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Introduction

This is the initial draft of the Dunedin City Council 30 year Infrastructure Strategy. This strategy is a new legislative requirement under the 2014 amendments to the Local Government Act 2002. The aim of the strategy is to identify the key infrastructure issues facing the Council and the principal options for managing these issues.

The document is structured in a series of chapters, describing the strategic framework surrounding this strategy, the context that the strategy operates within and describes the major issues for the activities contributing to the strategy. Issues are described in summary initially, with activity specific responses to these issues described in later chapters of the strategy. Financial information is presented at the aggregated level in the ‘How much needs to be invested over the next 30 years’. Activity specific estimates of cost for operational, capital expenditure for renewals and new capital requirements across the thirty years and key asset management practices and considerations are described in the latter chapters of this document.

This document is supported by the Council’s wider strategic framework and activity group Asset Management Plans.
Executive summary

One of the Dunedin City Council’s main functions is to provide roading, water supply and waste services to the city. The networks of roads and footpaths, pipes, treatment stations and drains that provide these services are called service infrastructure.

This draft Infrastructure Strategy outlines a planned approach to four key areas of service: roading and footpaths, water supply, wastewater and stormwater. The latter three, collectively referred to as 3 Waters, include an asset base with a gross replacement cost of $1.6 billion, while the roading and footpath asset base represents a further $1.3 billion. Providing these services forms a substantial part of the Council’s activity and expenditure, accounting for approximately 47% of annual operating expenditure and approximately 81% of annual capital expenditure. Ensuring consistent and reliable service delivery to the community requires good asset management practices and strategic thinking.

Dunedin’s aging infrastructure, and the nature of infrastructure investment over time, means the Council faces challenges over the next 30 years as it balances the need for infrastructure renewal, new capital expenditure and ongoing maintenance. This will require significant investment to maintain existing levels of service. By level of service we mean the range and quality of service that we provide for the community - the measurable outputs such as the quality of drinking water or the efficiency of travel on the roading network. There are small pockets of the city where we are not meeting service levels and this will continue in the short term as the infrastructure deteriorates. However, careful planning of infrastructure renewals delivering efficiencies, and the gradual increase in funding, will allow us to address these areas in the medium term. Key service levels, such as drinking water quality, are not affected.

A range of factors that need to be considered when planning for infrastructure renewal and development. However, the overriding issue is the age and condition of the infrastructure. This situation is partially due to underfunding in the past and partially due to nature of the city’s development, with large quantities of network infrastructure being built over a short time. This has led to the need to renew a large number of these assets over the next 30 years.

We are maintaining the existing levels of customer service by providing appropriate renewals funding. That ensures the services continue to function at the level they are now. By developing a 30 year Infrastructure Strategy as part of the Long Term Plan (LTP), the Council is able to take a long term strategic view of asset renewal and development, managing and prioritising the capital programme to provide greater certainty for financial planning. It outlines the key issues associated with the on-going management of the infrastructure and the most likely scenarios for operational and capital expenditure requirements across the strategy’s three decade time span. This provides a clearer picture of when expenditure is required and how this may impact on rates requirements during and beyond the ten years of the LTP.

We are forecasting expenditure of $838 million and $714 million respectively on 3 Waters and roading infrastructure renewals and new capital in the 30 years between 2015/16 and 2045/46. Over the same period, just under $1.8 billion is forecast to be spent on operational costs. This expenditure will allow us to continue to provide the services that are in place now. Decisions to increase service levels by adding or improving services, will mean either increased costs or that existing programmes would have to be reprioritised to include them. That could result in some previously planned work being delayed.

Renewals expenditure is forecast to be $16-18 million per year for 3 Waters and $17 million per year for roading and footpaths. It is important to note, however, that due to under-funding of renewals in the past it will be necessary to fund them above this level in the short to medium term to address the backlog.

Stepping up the renewals programme in the first 10 years of the strategy is the preferred way to deal with the issues outlined above. This allows us to manage any expenditure peaks and troughs in the longer term and ensure our key service levels can be maintained without big increases in operating costs.

In order to reduce the impact of these peaks, the DCC has developed a prioritised programme so the assets which most need to be replaced are tackled first. At the same time we will be working to provide best value for money in the way we manage these projects. This will include departments co-ordinating work planned for areas such as the Warehouse precinct and the central city. The Council believes it is preferable to invest in catching up on renewals over the next thirty years than to leave funding at 2014/15 levels and have assets and service levels deteriorate over time.
Introduction

This is the initial draft of the Dunedin City Council’s 30 year Infrastructure Strategy. This strategy is a new legislative requirement under the 2014 amendments to the Local Government Act 2002. The aim of the strategy is to identify the key infrastructure issues facing the Council and the principal options for managing these issues.

The document is structured in a series of chapters, describing the strategic framework and context that the strategy operates within, and the major issues for the activities contributing to the strategy. Major issues are described in summary initially, with activity specific responses to these issues described in later chapters of the strategy. Financial information is presented at the aggregated level in the chapter: ‘How much needs to be invested over the next 30 years’. Activity specific estimates of cost for operations, capital expenditure for renewals, new capital requirements across the 30 years and key asset management practices and considerations are described in the latter chapters of this document.

Financial information is provided in detail for the first 10 years of the strategy, with estimates of expenditure for the remaining 20 years which are shown in blocks of five years.

This document is supported by the Council’s wider strategic framework and activity group Asset Management Plans.

What is an infrastructure strategy?

This strategy provides information about the significant infrastructure issues that the Council will face over the next 30 years. This strategy applies to the following groups of activity:

- roading and footpaths
- water supply
- sewage treatment and disposal (more commonly known as wastewater)
- stormwater.

Providing these services forms a substantial part of the Dunedin City Council’s activity and expenditure:

- approximately 47% of the Council’s annual operating expenditure
- approximately 81% of Council’s annual capital expenditure.

The Council ensures that people receive drinking quality water at their taps, that wastewater is removed and treated for environmentally safe discharge at sea and ensures that rainwater going into the stormwater network from roofs and streets is removed and disposed of in accordance with Regional Council resource consent requirements. This is achieved via a vast network of largely underground pipes, pumping stations and treatment plants.

Roading infrastructure also connects Dunedin to the wider national and international road, rail, shipping and air transportation networks.

Managing and maintaining these assets to ensure consistent and reliable service delivery to the community requires good asset management practices and strategic thinking. A key characteristic of Dunedin is the age of the existing infrastructure. By developing a 30 year Infrastructure Strategy in this Long Term Plan (LTP), the Council is able to demonstrate that it is taking a long term strategic view and making prudent decisions regarding the funding of any further development of networks and maintenance, and renewal of the existing assets.

In the past five years, the Council has focused on strategic planning by developing an integrated strategic framework based on eight core strategies, including a Spatial Plan for the city. The city’s infrastructure enables the social, economic, recreational, environmental and other outcomes discussed in these strategies. Two of these strategies relate specifically to the overall planning for the city’s infrastructure and take long term strategic views - the 50 year 3 Waters Strategic Direction Statement completed in 2010, and the 30 year Dunedin City Integrated Transport Strategy completed in 2013. Development of these strategies involved extensive community consultation and they are supported by investment in technology to assist with assessing network asset condition and management of asset life cycles.

The 30 year Infrastructure Strategy compliments this work by outlining the key issues associated with the on-going management of the infrastructure and the most likely scenarios for operational and capital expenditure requirements across the thirty year time span of the strategy. By providing a longer view of requirements residents and ratepayers will get a sense of when expenditure is required and how this may impact on rates requirements beyond the 10 years of the LTP.
Infrastructure strategy at a glance

This strategy applies to the Council’s roading and footpaths, water, wastewater and stormwater services.

Challenges faced by the Council:
- ageing infrastructure
- relatively low levels of population growth and economic growth
- an aging population which will provide challenges and opportunities for infrastructure networks, particularly for roading and footpaths
- predicted effects of climate change.

Over the next 30 years the Council plans to:
- maintain existing levels of service while managing the above challenges
- manage infrastructure by focusing expenditure on renewal of ageing assets
- step up the level of renewals funding in the next five years and hold funding at the increased level to manage peaks in asset renewals noting that,
  - peaks occur when large numbers of assets need renewal at the around the same time
  - sustainable levels of renewals expenditure is forecast to be approximately $16-18 million per year for the 3 Waters and $17 million per year for roading and footpaths
  - higher levels of funding are required in the early years of the strategy to manage backlogs in renewals in the 3 Waters
- strengthen the capability and capacity of the teams developing and delivering renewals programme requirements.

Where will we be in 30 years’ time?
- renewals backlogs will be caught up
- Dunedin’s infrastructure will be fit for purpose and will be continuing to deliver levels of service that meet today’s community expectations.
**DUNEDIN’S MULTI BILLION DOLLAR INFRASTRUCTURE**

The DCC assets are valued annually so that appropriate depreciation can be allowed for in budgets to replace assets at the end of their life.

*GRC – Gross Replacement Cost*
# Key assumptions

These are the key assumptions that underpin the draft Infrastructure Strategy and projected budget requirements.

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Risk</th>
<th>Level of Uncertainty</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levels of service</td>
<td>It is assumed that existing levels of service will be maintained unless otherwise stated for the duration of the 2015/16 - 2024/25 LTP.</td>
<td>Low</td>
<td>Changes to the stated service levels may result in new operational and/or capital expenditure costs which may require an increase in rates requirement.</td>
</tr>
<tr>
<td>Capital Expenditure Budgets - Renewals</td>
<td>The level of renewals shown in the budget estimates and this Infrastructure Strategy will ensure the long term integrity of infrastructure assets within the roading and footpaths and 3 Waters networks.</td>
<td>Low - Medium</td>
<td>A long term deferral of renewals poses a risk of asset deterioration and compromise of network integrity which may attract additional capital expenditure costs in the future.</td>
</tr>
<tr>
<td>Capacity and Capability - 3 Waters Renewals</td>
<td>That the planned improvements to work and procurement practices will allow 3 Waters to deliver the renewals programme to budget. Efficiencies of 16% are required on renewals costs in order to deliver projected work programmes and budgets.</td>
<td>Low - Medium</td>
<td>Failure to find the required efficiencies will impact 3 Waters' ability to catch up on renewal work to the level proposed in this strategy. This would result in a further backlog of renewal works and may attract additional capital expenditure costs in the future.</td>
</tr>
<tr>
<td>Useful lives of significant assets</td>
<td>The useful lives of significant assets shown in accounting policies and activity management plans have been assessed appropriately.</td>
<td>Low</td>
<td>Asset management planning is a priority for the Council. An unexpected failure of an asset would be managed by re-prioritisation of capital expenditure programmes. Additional borrowing costs may be incurred if renewals programmes were not able to be re-prioritised, and could require rates funding.</td>
</tr>
<tr>
<td>Population growth projections</td>
<td>It is assumed that the population growth projections stated in the LTP significant forecasting assumptions and utilised in roading and 3 Waters asset management systems, provide an appropriate indication of population growth for asset management and planning purposes.</td>
<td>Low</td>
<td>Slower or faster population growth may impact on service levels, infrastructure expansion renewal programmes and costs, resulting in increased or decreased rates requirements.</td>
</tr>
<tr>
<td>Assumption</td>
<td>Risk</td>
<td>Level of Uncertainty</td>
<td>Impact</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Industry capacity for infrastructure asset construction</td>
<td>It is assumed that sufficient design, engineering, and construction capacity, including availability of construction materials, will exist in the construction industry to undertake the physical works programme within projected timeframes.</td>
<td></td>
<td>Issues with availability of contractors may cause delays and/or cost escalations in competitive tendering which will impact project budgets and timelines.</td>
</tr>
<tr>
<td>Oil price volatility</td>
<td>Oil price fluctuations may impact on operational and capital expenditure estimates with fluctuations in fuel pricing and movements in the Construction Cost Index (CCI). Impacts may be positive or negative but in the longer term are expected to be negative. No specific allowance has been made in budgets to accommodate oil price volatility. Oil price fluctuations may influence modal (method of transport) choices.</td>
<td>Medium</td>
<td>Increased CCI and fuel costs may impact the Council’s ability to complete programmed work within budget. Work programmes may need to be changed to fit funding. That changes in modal preferences result in additional costs and potential rate increases.</td>
</tr>
<tr>
<td>Climate Change</td>
<td>It is assumed that the climate change projections commissioned by the Council and utilised in the 2011 Climate Change Policy are correct.</td>
<td>Medium/Unknown</td>
<td>Climate change adaptation and/or mitigation works are required earlier or later than programmed and require changes to capital expenditure programmes.</td>
</tr>
</tbody>
</table>

The complete set of significant forecasting assumptions for the Council can be found in Section 2 of the supporting documents provided on the Council’s website: www.dunedin.govt.nz/ltp.
Maintaining service levels

The infrastructure strategy is based on the assumption that the current levels of service provided by the roading and footpaths and 3 Waters activities will be maintained across the next 30 years. Levels of service are usually defined as the outputs of a service and are supported by performance measures. For example ‘Residents receive safe clean water’ is a service level and can be measured by compliance with aspects of the New Zealand Health Drinking Water standards.

In order to maintain existing levels of service, infrastructure networks and assets will need to be maintained in a condition that will support these levels. This means that the Council will be focused on the renewal of assets rather than major new projects. Any new projects that may be requested by the community would result in additional costs over and above the projected funding included in this strategy and potentially result in an increase in rates. New projects would be viewed as an increase in service levels or a new service level.

There are some infrastructure issues that are affecting the level of service provided by the Council. The footpath renewal programme has been slowed while Chorus complete ultrafast broadband cabling work. In 3 Waters, ageing pipes and sewers are creating ‘nuisance’ level problems for residents. Deteriorating clay pipe sewers (which were largely built in the early 1900s) are now causing overflow and flooding issues. Ageing cast iron water mains (many of which were installed in the 1920s and 1930s) are causing discoloured water and affecting water flow and pressure. The levels of service that are affected by these issues are shown below. Further information about these can be found in the Activity Management Plans for the water, wastewater and transport activities and in the activity specific sections of this strategy.

![Level of service: The water tastes and looks pleasant](image)

Performance Measure: Number of complaints regarding colour, taste and odour per 1000 connections

The stepped target is considered achievable with the planned renewals programme in place and targeted planned maintenance programmes.
Level of service: Water is available for firefighting

Performance Measure: Percentage of Tested Hydrants that meet NZ Fire Service Code of Practice

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
<th>Actual results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/10</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2010/11</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2011/12</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2012/13</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2013/14</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2015/16</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Condition issues in older cast iron water mains causes some flow and pressure restrictions in certain areas. These areas are being targeted for renewal and compliance with NZ Fire Service Code of Practice is expected to rise over time as these projects are delivered.

