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1.0 Introduction

This section introduces the stormwater activity and objectives, sets out the reasons for owning and operating the relevant assets, outlines the key stormwater issues faced by the Wellington community, summarises the potential significant negative effects from this activity and lists the key stakeholders and relationships that are in place. It also puts into context the reasons for preparing an asset management (AM) plan, its position within the strategic framework and its relationship with other plans.

1.1 Asset management plans

Wellington City Council recognises that, within Australia, New Zealand, South Africa and United Kingdom, the generally accepted means of demonstrating effective and prudent management of core activities reliant on infrastructure assets is through the development of an asset management plan, and that the generally accepted “best practice” framework for such a plan is presented within the International Infrastructure Management Manual. This plan has been developed consistent with this framework as discussed further in Section 1.9.

The overall purpose of asset management (AM) planning is:

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

The asset management plan is the key tactical document linking works activities, and associated resources required to carry out these activities, to the levels of service required by the stakeholders and to community outcomes. The plan:

- identifies the levels of service required to meet the needs of the stakeholders, to directly support achievement of community outcomes and to deliver Council strategic goals
- assesses how future changes may affect these levels of service and identifies implications for the stormwater activity
- identifies risks in managing the stormwater activity
- identifies the infrastructure in place to enable the activity, and discusses the condition of these assets and how well they are delivering the required service
- identifies activities required to achieve the required levels of service in the most cost-effective manner, considering future change forecasts and risk
- identifies costs associated with these activities
- summarises activities planned to achieve continuous improvement in the management of the stormwater activity.

1.2 Activity description and goals

The overall purpose of Wellington’s stormwater assets is to deliver a service – to protect the community from flooding and to dispose of stormwater in an environmentally sustainable way. The goal of the asset management process is to ensure the assets deliver that service to the city to an agreed level. Reliable and sustainable flood protection is a fundamental requirement to protect the health and well-being of the community.

The Wellington City Council manages Wellington's stormwater activity because:

- The activity directly supports the achievement of a number of community outcomes (outcomes the Wellington community believe describe the city they wish to live in. This is discussed in more detail in Section 1.7). It follows that it also fits the strategic objectives of the Council to safeguard public health and the environment, and supports economic growth of the community.
- The Council can provide a specified level of service in a cost-effective manner.
- The Local Government Act 2002 (section 130) requires the Council to provide water services and maintain its capacity to do so.
- The Health Act 1956, (sections 23 and 29) requires the Council to "improve, promote and protect public health" within the district as necessary. Section 29 defines what constitutes a nuisance for the purposes of the Act. The term nuisance includes situations that may arise if no stormwater services were provided. Section 30 provides that it is an offence to let a nuisance continue.
- The community has indicated its support of Council involvement.

The goals identified in this stormwater asset management plan can be summarised as follows:

- to prudently manage the piped and natural stormwater system
- to reduce public health and flood damage risks
- to ensure the provision of stormwater services is sustainable in the long term
- to ensure that works on the stormwater asset are effective and efficient
- to provide a service with a level of reliability that meets the customer and regulatory needs
- to continue to minimise risks to marine environments from pollutants in the stormwater system
- to enable the Council to deal with stormwater quality issues associated with sewage, heavy metals, pathogens and sediments
- to optimise the balance of investment, management options and risk reduction in developing stormwater strategies and programmes.

This plan covers the 10-year planning period 2009-2019. It has been prepared jointly by suitably qualified staff from Capacity and Wellington City Council.

1.3 Assets which enable the activity

The primary stormwater assets owned by the Council to enable the activity include:

- a 692km pipe network
- 1km of stormwater tunnels
- three debris/sediment collection facilities
- more than 65,000 connections

In addition, stormwater activity goals are achieved through:

- stormwater overland flow paths, known as the secondary stormwater system, provided to safely transport floodwaters when the primary stormwater system is overloaded

- planning and building controls, such as restrictions on building in high-flood-risk areas and minimum floor heights
- stream maintenance advice to residents adjacent to the six streams within Wellington City
- public education programmes to minimise the entry of pollutants to the stormwater system, and traps in the stormwater system to reduce the quantities of debris that can be conveyed in stormwater drains.

Wellington City's stormwater network is bounded by:

- Hutt City boundary immediately south of Cornish Street, Petone
- southern and western coasts, together with the inner harbour
- Porirua City boundary, through Main Road, Tawa, including Rembrandt Avenue and excluding Wall Place.

The replacement cost of the stormwater infrastructure is approximately \$640 million (as at 17 June 2008). Section 5.0 describes the assets in greater detail.

1.4 Point of service

The stormwater point of service is either the junction connection on the Council main (pipeline), if applicable, or, more typically, the point of discharge at the kerb face from the private lateral into the channel. The Council owns and maintains all stormwater pipelines up to and including the junction connection (where applicable). All drains upstream of the point of service are owned by and are legally the responsibility of the property owner. These may include drains beyond the property boundary.

1.5 Key stormwater issues

Key stormwater issues faced by the Wellington community and the Council are summarised in Figure 1 and described below.

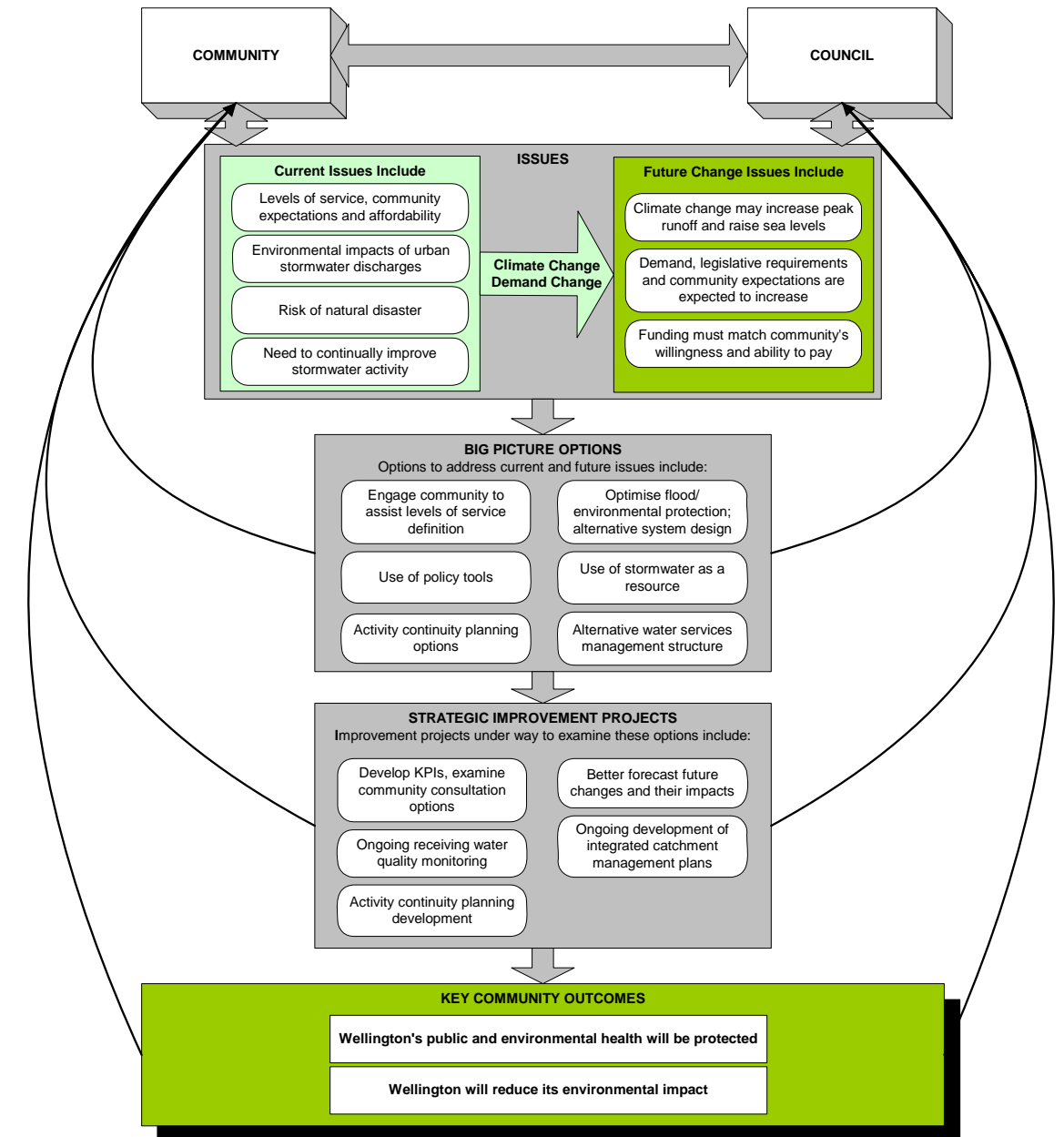


Figure 1 – Key stormwater issues

1.5.1 Strategic context

An understanding of the challenges likely to affect Wellington City in the future is required to ensure the continued environmentally sustainable flood protection for the Wellington community. The key challenges likely to affect the stormwater activity are: urbanisation and changes in catchment characteristics, environmental sustainability and the projected effects of climate change and continued affordability of meeting the community's expectations. These challenges provide the "strategic context" for further developing and improving asset management plans.

1.5.2 Current approach

The Council's programme of asset renewals and maintenance aims to maintain the network's current performance levels, with service level improvements and impacts of growth addressed through capital upgrade programmes. To meet the city's strategic challenges and continue to satisfy community expectations, the Council has embraced the four well-beings required under the Local Government Act 2002 (LGA) in all aspects of its activities:

- environmental well-being
- social well-being
- cultural well-being
- economic well-being.

The potential impact of the Council's stormwater service planning decisions on each of the four well-beings is taken into consideration during the decision-making process. Total lifecycle impacts and costs are taken into account when specific asset-based decisions are made.

To ensure continued sustainable achievement of the fundamental strategic goals, Council planning specifically includes:

- demand analysis and management, including effects of urbanisation and climate change (Section 3.0 of this asset management plan)
- risk assessment and management (Section 4.0 of this asset management plan)
- efficiency assessments and continuous improvement, including the development of specific decision-making tools such as multi-criteria analysis models to assist with optimum option identification and works prioritisation.

1.5.3 Issues we need to address

The community, through the community outcome process, has strongly indicated that the Council must sustainably manage the stormwater activity to protect public and environmental health, critical infrastructure and property, and to actively reduce adverse environmental impacts.

It is considered likely that, if future challenges are not factored into analysis and implementation programmes, the current approach may be unable to continue to deliver the level of service the community expects. Over time, this could compromise the network's performance.

Maintaining a continuous improvement approach to asset management has been adopted to effectively factor in and manage these challenges. Continuous improvement can be achieved by:

- looking at innovative solutions
- considering service delivery and funding options in terms of equity.

Levels of service

The level of service provided to Wellington City by the stormwater activity is consistent with current industry standards and levels of service provided by other councils in New Zealand, although quantified performance of flood protection is difficult to measure. Since efforts in 2000, when community feedback was poor, the Council has not actively sought to establish satisfaction levels with regard to stormwater control and flood protection. Analysis of customer requests for service and resident survey feedback indicates the

current level of service broadly satisfies community expectations, although better engagement with the community could improve identification of service level gaps.

The identification of service level gaps by communities would confirm the level of flood protection provided and would increase confidence in the level of investment in work programmes. It would also determine the affordability of meeting stakeholder expectations.

The performance of the networks must be maintained through the Council's systematic programme of asset renewals and maintenance, as well as being improved through the application of a future-focused planning process. Planning for improvement needs to consider the network as an interrelated whole and ensure that works are efficient in delivering the services required and effective in achieving the long-term objectives of the asset management process.

Future changes

The effects of future climate change are uncertain. Warmer temperatures, some increases in peak rainfalls and rises in sea levels are expected, however. Population growth and urbanisation are expected to continue. The projected increase in stormwater run-off generated from these changes, decreased ability to dispose of the run-off through sea level rise and increased risk of coastal inundation requires active management, recognising that planning for change and implementing identified initiatives takes time. A decline in the actual level of service while community expectations increase is possible should future change not be included in the analysis and implementation of programmes.

Environmental impact from stormwater flows

Stormwater run-off from urbanised catchments is greater than natural catchments, reflecting the higher proportion of impermeable surfaces. Traditional stormwater systems, such as those prevalent within Wellington, aim to capture this run-off and convey it efficiently to receiving waters. Increased run-off flows can scour and otherwise degrade natural watercourses, and the use of such systems reduces groundwater recharge.

Further, contaminants such as oils, grease, metals and other contaminants washed from pavements and other areas in urban catchments and discharged into sumps are present in stormwater entering watercourses, the harbour and coastal receiving environments. While there is limited quantitative information on the impact of these contaminants on our environment, there is growing awareness in New Zealand that there is risk of environmental damage, and possibly a risk to public health.

The wastewater network occasionally overflows to the stormwater system in wet-weather events through a series of constructed overflows. The stormwater, contaminated with dilute wastewater, is then discharged to watercourses or the sea. The environmental and public health impacts of these discharges, and actions in place to address them, are covered within the wastewater asset management plan.

Risk of natural disaster

A catastrophic natural disaster, such as a major earthquake, could limit the ability to provide reliable flood protection to the community and would hinder reinstatement of other necessary services, such as accommodation, water supply and wastewater disposal. Reinstating flood protection systems, both temporarily and permanently, would be costly and would take a considerable time.

Continuous improvement

The Council recognises the fundamental need to continually improve its asset management processes. Flood protection must be provided at agreed service levels and with increasing efficiency to reduce costs, reduce resource use and minimise environmental impacts. The continuous improvement approach directly affects management strategies and places the emphasis on planning processes.

1.5.4 Options to address these issues

A range of options has been developed to address the issues discussed above.

Levels of service

The Council will continue to gather data to determine the actual level of service and resident satisfaction, and will progressively move to better understand flood risk. Performance targets are set by the Council with reference to a number of data sources:

- legislative and regulatory requirements
- industry standards
- feedback from the community outcomes process (undertaken as part of the ongoing development of the Long Term Council Community Plan) that provides information on stakeholder expectations
- annual plan submissions
- resident surveys and request for service analysis
- current performance.

The above data can be enhanced by presenting a number of alternative key levels of service targets and associated cost implications. The Council would select alternatives and consult with the community to assess a representative service level based on the community's willingness to pay. These enhancement options are being specifically investigated in the following improvement projects discussed further in Sections 2.0 and 7.0:

- Asset management improvement project 1b – Data collection and source mechanisms.
- Asset management improvement project 1c – Key performance indicator collection with standardised reporting and presentation of targets and results.
- Asset management improvement project 8c – Consultation on customer service standards.

Future changes

Increasing run-off is managed through system upgrades and/or management of the run-off effects using policy tools such as restricting development, protecting or purchasing at-risk properties, and maximising the secondary system (overland flow and storage) potential.

Options to reduce stormwater flows include the increased interception of rainfall. Measures to achieve this currently include re-vegetation programmes and limited infiltration drainage (soakage). Further options which may be examined include the use of porous pavements and collecting rainfall run-off, particularly from roofs, for non-drinking purposes such as irrigation or toilet flushing.

The need for improved understanding of the extent of future change is being specifically addressed in asset management improvement project 2 – Demand analysis, and is discussed further in Sections 3.0 and 7.0.

Environmental impact from stormwater flows

The Council will continue to monitor water quality and advancements in understanding environmental and health impacts from urban stormwater discharges. It will also continue working with the Greater Wellington Regional Council to determine what water quality standards are required in the region.

Options to reduce impacts that have been implemented include directing run-off away from environmentally sensitive areas, limited use of infiltration drainage (soakage) and restoring wetland areas. Further options which may be examined include public education programmes to reduce point discharges and engineered interception and treatment facilities.

Risk of natural disaster

The Council will continue with the balanced approach to business continuity planning, including resilient system design and appropriate material selection, response planning and capability, insurance of critical assets and emergency funding.

This asset management plan has identified stormwater activity risks (refer Section 4.0), risk mitigation options currently implemented to manage these risks, and additional mitigation options to develop to further reduce risk exposure. Asset management improvement project 9 (refer Section 7.0) aims to further develop this risk assessment and analysis work into a separate detailed Activity Risk Management Plan.

Continuous improvement

The Council will continue to comply with legislative requirements in stormwater activity planning and will adopt a "business as usual" approach.

Additionally, the Council will continue to work towards appropriate best practice through organisational commitment in asset management planning, routine audits and reviews of asset management capability and performance, and the adoption of processes and tools to assist decision-making. Key improvement projects identified are:

- Asset management improvement project 11 – Incorporating activity performance into organisational performance.
- Asset management improvement project 5a – Construction contract quality assurance framework.
- Asset management improvement project 6e – Asset unit rates database development.
- Asset management improvement project 7a & b – Asset condition and remaining life modelling.
- Asset management improvement project 10 – Asset performance monitoring data identification and collection.
- Network operation and management improvement projects.

1.5.5 Key restraints

A number of key constraints that affect the Council's ability to address the challenges have been identified. These include:

- The existing stormwater network is a considerable asset that has been progressively developed over a long period of time. The current approach to the management of the network is one of continuous improvement that will see the gradual renewal of older assets with modern replacements of suitable capacity.
- Changes in the natural environment are unpredictable, including natural hazards and climate change. This unpredictability affects the ability of the Council to plan in the

most cost-effective manner. Updating forecasts and amending planned activities will require regular review. Risk assessment and management processes aim to achieve a balance between the risk exposure costs, and those of preventative measures. Despite structured decision-making processes, future unpredictability and other factors such as budgetary realities and political preference could make implementation of some strategic options problematic.

- The community has indicated through the community outcome process that the Council must manage the stormwater activity sustainably to protect public and environmental health, and to actively reduce adverse environmental impacts. However, engaging in robust consultation with the community can be challenging, and it is sometimes difficult to establish how representative the community outcome consultation actually is.

1.6 Significant negative effects

The potential significant negative effects of the stormwater activity are:

- **Environmental** values can be degraded by stormwater run-off contaminated with microbiological content (from cross-connection and overflows from the wastewater system, sediments, oils, greases, metals, animal waste and organic material washed from roads and other impervious areas, rubbish and contaminants illegally discharged into the stormwater system). In rural areas, run-off may also be contaminated with herbicides, pesticides and fertilisers.
- **Social** values, the quality of life and public health, can be diminished by:
 - blockage of stormwater system leading to overflows and flooding of adjacent areas and buildings
 - excessive inflow/infiltration of stormwater into the wastewater network, causing wastewater overflows to land, streams, the harbour and coast (this is managed within the wastewater activity).
- **Cultural** sensitivities are compromised by contaminated stormwater discharges to watercourses and coastal receiving waters.
- **Economic** costs to the community accrue as a result of flood damage and the cost of mitigating discharges of contaminated stormwater into watercourses or coastal receiving waters.



The Council mitigates these potential negative effects with balanced asset management planning activities. These include:

- asset management planning
- asset maintenance, renewal and development work
- monitoring and testing
- compliance with comprehensive environmental and health and safety procedures
- public education
- regulatory controls (e.g. building floor level restrictions) and bylaws.

1.7 Planning and regulatory framework

1.7.1 Overview

Asset management plans are a key component of the Council's planning framework. The overall purpose of asset management planning is:

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

Figure 2 indicates how the asset management plans link to the key legislation, planning and documents that guide the Council's activities:

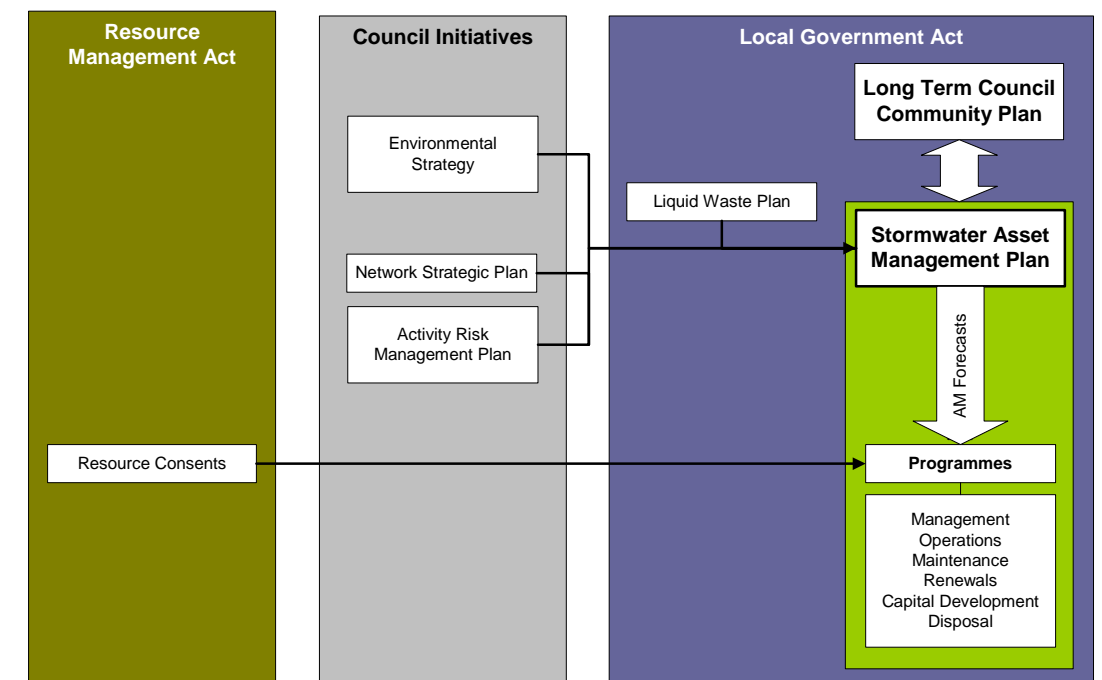


Figure 2 – Planning and regulatory framework

The Council's policy on significance identifies the stormwater system as a strategic group of assets of importance to the current and future well-being of the community. As such, any Council decision to construct, replace or abandon these assets which may affect the overall strategic nature of the system cannot be made unless it has first been included in the Long Term Council Community Plan.

1.7.2 Community outcomes

Community outcomes are the community's overall aspirations for Wellington's future and drive all Council activities. While many of these outcomes relate directly to Council activities, some can only be achieved with help from other organisations such as business, government and the education sector, and some relate to areas the Council has very limited ability to influence.

The community outcomes guided the development of the Council's own city outcomes, which interpret the community outcomes over which the Council has direct influence. The

Council has identified key strategic areas, and within each of these areas has developed strategies in order to deliver the city outcomes. In turn, these strategies form a key input into the tactical (asset management) plans, along with stakeholder and legislative requirements, current and future demand information, and risk issues.

Asset management plans present a detailed programme of works to support and encourage quality of life, enterprise and prosperity through the provision of sustainable flood protection.

The Council has prepared business plans, and in turn contracts and service level agreements, in order to implement works and other initiatives that achieve asset management plan goals.



Wellington City Council has been working with councils in the Wellington region on the Wellington Regional Strategy (WRS). This is a sustainable economic and growth management strategy for the region with a 50-year timeframe. This strategy recognises that our best chances of success as a region come from working together with a common vision, direction and commitment to act. The regional strategy influences the city strategies.

The stormwater activity contributes primarily to the following community outcome:

“Wellington’s long-term environmental health will be protected by well-planned and well-maintained infrastructure.”

Table 1 shows the community outcome linkages with the stormwater activity and the nature of the contribution.

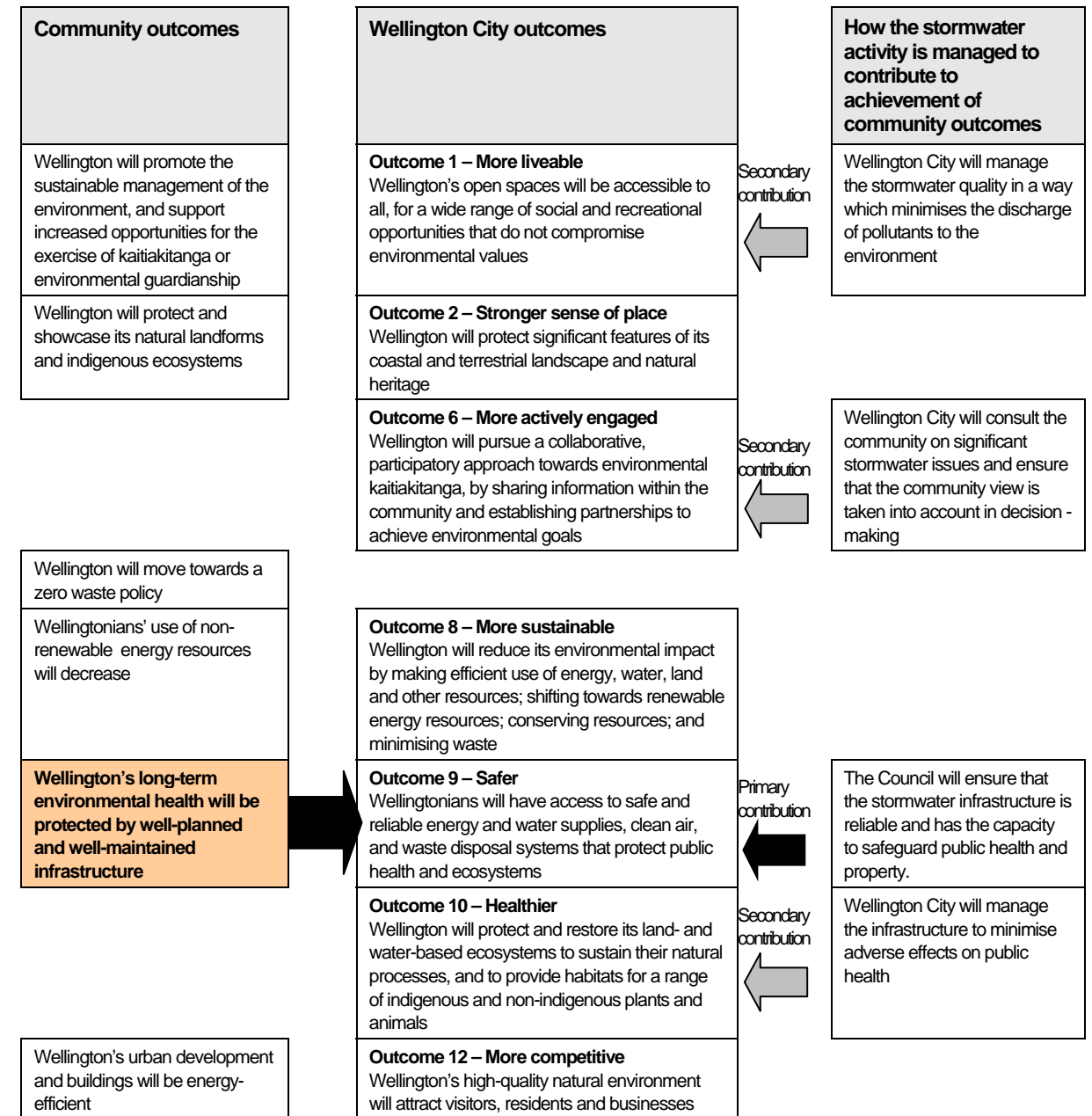


Table 1 – Community outcomes, city outcomes and strategies

1.7.3 Key documents

The key Council planning documents with linkages to this plan are;

- **Long Term Council Community Plan** – Required by the Local Government Act 2002, this is the core strategic planning document of the Council. It includes the community outcomes, city outcomes and strategic priorities, the activities that will be undertaken to achieve these, the long-term (10-year) financial and funding implications, and a summary of how the Council's performance is reported.
- **Annual Plan** – The Annual Plan updates information reported on within the LTCCP.
- **Revenue and Finance Policy** – This policy sets out how each service and activity of the Council should be funded.
- **Subject Area Strategies** – The Council's overarching strategic direction is supported by a number of specific strategies, policies and plans. These provide the detail behind the achievement of the different city outcomes and inform the asset management plans on high-level priorities and tactical direction.
- **Asset Management Plan** – The asset management plan collects high-level management, strategic, financial, engineering and technical outputs from various planning studies and asset management systems, and combines these into a single document. The plan provides the tactics to enable the Council to achieve the strategic goals in the most cost-effective manner.
- **Business Plan** – The business plan translates the objectives contained in the LTCCP and/or Annual Plan and asset management plans into detailed work plans for a particular, or range of, business activities. Activities may include marketing, development, operations, management, personnel, technology and financial planning.
- **District Plan** – The District Plan states the resource planning matters that the asset management plans must incorporate.
- **Water and Sanitary Services Assessments** – The Council is required by the LGA 2002 to carry out an assessment of public and private water and sanitary services.
- **Liquid Waste Management Plan** – Under the LGA 2002, the Council is required to prepare a waste management plan based on the provisions set out in the LGA 1974. The first part of the plan, on solid waste, was adopted in 2005. The Liquid Waste Management Plan 2005, which is the second and final part, sets out how the Council will manage liquid waste in an environmentally, economically, socially and culturally sustainable manner.
- **Environmental Strategy** – This strategy adopted by the Council in 2006 provides a high-level statement of the Council's long-term environmental intentions for Wellington as well as shorter-term priority areas for action.
- **Wellington Regional Strategy** – This is a sustainable economic and growth management strategy for the region with a 50-year timeframe.
- **Regional Policy Statement** – This is a document which provides the framework for managing the resources of our Region in a sustainable way.
- **Code of Practice for Land Development** – This document sets out the standards in relation to water supply and wastewater design and construction to ensure that developments are sustainable and ecologically-friendly.

