

Different infrastructure assets will deteriorate at different rates over time. This may lead to underperformance, increased risk of failure and increased maintenance requirements. Undertaking asset renewals is an appropriate way to extend an asset's working life and these are planned (in conjunction with asset lifecycle assessments) to deliver the most efficient use of expenditure. To help with renewals programming, assets are revalued on a three-yearly cycle to inform future financial projections.

Historically, the council has planned capital renewals based on asset life expectancy. Each type of asset, having a known construction date and assumed life span would be replaced when the end date was reached. While developing this programme the council have evaluated alternative renewals planning approaches which consider available asset condition information (collected yearly) and adjust the end date when the asset should be replaced accordingly. The adopted additional renewals approach involves identifying each asset renewal date based on the remaining life, as indicated by the asset's condition score. As each asset deteriorates, its condition is reflected by a reduction in its remaining life.

4.6 Climate and morphological change

It is predicted that the effects of climate change will impact on infrastructure and the way the council manage it. The work programme will include the level of response needed based on national climate change forecasts. These changes will be agreed with communities. Within this LTP, we have incorporated the cost of climate change on stopbanks. The predicted increasing impacts of climate change will require the core height and/or width of stopbanks to be increased. As the cost of the stopbank core is not depreciated within our financial policies, this additional cost is considered as new capital and will fall within the new capital accounting principles. The impacts of climate change on pumpstations, floodgates, and other structures is currently unknown has not been budgeted for.

Rivers and catchments are natural systems that are subject to continual change. These changes and their consequences in terms of the continuity of service delivery need to be

understood and actively managed. For instance, some the beds of river systems are aggrading due to higher silt loads and changes in the characteristics of the river channel. These changes have the potential to compromise levels of service. We will therefore actively monitor and survey rivers as part of the regular review of scheme performance.

4.7 New capital

The council will consult with communities on requests for new capital work initiatives. Funding will be agreed based on our funding policy – a requirement of the Local Government Act. In general terms, this means that costs will be met by those that benefit or contribute to the need for the capital work.

The council have processes for new capital works which are used when a community requests a new scheme, or when a community indicate a scheme is no longer required.

During this LTP period, a decision has been made to classify permanent river management structures as capital works rather than within operational budgets.

4.8 Service sustainability

Council intends to carry out regular reviews of the long-term sustainability of river and flood management assets and the service they provide. This is required in light of the potential challenges discussed in Section 3.

5 Significant infrastructure issues

This section summarises the significant infrastructure issues facing the council over the next 50 years, the potential consequence of these issues and our proposed approach to managing the issue. The significant issues that have been identified are as follows:

- Economic conditions and affordability
- Land use change
- Climate change
- Risk of natural disasters and residual risk
- Environmental and regulatory performance expectations
- Business and knowledge capability.

These issues are discussed along with the council’s preferred management approach in the following tables. To determine the proposed approach, council has considered a number of options and their potential implications along with the drivers for changes identified in our 10-year strategy (shown in Appendix A). Options have been considered across the short (1-3 years), medium (3-10 years) and long term (10-50 years). It is important to recognise that these issues are highly interconnected. The responses will require a joined-up, approach across council.

5.1 Economic conditions and affordability

Issue: ability to pay for maintenance, renewals and new works

The region’s economic conditions impact on the ability of communities to pay for the services provided. There are also increasing pressures on the current level of funding to deliver more. The affordability of our levels of service will be impacted in the future by: levels of perceived risk; increasing input costs; reducing returns from reduced productivity; increasing compliance costs; reducing insurance availability; and ongoing changes in public perception and acceptance of land use practises.

Unforeseen events have the potential to significantly lower the trajectory of economic activity within the region, such as with COVID-19. They potentially have a knock-on effect for funding services, delaying critical works upgrades and increasing the risks of failure for communities and businesses across the region.

Our flood management and drainage infrastructure generates economic benefits for the region. This is highlighted through the protection of critical national infrastructure (e.g. state highways, rail infrastructure and crown land), whose caretakers do not contribute any funding towards the assets protecting them. As management of these assets has moved from a new capital to maintenance and renewal funding model, the stress on communities paying for the maintenance of the assets has increased. This was recently recognised in the proactive release of Cabinet material about improving resilience to flood risk and supporting the COVID-19 recovery on 1 July 2020⁽²⁷⁾ This paper acknowledged that ‘*the current funding model where local government is the primary funder of flood risk management and central government does not contribute funding despite national benefits accrued is no longer sustainable*’.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Prioritised work programmes	<ul style="list-style-type: none"> • Continue current funding policies, implemented in consultation with communities. • Unlikely to be sustainable in the long term. 	✓			H (long term)
2. Improved evaluation	<ul style="list-style-type: none"> • Improvements in forecasting of market trends, costs, and resource availability. • Better management of programmes and understanding future costs and impacts. 	✓	✓		L

27 [https://www.dia.govt.nz/diawebsite.nsf/Files/Central-Local-Government-Partnerships/\\$file/Resilience-Cab-material-August-2020.pdf](https://www.dia.govt.nz/diawebsite.nsf/Files/Central-Local-Government-Partnerships/$file/Resilience-Cab-material-August-2020.pdf)

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
	<ul style="list-style-type: none"> Better understanding at a local level of which schemes are close to being financially non-viable so we can plan engagement with communities. May require changes to procurement practices including letting of longer-term large-scale contracts to provide greater certainty. 				
3. Amend funding policies	<ul style="list-style-type: none"> Need to review scheme beneficiaries to assess if current funding policies continue to be appropriate. Clear policy and frameworks will be required to steer the assessment approach. May adversely impact on community affordability. 	✓			M
4. Asset withdrawal	<ul style="list-style-type: none"> Managed withdrawal from assets may involve handing asset maintenance back to communities. Challenging in terms of political reputation if not approached appropriately. 				H
5. Community Engagement	<ul style="list-style-type: none"> Flood protection will not be economically viable in all communities. Dependent on early engagement with communities and improved estimation and forecasting. Some decisions may not be accepted by councillors and communities. This approach aligns to anticipated changes to the Resource Management Act. 		✓	✓	M
6. Leverage and influence	<ul style="list-style-type: none"> Apply pressure to central government to leverage funding for flood resilience. Requires collaboration with other authorities and stakeholders. Use shovel ready funding to improve climate resilience and create over 200 short and long-term jobs. Potential to further leverage funding opportunities for projects that are not currently feasible or deliverable due to affordability issues. Apply lessons learnt from historical central government funding. 	✓	✓		M
Preferred approach	<p>Council recognises the need to balance both the demand for current and additional services with the community's ability to pay. This balance can be achieved through the prioritisation of work requirements, sustainable revenue and financing policies, and awareness of community needs. This will likely require a combination of options 2-6 over the next 50 years.</p>				

