

Te Rautaki Hanganga 2024-54 Draft Infrastructure Strategy 2024-54

Infrastructure Strategy

2024-2054

Quality Information

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Revision History

Revision	Revision Date	Details	Authorised	
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Draft v6	22 Feb 2024	Responding to Audit NZ review feedback	BK	
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Draft v9	12 March 2024	LNIRM KRH change 169m investment	DJ	

Executive summary

Greater Wellington's Infrastructure Strategy tells you how we plan to manage our infrastructure over the next 30 years. To support the extraordinary region: thriving environment, connected communities, resilient future vision we have for the region, this strategy defines the nature of the challenges we face, our approach and options for dealing with those challenges; and the implications of these actions as we work towards intergeneration equity.

The Infrastructure Strategy is informed and delivered by the following asset management plans –

- Metlink Public Transport
- Flood Resilience
- Regional Parks
- Environmental Knowledge and Insights
- Harbours
- Water Supply – Resource Services Plan

Our strategy for GW infrastructure responds to some big regional challenges:

1. Ensure Te Taiao is protected, and its resilience retained
2. Climate change and adverse natural events
3. Managing forecast change in demand
4. Managing risks, infrastructure performance and cost within our changing context

Introduction

Infrastructure is the Council's biggest area of activity (regulator, funder and provider): GW is responsible for \$2.2 billion of assets. The core infrastructure assets we own for bulk water supply, flood protection, and public transport constitute the majority of Greater Wellington's asset value. These require our largest annual operating expenditure commitments. These assets all enable and support our activities and outcomes for the region.

The infrastructure GW manages plays a key part of its critical kaitiakitanga role - ensuring the well-being of our local communities and environment.

Scope of Strategy

The strategy identifies our significant issues, the most likely scenarios and significant decisions we need to make, against the 30-year timeframe.

GW manages the following infrastructure portfolios.

- Water Supply
- Metlink Public Transport
- Flood Resilience
- Regional Parks
- Environmental Knowledge and Insights
- Harbours

This Infrastructure Strategy provides details of the level and timing of investment needed to operate, replace, renew and upgrade existing facilities and the Financial Strategy outlines the required rating and debt levels to fund these investments. Together the two strategies outline how Greater Wellington intends to balance investment in assets and services with affordability. No material assumptions used in the preparation of this document have a high level of uncertainty. We have applied a precautionary and prudent approach to the consideration of available options and scenarios presented within this strategy.

What has changed since 2021?

Much of the information and high-level assumptions in our preceding infrastructure strategies are valid today. Some things have changed over that time. The scale of our infrastructure network has continued to grow. Our operating and maintenance commitments have also grown. Scopes of planned work have changed. Keeping budgets realistic and in-line with our expected workload is fundamental to prudent asset management.

The type of work GW needs to do has not changed. However, we continue to review and adjust how we operate and how we deliver our services. Programmes of work originating from our previous Infrastructure Strategies continue through into the 2024 strategy addressing issues that continue to hold relevance today (Table 1).

Table 1: The status of issues and options proposed in 2021's Infrastructure Strategy

2021 Issue	Timing of project	Principal Option	Costs (\$000)	Status 2023
Achieving Carbon Neutral	2022-2024	Belmont (Waitangirua) recreational facilities	\$830K (Low Carbon Accelerator Fund)	Renamed 'Recloaking Papatūānuku' – upscaled to \$29.3m (2024-33)
	2024 - 2026	Bus Layover Decarbonisation	\$4.3M	Rephased 2024-28
Asset renewals as a critical enabler of resilience and adaptation	2021-51	Deliver major Floodplain Management Plans projects	\$223M	As planned
	2021-24	QEP Coastal Erosion Plan – Managed Retreat	\$2.3M	Project rephased 2025-27 \$2.7m
	2021-22	Ground strengthening Waterloo treatment plant	\$4.4M	Initial geotechnical assessment and ground injection trials complete. Options being reconsidered
	2021/22-2023/24	Replacement of Kaitoke main, Silverstream Bridge	\$30.5M	Underway - construction planned until 2025 (expected cost \$92m)

2021 Issue	Timing of project	Principal Option	Costs (\$000)	Status 2023
	2021/22	Kaitoke Flume Bridge Seismic Upgrade	\$4.2M	Project budget increased to \$42m. Construction expected to be complete in 2025
Delivering an efficient, accessible, and low carbon public transport network	2021/22 - 2049/50	Metlink Bus new capex	\$28M	
	2023-2026/27	Waterloo Interchange	\$22M	Revised to \$115m 2024-28
	2021/22 – 2023/24	Integrated ticketing solution	\$48.4M	Rephased 2024/25 estimated \$60m
	2023/24 - 2029/30	Upgrading rail station customer amenities	\$19M	
		Wairarapa and Manawatu rail service and capacity enhancements	\$568M	As planned – Crown bid approved. GW contribution \$57m 2024-2029
Delivering our critical assets	2022-30	Gear Island and Waterloo wells replacement	\$18M	As planned
	2032 -36	Kaitoke intake	\$36M	Budget and timing to be confirmed
	2021/22 - 2049/50	Metlink Bus Capex renewals	800k to \$1.7M	
	2021/22 to 2050/51	Lower Wairarapa Development Scheme, including the George Blundell Barrage	\$220.1M	As planned. \$104.1m 2024-54 overall

2021 Issue	Timing of project	Principal Option	Costs (\$000)	Status 2023
Meeting future demands	2021-23	Installation and provision of regional-scale monitoring and structures	\$468k	As planned
	2021-25	Te Marua capacity optimisation	\$38.9M	Project budget upscaled to \$59m. In design and construction phase.
	2021/22 - 2032/33	RiverLink - Te Wai Takamori o Te Awa Kairangi	\$76.5M (Flood)	As planned – budget revised to \$287.2m 2024-33.
	2032 -49	Water Supply assets to support growth	\$19M	Budgets and timing to be confirmed.

Other factors have had an impact on what and how we deliver services and when, including;

- Effects of Water Reforms
- Continued change in the Carbon neutrality and climate change areas – with increasingly ambitious change programmes, infrastructure investment and policies
- Inflationary pressure on our economy following Covid-19 and world-wide commodity prices pressures from the Russia/Ukraine conflict combined with labour shortages affecting key sectors including public transport
- Since the last Infrastructure Strategy, we have reviewed and revised our Catchment and Environment activities, culminating in the creation of the new Rōpū Taiao (Environment Group) – with new operating models, functional groupings and management structures
- We have implemented of our new asset management information system along with an update to our business processes. Our asset data structures have been updated, with allowance for spatial data improvements and field-mobility.

Our Strategic direction

Our vision and priorities

Greater Wellington’s Strategic Framework (Fig. 1) recognises the importance of infrastructure for delivering our vision and focus areas. The framework links draws together high-level planning principles across Activity Management Plans, the Finance Strategy and the Infrastructure Strategy.

Strategic Direction

A high level integrated overview of the principles that guide our planning

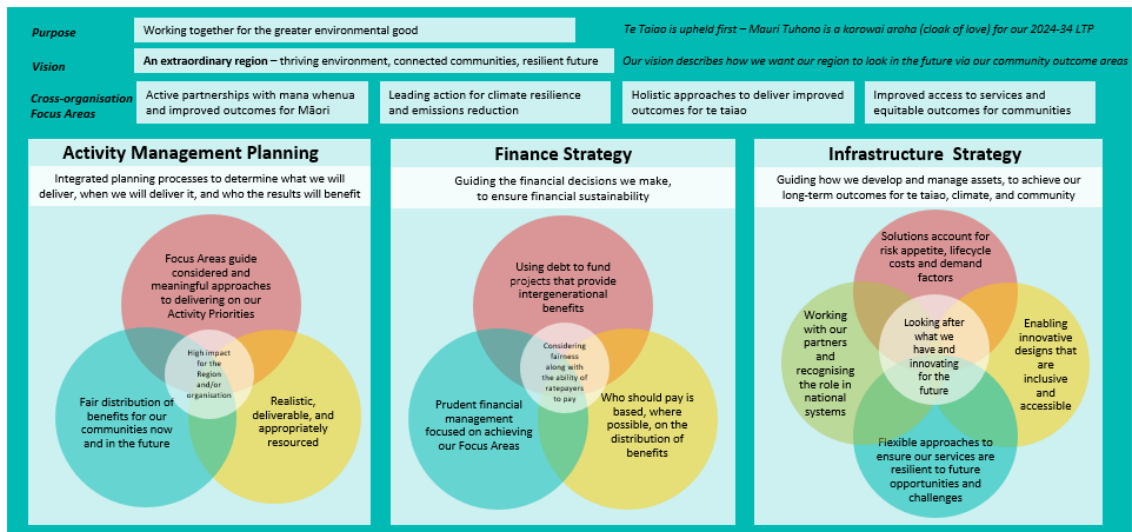


Figure 1: Greater Wellington’s Strategic Framework for the 2024 Long Term Plan

This framework outlines how our assets and the activities they support will contribute to achieving our vision and focus areas.

Infrastructure Strategy Principles

We take a principles approach to how we manage our assets, ensuring a consistent and considered approach.