1.8 Tactical approach

The tactical approach adopted to ensure the stormwater activity helps achieve Wellington's community outcomes comprises:

- | | |
|--------------------------------|--|
| Community involvement | <ul style="list-style-type: none">• The community will be consulted on all key aspects of Council work significantly affecting the community or levels of service.• Service levels and performance targets will be aligned with the relevant community outcome and have been agreed to by our communities.• The actual performance of Wellington City Council against these targets will be reported in the Annual Report and the asset management plan.• The service levels in this plan will be formally reviewed at least every three years. Consultation on service level options will be undertaken for specific projects. |
| Risk management | <p>Risks associated with delivering agreed service levels will be managed by:</p> <ul style="list-style-type: none">• identifying critical assets, and managing these assets more proactively than non-critical assets• monitoring the performance and condition of assets• undertaking studies to understand trends relevant to the delivery of stormwater services (e.g. growth, climate change, seismicity)• implementing optimal risk mitigation measures where an unacceptable level of risk exposure is identified. |
| Asset service potential | <ul style="list-style-type: none">• The service potential of the assets will be maintained through an optimal balance of maintenance and renewal works. |
| Operational | <ul style="list-style-type: none">• Service agreements with contractors will contain performance measures consistent with asset management and activity service targets to align operations with the Long Term Council Community Plan. |
| Organisational | <ul style="list-style-type: none">• Organisational expertise will be retained and developed to practise advanced techniques. |
| Asset management plan | <ul style="list-style-type: none">• The asset management plan will be developed as a "living" document and reviewed at least three-yearly to ensure alignment with current Council organisational policy. |
| Continuous improvement | <ul style="list-style-type: none">• Asset management plans will be subject to formal adoption by the Council.• Improvement of asset management practices, processes, systems and plans will be undertaken in accordance with the improvement plan, which will be reviewed annually. |

1.9 Asset management model and plan structure

The asset management planning process implemented by the Council is shown in Figure 3.

This plan is structured around the framework set out in the International Infrastructure Management Manual 2002 (IIMM). Key elements of the plan are presented in Figure 4 – these are covered in greater detail in other sections of the document.

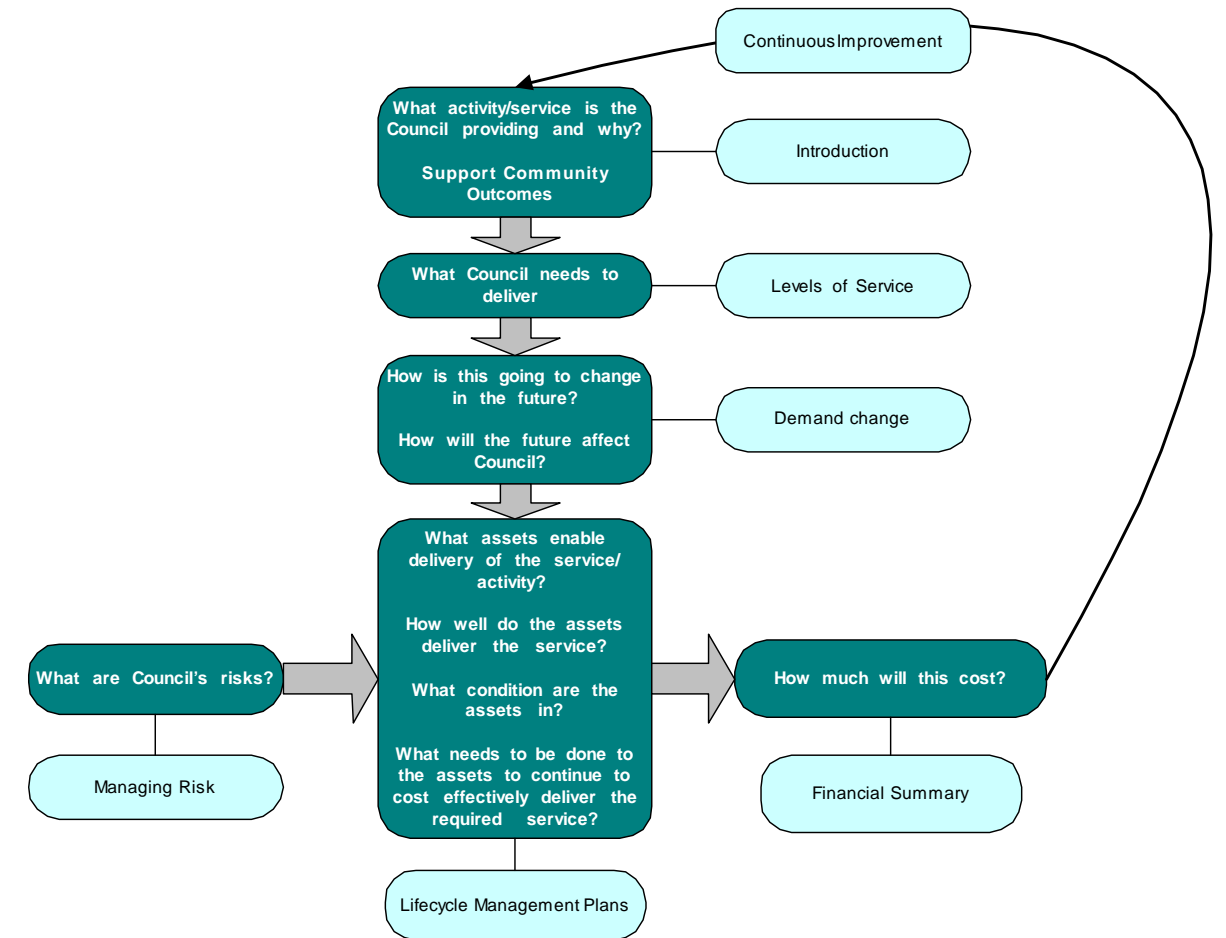


Figure 3 – Asset management planning model

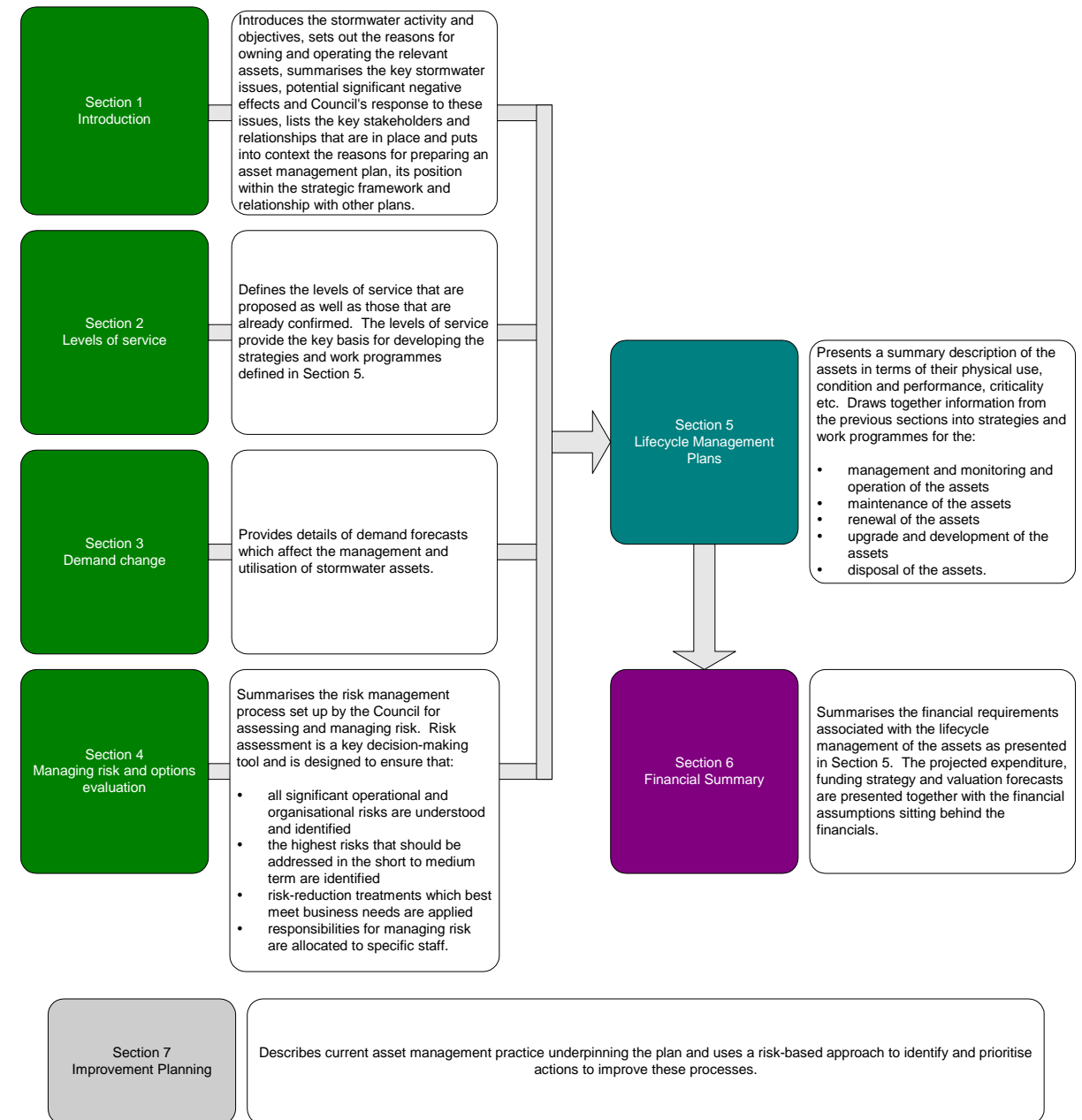


Figure 4 – Plan framework

2.0 Levels of service

This section defines the proposed levels of service as well as those already confirmed. The levels of service provide the basis for the strategies and work programmes defined in Section 5.

2.1 Introduction

The focus of this plan is to match the level of service provided by the asset with expectations of customers. This requires a clear understanding of customers' needs and preferences. The levels of service defined in this section will be used:

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

As indicated in Figure 5, the adopted levels of service for the stormwater activity scheduled in Table 2 are based on:

- Community outcomes and strategic goals (Section 2.4) – Community outcomes provide the highest-level summary of the type of community the community wish to live in. City outcomes have been developed which address outcomes over which the Council has direct influence. Alignment with these outcomes is fundamental to the development of levels of service. Strategic goals provide guidelines for the scope of current and future services offered and the manner of service delivery. They also define specific levels of service which the organisation wishes to achieve.
- Statutory requirements (Section 2.5) – Environmental standards, regulations, acts and Council bylaws that impact on the way assets are managed (that is, resource consents, building regulations, health and safety legislation). These requirements set the minimum level of service that must be provided.
- Industry practice (Section 2.6) – Generally accepted national practice for the provision of stormwater services.
- Customer research and expectations (Section 2.7) – Information gained from customers on expected quality and price of services.

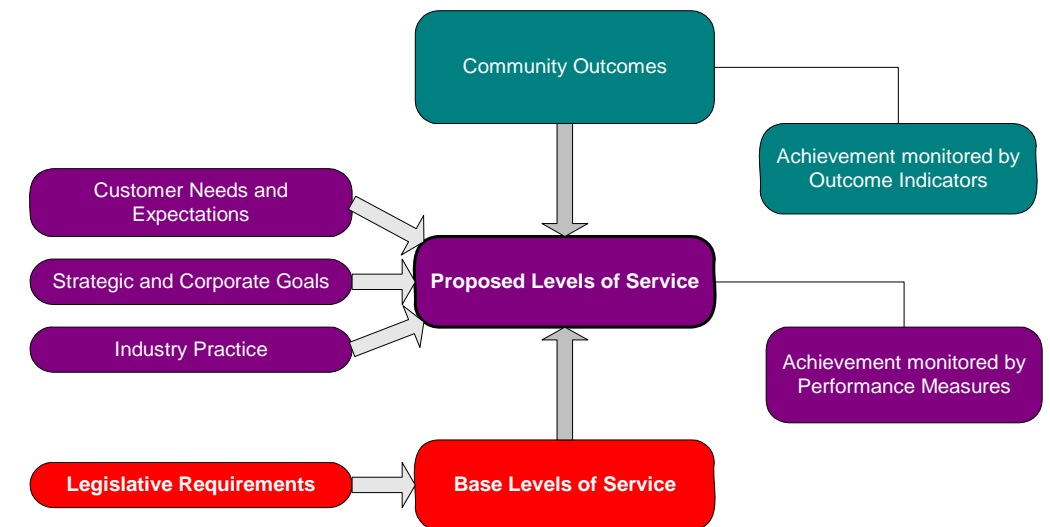


Figure 5 – Levels of service drivers

The current and target levels of service as at 2009/10, and the gap between these levels, are indicated in Section 2.9. The proposed changes to accommodate the Council's direction for 2009/18 are shown where these are different.

2.2 Key levels of service issues

2.2.1 Broad approach

The Council plans to continue delivering broadly the same level of service within the stormwater activity, with gradual improvements to flooding and environmental protection. Operational enhancements are expected to increase operational efficiency, cost-effectiveness and environmental performance through:

- developing optimised decision-making frameworks to increase confidence in project option selection and works prioritisation
- a network strategic plan, including linking the systematically developed management plans for each of the city's 34 catchments to ensure the stormwater system has sufficient capacity to cope with heavy rain (this is further discussed in Section 5.3.2).

2.2.2 Key issues

The key level of service issues are:

- There must be a balance between levels of flood protection provided by the primary (piped) system and cost. Although overland flow paths and natural ponding areas provide an integrated flood protection system, there is evidence that the community considers these secondary flows undesirable.
- The protection of the environment from urban contamination must be balanced against cost. It is likely that consent conditions will increase in this regard.
- There is a need to obtain, and comply with, resource consents for the quality of streams and coastal waters.

We recognise that these adopted measures do not comprehensively describe the key aspects of the stormwater activity, including the actual flood protection currently provided and residual flood risk. Asset management improvement projects to address this are under way (refer to Section 7.0). Asset management improvement projects 1 and 3 include:

- identifying performance measures that comprehensively describe the key aspects of the stormwater activity

- data capture to quantify historic and current performance against these performance measures
- reviewing key service level options and implication analysis.

Appendix A presents the performance measures proposed, and we are gathering the data required to describe the current levels of service provided.

- We currently have limited knowledge of stakeholder' needs and expectations, as discussed in Section 2.7. Without this knowledge, there is uncertainty as to whether we are undertaking the activities to meet these needs in the most effective way. Asset management improvement project 8 includes a review of community consultation options, including willingness to pay.

2.3 Our stakeholders

The Council recognises there are a wide range of customers and stakeholders with an interest in how the stormwater collection and disposal activity is managed. The resident community, specific interest groups within the community as well as regulators are just some of the groups that the Council needs to engage with to ensure the right services are delivered at an affordable cost. These stakeholders include:

- the Wellington community – citizens and ratepayers
- residential, commercial and industrial users of the services
- community, cultural and recreational groups
- Wellington City Council elected members, senior managers and staff
- Government departments and agencies such as the Department of Conservation and the New Zealand Fire Service
- Capacity (the council controlled organisation formed to manage the water utility assets for both Hutt City and Wellington City councils)
- Greater Wellington Regional Council (has an environmental regulatory and monitoring role under the Resource Management Act that includes the management of resource consents issued for the discharge of stormwater to receiving waters)
- the Ministry of Health, which has statutory responsibility for public health issues in New Zealand including health-related aspects of stormwater services (the Local Government Act 2002 specifically requires consultation with the Medical Officer of Health over the content of Water Services Assessments)
- iwi (a formal relationship has been developed between the Council and the Maori community through Ngati Toa and the Tenth Trust, reflecting the significance of water-related activities to Maori culture)
- environmental groups
- consultants and contractors
- Office of the Auditor-General (in a regulatory capacity).

2.4 Community outcomes and strategic goals

2.4.1 Overview

The Local Government Act 2002 makes it clear that all council activities must contribute to the achievement of the community outcomes. Therefore performance measures and targets must also clearly align with these community outcomes.

Figure 6 summarises the strategic goals within each of the seven key strategic areas, and Figure 7 presents the core themes from each of the key strategic areas that have been considered for definition and measurement of service levels. This recognises the complex inter-relationships between assets, activities and outcomes where the stormwater activity affects, and is affected by, other key activities.

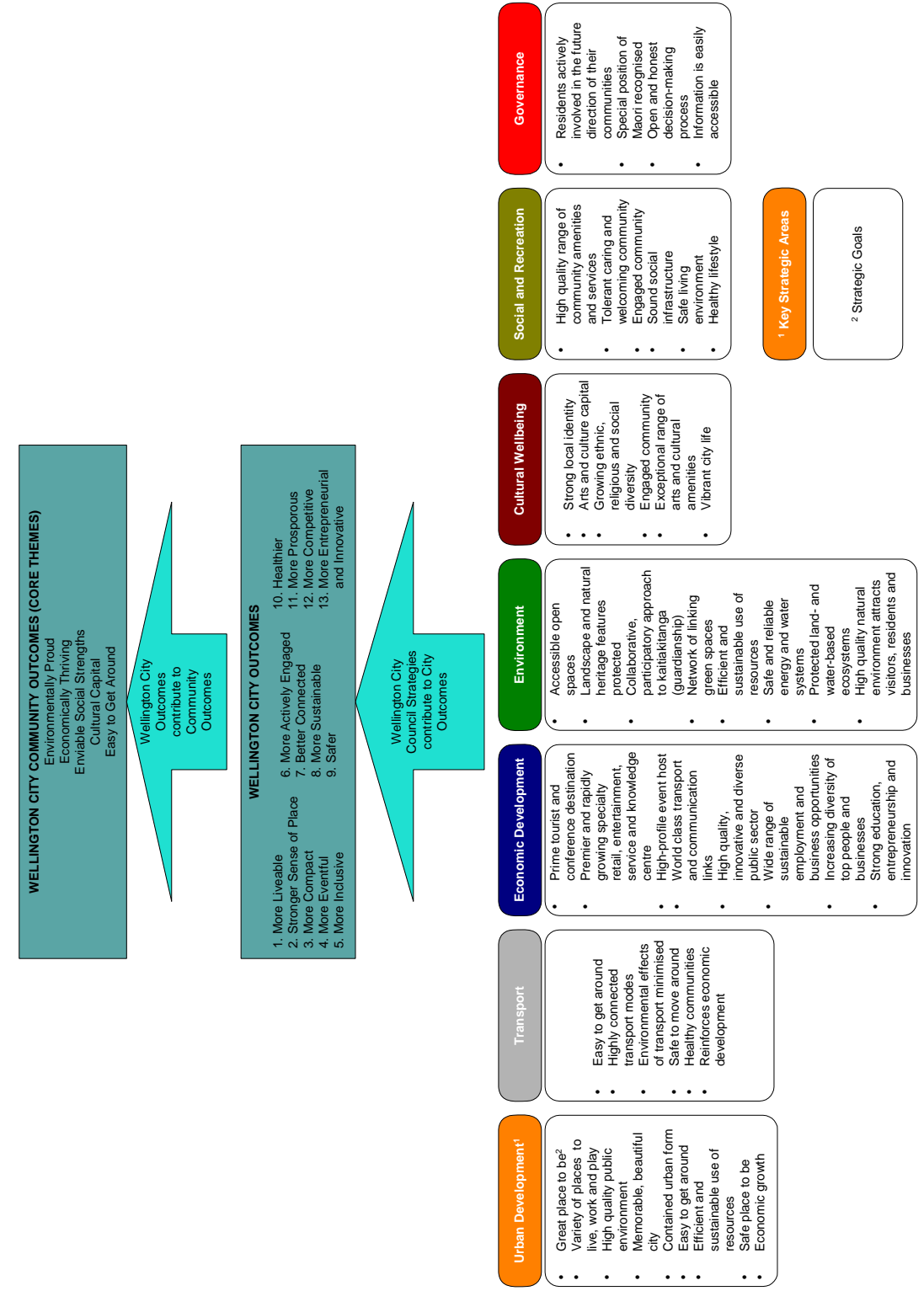


Figure 6 – Strategic goals linkage to community outcomes

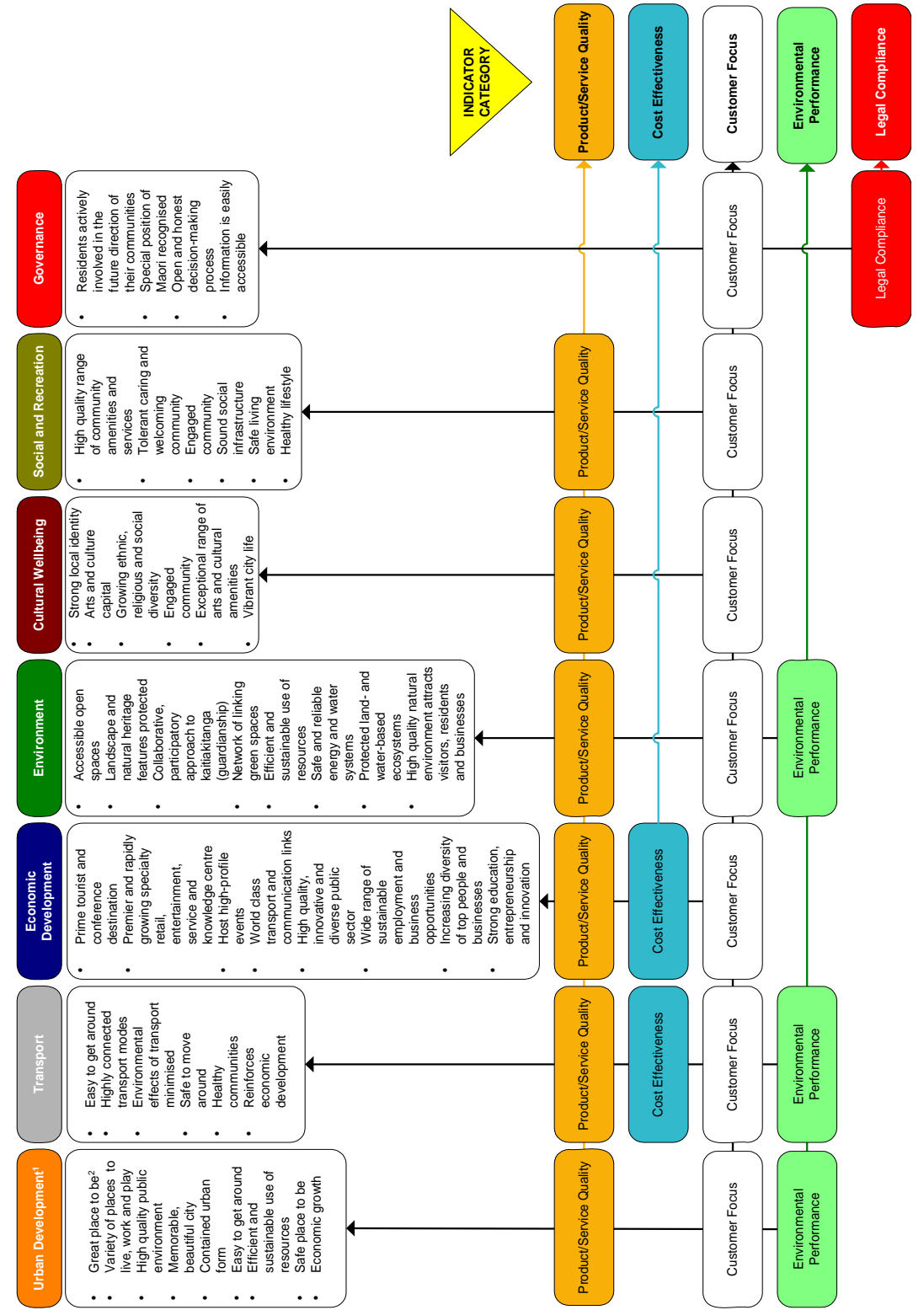


Figure 7 – Core themes for key performance measures

2.4.2 Three-year strategic priorities

The core themes or indicator categories implied by the three-year strategic priorities in the LTCCP are:

- environmental performance
- cost-effectiveness.

The biodiversity strategy adopted by the Council in 2008 identifies the following as priorities over the next three years:

- increase efforts to improve the quality of streams (this affects management of stormwater run-off quality, piping of watercourses and design of other flood protection works)
- increase the Council's promotion of sustainable resource use, including a drive for energy and other efficiencies in the operation of the city's infrastructure.

2.4.3 Key stormwater goals

The core themes or indicator categories implied by the key stormwater strategic goals are:

- service quality
- environmental performance
- cost-effectiveness.

The following key detailed stormwater asset management strategies and action plans directly support the draft corporate strategies summarised in Figure 6 and Figure 7 and provide processes and priority guidelines for asset management decision-making.

Key stormwater goals are to:

- provide a sound infrastructure
- increase levels of public safety
- increase the protection of properties from flood damage
- reduce the risk of catastrophic failure of the drainage system
- improve the environmental performance of the city's stormwater systems in the city
- reduce sewage pollution of the harbour, coastal waters and streams (relevant in terms of cross-connections)¹
- increase and/or preserve the amenity of the city, particularly natural streams
- adopt a more holistic integrated approach to managing waterways as articulated in the Council's Bush and Streams Restoration Plan, "Wet and Wild" 2001 and the Biodiversity Plan (2008)
- manage the network effectively and efficiently using the critical drains process described in the Drainage Rehabilitation Plan (1993) to proactively inspect and maintain/rehabilitate/upgrade those sewers where the consequences of failure of the drains for public safety, cost and social disruption justify it (critical drains) – the remainder of the network will generally be managed on a reactive basis
- implement a plan under the flood protection strategy to assess the deficiencies of the drainage system and deal with flooding.

¹ This is dealt with in the wastewater asset management plan

manage liquid waste in an environmentally, economically, socially and culturally sustainable manner by observing the key principles of the Liquid Waste Plan:

- sustainable development
- liquid waste is a resource
- integrated solutions
- Maori and iwi values are incorporated
- partnerships
- polluter pays.

2.5 Statutory requirements

The core themes or indicator categories implied by legislative requirements are:

- environmental performance
- legal compliance.

Statutory requirements set minimum requirements for some levels of service that must be provided. The key legislation and regulations relevant to the management of the stormwater activity are outlined below.

2.5.1 Legislation

- **Local Government Act (LGA) 2002:** Defines the purpose of local authorities as enabling local decision-making by and on behalf of the community, and allows local authorities the power of general competence. To help local authorities achieve this, the Act includes significant consultative requirements. These stipulate that the Council must:
 - identify community outcomes and priorities for its region or district no less than every six years
 - prepare and adopt a long-term council community plan in accordance with the special consultative procedure no less than once every three years
 - consult with the community on a range of specific issues, including changes to service delivery and transfer of Council assets
 - provide appropriate information when consulting with the community and deliver information in ways that enable communities to participate effectively
 - outline how the asset management implications of changes to demand and service levels and standards are to be assessed and dealt with.
- **Local Government (Rating) Act 2002:** Allows councils to strike a rate or charge for any activity they choose to get involved in (Section 16).
- **Resource Management Act 1991:** Requires councils to manage the use, development and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well-being and for their health and safety while:
 - sustaining the potential of natural and physical resources to meet the reasonable foreseeable needs of future generations
 - avoiding, remedying or mitigating any adverse effect of activities on the environment
 - safeguarding the life-supporting capacity of air, water, soil and ecosystems
 - complying with planning documents prepared under the Resource Management Act that impact on the management of stormwater assets (including the district and regional plans)
 - taking into account the principles of the Treaty of Waitangi in exercising functions and powers under the Act relating to the use, development and protection of natural and physical resources.

Managing the use, development and protection of natural and physical resources requires the Council to recognise and provide for the following matters of national importance:

- the preservation of the natural character of the coastline environment (including the coastal marine area), wetlands, lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development
- the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development
- the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna
- the maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers
- the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga.

The stormwater activity is undertaken in accordance with the conditions specified in the 20 resource consents lodged with the Greater Wellington Regional Council. These consents are summarised in Appendix H.

The Government intends to develop a National Policy Statement (NPS) on managing flood risk under the Resource Management Act. This is intended to strengthen the policy framework to allow councils to manage the risk of flooding with more certainty. The Council has issued a submission to central government on this process and will continue to closely monitor the development of the framework and ensure adherence to its principles where appropriate.

- **Building Act 1991:** Sets minimum standards for buildings and facilities. It requires Councils to produce project information memoranda (PIMs), which may include details of access restrictions, approvals, leases, plans, relevant records, notices, correspondence etc.
- **Health and Safety in Employment Act 1992:** Requires the provision of safe work places for all staff and contractors, and the maintenance of an audit trail to demonstrate compliance.
- **Civil Defence Emergency Management Act 2002:** Under the CDEM Act 2002, water and wastewater providers are required to:
 - function at the fullest possible extent during and after an emergency, even though this may be at a reduced level
 - have plans for such functioning that can be made available to the Director of the Ministry of Civil Defence and Emergency Management if requested
 - participate in CDEM planning at national and regional levels where requested
 - provide technical advice on CDEM issues where reasonably required
 - ensure disclosed information is only used by a utility for purposes under the CDEM Act.