5.2 Land use change

Issue: Land use intensification

Across the Waikato region, there is a general pattern of rural depopulation and urban growth. While some rural towns on the fringes of Hamilton are growing, the populations of other more distant towns are shrinking.⁽²⁸⁾ The depopulation of rural areas has implications for affordable levels of service, with fewer people paying more of the costs of our flood management schemes.

Where urban growth continues, the demand for new schemes and higher levels of protection are expected. Increased urbanisation can increase surface water runoff due to increasing amounts of impervious surface area. This is important in areas along the State Highway 1 corridor (e.g. Pokeno and Te Kauwhata), where current systems are not sized for increased catchment runoff. It is currently a problem that we are not consulted with by default regarding new development. Instead, we rely on others to engage with us for support, advice and planning on these issues to ensure they align with the 2016 Regional Policy Statement. In some cases, we have been required to designate areas to prevent planned developments increasing the risk of flooding within a catchment.

As fertile viable land reduces, the Pukekohe and Tuakau areas from Auckland continue to grow south. Land traditionally used for sheep, dairy, and beef farming may be used for crops and, in the future, more glass houses and high-intensity farming options be developed. The current flood management systems are not designed for these new needs and future increased demand for additional levels of service. No funding is currently collected to account for these types of requests.

Drained peat soils, which make up approximately 60 per cent of soil structures in the Waikato, are economically important. As they are almost entirely made up of organic matter, drainage of peat results in ongoing land subsidence and carbon loss. This impacts the levels of service of flood management infrastructure built on it (e.g. stopbanks subsiding reducing the embankment height and pump levels being impacted).

Ongoing Treaty of Waitangi settlements will also result in land use in changes in the Waikato, although the extent of these changes remains uncertain at this time.

The National Policy Statement on Urban Development requires councils to ensure that there is development capacity for housing and business needs. This is likely to put pressure on existing flood management and drainage systems and requires careful decisions about land that is appropriate for development.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Continue to collaborate and share knowledge with stakeholders	<ul style="list-style-type: none"> Provide information on natural hazard management and assess required service levels. Continue growth planning and population projection workstreams. Continue Treaty of Waitangi settlement engagement. Assist territorial authorities in their planning approach. Assist in developing a more collaborative approach for wider engagement and leverage with central government. 	✓			L
2. Increase focus on sustainable development in service-level reviews	<ul style="list-style-type: none"> Opportunity to use hydraulic modelling to better inform communities and territorial authorities to ensure development is sustainable. This avoids at-risk areas, and doesn't have an adverse impact on flood risk within the catchment. Requires increased application of two-dimensional flood modelling to be incorporated within scope of 	✓	✓		L

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
	<p>existing service-level reviews, with greater stakeholder involvement.</p> <ul style="list-style-type: none"> Requires additional financial contributions from stakeholders but offers efficiency overall to both parties. 				
3. Active role in managing peat settlement issues, through adaptive or mitigating approaches	<ul style="list-style-type: none"> Council acknowledge the need to better understand the rates of peat settlement and potential impacts within the Waikato, and to be more active in meeting the challenges posed. This should be undertaken through informative and collaborative approaches with communities, that enable them to make informed decisions. 	✓			L
4. Advise stakeholders on the best use of land types	<ul style="list-style-type: none"> We have a duty to inform and advise stakeholders on the best use of land types. In the current policy environment, some land types (e.g. peat) land may have greater value as a carbon sink to meet wider legislative targets and/or budgets. Develop land use projections and mapping that incorporates climate adaptation and green house gas mitigation, increasing environmental aspirations, and changing socio-economic drivers, to better understand what the Waikato will look like in 50 years. 		✓	✓	L
5. Amend funding policies	<ul style="list-style-type: none"> Land use change does not fall within current asset renewal or operational funding guidelines. In the future, changes to systems to meet new land use policy requirements will need to be funded under new capital policies. This may impact community affordability. 		✓	✓	M
6. Take a more restrictive role in land use change	<ul style="list-style-type: none"> To address the changes in central government policy, one option would be to take a more hands-on role in managing land use that does not align to policy requirements, potentially through the Waikato Regional Policy Statement. This would require a hands-on role in restricting development and land use, e.g. in areas at risk of peat settlement and natural hazards. This would have a have political impact 		✓	✓	H
Preferred approach	<p>Option 1 is part of business as usual and the council is already considering ways to implement options 2-5 through strategic development processes, the current Long Term Plan and in developing the SIDF.</p> <p>Option 6 is considered to be too restrictive to be adopted and is not a preferred approach.</p>				

5.3 Climate change

We recognise that climate change is the biggest challenge we are facing. This is acknowledged in the decision to create a new Climate Action Committee and reflect a consideration of climate change implications in future decisions.

The Ministry for the Environment's climate change risk assessment⁽²⁹⁾ for New Zealand has identified that local authorities are highly sensitive to the financial risks from climate change, with varying but generally limited capacity to respond to economic risks. The second highest of all assessed risks was the risk to authorities from the economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.

There are three key climate change issues facing our flood management and land drainage infrastructure: increased frequency and severity of storm events, sea level rise, and an increased likelihood of drought events. It is anticipated that agriculture practice will change to adapt to the predicted changes as will the council's infrastructure management approach.