- Solutions account for risk appetite, life cycle costs and demand factors
- Enabling innovative designs that are inclusive and accessible
- Flexible approaches to ensure our services are resilient to future opportunities and challenges
- Working with our partners and recognising the role our infrastructure plays in national systems
- Underpinning these is a central principle ‘Looking after what we have and innovating for the future’



Our assets and the services they provide

Asset profiles provided below are summarised as at 11.12.2023.

Water Supply






The bulk water supply assets include a network of pipelines, pumping stations, reservoirs, treatment plants and other assets. Greater Wellington owns the bulk water supply assets.

Greater Wellington provides bulk water supply to four of the region’s cities - Wellington, Porirua, Hutt, and Upper Hutt. Those cities supply water to the end consumer through their local reticulation networks. Wellington Water Limited, a council-controlled organisation owned by the six local authorities, is contracted to manage the water supply activity on the Councils’ behalf.

Assets	Levels of Service	Performance (2022/23 Annual Report)
Distribution pipework 187 km	Provide water that is safe, and pleasant to drink	
Treatment Plants (4) Tunnels 9 km		
Water storage (3) Pump stations (15)	Provide a continuous and secure bulk water supply	
Roads and tracks 45 km Raw water intakes & wells 2,688 Aquifer wells (18)		Sufficient water cannot be guaranteed to meet normal demand in a drought with a severity of greater than or equal to 1 in 50 years.



Metlink Public Transport

Greater Wellington plans, funds and operates the Metlink Public Transport network of train, bus and harbour ferry services throughout the region. We own and maintain parts of the public transport network including trains, railway stations, and bus shelters. We contract companies to operate the train, bus and harbour ferry services on our behalf. Ownership of the buses or the ferries is predominantly with operators.

Assets	Levels of Service	Performance (2022/23 Annual Report)
<p>Rail Rolling Stock (108) Buses 'On Demand' (6) Buildings (Bus 634; Rail 126) Structure – Rail (235) Barrier lines – Rail (189) 13,477 m Footpaths and Tracks – Rail (21) 2,899m² Signs (Bus 7,373, Rail 2,336) Furniture (Rail 2,738, Bus 114) Equipment incl. CCTV/security (Rail – 1,953, Bus - 37)</p>	<p>Provide a consistent and high quality customer experience across the public transport network</p>	<p> Both satisfaction Rail services overall and convenience of paying for Metlink services met target. Punctuality targets were not met - affected by speed restrictions on rail network – affecting passenger satisfaction. Punctuality of bus services and passenger satisfaction affected by driver staff shortages (Bus) and route compliance. Satisfaction with information services affected by delays and disruptions.</p>
	<p>Promote and encourage people to move from private vehicles to public transport</p>	<p> Per capita boardings recovering but still reduced compared to pre-Covid levels.</p>
	<p>Provide fit-for-purpose vehicles, infrastructure and services to continually deliver a high quality core network that meets ongoing demand</p>	<p> Station/stop/wharf satisfaction possibly affected by severe weather events, although satisfaction with condition of the vehicle fleet met targets.</p>
	<p>Gross emissions for Metlink's public transport fleet will be minimised, reducing the offsets required to reach net carbon neutrality</p>	<p> Emissions reported (21,019t) above reduction target (19,223t).</p>
	<p>Reduction of accidental death and serious injury on the public transport network and prioritisation of safety and maintenance on the Public Transport network to encourage safe behaviours</p>	<p> Targeted 5% reduction not met - 3 incidents of serious injuries and no deaths.</p>



Flood Resilience

We manage flood risk from the region's rivers and streams. We investigate flood hazards, develop floodplain management plans and maintain and build flood protection works in accordance with these plans. We also provide an advice and consultation service for internally and externally in relation to flood and erosion risks. In providing this activity we also enable public recreational use and enjoyment of river corridors and contribute to the restoration of the natural and cultural values of rivers.

Assets	Levels of Service	Performance (2022/23 Annual Report)
Buildings (23) Structure (4,971) Erosion control vegetation areas (1,202 by Model Category)	Progress towards completion of RiverLink - Te Wai Takamori o Te Awa Kairangi flood control works	
Footpaths and Tracks (562) 230,733 m ² Barrier lines (58) 67,477 m	Provide the standard of flood protection agreed with communities Provide information and understanding of flood risk in the community	 Tracking ahead of target with Flood Management Plans. Consulting delays affecting consenting of proposed works. Work delivery has been affected by weather.


Regional Parks

Greater Wellington manages a network of Regional Parks and Forests for the community's use and enjoyment. The network includes a range of unique natural areas for recreation and conservation. We plan for the future of the network, provide services and facilities for visitors and work with Mana Whenua and community groups to protect and restore the environment of regional parks.

Assets	Levels of Service	Performance (2022/23 Annual Report)
Amenity area (70) Building (197) Environmental area (39) Park furniture (440) Heritage feature (166) Sign (1,856) Structure (1,083)	Protect and care for the environment, landscape and heritage	 Behind target for grazed land retirement and restoration, although more than doubled the target for indigenous species planted.
Footpaths and tracks (2330) 454,826 m ² Barrier lines (1,316) 357,266 m	Customer satisfaction and improved public access	 Parks visits (1.68m) declined from previous years. New online method tracking user satisfaction results have shown a reduction (to 84%).


Environmental Knowledge and Insights

We monitor rainfall, river flows, groundwater levels and quality, freshwater coastal water quality, air quality and land quality and biodiversity. We gather this information to carry out our regulatory functions, to monitor the state of the environment and measure the effectiveness of policy statements and plans, and to make the information available to the public.

Sites (number)	Levels of Service	Performance (2022/23 Annual Report)
Air Quality Monitoring (8) Auto Freshwater Quality (8) Auto Groundwater Level (92) Auto Lake Level (8) Auto Rainfall (82) Auto River Level (71) Auto Tide Level (2) Auto Wetland Level (7) Meteorological (24)	Provide environmental information to the community and our stakeholders.	

Harbours

We provide aids to navigation to assist all users of the region's coastal waters to navigate safely. This includes providing accurate, relevant and timely information via our Harbour Communication Station (Beacon Hill).

Assets	Levels of Service	Performance (2022/23 Annual Report)
Buildings (9) (incl. 6 lighthouses and 1 Signal Station operated 24/7) Equipment (179) Structure/pile light (12) Vessels (3)	Manage the safety of marine activities in the region's waters.	 Risk reviews tracking behind target.

Critical Assets

Central to managing risks, hazards and resilience is the criticality of assets. Critical assets are those that, were they to fail, would likely result in significant financial, environment and social cost in terms of impact on strategic priorities and agreed level of service, the environment, the organisation's reputation or priorities, or economic and financial impacts.

A criticality framework is used to ensure a consistent approach to assessing the probability and consequence of failure. The criticality ranking aligns with the Global Criticality Rating, subsequently developed by the NZ Treasury – National Infrastructure Unit. The criticality of all Greater Wellington's assets (1 (Insignificant) to 5 (Extreme)) has been established and used to inform their lifecycle management and prioritise associated work programmes.

Asset management approach

GW is committed to best practice asset management as a core business process. By managing assets and long-term works programmes we aim to deliver agreed levels of service, in the most cost-effective manner, throughout their lifecycle.

Greater Wellington uses its asset management plans as a basis for, and to deliver, the Infrastructure Strategy. Our approach is guided by the International Infrastructure Management Manual (IIMM). Asset management is a continuous exercise and Asset Management Plans are reviewed every three years, to deliver activities and contribute strongly to Greater Wellington's priorities.

The three components of best practice asset management relevant to this strategy are-

- Lifecycle analysis
- Service Levels and
- Future demand and risks.

Lifecycle analysis

Greater Wellington uses a lifecycle management approach in its management of assets. In general, we maintain our assets until they reach the end of their useful lives, when they are either renewed, replaced, or upgraded. When making decisions we consider lowest long term/whole of life cost - rather than short term savings. Where levels of

service are highest, decisions to replace or perform a maintenance renewal may occur earlier in the standard asset lifecycle.

Asset knowledge and information is crucial; it underpins this Infrastructure Strategy, and the LTP, and enables evidence-based decision making. Our knowledge of our assets and forecasting capability has continued to grow – as part of the implementation of our new asset management information system – Ngātahi. Asset data and insights perform an important role in optimising asset useful lives.

The useful lives of major classes of fixed assets have been estimated as follows:

Port, wharves and paving	2 to 100 years
Operational buildings	5 to 75 years
Operational plant and equipment	2 to 40 years
Operational vehicles	2 to 34 years
Flood protection infrastructural assets	10 years to indefinite
Transport infrastructural assets	4 to 150 years
Rail rolling stock	20 to 30 years
Navigational aids infrastructural assets	10 to 50 years
Parks and forests infrastructural assets	5 to 155 years
Regional water supply infrastructural assets	3 to 214 years

An asset's effective useful life is managed based on:

- Assets Health profiles (including observed condition, function, capacity and utilisation) and Risk profiles (including asset criticality, risk consequence and risk likelihood)
- Performance and customer service issues
- Growth and changing demands
- Ongoing maintenance requirements
- The differing economic lives of individual assets

Condition, data confidence, criticality and asset management maturity are all based on 1 – 5 rating scales (Table 2). Table 3 summarises the value, condition, reliability of asset data and criticality of the assets covered by the Strategy.