Expectations of water sector utilities and the practical manner in which they can be achieved have been explained in a set of director's guidelines and supplementary best practice guide. There are expectations that water sector utilities will:

- be able to ensure continuity of a level of service, especially to critical customers
- establish planning and operational relationships with regional CDEM groups (local authorities working in partnership with emergency services to deliver emergency management within regional boundaries)
- communicate and plan across their sectors to optimise service during emergencies.

One of the ways that inter- and cross-sector connections are being strengthened is through Lifelines Group activity. Lifelines projects aim to identify and address interdependencies by bringing utility and network operators together within a region. Input is also provided by scientists and engineers, emergency managers and planners. As a result of the CDEM Act, it is necessary for the Council to:

- participate in the planning and implementation of the new CDEM groups as required by law
- remain involved with the lifelines technical forum
- actively promote the preparation, mitigation and response aspects identified as essential to comply with the CDEM Act.

- **Public Works Act 1981:** Provides compulsory land acquisition for essential public works.

2.5.2 Bylaws and policies

The core themes or indicator categories implied by Council bylaws and policies are:

- environmental performance
- cost-effectiveness.

Several bylaws and policies apply to the stormwater activity, including:

- **Wellington City Council Consolidated Bylaw 1991** – This includes conditions and requirements regarding:
 - earthworks
 - trade waste
 - watercourses
 - drainage and plumbing.
- **District Plan** – This core document incorporates policies and objectives for land use in Wellington, providing key planning inputs for stormwater design and asset management.
- **Building Over Drains Policy** – Provides guidelines and conditions for those proposing to construct over existing pipelines or watercourses.
- **Lateral Policy** – This policy defines ownership and maintenance obligations of the Council and property owners regarding stormwater laterals.

2.6 Industry practice

The core themes or indicator categories implied by industry practice are:

- product/service quality
- cost-effectiveness
- environmental performance.

The following documents include generally accepted industry practices:

- Wellington City Council Code of Practice for Land Development (currently being reviewed), and associated technical specifications, standards and guidelines, ensures that stormwater infrastructure is developed in a manner that protects both the public and the environment, and which can be cost-effectively maintained within the appropriate design life of the various components of the system.
- The Council's policies and quality assurance procedures and guidelines define how the stormwater system is managed.
- Capacity Contracts System (under development) provides guidelines and policies for the procurement of services or goods.

Key industry practice considerations included within these documents are:

- rainfall intensities and consequent design flow calculations and forecasts
- pipe materials, design lives and installation details
- testing and monitoring
- procurement of services or goods.

In addition, industry practice is included within the drainage rehabilitation plan, particularly regarding the adoption of the critical drains management methodology. This methodology identifies critical drains and adopts a proactive management regime for these pipes. The remaining pipes are managed reactively.

2.7 How we engage with the community

The core themes or indicator categories implied by customer research and expectations are:

- product/service quality
- customer focus
- environmental performance.

The Local Government Act 2002 requires the Council to consult with affected and interested parties in making decisions. A coherent, integrated and transparent process is needed to implement level of service changes, options analysis and the selection of the best practicable and preferred option.

The Council ensures that all interested stakeholders have an opportunity to influence level of service decisions by:

- ongoing consultation with the community regarding community outcomes as part of the LTCCP development
- consultation with the community in 2000 as part of the strategic review (for the consultation process, alternative levels of service were developed together with associated cost implications, but feedback from the community was not comprehensive)
- consultation as part of the preparation of catchment management plans and flood protection programmes.
- consultation as part of the preparation of the Assessment of Water and Sanitary Services (2005), including the consultation with Ngati Toa and the Tenth Trust, the Makara/Ohariu valley, South Karori and Horokiwi communities, and 157 resident and special interest organisations
- making asset management plans available on the request
- consulting with affected persons on specific projects (as required by the Resource Management Act 2001)

To date, research on customer needs and expectations has been limited to:

- The Residents' Satisfaction Survey – These are undertaken to gain an understanding of community satisfaction with the services and associated assets, and therefore an indication of the success of the underlying management strategies. The rating of community satisfaction with the management of stormwater activity has dropped from 68 per cent in 2003, to 56 per cent in 2005 as indicated in Figure 8. The target achievement is 95 per cent. Future developments will seek to address issues surrounding:
 - aspects of the services that need to be changed and the willingness to pay for any changes
 - priorities to be assigned to the different aspects of a service
 - trade-offs between the standard of different services provided by Council.

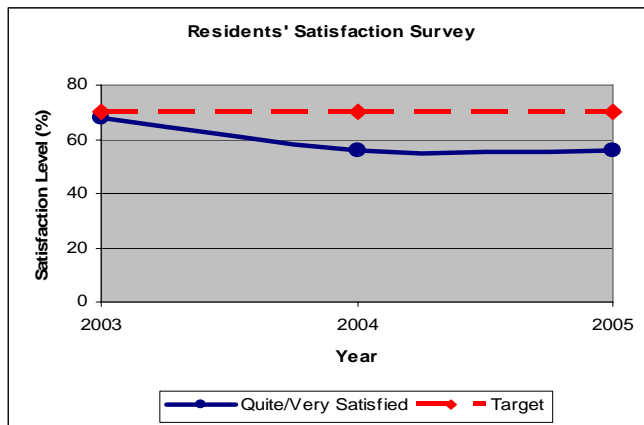


Figure 8 – Residents' satisfaction survey over three years

This question was replaced in 2006 by one identifying the proportion of residents actively doing something to reduce the amount of pollution entering the stormwater system, and what these actions are. The responses to this question are summarised in Figure 9.

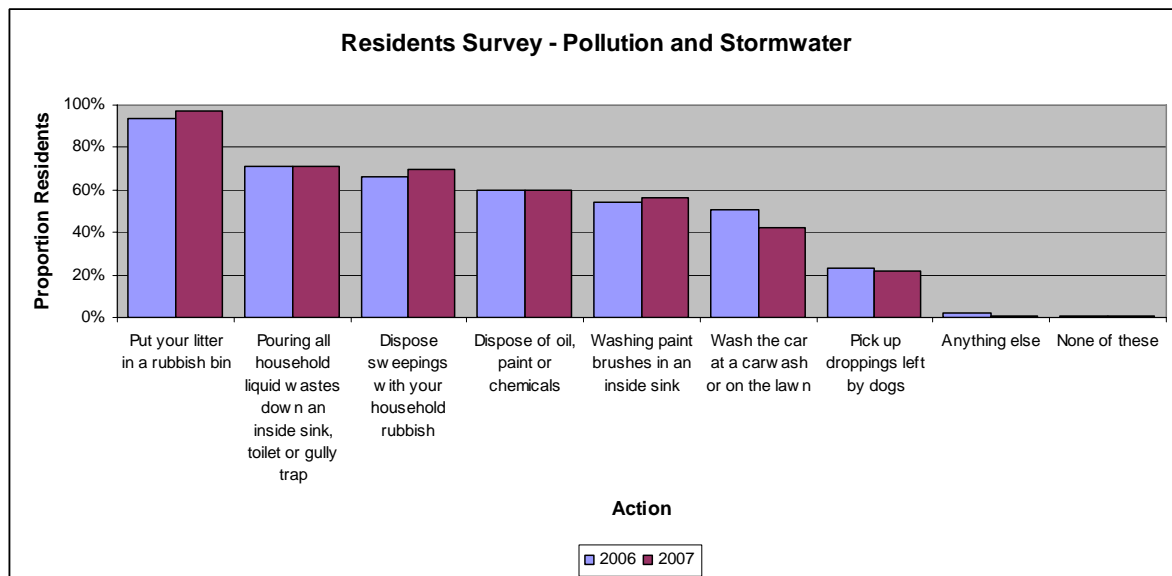


Figure 9 – Residents survey, stormwater pollution reduction

- Complaints and Requests for Service (RFS) – The Council records and monitors complaints and requests for service:
 - to ensure that these are dealt with promptly and effectively
 - as an indicator of community satisfaction and to review the effectiveness of current asset management strategies.

The majority of RFS relate to minor maintenance issues, which are addressed through the Council's reactive maintenance strategies. Higher-level complaints and queries are directed to appropriate staff for monitoring and response.

- Submissions received as part of the LTCCP or Annual Plan process – Planned priorities, activities and works, and financial implications are available to the public to provide feedback by way of submissions.
- Consultation for specific capital works projects.

Customer service regarding physical works is undertaken through the customer calling cards system. Short survey questionnaires are delivered to all affected properties inviting feedback and rating on notification and customer aspects of the works. Service performance is evaluated through analysis of the returned cards.

While much of the Council's consultation will continue to be done at a high level, there is a need to seek the community's view on the trade-offs necessary where there are conflicting goals. To establish these views it may be necessary to conduct more detailed and ongoing consultation with stakeholders than occurs at present, as noted in Section 7.0.

2.8 Adopted level of service and how we are doing

The level of service for the stormwater activity is defined by:

- **Activity measures** – These measure overall activity, covering the aspects of service of most interest to the community and community satisfaction indicators. Activity measures are the focus for community consultation in the LTCCP and are reported on in the Annual Report.
- **Operational measures** – These measure the overall quality of the stormwater activity (such as environmental, technical and cost-effectiveness standards) and are reported on in the asset management plan.

The current and future activity measures and the operational measures adopted, and the level of performance achieved, are shown in Table 2 overleaf.

Performance measure	Target	How we are doing																																																
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<ul style="list-style-type: none"> Response time to service requests – percentage of requests for service responded to within one hour of notification (response includes investigation and prioritisation of work). 	07/08 97% 08/09 97% 09/10 97% 17/18 97%	<table border="1"> <caption>Response <1hr Percent Compliance</caption> <thead> <tr> <th>Period</th> <th>Response</th> <th>Target</th> </tr> </thead> <tbody> <tr><td>Jul-05</td><td>98%</td><td>97%</td></tr> <tr><td>Oct-05</td><td>96%</td><td>97%</td></tr> <tr><td>Jan-06</td><td>98%</td><td>97%</td></tr> <tr><td>Apr-06</td><td>96%</td><td>97%</td></tr> <tr><td>Jul-06</td><td>95%</td><td>97%</td></tr> <tr><td>Oct-06</td><td>97%</td><td>97%</td></tr> <tr><td>Jan-07</td><td>99%</td><td>97%</td></tr> <tr><td>Apr-07</td><td>98%</td><td>97%</td></tr> <tr><td>Jul-07</td><td>99%</td><td>97%</td></tr> <tr><td>Oct-07</td><td>99%</td><td>97%</td></tr> <tr><td>Jan-08</td><td>99%</td><td>97%</td></tr> <tr><td>Apr-08</td><td>99%</td><td>97%</td></tr> <tr><td>Jul-08</td><td>99%</td><td>97%</td></tr> <tr><td>Oct-08</td><td>99%</td><td>97%</td></tr> <tr><td>Jan-09</td><td>95%</td><td>97%</td></tr> </tbody> </table>	Period	Response	Target	Jul-05	98%	97%	Oct-05	96%	97%	Jan-06	98%	97%	Apr-06	96%	97%	Jul-06	95%	97%	Oct-06	97%	97%	Jan-07	99%	97%	Apr-07	98%	97%	Jul-07	99%	97%	Oct-07	99%	97%	Jan-08	99%	97%	Apr-08	99%	97%	Jul-08	99%	97%	Oct-08	99%	97%	Jan-09	95%	97%
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Table 2 – Activity performance measures

2.9 Future improvements

The following improvements are identified that will contribute to the robustness of the service level review processes described in this section. These include:

1. developing a consolidated performance database that supplies information to all relevant reports such as the asset management plan, LTCCP, water industry benchmarking and consent monitoring
2. developing a range of service performance measures which are aligned to the Council's community outcomes, are meaningful from a customer perspective and have value for managing the network

Note: In early 2006 Council staff participated in a facilitated workshop to identify a range of measures that will be considered for adoption and for which historical data will be assessed to enable suitable targets to be set. The measures, which are included as Appendix D, relate to:

- Cost-effectiveness
 - operating efficiency
 - infrastructure efficiency.
 - Safety/flood protection
 - network capacity/condition
 - incidence of nuisance flooding
 - incidence of flooding of habitable buildings.
 - Service quality
 - frequency of system failures
 - duration of service interruptions
 - prior notification of service disruptions
 - incidence of complaints.
3. collating information on historical performance trends against key levels of service for the last five years or so
 4. developing a programme for engaging customers in debate over level of service/cost options.

3.0 Demand change

This section provides details of demand forecasts, which affect the management and utilisation of the stormwater assets. It forms the basis for new works described in Section 5.

3.1 Key demand issues

There is inherent uncertainty in forecasting changes in demand, which has implications on the assets and activities associated with providing flood protection to the Wellington community at the agreed level of service. In particular, there is uncertainty in:

- extent and pattern of urbanisation
- climate change
- change in community expectations.

The goal of managing the infrastructure to provide flood protection to the community at the required level of service as efficiently as possible needs to be balanced with an assessment of possible change and the risk associated with not being able to meet this level of service in the future. The extent of the infrastructure means that significant work, and therefore time, is often required to effect noticeable change. Therefore any increased demand would pose an increasing challenge to management should required capital development projects and/or demand management initiatives be delayed.

High level demand analysis has been completed for the stormwater activity. Further detailed analysis will be carried out in conjunction with the strategic plan.

3.2 Growth and demand trends

Key drivers for demand for stormwater services are:

- population and demographic change
- subdivisional and residential change
- commercial and industrial change
- climate change
- change in community expectations.

3.2.1 Population change

Implication for stormwater services: Increasing population implies increasing urbanisation and subsequent increase in stormwater run-off. This is discussed in 3.2.3.

Anchoring a region of approximately 457,000 people, Wellington City had a resident population of 179,466 in June 2006. This followed a number of years of higher than average population growth due to increased immigration and inter-regional migration into the city. Latest long-term population projections suggest healthy rates of population growth rate for the city.

Under the medium series projections produced by Statistics New Zealand in February 2005, the estimated population of Wellington City is expected to grow by 0.7 per cent per annum between 2006 and 2026. This represents an increase of approximately 27,000 people over this period, which is considerably higher than the earlier projection produced by Statistics New Zealand in 2002. Rises in

the fertility rate and expected higher rates of net migration are the main factors behind the more recent higher projections.

A slowdown in population growth is expected around 2030 in concert with an ageing population and projected slowing of world population growth. Increasing population implies increasing water demand.

The following graph places the Statistics New Zealand projections in the context of historical population changes.

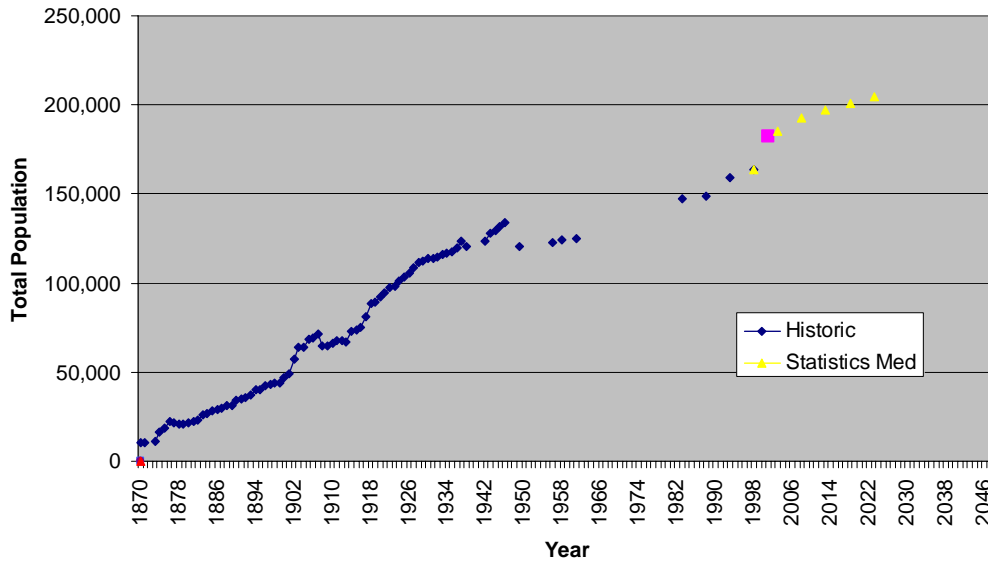


Figure 10 – Long-term population projection

Stormwater run-off projections are based on land use, topography and rainfall characteristics. Increasing population generally implies increasing urbanisation and therefore increasing stormwater run-off. This is discussed further in 3.2.3.

3.2.2 Demographic change

Implication for stormwater services:

- negligible effects from aging population trends within this planning period
- decreasing household size is reflected in changes to dwelling types (denser and a higher proportion of impervious areas per lot imply increased stormwater run-off, as discussed further in 3.2.3)

- **Ageing population** – The median age of Wellington City’s population has increased from 29.1 in 1981 to 33 in 2006.² Wellington’s age profile differs markedly from the New Zealand average. Wellington has a high proportion of working population, aged 15 to 54 (65 per cent compared to the national average of 53 per cent). In the 2001 census, only 8.6 per cent of people were aged 65 and over compared with 12.1 per cent for all of New Zealand.³ Population projections from

² Wellington City Quarterly Review, Statistics NZ, March 2008.

³ 2001 Census: Wellington City Profile, prepared by the Policy and Planning, Performance and Research Group of Wellington City Council using Statistics New Zealand Census 2001 data.

Statistics New Zealand indicate that the increase in population in the 0- to 64-year group will flatten off to minimal growth by the year 2016, as shown in Figure 11 and Figure 12. The over-65-year-old group, while forecast to grow at a significantly increasing rate, remains a relatively small proportion of the total population within this planning period.

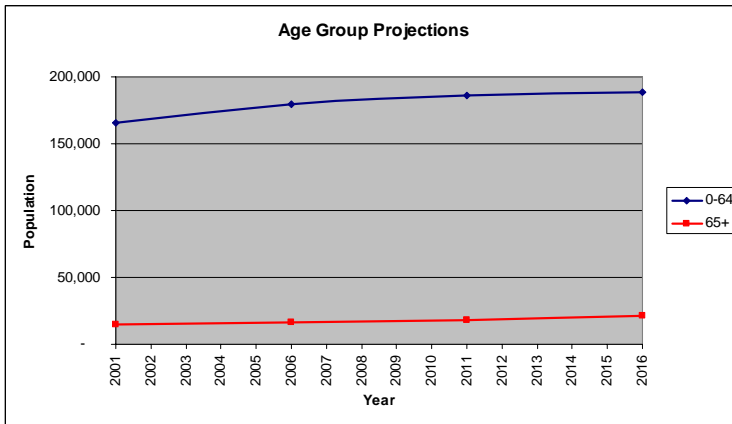


Figure 11 – Population projections by age group

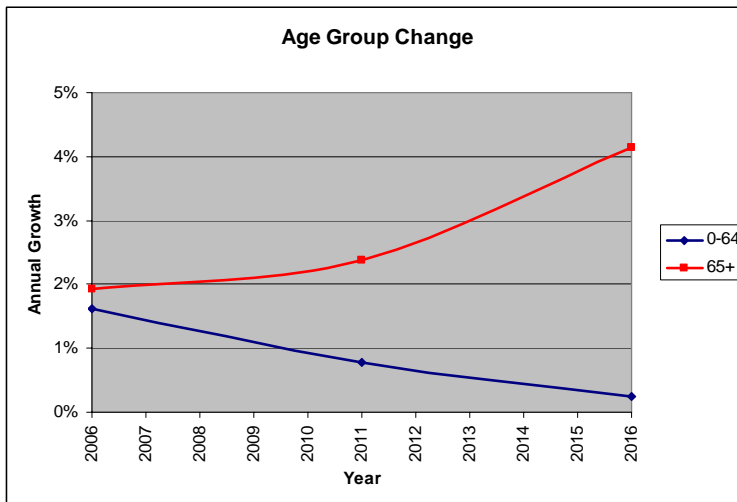


Figure 12 – Population change projections by age group

An aging population implies a decrease in the average occupancy per household, with corresponding effects noted below.

- **Household composition** – The average household size for Wellington City is decreasing in line with the national trends. The mean number of occupants for private households in Wellington City has changed from 2.72 in 1981 to 2.7 in 2006. This is expected to be 2.42 in 2021. Types of dwellings are also changing to reflect this, with a greater proportion of sealed and roof areas and therefore increased stormwater run-off implications as discussed further in Section 3.3.3.
- **Ethnicity** – There are no significant trends in the ethnic diversity of the city that will impact on the management of the stormwater activity.

3.2.3 Subdivisions and residential change

Implication for stormwater services:

- Denser and higher impervious areas per lot imply increased stormwater run-off.
- Inner-city development generally implies increased multi-storey apartment blocks to accommodate higher population numbers, with limited effect on stormwater flows.
- Greenfields development, estimated to make up 18 per cent of future development and generally limited to the northernmost suburbs, may require new infrastructure to serve the developments in addition to the development infrastructure.
- Infill development, estimated to make up 82 per cent of future development, results in increased flows and can lead to capacity issues within existing infrastructure. The majority of this development is expected in the central area, Johnsonville, Kilbirnie and Adelaide Road.
- Overall ability of the network to manage flows is compromised by historical legacies.
- Increased urbanisation leads to increased discharge of contaminants normally associated with urban run-off.
- Financial and development contributions policies are in place to recover costs of infrastructure development required as a consequence of subdivisional or residential (or commercial/industrial) growth.

Wellington's topography and development policies have encouraged a relatively intensive urban footprint when compared to other New Zealand cities. The inner ring of suburbs from Thorndon through Mt Cook to Mt Victoria and Oriental Bay are the most intensively settled areas of the city. Other higher than average areas of population density are found in Newtown, Kilbirnie and Hataitai.

In June 2006 there were 68,901 occupied dwellings in Wellington City. Current housing composition is approximately two thirds stand-alone dwellings and one third terrace/unit or apartment dwellings,⁴ although over the last few years new houses have been approximately one third stand-alone dwellings and two thirds terraces/units or apartments. This trend reflects both the decreasing availability of land (especially larger parcels of land) and growing demand for smaller affordable housing, lifestyle choice and, more generally, an increasing acceptance of this form of housing. The new dwellings have been spread across the city. However, a large proportion of new dwellings have been in the central area, reflecting the popularity of apartments, town houses/terrace houses and units. As would be expected, new stand-alone dwellings tend to be in the fringe suburban areas (reflecting the scarcity of larger parcels of land in the more central areas.)⁵

These trends are illustrated in the following graph showing the suburbs that have had the greatest number of new dwellings constructed, stand-alone dwellings, duplex dwellings or unit/apartment developments.

⁴ 2001 Census: Wellington City Profile

⁵ Wellington City Council Building Consent data 2000-2004

New Dwellings 2000-2004 Top Ten Suburbs

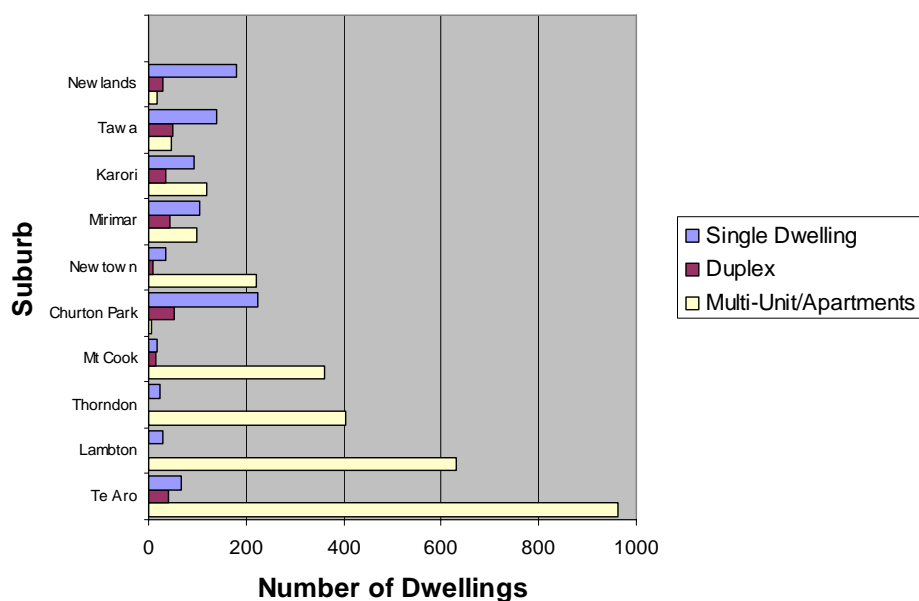


Figure 13 – New dwelling types and locations

Greenfields development is largely limited to the northernmost suburbs of Wellington City and makes up approximately 20 per cent of all new residential development. New infrastructure required to service these developments⁶ is generally constructed by developers to Council standards and adopted by the Council at the completion of the development.

In line with declining household size, Wellington will need to provide approximately 24,000 additional dwellings between 2006 and 2026. Wellington’s Urban Development Strategy (Working Paper 9 – Quantifying the Growth Spine) anticipates increasing demand for medium- and high-density housing, while demand for new traditional family dwellings on residential lots will decline. It is expected that:

- Thirty-six per cent of the total growth will be high-density housing based on a household of 1.5 occupants. Ninety per cent of this demand is expected to be met in the central area and the first section of Adelaide Road. A small amount is expected to be in Johnsonville, with the remainder dispersed to Oriental Parade and other centres along the “growth spine”, such as Kilbirnie and Newtown.
- Thirty per cent will demand medium-density housing based on a household size of 1.8 occupants. It is expected that two thirds of this demand will be met in key centres along the growth spine – Johnsonville, Kilbirnie and Adelaide Road. The remaining demand will be met in other suburban centres (particularly those within or close to the growth spine) and inner residential areas.
- The remaining 34 per cent will demand low-density mainly detached housing based on a household size of 2.0 occupants. Just over half of this demand is expected to be in the form of residential greenfield subdivisions in the northern suburbs and in pockets of undeveloped land within the existing urban footprint. The remaining demand is expected to be in the form of residential infill, encouraged in areas close to key centres and major public transport routes.

Both greenfields and infill development impact on the existing stormwater infrastructure. Development of greenfields areas reduces pervious areas which would otherwise allow some absorption of rainfall incident upon it. The additional hard standing and roof areas increase the volume of run-off and increase the peak stormwater flows. Similarly, infill development and urban

⁶ Individual household services remain in private ownership.

change to smaller, lower-maintenance dwellings generally increases impervious areas and also leads to increases in stormwater run-off. However, development of multi-storey apartment blocks from existing inner city buildings implies that a greater population may be accommodated within the inner city with negligible effect on stormwater flows.

Although the stormwater network is being designed to manage peak design flows from the ultimately developed area, factors can lead to inability of the network to manage actual flows. These include:

- historical legacies, such as:
 - stormwater systems designed without full consideration of the future catchment development and the implications on stormwater run-off
 - subdivisional and subsequent property development not recognising the importance of maintaining clear secondary overland flow paths, which has resulted in obstructions and some “at-risk” areas
- unexpected changes to the catchment characteristics, such as through changes to the District Plan zoning requirements
- climate change.

Increasing urbanisation also implies greater discharge of contaminants associated with urban run-off. This is discussed further in 3.2.6.

In accordance with the Local Government Act 2002, the Council has implemented a development contributions policy. Development contributions are received from developers to fund infrastructure required as a result of growth. In addition to development contributions, the District Plan allows fees to be imposed. However, there is limited capacity for assessing the impacts of individual developments, and historically Council has only applied fees where a clear relationship can be established between the development and infrastructure. Developers may carry out works that may improve the asset’s performance. In these instances, the Council may contribute toward the cost of the works, but only with prior written approval of the Council. At present this contribution is usually limited to the cost of the additional pipe size required to accommodate the flow generated outside the development.

3.2.4 Commercial and industrial change

Implication for stormwater services:

- Limited growth in industry may marginally increase impervious areas within the catchment and so marginally increase stormwater run-off.
- Limited increase in industry may increase the risk of point source contamination of the stormwater discharges.

Wellington is not expecting any significant change to the type and level of industry currently in place in the city. Limited growth of industry may affect the sub-catchment characteristics by marginally increasing the imperviousness and therefore the quantity of stormwater run-off to be managed. These effects are further discussed in 3.2.3.

Industrial premises can be sources for contaminants entering the stormwater system. These effects are discussed further in 3.2.6.

3.2.5 Climate change

Implication for stormwater services:

- Increased peak intensity rainfall may lead to increased frequency of primary system overflow and flood risk.
- Increased sea level may compromise high tide discharge and increase the risk of coastal inundation and upstream flooding. This may be offset by ongoing seismic ground uplift.

In recent years, there has been an increase in the incidence of extreme weather events around the world. Recent NIWA studies⁷ indicate that high-intensity rainfall events are expected to increase by between 1 per cent and 28 per cent by 2030. Rainfall intensities are estimated to increase by between 3 per cent and 13 per cent, implying that the primary system would be expected to be overloaded with peak stormwater flows more frequently than at present, with consequent flood protection levels of service issues.

Further, sea levels are predicted to rise by between 0.14m and 0.18m by 2050, and by 0.3m to 0.5m by 2100. This will affect the ability of the outlet pipes to discharge, particularly at high tide, which may result in surcharging and upstream flooding. This would result in the lower-lying areas of the CBD, Newtown, Kilbirnie and Miramar being at risk. Future works may ultimately be required, including stop banks and pumping systems. However, geological changes around Wellington indicate that ongoing ground uplift along the fault lines may offset this rising sea level.⁸ All available information is being closely monitored and will be included in the design standards as appropriate, including possible amendments to the design rainfall charts.