Level of service: The wastewater service is reliable

Performance Measure: Number of Breaks per 100 km Foul Sewer Main

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
<th>Actual results</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/10</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>2010/11</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2011/12</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>2012/13</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>2013/14</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2015/16</td>
<td>0.5</td>
<td>0</td>
</tr>
</tbody>
</table>

The target has been met in recent years due to recent improvements in the approach to renewals planning. The target has been stepped accordingly from 2 breaks per 100 km to 1.5 breaks per 100 km from 2015/16.
Level of service: Sewage is managed without adversely affecting the quality of the receiving environment

Performance Measure: Number of recorded breaches of the Resource Management conditions (Wastewater)

The increase in recorded breaches relates to more intensive monitoring of spill sites as well as deterioration of the pipes. The number of monitoring sites has been increased annually from 2012/13. The proposed renewals programme will improve performance on this measure over time; however it is subject to annual variation due to the number and intensity of weather events.

Level of Service: The transport network facilitates active travel

Two performance levels measures apply to this service level.

Performance Measure: The total length in kilometres of footpath resurfaced annually
Performance Measure: Resident’s satisfaction with the condition of footpaths throughout the city

The slowing down of footpath renewals since 2012/13 has not adversely affected satisfaction as yet. Renewals in particular streets have been rescheduled so that they are not undertaken until after the work on ultrafast broadband is carried out. Chorus is reinstating the footpath that is disturbed during their work.

Basis of budget estimates from 2025/26 – 2044/45

The latter 20 years of the strategy contains estimates of expenditure based on five year averages:

- operational expenditure – it has been assumed that expenditure will be similar to the 2024/25 year through the following 20 years
- capital expenditure for renewals - estimates are based on data generated by condition assessment programmes, performance data and remaining asset lives
- new capital expenditure is based on projects identified in strategic plans.

Budgets for the first 10 years have been inflated using information provided by BERL in October 2015. An inflator of 2.5% per annum based on an analysis of prospective information from BERL (20 years average percentages for key inflation adjustors, a consideration of CPI projections and other economic indicators) has been applied to the 2025/26 – 2044/45 years.

Unless specified, budget information is shown with inflation applied.

When individual projects are discussed within the strategy, these are shown as uninflated (in today’s dollars). This allows the reader to assess the costs of the individual projects and compare these without the distorting effect of inflation, particularly in the later years of the strategy. Where individual projects are described in the activity specific sections of this document uninflated costs (in today’s dollars) are used for the same reason.
Dunedin faces some unique challenges and opportunities now and in the future relating to its population and demography, economy, social wellbeing and connectedness, housing, arts and culture and environment. These trends will impact on the Council’s strategic priorities, its land use planning, amenities, services and ability to fund Council infrastructure. The city profile has described these in more detail. A number of these challenges are common to both the roading and footpaths and the 3 Waters groups of activity and some are unique to a particular group.

These challenges will affect how we manage our 3 Waters networks and how people and businesses will choose to travel and move goods. Some of the challenges are national or global, and many cities around the country and the rest of the world are faced with the same, or similar, challenges. Others are more specific to Dunedin due to factors including geography, socio-economic conditions and the nature of the existing networks.

The following information summarises the significant issues facing the Council’s roading and footpaths and 3 Waters activities. The proposed response to each of these issues is explained in the activity specific sections of this document and includes the principal response(s) along with the implications of no response.

Ageing infrastructure

The nature of Dunedin’s growth has meant that large quantities of network infrastructure were built over short time periods or ‘investment bubbles’. Assets that were built at the same time generally require renewal at the same time, causing peaks in renewals cost.

Climate change

Climate change has been flagged as a critical consideration in the Council’s long term planning. The Council uses guidance from the New Zealand government, based upon the best available climate science, to underpin planning. Currently we are using guidance from the Ministry for the Environment that is based on the Intergovernmental Panel on Climate Change’s (IPCC) Fourth Assessment Report 2007 predictions, and our own Climate Change Projections Policy (updated in 2011 following a report commissioned by the Council from Professor Blair Fitzharris of the University of Otago).

The IPCC published a fifth Assessment Report in November 2014. This provides a clear and up to date view of the current state of scientific knowledge relevant to climate change for policymakers¹.

The Council is now waiting for the Government to work through updating its guidance based on this new information, and then we will be able to update our Projections Policy and current climate change assumptions if needed, and continue to plan actively for future possible events and scenarios.

The Council’s current Climate Change Projections Policy sets out the following climate change projections:

<table>
<thead>
<tr>
<th>Climate variable</th>
<th>Projected change in Dunedin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2040</td>
</tr>
<tr>
<td>Mean temperature change</td>
<td>+1.1°C</td>
</tr>
<tr>
<td>Sea level rise</td>
<td>+0.3m</td>
</tr>
<tr>
<td>Annual rainfall change [min, max]</td>
<td>-5 to -5 %</td>
</tr>
<tr>
<td>Daily temperature extremes</td>
<td>Fewer frosts, increasing very hot days</td>
</tr>
<tr>
<td>Extreme rainfall</td>
<td>+9%</td>
</tr>
<tr>
<td>Drought</td>
<td>Drought incidence will be largely the same over large areas of the city, slight increase for urban area of Dunedin city and expected to increase for coastal areas north of Waitati</td>
</tr>
<tr>
<td>Waves and storm surge</td>
<td>Storm surge level likely to rise at least in line with sea-level and to be greater when combined with El Niño Southern Oscillation events and increased storm intensity</td>
</tr>
<tr>
<td>Average wind</td>
<td>Increased annual mean westerly component</td>
</tr>
<tr>
<td>Strong wind</td>
<td>Increased possibility of severe winds</td>
</tr>
<tr>
<td>Snow</td>
<td>Snow level rising with decreased annual mean snowfall</td>
</tr>
</tbody>
</table>

Looking forward, Dunedin is expected to experience greater seasonality with the climate becoming drier for extended periods, with increased mean temperatures and daily temperature extremes. Increased peak demand due to drier periods and decreased average river ‘low-flows’ could create a drought situation. However, rainfall events are likely to become heavier but less frequent, which results in an increased annual catchment yield. Sea-level is predicted to rise with increased occurrence of associated storm surges. Dunedin may be at particular risk to the effects of sea-level rise as it has significant areas of low-lying land, some of which is reclaimed.

¹ The Intergovernmental Panel on Climate Change (2014) http://www.ipcc.ch/
Population trends

Dunedin’s population is ageing, with a high and growing proportion of people aged over 65 years, while the working age population (15–64 year olds) is predicted to remain static initially and then decline. The 65-plus group is projected to increase over the next 20 years, increasing from 14% to approximately 22%. Dunedin’s ageing population will affect demand for modes of transport and drive changes in travel patterns as older people tend to make greater use of shared transport, public transport and mobility scooters. There will also be increased demand for healthcare services and community facilities. Better pedestrian environments that cater for those with mobility impairments, using wheelchairs and mobility scooters will be important to ensure accessibility for an ageing population. An emerging trend where fewer young people are learning to drive may also impact demand for alternate transport modes.

Population projections and census data show that Dunedin has lower growth relative to the rest of the country. Dunedin’s population is projected to grow by only 4.4% over the next 20 years.

Dunedin also has a high proportion of 15–24 year olds (21.3% in Dunedin compared to 13.9% nationally). This is because Dunedin is home to about 28,000 tertiary students, of whom about 80% (22,400) are from outside Dunedin. This presents an on-going transport challenge in regard to providing for this group’s transport needs and choices, and because young people are over-represented in Dunedin’s road crash statistics.

Another trend related to ageing population is average household size which is declining. Dunedin’s average household size is 2.5 people compared with 2.7 people nationally and is projected to decline to 2.2 people by 2060. This trend is influenced by lifestyle choices as well as population changes and may result in more demand for smaller housing units and urban intensification in future years. This may in turn affect infrastructure requirements.

Resilience

The Council will work with other authorities and lifeline utilities throughout the Otago Region in order to implement the activities outlined in the Otago Lifelines Project Report. This report addresses the criticality of network components, known risks from environmental effects, interdependencies between lifeline utilities in responding to a major event and proposed initiatives to improve network resilience. Identified hazards include earthquake, tsunami, flooding, landslides, fire, weather events (snow, wind and rainfall) and events arising from human activity such as terrorism, a global financial crisis or a more localised economic downturn.

Economic predictions

While Dunedin provides its residents with a great lifestyle, the city is at risk of losing business and people to other centres. Economic growth in Dunedin has been slow and at times declining over the past 10 years relative to the rest of the country. Creating an attractive environment – where businesses thrive and residents feel proud – will establish Dunedin as one of the world’s great small cities. Dunedin’s economic development strategy aims to increase employment growth by around 2% per annum and to see an increase in GPD per capita by around 2.5% per annum over the next 10 years.

Dunedin has important economic foundations on which to build a prosperous city of opportunity. These include:

- the University of Otago and Otago Polytechnic, and a reputation for high quality education, innovation and research
- access to significant natural resources, such as mineral wealth in the hinterland and extensive agriculture
- developing strengths in high value niches of the economy related to health technologies and biotechnology, food processing, ICT, creativity, niche manufacturing and engineering
- being the gateway to the lower South Island – a major transport and export hub
- access to New Zealand’s fastest fibre optic broadband services from February 2015.

Dunedin has a comparative advantage in the education and health industry sectors, with employment in medium and high-tech manufacturing and knowledge intensive services also relatively higher than the rest of the country. Alongside this is Dunedin’s strong quality of life rating, with its residents’ rating of their overall quality of life one of the highest in the country.

The challenge for the Council’s infrastructure networks is to be able to manage expected levels of service and the long term financial and environmental sustainability of infrastructure networks in a strategic manner. This means being able to readily adapt to changes in growth supported by reliable knowledge of infrastructure network asset condition and capacity.
Capacity and capability
The Council delivers its services through a combination of in-house and external professional services and physical works contractors. The Council, as one of the main clients of civil construction services in the region, needs to ensure that there is sufficient capability and capacity within the marketplace to meet the future level of works as outlined in this strategy. This will require the Council to act as a “smart buyer” of such services, and to tender out the works in such a manner that the industry remains able to deliver the required works in a competitive manner.

Funding and affordability
The requirements for the renewal of infrastructure assets are scheduled to increase across the next 30 years.

Over the past 20 years the Council engaged in a period of significant new capital expenditure, building new assets such as the Forsyth Barr Stadium, redeveloping the Toitū Otago Settlers Museum and Town Hall/Dunedin Centre complex, and upgrading existing infrastructure assets such as the Tahuna Wastewater Treatment Plant and outfall, and water supply and stormwater networks. This capital investment has increased levels of service and enhanced the liveability of the city. The expenditure was largely funded by borrowing and has increased the Council’s debt levels and resulted in high increases in overall rates during the periods of heaviest expenditure. With these major projects completed, the Council has shifted its focus and is now operating in an environment of financial constraint in order to reduce debt and limit rates increases to the levels specified in the Financial Strategy. This approach is supported by the people of Dunedin who have indicated in successive Residents’ Opinion Surveys that they want the Council to keep new spending, debt and rate increases in check.

The 2015/16 LTP provides funding for the first 10 years of the Infrastructure Strategy and the Council’s revised financial strategy acknowledges the need to increase the level of funding for infrastructure renewals going forward. It should be noted that the backlog of renewals in 3 Waters ($60m in today’s dollars) in the LTP period which is not funded, represents assets at their theoretical end of life. This does not mean that $60m of assets are at risk of failing at the same time. The identified backlog represents the best knowledge about when these assets should be renewed if there were no funding constraints and sufficient industry market capacity was available to carry out the work. The backlog combined with other scheduled renewals cannot be managed within the first five years of the LTP. There is smaller backlog of renewals for footpaths, as a result of slowing these while work on the Ultra-Fast Broadband (UFB) network is completed.

The approach to managing renewals in both 3 Waters and roading and footpaths is to steadily increase the level of renewals funding across the next six years and to hold funding at this higher level to enable smoothing of renewals across the later part of the LTP period and the following 20 years.

Figure 1: Schematic of Metropolitan Population Change to 2031
How much needs to be invested over the next 30 years?

In addressing challenges and retaining levels of service, the Council is forecast to spend $838 million and $714 million respectively on 3 Waters and roading and footpath infrastructure renewals and new capital in the 30 years between 2015/16 and 2045/46. Over the same period, just under $1.8 billion is the forecast spend on operational costs, though operational efficiencies are a continual area for improvement and savings are actively being pursued in this area.

The 3 Waters asset base is estimated to be worth a gross replacement cost of $1.6 billion. The roading and footpath asset base represents a further $1.3 billion. Broadly assuming an 80 to 100 year life cycle for network assets, it is expected that sustainable renewals expenditure is $16m to $18m per year for 3 Waters and $17 million in roading and footpaths. The projected total is around $480 million over the 30 year Infrastructure Strategy. It is important to note, however, that due to historic under-funding of renewals it is necessary to fund renewals above the sustainable level in the short to medium term to address the backlog. It is also true that some assets have a considerably shorter life cycle such as those with mechanical and electrical components.

The graphs on the following pages show the total projected infrastructure expenditure (Figure 2), the total capital expenditure projections (Figure 3) and the total operational expenditure (Figure 4) across the 30 year period of the strategy for 3 Waters and roading and footpaths.

Figure 2 shows total projected expenditure for the 3 Waters and roading and footpaths in a stacked area graph split into operational expenditure, capital expenditure on renewals, and capital expenditure on new projects.

The 3 Waters have set themselves a significant challenge by adopting a funding strategy that does not provide for all of the renewals that are required over the 30 year horizon. This will be absorbed by implementing the following management strategies.

- Addressing 3 Waters’ networks as one – where economically appropriate the Council will renew all 3 Waters’ networks in a given locality at once as a part of the same contract. This approach will yield significant efficiencies for the Council over the next 30 years. A recent example of this approach resulted in a contract price roughly 40% of the pre-tender estimate.
- Use of alternative rehabilitation techniques – where it constitutes the lowest life cycle cost the Council will use alternative rehabilitation technologies such as pipe relining to address renewals requirements.
- Optimisation of existing networks – the Council will ensure all pipes are optimised to achieve the required levels of service by utilising its in-house hydraulic modelling capability.
- Optimisation of renewals timing – the Council will develop tools (both software and process) to optimise the timing of renewals to ensure the most appropriate level of funding is made available.

To achieve this target 3 Waters will need to find collective efficiencies of approximately 16% on total renewals costs over the next 30 years, while absorbing other cost pressures such as peak oil and growth. This is an ambitious target.