Issue: Increased frequency and severity of storm events

According to predictions from the Ministry for the Environment, flood risk is expected to rise in the Waikato by 2090, due to more frequent, high-intensity rainfall events. This will likely increase the risk of inland flooding in the west and in river catchments in the Coromandel.

It will not be sustainable to keep building larger stopbanks and continually increasing pumping capacity, either technically or economically. Ratepayers and the council will be faced with difficult choices about whether they continue to supply flood management.

Issue: Sea level rise

Coastal flooding is currently a risk to 8000 Waikato residents, \$1.46 billion worth of buildings, and 540 km² of productive land. A rise in sea level of one metre is projected by the end of the century and considered appropriate for coastal hazard planning purposes.

Rising sea levels and storm surge will increase the risk of salt-water intrusion and coastal inundation in low-lying coastal areas. They will also impact the frequency of flood events across flood management land drainage, increasing wear and tear and causing assets to degrade at a faster pace.

29 <https://www.mfe.govt.nz/climate-change/assessing-climate-change-risk>

Issue: Increased frequency and severity of drought events

Increased and prolonged periods of drought are occurring now and are predicted to increase over the next 30 to 50 years in parts of the Hauraki district, Matamata and Thames-Coromandel. More frequent droughts are likely to lead to water shortages, increased demand for irrigation and an increased risk of wildfires⁽³⁰⁾

Soil strength is partially determined by moisture content. Over 90 per cent of the council's stopbanks are earthen structures. As moisture content reduces during a drought, soil strength reduces and cracks occur, increasing the likelihood of failure during an extended flood event.

Over 50 per cent of pump stations and floodgates are built on marine muds and peat. During a drought, cracks can occur between concrete structures and foundational soils, allowing water to permeate and increasing the risk of asset failure.

Droughts also impact water levels, dissolved oxygen levels, and water acidity within council and tertiary authority drainage systems. This will increase the likelihood of localised extinction events for aquatic and bird life, as experienced recently during the botulism event in the Piako river.

Increased acidity also reduces the life of pumps, pipes, and other concrete structures, significantly shortening asset lifespans. It is predicted that this will lead to a significant number of asset failures in 20 to 30 years' time.

It is expected there will be increased sedimentation issues in rivers due to lack of consistent flows, which will have additional impacts on the 'blue economy'⁽³¹⁾ and environment of the Hauraki Gulf.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Continue with current management approach	<ul style="list-style-type: none"> Reliance on current infrastructure approach to accommodate the short to medium-term effects of climate change. Deferral to a time when more substantial provision is needed. Accumulation of infrastructure debt. Risk that insufficient provision is in place. 	✓			H
2. Amend decision making processes	<ul style="list-style-type: none"> Impacts of climate change will become part of all asset-related decision-making processes. Complete and have approved internal climate change guidelines and the Sustainable Infrastructure Decision Making Framework. Recognise the inherent uncertainty faced across the region and apply a Dynamic Adaptive Policy Pathways (DAPP) approach to policy and decision-making. Changing in decision making will require resource and effort to consult, collaborate and change processes. 	✓	✓		M
3. Build knowledge	<ul style="list-style-type: none"> Implement monitoring in years where there is a drought to assess infrastructure damage and alter renewals priorities accordingly. Monitor pumps and floodgates to better understand the impacts of climate change on asset use and lifespan. Continue investing in flood risk forecasting and coastal inundation and prediction tools. Improved understanding will allow council to better 	✓	✓		L

30 <https://www.mfe.govt.nz/climate-change/likely-impacts-of-climate-change/how-could-climate-change-affect-my-region/waikato>

31 <https://gulffournal.org.nz/article/blue-economy/>

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
	<p>communicate with communities and stakeholders via the regional hazard’s portal and other channels.</p> <ul style="list-style-type: none"> Additional cost impacts to additional monitoring and investment. 				
4. Community engagement	<ul style="list-style-type: none"> Continue to find ways to engage with and influence stakeholders and community groups. For example as board members in the Hauraki District Council's Wharekawa Coast 2120 and Thames Coromandel District Council's Shoreline Management Plan projects. Develop joint solutions with stakeholders to mitigate the impacts to inland water species and water quality in drainage systems. 		✓	✓	L
5. Change in practice	<ul style="list-style-type: none"> Investigate alternative building methodologies to reduce the impact of drought conditions on future assets. Consistently apply the SIDF, which will require different methods of communication with the affected communities, particularly in considering managed realignment of communities. Apply DAPP as part of the SIDF. This will require a more holistic and long-term approach, informed by evidence. 		✓	✓	M
6. Change in funding agreements	<ul style="list-style-type: none"> Consider changing agreed levels of service provided by flood management infrastructure or alter level of service agreements. This needs to be done alongside communities and stakeholders. Could be done by including the impacts of climate change in updates to the council’s Regional Plan. 	✓	✓		L
7. Increase coastal protection asset base	<ul style="list-style-type: none"> Engineered solutions could be used to provide respite from the effects of coastal inundation and associated erosion. However, these will only buy time until a long term strategy can be developed, agreed on and implemented. Considerable cost implications. May have negative effects on the natural environment and coastal processes. The council’s influence is primarily focused on land management and information for coastal inundation. 		✓	✓	H
Preferred approach	<p>Council wants to respond to the challenges posed by climate change, so option 1 is considered unsustainable and council are already considering ways to implement option 2.</p> <p>Options 3-5 are being considered as part of this LTP, recognising the increased resource implications. Option 6 requires further investigation and consultation before it is a preferred option. Option 7 is not considered a viable option due to the high risk and high costs.</p>				

5.4 Risk of natural disasters and residual risk

Issue: Managing planning, response and recovery from a natural disaster

Extreme events such as tsunamis, coastal storm surge, land instability, earthquakes and volcanic eruptions pose significant threats to infrastructure assets and the services they provide.