3.2.6 Change in community expectations

Implication for stormwater services:

- increasing expectations that houses will not be flooded as frequently
- increasing community awareness of the need to use roads and other catchment features as temporary flow paths or ponding areas in heavy rainfall events
- increased focus on environmental quality implies decreased tolerance for contamination of receiving waters by urban stormwater discharges (the Council will continue its investigation into contamination effects).

At present, the community generally expects stormwater run-off to be managed by the primary system, reflecting the traditional approach to intercept and dispose of run-off as quickly as possible. Effective management of flood protection reflects community expectations that includes

- protection of the environment
- cost-effective solutions (these include considering secondary overland flow paths and other topographical features within the catchment as an integral part of stormwater management).

In recent years, there has been an increased awareness of contaminants within urban stormwater run-off, such as organic material, metals, hydrocarbons and sewage, in heavy rainfall events. There is an increasing focus on the quality of the environment, including water quality in watercourses and the coastal receiving waters. Although specific treatment of stormwater is currently limited to catchpit and baffle installations in sumps, the Council is continuing to monitor the effects of urban stormwater discharges and will work with the Greater Wellington Regional Council to address issues identified.

⁷ Impacts of Long Term Climate Change on Weather and Coastal Hazards for Wellington City (NIWA, March 2006)

⁸ Rugged Landscape; The Geology of Central New Zealand, Graeme R Stevens

3.3 Impacts of changing demand

A summary of the impact of demand (and therefore on the management of stormwater assets by the above issues) is shown in Table 3.

Issues	Impact on assets
Population change	<ul style="list-style-type: none"> • Increasing population implies increasing urbanisation and subsequent increase in stormwater run-off.
Demographic change	<ul style="list-style-type: none"> • Decreasing household size is reflected in changes to dwelling types as discussed in subdivision activity and residential change.
Subdivision activity and residential change	<ul style="list-style-type: none"> • Denser and higher impervious areas per lot imply increased stormwater run-off. • Inner-city development generally implies increased multi-storey apartment blocks to accommodate higher population numbers, with limited effect on stormwater flows. • Greenfields development, estimated to make up 18 per cent of future development and generally limited to the northernmost suburbs, may require new infrastructure to serve the developments in addition to the development infrastructure. • Infill development, estimated to make up 82 per cent of future development, results in increased flows and can lead to capacity issues within existing infrastructure. The majority of this development is expected in the central area, Johnsonville, Kilbirnie and Adelaide Road. • The overall ability of the network to manage flows is compromised by historical legacies. • Increased urbanisation leads to increased discharge of contaminants normally associated with urban run-off.
Commercial and industrial change	<ul style="list-style-type: none"> • Limited growth in industry may marginally increase impervious areas within the catchment and so marginally increase stormwater run-off. • Limited increase in industry may increase the risk of point source contamination of the stormwater discharges.
Climate change	<ul style="list-style-type: none"> • Increased peak intensity rainfall may lead to increased frequency of primary system overflow and flood risk. • Increased sea level may compromise high tide discharge and increase the risk of coastal inundation and upstream flooding. This may be offset by ongoing seismic ground uplift.
Increasing community expectations	<ul style="list-style-type: none"> • There are increasing expectations that houses will not be flooded. • There is increasing community awareness of the need to use roads and other catchment features as temporary flow paths or ponding areas in heavy rainfall events. • Increased focus on environmental quality implies decreased tolerance for contamination of receiving waters by urban stormwater discharges. The Council will continue investigating contamination effects.

Table 3 – Summary of demand impacts

3.4 Meeting growth and increased demand needs

Wellington City Council meets increased demand through a mix of:

- demand management initiatives (these are non-asset development strategies to reduce demand for the service, in this case, reducing peak stormwater flows to the network and making use of natural features within the catchments for secondary flow or attenuation)
- operational strategies to maximise the potential of the network
- maintenance and renewal programmes to ensure assets perform to their potential
- capital development strategies.

Strategies and projects implemented to address growth and demand related issues are discussed in Section 5.0. Demand management strategies are discussed in Section 3.5.

Funding strategies to meet the costs of capital works required as a result of growth are included in Section 6.0, as are assessments of additional maintenance, operations and renewals costs resulting from these new assets.

3.5 Demand management strategies

Demand management strategies provide alternatives to creating new or improved assets in order to meet demands. They address ways of modifying customer demand so the use of existing resources is maximised and the need for new resources is deferred or reduced.

3.5.1 Current practices

Demand management is practised continuously to maintain demand at reasonable and sustainable levels. Demand management options that are currently implemented include:

Regulation –The District Plan dated July 2000, discourages greenfield development through its urban containment policies by encouraging infill housing in existing urban areas. It includes policies to limit site coverage and therefore peak run-off volumes.

Education – This includes promoting environmental awareness and the effects of activities such as car washing, where contaminants may enter the stormwater system through sumps.

Demand substitution – implementing integrated solutions through:

- maximising the use and benefits of natural catchment areas, including soakage and storage/attenuation potential
- exploring opportunities to reduce stormwater run-off through re-vegetation programmes, the use of porous pavements and infiltration drainage (soakage)
- managing waterways using a holistic approach as articulated in the Council's Bush and Streams Restoration Plan, "Wet and Wild" 2001, and the Biodiversity Plan 2008
- minimising run-off impacts through raising affected properties, or purchasing, protecting and reselling affected properties.

3.5.2 Possible future practices

Demand management options that will be considered as part of the development of the network strategic plan include:

Education – increased promotion of environmental awareness and effects of activities such as car washing, where contaminants may enter the stormwater system through sumps

Demand substitution – exploring opportunities to reduce stormwater run-off through capture of run-off from roofs for re-use as a non-drinking water source.

3.6 Stormwater demand projections

3.6.1 Stormwater demand projection assumptions

Based on the factors discussed in the previous sections, the following assumptions are made in developing the stormwater demand forecasts:

Medium demand scenario

- household forecasts are as given within the census household projections, medium series
- urbanisation proceeds as assumed in Wellington's Urban Development Strategy (Working Paper 9)
 - Thirty-six per cent of urbanisation comprises high density development, with 80 percent of this being within the inner city, and the remainder within inner residential areas. The run-off coefficient change from this development on a per lot basis is zero ($c=0.95$) within the inner city and 0.25 ($c=0.7$ to $c=0.95$) within the inner residential areas.
 - Thirty per cent of urbanisation comprises medium density development. The run-off coefficient change from this development on a per lot basis is 0.2 ($c=0.5$ to 0.7).
 - Thirty-four per cent of urbanisation comprises low density development, with 45 per cent of this being suburban infill housing, and the remainder greenfield development. The run-off coefficient change from this development on a per lot basis is 0.1 ($c=0.5$ to $c=0.6$) within suburban areas and 0.15 ($c=0.35$ to $c=0.5$) within developed greenfield areas.
- no effects from demographic change
- no effects from commercial industrial change
- intensity of rainfall increases by 8 per cent by 2026, corresponding to medium temperature and rainfall increase forecasts by NIWA⁹.

High demand scenario

- household forecasts are as given within the census household projections, high series
- urbanisation proceeds as assumed in Wellington's Urban Development Strategy (Working Paper 9) as detailed above
- no effects from demographic change.
- no effects from commercial industrial change
- intensity of rainfall increases by 13 per cent by 2026, corresponding to high temperature and rainfall increase forecasts by NIWA.

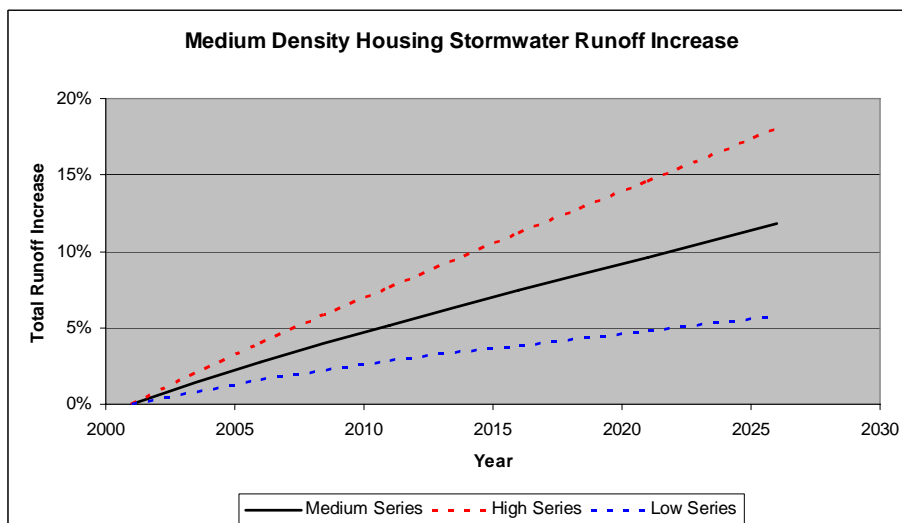
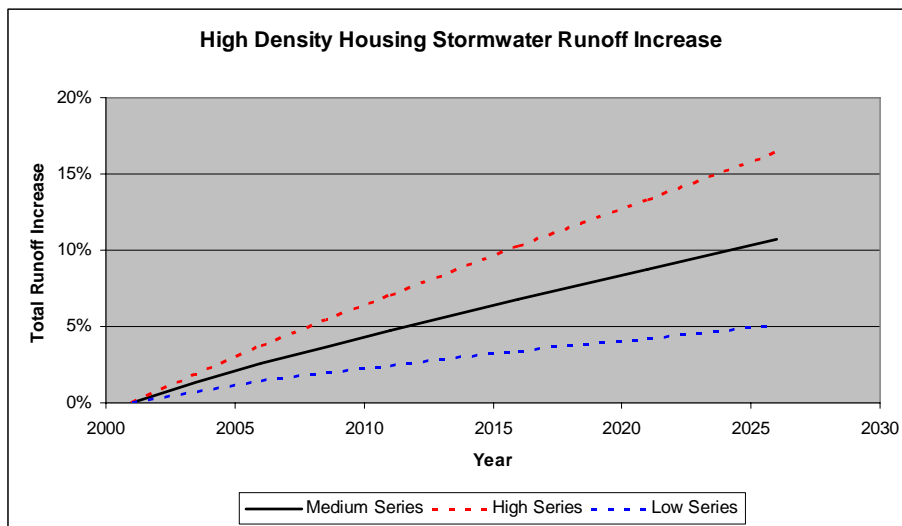
⁹ Impacts of Long Term Climate Change on Weather and Coastal Hazards for Wellington City, 2006

Low demand scenario

- household forecasts are as given within the census household projections, low series
- urbanisation proceeds as assumed in Wellington’s Urban Development Strategy (Working Paper 9) as detailed above
- no effects from demographic change
- no effects from commercial industrial change
- intensity of rainfall increases by 3 per cent by 2026, corresponding to low temperature and rainfall increase forecasts by NIWA.

3.6.2 Stormwater demand projections

Figure 14 presents estimated indicative cumulative increases in stormwater run-off from development and climate change for each type of development area. Figure 15 separates out the estimated impacts from urbanisation and climate change for the medium series, medium-density housing areas. Greater detail is provided in individual catchment management plans, including the capability of the primary and secondary stormwater system to manage these flows.



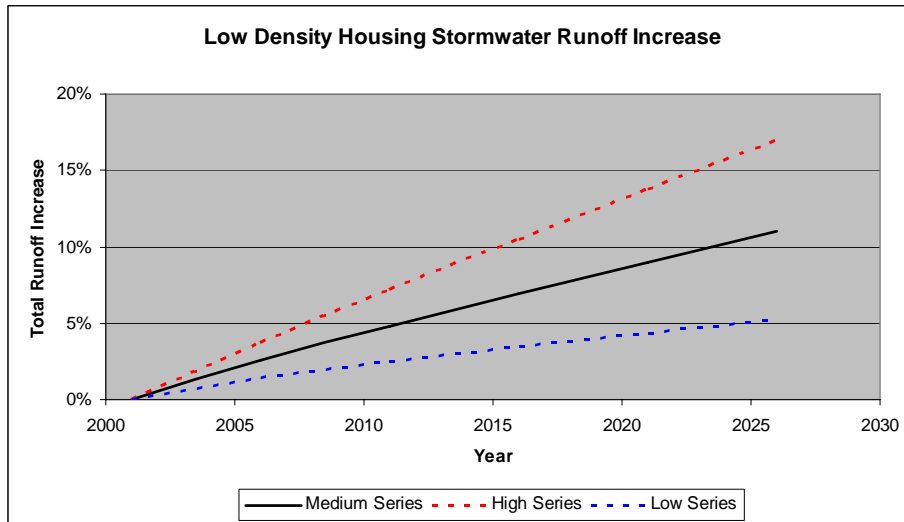


Figure 14 – Projected cumulative increase in stormwater flows

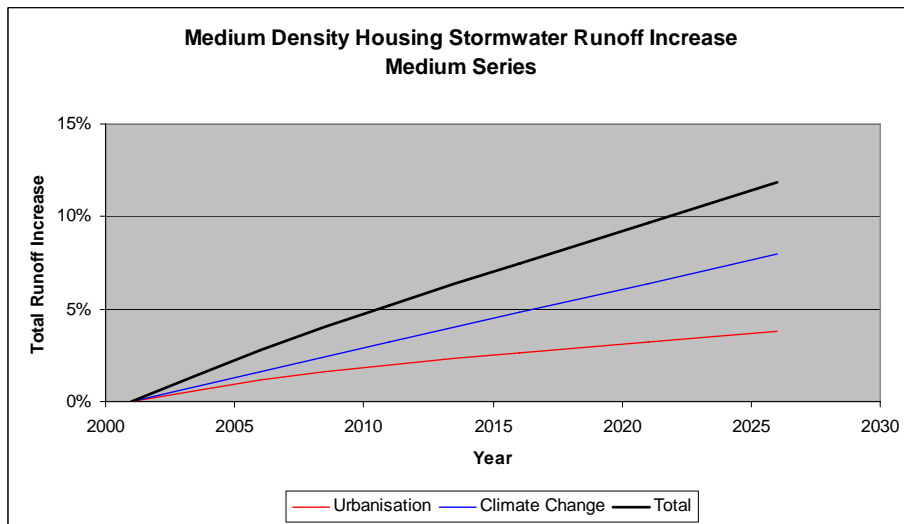


Figure 15 – Relative components of stormwater run-off increases

3.7 Future improvement

A project will be undertaken to strengthen processes for assessing growth and demand (including climate change) and the impact on the network as part of asset management improvement project 2. Initial improvements will be targeted at:

- reviewing climate change assumptions made and implications to existing analysis within catchment management plans and the underlying analysis/modelling
- reviewing the area-specific urbanisation baseline and growth assumptions made with reference to “Quantifying the Growth Spine”, census area unit dwelling statistics, and the analysis/modelling underlying the catchment management plans
- reviewing the assumptions made in run-off co-efficient change from urbanisation and implications to existing analysis.

The approach and assumptions underlying this high-level demand analysis will therefore be consistent with the detailed analyses in the catchment management plans and thus linked to consequent work projects and programmes.

4.0 Managing risk and options evaluation

This section looks at the risk management processes set up by the Council to assess and manage risk. Risk is used as a strategic decision-making tool to help develop and prioritise the strategies and work programmes detailed in Section 5.0.

4.1 Introduction

The Council strives to manage risk in a responsible manner to enable business objectives to be consistently met. The risk management process is designed to ensure that:

- all significant operational and organisational risks are understood and identified
- the highest risks that should be addressed in the short to medium term are identified
- risk reduction treatments which best meet business needs are applied
- responsibilities for managing risk are allocated to specific staff.

The adopted risk management process is consistent with Australian/New Zealand standard AS/NZ 4360 (see Figure 16), which defines risk assessment and management. Key Council and Capacity staff responsible for managing the stormwater assets have established and reviewed key asset-related risks.

4.2 Risk management process

4.2.1 Risk context

A framework for successfully identifying, analysing, evaluating and managing risk was established based on the Australian/New Zealand standard AS/NZ 4360. The Council has introduced a risk framework for the assessment of risk consequences and a risk priority treatment matrix to be applied for the management of all stormwater activities.

The following steps were undertaken to establish the context:

- definition of the relationship between the organisation and the environment, and the organisation's strengths, weaknesses, opportunities and threats to provide an understanding of the "big picture" potential risk areas and opportunities to manage these risks
- identification of internal and external stakeholders
- identification of the organisation's capabilities to meet the objectives (levels of service and community outcomes)
- identification of broad categories for sources of risk of not achieving the levels of service and community outcomes, and areas of impact.

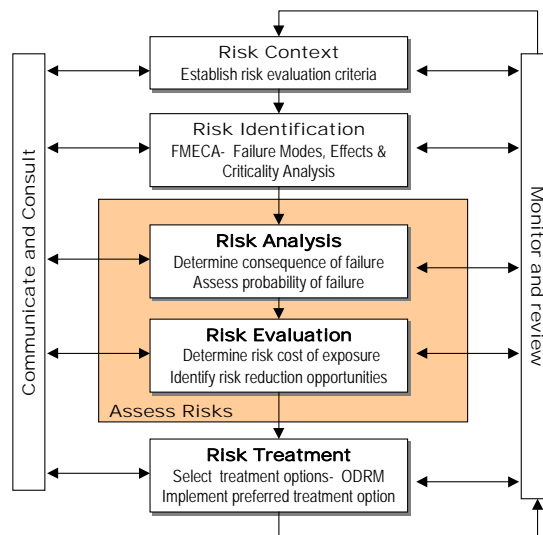


Figure 16 – Risk management process

The key risk criteria, or areas of impact adopted by the Council for assessing the consequences of identified risks are:

- health and safety
- financial/business/property damage
- community impact

- environmental
- reputation or credibility with customers.

4.2.2 Risk identification

Events leading to failure to achieve defined levels of service, and therefore compromising achievement of community outcomes, have been identified and their consequences defined. The adopted risk reduction treatments are presented in Section 4.3.

4.2.3 Risk options

Options for mitigating risks considered to reduce the cause, probability or impact of failure, are:

- do nothing – accept the risk
- management strategies – implement enhanced strategies for demand management, contingency planning, quality processes, staff training, data analysis and reporting, reduce the target service standard, etc
- operational strategies – actions to reduce peak demand or stresses on the asset, operator training, documentation of operational procedures, etc
- maintenance strategies – modify the maintenance regime to make the asset more reliable or to extend its life
- asset renewal strategies – rehabilitate or replace assets to maintain service levels
- development strategies – investment to create a new asset or augment an existing asset
- asset disposal/rationalisation – divestment of assets surplus to needs because a service is determined to be a non-core activity or assets can be reconfigured to better meets business needs.

The risk policy specifies the following broad treatment strategy for the levels of risk:

Risk severity		Treatment strategy
E	Extreme	Immediate action required to reduce risk
H	High	Senior management attention needed
M	Moderate	Management responsibility must be specified
L	Low	Manage by routine procedures

Table 4 – Risk evaluation and strategy summary

In the case of high risks, senior management attention includes the review of treatment options and additional action taken to manage risk.

4.3 Risk summary

The Council and Capacity are developing a decision-making framework to help select the best works option for a given issue and to prioritise works and other capital investment decisions. Risk mitigation options will be evaluated using this framework on its completion.

The framework uses multi-criteria analysis (MCA) to assign weighted scores to defined criteria within:

- service quality
- customer focus
- financial benefits
- environmental performance
- legislative requirements.

4.3.1 Emergency planning

Identified risk events with high consequences are considered for inclusion within contingency planning, business continuity planning and emergency response planning, even though the likelihood of the events may be small. High-consequence risks included in these separate assessments are summarised in Table 5.

Core value	Activities / services / products	Risk event description	LOS failure indicator
Service quality	System capability	Incorrect demand forecasts, deferred planning action	Increased frequency of flooding, slips
		Changes to DP and catchment characteristics	
	Natural hazard/disaster	Coastal inundation through seal level rise	Increased frequency of coastal area flooding
Customer focus	Activity hazards	Earthquake	Loss of flood protection, injuries and damage from asset failure
		Pedestrian (child) entering/washed into stormwater system/culverts	Near misses, serious harm incidents, fatality
Cost effectiveness	LOS	Risks associated with working on the network	
		Do not understand community needs/ aspirations - activity may fail to meet community needs/ aspirations	Inefficient management of assets

Table 5 – High-consequence risks

4.4 Future improvements

Future identified improvements to assess and manage risk include the development of a specific activity risk management plan. The following improvement will be included in the development of this document:

- develop a more robust framework for identifying critical assets (refer to the “priority sites response and recovery” project)
- undertake annual reviews of activity risks to ensure the risk profile remains current (risks associated with critical assets to be separately assessed)
- undertake mitigation option analysis using optimised decision-making framework on all high or extreme risks and implement outcomes.

5.0 Lifecycle management plans

This section applies the risk policies described in Section 4.0 to develop the broad strategies and specific work programmes required to achieve the goals and standards outlined in Section 2.0. It presents the lifecycle management plan for the stormwater assets, and includes:

- a description of the assets groups
- detailed operations, maintenance, renewal and development strategies
- work programmes and associated financial forecasts.

5.1 Introduction

This section describes the stormwater assets, the lifecycle management strategies used to manage them and work plans for the next 10 years. The asset groups and the physical quantities are shown in Table 6. Figure 17 shows the proportion of the total replacement value for the main asset groups.

Activity	Asset components	Quantity
Pipes systems	Pipes	649km.
	Tunnels	1km.
	Kaiwharawhara sediment/debris collection facility	1
	Ngauranga sediment/debris collection facility	1
	Karori sediment/debris collection facility	1
Natural systems	Porirua Stream – 33% share with Porirua City Council	1
	Ngauranga Stream	1
	Kaiwharawhara Stream	1
	Karori Stream	1
	Ohariu Stream	1
	Owhiro Stream	1
Associated collection assets	<ul style="list-style-type: none"> • kerbs and channels • sumps 	Considered transportation assets and included in the transportation asset management plan.
Secondary system	<ul style="list-style-type: none"> • overland flow paths and ponding areas <ul style="list-style-type: none"> - road corridors - drainage reserves - parks and reserves 	Integral to the management of stormwater run-off and flood protection, although not considered stormwater activity assets. Included in the transportation, property and parks asset management plans.

Table 6 – Stormwater assets summary

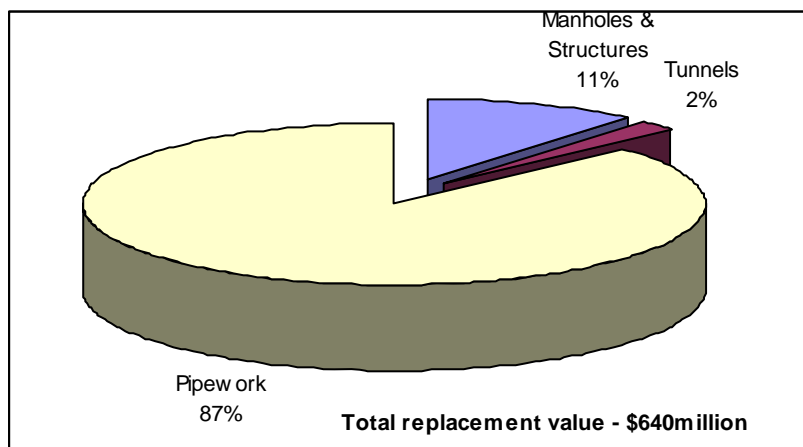


Figure 17 – Stormwater asset replacement cost

5.1.1 Network overview

Stormwater management and flood control in Wellington City is achieved through:

- Primary system:
 - Structures that intercept and direct rainfall run-off to conveyance systems, these include kerbs, channels, sumps and specific intake structures. Kerbs, channels and sumps are managed as part of the transportation activity.
 - Conveyance systems which transport run-off to the sea. These are generally piped systems, although in some cases are natural watercourses. Many of the natural streams in the Wellington City area were piped many years ago. Typically, the larger pipes in the stormwater drainage system are laid along the beds of the original streams (often on private property) with the smaller feeder pipes in legal road.
- Secondary system:
 - Overland flow paths and ponding areas to safely manage flows in excess of the capacity of the primary system. Most secondary flow paths tend to be roads.

Activities contributing to coastal flood defences are managed separately, such as:

- Provision of seawalls, managed as part of the transportation activity
- Dune stabilisation, managed as part of the gardens and beaches activity.



Stormwater run-off in Wellington is managed in 44 separate catchments as indicated in Figure 18.

Because residential development in the Wellington region after 1945 has occurred predominantly outside Wellington's boundaries, the percentage of stormwater pipes 50 years or older is high by average standards in New Zealand. There also tends to be a larger number of small-diameter pipes in Wellington compared to many cities of similar size due to the steeper topography.

Network capacity, performance and condition are discussed in Section 5.4.

Figure 18 – Wellington stormwater catchments

5.2 Lifecycle management strategies

Strategies for delivering the stormwater services can be separated into the following groups:

- **Management strategies** which support the specific lifecycle works and strategies and include:
 - strategic planning
 - data management and evaluation
 - business processes
 - monitoring
 - financial management.

Developed and implemented by Capacity and Wellington City Council

- **Operations and maintenance strategies** set out how the stormwater system is operated and maintained on a day-to-day basis to consistently achieve the optimum use of assets.

Managed by Capacity – implemented by external service providers

- **Renewal strategies** to provide for the progressive replacement of individual assets that have reached the end of their useful life. The rate of asset renewal is intended to maintain the overall condition of the asset system at a standard which reflects its age profile and ensure that the community's investment in the city's stormwater infrastructure is maintained.

Managed by Capacity – implemented by external service providers

Maintaining the service potential of the assets and ensuring that the assets achieve that potential

- **Capital development and disposal strategies** adopted to improve parts of the system currently performing below target service standards and to allow development to meet future demand requirements.

Managed by Capacity – implemented by external service providers

Closing service gaps.

Meeting future demand

5.2.1 Management strategies and standards

Wellington Water Management, trading under the name Capacity, has been managing the asset since early 2004. This Council controlled organisation is responsible for the management functions previously carried out by the Wellington City Council and Hutt City Council's drainage and water supply units for the assets in Wellington and Hutt City. In 2008 this was extended to also include the management of the water activity assets for Upper Hutt City Council.

Capacity was established to enable water services to be managed to higher standards and at lower cost by eliminating duplication in the management of the two cities' water services.

The ultimate responsibility for the stormwater service in Wellington City and ownership of the stormwater system remains with Wellington City Council. The Council also retains the responsibility for setting standards, policy and charges.

Capacity manages the stormwater activity to achieve the outcomes specified by Wellington City Council. It does this by using a balance between its own resources and a range of external contractors and specialists.

Management strategies

The following summarises management strategies in place to support delivery of the stormwater services. Further detail is attached as Appendix E.

- **Organisational structure**
 - manage the stormwater service through a structure that maintains a separation between asset management and service delivery to promote accountability, transparency and efficiency.

- **Strategic planning**
 - asset management commitment – the stormwater asset management plan is the key plan for managing the stormwater activity and is a “living” document that is reviewed on a regular basis
 - demand management – regularly review demand forecasts and plan to meet changing demand through holistic solutions, including demand management initiatives
 - risk management – completing regular risk assessments to update the risk management plans and implement risk mitigation measures to maintain risk exposure at a level compatible with the corporate risk policy
 - service level consultation – regularly review appropriateness of service standards by monitoring customer feedback and applying appropriate consultative methods
 - optimised decision-making – develop processes to assist decision-making
 - sustainable resource management – operate, manage and develop the asset system in a manner compatible with sustainable resource management principles.

Management standards

The stormwater activity in Wellington City is managed in accordance with the following standards:

- generally accepted accounting practice (GAAP) and more specifically with FRS-3 “Accounting for Property, Plant and Equipment” (to be superseded by NZ IAS 16)
- the International Infrastructure Management Manual
- resource consent conditions for the stormwater activity (these are summarised in Appendix H)
- the Wellington City Council Health and Safety Plan
- Wellington City Council and Capacity business plans and quality assurance documents

- Wellington City catchment management plans
- flood protection plan
- drainage rehabilitation plan, including the critical drains process
- “Wet and Wild” bush and stream restoration plan
- emergency management plan.

5.2.2 Operations and maintenance strategies and standards

Operations and maintenance activities are described below:

- **Asset operations** – the active process of utilising an asset, which will consume resources such as manpower, energy and materials. Operations include routine inspections and testing to monitor asset condition and identify the need for maintenance and repair work.
- **Asset maintenance** – the day-to-day work activity required to keep assets serviceable and prevent premature deterioration or failure. Two categories of maintenance are carried out:
 - unplanned maintenance – work carried out in response to reported problems or defects (for example, repair of a blockage)
 - planned maintenance – work carried out to a predetermined schedule (for example, vegetation management around stormwater assets) or programmed as a result of identified needs (for example, repairs of faults of a more significant nature, but which do not pose a hazard).

Operations and maintenance strategies

The following summarises operations and maintenance strategies. Further detail is attached as Appendix E.

- Operations and maintenance contracts – use performance-based term contracts to achieve defined service standards for the operation and maintenance of the stormwater system. Audits of contract performance will be carried out to verify that operational procedures and an adequate level of maintenance are carried out.
- Incident management – effectively respond to and manage incidents to ensure system availability and service continuity, and mitigate adverse effects.
- Critical asset management – identify critical assets and manage these proactively, manage non-critical assets reactively.