Table 1: Expenditure 2015/16-2044/45 (inflated)

<table>
<thead>
<tr>
<th>Infrastructure Activity</th>
<th>New Capital Expenditure</th>
<th>Renewals Capital Expenditure</th>
<th>Operational Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Supply</td>
<td>$16.65M</td>
<td>$431.19M</td>
<td>$513.62M</td>
</tr>
<tr>
<td>Wastewater</td>
<td>$9.00M</td>
<td>$267.79M</td>
<td>$567.14M</td>
</tr>
<tr>
<td>Stormwater</td>
<td>$11.24M</td>
<td>$102.53M</td>
<td>$108.67M</td>
</tr>
<tr>
<td><strong>3 Waters combined activities</strong></td>
<td><strong>$36.89M</strong></td>
<td><strong>$801.52M</strong></td>
<td><strong>$1.19B</strong></td>
</tr>
<tr>
<td>Roading and footpaths</td>
<td>$175.15M</td>
<td>$538.65M</td>
<td>$602.66M</td>
</tr>
<tr>
<td><strong>Sub totals</strong></td>
<td><strong>$212.04M</strong></td>
<td><strong>$1.34B</strong></td>
<td><strong>$1.79B</strong></td>
</tr>
</tbody>
</table>
Figure 3 shows capital expenditure by each activity group across the 30 years of the strategy. It should be noted that the scale on the vertical axis of this graph differs from that of Figure 2 and shows a peak in spending on water infrastructure relating to the renewal of the Deep Creek and Deep Stream water supply pipelines. This is discussed further in the Capital Expenditure Highlights for 3 Waters. Figure 4 shows forecast for operating costs in each activity. Operating costs begin high in water supply and wastewater sectors, but slowly drop until the 2025/26 year where a constant sustainable level of costs is maintained. This is mostly due to savings in interest costs from the recent new capital expenditure and upgrade programme. Stormwater has a low operational cost and only equates for 9% of operational budget, with its spend remaining constant at around $3 million per year over the 30 year infrastructure period as it is the only activity with no treatment costs.
Figure 4: Operational Expenditure Projections by Activity 2015–2045 (inflated)

Figure 5: Relative proportion of capital expenditure for each of the activity

Figure 6: Relative proportion of operational expenditure for each of the activity
Activity Specific Assumptions
Roading and Footpaths
The roading and footpaths activity group is responsible for roading assets and their use. To achieve this it undertakes short and longer term planning to meet the city’s transportation needs, develops strategies to manage the increasing volumes of traffic, and actively promotes improved road safety. It manages the maintenance and enhancement of the city’s physical transportation network, including roads, footpaths, cycleways and associated structures and amenities. It also regulates the activities of other parties, both on and next to the road corridor, which impact on the condition and availability of the network.

Dunedin’s road transport network comprises state highways managed by NZTA and local roads managed by the Council.

The network experiences little congestion and most parts of the city have ample on and off street parking. Because much of Dunedin was developed prior to the era of the car, the city’s main urban area is compact with a distribution of land-uses that generally supports good accessibility.

Urban Dunedin’s relative compactness means that many trips can be done on foot, by bike or public transport. Dunedin’s Integrated Transport Strategy notes that accommodation of alternative modes of transport should be a primary consideration for new development and urban densification.

**Integrated Transport Strategy 2013**

In 2013 the Council publicly consulted on and adopted a 30 year Dunedin Integrated Transport Strategy (ITS) and the transportation component of this Infrastructure Strategy aligns with and supports it. The ITS enables the Council and other agencies who invest substantial funding in Dunedin’s transport system to review whether past investment priorities are still relevant and whether they are achieving the type of transport system that will best support the city, its people and the wider region. Because Dunedin’s challenges and priorities will continue to evolve over the next 30 years, the Council will review the ITS every five years.

The ITS identifies some of Dunedin’s key transport challenges, including road safety, fuel price volatility, high dependence on motor vehicles, the importance of improving provision for travel modes other than cars, and the future complexities of prioritising, protecting and maintaining critical infrastructure in light of a changing climate.

To address these challenges, the ITS has identified a vision and five ‘Areas of Focus’ that the Council will prioritise. The vision is:

*‘Dunedin is one of the world’s great small cities, with a safe low-carbon transport system that supports a compact city with resilient centres, inclusive and healthy communities and national and international connectivity’*

The identified areas of focus are:

- **Safety**: Improving Dunedin’s road safety record
- **Travel Choices**: Providing safe, viable travel options in addition to the car
- **Centres**: Strengthening connections to, within and between Dunedin’s centres
- **Freight**: Supporting safe and efficient freight movement
- **Resilience**: Ensuring the on-going resilience of Dunedin’s transport system and key infrastructure.

The ITS is based on five key assumptions which are closely related to the significant challenges for transportation infrastructure in the city:

1. The cost of fuel will continue to be volatile
2. Road safety needs to improve for all users of Dunedin’s transport system
3. There is a need to provide for the transport requirements of Dunedin residents who do not have access to a car
4. The Integrated Transport Strategy should give effect to the Dunedin City Spatial Plan
5. Providing active transport options will contribute to a healthy and sustainable city.

A copy of this strategy can be found at www.dunedin.govt.nz/transport
Roading and footpath’s specific challenges
This section provides further comment and describes the principal responses to the challenges identified in the ‘Context and Major Issues for Dunedin’s infrastructure’ section, as applicable to the roading and footpaths activity group.

Ageing infrastructure
Dunedin has around 1800km of local roads plus other transport-related assets worth a total of $1.3 billion (excluding land). Many of the assets were initially developed early in the 20th century as the population transitioned to the use of motor vehicles, and ongoing expansion and improvement continued from there. From the 1930s to 1950s many of the originally gravel roads were strengthened and sealed. Then from the late 1950s through to the early 1970s significant expansion occurred with the Housing Corporation developments. While assets with shorter effective lives are being renewed at a steady rate, for those with longer lives, future renewals will have peaks that reflect the times of increased construction activity in the city. Many of the older local road pavements are not fit to carry the larger and heavier vehicles that are being introduced and are likely to require earlier rehabilitation intervention. The assets require ongoing maintenance to ensure that their value is maintained and they continue to meet the needs of the community and wider region. Effective condition-based maintenance means that assets can achieve this for the maximum life cycle.

Activities that are expected to cause significant future fluctuations from a steady renewal budget line are:

- Bridges – 60% of bridges were constructed between 1950 and 1990 so renewals will be at a low level until beyond 2050
- Kerbs – 55% of kerbs were constructed between 1950 and 1980 (Housing Corporation developments) so renewals are at a low level now increasing to a peak in 2030s
- Pavements – with network expansion peaking in the 1960s an increase in pavement rehabilitation is expected from 2020
- Seawalls – there was substantial renewal of the harbour stone seawalls in the 1930s which means most are at the end of serviceable life and renewals for the next decade will continue to be at a high level.

Principal responses
- The Council will invest adequately in renewals to maintain the performance of our infrastructure.
- The Council will invest carefully by understanding which assets are most critical to maintaining the delivery of service and using information to drive pro-active condition assessment of these critical assets.
- The Council will plan renewals effectively to avoid sharp increases in costs and gain cost efficiency in procurement and project delivery.
- The Council will take a ‘one network’ approach to managing the Dunedin transport system. This means that DCC will work collaboratively with the other organisations responsible for delivering the transport system to ensure seamless, logical and integrated delivery of the transport network and to ensure that the separation of control over different parts of the network does not affect the user’s experience and the coherence of the network.
- The Council will develop tools to communicate effectively the implications of levels of funding.

Do nothing
- Failure to find the right balance between investing in renewals and deferral could either leave the Council struggling with over-investment where the community has infrastructure surplus to requirement, or under investing and delivering a level of service that does not meet public expectation which would breach our key strategic priority (we will ensure that, as a minimum, key service levels are maintained into the future). Both of these scenarios will result in a rising service cost.

Climate change
Rising sea and groundwater levels, and changing weather patterns as a result of climate change, are expected to have an impact on Dunedin’s transportation network in the future. Low lying densely populated urban areas (especially South Dunedin), coastal areas and major transport infrastructure (including harbour roads, the railway, and Dunedin International Airport) are likely to be affected by this.

Climate change is likely to lead to higher rainfall and more frequent, more severe, storm events. This has implications for Dunedin’s transport infrastructure and asset management. Such changes may lead to more frequent and larger slips, more flooding and wetter ground conditions, with increases in temporary road closures on key transport routes and increased risk of asset failures. The life expectancy of assets may also be reduced under these conditions. All of this is likely to result in rising maintenance, repair and renewal costs. The Council and partner agencies, will need to plan ahead to appropriately meet these challenges.
Principal responses

- Increase the flexibility and resilience of our affected infrastructure to reduce the risk of prolonged service interruption.
- Promote the integration of land use and transport planning to reduce the demand for vehicle travel.
- Plan, prioritise and support local community responses, to ensure Dunedin’s critical transport infrastructure is resilient in the face of future threats and constraints.
- Actively planning for potential events that result from climate change scenarios, for example designs for roading works adjacent to the foreshore will include provisions for sea level rise.

Do nothing

- This would place pressure on infrastructure loss of accessibility to the road network due to flooding and increased road deterioration, or inundation of low-lying infrastructure due to storm surge, seabed rise, or a combination of the two.
- Require a possible change in location of residential population.

The harbour-side and south city area covers the most densely populated part of Dunedin, with a population of about 10,000 residents. It contains a lot of infrastructure, such as wastewater and stormwater assets and key roads. The area has an estimated asset value of $4.3 billion. This low-lying area has been assessed as being the part of Dunedin most vulnerable to sea-level rise in the medium to long term. A rise as predicted (0.59 metres by mid-2090) would leave substantial areas vulnerable to coastal inundation and a number of key assets susceptible to saltwater intrusion. The main threat, at least in the medium term, is from rising groundwater in the south city area, as groundwater levels are forced up by rising sea levels. Direct inundation from the sea becomes more of an issue around the Otago Harbour in the long term. This scenario could also displace coastal residents and require them to move to other parts of the city with insufficient infrastructure to support the localised increase in population.

Population trends

Predictive modelling is carried out to estimate future traffic growth using various parameters that include land use, population census data and historic traffic counts. The table below illustrates the expected change in vehicle trips in relation to household and population changes. The chart does not reflect the effect that rising fuel prices might have, however indications from some experimental modelling are that traffic growth will reduce as fuel prices increase.

### Table 2 – Projected Population Growth and Impact on Vehicle Trip Numbers

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2008</th>
<th>2021 (forecast)</th>
<th>2041 (forecast)</th>
<th>2008 – 21 growth (pa)</th>
<th>2008 – 41 growth (pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households</td>
<td>44,789</td>
<td>51,035</td>
<td>57,155</td>
<td>1.1%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Population</td>
<td>120,298</td>
<td>126,726</td>
<td>131,303</td>
<td>0.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>All day trips</td>
<td>396,527</td>
<td>445,274</td>
<td>487,452</td>
<td>0.9%</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Principal responses

- The Council ensures collaboration with infrastructure providers occurs during processes such as the Second Generation District Plan. For example water and waste services considers the impact of each proposed density change on the 3 Waters networks using in-house hydraulic modelling capability. The district plan in turn allows for additional growth where infrastructure capacity is available.
- The Council will take a sustainable development approach to delivering Dunedin’s transport system. This includes taking into account the social, economic, and cultural interests of Dunedin’s people and communities, maintaining and enhancing the quality of the environment, and taking into account the needs of future generations.
- Where infrastructure capacity is compromised one of the following approaches is taken:
  - The district plan constrains growth
  - The Council makes capacity available by utilising the development contributions policy.

Do nothing:

- Increased congestion can put pressure on local roads, or alternately it may no longer be economical to maintain roads to the current levels of service (for example a sealed road could revert back to unsealed).

Multi modal access

Car ownership levels in New Zealand are particularly high compared to most other developed countries. Consistent with this, Dunedin has relatively low rates of public transport or active mode (walking and cycling) use. This is even more pronounced in the more rural communities.
Much of Dunedin’s transport network has been developed in the context of increasing vehicle use and private travel, and in anticipation of a degree of city growth which, largely, has not occurred. This has insulated Dunedin from many of the transport problems that bigger cities face, especially in regard to urban sprawl, congestion, pollution and car parking. This has benefitted private vehicle use and helped make Dunedin very accessible by car. Well maintained roads, generally ample parking, low traffic volumes and free-flowing urban street environments with no significant congestion all contribute to Dunedin’s relatively short vehicle travel times.

Research identifies that where vehicles speeds are higher, and where little provision is made for active modes, road safety is generally compromised. In keeping with this, partly due to wide, high-speed urban street environments (such as the one-way system, Andersons Bay Road, Princes Street, and Hillside Road) and poor provision for other modes (such as buses, walking and cycling), road safety has suffered in Dunedin.

Despite Dunedin’s high level of car ownership, the proportion of Dunedin residents that do not have access to a car is higher than the national average and, in a city that has prioritised the demand for car travel, the travel needs of these residents have not traditionally been well provided for.

**Principal responses**
- The Council will reprioritise investment and reallocate space on the transport network to achieve a significant improvement in the provision of active travel modes and public transport in Dunedin, and explore initiatives to support the uptake of travel choices.

**Do nothing**
- Conflicts between pedestrians, cyclists and motor vehicles will continue.

**Road safety**

The New Zealand Transport Agency’s Communities at Risk Register (CARR) identifies road safety as a major challenge for Dunedin.
- CARR ranked Dunedin as having seventh highest risk out of New Zealand’s 67 territorial and unitary authorities in 2013 - a slight improvement from the third highest ranking in 2011 but it remains the highest of all the major urban centres.
- Dunedin has the highest risk for intersections and the second highest risk for younger drivers.
- The city has the third highest risk for pedestrians, motorcyclists and older road users, and the fifth highest for cyclists.

**Principal responses**
- Signalisation of intersections and improvements to phasing on existing signalised intersections on both State Highway and local roads has increased in recent years. Maintenance of traffic signals is to a high level recognising the safety benefit. Improvements will continue at high risk intersections.
- Street lights provide safety and security for motorists and pedestrians. The Council intends to replace all of its conventional street lighting fittings with LED luminaires over the next four years in order to ensure the provision of safe and efficient lighting.

**Do nothing**
- Dunedin’s accident statistic trends may not improve or may become worse.

**Oil price volatility**

In New Zealand, the transport sector is responsible for 86% of total oil consumption, with road transport using 87% of that total. In addition to the oil-based fuel used in motor vehicles, our roads themselves are also oil-dependent. Bitumen, the binding agent used in sealed road surfaces, is an oil-based product which also increases in expense as oil prices rise. This means, in the absence of more cost-effective alternatives, the cost of maintenance and renewal of existing sealed roads will increase, as will the cost of building new roads.

Recycling of waste product from road infrastructure maintenance may also provide an opportunity for increased resilience in the future. Crushed concrete from demolition sites and asphalt millings removed during sealed road resurfacing are examples of products that may be recycled back into the transport network.

**Principal responses**
- The Council will stay informed of developments in these areas and will encourage contractors to adopt sustainable practices over time. One method of supporting uptake in this area may be through the Council’s Waste Levy Fund, whereby roading contractors seeking to invest in waste minimisation methods may be eligible to apply for grants from the fund.

**Do nothing**
- The Council may have to absorb rising costs and may have to decrease levels of service provision for roading and footpath infrastructure.
Resilience

Principal responses
- The Council will ensure infrastructure is built to a resilient standard.
- The Council will address most vulnerable materials at the time of renewal except where an asset has a high level of criticality. In which case, the asset will be assessed to determine its level of resilience and where necessary renewal may be prioritised.