In addition, there will always be a residual risk associated with flood events if our assets were to fail or the Civil Defence response was inadequate.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Build knowledge	<ul style="list-style-type: none"> Continue to improve data and monitoring to enhance flood warning and monitoring outcomes as well as response capabilities following natural disasters. For example, by developing flood forecasting models in partnership with stakeholders. Monitor the structural integrity of assets through regular condition inspections. 	✓	✓		L
2. Contingency planning	<ul style="list-style-type: none"> The Regional Asset Management Plan will continue to incorporate residual risk from natural disasters and discuss how they are included in regional asset management planning. Continue to collaborate with local and national Civil Defence and improve response planning. Maintain regional recovery funds, ready for when a significant event does occur. 	✓	✓		L
3. Build back better	<ul style="list-style-type: none"> In the event of a natural disaster causing catastrophic failure of an asset, there is an option to consider how to build back There may be opportunities to actively improve a community following an event. When considering the long-term future of a community, the best outcome may not be to build the same type of asset in the same location, and this is where a better long-term view of assets is required. Would require additional resource from a range of sources. May not be possible to improve future for whole communities. 		✓	✓	M
Preferred approach	<p>The preferred option is to maintain a business as usual approach through options 1 and 2. The council will look to collaborate with stakeholders and central government while considering how option 3 could be implemented following a major event.</p>				

5.5 Environmental and regulatory performance expectations

Issue: Increased regulatory demands

We recognise that there will likely be significant changes to existing legislation and that new legislation will be (or has already been) introduced (refer to Section 2.5.3). For example, the recent decisions on Regional Plan Change 1 will see a change in land use over the next 80 years as part of the Healthy Rivers Wai Ora strategy that aims to achieve complete water quality restoration by reducing the amount of contaminants from point and non-point source discharges linked to agriculture. The changes will affect approximately 10,000 properties over a land area of 1.1 million hectares within the Waikato and Waipā river catchments.

It is anticipated that significant changes in land use farming practices will be required, as well as land use change over time. The effect on existing infrastructure is currently unknown.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Influence	<ul style="list-style-type: none"> Recognise that while we can influence legislation it is not possible to change it once in force. Take an active role in special interest groups and other platforms to collaborate with other local government agencies. 	✓	✓		L
2. Respond	<ul style="list-style-type: none"> Develop methods to deliver increased environmental protection while supporting sustainable development before legislation takes effect. Self-fund or seek community funding. Will require additional levy to be raised alongside additional capital requirements. Retreat from flood protected lands may be favoured as a result of central government directives. 	✓	✓		L
3. Amend decision making processes	<ul style="list-style-type: none"> Set a long-term intergenerational vision for waterbodies, informed by the aspirations of tangata whenua and our wider communities. Requires an understanding of current pressures and an understanding of waterbodies' history, and investigation of options for tangata whenua involvement. Continue to apply the decision-making frameworks being developed (SIDF, Pathways to the Sea). Consider opportunities for greater promotion of catchment-wide initiatives through use of green infrastructure, including promotion of afforestation in upper catchments as a means of mitigating flooding. 		✓	✓	M
4. Compliance	<ul style="list-style-type: none"> Minimum compliance within resource consent and other regulatory requirements. Achievement of currently agreed standards. Likely to result in failure to meet increasing expectations. 	✓			H

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
	<ul style="list-style-type: none"> Declining environmental outcomes, some issues not addressed. Decline in the long-term sustainability of protection schemes. 				
Preferred approach	<p>A combination of options 1-3 will be implemented. We will continue to influence and respond to changes in policy where possible. It will be important to further develop our understanding of the financial and community impacts of these changes. In the long term, we will look at how to set visions and collaborate with communities.</p> <p>Option 4 is not considered sustainable.</p>				

5.6 Business and knowledge capability

Issue: Long-term staff capability

Experienced and skilled personnel are required if a high standard of service is to be provided to the regional community into the future. In relation to infrastructure management, staff must not only possess the necessary skills to carry out routine or core business activities but also the ability to function effectively in emergency situations.

This is a matter of both resource capability and business capacity to continue business as usual works during an emergency. The council recently experienced this issue during the COVID-19 pandemic.

There are concerns nationally and within the council regarding the availability and retention of skilled and experienced staff. There are also issues associated with resilience during CDEM incidents to ensure that the council can respond to incidents without BAU suffering.

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
1. Role requirements	<ul style="list-style-type: none"> Undertake a gap analysis of role requirements in the present and future. Future technology and industry changes will impact this process. Continue to train and involve staff in CDEM. 	✓	✓		L
2. Staff capability	<ul style="list-style-type: none"> Identify training and development solutions to meet role requirements. Monitor, develop and implement solutions. There are additional budget implications to this approach. Actively engage with professional and educational institutions to develop national capabilities. 	✓	✓		L
3. Succession planning	<ul style="list-style-type: none"> Identify staff approaching retirement (or leaving) and develop plans to capture their knowledge. Provide these staff the opportunity to mentor and teach others, allowing them to step back from BAU work. 		✓	✓	

Options	Implications of the options	Year 1-3	Year 3-10	Year 11-50	Risk (L/M/H)
4. Outsourcing	<ul style="list-style-type: none"> Consider alternatives to current recruitment policy and whether talent always needs to be recruited within the council or if this can be outsourced. Outsourcing may impact long-term business capability. 		✓	✓	M
Preferred approach	<p>Options 1 and 2 are a continuation of business as usual. There is a recognised need to implement option 3 to improve succession planning.</p> <p>Option 4 is to be considered on a case-by-case basis but does not currently form part of the council's recruitment strategy.</p>				

6 Infrastructure investment programme

The council recognise that the development of the current programme has assumed a business as usual approach to infrastructure and that there will still be demand for assets in their current locations. As discussed within Section 3.3, council recognise that a business as usual approach is unlikely in reality. There will be difficult decisions and conversations for the council and communities regarding the levels of service provided in terms of what is realistically achievable.

6.1 Planning asset renewals

Council undertake physical inspections of above-ground assets on an annual basis. This allows asset condition to be determined, which confirms or influences the assigned remaining life of the asset (asset lives are contained in zone management plans and in the council's asset management information system).

In addition to visual inspections, the council has undertaken a programme of structural audits which commenced in 2012. To date, structural audits of 95 out of 119 pumpstations (80 per cent), 312 of 429 stopbanks (73 per cent), and 198 out of 479 floodgates (41 per cent) have been undertaken. This programme is ongoing.