Operations and maintenance standards

The following standards are applicable to the operation and maintenance of the stormwater system:

- the Operation and Maintenance Contract for Wellington City and Hutt City Water, Wastewater and Stormwater Services, including the agreed operations and maintenance plan
- relevant resource consents and the Resource Management Act 1991
- Transit New Zealand Guidelines “Working on the Road”
- Wellington City Council Guidelines “Working on the Road”
- health and safety plans
- Capacity and Wellington City Council quality assurance processes, including contract management procedures
- Wellington City Council customer service standards (including standards for notification of works).

5.2.3 Renewals strategies and standards

Asset renewal describes major work that restores an asset to its original capacity or the required condition. It includes rehabilitation and replacement.

Renewals strategies

The following summarises operations and maintenance strategies. Further detail is attached as Appendix E.

- Critical asset management – identify critical assets and manage these proactively, manage non-critical assets reactively.
- Identification of renewal needs – cyclic renewal needs are identified by analysing age, material type and condition data, maintenance and request for service records (asset failure and expenditure history) and observations of staff and contractors.
- Prioritisation of renewal projects – renewal projects are justified and prioritised using a risk-based process.
- Project approval – a long-term renewal expenditure forecast is prepared and annual programmes developed from projects meeting the assessment criteria. The annual proposed renewal expenditure is approved through the Annual Plan process.
- Project design – system performance and rationalisation options are investigated as part of project design (refer Appendix E).

Renewals standards

The following standards are applicable to the renewal of stormwater assets:

- the stormwater asset management plan
- Wellington City Council Code of Practice for Land Development (including the updated draft Code)
- customer service standards (including standards for notification of works)
- relevant resource consents and the Resource Management Act 1991
- relevant Wellington City Council specifications and standard detail plans
- Transit New Zealand Guidelines “Working on the Road”
- Wellington City Council Guidelines “Working on the Road”
- health and safety plans
- Capacity quality assurance processes, including contract management procedures
- drainage rehabilitation plan, including the critical drains process.

5.2.4 Capital development and disposal strategies and standards

Asset development and disposal activities are described below:

- **Asset development** – the creation of new assets or works which upgrade or improve an existing asset beyond its existing capacity or performance in response to changes in demand or levels of service targets.
- **Asset disposal** – disposal is any of the activities associated with the disposal of a decommissioned asset. Assets may become surplus to requirements for any of the following reasons:
 - under-utilisation
 - obsolescence
 - provision exceeds required level of service
 - asset no longer provides the service or fulfils the purpose for which it was intended

- uneconomic to upgrade or operate
- policy change
- service provided by other means (e.g. private sector involvement)
- potential risk of ownership (financial, environmental, legal, social, vandalism).

Development and disposal strategies

The following summarises development and disposal strategies. Further detail is attached as Appendix E.

- Identification of development needs – asset development needs are identified from analysis of system performance monitoring (flooding etc), catchment modelling, demand forecasts, risk assessment and customer service requests.
- Prioritisation of development projects – development projects are justified and prioritised using a risk-based process.
- Project approval – a long-term development programme is prepared from projects meeting the assessment criteria, and all projects are approved through the Annual Plan process.
- Project design – all asset development works will be designed and constructed in accordance with current adopted industry standards (or known future standards). System performance and rationalisation options are investigated as part of project design (refer Appendix E).
- Asset disposal – assess each proposal to dispose of surplus or redundant assets on an individual basis, subject to the requirements of the relevant legislation.
- Vested assets – the risk, cost and benefits of accepting any new privately funded assets constructed in association with property development will be considered on a case-by-case basis in approval decisions.

Development and disposal standards

Standards and specifications for the construction of assets will reflect the best practice technologies, national standards and legislative requirements. All construction and the materials used comply with:

- the stormwater asset management plan
- Wellington City Council Code of Practice for Land Development (including the updated draft Code)
- customer service standards (including standards for notification of works)
- relevant resource consents and the Resource Management Act 1991
- relevant Wellington City Council specifications and standard detail plans
- Transit New Zealand Guidelines “Working on the Road”
- Wellington City Council Guidelines “Working on the Road”
- health and safety plans
- Capacity quality assurance processes, including contract management procedures
- drainage rehabilitation plan, including the critical drains process.

The standards will be reviewed regularly and updated to incorporate relevant experiences, legislative requirements and changes in best practices.

5.3 Support services plan

5.3.1 Asset management activities

Activities undertaken to support the continued operation of the stormwater assets to meet the required levels of service include:

- water quality monitoring at selected strategic sites
- computer modelling, flow monitoring and other analysis as part of the development of catchment management plans
- ongoing upkeep of rain gauges and the data collected
- network inspections, including CCTV inspections
- data management
- asset management planning, including growth planning, risk management and policy development
- proactively keeping abreast of legislative and technological change
- design and contract management associated with operations and maintenance activities
- response to requests for service including:
 - monitoring complaints and asset fault history
 - tracing source of seepages as requested by the Council’s building control and licensing services inspectors
 - determining the location of drains not shown on drainage plans.

These activities are managed by Capacity with some modelling, analysis and asset management improvement activities undertaken by external service providers. Some on-site assistance, including opportunistic data capture, is provided by the maintenance contractor. CCTV inspections are undertaken by specialist contractors.

5.3.2 Catchment management plans

Catchment management plans are being progressively completed to provide the Council with the following information:

Asset knowledge	<ul style="list-style-type: none"> • assess flood risk • prepare flood hazard maps.
Upgrading	<ul style="list-style-type: none"> • provide information to prioritise, plan and budget for flood protection works as a basis for future detailed design of the stormwater system • explore options for flood mitigation • consider options for mitigating adverse environmental effects, particularly road run-off.
Development control	<ul style="list-style-type: none"> • set floor levels for new developments above flood levels • control development on overland flow paths to prevent the blockage of these paths • identify catchments where general restrictions on development are needed • establish land use controls as appropriate • possibly set levies on development to fund works.
Water quality	<ul style="list-style-type: none"> • determine the influences on water quality in streams and receiving waters • determine what mitigation works might be implemented.

Table 7 – Catchment management plan information

Plans completed now consider a broader approach to stormwater management than earlier plans, which were focused principally on flood risk. Under the new plans, the best environmental outcomes can be secured for the effort expended. These integrated plans also consider:

- sanitary sewer overflows
- environmental management
- contaminants such as litter, heavy metals and hydrocarbons
- education to achieve desired outcomes
- land use and development controls
- run-off management
- recognition of stormwater as a potential resource.

Catchment management plans have been completed for what were ranked as the top priority catchments, defining flood protection works programmes and also considering environmental risk and potential growth issues. Separate flooding and environmental assessments have been undertaken on further catchments. The catchments are:

Catchment	Catchment management plan	Pipe/channel model	Overland flow model	Flood hazard mapping
Miramar	1998	1998	2004	2004
Karori East	1990	2005	2005	2005
Te Aro	2000	2000	2005	2005
Karori Stream	1990	2005	-	2005
Karori West	1990	-	-	-
Newtown	1997	1997	-	2004
Island Bay	1997	1997	-	-
Waring Taylor	1997	1997	-	-
Kilbirnie	2003	2003	-	2003
Taranaki Street	-	2006	2006	2006
Tawa	-	1997	-	-
Tory Street	-	-	-	-
Bowen/Bunny	-	-	-	-
Harris	-	-	-	-

Table 8 – Catchment management plans and other assessments completed to date

This is shown spatially in Figure 19:

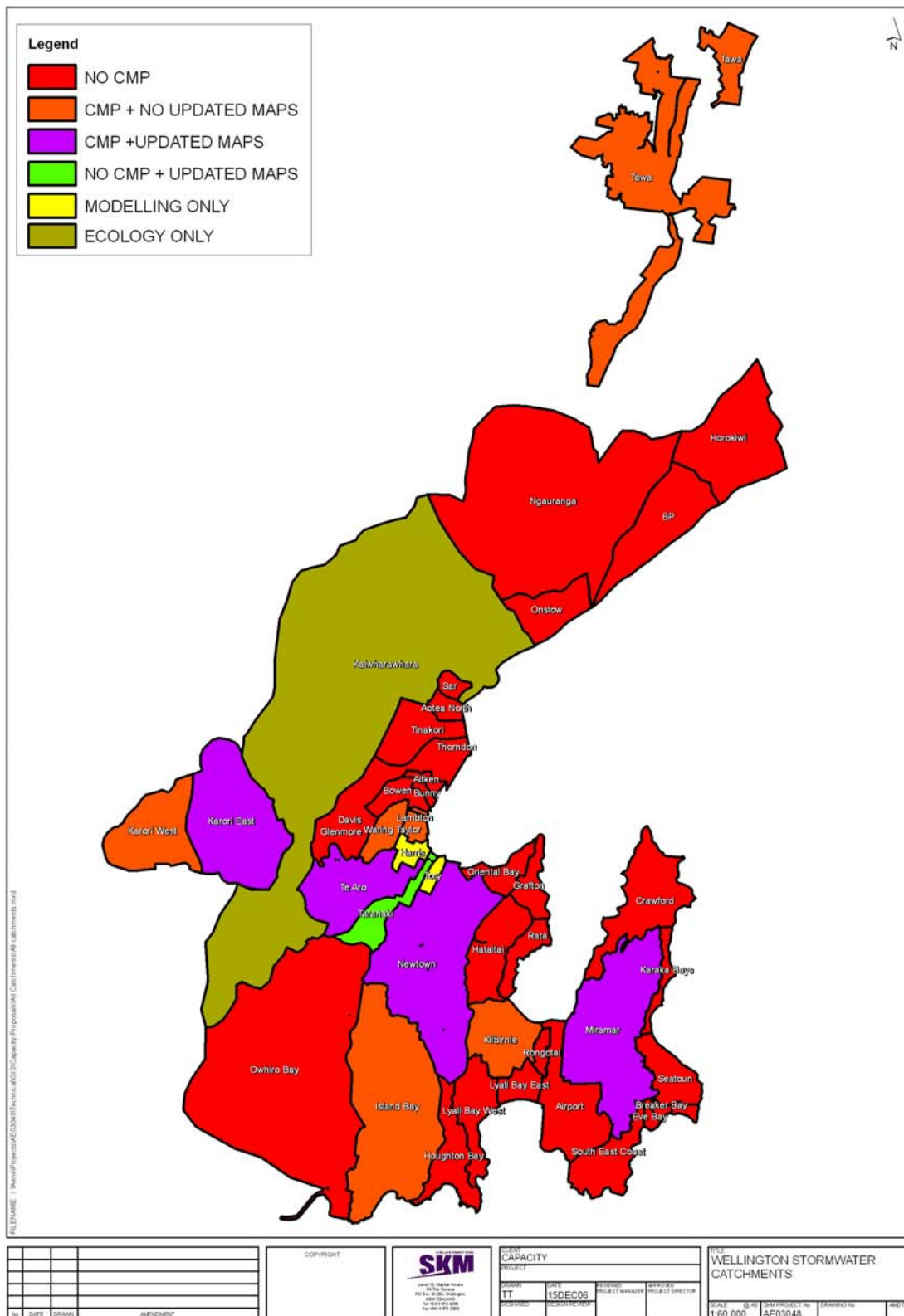


Figure 19 – Stormwater flood protection and environmental studies undertaken

A more comprehensive matrix that includes all the catchments in the city has been developed to determine the priorities for developing future plans and includes consideration of:

- flooding risk
- environmental risk, including cultural effects
- customer reputation/potential growth
- health and safety.

Flooding investigation triggers (level of service and breaches) occasionally require a flooding investigation or partial catchment management plan be carried out without regard to catchment ranking priorities. These investigations will normally be for discrete areas and any works will be programmed according to the benefit/cost. This information would be included in the more comprehensive catchment management plan when that plan is prepared.

The Council has recognised that citywide flood protection capability is not yet well quantified and that better understanding of the extent of flood risk is essential to prudently manage the stormwater activity. The Council is therefore developing both a capital works prioritisation framework, as well as a network strategic plan to assist in identifying works required to most effectively manage flood risk in Wellington. These initiatives include reviewing the programme of further catchment management planning studies to be undertaken, as well as integrating the solutions identified in individual catchment management plans. The first phases are under way, including a gap analysis of the existing catchment management plans and planning for five interlinked catchments – Harris, Te Aro, Taranaki, Tory and Newtown. These five catchments are among the highest ranked in the Council's catchment management planning priority matrix and collectively contain the largest flood hazard risk. The catchment management planning for the five interlinked catchments should be complete by the end of the 2008/09 financial year and will deliver the following:

- updated flow models for Harris, Te Aro, Taranaki and Newtown catchments that reflect recent upgrades, include physical connections between the stormwater networks and comply with the Council's modelling best practice guidelines
- a new model for the Tory Street catchment
- updated flood hazard maps for the five catchments.
- integrated flood mitigation options for managing the flood risk for the five catchments that are suitable for input into the Council's capital works programme.

The Council intends to complete catchment management plans for the remaining two identified "at risk" catchments following the completion of the inner-city plan noted above, with further catchment management planning needs to be prioritised using the capital works prioritisation framework.

5.3.3 Flood hazard maps

The topography of Wellington often results in private properties having appreciable quantities of stormwater flowing through them. The Resource Management Act requires territorial authorities to control potential development effects, including mitigation of natural hazards. This requires the authority to have a record of these natural hazards. The Building Act also requires buildings to be protected up to a 50-year average recurrence interval (ARI) event.

The Council is preparing flood hazard maps to accompany the catchment management plans, based on a 50-year storm event and a freeboard of at least 300mm. Each flood risk area has an associated level for the minimum floor level that includes this freeboard. The Council tries to ensure that buildings are not constructed on identified flood plains, in secondary flow paths or in natural hollows. All building consent applications are checked against the hazard map and contour plans, but site visits are rare as the risks associated with the present process are considered to be acceptable.

Figure 19 indicates catchments for which flood hazard maps have been completed. We plan to review the need for developing further flood hazard maps, considering risk and resources required to do so, and prioritise the completion of further maps using the capital works prioritisation framework.

Catchment management plans completed to date have had differing assumptions and methodologies, making the preparation of a consistent hazard map difficult. The report Stormwater Modelling and Flood Mapping Recommendations for Wellington City (Wallace, July 2003) examines and makes recommendations to standardise future plans so the information can be more readily compared.

In conjunction with the hazard map preparation, those roads that act as secondary flow paths are being identified. When these roads are resealed, the road is to be roto-milled first to ensure that the capacity of the secondary flow path is not diminished. The cost of the roto-milling will be covered by the stormwater asset projects.

5.3.4 Computer modelling

The Council has historically used both hydraulic and hydrological models in the development of catchment management plans (Section 5.3.2). The focus of these models has been primarily on system capacity and flood protection option analysis. These models have been developed catchment by catchment, in order of priority.

A more holistic approach is now being adopted to address issues of stormwater quality as well as quantity, as noted in Section 5.3.2. The procedures used to develop and maintain these models have been standardised to ensure the integrity of the data is retained and the potential to combine individual catchment models into a larger network model is not lost.

It is proposed to expand on the existing procedures and develop a long-term strategy for catchment model development and maintenance.

5.3.5 Water quality management

Some 80 sites, both fresh water and marine, are sampled fortnightly throughout the year. The samples are analysed for a variety of environmental performance indicators. These include faecal coliforms, E-coli, enterococci and, at some sites, heavy metals. The results of this monitoring form the basis of the pollution investigation work reported to the Greater Wellington Regional Council annually.

Some 20 beach sites are monitored weekly from 1 November to 31 March. This summer beach sampling is carried out in accordance with the "Ministry for the Environment's Bathing Beach Monitoring Guidelines" and the results are published on the internet within 48 hours of the sample being collected. The Ministry for the Environment has strict guidelines on the type of monitoring required and the trigger levels requiring beach closures and public notification.

All water quality sampling and analysis is carried out by an independent TELARC accredited laboratory. The results are provided to Capacity, both electronically and in hard copy. This data is stored on Hilltop, an environmental database managed by Capacity.

Environmental assessments have been undertaken for the Kaiwharawhara Stream, Porirua Stream, Karori Stream, Ngauranga Stream and Makara Stream. As Makara Stream is managed by Greater Wellington, it is not included in this asset management plan.

Investigations are currently being carried out in conjunction with the Greater Wellington Regional Council to determine what water quality standards should be required in the region. This will

determine the requirements to improve stormwater quality standards. As a consequence of this work, there may be a need to consider stormwater treatment options.

5.3.6 Network inspections

Critical drains are inspected proactively in accordance with our lifecycle management strategies (refer Section 5.2.2). Critical assets are defined in 5.4.1. The Council inspects and assesses the condition of approximately 16 kilometres of “critical drains” annually.

Most of the inspections use closed circuit television (CCTV), the balance being visually inspected. Since 2003/2004 the New Zealand CCTV Pipe Inspection Manual Criteria has been used for interpreting inspections, enabling Wellington City Council drain condition grades to be based on a nationally accepted standard.

We have reviewed the criteria for first inspections, re-inspections and inspection frequencies to better target our inspection programme and therefore to improve prioritisation of drain renewal expenditure.

Inspection frequencies are as follows:

- Critical A – five-yearly inspections
- Critical B – 10-yearly inspections
- Critical C – 15-yearly inspections
- Non-critical – not proactively inspected.

5.3.7 New technologies

Pipe bursting and relining are now established methodologies, with different techniques and products being launched continuously. Drilling and tunnelling of both small and larger diameters are becoming the preferred construction techniques, particularly within congested inner-city areas. One of the perceived disadvantages in New Zealand is the relatively small market, making some of these technologies beyond reach. However, opportunities for their use are always being investigated. Non-asset alternatives to “hard” engineering solutions will continue to be investigated in conjunction with future catchment management plans.

5.4 Stormwater (primary system) lifecycle management plan

5.4.1 Asset description

The network

The majority of the stormwater reticulation network comprises pipes of less than 390mm diameter, as indicated in Figure 20. Only 26 per cent of the network by replacement cost is of 591mm diameter or greater. More than half of the pipelines were installed between 1950 and 2000.

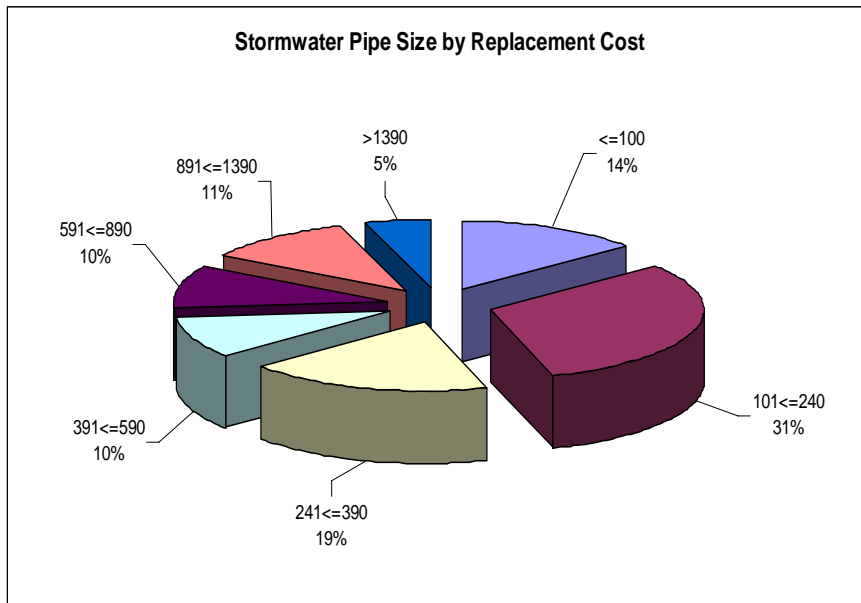


Figure 20 – Reticulation size distribution

The majority of the reticulation consists of concrete pipes, as indicated in Figure 21. Earthenware, ceramic and brick pipes make up another 11 per cent of the network. Twenty-seven per cent of the pipe material types are unknown. These pipes are generally considered to be older drains in the network where information has been lost or was not recorded at the time of installation.

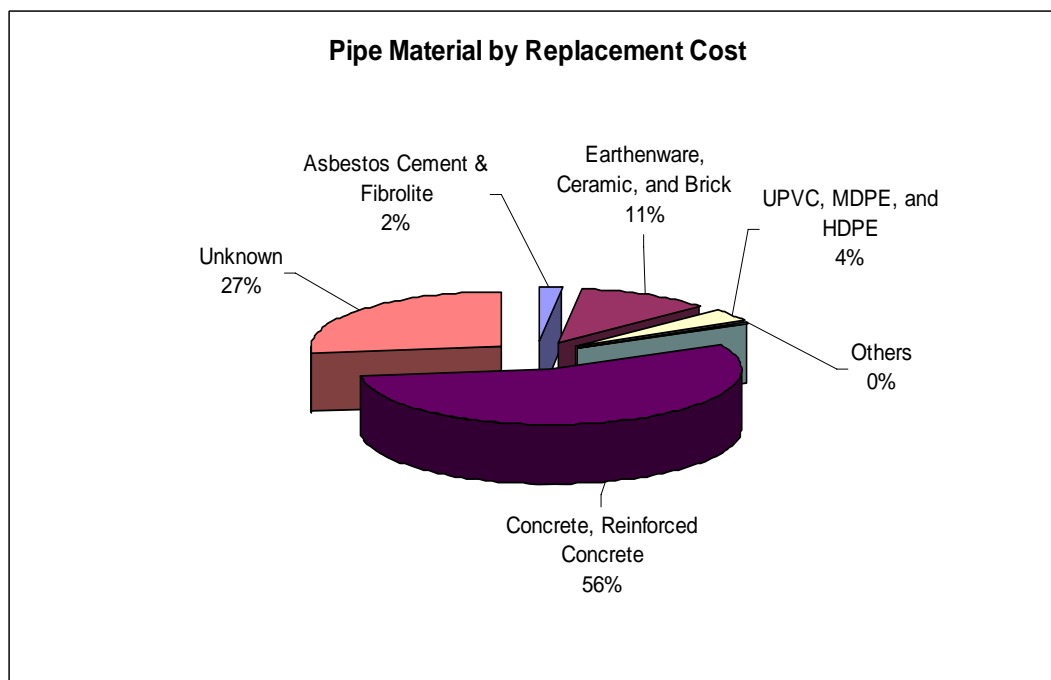


Figure 21 – Reticulation material distribution

Critical assets

Pipelines are assigned criticality ratings based on their size, location and consequence of failure, as presented in Table 9.

Criticality	Description of drains
A (2% of the network)	Where collapse is the most expensive and disruptive to repair (includes all brick culverts).
B (8% of the network)	Where collapse will have high cost and social impact, includes: <ul style="list-style-type: none"> earthenware and asbestos pipes under buildings drains under arterial routes, railways and airport.
C (8% of the network)	Where collapse will have medium cost and social impact, includes: <ul style="list-style-type: none"> remainder of pipes under buildings drains deeper than 5m.
Non-critical (82%)	Managed on an as-required basis.

Table 9 – Critical drains

Criticality definitions will be reviewed and clarified as part of the stormwater activity risk management plan development (refer Section 7.3.1).

Tunnels

Tunnels are generally circular and of concrete construction as indicated in Figure 22. The main tunnels are:

- Ngauranga Stream (North) tunnel
- Curtis Street to Abermarle Road tunnel
- Blackbridge Road tunnel
- Ghuznee Street tunnel
- Liardet Street tunnel

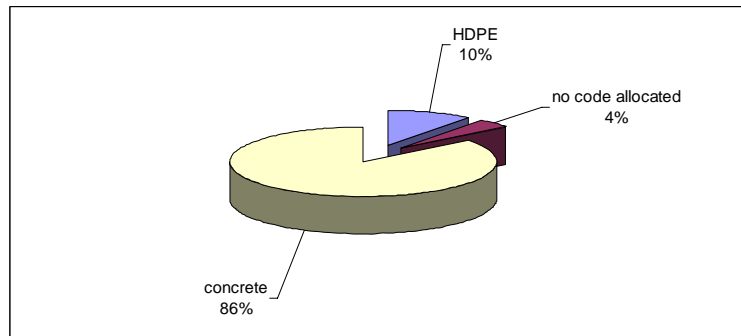


Figure 22 - Tunnels material distribution by replacement cost

5.4.2 Asset capacity and performance

Flood protection

With minor exceptions, Wellington’s stormwater network has the capacity to manage moderate rainfall events. Ongoing analysis and modelling as part of the catchment management plan development helps quantify the actual level of flood protection provided. This is likely to be in the order of between a one- in two-year and a one- in five-year ARI event. Stormwater run-off in rainfall events more severe than this is not managed by the primary system and flows down secondary overland flow paths. These flow paths are generally roads, although can also include parks, reserves and private property.

The adopted approach recognises that the consequences of this secondary flow vary, depending on the location and nature of the adjacent land use. This plan has two levels of flood protection as intervention levels for works:

- a base level defining an unacceptable level of flood protection that should be corrected in the short term

- an intermediate level of flooding problems that can be tolerated in the short term but should be targeted for longer-term upgrading.

The flood intervention levels are detailed in Table 10.

Flooding of property	Intervention trigger		
Land use	Unacceptable situation Trigger for upgrading	The minimum acceptable (no upgrade considered)	Standard for new design
Arterial roads, major community facilities related to essential services	>1 in 20 years	1 in 50 years	1 in 100 years
Houses, commercial and industrial buildings, internal flooding	>1 in 10 years	1 in 20 years	1 in 50 years
Garages, sheds and unoccupied basements – internal flooding	>1 in 2 years	1 in 5 years	1 in 10 years
Roads, active recreational area, access to property – safe use denied, damage	>2 in each year	1 in 2 years	1 in 5 years
Gardens, yards, passive recreation areas, flooding >150mm deep over more than 20 square meters	>5 in each year	1 in 2 years	1 in 2 years

Table 10 – Flooding intervention levels

A desk-top investigation into the larger stormwater catchments carried out in 1995/96 identified “at-risk” catchments. It estimated that some \$60-80 million of work was required to upgrade the pipework in these catchments to current design flood protection standards. Further investigations are refining this estimate.

Catchment management plans completed indicate the following areas where the primary system has insufficient capacity to provide the base level of flood protection specified in Table 10:

- Kilbirnie:
 - Area c – Yule Street
 - Area d – Ross Street
 - Area e – Salek Street
 - Area f – drainage reserve.
- Karori – Upper Duthie Street
- Inner City:
 - Te Aro Culvert
 - Taranaki Street

Catchment management plans have been developed for the remaining “at-risk” catchments, starting with the five linked inner-city catchments – Harris, Te Aro, Taranaki, Tory and Newtown catchments. The completion of these plans has enabled more accurate location of areas with inadequate flood protection. In addition, there are a number of localised flooding problems of a more minor nature.

Cost-effective non-asset solutions to manage stormwater flows and increase overall flood protection levels include:

- **Soakage** – The impact of soakage in the city is considered to be limited due to the relatively impermeable nature of the soils. Also, because of the topography, water velocities are such that soakage is difficult. However, there are areas where soakage should be considered further, especially in the eastern suburbs. A study of this was undertaken in conjunction with the Miramar Catchment Management Plan (1998) but the benefit/cost for flood upgrade works was not sufficient to progress with detailed design. The Kilbirnie catchment management plan (2003) recommended that the possibility of utilising soakage should be investigated further. These investigations are under way.
- **Re-vegetation** – Re-vegetation may be possible in limited areas if a way of protecting planted areas can be enforced. However, the impact on stormwater quantities is very limited in the main urban area, such as identified in the Island Bay catchment management plan.
- **Storage** – The modelling of Porirua Stream considered a number of alternatives to increasing the capacity of the stream. The option favoured at this stage is using the storage upstream of the existing “under-capacity” pipes under the motorway. Using parks for attenuation of stormwater is being considered in more detail. This has not been favoured in the past as it was considered to be a hazard, but this is being reviewed. Most parks are unlikely to be suitable due to their topography, although there may be some small sites adjacent to Tawa which could be used.

Environmental quality

Water quality has improved following the implementation of the sewage pollution elimination (SPE) programme and is now considered moderate. (This is discussed in the wastewater asset management plan.) Stormwater discharge is currently subject to 10 resource consents as summarised in Appendix H. Discussions regarding the appropriateness of these consents are under way with the Greater Wellington Regional Council, although it is anticipated that environmental requirements will increase in the future.

A report on the condition of our receiving waters (Baseline Assessment of Environmental Effects) shows that there are some discharges that indicate remedial works are needed within the contributing catchments. A separate investigation has also been carried out in conjunction with Greater Wellington on the health of our remaining streams. This report documents the current condition, but more work is required to determine what actions need to be taken. This will be included as part of the development of the network strategic plan.

Treatment options are included in some developments. The Waitangi Park development by the waterfront has a wetland that provides some treatment to the water pumped from the piped Waitangi Stream. Although the quantity of water being treated is minimal, it is a means by which the public awareness is raised and can be considered educational.

5.4.3 Asset condition

A “top-down” assessment of the pipe condition undertaken in 2000, and again in 2006, provided the Council with the condition grade profile as shown in Figure 23 (where condition grading 1 indicates very good condition and pipes in condition grading 5 have failed or are about to fail). The update assumed the same sample extrapolation approach, strata definitions and deterioration profile.

The pipe network is generally in moderate to good condition and is consistent with the assessments made in 2000.