Do nothing
- Potential loss of access to road network due to damaged infrastructure in a major event.

Economic predictions

Principal responses
- Optimise the current planning to cater for the economy. Much of the planning around roading and footpaths and 3 Waters infrastructure planning aims to be nimble and responsive to change, allowing any change in the economy can be accounted for at the planning stage.
- The Council will build on the existing foundations and use strengths and capabilities to ensure sustainable economic and community development.
- The Council will provide diverse economic opportunities for businesses and residents, while also ensuring environmental sustainability.

Do nothing
- Failure to address and prepare for the issue of economic fluctuations could result in reduced infrastructure capacity and reduced ability to cater to consumers’ needs and retain levels of service.

Capacity and capability

Principal responses
- The Council will provide works and services in accordance with its relevant procurement policy and strategy.
- Procurement of subsidised roading works will comply with Transport Agency procurement procedures and policies.
- Multi-service projects (including place-based planning) where tenders packages include all 3 Waters services, transportation and other infrastructure works to minimise construction overhead costs and long term disruption to the area. This includes spreading contract delivery over several financial years.
- ‘Piggy-backing’ existing infrastructure projects. Examples such as the University Campus works and the SH1 Safety Improvements package enable us to enter existing construction contracts, receiving good value construction.
- Active engagement with the market. Meetings are held with each of the large local contractors, informing them of the scope and timing of upcoming capital projects to enable them to better plan and prepare their workforces. Tenders are also released to the market to a programme based on which contract resources are already committed.
- Multi-year renewals package contracts are used where it’s appropriate. Discussions have already begun with several of the City’s larger contractors around appetite for longer term contracts and how these might be mutually beneficial.
- Using a range of tender evaluation methods to give consideration of contractor’s ability to deliver work to deadlines. Where a renewal can be completed with a number of different methods delivering assets of different expected lives (based on material or construction method), the new weighted evaluation process will help to optimise value, comparing price per year of service with delivery risks.
- Where possible, bringing forward projects to compensate for projects that are delayed, this includes over-allocating the capital works programme for each year (but not committing beyond approved budget) in anticipation that some projects won’t go to plan.

Do nothing:
- There is a risk that insufficient capability or capacity within the industry may lead to an inability to deliver services or the incurring of costs in excess of market prices.
Funding and affordability

Principal responses

► Stepping up renewals expenditure across the 30 years of the strategy to allow infrastructure renewal needs to be managed proactively and in a timely manner. It is more cost effective to manage renewals in a prioritised programme than to defer work on renewals in order to make savings and risk a much more costly asset failure in the future.
► The proposed 10 year plan provides adequate funding for renewals of infrastructure across the immediate 10 years with few new capital projects programmed.
► Smoothing renewals expenditure in outward years to ensure that there is adequate funding outside of the immediate LTP period.
► Renewals expenditure is funded from operating cashflow (rates) not debt.
► Ensuring that the Council’s financial strategy recognises the need to increase renewals funding and is able to manage this within the overall strategy limits.
► Ensuring the Council’s activity groups work together on planning of renewals work to provide delivery of programmed work in the most efficient and cost effective manner. For example city development, 3 Waters and roading and footpaths working together to deliver sequenced work on roading and footpath renewals, 3 Waters network pipe replacements and city amenity work to avoid unnecessary remedial work on newly replaced infrastructure.

Do nothing:

► There is a risk that funding of renewals will be underfunded or deferred due to other priorities and assets will deteriorate to failure impacting service levels and requiring significant unscheduled expenditure.

Multi-agency responsibilities for transport

Several organisations are responsible for both the provision and funding of different components of Dunedin’s transport network.
► The City Council is responsible for most of the Dunedin transport system, including local roads and the infrastructure associated with them (such as footpaths, cycleways, bridges, etc), provision of parking and bus stops, road safety planning and engineering, traffic signals, and land use planning.
► The Otago Regional Council is responsible for the provision of public transport services, the Regional Land Transport Programme, major drainage controls and Port Otago.
► The New Zealand Transport Agency manages the state highway network and associated infrastructure such as state highway intersections and cycleways.
► The Transport Agency co-funds the local roads and public transport.
► The City Council manages footpaths, parking, lighting and traffic signals on state highways on behalf of the Transport Agency.
► A range of community organisations, volunteer interest groups, institutions and private landowners also influence Dunedin’s transport network.

These multiple partners add complexity to transportation infrastructure decision-making and funding processes.

Principal responses

The Council will take a partnership approach to delivering Dunedin’s transport system.
► Collaborate and liaise with key transport delivering organisations such as the Transport Agency, Regional Council, New Zealand Police and KiwiRail.
► Work with the Road Safety Partners and other stakeholders as required.
► Partner and collaborate with tertiary institutions, emergency services, the health sector, business organisations and transport-focussed advocacy and stakeholder groups where possible.
► Engage and assist neighbourhood and community groups where possible.

Do nothing

► The transport network may no longer meet the needs of those who rely upon it.
► Co-investment funding may be compromised.

One Network Road Classification (ONRC) system

The ONRC is a joint initiative of Local Government New Zealand and the Transport Agency’s Roading Efficiency Group to provide a nationally consistent framework that helps with asset management planning, investment choices, maintenance and operational decisions. The initiative aims to standardise the road user experience nationally, to support consistent asset management across the country, and facilitate collaboration and prioritisation between organisations responsible for planning and service delivery for the national road network.
The classification will promote a customer focus and investment decisions will be based on whether the roads are fit for purpose and meeting the needs of the users. That will require the Council to start taking greater risks on the timing of maintenance and renewals, i.e. by not carrying out works even if the asset is not in an ideal condition but is still useable. However, the Council will not allow that risk to extend to the failure of the road, resulting in excessive or unnecessary rehabilitation costs. The Council supports the implementation of the ONRC system and will start to use the ONRC technical and customer levels of service to guide the development of its maintenance and renewals plans.

**Principal responses**

- The Council will take a ‘one network’ approach to managing the Dunedin transport system.

**Do nothing**

- Road users may be exposed to inconsistent levels of service
- Co-investment may be compromised

**Central government investment priorities and co-investment funding model**

The bulk of government transport investment is targeted toward highways, including the Roads of National Significance. This expenditure is primarily focused on the higher population areas in the North Island. The current Government Policy Statement funding allocation for local road maintenance has not increased in line with inflation. This means that, in real terms, local authorities like Dunedin have diminishing funding for maintaining local roads, requiring increased prioritisation of network maintenance, a rise in rates or a reduction in service levels.

The Council has started implementing the new Transport Agency business case approach for investment initiatives. For example, the Council has worked with the Agency on developing the State Highway Cycleway improvement project through the centre of Dunedin and is currently working through the business case stages for the Council Central Activity Area Safety and Accessibility Upgrade project. From 2015/16 all new investment proposals will undergo this business case approach to ensure that the projects are consistent with the Agency’s expectations under the National Land Transport Programme and represent value for money.

The New Zealand Transport Agency Funding Assistance Rate (FAR) is expected to decrease from 59% in 2015 to 51% in 2022.

**Principal responses**

- The Council will use the Transport Agency business case intervention hierarchy to prevent congestion, safety problems or accessibility problems from occurring in the first place, and thereby minimising the need for costly infrastructure investment later.
- If a major change or significant investment is being considered the Council will use temporary trials where practicable and appropriate, to ensure the effects of the proposal are properly understood.
- Where new transport infrastructure is being designed, or existing infrastructure redesigned, the needs of all road users and modes will be considered.
- The changes to the Transport Agency FAR may necessitate the managed downgrading of some lower priority infrastructure to allow for more critical upkeep of high priority infrastructure.
**Do nothing**
- The Council may not be able to implement the required roading works to achieve target levels of service or to cater for growth
- Risk that investment is not focussed towards the highest needs

**Network Layout**

The topography of the city contributes to urban severance. The location of Port Chalmers, the harbour and the hills surrounding the city have historically dictated where key transport corridors, such as the state highways and the railway, have been located.

Severance refers to parts of the city being cut off from other parts by infrastructure that creates a barrier to access. This can affect all transport modes but is most pronounced where it creates barriers for pedestrians and cyclists.

The railway, heavy traffic bypass and the one-way system all combine to create severance throughout central Dunedin. This is most pronounced where the one-way system runs through the University campus, reducing connectivity between the tertiary area and the central city, as well as between the central city and the harbour, and the Warehouse Precinct south of Queens Gardens.

However, these roads and the railway are essential for the movement of goods through Dunedin and a key challenge is maintaining an efficient network while improving connectivity and safety, particularly for vulnerable modes. This means some freight traffic (including trains) have always needed, and will always need, to pass through the central city. This situation could only be avoided at great expense through the use of tunnels or bypasses. Such large-scale infrastructure is unlikely to ever be financially viable and may not even be technically feasible.

Due to the narrow width of many Dunedin roads, it is not always possible to fully and safely accommodate all modes. This is a particular concern where there is insufficient space to safely provide for more vulnerable road users, such as pedestrians and cyclists.

**Principal responses**
- Improve the connections within and between Dunedin’s central city and centres so that they become highly accessible by active travel modes and public transport, and improve the road environment within centres to create safe, pleasant, people-friendly places.

**Do nothing**
- Continued conflicts will occur between different transport modes.
Roading and footpaths capital expenditure highlights

The studies undertaken to date confirm that in general Dunedin’s transportation network has sufficient capacity to cater for road user needs over the next 30 years. However, there are some specific areas where infrastructure changes are necessary to cater for growth. The Council has identified projects to address the long-term needs in the Mosgiel-Taieri area, for upgrading key routes on the Otago Peninsula and for delivering the Strategic Cycle Network. Options for changes to address strategic corridor deficiencies in the central city were consulted on as part of the process of developing the 2013 Integrated Transportation Strategy (ITS) and projects for the future were defined in the 2006 Transport Strategy and reviewed in the 2013 strategy. Ongoing discussions are held with both the NZ Transport Agency and the University of Otago, regarding the operation of the one-way pair through the city. The Harbour Arterial identified in the Transportation Strategy is promoted to freight operators as a bypass from SH1 Andersons Bay to Port Otago.

The other area of need relates to work to address deficiencies in the network, particularly those relating to safety, and to cater for changing needs, including modal change. This work includes:

- the provision of additional footpaths
- facilities for those with mobility or sight impairment
- works to improve safety.

Minor works are identified and delivered through the minor improvement budget. In addition, a strategic cycling network route map has been developed, consulted on, and adopted by the Council. This will guide cycling investment for the next 20 years. A Centres Programme has been developed to enable targeted walking and cycling improvements in local neighbourhoods along with local area traffic management. The Council uses a place-based approach to deliver transportation improvements at the same time as amenity improvements are made.

These projects have been identified in a draft 10 year transportation programme to allow the Council to allocate additional funding. This is necessary as the minor improvements budget is limited in what can be delivered, particularly where there are significant safety issues such as in the central city.

New capital projects

In terms of major projects the ITS currently identifies projects to improve key routes on the Otago Peninsula, address arterial route needs in the Mosgiel-Taieri area, upgrade streetlights to LED and construct the Strategic Cycle Network. Work has been undertaken to define a 10 year transportation programme of new capital investment which will be considered by the Council as part of the LTP process. Ultimately the Council, in consultation with staff, will determine the programme to be funded through the LTP.

Most likely scenario for major improvement capital works

The major improvement capital projects are depicted in the diagram on the next page, in the likely order of implementation with an indicative cost. All the projects shown are yet to be confirmed through the LTP process and are subject to business case assessment to fulfil the co-investor expectations prior to implementation.
Roading and Footpaths Improvement Capital Expenditure Projects Likely Scenario

- Minor Improvements $1.3m per year
- Roading Miscellaneous $0.15m per year
- Mosgiel Growth East & West $4.1m
- LED Street Lights $6m
- Portobello/Harington Point Road Improvements Harbour Road $19.9m
- CN Strategic Cycle Network $19.2m
- Central City Upgrade $18m
- Eastern Freight Bypass $1 – 2m
- Mosgiel Centre Upgrade $2.1m
- SH1 1-way to 2-way Conversion $5.4m
- Cycle Network $8m
- City to Harbour Bridge $2m
- Aramoana Road Improvements $5 – 10m


Funded  Unfunded  Unfunded - Not in Integrated Transport Strategy

Note: Costs are shown in today’s dollars
Figure 7: Footpaths and footpaths renewals capital expenditure profile 2012/13 – 2044/45
(Please note: the source data for this graph has not had inflation applied, project costs are in today’s dollars)

Figure 8: Roading and footpaths new capital expenditure profile 2012/13–2044/45
(Please note: the source data for this graph has not had inflation applied, project costs are in today’s dollars)
**Asset management approach**

The maintenance and operating regimes for roading and footpath assets have a technical and a social aspect. Asset condition and activity on the network affects all residents and users on an ongoing basis. The current level of service provided meets the service level targets set in the Asset Management Plan and the programmes implemented will provide fit for purpose infrastructure that retains or improves these service levels.

There are four main types of intervention on roading assets to provide appropriate levels of service:

- maintenance to fix defects and preserve useful life
- maintenance to mitigate safety issues
- maintenance to provide appropriate aesthetic standards
- asset rehabilitation and renewal.

Generally the mid to long-term budgets are set with the aim of maintaining assets at the current condition level in perpetuity.

When an asset reaches about 75% of its service life, deterioration will accelerate. If a road pavement, for example, is left beyond this point without maintenance the cost to restore serviceability could be 4-5 times higher (see Figure 9).

Maintenance and renewal interventions are interlinked.

- Just as timely routine repairs can extend the time until a reseal is required on a road, resealing at the right time will extend the life of the pavement structure beneath.
- Interventions are scheduled to be applied before the only remedy is an expensive reconstruction. Routine maintenance deals with defects such as cracks before more serious defects develop.
- A road surface is resealed at regular intervals (the average reseal cycle is 14 years). Eventually the material making up the road pavement layers deteriorates to the point where it can no longer support the loads imparted by traffic. Pavement rehabilitation or replacement is carried out to return the road to an acceptable condition. Figure 9 above demonstrates this cyclic process.

Asset management has been supported by the Road Asset and Maintenance Management (RAMM) system for many years. RAMM manages asset inventory and condition data, reporting, asset valuation and maintenance contract administration tools. TRACKS is utilised for transportation strategic planning.

The Council is developing improved asset management planning systems and technology and is looking at procurement opportunities to enhance its asset management capability.

**Routine maintenance**

Routine maintenance includes pavement and corridor maintenance and is the day to day work that keeps the network sound, serviceable and clean. This work includes:

- pavement patching, repairs and crack sealing
- routine maintenance and repair of surface water channels
- renewal and installation of culverts
- grading and gravel replacement on unsealed roads
- shoulder maintenance on sealed roads
- street cleaning including central activity area cleaning
- traffic facility maintenance and renewal
- bridge and minor structure maintenance.