Table 2: Key for condition, data confidence, criticality and asset management maturity scales

	Condition	Data confidence	Criticality	Maturity
1	Very Good – only normal maintenance required	Systematic and fully optimised data programme	Insignificant - negligible social or economic impact	Aware (Maturity 0-20) Intentions to develop Asset Management Plans (AMPs)
2	Minor defects only – minor maintenance required	Reliable data in information system with analysis and reporting	Minor - minor service disruption	Basic (Maturity 20-40) Plan contains basic information on assets, service levels, planned works, and financial forecasts.
3	Maintenance required – significant maintenance required to return to the expected level of service	Sufficient information to support basic analysis	Moderate - serious localised impacts and cost	Core (Maturity score 40-60) Approach to risk, condition and performance assessments, demand forecasts, 10yr financial and an improvement plan.
4	Requires renewal - significant renewal/upgrade required	Basic /incomplete information based on assumptions	Major - major disruption over an extended period	Intermediate (Maturity score 60-80) Strategic context, analysis of condition and performance, customer engagement in LOS, Optimised Decision Making (ODM)/risk applied to projects.
5	Asset unserviceable – Asset requires replacement	No asset register	Extreme - significant, region wide, long term disruption and significant cost to restore service Negligible social or economic impact	Advanced (Maturity score 80-100) Programmes driven by optimised decision making, risk management and service level /cost trade off. Improvement programme focus on maintaining ongoing practice

Table 3: Asset group profiles

Asset Group	Asset value* (2023)	Overall condition	Data confidence	Criticality	Maturity
Water Supply	\$654.2m	2 -Minor defects only	2 -Reliable	5 -Significant – for the entire network	4 – Intermediate
Flood Resilience	\$462.5m	2 -Minor defects only	3 - Sufficient information	5 –Significant – stop banks, flood gates, barrage gates, detention dams	3 – Core
Metlink Public Transport – Rail	\$516.6m	3 -Maintenance required	2 - Reliable	3- Moderate	4 – Intermediate
Metlink Public Transport – Bus and Ferry	\$64.4m	3 -Maintenance required	3 - Sufficient information	3- Moderate	4 – Intermediate
Regional Parks	\$126.6m	2 -Minor defects only	2 -Reliable	3 -Moderate	4 – Intermediate
Environmental Knowledge and Insights	\$4.0m	2- Good	2 -Reliable	4 -Major River and rainfall monitoring equipment	4 – Intermediate
Harbours	\$1.9m	2- Minor defects only	3 - Sufficient information	3 -Moderate for the Signal Station at Beacon Hill	3 - Core

* Source: Greater Wellington Regional Council Annual Report 2022/23).

Levels of service

Greater Wellington’s strategic priorities drive levels of service, which in turn influence timing and quality of maintenance, renewals and upgrade works. Levels of service are

therefore the vital link between Greater Wellington’s priority areas and expenditure requirement, and account for expenditure differences between:

- Asset types (such as between Water Supply and Parks assets)
- Asset components (such as between bus stops and railway carriages)
- Expenditure categories (such as between maintenance and renewals).

Capital development funding is categorised according to whether it predominantly meets levels of service, growth or renewals needs.

Future Demands and Risks

Section 101B(3)(b) of the Local Government Act requires local authorities to provide for the resilience of their infrastructure by identifying and managing risks. Infrastructure managers are obligated to integrate increasingly complex risks and challenges within decision-making processes. This includes the regulatory reforms, limiting carbon emissions, adapting to climate change, natural and human-induced disasters and the structural aging of infrastructure.

Risk management involves assessing and managing likelihood and consequences of an event happening that will impact on the achievement of Greater Wellington’s priorities. The individual Asset Management Plans which inform this Strategy analyse the risks associated with the assets and activities and manage and mitigate those risks.



Figure 2: Risk Screening Approach

GW’s corporate risk framework includes ‘Fitness for purpose of assets’ as the main area for measuring and managing risk and uncertainties associated with asset management. This area targets our objective of ensuring assets are fit for purpose and enable the required levels of service to be delivered – both now and in the future.

Our risk management policy uses a top-down strategic view of risk management that is integrated across GW operations and processes. Risk reflects uncertainty about the future, and its impact on the delivery of our objectives depends on the opportunities or threats that arise. Reporting dashboards relating to this area are regularly updated. The dashboard highlights threats and opportunities associated with achieving the desired outcome.

The framework identifies the likely threats that may arise if the desired outcome is not achieved, such as: Inability to deliver strategic outcomes; Affordability to fund whole of asset maintenance and improvements; Legacy assets; Fatal or severe harm to the public; Physical damage to public and private assets; Inability of assets to meet current and future community needs - including climate change; and Non-compliance with legislation. Working in accordance with GW’s asset management policy, infrastructure/asset management

planning documents and supporting systems are seen as important management controls, as are third party relationships and contracts, alongside protecting certain assets through statutory documents (e.g., regional policy statements).

Principles adopted within the framework maintain a flexible and evolving risk management framework which is aligned with ISO 31000:2018. Our approach to risk management includes a formal risk governance structure with accountabilities and responsibilities identified at all levels to ensure our approach to risk is ratified and continuously reviewed. The risk framework and associated dashboard improvements will help GW identify key risks so that necessary controls are implemented – towards a more resilient infrastructure network.

Environmental Scan – Big trends and risks

The following section is a scan of future local needs as well as industry and global influences and the impacts these will have for infrastructure delivery in the region.

Our principles shape how we plan and manage our assets. The considerations in this section will ensure our infrastructure networks are fit for purpose – developed and managed with consideration for long-term use, and lifetime cost and demand factors.

As a region we are facing several challenges, such as housing supply and quality and affordability constraints with water supply, public transport and flood protection infrastructures' ability to support new development. The Climate Emergency (declared by GW in 2019) draws attention to the significance of climate change to our region. Increasing population will place pressure on our existing infrastructure, increase demand for new assets and have potential to exacerbate threats to the health of our waterways, indigenous biodiversity and our contribution to the climate crisis.

Demographics

Projected change to the regional population affects future demand for infrastructure services. Current projections will see our regional population (554,200) steadily grow by 0.9% annually (2021-2051) with an expected growth of 164,000 residents over this period (30%). This is a slight decline in previously projected growth (1%) due in part to Covid-19 related immigration changes. Regional growth rate variations are expected, with higher annual growth rates (1.3%) forecast in Masterton and Carterton. Our greatest numerical increases are expected in Wellington (50,100 additional residents), Lower Hutt (34,900) and Kapiti (21,100) (Sense Partners 2023). Age profile projections indicate a progressively ageing population structure. The highest growth rates are projected within the +50-year age groups, especially in Kapiti and Wairarapa. Relative growth rates also vary by ethnicity. Māori and Pacifica groups are projected to increase as a proportion of the total regional population, particularly in Porirua and Lower Hutt. These projections collectively suggest a steady increase in the regional population that will increasingly age and become more ethnically diverse. As population increases, we can expect an increase in the number of residential dwellings and demand for GW infrastructure and services. Factoring in expected future demand is important as a means of future-proofing our infrastructure and associated services.

Economic uncertainty, affordability challenges, and resource shortages

Economic conditions have fluctuated markedly over the last three years alongside responses to the Covid-19 pandemic and global conflict, particularly in Ukraine. Supply-chain shocks, inflationary pressures, and responses in terms of monetary policy to address stubbornly high inflation are expected to continue. While the Treasury considers CPI inflation to be near its peak, they forecast it will be relatively slow to fall away – not moving back inside the 1 to 3% target band until end-2024 (GW Horizon Scan 2023). GDP growth is expected to slow over the short and medium term, with a slow gradual recovery. Unemployment is expected to rise from near record lows. NZ's economic outlook is increasingly uncertain against a backdrop of a highly uncertain global outlook. As a result, we can expect increased costs for GW as costs for staff labour, contractors, resources, physical infrastructure components, and maintenance services increase significantly. The impact on infrastructure is notable, where the costs of construction, maintenance and operating factor into overall infrastructure cycles. This poses challenges as to how GW will balance community need with affordability.

Increasing risk from environmental change and natural hazards

Our climate has already changed and will continue to change. The region will continue to experience more frequent and intense rainfall events, and longer duration and more frequent drought events. The number of hot days will increase, and the number of frosts will decrease. There will be permanent sea level rise and more frequent and intense coastal flooding and erosion. Inland we will see more intense river flooding, and increased slips and landslides. The annual average temperature will also rise. The region will also continue to be at risk from adverse natural events including earthquakes, tsunamis and, increasingly, wildfires – all pose threats to life, property and livelihoods. These impacts will present significant challenges for our region.

Climate change will have adverse effects on our natural environment, agricultural productivity, and our communities. Infrastructure will be impacted that will, in turn, increase pressure on the economy and society. At a broader level, the National Climate Change Risk Assessment 2020 identified priority risks that Aotearoa faces from climate change - outlining the most significant risks across five domains (natural, human, economy, built and governance). In relation to the human domain, risks have been identified to Māori social, cultural, spiritual and economic wellbeing from loss and degradation of lands and waters, as well as cultural assets such as marae, due to ongoing sea-level rise, changes in rainfall and drought. There are risks to Māori and European cultural heritage sites due to ongoing sea-level rise, extreme weather events and increasing fire weather. Ten other 'most significant risks' include risks to the 'Built' domain – including buildings and potable water supplies (where both have disproportionate effects on Māori).