For the first 10 years, confirmed works programmes and project estimates are the dominant influence on the forecast expenditure associated with asset renewals. Beyond the ten-year horizon, the combination of current asset values (determined through asset revaluation)⁽³²⁾ and remaining asset lives are used to estimate longer term renewal forecasts out to 50 years in the future. Where practical and safe to do so, the council will smooth planned replacement programmes to ensure effective use of resources and management of risk. Critical assets have a lower threshold for action than non-critical assets.

6.2 Infrastructure expenditure assumptions

The Infrastructure Strategy investment programme is based on the following assumptions:

General
All capital renewal expenditure is based on the continued provision of current levels of service.
Council's zone management plans and a significant planning and consultation exercise have been used to determine issues and understand the asset management requirements.
Council's renewals forecasting and modelling tool has been used as the basis for determining capital renewals costs. Assumptions made by this tool have been adopted by the Infrastructure Strategy.
Asset lifecycle costs are based on useful remaining lives, condition assessments, and replacement values.
Asset replacement costs are based on like-for-like part replacements.
Policy and planning frameworks will limit growth and development in flood-prone areas. Thus, there will be only limited associated impact on additional growth-related investment.
It is assumed responses to major natural disasters will be funded through insurance and damage reserves.
There are sufficient internal and external resources to deliver the planned program.
2021-2024
Any asset health and safety deficiencies identified by operations teams are addressed.
All 2017-20 structural audit report critical recommendations are addressed.
Known asset performance deficiencies are addressed.
All poor condition (grades 4 & 5) assets have been Investigated, scoped, and programmed into the first three years of the LTP.
All projects with a total cost greater than \$150k have investigation and design costs included in the year preceding construction.
All stopbank and spillway bank upgrade projects have been confirmed as below target (grades 4 & 5) performance.
Priority will be given to banks associated with dams (legal responsibility) and spillway banks to ensure emergency storage is utilised correctly.
2024-2031
Pump station and floodgate assets with condition score 1-2, reaching end of life (EOL) can be moved out to beyond years 8-12.
Pump station/floodgate assets with condition score 4-5 reaching EOL should be replaced within years 1-3.
Pump station/floodgate assets with condition score 3 will be replaced at EOL date.
Stopbank renewal frequency calculated from individual bank settlement rates, accounting for subsoil conditions and available freeboard.

Further details on the underlying assumptions, associated uncertainty and the potential implications is provided in Appendix C.

6.3 Total expenditure

In addressing the issues identified in Section 5 of this strategy, the council expects to spend a total of \$1,026 million on capital expenditure between 2021 and 2071. The capital forecasts are discussed in more detail below. Over the same period, \$2,239 million is expected to be spent on non-capital related cost including ongoing operating and maintenance, labour, and depreciation. It is anticipated these figures will be spread across the zones and land drainage schemes as shown in Table 2.

Table 3 Expected infrastructure expenditure, 2021-2071 (forecast inflation included)

Catchment zone	Capital expenditure (\$m)	Operational expenditure (\$m)	Total expenditure (\$m)
Central Waikato	23.2	269.6	292.8
Coromandel	1.1	98.6	99.8
Lake Taupō	380.4	699.9	1080.3
Lower Waikato	2.7	54.7	57.4
Upper Waikato	0.0	9.7	9.7
Waihou-Piako	573.1	974.2	1547.3
Waipā	40.4	105.9	146.3
West Coast	5.5	26.1	31.6
Total	1,026	2,239	3,265

The council were recently awarded \$23.8 million of central government funding towards 10 flood management and catchment projects, as part of the Shovel Ready post-COVID-19 programme, creating over 200 short and long-term jobs across the project's lifetime.⁽³³⁾ Of this funding, \$18 million forms part of the infrastructure capital programme for the LTP period and is required to be spent by 2024. The government funding has been flagged separately within the programme as it is outside of the council's typical funding mechanisms.

The operational expenditure is split between river management, flood control, and land drainage, with depreciation shown separately.

The total expenditure profile over time across the capital and operating expenditure categories is shown in Figure 13. The total annual expenditure is shown from 2021/22 to 2030/31 and then an average spend over five-year periods is shown between 2031 and 2071.

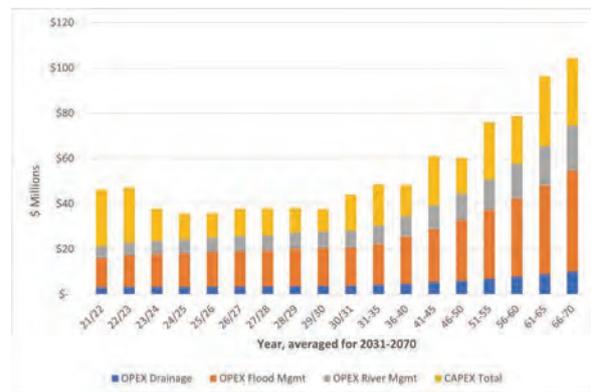


Figure 13: Total expenditure summary (forecast inflation included)

As shown in both Table 2 and Figure 11 above, the vast majority of the forecast expenditure in relation to flood control and river management assets is associated with operational requirements and depreciation.

33 <https://waikatoregion.govt.nz/community/whats-happening/news/media-releases/waikato-gets-23.8m-from-government-covid-19-recovery-fund-for-climate-resilience-and-flood-protection/>

6.4 Capital expenditure

The capital expenditure consists primarily of expenditure associated with asset renewals (\$1,813.1 million), with new capital expenditure totalling \$213.3 million (including inflation). There is considerable increase in new capital from the previous LTP, predominantly due to proposed changes to capitalising stopbank core upgrades (Section 4.6) and capitalising river works (Section 4.7), which contribute \$112 million and \$58.8 million respectively.

There will be an ongoing requirement to make decisions on renewals expenditure on a cyclical basis as part of the processes associated with the council's long term plan. Figure 14 shows the expected renewal expenditure profile against depreciation (an Operational cost). This expenditure forecast has been developed in line with the assumptions outlined in Section 6.2.