The physical works on the transportation assets are all delivered by contractors under a range of formal contracts.
Renewals
Renewal work is defined as “work that is required to refurbish or replace existing facilities with facilities of equivalent capacity or performance capability”.

Renewals of infrastructure can be triggered by accident history, observed failures, increased maintenance costs, complaints from road users, high road user operating costs, high levels of defects picked up during condition surveys or when the asset has reached the end of its useful life. Typical average life expectancies for various asset types in Dunedin are shown in Table 3.

There will be peaks in renewal costs where a large number of new assets were constructed over a short time period or where a major asset reaches the end of its serviceable life.

Renewals priorities
Renewals are considered to be of higher priority than new capital and have been ranked taking into consideration such things as:
- operating cost implications
- safety implications
- cost of a more expensive renewal
- backlogs.

Table 3 on page 28 shows the main assets and relative importance the Council has placed on their renewals.

Infrastructure renewals programming and budget
The asset components that have the most significant impact on budgets now and into the future have forward works programmes that have been developed from life cycle, condition surveys, predictive modelling, historic cost trends and informed reporting from maintenance contractor assessments. These are:
- carriageway resurfacing
- carriageway rehabilitation
- bridge renewal
- kerb renewal
- footpath resurfacing.

For the other components, some renewals are based on condition and others reflect historic levels.

Sustainability of renewals
Equating the value of renewals to the annual depreciation value is a measure of sustainable renewals called the “sustainability ratio”. The Council uses the same unit costs for asset valuation as for budget estimation. These are based on real cost trends and this is necessary for the ratio to be valid. The ratio for Dunedin shows that renewal lags depreciation by about 15%, reflecting continual historic growth in the asset base. If work achieved in any year is less than the AMP target the ratio will be lower, and if a single major renewal occurs the ratio could exceed 100%.

The Council has a ratio that averages around 80% but varies depending on what is achieved or budgeted. Figure 10 shows the annual depreciation, sustainability ratio and level of renewals funding for roading and footpaths across the period of this strategy.
### Table 3: Asset renewals strategy

<table>
<thead>
<tr>
<th>Priority</th>
<th>Renewal Category</th>
<th>% Annual Depreciation</th>
<th>Priority Reason</th>
<th>Condition</th>
<th>Typical asset life</th>
<th>Forward Works Programme (FWP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carriageway Resurfacing</td>
<td>27.0%</td>
<td>Pavements are the highest value asset and failure to resurface in time can result in safety issues and eventually in premature rehabilitation costing 4-6 times the surfacing cost.</td>
<td>ROS and Surface condition index results indicate satisfactory condition is maintained</td>
<td>7 to 60 years</td>
<td>FWP is developed with reference to current condition (RAMM treatment selection), predicted future treatments (dTIMS), maintenance costs and theoretical treatment lives. Fine tuning from annual validations indicates that the current 60km/year resurfaced or 5.7% of network is minimum sustainable annual level.</td>
</tr>
<tr>
<td>2</td>
<td>Seawalls</td>
<td>3.0%</td>
<td>Inner harbour stone seawalls are at end of life and the risk from failure is the loss of the road and accessibility and also private land beyond the road could be at risk.</td>
<td>Condition surveys indicate high portion of stone seawalls in poor condition</td>
<td>70 years</td>
<td>A substantial part of the stone seawall asset is near the end of its serviceable life. Renewal rate reflects this and work will be coordinated with inner harbour road improvements.</td>
</tr>
<tr>
<td>3</td>
<td>Bridges and large culverts</td>
<td>5.7%</td>
<td>The unexpected loss of a bridge could mean accident or the loss of access to a community or commercial area. Loss during an event could compromise lifelines.</td>
<td>Bridge inspections indicate bridges generally in good condition</td>
<td>70 to 150 years</td>
<td>Full Replacement: In the short term no expected replacements in next five years. The age of bridge stock indicates future expense risk and nominal sums are budgeted from 2019/20 with a peak expected beyond 2050. Structural components: The life of the bridge can be extended by timely replacement of defective components (e.g. replacing the deck). Knowledge of condition provides confidence in future budgeting.</td>
</tr>
<tr>
<td>4</td>
<td>Unsealed road re-gravelling</td>
<td>4.2%</td>
<td>The loss of the road material could result in unacceptable ride quality and possible loss of access to residents or farms.</td>
<td>Contract Audits indicate roads maintained to satisfactory level</td>
<td>8 years for surface course</td>
<td>The base layer provides strength to support loading. Renewal is typically reactive and prompted by requirements of heavy loading (logging, dairy). The surface course is replaced on a cyclic basis determined from condition, traffic loading and long term knowledge of materials performance. Current renewal is at a sustainable level.</td>
</tr>
<tr>
<td>5</td>
<td>Footpath Resurfacing</td>
<td>15.8%</td>
<td>The risk of not resurfacing is more expensive treatment required later and safety issues with uneven surfaces.</td>
<td>Resident opinion and condition surveys indicate footpaths generally in good condition</td>
<td>10 to 60 years</td>
<td>The FWP developed considering construction date, condition (RAMM) and reported issues. Factors include extensive cracking and defects that create trip hazards. The FWP has been modified to allow coordination with UFB rollout work currently in progress and with future central city upgrade. In general footpaths will be renewed in asphalt with exceptions in central and local activity areas.</td>
</tr>
<tr>
<td>6</td>
<td>Pavement rehabilitation</td>
<td>15.8%</td>
<td>The risk is more expensive maintenance costs initially and eventually a road that is unsafe and un-trafficable compromises accessibility.</td>
<td>Smooth travel exposure is being maintained at 80%. Local roads are rougher while pavements are mostly sound</td>
<td>40 to 140 years</td>
<td>The FWP is developed with reference to current condition, prediction tool outputs for the long term view, recorded maintenance costs, contractor reports and validation inspections. Rehabilitation is justified as the best cost life cycle option. On the basis of construction date profile and predictive modelling tool the quantity is expected to increase over the strategy period and budgets allow for this. Currently 7km or 0.7% of the network is adequate and this will increase to 10km in the 2020’s.</td>
</tr>
<tr>
<td>Priority</td>
<td>Renewal Category</td>
<td>% Annual Depreciation</td>
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</tr>
<tr>
<td>7</td>
<td>Signs, Road Marking and Signals</td>
<td>7</td>
<td>The risk is lack of clear direction or confusion that could lead to car crashes, congestion or lost journeys.</td>
<td>Generally in good condition</td>
<td>Markings 1 to 4 years Signs, signals 12 to 23 years</td>
<td>Renewal is condition-based with a high portion replacement because of third party damage in signs and signals. These assets typically have a shorter life and there is a steady renewals level.</td>
</tr>
<tr>
<td>8</td>
<td>Street lighting</td>
<td>3.6%</td>
<td>The risk is that deficiencies in visibility may result in accidents or loss of security</td>
<td>Resident satisfaction and condition surveys indicate lights are in good condition</td>
<td>18 to 40 years</td>
<td>Street lights are condition assessed at each maintenance visit. Renewals are identified from condition rating. The level of service will be lifted with budgeted conversion to LED lights from 2016.</td>
</tr>
<tr>
<td>9</td>
<td>Culverts and mud-tanks</td>
<td>4.3%</td>
<td>The risk is flooding causing damage to road or property and temporary loss of accessibility.</td>
<td>Generally in satisfactory condition</td>
<td>80 years</td>
<td>Culverts are assessed on three yearly basis and mud-tanks on a regular cycle when cleaned. Renewals are programmed based on condition assessments. Increasing the capacity of culverts when renewed is considered to cope with global warming effects.</td>
</tr>
<tr>
<td>10</td>
<td>Surface Water Channels (Kerb)</td>
<td>13.0%</td>
<td>The risk is potential damage to pavement from water ingress or possible seepage damaging property.</td>
<td>Condition rating shows condition is maintained at a satisfactory level</td>
<td>12 to 100 years Concrete kerb 80 years</td>
<td>The FWP shows renewal increasing from 4km/y at present to 16km/y from 2030. Long range average renewal is 12km/y. This increase is following the construction date profile. The budget allows for this increase in the future.</td>
</tr>
<tr>
<td>11</td>
<td>Retaining Walls</td>
<td>1.2%</td>
<td>The risk is loss of support for roadway and compromised accessibility.</td>
<td>Generally in good condition</td>
<td>80 years</td>
<td>Retaining wall renewal is currently reactive. Current inventory and condition data collection will allow for a condition-based FWP. The budget allowance is nominal reflecting the reactive nature of the renewals.</td>
</tr>
</tbody>
</table>

It is important to note that a high standard of professional services applied to the design and supervision of renewals projects is required to ensure the best long term outcome and value for money.
Activity Specific Assumptions
3 Waters
Overview of the 3 Waters activity

Water supply
The Council manages the collection, supply, treatment and distribution of water to domestic and commercial residents in Dunedin.

The main aspects of the supply system are:
- raw water (not treated) - surface water and ground water that is collected from the catchments
- supply - the main supply pipelines that convey raw water from the catchments to the raw water reservoirs or directly to the treatment plants
- treatment - raw water is treated at one of Dunedin’s 12 water treatment plants
- distribution - the main pipelines between the treatment plants and the treated water service reservoirs (some mains provide both primary distribution and reticulation functions)
- reticulation - the pipelines that distribute water from the service reservoirs to the customers’ boundary.

Our assets include 21,000 hectares of water catchment, 12 treatment stations, 35 pumping stations and 57 reservoirs (raw and treated water). The total water pipe network has a length of 1,450km that conveys water from the source to your boundary.

Dunedin’s water comes from surface water and ground water sources:
- Deep Stream, Deep Creek, and the Silver Stream are the main surface water sources to Dunedin City
- the Taiier Bores are used to supplement the above sources
- Mosgiel’s water comes from an aquifer beneath the suburb via bores
- Waikouaiti and West Taiier source water from the Waikouaiti River and Waipori River respectively
- Waitati and Warrington are normally supplied with water sourced from Deep Stream and Deep Creek but can also be supplied from water sourced from the Waikouaiti River if required.

Wastewater
The Council manages the collection, treatment and disposal of trade and domestic wastewater from residents and commercial customers across the city. The service aims to ensure the health of the community by providing cost effective reticulated wastewater services throughout the urban area, and treating wastewater to a high standard before disposal to either land or sea.

The main aspects of the wastewater system are:
- reticulation - the reticulated network collects wastewater from domestic and commercial private lateral connections to the system with the majority of the 1200km of publicly-owned wastewater reticulation system operating via gravity with pipe size varying from 100 mm to 1650 mm in diameter
- pump stations - overall there are 78 wastewater pump stations throughout the reticulated network which lift wastewater from low points back into the gravity network
- treatment - the Council owns and manages seven separate wastewater treatment systems. The population served by each plant varies from 100 for the smallest plant to 83,000 for the largest plant.

It has been estimated that $26 million may be required over the next 10 years for trunk mains and reticulation renewals.

Stormwater
Stormwater is rainfall or snow runoff that does not soak into the ground naturally, but instead is collected and channelled by roads, pipes or other public or private infrastructure. The Council provides reticulated stormwater services to the metropolitan area and most other areas that also receive reticulated wastewater. In total the Council owns operates approximately 360km of stormwater pipes and 10 pump stations.

When an area is developed, stormwater generally increases due to runoff from impermeable surfaces (e.g. roofs, roads, car parks, or compacted soil). It flows naturally from higher to lower ground, and ultimately discharges into natural watercourses such as wetlands, creeks, rivers or the sea. Land development necessitates the creation of both private and public stormwater systems; these networks work cooperatively to collect and transfer stormwater to waterways, and in some cases the marine environment, efficiently minimising damage to downstream assets.
Stormwater and wastewater use two separate systems. Stormwater is generally discharged untreated into the harbour, the sea, or the nearest watercourse. It is important not to let pollutants like litter, animal excrement or contaminants left behind on roads enter roadside drains as these can then contaminate the stormwater discharge. Washing cars on the footpath or road or excessively watering lawns can also flush pollutants into the stormwater system. The stormwater system can flood when the volume of runoff is high during intense rainfall events that are above the systems design capacity.

The 3 Waters Strategy Project included works for targeting manhole overflows, reducing flood risk, removal of wastewater/stormwater cross connections and mitigating the tidal influences on the capacity of the stormwater system. Flood hazard maps have been developed, which indicate areas that potentially require localised flood protection, upgrades or renewals now and in the future.

3 Waters Strategic Direction Statement 2010 – 2060

The Council’s 3 Waters Strategic Direction Statement was developed in 2010 to provide a picture of current water supply, wastewater and stormwater (3 Waters) services and determine service delivery priorities for the next 50 years. The document explores the current activities, strategic issues, community priorities and external challenges of Dunedin’s 3 Waters business. Identified within the document are seven key strategic priorities that underpin the way the Council will deliver the 3 Waters activities to the community.

1. We will meet the water needs of the City for the next 50 years from existing water sources.
2. We will be able to adapt to a variety of future scenarios for climate change and fluctuations in population.
3. We will reduce our reliance on non-renewable energy sources and oil-based products.
4. We will improve the quality of our discharges to minimise the impact on the environment.
5. We will ensure that, as a minimum, key service levels are maintained into the future.
6. We will limit cost increases to current affordability where practical.
7. We will adopt an integrated approach to management of the 3 Waters and embrace the concept of kaitiakitaka.

These priorities were the result of analysis of the activity’s issues, challenges and community voice. The community priorities were gathered using a telephone survey which took a representative sample of 600 Dunedin household participants. The top priority was identified as ‘providing safe and pleasant drinking water at an acceptable cost’. There was a strong desire from the community to improve the quality of stormwater and wastewater discharges, and where possible, cease discharges to the rivers and the sea.

Our community expect us to maintain our current levels of service, while managing future challenges such as climate change and economic fluctuations.

A copy of this strategy can be found at www.dunedin.govt.nz/3watersstrategy

3 Waters specific challenges

This section provides further comment and describes the principal responses to the challenges identified in the ‘Context and Major Issues for Dunedin’s infrastructure’ section, as applicable to the 3 Waters activity group.

Ageing infrastructure

Over 50% of Dunedin’s 3 Waters network infrastructure is expected to reach the end of its useful life (of 80-100 years) and require renewal by 2060, at a cost in the region of $820 million.

Principal responses

- The Council will invest adequately in renewals to maintain the performance of our infrastructure.
- The Council will invest carefully by understanding which assets are most critical to maintaining the delivery of service and using information to drive pro-active condition assessment of these critical assets.
- The Council will plan renewals effectively to avoid sharp increases in costs and gain cost efficiency in procurement and project delivery.
- The Council will continue with its planned programme of water upgrades and once completed, maintain our drinking water quality at those levels.
- The Council will develop tools to communicate effectively the implications of levels of funding.