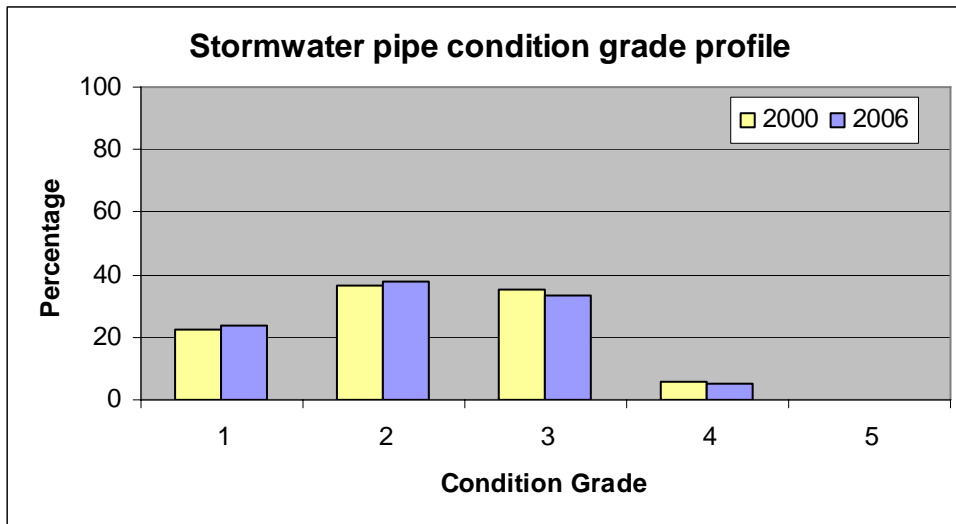


Figure 23 – Citywide condition grade profile for stormwater pipes by length

Figure 24 presents condition by pipe material type as a proportion of total network length. The prevalence of concrete pipes is reflected in this figure, as is the high proportion of pipes of unknown material.

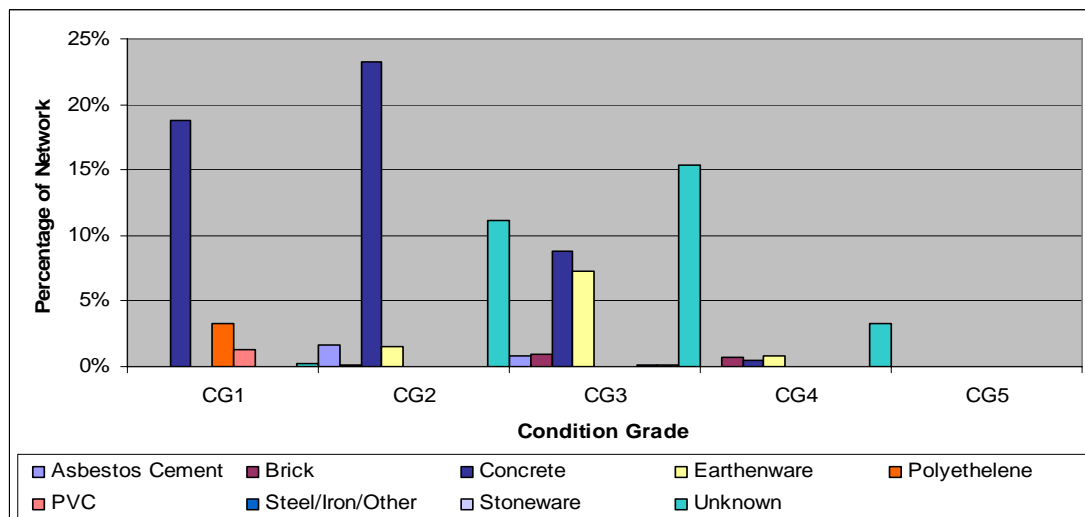


Figure 24 – Network condition by pipe material

The key observation from this data is that earthenware and brick pipes are in poorer condition than any other material type, reflecting their older age.

Condition data from CCTV surveys is currently being analysed and loaded into Confirm. This data will supplement the top-down approach and over time will improve the accuracy of renewals forecasting. However, there is less importance placed on knowing the condition of stormwater pipe assets than water supply or wastewater assets. Joint failures and other common faults which adversely affect pressurised systems or may cause pollution incidents have less of an impact on stormwater pipes.

5.4.4 Operations and maintenance plan

Operations work activities are discussed in Section 5.3 – Support services plan.

The adopted strategy for managing 85 per cent of the network reactively results in some uncertainties when forecasting future maintenance requirements. Maintenance expenditure is dependent on the weather, the nature and location of faults, and chance.

Maintenance work activities are undertaken under 4+2-year term contract covering wastewater, stormwater and water supply assets in Wellington and Hutt cities. Maintenance activities include:

- response to blockages, including silt removal, flushing and tree root removal
- reactive repair of stormwater pipelines and manholes
- planned repairs to critical pipelines (see also Section 5.4.5)
- routine maintenance of drainage reserves, including grass cutting and minor restoration works to watercourse banks following erosion slippage
- marking out the location of drains for other utility operators, property owners and developers.

The five-year financial forecast for these activities is presented in Table 11.

Expenditure category	Project	2009/10	2010/11	2011/12	2012/13	2013/14
MAINTENANCE		1,418,996	1,469,669	1,506,103	1,553,488	1,479,163
Unplanned maintenance		1,418,996	1,469,669	1,506,103	1,553,488	1,479,163
Stormwater network maintenance	C086C	1,418,996	1,469,669	1,506,103	1,553,488	1,479,163
Planned maintenance		-	-	-	-	-

Table 11 – Short-term maintenance programme

5.4.5 Renewal plan

Renewal works are carried out when it is not cost-effective to repair the drains. This occurs when the cost of repairing the pipe length would be more than 35 per cent of the cost of relaying the pipe.

Some pipe upgrading works are undertaken as a consequence of pipe condition. In these cases, although the pipe size is increased, with a consequent increase to the level of flood protection, condition is the key driver and the additional cost to upgrade the asset is minor. The pipe diameter required to comply with the Code of Practice is always used.

The critical drains process divides the network into four categories as presented in Table 9, each with specified inspection criteria (see Section 5.3.6) and rehabilitation criteria as below:

- Critical A – rehabilitate when collapse is imminent
- Critical B and C – rehabilitate when collapse is imminent or has actually occurred
- Non-critical – rehabilitate following collapse or repeated failure.

All designs and construction are carried out to the standards specified in the Code of Practice for Land Development, and the Drainage General Specification. This code incorporates design standards for the future in accordance with the District Plan, and is currently being reviewed to encourage more non-pipe solutions to be implemented.

The Council evaluates other alternatives (including non-engineering solutions or improving the use and performance of existing assets) to confirm that the need is justified. Alternatives to piped or engineering solutions, such as improving soakage, have been investigated in the past few years. However, the extent of development and the general steepness of Wellington terrain allows little if any benefit from alternatives identified to date, as discussed in 5.4.2.

Renewal works are publicly tendered and undertaken by external contractors.

Figure 25 presents forecast expenditure requirements for stormwater pipeline assets, based on the top-down condition assessment and assuming a second-order deterioration profile.

The 100-year average expenditure is calculated at \$3.2 million per year, although the modelled profile indicates that peak renewals expenditure of approximately \$4.6 million will be required in 2031/32. Condition assessments and renewals forecasting is planned to be undertaken every three to five years. Given the confidence in the data, a “smoothed” profile has been adopted, which reduces and defers the modelled peak expenditure. This does not defer any anticipated short-term renewals, and consequent renewals forecasting may result in amendments being made to this profile.

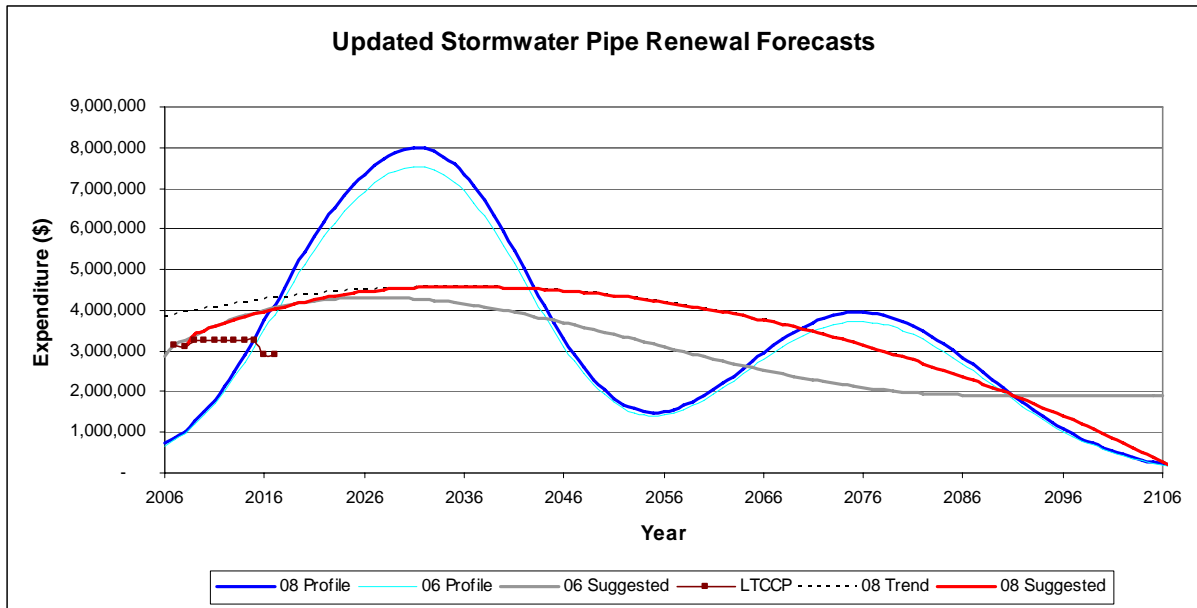


Figure 25 – 100-year renewal forecast for stormwater pipeline assets

Depreciation for pipes and fittings at June 2008 was calculated at \$5.81 million per year. Excepting 2006/07, adopted renewals requirements are slightly less than this sum, although increase above this in the following 10-year planning period.

No renewals works are planned for watercourses and streams.

Provisional five-year financial forecasts for these activities are presented in Table 12.

Expenditure category	Project	2009/10	2010/11	2011/12	2012/13	2013/14
RENEWALS		3,385,385	3,585,245	3,762,884	3,946,421	4,123,240
Unplanned maintenance		3,385,385	3,585,245	3,762,884	3,946,421	4,123,240
Stormwater reticulation renewals	CX151	3,385,385	3,585,245	3,762,884	3,946,421	4,123,240

Table 12 – Short term renewal programme

5.4.6 Capital development plan

Capital development works include providing new or upgraded assets in response to utilisation and capacity performance issues. Capital development can be separated into:

- growth – development or upgrades required due to increase in demand resulting from population growth and residential/commercial activity
- level of service improvement – development or upgrade required to meet specified levels of service.

Capital development works are publicly tendered and undertaken by external contractors.

Growth

Although it is likely that historical growth has been the major contributor to flood protection service gaps identified, the Council has assumed this is backlog, and works to address these gaps is not included as works required for growth. It is therefore assumed that capital upgrade projects in place to address all current service gaps are level of service improvement projects.

Level of service improvement

Identified flooding or other performance issues or service gaps noted above are investigated and prioritised before being programmed for construction. Current analysis includes the benefit/cost for various works, although a more sophisticated optimised decision-making framework is being developed.

At present, flooding performance issues are not able to be linked to identified service gaps, although the improvements being undertaken to better define levels of service should enable this in the next version of this plan, as discussed in Section 7.0.

Some pipe upgrading works are undertaken when pipe renewal is due to poor condition or structural failure. The condition of the pipe is the key driver, and these projects are managed as renewal projects, as noted in Section 5.4.5.

Upgrading stormwater pipes normally involves the construction of large-diameter concrete pipes. When there is a natural stream, consideration is given to installing a pipeline for the flood flows but retaining the stream for low flows. This enables the ecological values associated with the stream to be retained in line with Council “Wet and Wild” policy.

Capital development financial requirements

Provisional five-year financial forecasts for these activities are presented in overleaf in Table 13.

Expenditure category	Project	2009/10	2010/11	2011/12	2012/13	2013/14
CAPITAL UPGRADES		1,604,073	372,744	381,221	334,614	341,867
Growth		-	-	-	-	-
Levels of service improvement		1,604,073	372,744	381,221	334,614	341,867
Localised Flooding Projects	CX031	206,844	319,495	326,761	334,614	341,867
Drainage works associated with Tacy Street	CX031	465,398				
Monorgan Rd (No 28)	CX031	224,115				
Construction of grit traps in CBD culverts	CX031	103,422	53,249	54,460		
Kilbirnie - area f - Dge res	CX031	33,405				
Kilbirnie-area d-Pipe Ross St	CX031	234,768				
Kilbirnie - area c - Pit Yule St	CX031	134,448				
Te Aro/Taranaki St (Clear of ICB) - Stage 1 (12M)	CX031					
Te Aro/Taranaki St (Clear of ICB) - Stage 2 (12M)	CX031					
Te Aro/Taranaki St (Clear of ICB) - Stage 3 (10M)	CX031					
Kilbirnie-area e-Salek Street	CX031	201,673				

Table 13 –Short term capital development programme

6.0 Financial summary

This section outlines the long-term financial requirements for the operation, maintenance, renewal and development of the stormwater assets based on long-term strategies and tactics outlined earlier in the plan. Funding issues are discussed and key assumptions made in preparing financial forecasts are noted.

6.1 10-year financial forecast summary

The consolidated 10-year financial forecasts for the stormwater activity are presented in Figure 26.

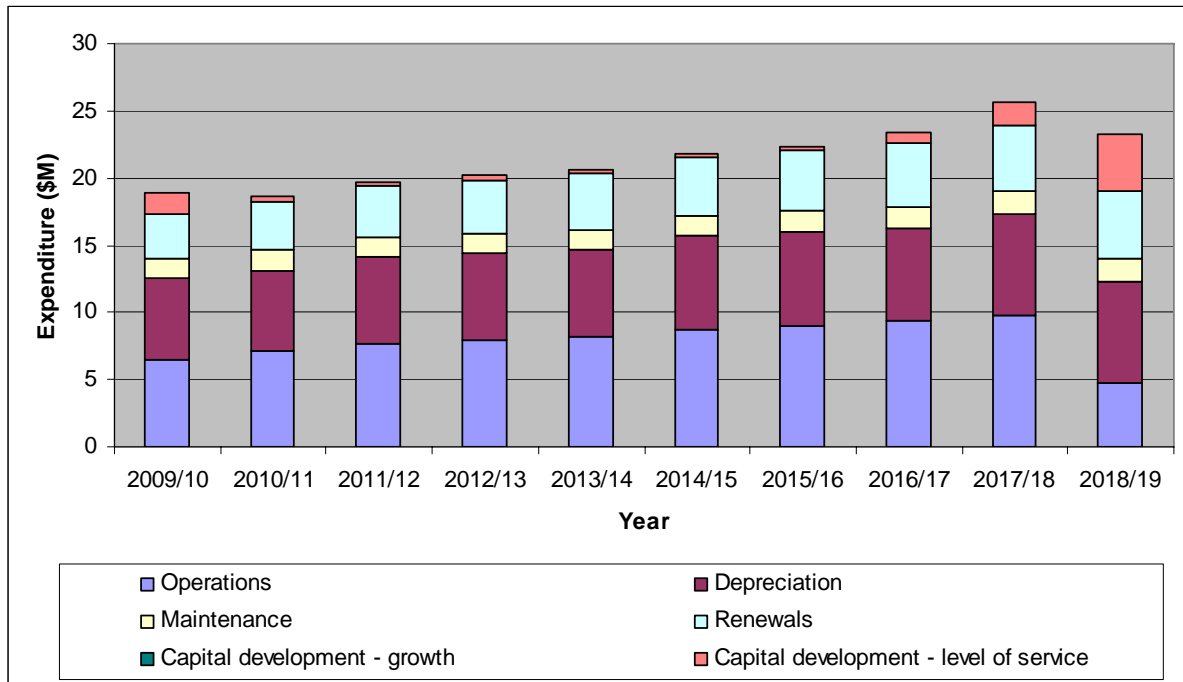


Figure 26 – Consolidated financial forecast

The key provisions and trends in the 10-year financial forecast are:

- Operations and asset management – increases 17 per cent from \$10.2 million to \$11.9 million in 2015/16, before reducing to \$11.1 million the following year. Increases are due predominantly to significant incremental increases in corporate interest allocation to reflect the level of investment in capital works and the resulting increase in asset value. Depreciation also increases marginally, reflecting this capital investment.
- Maintenance – reduces from \$1.7 million by 13 per cent next year, and then shows marginal increase through the planning period to reflect additional unplanned maintenance needs as the network ages.
- Renewals – approximately \$3.3 million per year is budgeted over the next 10 years for renewal works.
- Capital development for level of service enhancement – \$17.9 million is budgeted over the next 10 years for ongoing network upgrades to improve the level of flood protection in vulnerable parts of the city.
- No growth-related projects have been identified.

6.2 Expenditure categories

Expenditure and revenue projections within this plan are classified as capital (new and renewal) or operating in accordance with generally accepted accounting practice.

The Council has developed a depreciation policy reflecting accounting treatment of activities for infrastructure asset components. It has approved the use of this policy and these definitions are applied during the development of this asset management plan.

Expenditure category	Project	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Total operating expenditure		\$ 13,945,894	\$ 14,616,920	\$ 15,606,903	\$ 15,909,180	\$ 16,183,236	\$ 17,202,248	\$ 17,536,122	\$ 17,886,565	\$ 19,002,339	\$ 19,638,994
Total capital expenditure		\$ 4,989,458	\$ 3,957,989	\$ 4,144,105	\$ 4,281,036	\$ 4,465,106	\$ 4,649,816	\$ 4,844,333	\$ 5,538,870	\$ 6,630,505	\$ 9,322,736
OPERATIONS		12,526,898	13,147,251	14,100,800	14,355,692	14,704,073	15,691,715	15,984,018	16,291,030	17,365,055	17,952,736
Stormwater asset stewardship		11,339,298	11,919,414	12,836,028	13,052,212	13,370,767	14,331,252	14,587,819	14,855,688	15,891,456	16,434,914
Rates	A041A	1,811,890	1,866,246	1,916,979	1,971,336	2,025,692	2,083,673	2,148,901	2,203,258	2,253,991	2,304,723
Overheads	A041A	13,934	14,721	14,921	16,805	17,328	18,362	19,950	19,928	19,690	20,769
Interest	A041A	2,781,055	3,290,193	3,662,168	3,819,325	4,083,035	4,436,886	4,623,774	4,832,460	5,198,642	5,670,076
Insurance	A041A	521,030	538,224	550,208	563,755	575,739	587,722	601,269	615,337	629,926	646,078
Depreciation	A041A	6,022,882	6,014,583	6,491,251	6,473,803	6,456,854	6,988,271	6,971,633	6,955,530	7,553,401	7,549,795
Asset stewardship specialists	A041A	10,346	10,687	10,925	11,194	11,432	11,670	11,939	12,218	12,508	12,829
Asset stewardship	A041A	178,161	184,760	189,576	195,994	200,687	204,667	210,353	216,957	223,299	230,643
Direct opex		641,962	664,668	680,675	701,042	716,817	731,584	750,600	770,714	790,496	813,460
Stormwater resource consent monitoring	C090	126,250	130,471	133,475	136,930	139,889	142,785	146,180	149,749	153,432	157,526
Stormwater resource consent monitoring - income	C090	(8,368)	(8,619)	(8,878)	(9,146)	(9,422)	(9,698)	(9,991)	(10,292)	(10,602)	(10,920)
Stormwater critical drains inspections	C496	524,080	542,816	556,078	573,258	586,351	598,497	614,411	631,257	647,666	666,854
Planning, policy and management		545,639	563,170	584,097	602,437	616,489	628,879	645,599	664,628	683,103	704,362
Asset management planning	C498	545,639	563,170	584,097	602,437	616,489	628,879	645,599	664,628	683,103	704,362
MAINTENANCE		1,418,996	1,469,669	1,506,103	1,553,488	1,479,163	1,510,533	1,552,104	1,595,534	1,637,283	1,686,258
Unplanned maintenance		1,418,996	1,469,669	1,506,103	1,553,488	1,479,163	1,510,533	1,552,104	1,595,534	1,637,283	1,686,258
Stormwater network maintenance	C086C	1,418,996	1,469,669	1,506,103	1,553,488	1,479,163	1,510,533	1,552,104	1,595,534	1,637,283	1,686,258
Planned maintenance		-	-	-	-	-	-	-	-	-	-
RENEWALS		3,385,385	3,585,245	3,762,884	3,946,421	4,123,240	4,300,663	4,487,035	4,683,940	4,879,229	5,087,876
Unplanned maintenance		3,385,385	3,585,245	3,762,884	3,946,421	4,123,240	4,300,663	4,487,035	4,683,940	4,879,229	5,087,876
Stormwater reticulation renewals	CX151	3,385,385	3,585,245	3,762,884	3,946,421	4,123,240	4,300,663	4,487,035	4,683,940	4,879,229	5,087,876
CAPITAL UPGRADES		1,604,073	372,744	381,221	334,614	341,867	349,153	357,299	854,930	1,751,276	4,234,860
Growth		-	-	-	-	-	-	-	-	-	-
Levels of service improvement		1,604,073	372,744	381,221	334,614	341,867	349,153	357,299	854,930	1,751,276	4,234,860
Localised Flooding Projects	CX031	206,844	319,495	326,761	334,614	341,867	349,153	357,299	610,664	500,365	384,987
Drainage works associated with Tacy Street (\$350k ex CX151)	CX031	465,398									
Monorgan Rd (No 28)	CX031	224,115									
Construction of grit traps in CBD culverts	CX031	103,422	53,249	54,460							
Kilbirnie - area C to F	CX031	384,294									
Karori Dam Spillway Upgrade - pipe extension works	CX031	220,000									
Te Aro/Taranaki St (Clear of ICB) - Stage 1 (12M)	CX031								244,266	1,250,911	3,849,872
Te Aro/Taranaki St (Clear of ICB) - Stage 2 (12M)	CX031										
Te Aro/Taranaki St (Clear of ICB) - Stage 3 (10M)	CX031										

Table 14 – Summary financial forecast for stormwater assets

6.3 Key assumptions

The basis for the financial forecasts is explained in the lifecycle management plans (Section 5.0). The following general assumptions have been made in preparing the 10-year expenditure forecasts:

- All expenditure is stated in dollar values as at June 2008 with no allowance made for inflation over the 10-year planning period. They will be inflation-indexed in terms of the BERL economic forecast index for the water industry, as recommended by the Audit Office, prior to finalising in the LTCCP.
- The rate and pattern of urban growth and development continues as assumed and noted within Section 3 of this plan.
- Maintenance costs are based largely on historical expenditure and assume there are no significant changes in contract rates (above the rate of inflation). Impacts of fuel tax are still being assessed and will be included in updated financial forecasts in subsequent versions of this plan.
- Maintenance and renewal allocations have been based on preserving current levels of service. Expenditure levels have been increased to match the growth of new assets and achieve the target levels of service noted in Section 2.
- Remaining lives for pipeline renewals planning are based on a top-down condition assessment and assumed deterioration profile.
- Repairs exceeding \$10,000 are capitalised as a renewals item.
- The dominant reason (growth or level of service enhancement) for renewing or upgrading a stormwater drain is used to assign such works to a corresponding renewal or upgrading programme.

The most significant potential changes to the forecasts may result from the following factors:

- The desired level of service and service standards may change from those identified in this asset management plan, particularly consent and other regulatory or legislative requirements.
- Assumptions made as to the average useful lives and average remaining lives of the asset groups based on current local knowledge and experience, historical trends and predictive modelling outputs may no longer be valid. (These need to be reviewed and the accuracy improved based on real time assessments of asset deterioration. Review of the effective economic life of pipeline assets has the potential for greatest variance in future cost predictions.)
- Peak stormwater flows may change due to the effect of climate change.
- Contract rates may be above inflation due to market or other external influences.

6.4 Confidence levels

The confidence in data used as a basis for the financial forecasts has been assessed using the grading system from the NZWWA New Zealand Guidelines for Infrastructure Asset Grading Standards, as summarised in Table 15 overleaf.

Confidence grades are assessed as:

- demand forecasts C - Uncertain
- service gap interpretation B - Reliable
- quantities B – Highly reliable
- condition grades
 - reticulation C – Uncertain
 - discrete assets B - Reliable
- unit rates B – Reliable
- base lives - reticulation C - Uncertain
- remaining lives D – Very uncertain
- valuation and depreciation B - Reliable
- financial forecasts
 - short term 1-3 years B - Reliable
 - mid term 4-10 years C - Uncertain
 - long-term renewals D – Very Uncertain

Forecasts will be improved with more sophisticated analysis and improved knowledge of the assets as discussed in Section 7.0.

Grade	General meaning
A	Highly reliable Data based on sound records, procedures, investigations and analysis which is properly documented and recognised as best practice
B	Reliable Data based on sound records, procedures, investigations, and analysis which is properly documented but has minor shortcomings (eg data is old, some documentation is missing and reliance is placed on unconfirmed reports)
C	Uncertain Data based on sound records, procedures, investigations or analysis which is incomplete, unsupported, or extrapolation from a limited sample for which grade A or B data is available
D	Very uncertain Data is based on unconfirmed verbal reports and/or cursory inspection and analysis

Table 15 – Confidence grade definitions

6.5 Development contributions

6.5.1 Overview

Development contributions are calculated in accordance with the methodology set out in Schedule 13 of the LGA 2002, by using the seven-step process shown in Figure 27.

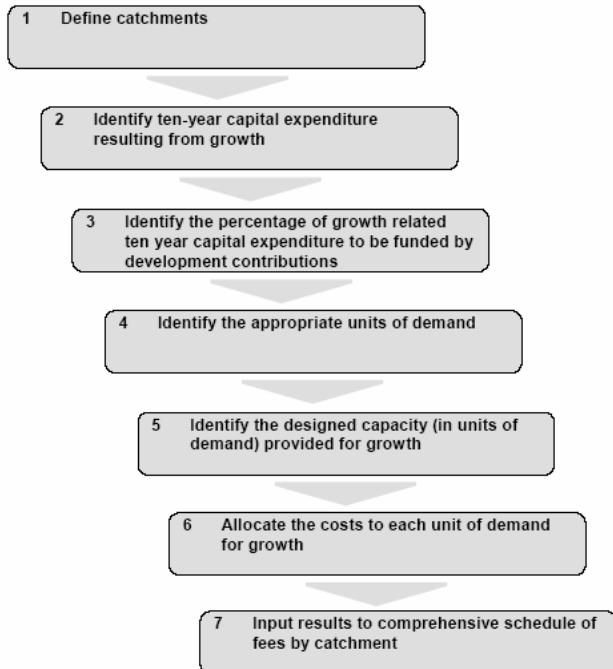


Figure 27 – Methodology for calculating development contributions

Large-scale flooding has occurred in the past in the central city, Miramar, Karori, Island Bay/Berhampore, Kaiwharawhara and the Tawa basin. The lack of sufficient pipe capacity and the resulting need to implement flood protection works across the city is seen as one of the most significant impacts of continued development. The priorities for these works are determined after considering the impact of flooding, environmental risk, existing resource consents and potential growth.

Development contributions for the stormwater activity are levied to recognise the investment required to upgrade the capacity of pipes and streams that make up the stormwater network.

Increases in capacity resulting from growth are factored into the regular renewal and upgrading of the network.

6.5.2 Assumptions

Section 201(b) of the Local Government Act 2002 requires the development contribution policy to state significant assumptions underlying the calculation of the schedule of development contributions.

- **System-wide view** – In developing a methodology for development contributions, the Council has taken a system-wide view in identifying the cumulative effect of development on infrastructure. That is, it considers the infrastructure impacts on all ratepayers created by both individual and multiple developments across a catchment. For citywide catchments, this means growth is proportionally reflected in total capital expenditure.
- **Planning horizon** – Capacity increases are designed to reflect the overall level of growth in equivalent housing units expected over the next 10 years.
- **Growth forecasts** – The overall planning assumption is for a 10 per cent increase in growth and capacity for renewals and upgrades for citywide catchments to take account of the impact on infrastructure of continuing growth within the city over the next 10 years. Growth for capacity planning purposes is estimated after considering projections of population, households and employment prepared by Statistics New Zealand based on census data.
- **Application of costing methods** – Average cost is a reasonable proxy for the incremental cost of additional capacity. The cost of installing additional capacity during renewal projects is limited to the appropriate proportion of the cost of materials, as all other costs are deemed to relate to the renewal of the asset.
- **Cost of individual items of capital expenditure** – The Council has used the best information available at the time of developing this policy to estimate the cost of individual items of capital expenditure that will be funded in whole or part out of development contributions. It is likely that actual costs will differ from estimated costs owing to factors beyond the Council's ability to predict, such as changes in the price of raw materials and labour, and the time of capital works. The Council will review its estimates of capital expenditure annually and adjust the LTCCP.
- **Financial assumptions** – The following financial assumptions have been applied:
 - All costs in the development contributions policy are based on current known infrastructure prices in 2009 dollars, indexed up from the costs applied in 2007.
 - Income generated from rates will be sufficient to meet the operating costs of growth-related capital expenditure into the future.
 - The methods of service delivery will remain substantially unchanged.