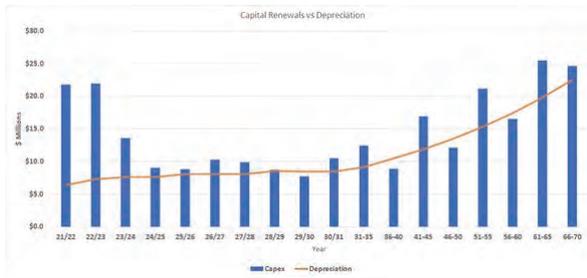


Figure 14: Capital renewals compared to depreciation

Points to note in regard to Figure 14:

- Values are shown **inflated**.
- There is a greater level of capital expenditure in the first three years and this is related to the required asset renewal programme and the shovel ready projects, driven by the asset age profile and deferred works from previous years.
- Assumes climate change provision as from Year 4 (2024/2025).

The split between capital renewal expenditure by asset type is shown in Figure 15 below.

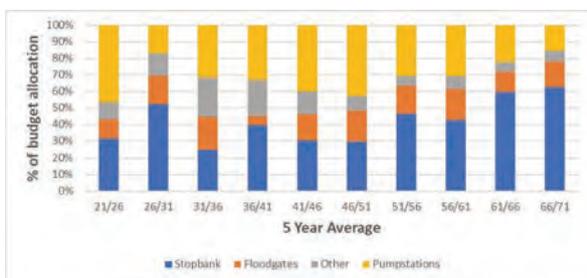


Figure 15: Renewal expenditure by asset type ⁽³⁴⁾

34 Other includes river management and other land drainage works

35 Inflation is included

6.4.1 Significant capital expenditure

There are a number of significant individual expenditure programmes and projects which make up this forecast. Significant capital expenditure is defined as where the project or programme of works exceeds \$100,000.

In terms of renewal expenditure, the schemes within the Lower Waikato and Waihou-Piako zones have the most significant planned expenditure across the region. Table 4 summarises the total zone expenditure by category over the next 50 years.

Table 4: Significant renewal expenditure ⁽³⁵⁾ 2021-2071

Renewal category	Catchment zone	
	Lower Waikato	Waihou-Piako
Floodgate	\$9.8m	\$62.3m
Pumpstation	\$94.6m	\$68.9m
Stopbank	\$128.9m	\$315.7m
Other	\$18.9m	\$4.9m
Total	\$252.2m	\$451.8m

Only one significant project is currently planned within the next 10 years to increase the current level of service provided: the Muggerridge's pumpstation. It will deliver an increase level of service and increase resilience within the lower Piako catchment. Additional new capital projects will likely be identified over the next 50 years, and these will be developed and included during regular revisions to this strategy and other relevant planning documents.

Although not currently classed as new capital, an internal policy change has been made to consider the upgrade to stopbank cores due to the impacts of climate change as new capital, as discussed in Section 4.6. While there are no specific new capital expenditure projects named in the 20 – 50-year window, it is expected that climate change and land subsidence will lead to either additional pump stations or increased sizes of pumps within existing pump stations and increases in stopbank heights if the council is to continue to meet its current levels of service. Additionally, a decision has been made to classify permanent river management structures as capital works instead of their current classification within operational budgets.

There is an ongoing project for the replacement of the Tamahere barge with a self-propelled vessel. The barge is considered plant, so has not been included as new capital below.

Table 5: Significant new capital expenditure (inflated), 2021-2071

Project	Expenditure	Timing	Project assumptions
Waihou Piako			
Investigation, design and construction of new Muggerridge's pumpstation (Piako River Scheme)	\$2.47m	2021-2023	This expenditure assumes community support and adoption of a funding policy to enable this project to proceed. The project will deliver an increase level of service and catchment resilience. Additional central government funding of \$4.4m is being used to deliver the project.
Stopbanks			
Stopbank core upgrades due to climate change	\$112m	2021-2071	Estimates based on assumption of 3.2°C temperature rise. These works are to meet additional requirements to meet levels of service due to the impacts of climate change.
River Management			
Transfer of building permanent river structures from operations budget to capital budget	\$58.8m	2021-2071	Costs based on historic costs to create permanent structures for the last few years, then extrapolated over 50 years. Works will maintain existing levels of service but there is a change in how they are budgeted for.

6.5 Updating expenditure forecasts

It is expected that, with each review, zone/asset management, long term plan and infrastructure strategy, the cost estimates will be updated, particularly in the early stages of the plan. This will allow the forecasts to be updated to reflect more detailed design and understanding of costs associated with those projects progressing in the early years.

PUTTING IT INTO ACTION

Me whakatutuki

Strategic priorities (2020-2030)

Goals for success (2019-2022) SDGs

Water



- Locally developed water policy that complies with national direction and improves areas for safe swimming and mahinga kai.
- Water policy that increases equity, sustainability and opportunities for innovation, particularly in regard to water storage.
- Encourage and support a regional centre of excellence for three waters planning, operations and compliance.

Biodiversity and biosecurity



- Communities are supported to deliver biodiversity outcomes that provide multiple benefits.
- A strategic regional approach is taken to biodiversity investment and partnering.
- Delivery of a refreshed regional pest management approach that is planned, prioritised and performance based.

Goals for success (2019-2022) SDGs

Sustainable infrastructure



- Land is used appropriately. Where land use places increased pressure on public infrastructure, the funding implications are well understood.
- Infrastructure to support economic growth is focused on best sustainable practice. In other words, it isn't at the expense of our natural resources.
- Focused improvement on the alignment of local and regional hazard management and planning.

Climate



- A climate change lens is applied to decision making, laying the platform for a new way of doing business.
- Climate change risk is proactively and appropriately communicated.
- Annual climate change inventories demonstrate improvements year on year.

Goals for success (2019-2022) SDGs

Coastal and marine



- Increased investment in the coast leads to better understanding of the impacts of land use activities on sensitive coastal areas.
- We have partnered with communities to deliver a future focused coastal plan.
- Risk to life and property in the coastal environment is well understood, and the need for public funding is minimised.