We can anticipate adverse impacts on infrastructure and assets and increasing pressure on the economy and society. Vulnerable assets are likely to become increasingly difficult and costly to insure and maintain (e.g., low-lying built infrastructure).

There is an opportunity to ensure that new infrastructure is resilient to expected natural events – and readily replaceable through modular/relocatable designs. We can ensure there is sufficient future resourcing to undertake preventative and reactive maintenance and ensure continuity of critical infrastructure levels of service, and for GW to demonstrate regional leadership by encouraging positive environmental behaviour and solutions. We have opportunities to transform land-use to encourage nature-based solutions to mitigate the adverse impacts of climate change and strike the difficult balance between mitigation and adaptation efforts when planning. We can avoid investing in services and infrastructure that will not cope with expected natural events.

The importance of adaptation to climate change, as well as actions to mitigate climate change (by reducing greenhouse gas emissions) will increase over the life of this strategy. We need to rapidly reduce greenhouse gas emissions in all sectors while also building resilience and adapting to our changing climate. Major investment is required on both sides of the climate equation – adaptation and mitigation. GW's reliance on third parties to deliver our services across our Metlink Public Transport and Flood Resilience networks highlights the need to take a big-picture view regarding network resilience, and adaptation to climate change.

A wide spectrum of planning and decisions will increasingly need to be guided by climate change projections and continue to adapt as new challenges and opportunities arise. Greater Wellington plays an important role in building understanding of regional climate change projections and our exposure to natural hazards (and the interactions between the two) and coordinating actions to help reduce their impacts on our communities, the environment and our assets.

A coordinated, kaitiakitanga response is essential to wellbeing and resilience

The predicted and anticipated regional growth agenda, carbon reduction aspirations and a healthy environment are not mutually exclusive - they do pose planning and delivery challenges. We need to ensure urban development planning is conscious of current and future infrastructure limitations, including flood risk, and compliance with increasing community expectations, environmental legislation and the ecosystem services values.

These challenges cannot be managed effectively with traditional management approaches. Carbon neutral mandates, urban growth and demand and stricter water quality rules all require changes to what was business as usual.

GW sees these challenges as a context and opportunity to deliver and reshape decisions and plans, redirect energy and create a better environment supporting the needs of our community and ecosystems. The way we respond to the significant issues as a region will enable our transition to a thriving environment, connected communities and a resilient future.

Cross cutting and significant issues

As outlined above, the Wellington Region needs to respond to some big challenges in relation to community wellbeing, climate action, infrastructure affordability, Wellington being home to more people, structural and legislative reforms. Responses to these challenges need to consider fairness along with ratepayers' ability to pay.

To deliver the vision of an 'Extraordinary Region - Thriving Environment, Connected Communities and Resilient Future', the significant issues for infrastructure identified are:

- Climate change and adverse natural events
- Managing forecast changes in demand
- Managing risks, infrastructure performance and cost - within our changing context

Ensuring Te Taiao is protected and its resilience is retained is an underlying infrastructure management issue for GW.

The issues address the focus areas within GW's LTP Strategic Framework:

- Active partnerships with Mana Whenua and improved outcomes for Māori
- Leading action for climate resilience and emissions reduction
- Holistic approaches to deliver improved outcomes for Te Taiao
- Improved access to services and equitable outcomes for communities

These issues are now explored in detail including what challenges they present to GW and how we plan to manage them. Significance is applied as per GW's Significance and Engagement Policy (2023).

Climate change and adverse natural events

The rise in global temperatures is causing more volatile weather, having profound effects on biodiversity and ecosystems and threatening human health and well-being in numerous ways. It is increasingly unlikely that global temperatures can be kept from rising by more than 1.5°C – even with carefully planned and rapid transitions to achieve steep carbon emissions reductions. In Wellington Region the planned emission reductions will be primarily from transport, energy source and agriculture.

GW declared a Climate Emergency in 2019 due to the risk facing our communities. GW has adopted a goal of 40% reduction in Greater Wellington's net emissions by 2025, and to be carbon neutral (have net zero emissions) as an organisation by 2030 and 'climate positive' (be absorbing more emissions than it is emitting) by 2035. Our organisational Carbon Neutral 2030 goal is supported by the Organisational Climate Emergency Action Plan, a Carbon Reduction Policy (2020) and a Climate Change Consideration Guide (2020) requiring options for adaptation and mitigation to be considered for all work. The action plan was updated in 2023 to incorporate a wider range of actions that include: investigating an Energy Transformation Initiative to maximize the potential of renewable energy and batteries to reduce organisational GHG emissions, reduce energy costs, earn revenue and increase energy security, through direct investment and new

supply arrangements, a carbon storage tracking system, enhancing pest animal control to help ecosystems sequester carbon and working with partners to ensure adaptation planning is community-led and informed by sound science and Te Aō Māori. We plan to investigate options for reducing and sequestering emissions on Flood Resilience land including nature-based solutions. Across GW, we will complete and maintain an organisational climate risk assessment and produce and implement an organisational adaptation plan.

At the regional scale, our Regional Climate Emergency Action Plan sets out a 10-point plan for how the Region will address the Climate Emergency, including infrastructure-related actions (e.g., reducing transport emissions by increasing public transport services to Wairarapa and Palmerston North; and ensuring that long term infrastructure investments, including in housing and urban centres, properly account for and are resilient to anticipated increased climate change impacts, including both physical risks and transition risks, and avoid locking in high-emissions activities). GW's infrastructure has an important role to play in achieving the Action Plan, at both organisational and a regional scale.

The greenhouse gas emissions calculated for the Wellington Region are available since 2001 – emissions are tracked on a regular basis. Gross emissions in the region have decreased by 9% between 2018/19 and 2021/22. This reduction was mainly driven by a reduction in transport emissions (-18%), most likely due to the restrictions in transport activities associated with the Covid-19 pandemic response. There was a 15% reduction in waste emissions on the same period, due to improvements in landfill gas capture.

GW has undertaken organisational annual greenhouse gas inventories since 2019. The organisational inventories are verified by Toitū Envirocare. GW's organisational gross emissions have decreased by 5% between 2018/19 and 2021/22. Initial indications are that the 22/23 gross emissions show a significant drop of 23% with the main drivers being the retirement of grazing from parks, decarbonisation of the bus fleet and a higher proportion of renewable energy delivered through the national electricity grid.

It is acknowledged that directly (operational emissions) or indirectly (capital/construction related emissions and decommissioning), infrastructure is a big carbon emitter and therefore has a pivotal role to play in achieving carbon neutrality. The greatest opportunities for organisational emissions reduction from our assets were identified in public transport, retiring grazing in parks, and water supply activities, as well as corporate building energy and fleet improvements. The Regional Parks, Flood Resilience and other activity within Rōpū Taiao provides opportunity for carbon capture and storage primarily through reforestation and wetland enhancement.

GW's carbon reduction will initially focus on reduction of operational emissions. We will achieve net zero carbon in operational energy emissions primarily through the electrification of the public transport network, retiring grazing from the Regional Parks and investing in restoration, and working with Wellington Water to decarbonise the bulk water supply network.

We have retired grazing and are working to restore 128.5 hectares of rare wetland and dune forest in Queen Elizabeth Park and 21.8 hectares of pastureland at Kaitoke Regional Park. We are intending to expand the restoration planting significantly with a boost to Belmont Regional Park’s programme (replanting 700 ha of previously grazed land). These decisions will accelerate our move to become climate positive by 2035.

We acknowledge the need to consider lifecycle carbon impacts of both new and existing assets. Integrating a lifecycle approach to carbon when planning and delivering assets is an important step in reducing carbon emissions to achieve emission targets. As such we are exploring expanding the Carbon Reduction Policy scope to encompass lifecycle carbon of assets.

Through our Procurement Policy we are seeking to encourage carbon, (and environmental and social) conscious purchasing. By implementing sustainable procurement policies we will accelerate progress towards a green, circular economy.

We are on our carbon neutrality journey. Taking a lifecycle approach represents a greater level of commitment. The reduction challenge will lead to new ways of thinking and working, innovation in digital technologies, construction techniques and new product development - underpinned by new infrastructure, policy and investment. Likely scenarios associated with climate change related issues are described in Table 4.