6.5.3 Stormwater development fees

Citywide related development contributions

The capital expenditure in the Council's 2008/09 Annual Plan (the proportion relating to growth less subsidies received from other parties to arrive at the total net contribution amount) are shown in Table 16. This is divided by the estimated citywide growth in equivalent household units to determine the citywide development contribution payable. Alignment of this figure with the financial forecasts presented in this asset management plan are ongoing, and include adoption of an agreed approach to renewal projects which include some upgrade elements.

Total planned CAPEX	Gross contribution amount	Net contribution amount	Economic housing units	Citywide development contribution amount
\$72,295,229	\$1,807,381	\$1,807,381	9175	\$197

Table 16 – Citywide development contribution for stormwater

6.6 Valuation summary

Table 17 summarises the valuation of the stormwater assets as at 30 June 2008, including the base lives used.

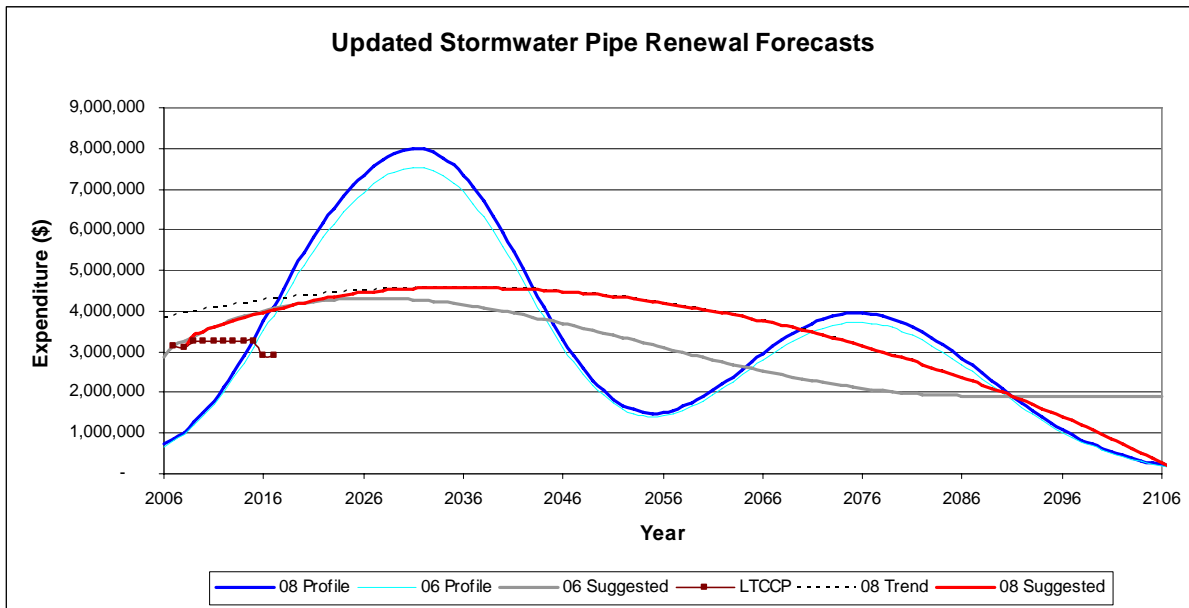


Table 17 – Summary of stormwater assets valuation

6.7 Revenue and financing policy

The Local Government Act 2002 requires the adoption of policies that outline how operating and capital expenditure for each activity will be funded. This is detailed in the revenue and financing policy, which is included in the Council's LTCCP. The policy identifies:

- the community outcomes to which the activity primarily contributes
- the distribution of benefits between the community as a whole, any identifiable part of the community, and individuals
- the costs and benefits, including consequences for transparency and accountability, of funding the activity distinctly from other activities.

Community outcomes are discussed in Section 2. The statements which follow summarise who benefits from the services, who pays for the service and how the programmes are funded.

Operating expenditure

- Who benefits:
 - identifiable parts of the community 80%
 - whole community 20%
- Who pays:
 - base (residential sector) 80%
 - commercial sector 20%
- Funding mechanism:
 - residential targeted rates 80%
 - commercial targeted rates 20%

Capital expenditure

Capital expenditure is funded from:

- Renewal and rehabilitation:
 - funded from depreciation (an operating expense funded from rates), any annual surplus depreciation used to repay borrowings
- Capital development (level of service enhancement):
 - primarily funded from borrowings.
 - contributions from third-party capital subsidies.

- contributions from sale of surplus assets¹⁰ where applicable (this is decided on a case-by-case basis – funds received in this manner which are not applied to capital development works are used to repay borrowings)
- contributions from restricted or special funds where applicable (this is decided on a case-by-case basis).
- Capital development (growth):
 - primarily funded from development contributions (no growth-related stormwater project are currently identified)
 - Resource Management Act 1991-based financial contributions will continue to be used in some circumstances
 - contributions from borrowings.

Given these funding policies, the estimated 2007/08 funding source allocation is presented in Figure 28. The development contributions received each year will not necessarily match development expenditure, and there are underlying uncertainties in the alignment of total capital development expenditure associated with growth as discussed in 6.5.3. Further, funding proportions will vary from year to year, reflecting the annual variations in expenditure. This graph should be considered indicative only and will be refined by the Council finance group in the next version of this plan.

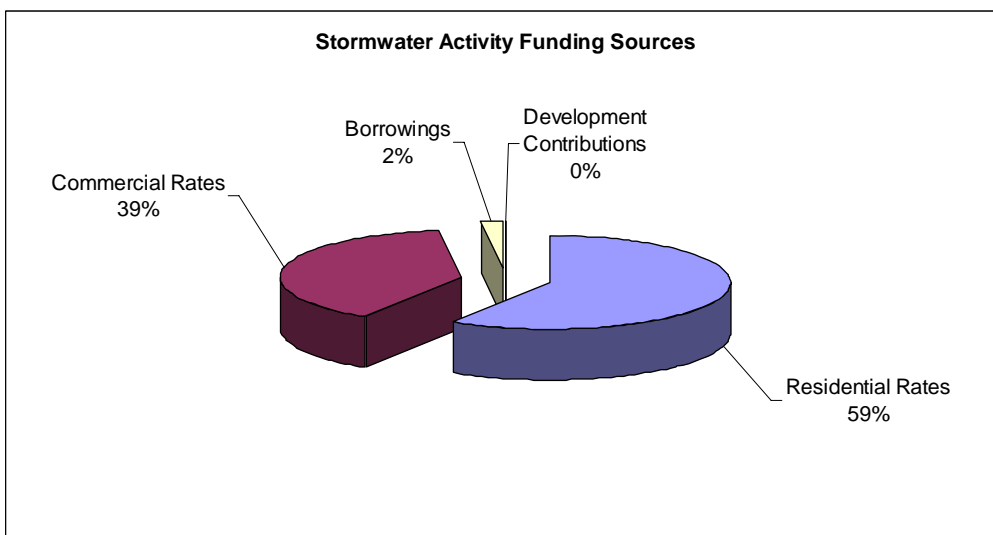


Figure 28 – Funding sources for the stormwater activity

6.8 Future improvements

The improvements summarised throughout this plan will contribute to making the financial forecasts more robust. Specific improvements relating to this forecast include:

- reviewing the expenditure forecasts with a particular focus on ensuring improvements to levels of service and asset management strategies can be achieved
- reviewing depreciation calculations to reflect improved understanding of network condition and performance
- determining replacement cost data collection capture needs and methodology to enhance the accuracy of the valuations (replacement cost data to be reviewed annually)
- developing and implementing a process for assessing asset base-lives and residual lives.

¹⁰ E.g. decommissioned pipes may be of interest to communications service providers as a conduit for their cables

7.0 Improvement planning

This section details a programme of asset management improvement adopted to enhance the level of confidence in the asset management plan strategies and financial projections. It also identifies the timetable for future reviews of the plan and defines the measures adopted to monitor its effectiveness.

7.1 Improvements achieved

The Council has progressively reviewed and improved stormwater asset management planning since the first plan was prepared in 1994. The 2007 version represented a significant departure from the style of previous plans, with the following key improvements being incorporated into this 2009 plan:

- **Strategic focus** – A new subsection has been included in the introduction outlining key strategic issues, implications of these issues to the Council, the community and other stakeholders, options available to address these issues and what actions we are undertaking. These issues are linked through the plan with new key issues subsections in the levels of service, demand, and risk sections.
- **Demand management** – Demand drivers have been separately reviewed and updated, with a summary of likely impact on the stormwater activity. Demand projections have been refined with updated analysis of urbanisation and climate change effects, and high, medium and low demand scenarios presented.
- **Risk management** – Risk assessment and evaluation has been revised using annual risk cost exposure to specify risk severity.
- **Lifecycle management plans** – Performance of the assets enabling the stormwater activity has been discussed in greater detail.
- **Financial summaries** – Financial projections and development contributions information has been updated.
- **Improvement planning** – Improvement plans have been updated, progress to June 2008 assessed, and responsibilities specified.

7.2 Approach

The Council has adopted a risk-based approach to developing the improvement plan, which assesses the following aspects of current asset management practice:

- business processes used in the implementation of asset management activities, including strategic planning, data collection, asset operations/maintenance and capital work practices
- information systems to support (and often replicate) asset management processes and store/manipulate data
- asset data and knowledge, its appropriateness, reliability and accessibility
- implementation strategies, including contractual, organisational, and people issues.

For each asset management process area, the analysis considers:

- the importance of the process to the Council's and Capacity's stormwater management activity
- the level of sophistication at which the Council and Capacity apply the process
- the time, resource and financial cost involved to improve the process.

The Council is committed to an ongoing improvement philosophy and has progressively reviewed and made improvements to their asset management planning since the first asset management plan was prepared. The risk-based review of the Council's asset management planning identified the priority improvement projects shown in the tables below. These projects are scheduled to be actioned over the next three years.

7.3 Short-term improvement programme

7.3.1 Asset management improvement tasks

Improvement project		Res	2008		2009				2010				2011	
			Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Activity standards and key performance indicators													
a.	Development of set of activity standards linked to community outcomes and associated key performance indicators for each Wellington City water services activity and incorporate in AMPs	AP	COMPLETE											
b.	Identify data required to measure indicators, identify data source and set up data collection mechanisms for Wellington City Council	AP				75% COMPLETE								
c.	Set up spreadsheets to record KPI data and develop standard graphs formatted for inclusion in AMPs and for ongoing monitoring of activity performance for Wellington City Council	AP												
2	Demand analysis													
a.	Identify drivers of future demand for water supply, wastewater and stormwater services in Wellington City	AP	COMPLETE											
b.	Estimate future trends for each driver of future demand for Wellington City	AP	COMPLETE											
c.	Produce projection of future demand for water supply, wastewater and stormwater services in Wellington City	AP	COMPLETE											
d.	Produce summaries of demand projections for water supply, wastewater and stormwater services suitable for inclusion in AMPs	AP	COMPLETE											
e.	Produce graphs of trends in drivers of demand and demand projections for water supply, wastewater and stormwater services in Wellington City formatted suitable for inclusion in AMPs	AP	COMPLETE											
3	Service gap analysis													
a.	Develop a framework for Wellington City to link service gaps to non-asset solutions and capital development programmes in AMPs	AP												
b.	Produce summary of Wellington City Council framework in form suitable for inclusion in AMPs	AP												
c.	Produce capital development programmes for Wellington City water services based on service gap analysis	AP												
d.	Restructure relevant sections of Wellington City water services AMPs to reflect service gap analysis framework	AP												

e.	Redraft relevant sections of Wellington City water services AMPs to reflect service gap analysis framework and incorporate in updated AMPs	AP																		
4	Capital works prioritisation																			
a.	Identify options for capital works prioritisation models	AP	COMPLETE																	
b.	Select preferred approach	AP	COMPLETE																	
c.	Develop preferred approach into working model	AP	COMPLETE																	
d.	Calibrate model for Wellington City Council	AP	COMPLETE																	
e.	Use model to select best option (where realistic options exist) for renewal capital works programme for Wellington City AMPs and LTCCP	AP																		
f.	Use model to prioritise renewal capital works programme for Wellington City AMPs and LTCCP	AP	COMPLETE																	
g.	Use model to select best option to close service gaps in Wellington City AMPs	AP																		
h.	Use model to prioritise capital development programme for Wellington City AMPs and LTCCP	AP	COMPLETE																	
5	Construction contract quality assurance																			
a.	Prepare construction contract quality assurance framework for Wellington City contracts	AP																		
b.	Document quality assurance frameworks as a quality procedure (or procedures)	AP																		
c.	Document procedures to support quality assurance framework for Wellington City contracts	AP																		
6	Asset unit rates																			
a.	Develop unit rates model	AP	COMPLETE		WILL BE VERIFIED AS PART OF VALUATION IN CONFIRM FOR ANOTHER COUNCIL IN 2009															
b.	Develop procedure for periodic recalibration of unit rates model	AP	COMPLETE																	
c.	Develop unit rates documentation for users	AP	COMPLETE																	
d.	Set up standard contract schedules of quantities for Wellington City Council contracts to ensure unit rates are captured in a form that facilitates input to the unit rates database	AP	COMPLETE																	
e.	Set up unit rates database for Wellington City	AP				CURRENTLY TRIALING MODEL ON ANOTHER COUNCIL														
f.	Use unit rates database to calibrate unit rates model for Wellington City	AP																		
g.	Set up system for use of unit rates model in contract estimating	AP																		
7	Asset condition/remaining life modelling																			
a.	Investigate options for modeling condition of buried pipelines and provide recommendation on how to proceed	AP	COMPLETE																	

b.	Decision on how determination of condition of buried Wellington City pipelines will be carried out in the future	AP																		DEPENDENT ON OUTCOME OF WSAA PROJECT (MAY 2009)
c.	Implementation of adopted option for determination of condition of buried Wellington City pipelines	AP																		DEPENDENT ON OUTCOME OF WSAA PROJECT (MAY 2009)
8	Consultation on customer service standards																			
a.	Summarise consultation carried out to date on service standards in Wellington City	AP																		
b.	Initial review of adequacy of consultation carried out to date on service standards in Wellington City in conjunction with Wellington City Council	AP																		SUBJECT TO DISCUSSION AND AGREEMENT WITH THE COUNCILS
c.	Preparation of draft methodology for consultation on service standards for Wellington City water services activities	AP																		
d.	Approval of methodology by Wellington City Council	AP																		
e.	Incorporate adopted methodology in Wellington City water services AMPs	AP																		
f.	Implement consultation methodology in Wellington City	AP																		
9	Activity risk management plans																			
a.	Develop framework for activity risk management plans showing how plans link to AMPs, organisational risk, asset criticality, quality assurance, continuity planning, emergency planning etc	AP																		COMPLETE
b.	Develop draft risk assessment tables for Wellington City Council water services	AP																		
c.	Calibrate risk assessment tables for Wellington City Council water services	AP																		
d.	Carry out risk assessments for one Wellington City water services activity	AP																		
e.	Draft activity risk management plan for one Wellington City water services activity (as basis for discussion with Wellington City Council)	AP																		
f.	Complete activity risk management plans for one Wellington City water services activities	AP																		
g.	Carry out risk assessments for other Wellington City water services activities	AP																		
h.	Draft activity risk management plan for other Wellington City water services activities	AP																		
i.	Complete activity risk management plans for other Wellington City water services activities	AP																		
10	Asset performance monitoring																			
a.	Identify purposes for which performance data is required	AP																		
b.	Identify performance data that is required (provisional – dependent on ability to obtain data)	AP																		
c.	Confirm performance data that will be monitored for Wellington City	AP																		

d.	Define data collection/management mechanisms for Wellington City	AP																
e.	Implement data collection and use in developing Capex programmes and for other Activity management purposes	AP																
11	Linking performance and business improvement																	
a.	Identify how activity performance will be used in organisational performance monitoring	AP																
b.	Identify how activity performance will be monitored at activity level	AP																
c.	Identify how activity performance will be used as an input to improving activity management	AP																
d.	Incorporate use of activity performance as an input into improving activity management in AMPs	AP																
			* TOTAL RESOURCE DOES NOT INCLUDE RESOURCE FOR IMPLEMENTING FOR TASKS 7c & 8g															

Table 18 – Asset management processes improvement tasks

	Important elements of 'Advanced' asset management
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7.4 Asset management plan review and monitoring

7.4.1 Asset management plan review

To ensure the asset management plan remains useful and relevant, the following ongoing process of plan monitoring and review will be undertaken:

- formal adoption of the plan principles and outcomes by the Council
- review and formally adopt levels of service
- revise asset management plan annually to incorporate and document changes to works programmes, outcome of service level review and new knowledge resulting from the asset management improvement programme
- quality assurance audits of asset management information to ensure the integrity and cost- effectiveness of data collected
- peer review – three-yearly audits will be undertaken to assess the effectiveness with which this plan meets corporate objectives (periodic internal audits will be undertaken to assess the adequacy of asset management processes, systems and data, and external audits will be undertaken to measure performance against desired practice).

This is summarised in Table 19.

Activity	Action	Target date
Asset management plan review and development	<ul style="list-style-type: none"> • Adoption of AM plan outcomes by Council 	February 2009 as part of the Annual Plan process
	<ul style="list-style-type: none"> • Annual review of plan context by AM team <ul style="list-style-type: none"> - Check AM plan content for consistency with adopted council programmes and plans - Compliance with agreed AM improvement programmes 	April each year
	<ul style="list-style-type: none"> • Full review of the AM plan and external review of technical content, including an assessment of the effectiveness and adequacy of AM processes, systems and data 	Three-yearly
	<ul style="list-style-type: none"> • Adoption of reviewed AM plan by Council 	February each year as part of the LTCCP/AP process
	<ul style="list-style-type: none"> • External review of AM plan information by Audit New Zealand 	As requested
Levels of service	<ul style="list-style-type: none"> • Review service performance measures (including public consultation process) and formally adopt levels of service 	Three-yearly
	<ul style="list-style-type: none"> • Consolidate performance against actual level of service delivered and report in Annual Report 	May each year for annual report
Risk	<ul style="list-style-type: none"> • Review of risk framework 	Three-yearly
	<ul style="list-style-type: none"> • Annual review of risk register by AM team 	2009/10
	<ul style="list-style-type: none"> • Review economic analysis of risk mitigation options 	Three-yearly

Table 19 – Asset management review plan

7.4.2 Asset management plan monitoring

The following indicators will be monitored to measure the effectiveness of this asset management plan.

Indicator	Measure	Source of information
Compliance with legislative requirements	<ul style="list-style-type: none">Unqualified audit opinion relating to asset management plan outputs.	Audit New Zealand reports
Quality of services delivered	<ul style="list-style-type: none">100%, compliance with LOS targets.	Annual Plan reporting
Quality of risk management	<ul style="list-style-type: none">No event occurring outside of risk profile.	Audit of risk register.

Table 20 – Monitoring asset management plan effectiveness

Appendix A Levels of service performance measure

Appendix A Levels of service performance measures

STORMWATER		Activity level of service	
Indicator and QBL category	Service aspect	Service objective	Annual performance target ¹¹
Service quality	Service quality	To minimise the incidence of “nuisance” flooding in moderate rainfall events	Average of < x flooding RFS/1000 population in less than a 10-year ARI rainfall event <i>(target to be established)</i>
		To minimise flooding of habitable buildings in severe rainfall events	Average of < x instances of habitable floor level flooding/1000 properties reported in 10- to 50-year ARI rainfall events <i>(target to be established)</i>
		To minimise flooding of habitable buildings in extreme rainfall events	Average of < x instances of habitable floor level flooding/1000 properties reported in 50- to 100-year ARI rainfall events <i>(target to be established)</i>
	SERVICE RELIABILITY	To provide for the reliable disposal of stormwater	< 0.1 blockage incident//km of public stormwater drain

Customer focus	Customer satisfaction	To achieve a relatively high overall level of customer approval of the stormwater service	70%
		To achieve a high approval rating for stormwater maintenance activities affecting properties	Average approval rating > 95% (measured from customer cards)
		To minimise complaints relating to the stormwater activity	< 1 complaints/3500 population
	Responsiveness	To respond promptly to blockages in the stormwater pipe network	97% of requests responded to within one hour of notification (response includes initial investigation and prioritisation of work)
		To respond promptly to enquiries concerning the stormwater activity	90% of enquiries acknowledged within three working days and full response within 15 working days
		To respond promptly to all requests for service	97% of requests responded to within one hour of notification
	SERVICE RELIABILITY	To manage the stormwater infrastructure in a way that protects community health and safety	No serious harm incidents caused by the stormwater infrastructure or associated construction, maintenance or operation work.

¹¹ Targets tentative only, pending data capture and analysis. Target definitions are presented in Appendix B

STORMWATER		Activity level of service	
Indicator and QBL category	Service aspect	Service objective	Annual performance target ¹¹
Cost-effectiveness <i>ECONOMIC</i>	Operating efficiency	To provide a cost-effective stormwater service	Operating cost/ha developed area < \$x <i>(target to be established)</i>
	Infrastructure efficiency	To provide an efficient stormwater infrastructure	Asset replacement value/ha developed area < <i>(target to be established)</i>
Environmental performance <i>ENVIRONMENTAL</i>	Environmental effects	To maintain a high standard of water quality at main recreational beaches	Water quality at monitored bathing beaches complies with Ministry for the Environment guidelines (green status) on at least 90% of sampling days
		To maintain a high standard of water quality in the city's watercourses	The following contaminants are not seen on 100% of sampling days: scums or foams, floating or suspended material, abnormal colour or clarity, fats or gross solids.
			At least 80% of monitored freshwater sites have median annual levels of faecal bacteria counts of less than 1000 per 100ml
		To progressively reduce the number of watercourse pollution incidents	< x pollution incidents reported <i>(target to be established)</i>
To minimise adverse effects on the environment	Full compliance with resource consents for discharges from reticulation		
Legislative compliance <i>SOCIAL</i>		To comply with relevant legislation	Full compliance

Appendix B Levels of service target definitions

Appendix B Levels of service target definitions

STORMWATER		
Indicator and QBL category	Service aspect	Definitions
Service quality	Service quality	<p>Request for service – a report from the community of a problem or a request for an action concerning the stormwater service</p> <p>ARI – Average recurrence interval of a rainstorm. Will be derived from analysis of data from the city’s rainfall monitoring network supplemented by additional data as appropriate</p> <p>Flooding not associated with stormwater system – flooding caused by:</p> <ul style="list-style-type: none"> • blockage of street sumps (sumps are part of the roading system) • insufficient street sumps (including an absence of street sumps at low points in the kerb and channel) <p>blockage of localised culverts under roads in rural areas (these culverts are part of the roading system)</p> <p>Flooding associated with stormwater system – All flooding not caused by:</p> <ul style="list-style-type: none"> • blockage of street sumps • insufficient street sumps • blockage of localised culverts under roads in rural areas <p>Instance – an occurrence of habitable floor level flooding as determined by a report or reports to the Council. A report may be by a member of the community, a council officer or agent of the Council, or by other organisations such as the New Zealand Police or Fire Service</p> <p>Habitable floor level flooding – floodwater entering into housing, communal residential and communal non-residential buildings (as defined in the New Zealand Building Code) at a level which is above the normally habitable floor level</p>
	Service reliability	<p>Blockage incident – overflow or damage resulting from an unintended full or partial obstruction within a public stormwater drain.</p>
Customer focus	Customer satisfaction	<p>Customer approval – will be determined from customer responses where an opinion is expressed. “Don’t knows” will be excluded from the determination of approval ratings</p> <p>Peer average – as identified in the annual NBR Communitrak survey.</p>
		<p>Stormwater maintenance activities affecting properties – a property is considered to be affected when:</p> <ul style="list-style-type: none"> • the work is within the boundaries of the property • the stormwater service to the property is disrupted or significantly restricted • vehicle or pedestrian access to the property may be affected • the work is in the footpath, berm or road adjacent to the property • the work involves cutting or removal of trees/ shrubs or landscaping in the vicinity of the property
		<p>Complaint – a formal expression of dissatisfaction by an external party about the way a request for service has been managed. (Note – a request for service or an expression of disagreement with a decision does not meet the definition of a complaint)</p>
	Responsiveness	<p>On site – the contractor is on the site to make an assessment of the problem and the remedial action required or to commence physical works if an assessment is not required. Where an assessment is required the timing of physical works will depend on the findings of the assessment</p> <p>Request for service – a report from the community of a problem or a request for an action concerning the stormwater service</p> <p>Responded to – means an initial assessment or investigation and prioritisation of work that may be required</p>
Public safety	<p>Serious harm – as defined in Schedule 1 of the Health and Safety in Employment Act 1992 (HASIE)</p> <p>“1. Any of the following conditions that amounts to or results in permanent loss of bodily function, or temporary severe loss of bodily function:</p>	

STORMWATER		
Indicator and QBL category	Service aspect	Definitions
		<p>respiratory disease, noise-induced hearing loss, neurological disease, cancer, dermatological disease, communicable disease, musculoskeletal disease, illness caused by exposure to infected material, decompression sickness, poisoning, vision impairment, chemical or hot-metal burn of eye, penetrating wound of eye, bone fracture, laceration, crushing.</p> <p>2. Amputation of body part.</p> <p>3. Burns requiring referral to a specialist medical practitioner or specialist outpatient clinic.</p> <p>4. Loss of consciousness from lack of oxygen.</p> <p>5. Loss of consciousness, or acute illness requiring treatment by a medical practitioner, from absorption, inhalation or ingestion of any substance.</p> <p>6. Any harm that causes the person harmed to be hospitalised for a period of 48 hours or more commencing within 7 days of the harm's occurrence.”</p>
Cost-effectiveness	Operating efficiency	<p>Operating cost – total operating expenditure as stated in the LTCCP or Annual Plan less depreciation, interest costs and rates plus any revenue incorporated within the total operating expenditure amount (depreciation, interest costs and rates are not good indicators of efficiency and their inclusion can compromise the validity of cost comparisons)</p> <p>Developed area – the area of the city that is serviced by a constructed stormwater network. This excludes localised culverting under roads in rural areas)</p>
	Infrastructure efficiency	<p>Asset replacement value – ORC from the most recent formal asset valuation</p>
Environmental performance	Environmental effects	<p>Ministry for the Environment guidelines – as set out in “Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas June 2003” published jointly by the Ministry of Health and the Ministry for the Environment</p>
		<p>Faecal bacteria – bacteria which are indicators of faecal contamination (typically enterococci and faecal coliforms).</p>

Appendix C Risk process

Appendix C Risk process

The table below presents the areas of impact, and consequence severity ratings used within the risk assessment.

CONSEQUENCE	IMPACT					
	0	1	2	3	4	5
Cost Range	\$0	< \$5,000	\$5,000 - \$50,000	\$50,000 - \$250,000	\$250,000 - \$5M	>\$5M
Cost Value	\$0	\$2,000	\$30,000	\$150,000	\$2,500,000	\$7,000,000
Description	Not Applicable	Insignificant	Minor	Significant	Major	Catastrophic
Health & Safety		Near miss / no injuries	Minor injuries First Aid treatment	Major injuries, medical treatment required	Single fatality or long term hospitalisation.	Multiple fatalities or long term epidemic
Financial / Business / Property damage		Minimal direct revenue loss & cost to restore service	Some direct revenue loss & cost to restore service	Significant direct revenue loss & cost to restore service	Major direct revenue loss & cost to restore service	Catastrophic direct revenue loss & cost to restore service
Community Impact		Slight service disruption affecting small number of customers	Significant localised disruption over short term period.	Major localised disruption over extended period.	Major long term city wide service disruption.	Long term city-wide loss of water supply system
Environment		Minor effect on environment	Contamination affecting 1 property, related to seage, stormwater or potable water	Contamination affecting up to 10 properties or to stream or harbour causing health warnings with effect lasting up to one week	Contamination (1) of land, stream or harbour with major detrimental effect; (2) damaging sewage treatment plant processes lasting <1 week	Discharge of contaminant destroying an ecosystem. Damage to sewage treatment plant processes lasting > 1 week
Reputation / customer credibility		no adverse media coverage or resident/customer dissatisfaction. Customer enquiries handled by front line staff.	no media coverage but up to 5 residents /customers dissatisfied. Drainage & Water supply Unit Manager informed of customer service issues.	adverse local media coverage or between 6 and 50 residents / customers dissatisfied. Infrastructure Mngmt. Team member informed of customer service issues.	adverse international media coverage, or > 50 residents / customers dissatisfied. Chief Executive informed of customer service issues.	Adverse international media coverage or widespread public condemnation

Table – Impact ratings and areas of impact

The table below presents the likelihood definitions used in conjunction with the consequence rating from the table above in order to evaluate overall risk severity.

Code	Likelihood of Occurrence	Description	Frequency	Equivalent Statistical Probability
A	Almost Certain	Is expected to occur in most circumstances	> twice a year	2
B	Likely	Will probably occur in most circumstances	Between once and twice a year	1
C	Possible	Might occur at some time	Between once a year and once every ten years	0.2
D	Unlikely	Could occur at some time	Between once every ten years and once every fifty years	0.03
E	Rare	May occur only in exceptional circumstances	Less than once every fifty years	0.0125

Table – Likelihood ratings

The consequence and likelihood ratings are used to assign the risk level associated with risk events as defined in the table below.