Transport connections



- People and communities are well connected to each other, essential services and opportunities such as recreation, education and employment.
- People feel their communities are a valued part of the Waikato and take pride in the region.
- New investment is attracted to the region through improved reputation and partnerships.

Appendix B: critical assets in the Waikato

Asset type	Effect			
	Environment / H&S	Reputation	Items of national significance	Social / economic cost
Tongariro River Flood Management Scheme	High risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Taupō – Kiko Spillway	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
LW – Harris Street (Huntly West) stopbanks	High risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
LW – SH1 (Huntly East) stopbanks	High risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
LW – Rangiriri stopbanks	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Waihou – Te Aroha stopbanks	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed
Piako – Ngatea stopbanks	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed
Waihou – Kopu stopbanks	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed
Waihou – Turua stopbanks	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed
Waipā – Ōtorohanga stopbanks	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed
Lake Waikare scheme	High risk if asset failed	Medium risk if asset failed	Medium risk if asset failed	Medium risk if asset failed
Whangamarino scheme	High risk if asset failed	Medium risk if asset failed	Medium risk if asset failed	Medium risk if asset failed
Coromandel – Coromandel town scheme (inc. Karaka and Whangarahi)	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Coromandel - Te Puru Scheme	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Coromandel – Tapu Scheme	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Coromandel – Graeme’s Creek	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Coromandel – Waiomu Scheme (inc. Pohue)	Medium risk if asset failed	High risk if asset failed	High risk if asset failed	High risk if asset failed
Hauraki - Kauaeranga Scheme	Medium risk if asset failed	High risk if asset failed	Medium risk if asset failed	High risk if asset failed

Key:

-  High risk if asset failed
-  Medium risk if asset failed

Appendix C: infrastructure assumptions and uncertainty

Forecasting assumption	Risk	Likelihood of occurrence	Reasons and financial effect of uncertainty
<p>Projected price change factors —</p> <p>forecast financial information contained in this plan includes a provision for inflation. The council has used the price level change factors supplied by Business and Economic Research Ltd (BERL) to calculate the amount of inflation to include.</p> <p>Where expenditure is subject to inflation, the following cumulative rates have been applied.</p>	<p>That actual price changes vary significantly from the levels assumed.</p>	<p>Uncertainty level: Medium</p> <p>Sources of uncertainty: National inflation rates and economy</p>	<p>Inflation is affected by external economic factors that are outside the control of the council. Given the current economic climate, the actual inflation rates for both the short and long-term are uncertain. While the council believes it has taken a conservative approach by applying the rates supplied to the local government sector by BERL, it acknowledges that actual inflation rates may vary from these in any year of the plan.</p>
<p>Useful lives of significant assets — the useful lives of the council's significant assets are as disclosed in the notes to the accounts.</p>	<p>That the actual life of an asset is shorter than assumed, most likely due to the impacts of climate change. This may impact on the level of depreciation expense recognised, the asset maintenance work required, and the timing of any asset replacement.</p>	<p>Uncertainty level: Medium</p> <p>Sources of uncertainty: Weathering of assets, increasing impacts of environmental changes such as water acidity</p>	<p>Council's most significant assets are its infrastructure assets, which are comprised of flood management works. The useful lives of these assets have been assessed by engineers and valuers. Following any significant capital expenditure, the useful life of an asset is also reassessed.</p>
<p>Sources of funds for future replacement of significant assets.</p>	<p>That the council has insufficient funds to replace significant assets at the end of their useful lives.</p>	<p>Uncertainty level: Low</p> <p>Sources of uncertainty: Changes in the financial climate and financial policies</p>	<p>As part of this LTP, the council is proposing to continue an external borrowing programme. This will provide a facility by which costs to renew / replace significant assets can be funded where these costs exceed the depreciation accumulated on the original asset.</p> <p>The financial strategy sets out how provision is made for damage costs.</p> <p>The revenue and financing policy sets out the funding sources that may be used in relation to capital expenditure.</p>
<p>Sufficient internal and external resources to deliver the planned program</p>	<p>That the forecasted program is not delivered in full due to lack of available resource.</p>	<p>Uncertainty level: Medium</p>	<p>Council will alter resources and project scheduling to meet the program demands. If there is insufficient resource to meet demand then projects will be</p>

Forecasting assumption	Risk	Likelihood of occurrence	Reasons and financial effect of uncertainty
		Sources of uncertainty: Resource availability	outsourced to external suppliers, or projects may be re-phased. This approach is currently implemented as required and is considered business as usual.
Resource consents valid — it has been assumed that resource consents for council assets will be renewed on an as-required basis and that budget is available within the programme.	Resource requirements change and new consents are required, risk of insufficient budget within the programme estimate.	Uncertainty level: Medium Sources of uncertainty: Legislative changes	As identified within Section 5.5, council will influence and adapt to changes in legislation and consent requirements. Engagement with central government will allow council to identify and plan for legislative requirements.
Depreciation rates on planned acquisitions New capital expenditure will be depreciated in line with the depreciation rates set out in the council's accounting policies.	That further review of capital expenditure may alter the depreciation expense incurred.	Uncertainty level: Low Sources of uncertainty: Changes in the financial climate and financial policies	Significant capital works are based on detailed asset management plans which specify the nature and timing of capital works. Due to the long-term nature of these capital works, any impact on depreciation is minimal.
Risk of natural hazards Our region is at risk of a range of natural hazards and disasters, such as earthquakes, tsunamis, flooding, drought, land instability, severe storms, fire and volcanic activity. Based on projections and modelling, it is assumed that natural hazards and disasters will increase in both frequency and severity over time.	There will be new natural or other hazard emergencies requiring work that cannot be funded out of normal budgetary provisions.	Uncertainty level: Medium Sources of uncertainty: While modelling and monitoring are carried out, exactly when or how severe an occurrence will be cannot be predicted. When it comes to the climate change related hazards such as sea level increase and flooding, the main uncertainty is the time until infrastructure service level thresholds will be reached.	There is a possibility that the region will have to cope with a severe adverse event in the LTP timeframe. The potential effect of a natural disaster on the council's financial position is dependent upon the scale, duration and location of the event. Business continuity planning is critical so that the council can continue to perform the functions needed when adverse effects happen. Building resilience into infrastructure may result in increased capital costs. Future events such as flooding, severe storms or earthquakes are likely to result in increased closures of transport networks in coastal, low lying or slip prone areas with links to some communities disrupted. Natural disasters would likely increase insurance costs and have a major economic impact in the region
Climate change	Impacts of climate change will be significantly greater than predicted.	Uncertainty level: Medium	Potential climate change impacts are factored into the council's planning and design activities as prediction and adaptation information becomes available. In particular, the council's infrastructure strategy considers the impact of climate change on the management of stopbank assets.