Table 4: Issues, options and their most likely scenarios to address arising from achieving our carbon neutral aspirations, adapting to climate change

Issues	Options	Most likely scenario
<p>To achieve carbon neutrality with operational emissions we need to:</p> <p>Phase out grazing from our regional parks</p> <p>Minimise gross emissions for the Metlink Public Transport fleet</p> <p>Reduce emissions associated with the abstraction, treatment and supply of drinking water.</p>	<p>Policy changes (low carbon consideration policy, energy and low carbon first)</p> <p>Change land uses</p> <p>Strategic changes to PT services and networks to increase patronage and mode shift towards decarbonised PT - decreasing regional transport emissions</p> <p>Changes to levels of service</p> <p>Low carbon Acceleration Fund</p> <p>Low carbon initiatives and innovations</p> <p>New infrastructure, investment and policy</p> <p>Leverage policy and operational initiatives to reduce drinking water</p>	<p>Investigation and assessment of options for water treatment and distribution</p> <p>&</p> <p>Investigate options for reducing and sequestering emissions on Flood Resilience land including nature-based solutions.</p> <p>&</p> <p>PT Transformational Programme (2024-44) & Increasing GW’s control of strategic Public Transport assets. This involves the development of additional depots and charging related infrastructure to support the current and future demands</p>

Issues	Options	Most likely scenario
	<p>network leakages and related emissions</p> <p>Non-asset solutions – manage drinking water demand</p> <p>Offset our emissions</p> <p>Do nothing- submit to >2°C warming /accept climate crisis</p>	<p>of a modern decarbonised bus network</p> <p>&</p> <p>Bus Layover</p> <p>Decarbonisation \$4.3M 2023/24 -2025/26. Electrify the entire public transport system. Achieve an all-electric bus fleet by 2035. Achieve a fully battery-electric light vehicle fleet for the organisation by 2030.</p> <p>&</p> <p>Recloaking Papatūānuku: plant 700 ha of previously grazed land at Belmont Regional Park (east) supported with sustained pest control of planted sites (2024-33)</p>
<p>To achieve net carbon neutrality and mitigate the lifecycle carbon emissions from assets we need to:</p> <p>Reduce carbon emissions associated with newly built assets and materials, manufacturing, transportation, operations, renewals and labour and end-of-life</p>	<p>Policy changes (Lifecycle carbon)</p> <p>Capital Carbon Inventory</p> <p>Permanent Forest Sink Initiative registration of area review</p> <p>Low Carbon Acceleration Fund</p> <p>New ways of thinking and working</p> <p>Innovation in digital technologies, construction techniques and development of standard products– i.e. cement-free concrete, trenchless pipe construction or modular structures</p>	<p>Nature-based solutions with flood protection and erosion control</p> <p>&</p> <p>Low Carbon Acceleration Funded projects</p> <p>&</p> <p>Capital Carbon and Inventory for assets.</p>

Issues	Options	Most likely scenario
<p>Adaptation to climate change for assets at risk from coastal erosion and undermining from sea level rise</p>	<p>Policy changes – including fight or flight, managed relocation/retreat or retire</p> <p>Community and stakeholder awareness, partnership and adaptation approaches</p> <p>Adaptive pathways and system thinking approaches</p> <p>Rebuild or upgrade with new investment and innovation construction techniques</p> <p>Work with TAs (and others) on land use changes</p> <p>Decrease to level of service</p> <p>Do nothing- accept the risk to assets and services</p>	<p>Organisational Climate Risk Assessment</p> <p>&</p> <p>QEP Coastal Erosion Plan \$2.7M 2025-27</p>
<p>Urban development planning is cognisant of current and future infrastructure limitations, including flood risk, and compliance with legislation and the ecosystem services values</p>	<p>Policy changes –no new development on hazardous land. Managed relocation/retreat or retire</p> <p>Adaptive pathways and system thinking approaches</p> <p>Community and stakeholder awareness, partnership and adaptation approaches</p> <p>Work with TAs (and others) on land use changes</p> <p>Vegetated ‘soft’ erosion edge protection</p> <p>Critical stopbank building and /or reconstruction</p> <p>Partnership for new infrastructure investment; edge protection</p> <p>Stimulus funding and recovery approaches</p> <p>Decrease to level of service</p> <p>Do nothing- accept the risk to assets and services</p>	<p>The RiverLink project - Te Wai Takamori o Te Awa Kairangi – will address broader infrastructure issues and flood risks by giving the Hutt River room to move and providing a climate resilient flood defence. This work is in partnership with Taranaki Whānui ki Te Upoko o Te Ika and Ngāti Toa Rangatira, Hutt City Council and Waka Kotahi. It will provide crucial flood protection and river restoration work, improvements to public transport, walking & cycling routes, local roads and the SH2 Melling Interchange, as well as urban revitalisation of the Lower Hutt city centre.</p> <p>&</p> <p>Other Flood Management Plan implementation</p>

Managing forecast changes in demand

Our existing infrastructure networks can generally cope with historical levels of use and demand. However, in the face of increased future demand, and higher performance standards, there are some networks that will not adequately meet expected future demand. Network performance issues will result unless we actively manage demand and/or progressively modernize these networks. Network performance and resilience is predicated on the performance of third parties, particularly in the Metlink Public Transport and Flood Resilience activity areas. Related issues, options and likely scenarios appear in Table 5.

Table 5: Issues, options and their most likely scenarios to address

Issues	Options	Most likely scenario
<p>Need to improve capacity reliability and customer experience across the PT network to enable mode shifts and reduce transport emissions.</p>	<p>Strategic, integrated approach to growth planning – smart connections and the Wellington Regional Growth Framework</p>	<p>Metlink Bus Capex – for a bus service that is accessible, safe and protected from environmental factors is key to an improved customer experience.</p>
	<p>Fund renewals and upgrades of critical assets</p>	<p>&</p>
	<p>New infrastructure, investment and policy</p>	<p>Waterloo Interchange - this project addresses customer experience issues with the existing facilities (including a distributed bus interchange that prevents bus users easily getting the next bus to their destination, lack of natural light, cold and windy). This investment will improve customer experience and enable future Transit Oriented Development at this site - our second busiest station after Wellington - and make public transport a more desirable choice.</p>
	<p>Change or decrease Levels of Service</p>	<p>&</p>
	<p>Partnership and funding models to drive efficiencies</p> <p>Do nothing</p>	<p>National Ticketing Solution – this is a critical component of a modern PT system. It makes it easier for customers paying for PT services across our network. By implementing this, customers from outside of the region will</p>

Issues	Options	Most likely scenario
		<p>be able to seamlessly use PT services.</p> <p>&</p> <p>Making shared and active modes attractive –upgrading rail station customer amenities.</p> <p>&</p> <p>Increasing GW’s control of strategic Public Transport assets. This involves the development of additional depots and charging related infrastructure to support the current and future demands of a modern decarbonised bus network. Initially, the programme will result in the development of bus depots in Lyall Bay and Northern Wellington, as well as the ownership of the Lambton Interchange. Over the long-term, this investment will reduce the overall cost of operating the network (via reduction in fees and charges from operators for their Depot related costs) and provide a fairer procurement playing-field for bus-services operators and new entrants.</p>
<p>Current infrastructure is not capable of safely accommodating additional trains, which restricts the options available to accommodate future demand</p>	<p>Fund renewals and upgrades of critical assets</p> <p>New infrastructure</p> <p>Partnerships and investment</p> <p>Decrease LOS</p> <p>Do nothing</p>	<p>Funding for rail network upgrades between Wellington, Wairarapa and Palmerston North and Wellington</p> <p>Transitional rail – investment 100% Funding Assistance Rate (FAR). This funds work programmes delivered by KiwiRail that target track and civil asset renewals, and capacity and resilience upgrades across the Metro rail network.</p>

Issues	Options	Most likely scenario
Our water supply system is under increasing pressure, with growth relatively high demand and requirements to ensure ecological flows, pushing us towards the limits of our current system.	New raw water source and new assets for growth	Sustainable water supply (Te Mana o te Wai) – including design and consenting of additional water storage lakes.
	Additional water storage	&
	Upgrading existing assets	Renewals and new assets to support growth in Porirua in the long term:
	Different technology (modular desalination)	Pukerua High Level Pump Station; Plimmerton Pump Station;
	Integrated planning and delivery with Regional Growth Plan	Belmont High Level Refill Pump
Partnerships and funding models	&	
Do nothing	Working with Territorial Authorities to manage demand	
The average household water use in the Wellington metropolitan region is 374 litres per person per day. This is significantly higher than the other major cities in New Zealand and comparable cities overseas.	Asset development –	Advocating for rolling-out water metering across Territorial Authority water distribution networks – residential and commercial.
	Advanced meter infrastructure (AMI, or “smart” meters)	
	Demand Management (leak detection, reduce network pressure, education and behaviour change)	&
	Decrease LOS	Education and behaviour change in partnership with the Territorial Authorities.
	Do nothing	

Managing risks, infrastructure performance and cost - within our changing context

The infrastructure industry faces transformative times. Legislative, statutory and regulatory change in all infrastructure fields is ongoing, and may change our role, relationships and ways of operating particularly due to stronger environmental regulation and increasing expectations for positive environmental outcomes. We will likely see new governance roles and changing responsibilities for land-use, water supply and transport.

The drinking water regulator, Taumata Arowai, was established in 2021 with the responsibilities of drinking water regulation and the oversight of wastewater and stormwater. Under current reforms, there will be an increasing focus on water agencies meeting performance and quality targets set by Taumata Arowai (under the 'Local Water Done Well' approach) and ensuring required future capital investments are planned for and resourced.

Market dynamics have led to a skills shortage at all levels of the engineering industry from experienced consultants and contractors to skilled labour. There are several projects nationally and within the region that are limiting the availability of contractors and consultants to progress programmed works. The limited availability is also leading to increased costs, impacting budgets and timeframes for delivery.

It is understood that the status quo will not deliver the future the region needs in the short or long term. To address all these funding, regulatory, skills and capability issues requires a change of paradigm from the way we have often planned and managed the region in the past, to a sequential, multi-disciplinary, multi-agency approach.