Risk Severity Table	
Annual Risk Cost	Risk Severity
<\$20,000	Low
\$10,000 - \$99,999	Medium
\$100,000 - \$499,999	High
\$500,000+	Extreme

Legend: E: Extreme risk; immediate action required
H: High risk; senior management attention needed
M: Moderate risk; management responsibility must be specified
L: Low risk; manage by routine procedures

Table – Risk severity matrix

Appendix D Lifecycle management strategies

Appendix E Lifecycle management strategies

Management strategies

Strategy	Objective/description
Organisational tactics	
Organisational structure	<p>Stormwater services are managed through a structure that maintains a separation between asset management and service delivery to promote accountability, transparency and efficiency.</p> <p>Asset management staff are responsible for ensuring the Council achieves its objectives for stormwater services through setting and implementing strategies and processes, and monitoring outcomes.</p> <p>The actual delivery of stormwater services is contracted, through competitive market mechanisms, to service providers who operate and maintain the assets in order to meet defined service standards.</p>
Human resources	<p>The professional skills and experience of staff are developed through adequate training and experience.</p> <p>Personal development needs are agreed with staff each year at performance reviews. A register is maintained to record training history. Staff are encouraged to belong to appropriate professional bodies and to attend appropriate conferences, seminars and training courses.</p>
Legislative compliance	<p>Maintain current understanding of legislative requirements, and comply with all requirements.</p> <p>There are defined and documented processes for legislative compliance issues. Staff are kept informed of changes in relevant legislation.</p>
Financial management	<p>Manage all stormwater finances responsibly and in accordance with statutes and corporate policy. Ensure the stormwater system is managed in a financially sustainable manner over the long term.</p> <p>Key features of financial management methods include:</p> <ul style="list-style-type: none"> • economic cost/benefit appraisal of all capital expenditure, with comprehensive business cases prepared for all investment which considers all options • annual review of asset management plan financial programmes • recording of deferred maintenance • tracking of changes in service potential • continuous monitoring of expenditure against budget.
Funding of asset management activity	<p>Prepare all asset management expenditure programmes in accordance with Council funding and budget preparation policies and procedures.</p> <p>The different categories of expenditure within the financial programmes will be identified to enable the funding to be allocated in accordance with the Council's policies.</p>
Infrastructure asset valuation	<p>Perform valuations in a manner that is consistent with national guidelines and corporate policy.</p> <p>Valuations will be carried out at intervals not exceeding five years (generally three-yearly). Data collection programmes are being implemented to improve the accuracy of renewal forecasts and valuations.</p>

Strategic planning	
Asset management commitment	<p>The asset management plan is the key planning document for the management of the stormwater activity. It is a "living" document that is reviewed on a regular basis.</p> <p>The scope of the review will be influenced by changes in service standards, improved knowledge of assets, introduction of asset management improvements and corporate strategy/ policy and process.</p>
Demand management	<p>Demand forecasts will be regularly reviewed and actions adopted to meet changing demand through holistic solutions, including demand management initiatives.</p> <p>Demand management initiatives limit demand on the asset and the consequent requirement to undertake capital development works. Holistic solutions ensure network optimisation.</p>

Strategy	Objective/description
Risk management	<p>Annual risk assessments are undertaken to update the stormwater risk register and risk mitigation actions adopted at a level compatible with the corporate risk policy.</p> <p>Risk mitigation measures include maintaining appropriate insurance cover, emergency response planning, condition monitoring of critical assets, preventative maintenance, implementation of water quality plan manuals, review of standards and physical works programmes.</p>
Service level consultation	<p>The appropriateness of service standards are reviewed periodically by monitoring customer feedback and applying consultative methods.</p> <p>Consultative mechanisms include resident surveys, targeted consultation, including community and focus groups, monitoring of requests for service and the Annual Plan submission process.</p>
Optimised decision-making	<p>Apply economic analysis techniques to justify and prioritise asset management decisions and work programmes.</p> <p>ODM processes include economic analysis and project timing optimisation techniques.</p>
Sustainable resource management	<p>Operate, manage and develop the asset system in a manner compatible with sustainable resource management principles.</p> <p>Capacity will pursue ways of limiting the use of natural resources, including valued landscapes and other natural heritage, and the pollution of air, land and waterways. This involves auditing the systems and materials used, and developing ways to incorporate sustainable operation and development principles into its activities.</p>
Strategic planning framework	<p>Develop strategic planning frameworks to assist in achieving long-term business objectives in an efficient and effective manner.</p> <p>Frameworks will provide strong linkages between the LTCCP and Wellington City Council Strategic Goals, service standards, asset management strategies and the asset management improvement programme.</p>

Data management	
Data collection	<p>Data collection programmes (condition, performance, asset registers) closely aligned with business needs will be implemented in accordance with documented quality processes.</p> <p>Data collection, maintenance and analysis are expensive and it is important that programmes and techniques are cost-effective and consistent with business needs.</p>
Asset management systems	<p>Optimise the application of asset management systems over the short to medium term and develop functionality in line with business needs.</p> <p>Confirm is the pivotal planning and monitoring tool used by for managing water services assets in Wellington City. Its integration with the customer services system, the financial system (Peoplesoft), the principal contractors and GIS (Arcview) provides scope to refine many business processes.</p> <p>Asset data needs are reviewed continuously as staff identify management applications for data held and refine reporting capacity.</p> <p>Capacity will review data analysis needs and proactively introduce enhanced system functionality as justified by business needs to support decision-making.</p>
Network modelling	<p>The Council will continue to implement models to allow asset managers to evaluate performance issues in a holistic manner considering multiple operating environments and looking at future-proofing any system improvements.</p> <p>Computer models of the stormwater pipe network and utilities are required to enable the Council to:</p> <ul style="list-style-type: none"> • determine accurately the existing capacity of the system • identify inadequate sections of the system • operate the system in the most efficient manner • determine the impact of further development on the system • compare options for upgrading the stormwater system.
Performance monitoring	<p>Maintain a programme of performance monitoring to manage risk (focused on critical assets), track achievement of service targets and support decision-making.</p> <p>Monitoring techniques include water quality testing, critical asset audits and</p>

Strategy	Objective/description
	<p>customer service request records.</p> <p>There is an ongoing programme of preparing and updating catchment management plans to determine the ecological health of the receiving waters and carry out works and programmes to ensure the water quality complies with the Resource Management Act.</p>
<p>Failure prediction</p>	<p>Establish and develop computer-based tools to predict failure of the assets.</p> <p>Computer models of the stormwater pipe network and utilities are being investigated to enable the Council to:</p> <ul style="list-style-type: none"> • optimise maintenance and renewal decision-making • programme short-term maintenance and renewal works • plan for mid- to long-term renewal requirements.

Operations and maintenance strategies

Strategy	Objective/description
Operations and maintenance contracts	<p>Use performance-based term contracts to achieve defined service standards for the operation and maintenance of the stormwater system.</p> <p>Wellington City Council delivers stormwater services using performance-based contracts designed to apportion a share of risk to the contractor and provide incentives for innovation, the introduction of new techniques and optimal maintenance programming to achieve target service standards. Periodic contract policy reviews will cover contract packaging, scope, reporting requirements, tender evaluation and performance assessment.</p>
Contract monitoring	<p>Audits of asset condition and performance are undertaken continuously to verify that operational procedures and an adequate level of maintenance are carried out.</p> <p>Audits are undertaken on at least 10 per cent of contract requirements to confirm compliance with contractual and statutory requirements.</p>
Incident management	<p>Effectively respond to and manage incidents to ensure system availability and service continuity, and mitigate adverse effects.</p> <p>The contract specifies performance measures for incident response. The principal contractor is expected to effectively manage minor incidents. Capacity staff becomes involved in serious incidents. A comprehensive emergency management plan is in place that includes “after the event” prioritised inspections.</p>
Critical asset management	<p>Identify critical assets and manage these proactively; manage non-critical assets reactively.</p> <p>“Critical drains” are those where the consequences of failure of the drains for public safety, cost and social disruption justify programmed inspections and preventative rehabilitation. Critical pipelines are identified as Critical A or Critical B. Critical assets are routinely inspected and works planned.</p>

Renewals strategies

Strategy	Objective/description
Critical asset management	<p>Identify critical assets and manage these proactively; manage non-critical assets reactively.</p> <p>“Critical drains” are those where the consequences of failure of the drains for public safety, cost and social disruption justify programmed inspections and preventative rehabilitation. Critical pipelines are identified as Critical A, Critical B or Critical C. Critical drains will be renewed or replaced prior to failure.</p>
Identification of renewal needs	<p>Cyclic renewal needs are identified by analysing:</p> <ul style="list-style-type: none"> • condition reports, • maintenance records (asset failure and expenditure history) • request for service records • observations of staff and contractors. <p>Renewal forecasts for pipe assets are based on assigned condition grades and an assumed deterioration profile.</p> <p>Remaining lives for discrete assets are estimated from inspections, maintenance history and customer issues.</p> <p>The short-term asset renewal programmes are prepared from specific renewal needs identified from the above information. When a fault has been recorded against a pipe length more than once in five years, a specific investigation is commenced.</p>
Identification of renewal needs	<p>Under the Critical Drain process, critical drains (which make up some 18 per cent of the network) will be renewed or replaced when:</p> <ul style="list-style-type: none"> • the performance of the asset fails to meet the required level of service due to the condition of the pipe • it is no longer cost-effective to continue repairing the asset • the risk of asset failure and the associated financial and social impact of that failure justify replacing the asset. <p>If the number of repairs needed between two manholes is such that repairing is considered uneconomical compared with replacing the drain, then that section of the drain is renewed. Similarly, if several repairs along the full length of a pipeline would cost more than 35 per cent of the relay cost, the entire pipeline is replaced.</p>
Prioritisation of renewal projects	<p>Renewal projects are justified and prioritised using a risk-based process.</p> <p>Decisions on renewal works consider the short- and long-term effects on the operating and structural integrity of the system. Renewal works are designed and undertaken in accordance with industry standards (or known future standards) and system design loadings.</p> <p>Short-term renewal priorities are reassessed annually, taking account of additional information that becomes available.</p>
Project design	<p>All asset renewal works will be designed and constructed in accordance with current adopted industry standards (or known future standards).</p> <p>The standardisation of designs and specifications will be considered in the interest of facilitating replacement and operational simplicity.</p> <p>New pipes are constructed from the best available earthquake-tolerant materials, bearing costs in mind. Pipes in the 160mm to 250mm diameter range are generally constructed from HDPE (high density polyethylene). Pipes of larger diameter are considered on a case-by-case basis with the decision on pipe material taking cost, location, risk of damage and effect of breakage into consideration.</p>
Renewals contracts	<p>Use publicly tendered contracts for the rehabilitation and renewal of the stormwater assets.</p> <p>Capacity generally manages contracts in-house, with the exception of some works designed by consultants.</p>

Strategy	Objective/description
Contract monitoring	<p>Manage capital works contracts in accordance with Council policy.</p> <p>There are well developed and documented contract management procedures.</p>
Deferred renewals	<p>The quantity and impact of deferred renewals (if any) is tracked.</p> <p>The Council recognises that although the deferral of some items on cyclic renewal programmes will not impede the operation of many assets in the short term, repeated deferral will create a future Council liability. As the Council currently fully funds asset renewals at a rate approximating depreciation, and there is a sound basis for renewal programmes, deferred renewals are not expected.</p>

Capital development and disposal strategies

Strategy	Objective/description
Identification of development needs	<p>Asset development needs are identified from analysis of:</p> <ul style="list-style-type: none"> • system performance monitoring (overflows, flooding etc.) • catchment modelling • demand forecasts • risk assessment • customer service requests • comparison of system performance against target service levels. <p>A provisional forward capital works development programme is maintained and updated at least annually from analysis undertaken as part of the development of integrated catchment management plans.</p>
Prioritisation of development projects	<p>Development projects are justified and prioritised using a risk-based process and rigorous cost/benefit analysis of all risk-reduction options.</p> <p>Decisions on development works consider the short- and long-term effects on the operating and structural integrity of the system.</p> <p>In determining the requirement for capital or asset development works, the short- and long-term effects on the operating and structural integrity of the system are considered, together with any forecast increase in loading upon the system.</p> <p>All feasible options, including non-asset demand management options and the use of second-hand plant, are considered. Development works are designed and undertaken in accordance with industry standards (or known future standards) and the system design parameters defined in the Code of Practice for Land Development.</p>
Project approval	<p>A long-term development programme is prepared from projects meeting the assessment criteria, and all projects are approved through the Annual Plan process.</p> <p>The actual timing of asset development works will reflect the community's ability to meet the cost, as determined through the Annual Plan process.</p> <p>Scheduled projects meeting assessment criteria not funded are listed on the forward works programme for future years.</p>
Project design	<p>All asset development works will be designed and constructed in accordance with current adopted industry standards (or known future standards) and system design loading.</p> <p>In determining capital or asset development work requirements, the short- and long-term effects on the operating and structural integrity of the system are considered, together with the demands of any forecast increase in loading upon the system.</p> <p>The standardisation of designs and specifications will be considered in the interest of facilitating replacement and operational simplicity.</p> <p>New stormwater pipes are designed for ultimate development potential, as indicated in the District Plan and according to the design criteria in the Code of Practice for Land Development.</p> <p>New pipes are constructed from the best available earthquake-tolerant materials, bearing costs in mind. Pipes in the 160mm to 250mm diameter range are generally constructed from HDPE (high density polyethylene). Pipes of larger diameter are considered on a case-by-case basis, with the decision on pipe material taking cost, location, risk of damage and effect of breakage into consideration.</p>
Capital development contracts	<p>Use publicly tendered contracts for the upgrade of the stormwater assets.</p> <p>Capacity generally manages contracts in-house, with the exception of some works designed by consultants.</p>
Contract monitoring	<p>Manage capital works contracts in accordance with Council policy.</p> <p>There are well developed and documented contract management procedures.</p>

Strategy	Objective/description
Asset disposal	<p>Assess each proposal to dispose of surplus or redundant assets on an individual basis, subject to the requirements of the relevant legislation.</p> <p>Asset disposal will comply with the requirements of the Local Government Act 2002. The disposal of any asset, or part of, shall be based upon an economic appraisal unless there is no further requirement to provide the service. Stormwater assets are generally decommissioned rather than disposed of. Opportunities for decommissioned asset use are investigated, including the selling or leasing of decommissioned pipes to other service utility providers, such as broadband providers.</p>
Vested assets	<p>The risk, cost and benefits of accepting any new privately funded assets constructed in association with property development will be considered on a case-by-case basis in approval decisions.</p> <p>Such assets will be accepted into public ownership when satisfactorily completed in accordance with approvals given and checked with CCTV surveys. The Council will not contribute to the cost of such work unless there are exceptional service standard or equity issues.</p>

Appendix E 2006 asset management practices

Appendix E 2006 asset management practices

Asset management data

The accuracy and completeness of the data currently held (and the processes for collecting and maintaining the data) is summarised in Table E.1.

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
ASSET KNOWLEDGE					
1.1	Asset categorisation	<ul style="list-style-type: none"> Assets are captured within Confirm at a "valuation" type component level. Pipes are defined between points of grade or direction change. Manholes, intakes etc are captured individually. All assets assigned unique ID. 	3	1	
1.2	Location data	<ul style="list-style-type: none"> Assets captured spatially in GIS 	3	1	-
1.3	Physical attributes	<ul style="list-style-type: none"> Age/year of construction, type, material, diameter, length (linear assets) recorded in Confirm Documented accuracy/unknowns Physical attributes not linked with GIS As-built plans Existing information gaps are not being systematically entered into Confirm 	3	2	<ul style="list-style-type: none"> Streamline process for retrieval of attribute data Link Confirm attribute data to GIS
1.4	Operations and maintenance data	<ul style="list-style-type: none"> Operations and maintenance contractor implementing job management system with mobile field computing. Will be linked to Confirm to relay procedures, update attribute information, and record maintenance history against the asset. Complaints, RFS and responses captured in Confirm, loaded against street address Maintenance activities captured in Confirm, loaded against asset 	3	2	<ul style="list-style-type: none"> Complete implementation of JMS and interface with Confirm
1.5	Condition data	<ul style="list-style-type: none"> Reticulation condition based on CCTV inspections of critical drains and some individual non-critical drains and captured within Access database 	3	2	Introduce representative sample CCTV inspections of non-critical drains (i) Consolidate condition data into Confirm
1.6	Capacity data	<ul style="list-style-type: none"> Catchment management plans (some Mouse modelling) for 11 out of 34 catchments (high-risk catchments) Overflow/flood complaint history recorded within Confirm 	4	3	Complete CMPs/ICMPs citywide Extend Mouse modelling to improve understanding of network capacity

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
1.7	Performance data	<ul style="list-style-type: none"> Capacity data as above Reticulation blockages/overflow complaints recorded within Confirm Regular monitoring and reporting against defined service standards 	4	2	Consolidate information into Confirm
1.8	Asset life data	<ul style="list-style-type: none"> Base lives developed and documented in G drive following assessment of maintenance history, knowledge of recent renewals, structured interviews, staff experience 	3	2	<ul style="list-style-type: none"> Ongoing refinement of base lives given improved operations and maintenance and condition data capture, and renewals forecasting
1.9	Risk management data	<ul style="list-style-type: none"> Risk register developed in 2001 using a series of workshop sessions 	3	3	<ul style="list-style-type: none"> Review and update risk register
1.10	Financial data	<p>1.0 Peoplesoft (FMS) captures financial information at the project level</p> <p>2.0 Confirm captures financial information at the Job level</p> <p>3.0 Accounting policies define operations, maintenance, renewals and capital development</p> <p>4.0 FRS-3 compliant valuations undertaken three-yearly</p>	3	2	<ul style="list-style-type: none"> Strengthen processes to allocate renewals and capital development portions of project costs. Strengthen processes to portion growth and LOS enhancement portion of project costs

Table E.1 – Asset knowledge

Asset management processes

The sophistication, quality of documentation, and application of the Council's asset management business processes are assessed in Table E.2.

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
STRATEGIC PLANNING PROCESSES					
2.1	Demand forecasting processes	<ul style="list-style-type: none"> Some modelling undertaken in the high-risk catchments (Mouse) Future demand analysis undertaken as part of development contributions analysis Forward design based on Code of Practice and District Plan zone densities, with consideration to other externalities (e.g. rezone potential) 	4	3	<ul style="list-style-type: none"> Include separate analysis of demand drivers to increase sophistication of demand projections Link and use best demand projections consistently across activity
2.2	Failure prediction	<ul style="list-style-type: none"> Proactive management of critical drains (inspections and condition monitoring) Non-critical drains managed reactively 	3	3	<ul style="list-style-type: none"> Introduce sampling condition monitoring of non-critical drains
2.3	Risk management strategy	<ul style="list-style-type: none"> Risk assessment done consistent with AS/NZS 4360, but not co-ordinated with other activities or corporately Highest risks examined and actions developed to mitigate the risk 	3	3	<ul style="list-style-type: none"> Review risk framework for consistency across Council Document clear strategy regarding risks and their management
2.4	Optimised decision-making	<ul style="list-style-type: none"> Business cases are developed for major projects, and include benefit/cost analyses and risk consideration. Prioritisation matrices for renewal and upgrade works 	3	3	<ul style="list-style-type: none"> Develop analysis to calculate optimum replacement timing, including reference to operations and maintenance costs
2.5	Service level reviews	<ul style="list-style-type: none"> Service levels developed historically with reference to legislative requirements, industry practice, service currently provided and customer feedback In-house workshops run to refine measures and KPIs. 	4	3	<ul style="list-style-type: none"> Review LOS consultation needs Develop strategy and methodology for LOS consultation Implement consultation strategy
2.6	Community outcomes	<ul style="list-style-type: none"> The Council has facilitated the consultation and interpreted the information to define the 10 community outcomes, grouped into seven strategic themes Processes developed for six-yearly review of community outcomes 	4	2	
ASSET MANAGEMENT PRACTICES					
3.1	Project identification/prioritisation	<ul style="list-style-type: none"> Capital projects identified through network condition monitoring (critical drains), customer 	3	2	<ul style="list-style-type: none"> Explicitly link capital projects to service gaps where

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
		complaints, fault history and targeted modelling/analysis <ul style="list-style-type: none"> Projects are prioritised using benefit/cost analysis, risk analysis and priority matrices 			applicable
3.2	CAPEX evaluation	<ul style="list-style-type: none"> Projects identified as part of asset management process, and include risk assessment and prioritisation processes High risk, contentious or capital development projects include specific consultation with Council and the community 	3	2	
3.4	CAPEX contract management	<ul style="list-style-type: none"> Contracts advertised publicly Discontinued term contract structure Contracts generally managed in-house, with the exception of works designed by consultants Well-developed and documented contract management procedures 	3	2	
3.5	Operations and maintenance strategy and analysis	<ul style="list-style-type: none"> High-level operations and maintenance strategies documented in asset management plan, linked to overall service objectives 	3	2	<ul style="list-style-type: none"> Formally link maintenance procedures to strategy framework
3.6	Operations and maintenance plans	<ul style="list-style-type: none"> Documented procedures for response to requests for service Health and safety plan in place Maintenance procedures detailed in maintenance contractor's job management system (to be linked with Confirm) 	3	2	
3.7	Operations and maintenance contract management	<ul style="list-style-type: none"> Term contract across Wellington and Hutt, managed in-house Well developed and documented contract management procedures. Being further refined – Capacity contract management system. 	3	2	<ul style="list-style-type: none"> Complete Capacity contract management system
3.8	Operations and maintenance monitoring	<ul style="list-style-type: none"> Performance indicators monitored and linked to payment adjustment methodology 	3	2	

Table E-2 – Asset management processes

Information Systems

The current capability of information systems used by the Council to support asset management is summarised in Table E.3.

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
INFORMATION SYSTEMS					
5.1	Asset register system	<ul style="list-style-type: none"> The principal asset register is Confirm High level summary in Peoplesoft Maintenance contractors job management system (JMS) 	3	2	-
5.2	Spatial information system	<ul style="list-style-type: none"> Arcview GIS is the principal source of spatial data Hard copy plans 	3	2	<ul style="list-style-type: none"> Streamline process for retrieval of attribute data Link Confirm attribute data to GIS
5.3	Maintenance management system	<ul style="list-style-type: none"> Confirm is used to record defects, generate works orders and record maintenance history at the component level Maintenance contractor is implementing JMS with greater level of detail, linked with mobile field computing 	3	2	<ul style="list-style-type: none"> Complete interface between JMS and Confirm
5.4	Capacity/ utilisation models	<ul style="list-style-type: none"> Mouse modelling of some trunk stormwater mains. Developed by consultants, managed in-house 	3	3	<ul style="list-style-type: none"> Extend modelling citywide.
5.5	Advanced asset management systems	<ul style="list-style-type: none"> Maintenance contractor is implementing JMS with greater level of detail, linked with mobile field computing. 	2	2	<ul style="list-style-type: none"> Complete interface between JMS and Confirm

Table E.3 – Information systems

Organisational tactics

The way in which the Council's structure, roles and responsibilities support the asset management functions is summarised in Table E.4.

Asset management category	Current practice	Rating		Improvement opportunity	
		Risk	Status		
ORGANISATIONAL TACTICS					
6.1	Asset management review/ improvement	<ul style="list-style-type: none"> • Good staff commitment to AM improvement • Detailed and prioritised AM improvement programme • PWC benchmarking discontinued • Annual internal and external peer review of plans 	3	2	-
6.2	Commercial tactics	<ul style="list-style-type: none"> • Capacity formed as a way of gaining savings in the operation and maintenance of the three waters in Wellington and Hutt. • Term maintenance contract (including both Wellington and Hutt) in place with performance requirements • Capex projects publicly tendered 	3	2	-
6.3	Corporate sponsorship and commitment	<ul style="list-style-type: none"> • Council is committed to the AM process and funding allocations are sufficient to meet business plan objectives • Council adopt the AM approach and "core" recommendations. Capital Development projects (discretionary funding) are subject to separate Councillor approval processes 	3	2	-
6.4	Asset management responsibilities	<ul style="list-style-type: none"> • Responsibilities are clearly defined in the Council and Capacity • Small Capacity AM team with risk of overload • Council's infrastructure AM manager responsible for three waters, landfill, quarry and transportation AM planning 	3	2	<ul style="list-style-type: none"> • Establish AM steering group for consistent AM approach across Council
6.5	Corporate objectives	<ul style="list-style-type: none"> • Outcomes, objectives, strategies, LOS and work programmes are clear and are aligned. • Corporate data for AM (e.g. demand) is not used consistently across Council. • Risk framework established for the three waters in isolation from other Council departments. No established linkage with a corporate risk framework. 	3	3	<ul style="list-style-type: none"> • Consolidate corporate data for AM and introduce processes to ensure that it is used consistently across Council • Review risk frameworks currently in place across Council and standardise

Asset management category		Current practice	Rating		Improvement opportunity
			Risk	Status	
ORGANISATIONAL TACTICS					
6.6	Asset management training and skills	<ul style="list-style-type: none"> • Small AM team means that external expertise is often sought • External expertise used to upskill in-house resource • Programme of workshops, training, seminars and conferences 	3	3	<ul style="list-style-type: none"> • Document a skills map to identify areas within the group which could be strengthened. • Review succession planning processes
6.7	Legislative compliance	<ul style="list-style-type: none"> • Defined procedures in place and documented for significant legislative compliance issues (e.g. contamination of receiving waters) • Changes in legislation communicated to staff, although no clear formal documentation of this process exists 	3	2	<ul style="list-style-type: none"> • Formalise process to ensure staff are kept abreast of legislative change
6.8	Funding strategy	<ul style="list-style-type: none"> • Development contributions policy established. • Funding for additional capacity (growth) and increased levels of service identified. 	3	2	

Table E.4 – Organisational tactics

Appendix F Resource consents for the stormwater activity

No.	Consent no.	Location	Expiry date	Resource consent description
1	WGN 920065(01)	Island Bay	30/06/09	To discharge contaminated urban stormwater at a dry weather flow rate of 100 l/s and a 20-year design flow of 30.4 m ³ /s.
2	WGN 920066(01)	Owhiro Stream	30/06/03	To discharge contaminated urban stormwater. Surrendered but is still being monitored.
3	WGN 920068(01)	Lyall Bay Beach	30/06/10	To discharge contaminated urban stormwater at a dry weather flow rate of 15 l/s and a 20-year design flow of 12 m ³ /s.
4	WGN 920069(01)	Ngauranga Stream	13/06/13	To discharge contaminated urban stormwater at a dry weather flow rate of 150 l/s and a 20-year design flow of 33 m ³ /s.
5	WGN 080245	Tory Street	30/06/13	To discharge contaminated urban stormwater at a dry weather flow rate of 30 l/s and a 20-year design flow of 5.6 m ³ /s.
6	WGN 920071(01)	Evans Bay Parade and Cobham Drive	30/06/10	To discharge contaminated urban stormwater at a dry weather flow of 50 l/s and a 20-year design flow of 126 m ³ /s.
7	WGN 920072(01)	Taranaki Street	30/06/09	To discharge contaminated stormwater at a dry weather flow rate of 25 l/s and a 20-year design flow of 7.9 m ³ /s.
8	WGN 920073(01)	Interislander Ferry Terminal, Aotea Quay (Thorndon)	30/06/13	To discharge contaminated urban stormwater at a dry weather flow rate of 50 l/s and a 20-year design flow of 9.8 m ³ /s.
9	WGN 920074(01)	Aotea Quay and Waterloo Quay (Davis Street culvert)	30/06/13	To discharge contaminated urban stormwater at a dry weather flow rate of 60 l/s and a 20-year design flow of 9.8 m ³ /s.
10	WGN 920075(01)	Waring Taylor Street north of Queen's Wharf	30/06/11	To discharge contaminated urban stormwater at a dry weather flow rate of 20 l/s and a 20-year design flow of 41 m ³ /s.
11	WGN 920076(01)	OPT Herd Street	30/06/13	To discharge contaminated urban stormwater at a dry weather flow rate of 150 l/s and a 20-year design flow of 234 m ³ /s.
12	WGN0 10080 (20836)	Houghton Bay Beach	23/03/36	To intermittently discharge contaminated stormwater to the coastal marine area at a rate of up to 7 m ³ /sec.
13	WGN030034 (22232)	Takapu Stream at No.1 Takapu Road	20/09/37	To replace concrete block all in the bed of Takapu Stream and excavating the stream bed for realignment.
14	WGN030034 (22233)	Takapu Stream at No.1 Takapu Road	30/09/37	To permanently divert the flow of Takapu Stream in connection with the construction of a concrete block wall and excavation of the stream bed for realignment purposes.
15	WGN040034 (22943)	The Esplanade, Island Bay, Wellington	29/08/38	To provide the coastal marine area with a stormwater outlet.
16	WGN030081 (22395)	Kaiwharawhara Stream	08/01/13	To extract gravel from stream bed for flood protection purposes.

No.	Consent no.	Location	Expiry date	Resource consent description
17	WGN040232 (23385)	Karori Stream	25/02/39	To extract gravel and install structures in the Karori streambed.
18	WGN040232 (23386)	Karori Stream	25/02/39	To temporarily divert Karori stream during gravel extraction on an annual basis
19	WGN060236 (25113)	Karori Stream	18/05/41	To repair erosion attributable to works, remove debris and maintain integrity of debris arrestor
20	WGN050135 (24088)	Spealy's Stream	10/01/40	Rail iron and concrete block retaining wall in bed of Spealy's Stream.