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2 Dunedin City Council (2010) the 3 Waters Strategic Direction Statement
A decision support tool (dTIMS) is being trialled in 3 Waters as a means of developing long-term strategies for the operation, maintenance and renewal of the 3 Waters pipeline assets. This tool is currently used for pavement deterioration predictive modelling in the roading and footpaths activity. It identifies intervention strategies and determines timing, frequency and treatment type to be implemented. It also optimises intervention strategies and produces expenditure forecasts, work programmes and predictions of future condition. The tool is currently in the development and trial stage.

**Do nothing**

- Failure to find the right balance between investing in renewals and deferral could either leave the Council struggling with over-investment where the community has infrastructure surplus to requirement, or under investing and delivering a level of service that does not meet public expectation. This would breach our key strategic priority - “we will ensure that, as a minimum, key service levels are maintained into the future”. Both of these scenarios will result in a rising service cost.

**Climate change**

Future drought poses a risk to water supply. Low or no rainfall over a prolonged period would decrease the quantity of water available from the Deep Stream and Deep Creek intakes which supplies 60% of Dunedin’s water. In addition there is typically higher demand for water in drier periods. The Council has adopted the ‘Security of Supply for Metropolitan Dunedin Strategy’. This strategy has been specifically designed to develop options ensuring that raw water supply to the city’s treatment plants is maintained following a disaster event or drought. The response from this strategy is outlined on page 56 (Security of Supply Project).

Increasing heavy rainfall events create increased pressure on wastewater systems, predominantly through inflow from private stormwater connections and groundwater infiltration from cracked and damaged pipes. Where capacity to transfer wastewater within a network is reduced as a result of inflow and infiltration, overflows and property flooding can occur.

The Council currently has 13 foul sewer overflows that are known to discharge to the environment during rainfall events. The volume and frequency of overflow is variable with extent of the rainfall event, but in the 12 months prior to August 2014 there were a total of 58 events recorded, with volume of discharge ranging from 0.2m³ to 4,500m³. For reference, an Olympic-sized swimming pool holds approximately 2,500m³.

Overflows during such events are diluted by the infiltration of groundwater and inflow of stormwater. However, the overflow is still contaminated with sewage.

Kaikorai and North-east Valley are two areas particularly susceptible to surcharge and overflow of the foul sewer network, and have been identified as the most sensitive to climate change and future growth. To limit the short term effects, 26 non-return valves have been installed to affected properties which would otherwise experience habitable floor flooding. A significant and ongoing modelling project is analysing a range of options for a more permanent solution for these areas. While there are a number of short term projects that can be delivered to alleviate these issues slightly, the long term solution is a sustained period of investment in renewals throughout the upstream network to reduce infiltration, and the downstream network to upsize where capacity is still insufficient even with infiltration removed. This is detailed further in the following section titled Mitigating Sewer Overflows.

Climate change threatens to increase both the intensity and frequency of rainfall events. The Council’s stormwater system is designed to accommodate 1 in 10 year rainfall intensity events. As climate change takes effect it is clear that an event considered to be a 1 in 10 year rainfall event today will increase in frequency in the future. The Council will review rainfall return periods on a five yearly basis to ensure design capacities are kept up to date with any evident climate change trends and take into account predicted climate change trends associated with an assets anticipated useful life.

**Principal responses**

- To increase the flexibility and resilience of our affected infrastructure to reduce the risk of prolonged service interruption.
- Actively planning for potential events due to climate change scenarios.
  - The Security of Supply Strategy for Metropolitan Dunedin (2012) presents a preferred strategy for the security of metropolitan Dunedin’s water supply. The strategy aims to ensure that raw water supply to the city’s treatment plants is maintained following a disaster event or drought.
  - Climate Change Vulnerability Assessments (2011 & 2014) have been developed by the Council for areas with 3 Waters infrastructure particularly vulnerable to climate change effects; such as Warrington, Waikouaiti and Seafcliff. These reports highlight the issues unique to the area such as sea-level rise (coastal inundation), storm surges, mean temperature rise, flooding and so on. These assessments highlight which risks need to be managed passively, and which need to be actively managed, and provide a range of options to do so. Further assessments are planned.

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Do nothing

- This would place pressure on infrastructure and potentially create:
  - shortage of water due to drought
  - inundation of low lying infrastructure due to storm surge, seabed rise, or a combination of the two.
  - a heavier reliance on pumping (because of flooding).
- Increased fire risk in catchment areas - inability to utilise from a particular water source.
- Increased competition for water, changed resource consents and degraded wetlands.
- Result in poor water quality due to increased stormwater runoff, and therefore higher treatment costs.
- Require a possible change in location of residential population.

Population trends

Predictive modelling accounts for growth by taking the same base information used to generate the City Profile, then projecting spatial growth trends in line with the District Plan and applying it to calibrated hydraulic models. This allows detailed analysis of spatial effects on all 3 Waters assets from minor reticulation assets through to major treatment and or supply activities. The same tool allows development of hypothetical options and ‘what if?’ analysis if required.

Hydraulic models allow 3 Waters to effectively manage all potential growth implications with relative agility, either through early warning of required spend; or through effective use of existing capacity. Although areas such as the Taieri Plains are currently experiencing moderate growth, population for much of central Dunedin is forecast to remain relatively static and some areas expect a population decline. This creates some specific challenges for Dunedin, both with potential for stranded infrastructure and limitations on affordability of service improvements and maintenance of the existing infrastructure.

In general terms, the relatively minor forecast changes in demographics and population for Dunedin are not expected to have a significant adverse effect on the ability to maintain the 3 Waters network current levels of service, providing these changes are in line with the District Plan. However, deviations from the District Plan will likely require significant capital investment to address any capacity shortfall. Dunedin is well placed in terms of water availability and treatment capacity. It would require a significant and un-forecasted change in demographics or population to have an adverse effect on the ability to supply water to consumers.

There are several isolated areas of the 3 Waters network, such as Mosgiel, where development even within the District Plan is causing stress on network capacity. These capacity issues will need to be managed through proactive or early renewals and upgrades.

Landowners are responsible for managing stormwater that falls naturally on their property, and must manage any runoff to avoid causing negative downstream effects. A watercourse is generally defined as an open channel through which water flows or collects (be it natural, modified or artificial), either continually or intermittently, or has the potential to do so. It includes river beds, stream beds, gullies, natural depressions, ditches, and drainage channels. A watercourse also includes any culvert or pipe that replaces a natural open channel. The property owner is responsible for a watercourse from where it enters their property to where it exits and must keep it and any associated grates clear so the water can flow unimpeded.

The District Plan requires all properties to connect to the public stormwater system, where available, while un-serviced areas must have onsite stormwater disposal. The Dunedin Code of Subdivision and Development 2010 outlines specific requirements, guidelines and minimum engineering standards for new stormwater systems.

A continuing decline in ‘wet’ industry and a stable population, coupled with the systematic separation of the stormwater network from the foul sewer, has led to a situation where normal flows can be insufficient to cleanse the pipes, allowing sediment to build up and causing sewer blockages. Significant changes in the volume and nature of wastewater, particularly through industry closure can lead to operational inefficiencies in wastewater treatment plants, which are designed for particular volumes and contaminant levels.
Principal responses

- The Council ensures collaboration with infrastructure providers occurs during processes such as the Second Generation District Plan. For example water and waste services consider the impact of each proposed density change on the 3 Waters networks using in-house hydraulic modelling capability. The District Plan in turn allows for additional growth where infrastructure capacity is available.

- The Water and Waste Services (3 Waters) business unit will work collaboratively with City Planning to ensure the Second Generation District Plan encourages growth where infrastructure capacity exists. The District Plan is the main document that sets the framework for managing land use and development within Dunedin and is scheduled for release in mid-2015. When proposals are put in place for growth in vacant land where no infrastructure currently exists (green field), developers are largely responsible to provide and install the required infrastructure.

- The Council will pursue renewals not only as a necessity to maintain service, but as an opportunity to optimise current capacity by appropriately sizing pipes and eliminating infiltration of groundwater to the network and cross connections.

- The Council will ensure that our infrastructure planning is flexible enough to adapt to different scenarios, whilst being affordable to current and future communities.

- Where infrastructure capacity is compromised one of the following approaches is taken: either the district plan constrains growth or the Council makes capacity available by utilising the development contributions policy.

Do nothing

- Significant changes in the volume and nature of wastewater, particularly through industry closure, can lead to operational inefficiencies in wastewater treatment plants, which are designed for particular volumes and contaminant levels.

- Decrease in population - normal flows could be insufficient to cleanse the pipes, allowing sediment to build up and causing sewer blockages.

- Increase in population - increased use of pumping would be required to avoid flooding on flat areas due to residential/urban intensification and a reduction of natural water channels for stormwater to drain.

- Localised rapid growth which outstrips the capacity of the existing reticulation and distribution infrastructure can leave residents with insufficient infrastructure to maintain levels of service.

Peak oil

There is growing concern that global oil prices will rise dramatically once ‘easy to reach’ deposits have been used up and demand for oil outstrips supply.

The 3 Waters activities depend on oil and oil-based products in order to deliver core services. Oil is not only used to produce the fuels we consume such as petroleum; it is also a key constituent of a wide range of plastics and other synthetic materials used by the 3 Waters activities. Unless alternatives are found, the increasing cost of oil will have consequential impacts for the cost of services.

Fortunately New Zealand is well placed to take advantage of renewable energy sources such as solar, hydro, geothermal and tidal power, which may be used as alternatives to fossil fuels in energy production.

Principal responses

- The Council will reduce reliance on oil-based products.

- The Council will prioritise the use of energy efficient technology.

- Where cost effective to do so, the Council will generate renewable energy from our network, catchments and other resources.

Do nothing

- Oil forms a part of nearly every supply chain in some form, therefore the potential for dramatic fluctuations in oil prices, and the subsequent effects on the price of goods and services should not be underestimated.

Resilience

Principal responses

- The Council will ensure infrastructure is built to a resilient standard.

- The Council will address most vulnerable materials at the time of renewal except where an asset has a high level of criticality. It will be assessed to determine its level of seismic resilience and where necessary renewal may be prioritised.

- The Council will avoid re-zoning land for urban development reliant on reticulated infrastructure in areas that are at risk from liquefaction, lateral spread or other seismic effects that may put people, property or infrastructure at risk.

- The Council will reduce single point dependencies for highly critical infrastructure.
Do nothing

▶ The 3 Waters network level of seismic vulnerability will remain a significant risk.

Economic predictions

Principal responses

▶ Optimise the current planning to cater for the economy. Much of the planning around 3 Waters infrastructure aims to be nimble and responsive to change, allowing any change in the economy to be accounted for at the planning stage.
▶ The Council will build on the existing foundations and utilise strengths and capabilities to ensure sustainable economic and community development.
▶ The Council will provide diverse economic opportunities for businesses and residents, while also ensuring environmental sustainability.

Do nothing

▶ Failure to address and prepare for the issue of economic fluctuations could result in reduced infrastructure capacity and reduced ability to cater to consumers’ needs and retain levels of service.

Capacity and capability

Renewals expenditure across the 3 Waters is currently scheduled to increase steadily over the next eight years. Deferral of these renewals will impact noticeably on the 3 Waters business unit’s ability to effectively deliver services to the community and further increase the backlog of technically ‘failed’ assets. Additionally, deferring the planned increase in renewals funding will mean that larger step increases in funding will be required in the future if we wish to maintain current levels of service and maintain an acceptable level of risk that is affordable over the long term. This ‘backlog’ represents approximately $60M ($ today) at this stage. We are stepping up the funding of renewals from $11.7m to $21.2m over the next eight years and then plan to hold the funding at around $21.2 million until 2032. At this time there may be a need for a short term increase in funding to fund a peak of renewals anticipated at that point before funding is dropped to between $16m and $18m per annum for the years beyond.

Principal response

▶ The Council will provide works and services in accordance with its relevant procurement policy and strategy.

▶ Multi-service projects (including place-based planning) where tenders packages include all 3 Waters services, transportation and other infrastructure works to minimise construction overhead costs and long term disruption to the area. This includes spreading contract deliver over several years.
▶ ‘Piggy-backing’ existing infrastructure projects. Examples such as the University Campus works and the SH1 Safety Improvements package enable us to enter existing construction contracts, receiving good value construction.
▶ Active engagement with the market. Meetings are held with each of the large local contractors, informing them of the scope and timing of upcoming capital projects to enable them to better plan and prepare their workforces. Tenders are also released to the market to a programme based on which contract resources are already committed.
▶ Multi-year renewals package contracts are used where it is appropriate. Discussions have already begun with several of the city’s larger contractors around appetite for longer term contracts and how these might be mutually beneficial.
▶ Using a range of tender evaluation methods to give consideration of contractor’s ability to deliver work to deadlines. Where a renewal can be completed with a number of different methods delivering assets of different expected lives (based on material or construction method), the new weighted evaluation process will help to optimise value, comparing price per year of service with delivery risks.
▶ Where possible, bringing forward projects to compensate for projects that are delayed. This includes over-allocating the capital works programme for each year (but not committing beyond approved budget) in anticipation that some projects won’t go to plan.

Do nothing

▶ There is a risk that insufficient capability or capacity within the industry may lead to an inability to deliver services or the incurring of costs in excess of market prices.

Funding and affordability

Principal responses

▶ Stepping up renewals expenditure to allow infrastructure renewal needs to be managed sustainably over the long term. It is more cost effective to manage renewals in a prioritised programme than to defer work on renewals in order to make savings and risk a much more costly asset failure in the future.
The proposed 10 year plan provides adequate funding for renewals to prevent any significant deterioration of infrastructure across the immediate 10 years whilst making progress on the renewals backlog with few new capital projects programmed.

- Smoothing renewals expenditure in outward years to ensure that there is adequate funding outside of the immediate LTP Period.
- Renewals expenditure is funded from operating cashflow (rates) not debt.
- Ensuring that the Council’s financial strategy recognises the need to increase renewals funding and is able to manage this within the overall strategy limits.
- Ensuring the Council’s activity groups work together on planning of renewals work to provide delivery of programmed work in the most efficient and cost effective manner. For example, city development, 3 Waters and roading and footpaths working together to deliver sequenced work on roading and footpath renewals, 3 Waters network pipe replacements and city amenity work to avoid unnecessary remedial work on newly replaced infrastructure.

**Do nothing**

- There is a risk that funding of renewals will be underfunded or deferred due to other priorities and assets will deteriorate to failure impacting service levels and requiring significant unscheduled expenditure.

**Property ownership issues – wastewater lateral connections**

Faulty wastewater lateral connections have been identified as a significant contributor of the inflow and infiltration of groundwater and stormwater into Dunedin’s wastewater network. Infiltration occurs when groundwater enters the wastewater system through defective pipe joints and breaks/cracks in pipes.

Inflow occurs when water enters the wastewater system from inappropriate connections. Up to 50% of inflow and infiltration volume enters the system through faulty wastewater laterals and causes problems with the reticulation network as it is not equipped to handle extreme influxes of water. This can cause an overflow into creeks and streams, some directly and some via roads and manholes. There is occasional flooding and it can present a potential health risk.