We need to explore new streams of revenues for infrastructure assets and identify strategies for partnerships and investment programmes and procurement. Similarly, we need to make evidence-based decisions at the macro scale to deliver services on the back of other major investment for the well-being of our community. We need to prioritise critical and strategic assets that directly contribute to delivering a thriving environment, connected, resilient, low carbon future.

As such it is likely that interdisciplinary, multi-benefit projects such as RiverLink - Te Wai Takamori o Te Awa Kairangi, and the replacement of the Kaitoke water supply main at Silverstream ('Whakawhirinaki' Bridge) will become more commonplace. These projects are being delivered with other stakeholders will replace single focused projects, deliver multi-benefits, and contribute to our strategic priorities. We are redesigning how we work across public and private sectors, combining people, teams and stakeholders collaboratively, powered by partnerships and Treaty-based relationships. These trans-disciplinary teams include engineers, ecologists and planners as well as social scientists can place the right priorities on how to best address the needs of people and their roles in the towns and communities.

With the councils across the region, and other stakeholder organisations, we have been thinking how we will respond and accommodate growth sustainably and resiliently through developing a 30-year Regional Growth Framework (with sight of one hundred years). It is recognised that integrated growth and spatial planning results in healthier, resilient, more productive local communities, homes and places. This integrated planning of core services and infrastructure, including water, parks, transport and mobility, encourages alignment of service planning and mutually beneficial people-centred solutions.

These aspects provide an important perspective to understand how GW can actively manage risks, infrastructure performance and cost within our changing context. At a fundamental level, the resources must be there to continue to maintain critical infrastructure networks. This is addressed specifically in the Flood Resilience area, with increased funding for the ongoing maintenance of critical flood protection works – which is necessary due to the increasing number and intensity of extreme weather events. We need to continue to maintain our flood prevention network to keep our communities safe. Maintaining structures and undertake protective planting both help to reduce the risk of floods affecting our communities. We also plan to continue exploring nature-based solutions, which offer options to restore our ecosystems at the same time as reducing flood risk. Nature-based solutions can include increasing room for river movement, using more native species in riverbank planting and creating new wetlands to slow water flow. Planting results in better water quality by filtering runoff, providing cleaner air, and improved habitat and biodiversity for wildlife. We are doing this work alongside our mana whenua partners.

One area that we are continuing to focus on with the management of infrastructure capital projects is our planning and resourcing, to ensure we deliver achievable capital programmes across our diverse range of activities. Our aim is to continue implementing recommendations from assurance work that has been completed specifically on this area. Achieving the full extent of our planned capital budgets is known as a ‘capital do-ability’ risk – which is being tracked currently at a ‘medium’ level. In recent years, due to the likes of Covid-19 and supplier availability, our performance has been variable. However, several major projects have progressed through early phases of their lifecycle, where the risks of delay and changes to scope are at their highest, and are now progressing with an increased level of certainty through the delivery phases. While some delays result from our reliance on third party agreements and funders, we acknowledge this and accept this presents risks and opportunities that require continuous management and oversight. Our measures to improve performance have been reflected in our performance over the last three years achieving 49% 84% and 82% of our capital budgets – this financial year is forecast to achieve 103%.

The following table (Table 6) outlines the issues for managing risks, infrastructure performance and cost - within our changing context, and the options available to us.

Table 6: Issues, options and their most likely scenarios to address

Issues	Options	Most likely scenario
<p>The condition and configuration of the coastal rail network makes it vulnerable to service disruptions which have a flow on impact into the wider transport system. <i>Noting GW does not own the rail network assets.</i></p>	<p>Partnership for new infrastructure investment and/or edge protection</p> <p>Adaptive pathways and system thinking approaches</p> <p>Risk management approach to service provision</p> <p>Decrease to level of service</p> <p>Do nothing- accept the risk to assets and services</p>	<p>Asset renewals, including risk prioritisation, as a critical enabler of resilience and adaptation.</p> <p>&</p> <p>Working with KiwiRail on resilience and alternative solutions across the rail network to raise visibility of slope stability risk on the rail network and help establish their investment plan.</p>
<p>Water supply network at risk from seismic events</p>	<p>New investment for upgrades and renewal</p> <p>Innovation with construction techniques and development of standard products</p> <p>Adaptive pathways and system thinking approaches</p> <p>Cross Harbour Pipeline</p> <p>Change level of service</p> <p>Partnership for investment</p> <p>Do nothing- accept the risk to assets and services</p>	<p>Waterloo Treatment Plant assessment</p> <p>& Replacement of Kaitoke main, Silverstream ‘Whakawhirinaki’ Bridge \$92M overall project cost (expected completion by 2025)</p> <p>& Kaitoke Flume Bridge Seismic Upgrade \$42M expected completion 2025</p> <p>& Thorndon Pump Station Seismic strengthening</p> <p>& Water Supply resilience to natural hazards and climate change \$64.7m</p>

Issues	Options	Most likely scenario
<p>We are not meeting our 1 in 50-year drought resilience level of service</p>	<p>Reduce consumption (Smart Services implementation, Leak detection, reduce network pressure, Education and behaviour change)</p> <p>Upgrading existing and new assets</p> <p>New raw water source for growth</p> <p>New additional water storage lakes</p> <p>Different technology</p> <p>Integrated planning and delivery with Regional Growth Plan</p> <p>Partnerships and funding models</p> <p>Do nothing - decrease LOS</p>	<p>Require Territorial Authorities to institute the installation of water-metering via their Long Term Plans</p> <p>& Te Marua capacity optimisation \$89M total project cost with an expected completion in 2025. A key part of this project is the construction of a Dissolved Air Flootation Plant that will be able to treat more water quickly to cope with the demands of a 1:50 year drought scenario. The improvements help deal with existing limitations to the treatment of water from the storage lakes and will significantly increase available capacity, by achieving a target treatment capacity of 140 MLD at Te Marua (up from the existing 80 MLD capacity).</p> <p>& Working with Councils to manage demand (including water-metering across their networks)</p>
<p>There is a small backlog of deferred water supply, Flood Resilience, and Metlink renewals which poses a growing risk to service reliability and performance.</p>	<p>Fund renewals and upgrades of critical assets</p> <p>Fund compliance and regulation driven activities</p> <p>Funding options- water levy, KiwiRail partnerships</p> <p>Decrease LOS</p> <p>Do nothing</p>	<p>Gear Island and Waterloo wells replacement – progressive installation of new boreholes to replace those approaching the end of their service lives. The objective is to reduce the risk of asset failure and interruption/limitation of supply.</p> <p>& Kaitoke Intake</p> <p>& Metlink Bus Capex renewals</p> <p>& Lower Wairarapa Development Scheme, including the George Blundell Barrage Gates</p>

Issues	Options	Most likely scenario
		& Deliver major Floodplain Management Plans projects including: <ul style="list-style-type: none"> • Waiohine • Te Kauru (urban reach)
Existing (and potential development) has a greater likelihood of flooding.	Vegetated 'soft' erosion edge protection Continue with traditional protection structures Integrated planning and delivery with Regional Growth Plan New policies - avoidance of inappropriate development in hazardous land Decrease Levels of service Do nothing	Hutt River Erosion – this project involves the identification and selection of options that will ensure the resilience of the Hutt River network, including various methods of river edge protection (where practicable including soft vegetation solutions) and more traditional protection structures. These measures will be in tandem with associated policies and integrated planning initiatives to reduce the risks to communities from flooding.
Increasing customer expectations, legislative requirements and increased and sustained demand for higher standard amenity and recreation facilities and ecological enhancement alongside provision of Parks and Flood Protection services.	Redesigning how we work, combining people, teams and stakeholders, powered by partnerships and Treaty-based relationships Programme and fund provision of recreational and amenity facilities Partnership / alternative funding and delivery mechanisms Non-compliance with legislative and statutory obligations (NPS-FW, Aotearoa Biodiversity Strategy 2020, RPS etc) Do nothing	Reframing our FMPs to deliver an agreed vision for regional rivers alongside implementing the code of practice river management activities. Including: Waiwhetu Lower Wairarapa Valley Development Scheme & Use opportunities to partner with corporates and philanthropic organisations for planting and recreational amenity provision.

Issues	Options	Most likely scenario
<p>Increased demand and legislative changes have resulted in a higher level of service for monitoring of ecology, flood warning, groundwater quantity and quality and soils and climate.</p>	<p>Programme and fund asset development</p> <p>Partnerships and funding models</p> <p>Reduce levels of service</p> <p>Do nothing</p>	<p>Renewal of assets in the environmental monitoring network that supports GW’s ecological, flood warning, ground water, soils and climate activities. By progressively renewing and modernising our monitoring network, we will ensure it stays in tune with evolving end-user needs and meets modern requirements. The investment will address our highest priorities in maintaining the network of assets to a reliable and usable condition to enable the delivery of the monitoring programmes and keep pace with the fast-changing monitoring/information storage and management technology available.</p>

Affordability

The key affordability pressures affect how we can:

- Improve the capacity and resilience of our assets and services – especially Water Supply and Flood Resilience
- Achieve Carbon Zero 2030 and transitioning to a low carbon economy
- Achieve Mode-shift targets
- Manage risks to project deliverability and cost escalation at all stages of planning, design and delivery of capital works (including engagement compliance, risk management, materials, bidding and delivery)
- Budget, recognising the increased demand on, and limited availability, of technical skills and engineering capacity and capability and disrupted international supply-chains
- Adapt to legislative, statutory and regulatory reforms
- Address increasing community and environmental expectations

We recognise the ability to pay is not uniform across the region. Our lifecycle approach to asset management is the method we are using to optimise the timing and scope of capex projects – and to balance lifecycle cost-pressures – while maintaining a healthy balance sheet.