Forecasting assumption	Risk	Likelihood of occurrence	Reasons and financial effect of uncertainty
<p>Regional growth —</p> <p>the council has estimated that the change in the capital value of the region through new property development will be 1.5 per cent growth. This estimate is used to project likely revenue for those rates set on a per-property charge and in the calculation of rating impacts to existing ratepayers.</p> <p>It should be noted this percentage is based on historical trends and we are in an exceptional point in history.</p>	<p>That growth will not be sustained at the level anticipated.</p>	<p>Uncertainty level: Medium</p> <p>Sources of uncertainty: A portion of regional growth is attributed to net migration. Net migration may be lower or higher than expected.</p> <p>There is a risk of significant deflationary pressure. How this plays out in asset values is currently unclear.</p>	<p>If growth is significantly lower than expected this will impact rates revenue. It will also impact activities such as infrastructure and spatial planning if the region does not follow projected growth.</p>
<p>Treaty of Waitangi settlements —</p> <p>it is assumed that central government will require the council to implement Treaty settlements over the life of this long term plan. This will come at an increasing and significant cost, for which the council will continue to seek recompense from central government.</p> <p>Post-Treaty settlement iwi are likely to want to increase their economic footprint through investment in primary production, housing, commercial development or other ventures. The scale of new ventures will vary but may generate proposals that seek changes to current district plan zoning of Treaty settlement land.</p>	<p>That no financial recompense is made by central government.</p>	<p>Uncertainty level: High</p> <p>Sources of uncertainty: A change in government may change the priority and/or process of addressing Treaty settlements at a national level.</p>	<p>The council is taking a conservative approach to resourcing Treaty settlements as implications are unclear at this stage. No additional resources have been allocated given the uncertainty.</p> <p>If central government does not provide recompense for settlement implementation, this will mean an increased funding requirement which will have to be budgeted to fund the cost to implement Treaty settlement legislation.</p>
<p>Iwi expectations — there is increasing influence of iwi in the region. Existing and nearly completed Treaty settlements are increasing the economic power of iwi and this will increase expectations of council, for example, over natural resource management.</p>	<p>That the council cannot meet iwi expectations and an increased level of service is required.</p>	<p>Uncertainty level: Medium</p> <p>Sources of uncertainty: The expectations of iwi may change or be otherwise different to what the council has assumed them to be, requiring additional</p>	<p>Evolution of the partnership approach and co-management will result in higher expectations from iwi partners,</p> <p>Elevating the maturity of partnership responsibilities and responsiveness in areas such as the meaningful integration of mātauranga Māori.</p>

Forecasting assumption	Risk	Likelihood of occurrence	Reasons and financial effect of uncertainty
<p>Iwi interest in council’s activities will continue to increase, including demands from iwi to participate as a partner in decision making.</p> <p>The council is assuming 20-30 partnership agreements as a result of Resource Legislation Amendment Act 2017 but is taking a conservative approach to resourcing as implications are still unclear.</p>			
<p>Community expectations — public interest in the council’s activities is expected to continue to increase, including demands from communities to participate at all stages of local decision-making processes in ways which suit their interests and needs, as well as increased access to information and decision making.</p> <p>The increasing availability of information creates a more informed public with higher expectations, but is accompanied by the polarising impacts of social media in civic engagement. Increasing public expectations of environmental quality also drive up treatment standards, and therefore the costs of meeting them.</p>	<p>That the council cannot meet community expectations and an increased level of service is required.</p>	<p>Uncertainty level: Low</p> <p>Sources of uncertainty: Uncertainty is linked to both potential population and demographic changes and the unknown impact of disruptive technologies</p>	<p>Individuals who might otherwise have remained voiceless may connect more and voice their concerns through engagement processes. This may lead to the need for the council to make unexpected changes to service delivery. With increased expectations for co-creation and citizen input in council business that was historically hands-off, increases in costs and longer timeframes may be required.</p>
<p>Global crisis or pandemic — it is assumed that the council will be able to maintain its level of service during a global crisis or pandemic, with sufficient systems and procedures in place to ensure business continuity.</p> <p>It is also assumed that the council will be able to adequately resource and</p>	<p>The effect of a crisis or pandemic on the council will be greater than assumed and levels of service will be significantly affected.</p>	<p>Uncertainty level: Medium — high</p> <p>Sources of uncertainty: The full impact of the COVID-19 pandemic in New Zealand and specifically in the Waikato region is as yet unknown. Even if the COVID-19 pandemic does not end up having a significant impact on</p>	<p>The council has systems and procedures in place for many staff to be able to work remotely if needed, however some of the council’s activities simply cannot be performed remotely.</p> <p>The council may be required to drop many of its business-as-usual activities to focus resources on a major Civil Defence response around the region. Widespread self-isolation, quarantine or</p>

Forecasting assumption	Risk	Likelihood of occurrence	Reasons and financial effect of uncertainty
support any Civil Defence response in the event of a global crisis or pandemic.		the council's activities and levels of service, when another pandemic or other crisis might occur is also unknown.	<p>complete lockdown may have an impact on staff ability to operate flood management assets if not deemed essential work by government.</p> <p>There would likely also be a significant impact on some ratepayers' ability to pay their rates, therefore affecting the council's income.</p> <p>The council's investment fund would be negatively affected by national and global economic downturn due to pandemic responses.</p>