Historically, where defective wastewater laterals have been identified as a source of inflow and infiltration, the issue of who pays has been managed on a case-by-case basis. The Council has either required the property owner to replace the wastewater lateral at the property owner’s cost (generally with the Council managing the renewal and recovering cost from the property owner); or Council has paid for the wastewater lateral to be replaced at no cost to the property owner.

In the past, this process has been managed in conjunction with the renewal of the public wastewater pipe the lateral connects to, and ownership of the wastewater lateral remains with the property owner post-renewal. However, this case-by-case decision-making makes it difficult for 3 Waters to accurately plan for future renewals of public wastewater pipes.

New housing affordability is affected by the cost of providing infrastructure services. In the recent past the Council has undertaken district plan changes to accommodate greenfield growth. Unfortunately in some instances the true cost of servicing some rezoned land has proven more expensive than initial indication and has resulted in economic development constraints.

**Principal responses**

- A work-stream is currently underway to assess the best fit model for ownership of Dunedin’s wastewater laterals, and presents options for where individual ownership stops, and council ownership starts.
- The Council’s planners and engineers will work closely to ensure the true cost of servicing is taken into account early in any District Plan change or development process. This will be done by utilising in-house hydraulic modelling capability to identify locations where surplus infrastructure capacity is available.

**Do nothing**

- The current process of case-by-case decision-making makes it difficult for 3 Waters to accurately plan for future renewals of public wastewater pipes. At present, the cost of replacing defective wastewater laterals is not included in high level budgeting but in some cases is absorbed at the capital project level. This distorts the true cost of the wastewater pipe renewal. There is also no clear process for the systematic renewal of defective wastewater laterals and the liaison with affected property owners.
- If growth cannot be economically accommodated the high cost of residential and industrial development will potentially result in low growth rates, high housing market inflation and lost employment opportunities for the city.

5 The Rating Powers Act (RPA) 1988 contained some general provisions which allowed Councils to recover costs from property owners. These general provisions were removed when the RPA was repealed by the enactment of the LGA 2002.
**Legislative considerations**

The 3 Waters are affected by various pieces of legislation; primarily the Local Government Act 1974 and 2002 (LGA), the Health (Drinking Water) Amendment Act 2007 (HDWAA) and the Resource Management Act 1991 (RMA). The LGA requires the Council to maintain 3 Waters services, and to assess the provision of those services from time to time. The HDWAA sets requirements for drinking water suppliers to protect the health and safety of communities. The RMA promotes sustainable management of natural resources, and matters addressed include management of fresh water and the beds of rivers and lakes, and discharges into the environment.

**Water takes**

The Regional Council is responsible for water allocation planning, which includes setting allocation limits and minimum flows. The allocation limit is the maximum amount of water that can be taken, while a minimum flow is considered to be the lowest flow at which ecological, cultural and community values are protected. Community water takes existing as at 1998 are listed in the Water Plan and are not subject to minimum flows, but all new or additional water takes will be. Any take may be subject to a residual flow; essentially a minimum flow at the point of take. Allowance may be made for growth at time of consent renewal, if there is an anticipated excess of water needed above what is already taken, however proof will be needed of what has been taken under current consent and why the additional water is needed. Recent Regional Council plan changes have placed great emphasis on limiting water use to within its local catchment and increasing the efficiency of water use. The City Council is starting to see an increased focus on water conservation being incorporated into our water take and use consents.

As demand for water grows from the primary production sector, the Council anticipates water-take consent volumes to be challenged, especially as the effects of climate change are taken into consideration. The extent of this challenge may require further catchment prospecting, to ensure security of water supply into the future. Some areas of New Zealand impose domestic water metering. This measures the amount of water your household uses and provides an accurate charge for the water you use. It is assumed that the Council will not universally meter its customers unless a central government legislative directive is put in place. Metering customers is not politically palatable and the cost of implementation currently out-weighs the benefits when Dunedin city’s current water loss drivers are taken into account.

**Drinking water standards**

The provision of safe drinking water at an acceptable cost was the single highest priority identified in the 3 Waters Strategic Direction Statement customer surveys. The Council aligns its priorities and strategies with the desired outcomes of the community and Dunedin’s water is typically very high quality. The Council follows the legislative requirements as outlined in the Health (Drinking Water) Amendment Act 2007:

> ‘[to] protect the health and safety of people and communities by promoting adequate supplies of safe and wholesome drinking water from all drinking-water supplies’

Currently all operational plants are meeting the minimum standards outlined in the Act with the exception of the Outram Water Treatment Plant, serving a small community of approximately 750 people. To resolve this issue, an upgrade is scheduled to commence in the 2015/16 financial year at a capital cost of $520,000.

**Safe discharges to the environment**

The Regional Council is also becoming increasingly stringent regarding contaminant discharges to the environment, and this is likely to affect any future applications to discharge contaminants.

The City Council has committed to improving the quality of discharges to minimise the impact on the environment as a strategic priority. Monitoring wastewater and stormwater outfalls for water quality is a vital part of delivering on this priority and is also a resource consent requirement. As discharge consents are renewed in the future we are expecting more stringent quality requirements to be imposed as conditions. To meet additional requirements some of the rural plants will require upgrade to achieve greater quality, and/or improvements in discharge methodology. Approximately $97 million has been spent on treatment and disposal upgrades associated with the Tahuna Wastewater Treatment Plant upgrade.

Global research increasingly agrees that stormwater runoff may be having a detrimental effect on receiving environments and untreated stormwater can have a significant effect on ecology. Stormwater collects chemical and microbial contaminants as it runs over roads, rooftops, and impermeable surfaces.


Management of these effects is extremely important for New Zealand’s clean, green image and New Zealand’s waterways contribute billions to the nation’s GDP\(^8\). The 3 Waters Strategic Direction Statement identifies ‘we will improve the quality of our discharges to minimise the impact on the environment’ as a key strategic priority.

The Council discharges stormwater to fresh water generally as a permitted activity under the Otago Regional Plan: Water. The Regional Council has indicated they will review stormwater discharge rules in the near future although no timeframes have been confirmed. If the activity status of these discharges were to change, the City Council would need to work through a consent application process, avoiding, remedying and mitigating any adverse effects of the discharge.

Stormwater discharged to the coastal environment is a controlled activity requiring resource consent. Consents to discharge to the Otago Harbour and St Clair Beach were granted in 2013 based on the Integrated Catchment Management Plans developed for each of the 10 contributing catchments. These consents have 35 year term with a five year review period. Generally the consents operate on an adaptive management principle. The Council is required to monitor and where contamination is identified, investigate further and address the source of any contamination.

As part of the suite of environmental monitoring that forms conditions of consents to discharge to the marine environment, the Council conducts analysis of shellfish at stormwater outfalls to assess the accumulation of contaminants in the food chain. Additionally, eight separate sites around the Dunedin coastline are monitored specifically for bathing water quality. The consent principle and monitoring results to date indicate that the risk of significant infrastructure solutions being required in the future is low.

The Council is looking to conduct research to ascertain if contaminant levels in the Otago Harbour outfalls are a consequence from historic discharge practices, or whether it is a recent accumulation. The Council will also investigate whether certain concentrated areas are contributing more to the stormwater contaminant issue, or whether it is widespread throughout the city. Upon completion of the research, a range of options and considerations will be constructed to allow adequate planning going forward (such as stormwater treatment), but there are no tangible investment plans at present.

The Council is anticipating that increasingly stringent conditions will be applied when we apply for consents to discharge to the environment.

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8 Hannah, Michael (2004) Discussion document into a national programme for evaluation and testing of stormwater products and practises.
Minor, small value treatment facilities capital works are delivered by the respective 3 Waters teams using multiple quotes or invited pricing procurement. Again, this creates room in our in-house project management resource and utilises resource from smaller contractors, perfectly capable of delivering the projects.

- Multi-year renewals package contracts are used where it is appropriate.
- Renewals method-weighting for tender evaluation. Where a renewal can be completed with a number of different methods delivering assets of different expected lives (based on material or construction method), the new weighted evaluation process will help to optimise value, comparing price per year of service with delivery risks.
- Multi-asset renewals. Wherever possible we are now packaging up 3 Waters renewals by area, so that a single tender covers water, wastewater and stormwater renewals. This is more efficient use of contractors, reduces establishment costs and minimises the long term disruption to areas of the city.

With the growing renewals programme the capability and capacity of the teams developing and delivering the programme is also being strengthened accordingly.

Renewals backlog

Renewals expenditure across 3 Waters is currently scheduled to increase steadily over the next 5 to 10 years. Deferral of these renewals will impact noticeably on the ability to effectively deliver services to the community and further increase the backlog of technically ‘failed’ assets (Figure 11). Additionally, deferring the planned increase in renewals funding will mean that larger step increases in funding will be required in the future if we wish to maintain current levels of service and maintain an acceptable level of risk that is affordable over the long term.

Figure 11 shows the combined replacement cost over a 50 year period (in today’s dollars) of all 3 Waters’ assets based on condition assessed or modified remaining life rather than purely theoretical useful life. In this graph smoothing is based on informed assumptions and real data, the result of extensive condition assessment. Where assets have already exceeded their useful life and therefore failed (e.g. are not capable of delivering designed service levels such as fire flows in the water network or contained surcharging in the sewer network) these are shown in year one in addition to this year’s ‘genuine’ renewals programme. This ‘backlog’ represents approximately $60M at this stage. Whilst the expected lives of the assets are considered to be robust, the theoretical cost of the renewals does not take into account cost efficiencies that can be gained from effective packaging of work and rationalisation of under-utilised assets.

Clearly the backlog of failed assets and the loading of (particularly wastewater) renewals in years one to five is unable to be addressed within the stated timeframe, but represents our best knowledge to date of when assets should be replaced if there were no constraints around funding or the ability for the market to deliver the work. The renewals peak in 2015 shows the backlog of technically failed assets, i.e. assets that are no longer meeting the required level of service and have exceeded their useful lives. Each year, assets from the backlog are programmed and prioritised into the renewals programme thereby reducing the backlog.

We are proposing to continue our programme of stepping up renewals funding from the current level of $11.7m to $21.2m by 2021. We then propose to keep funding at the elevated level of $21.2m until 2023 when we will adopt the 10 year rolling average funding level.

Whilst the data that underpins when assets need to be renewed is relatively robust, the detail on the cost of renewal does not currently take into any efficiencies that can be made by packaging works efficiently or rationalising the assets that we no longer need. Therefore, whilst the theoretical cost to renew the assets over the next 30 years is $700m (in current dollars) we are only proposing to provide funding of $612m over the same period. As we review our underlying assumptions on renewal costs over the next LTP period we will have greater clarity of how long it will take to clear the backlog of work. We believe that it is realistic that we can close this gap between theoretical and actual cost by 16% which would allow us to catch up the backlog of renewals by 2039/40. However, if we can only close a gap of 13% it will take the fully 30 year period of the infrastructure strategy to clear the backlog. We will continue to refine these assumptions over the next LTP period and adjust our long term funding plan accordingly.

We are confident that the funding gap can be closed through a combination of reviewing the cost assumptions to reflect packaging of procurement, network rationalisation and programme optimisation, as well as by delivering projects at reduced cost through smarter procurement and multi-service projects (including as place-based planning) will enable smoothing of the required spend. Furthermore, the market has been primed for the delivery of increasing capital works programmes. Over the next one to two years, as further condition assessment continues to improve our knowledge and efficiencies of a new structure are bedded in, our ability to meet the 16% target and therefore catch up the backlog by 2040 will become more clear.
Additionally, 3 Waters have entered into a development partnership with IDS Ltd (Infrastructure Decision Systems) with the objective of developing a 3 Waters application for the dTIMS software. dTIMS is widely used by transportation authorities around the world to provide a network wide view of the future renewals and maintenance needs of a given asset base. A preliminary water network model has been developed in by Opus International Consultant, Deighton Enterprises, IDS and 3 Waters Staff. Preliminary results of the new tool are encouraging and suggest a proactive strategy of early renewal of the water network provides the lowest lifecycle cost.

As further testing is completed and confidence in the tool grows 3 Waters will look to demonstrate lifecycle management strategies and their consequence both in dollar and level of service terms. After 2030/31 it is proposed that the Council aim to fund at the level of the 10 year rolling average funding requirement. Currently this is elevated from 2034 to 2040, predominantly to fund the renewal of the Deep Creek and Deep Stream pipelines as a single pipeline, but it is anticipated that further smoothing will be possible in future years.

Figure 11: Renewals Programme Proposal (50 years)

(Please note: the source data for this graph has not had inflation applied, project costs are in today’s dollars)
3 Waters capital expenditure highlights

As shown in Figure 3 on page 19 the forecast budget for the 3 Waters activities remains relatively constant throughout the 30 year infrastructure period. Operational expenses remain the largest investment of just over $1 billion dollars for the duration of the 30 year strategy, and this covers operating costs, labour, materials and maintenance.

The renewals component makes up the vast majority of capital expenditure and will increase from $12 million per year to a peak of around $25 million in 2035 ($ today). From 2040 on the renewals budget decreases as more of the city’s infrastructure assets are replaced. The peak of renewals spending in 2035 is due to the anticipated renewal of the Deep Creek and Deep Stream pipeline as a single line. The Deep Creek and Deep Stream system, constructed in the 1930s and 1970s respectively, allows water to reach Mt Grand Water Treatment plant along 62 km of pipeline. The pipeline crosses the Taieri River on a steel arch bridge constructed in the 1930s and passes over Abbotts Hill to reach Mt Grand. System capacity is currently 8,000m³/day from DC and 38,000m³/day from Deep Stream, which provides the majority of Dunedin’s water along with an intake at Silverstream. An option is currently being explored on whether it is best to retain the Taieri River crossing bridge, or to divert the anticipated new combined pipe over land which would lower the risk of supply failure.

Aside from the Deep Creek and Deep Stream pipeline, the renewals focus is on replacing the large amount of infrastructure in Dunedin that is reaching the end of its useful life. This results in a budget which slowly climbs as more and more infrastructure reaches the end of its lifecycle and needs replaced, then decreases once the optimum levels of service is reached and the majority of main pipelines are renewed to a more constant level of expenditure (see the renewals section for more detail).