Most of our capital investment will be funded through debt, which will be paid back over an appropriate period for the underlying asset. Operating expenditure is funded out of

operating revenue. Rates and levies are set at a level to ensure that Greater Wellington achieves this objective.

Ensure Te Taiao is protected and its resilience is retained

GW's infrastructure and services have a key role in protecting Te Taiao and our community. Our infrastructure networks are distributed across the region, from mountain-tops, through waterways, servicing rural and urban communities. Our infrastructure must be considered within the context of its relationship with people and Te Taiao. Natural hazard events and climate change pose risks to infrastructure, the environment, the economy and land use. Communities are already feeling the effects of climate change. The resilience of both infrastructure and Te Taiao need to be mutually addressed – to ensure that our future networks reduce or eliminate impacts on Te Taiao and are more resilient to natural hazards and climate change.

For GW, resilience is a measure of the capacity of our communities, built environments, businesses, economy, infrastructure and natural ecosystems to respond and adapt to both sudden and slow-moving changes, specifically growth, climate change and earthquakes. The resilience decisions we make anticipate, prepare for and adapt to changing conditions, seeking to lower the risks, vulnerability and consequences. Approaches can take a range of forms:

- Planning responses
- Adaptive design and engineering methods
- Behavioural change and education

By taking a broader view when defining 'infrastructure', we can better address issues relating to protecting our environment and valuing the role infrastructure can play in restoring natural systems. Critical infrastructure needs to co-exist and perform reliably with heightened future states of change including earthquakes, climate change, sea level rise and other natural hazards.

Infrastructure is not just carbon-intensive, it is resource intensive – consumptive of water, energy and land. Our programmes need to address infrastructure resilience in the wider context of improving our degrading environment and ensure solutions have a positive impact and strengthen Te Taiao. The scale of environmental degradation is such that we may need more infrastructure to deal with hazards.

There is an opportunity to innovate and adopt more people/environment-centred solutions by adapting and applying nature-based solutions to balance or reduce carbon emissions, sequester carbon, and mitigate major impacts. By partnering effectively with Mana Whenua to address key priorities with infrastructure and its relationship with Te Taiao and people, our regional infrastructure will meet our wider organisational goals by applying Te Tiriti o Waitangi principles.

GW's previous Infrastructure Strategies have highlighted the significance of climate change and its effects on infrastructure and services, along with the potential scale of impacts to communities, the importance of community preparation, and the issues

affecting low-lying coastal whenua. Our networks will need to be able to handle a wider array of extremes: from flooding and inundation to drought and temperature extremes - triggering wildfires, alongside the expected extreme rainfall and associated wind and slip damage, erosion etc. While the specific effects of climate change will vary locationally, solutions must take these factors into account. Climate change poses increasing risks to our services due to failure of other infrastructure or services owned, controlled or managed by third parties. Flooding of roads affects our public transport capability; power outages due to extreme temperatures or high winds would remove services such as traffic signals. Similarly Fire and Emergency New Zealand rely on our water networks to fight fires. Network interdependencies present another dimension of vulnerability to the impacts of climate change.

Our specific significant issues relating to the broader issue, options and most likely scenarios (as solutions) include:

- Nature-based solutions
- Demand management
- Options leveraging natural resilience: making room and absorbing impacts through natural systems and processes (as opposed to hard infrastructure); acknowledging the important role wetlands, riparian planting and water sensitive design have to play
- Improving our knowledge base and solution-set to ensure we are aware of risks, opportunities and solutions particularly relating to our critical infrastructure networks
- Continuing with supporting programmes of work addressing our resource consenting and compliance relating to our infrastructure networks

How much needs to be invested

The capital investments Greater Wellington has made in the past, and will continue to make in the future, commit Greater Wellington to annual costs to maintain, operate, renew, and replace these assets.

Capital expenditure

In maintaining levels of service, meeting priorities and addressing challenges, Greater Wellington expects to spend \$1.75b on renewals and new capital between 2024/25 and 2033/34. Forecast annual capital expenditure and debt levels are displayed in Figure 3, under the most likely scenario for the whole of Council, including the four larger asset groups over the period of this Strategy. The corresponding information for the remainder of the 30-year period is shown in Figure 4 (totalling \$9.18b over the 2034/35-2053/54 period). The projections consider our horizon scan and the responses, alongside our planning assumptions noted in the earlier Horizon Scan section. As not all future costs are known, solutions will be developed and costed as part of future annual planning processes (including indicative needs for future additional Bulk Water storage and treatment capacities).

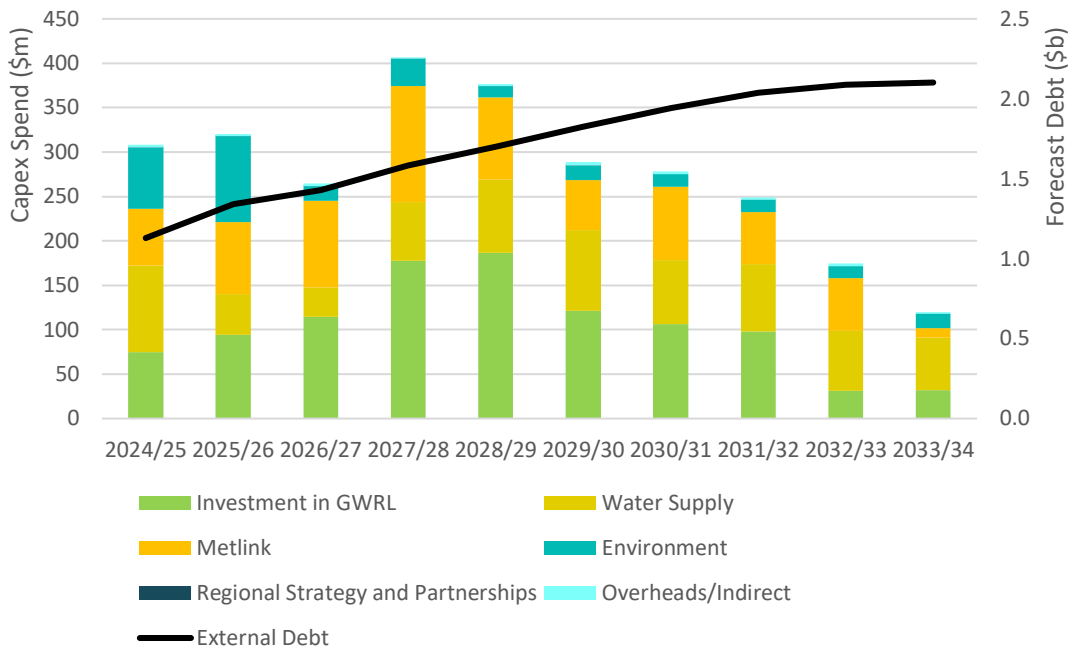


Figure 3: Forecast annual capital expenditure and debt-line for the core asset groups over the initial 10-yr period of this Strategy (including GWRL)

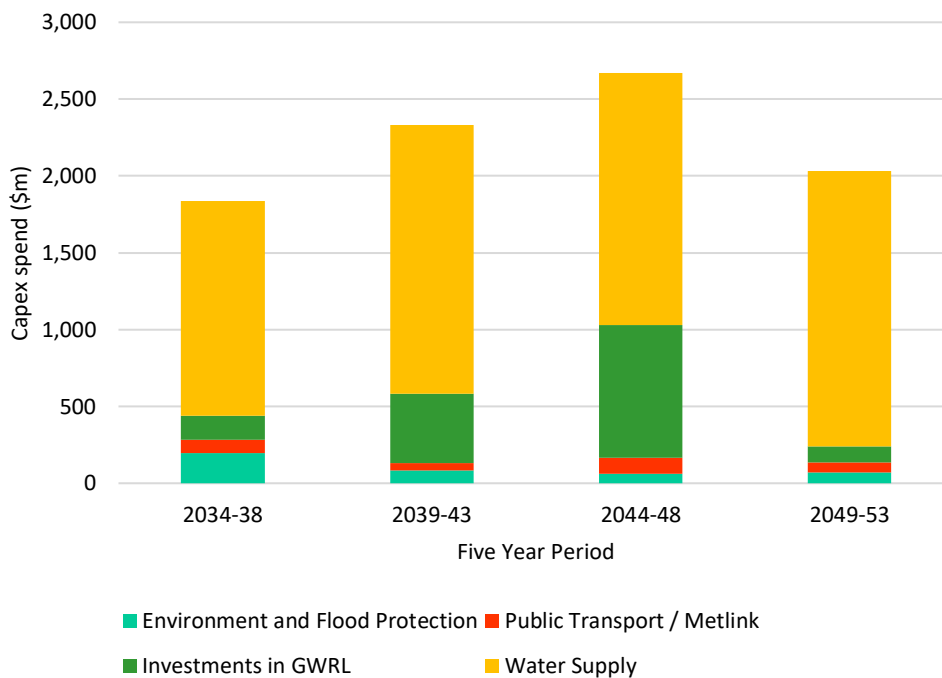


Figure 4: Forecast total capital expenditure for the core asset groups (yrs 11-30)

Operating expenditure

Over the life of the 10 Year Plan our operating expenditure is forecast to increase by 39 percent, from \$547.6m in 2024/25 to \$759.9m in 2033/34. Forecast operating expenditure for each of Greater Wellington activity group is displayed for the first 10 years (Figure 5) and the remainder 5-yr periods of this 30-year strategy (Figure 6).



Figure 5: Forecast annual operating expenditure (10 years)

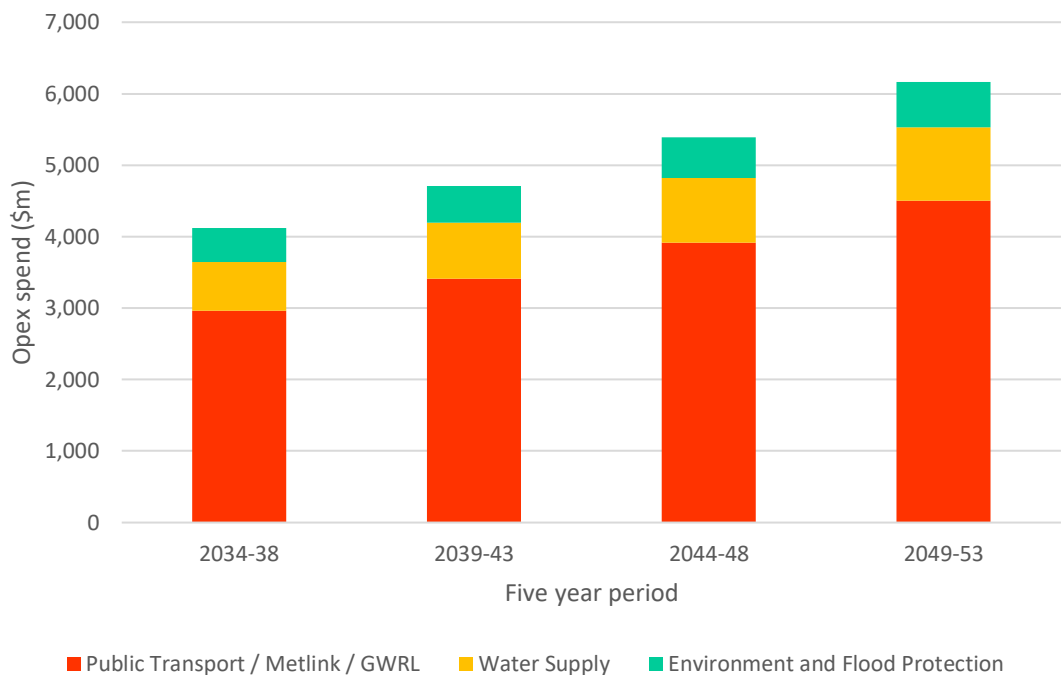


Figure 6: Forecast total operating expenditure (yrs 11-30)

Options and Significant Decisions

Our approach aims to deliver a thriving environment, connected communities, and a resilient, low carbon future for the region. We will manage our infrastructure in a manner that considers the current community and future generations – this means we need to make some significant decisions about capital expenditure required over the 30 years. Table 7 includes what the decisions are, when we need to make those decisions,

and the approximate scale of the costs involved. The timing of those decisions is broadly at two levels: firstly, via the LTP prioritisation/planning process and, secondly, via the Annual Planning process that occurs in the year/s prior to the project delivery. For all issues the risk of deferring capital investment is not achieving the extraordinary region: thriving environment, connected communities, resilient future vision we have for the region. Table 8 shows the impacts on levels of service from these decisions.

Table 7: Infrastructure Strategy issues, the most likely scenario projects

Issue	Timing of project	Principal Option	Costs	Level of Service impact	Risks and implications of deferring
Climate change and adverse natural events	2024-2033	Recloaking Papatūānuku: plant 700 ha of previously grazed land at Belmont Regional Park*	\$29.3m (Opex)	Increase/new	Not reducing public transport emissions and not replanting grazed land will make it very difficult for GW to meet its 2030 carbon neutral goals.
	2024-28 2024-48	PT CBD Layover* Control of strategic Public Transport assets	\$23.58m \$408m	Increase/new	
	2024-33	RiverLink - Te Wai Takamori o Te Awa Kairangi (Flood Resilience)* Associated Land purchase (PT)	\$166.3m \$2m	Increase/new	Not funding or deferring will put existing communities, services, assets, property and the environment at increasing risk from flooding or inundation. Non-compliance carrying legal risks
	24-54	Hutt Wellington Capex (Flood Assets) – Silverstream to Moonshine Bridge Channel Works – Moonshine to Maoribank Improvements – Waiwhetu Improvements – Ava Rail Bridge to Estuary Bridge Improvements – Belmont Improvements	\$213.3m	Meet /current	

Issue	Timing of project	Principal Option	Costs	Level of Service impact	Risks and implications of deferring
	24-54	Kapiti Capex (Flood Assets)	\$31.6m	Meet /current	
	24-54	Lower Wairarapa Valley Capex (Flood Assets) Barrage Gates Tawaha Sill Whakawhiriwhiri Stream	\$131.2m	Meet /current	
	24-54	Waiohine Capex (Flood Assets) North Street Stopbank Kuratawhiti Street Stopbank	\$5.9m	Meet /current	
	24-54	Te Kauru (Flood Assets) Waipoua Urban Reach	\$65.0m	Meet /current	
	24-54	Other Wairarapa (Flood Assets) Dams	\$12.5m	Meet /current	
	2024-2033	Water Supply resilience to natural hazards and climate change	\$64.7m	Meet /current	Not funding or deferring will put existing communities, services, assets, and the environment at increasing risk from water supply network failure. Non-compliance carrying legal risks
Managing forecast changes in demand	2024-31	Johnsonville transport Hub	\$13.3m	Increase/new	Without work and investment, we will continue failing to meet public transport levels of service.
	2024-27	Porirua Interchange	\$7m		
	2024-2029	PT Lower North Island Rail - Rolling Stock and network	\$57m (GW and Horizons)	Increase/new	

Issue	Timing of project	Principal Option	Costs	Level of Service impact	Risks and implications of deferring
		improvements Wgn/Masterton and Wgn/Palmerston North*	Reg, Council contribution)		
	2024-2032	Rail - Metro Rolling Stock fleet expansion and depot extension to meet growth in demand*	\$217m	Increase/new	
	2024-2033	Sustainable water supply (Te Mana o te Wai) – including design and consenting of two additional water storage lakes at Pakuratahi. Construction and operating cost estimates will be identified in future Long Term Plans.	\$35.5m	Increase/new	Potential for: demand for water to outstrip supply resulting in severe disruption to communities; resource consent compliance and environment to be compromised.
Managing risks, infrastructure performance and cost – within our changing context-	2024-2033	Existing Water Supply network renewal	\$424m	Meet /current	Not funding or deferring will put existing communities, services, assets and property at increasing risk.
	2024-2026	Harbours Channel Risk Review implementation	\$558k	Meet /current	
	2024/25	PT National Ticketing Solution – Implementation*	\$47.6m	Meet /current	
	2024-2025	PT RTI 2.0: Replacement of Real Time Information infrastructure	\$2.9m Capex	Meet /current	
	2024-35	PT Buses Replace Trains	\$10.0m	Meet /current	

(* denotes previously approved in past LTPs with revised budget shown). The following are excluded: Corp Support (Fleet and ICT costs), Regional Strategy and Partnerships (Transport Analytics, Stadium Trust- seismic improvements, and Regional Land Transport Strategy and Planning)

Table 8: The impact of the issues and most likely scenarios on our levels of service

<i>Water Supply</i>	We do not propose any significant changes to our current levels of service for water supply The most likely scenarios will address the impacts, and maintain the levels of service for safe to drink, and continuous and secure supply
<i>Flood Resilience</i>	We do not propose any significant changes to our current levels of service for Flood Resilience in the short term of this strategy. Increased investment may be required to maintain levels of service in the face of climate change and sea level rise.
<i>Metlink Public Transport</i>	We do not propose any significant changes to our current levels of service for Metlink Public Transport.
<i>Harbours</i>	We do not propose any significant changes to our current levels of service for Harbours.
<i>Regional Parks</i>	We do not propose any significant changes to our current levels of service for Regional Parks.
<i>Environmental Knowledge and Insights</i>	We do not propose any significant changes to our current levels of service for Environmental Knowledge and Insights.

Conclusions

To support the vision we have for the Wellington region, this strategy defines the nature of the challenges we face, our approach and options for dealing with those challenges; and the implications of these actions as we work towards intergeneration equity. Our approach aims to deliver a thriving environment, connected communities, and a resilient, low carbon future for the region. Our strategy outlines the significant decisions about capital expenditure that are required over the 30 years to deliver the infrastructure services needed for our community – now and for future generations.