New capital is low priority over the next 30 years, with the budget peaking at $4.2 million ($ today) in 2016/17, then dropping to $650,000 ($ today) and remaining a constant projection thereafter. The projections coincide with slow growth patterns within Dunedin, and accounts for historical over spending on new capital such as new water and wastewater treatment plants. In the past, the focus has been on creating new capital assets, with under-investment in renewals, however attitudes towards this have changed, with renewals becoming the top priority as assets reach the end of their lifecycle.
Significant projects over the next 30 years

3 Waters estimated timeline of significant Capital Projects

High-level flow diversions for problem wastewater catchments

Wastewater network and plant augmentation for Northern wastewater schemes

Ross Creek pump station

Port Chalmers feed from City upsized

Outram Water Treatment Plant

Upsize Dalziel Road pipeline

Stormwater trunk main for Mason Street catchments

Mosgiel wastewater treatment plant upgrades or decommissioning

New single pipeline for Deep Creek and Deep Stream catchments

New crossing point over the Taieri River for raw water supply


Disestablishment of Cedar Farm/Rossville Reservoirs and Port Chalmers water treatment plant

Sullivans dam rehabilitation or disestablishment

Southern water treatment plant refurbished

Tahuna wastewater treatment plant refurbished

Wastewater network and plant augmentation for Northern wastewater schemes

Wastewater renewals concentrated in Andersons Bay, Kaikorai Valley, Sawyers Bay and North East Valley to address flooding and overflows

Mount Grand water treatment plant refurbished

Peak in asbestos cement pipe renewals

Sustained programme of 3 waters renewals to address backlog of failed assets and prevent level of service failures

Ross Creek dam renewal

Disestablishment of Cedar Farm/Rossville Reservoirs and Port Chalmers water treatment plant

Sullivans dam rehabilitation or disestablishment

Southern water treatment plant refurbished

Tahuna wastewater treatment plant refurbished

Wastewater network and plant augmentation for Northern wastewater schemes

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High-level flow diversions for problem wastewater catchments

Wastewater network and plant augmentation for Northern wastewater schemes

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Mount Grand water treatment plant refurbished

Peak in asbestos cement pipe renewals

Sustained programme of 3 waters renewals to address backlog of failed assets and prevent level of service failures
Water supply projects

The information below outlines major projects that incorporate the projected capital expenditure associated with the management of Dunedin water supply infrastructure assets out to 2044/45. The estimated total cost of these works is approximately $219m ($ today). The projects also highlight their level of uncertainty, and an explanation if uncertainty is high. Cost estimates vary with levels of project certainty.

To ensure a robust investment programme, each project is subject to detailed engineering appraisal in the short term (three years). At this stage detailed programming is also carried out to ensure the Council’s procurement efficiency is maximised by aligning with parallel infrastructure investment programmes such as road resurfacing or drainage network renewals.

The broad nature of this ongoing programme means the level of certainty varies with time. The short term level of uncertainty is low, although this increases over the medium and long term.

Renewal of water treatment plant assets

The Council has invested heavily over the past 10 years in upgrading water treatment plants to improve drinking water quality and meet changing drinking water standards. This means the Council’s renewal requirement at these relatively new facilities is modest over the short term, although these will increase around 2025. Investment in water treatment plant membranes will be required in the short to medium term to maintain compliance with drinking water standards.

Outram Water Treatment Plant

The Outram Water Treatment Plant is the last of the Council’s water treatment plants requiring upgrade to meet minimum urban drinking water supply standards, set out in the Ministry of Health Drinking Water Standards for New Zealand 2008. Much of the design work has been completed for this project, with property boundary adjustments underway before construction begins in 2015/2016. The estimated cost of this project is $520,000 ($ today). There is very little uncertainty associated with this project.

Security of Supply Strategy for Metropolitan Dunedin

A “lifelines” study conducted in the late 1990’s identified significant risks associated with key infrastructure servicing Dunedin. Further work in the 2000’s identified several options to mitigate these risks with a significant associated expenditure profile. The development of the Security of Supply Strategy for Metropolitan Dunedin in 2010 involved analysis of the same risks in the wider context of Dunedin’s water supply network. The outcome was an investment strategy focusing on reuse and refurbishment of existing infrastructure, with a comparatively modest expenditure requirement and significant overall risk mitigation.
The projects that make up this plan are:

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost ($ today)</th>
<th>Year of works</th>
<th>Budget</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern to Mount Grand</td>
<td>$0.97M</td>
<td>2013/14</td>
<td>New Capital</td>
<td>Low. Constructed – commissioning late 2014</td>
</tr>
<tr>
<td>Treated Water Pump Station</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ross Creek Reservoir</td>
<td>$3.5M</td>
<td>2014/15 – 2015/16</td>
<td>Renewal</td>
<td>Low. Tendering late 2014</td>
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<tr>
<td>Ross Creek to Mount Grand</td>
<td>$4.6M</td>
<td>2016/17</td>
<td>New Capital and Renewal</td>
<td>Low. Funding allocated</td>
</tr>
<tr>
<td>Pump Station and Pipeline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Either Re-establishment or Decommissioning of Sullivan’s Dam Reservoir</td>
<td>$2.1M</td>
<td>2018/19 – 2019/20</td>
<td>New Capital and Renewal</td>
<td>High. Funding allocated although some specifics are yet to be determined</td>
</tr>
<tr>
<td>Renewal of Deep Creek and Deep Stream Pipelines as a single pipe</td>
<td>$67.8M</td>
<td>Nominally 2036</td>
<td>Renewal</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

### Delivery of pressure reducing valves

Dunedin’s steep topography presents significant technical challenges in delivering water supply to customers at uniform pressure. Much of the city’s low pressure areas have been addressed by past work programmes, however areas with very high pressure (above 1250kpa) still feature in the network. Plans to install five pressure reducing valves in Andersons Bay (three), Green Island (one) and North Road (one) will reduce high water pressure levels to more than 2000 properties, reducing private and public infrastructure deterioration and leakage. This programme began in 2014/15, with three recently commissioned in Andersons Bay, and the remaining installations planned for 2016/17 and 2017/18. The level of uncertainty associated with this project is low.

For more detailed information about water pressure in Dunedin including a current water pressure map, see [www.dunedin.govt.nz/services/water-supply/water-pressure](http://www.dunedin.govt.nz/services/water-supply/water-pressure).

### Power outage resilience

A report will be considered by the Council as part of the 2015/16 LTP, which will outline the current level of 3 Waters infrastructure resilience to power supply outage. The mode and time to failure following a power outage of each energy reliant site was considered, defining the current level of service. It is anticipated that the Council will adopt a minimum level of service, and that the associated funds will be made available in line with a proposed 10 year work programme. This project has a high level of uncertainty as it is yet to be considered by elected members.

### Aligning with DIA mandatory measures

The Council is committed to reducing leakage to economic levels over the next decade. Delivery of the zone metering programme for improved water accounting is required to better understand the water networks leakage profile.

Following five years of installing two to three meters per year at key strategic points around the city, the remaining 10-12 meters required are to be installed between 2017/18 and 2020/21. This will complete dissection of the city into ‘leakage zones’, which are used to more effectively account for water losses and target more focussed leak detection programmes. In some cases installation is required under existing resource consent conditions.

This greater level of monitoring will enable the development of a System Leakage Management Plan which will detail areas for investment if required. This project has a low level of uncertainty.
Port Chalmers Water Supply project
Currently Port Chalmers Water Supply is intermittently sourced from Dunedin city. However, during cruise ship season peak demand exceeds supply availability from the city, requiring the operation of a small water treatment plant, fed by two earth dam reservoirs. This is an expensive local water supply arrangement. Work to address this began in 2014/15 and compares the life cycle costs of infrastructure alternatives to meet Port Chalmers peak water supply needs. The options range from maintaining the status quo with no additional investment, to the upsizing of the distribution pipework from the city. Capital cost ranges from zero to $2.58M ($ today). It is anticipated that a report will go to the Council in the 2014/15 year recommending a management strategy. This project has a moderate level of uncertainty.

Mosgiel Water Supply Project
The wider Mosgiel area is serviced by seven groundwater bores, drawing from the North Taieri aquifer which is classed as ‘confined’. Once extracted, the water is transmitted to one of five treatment plants, although the only treatment required to meet drinking water standards is to adjust pH levels to avoid problems with public and private pipe corrosion. Historically, this has been an inexpensive and effective way to supply the Mosgiel community with water. More recently, investigations have indicated that the aquifers confined status may be called into question in the near future, and that evidence of a contamination plume flowing toward the current bore sites is growing. At this stage, further understanding of the movement of the plume will be gained by testing over time. This will give an indication of the timeframes over which the current arrangement can continue. Furthermore, it is unlikely that any intervention which provides an additional level of water treatment will be cost effective. Rather, it is more likely that the supply of fluoridated and chlorinated water from the Mt Grand Water Treatment Plant would be the most economical approach to supplying Mosgiel. In the past this option has received a negative community response, citing a reluctance to consume chlorinated or fluoridated water. Council will continue to assess the aquifers suitability as a drinking water supply by monitoring the quality of the aquifer upstream of the bore sites. A full options report will be compiled for the Council’s consideration when further information is compiled. It is important to note that evidence to date suggests the time until action is required is outside of the 10 year long term plan horizon.

Wastewater projects
The information in this section outlines major projects that incur capital expenditure associated with the management of Dunedin’s wastewater infrastructure assets out to 2044/45. The total forecast capital expenditure is $178m over this period. The level of uncertainty of the projects is highlighted, and an explanation given if uncertainty is high.

Figure 13: Wastewater expenditure profile 2012/13–2044/45 (Inflation applied)

Renewal of wastewater reticulation infrastructure
Dunedin’s wastewater network will require significant investment over the next 50 years. The city has begun a programme to renew wastewater infrastructure where it is proven to be significantly subject to groundwater infiltration. This infiltration can be fresh or saline water and is addressed further under the heading Mitigating sewer overflows. In conjunction, assets contributing to reticulation network level of service failures and poor environmental performance are addressed. These renewals are planned over the long term (50 years) based on a combination of remaining asset life, cohort condition observations, pressure, and programming considerations. Over the medium term (10 years) these hypothetical plans are optimised using actual break and other level of service information to prioritise areas where intervention will best impact overall network performance.
To ensure a robust investment programme each project is subject to detailed engineering appraisal in the short term (three years). At this stage detailed programming is also carried out to ensure the Council’s financial leverage is maximised by aligning with parallel infrastructure investment programmes such as road resurfacing or treated water network renewals.

The broad nature of this ongoing investment programme means the level of certainty varies with time. The short term level of uncertainty is low, although this increases over the medium and long term.

**Mitigating sewer overflows**

The Council’s wastewater network has several areas where insufficient capacity and high levels of inflow and infiltration periodically culminate in network overflow during heavy rainfall events. Typically the areas with high inflow and infiltration levels also coincide with some of the Council’s older and most significantly deteriorated pipework. The four main areas identified by hydraulic modelling are:

- the Andersons Bay catchment
- the Kaikorai Valley catchment
- the North East Valley catchment
- the Sawyers Bay catchment.

The Council has started work in Andersons Bay, renewing $6M worth of piped infrastructure between 2013 and 2015. Further work will be completed over the next 10 years. The Council has taken a combined services renewal approach, at the same time addressing firefighting incapacity. High pressure areas in the treated water network were addressed by installing pressure reducing valves along with renewing aged and tuberculated cast iron water mains. This approach yielded significant renewals spend efficiency: up to 40% (or $1.5M saved) in one tender.

A significant portion of renewals funding will be directed to addressing overflows caused by infiltration and inflow as a priority over the next 10 years and potentially beyond. The following tables outline projected spends in the priority areas.

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost ($ today)</th>
<th>Period of works</th>
<th>Budget</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersons Bay Wastewater Renewals</td>
<td>$12M</td>
<td>2013 – 2023</td>
<td>Renewals</td>
<td>Low. $6M invested to date, a further $6M is planned for between 2020 and 2023.</td>
</tr>
<tr>
<td>Kaikorai Valley Wastewater Renewals</td>
<td>$25M</td>
<td>2015 – 2030</td>
<td>Renewals</td>
<td>Low. Investment required based on modelling outputs and CCTV received to date. Several packages are already programmes and further filming to be received in 2015 will confirm the next priorities and overall need.</td>
</tr>
<tr>
<td>The Surrey Street Diversion</td>
<td>$4M</td>
<td>2015 – 2017</td>
<td>Renewals and New Capital</td>
<td>Low. Large diameter pipe requires renewal and in Hillside Road, there is an opportunity to renew and upsize this pipe at a marginally greater cost to redirect flow from the Surrey Street Bottleneck.</td>
</tr>
<tr>
<td>North-east Valley Wastewater Renewals</td>
<td>$10M</td>
<td>2019 – 2025</td>
<td>Renewals</td>
<td>Low. Investment required based on modelling outputs and CCTV received to date, further filming to be received in 2015 will confirm priority and overall need.</td>
</tr>
<tr>
<td>Sawyers Bay Wastewater Renewals</td>
<td>$5M</td>
<td>2017 – 2022</td>
<td>Renewals</td>
<td>Moderate. Investment required based on modelling outputs and CCTV received to date, further filming to be received in 2016 will confirm priority and overall need.</td>
</tr>
</tbody>
</table>
Wastewater treatment plant renewals

The Tahuna wastewater Treatment Plant services approximately 78% of Dunedin’s wastewater serviced population. The plant was extensively upgraded from 2009 through to 2015 to provide high quality wastewater treatment to the city, including UV disinfection and to comply with new discharge consent conditions. Subsequently, this major facility will require only relatively minor renewals investment over the short to medium term. However, this will likely increase around 2030.

The other large plants, Mosgiel and Green Island Wastewater Treatment plants, work in unison to serve approximately 21% of serviced customers. Green Island was upgraded in 2000, and provides ultraviolet disinfection to the pre-treated flow from Mosgiel. Mosgiel Wastewater Treatment Plant has not been extensively upgraded since the mid 1980s and will require significant investment within the next 10 years. Green Island no longer treats the industrial flows it was designed to as several key industrial customers ceased their high volume, high concentration discharge activities. The Council is currently working to determine an optimised strategy for the operation of the two plants for the future.

Northern wastewater strategy

Either significant network augmentation or additional treatment infrastructure is expected to be required in the northern townships of Waikouaiti, Karitane, Sealiff and Warrington when their respective wastewater discharge consent renewal applications are submitted. This is assumed to require $650k annually over three years and timing is projected for 2018/19 to 2020/21. The level of uncertainty is moderate as the exact nature of the consent conditions is as yet unknown, however the consent renewal timeframes are strict. The Council is working to firm this up by the end June 2015 by conducting additional environmental monitoring and wastewater network modelling.

Growth projects for the wastewater system

Pump station upgrades are required to accommodate the development at Variation 15 (Burns Street) programmed for 2018/19. The timing of this development is uncertain but for other aspects of delivery the level of uncertainty is low.

A further pump station is required to accommodate developments at Mosgiel East C (Gladstone Rd North) programmed for delivery 2015/16. The level of uncertainty is low.

Reticulated network expansion projects

The Council is required to carry out water and sanitary services assessments in accordance with the requirements of section 125 of the Local Government Act 2002. A full assessment was completed in July 2007 and annual review is completed through the Water and Waste Service Asset Management Plans.

Issues raised in the assessment were prioritised based on environmental impact and since 2007 Council has addressed a number of the highest priority issues including providing a low pressure sewer system for Allanton; reticulating areas of Blanket Bay and Curles Point; and inspecting septic tanks and requiring owners implement remedial measures.

A further recommendation from the assessment was to investigate wastewater disposal systems in Outram, to determine the most sustainably and appropriate long term arrangement. This investigation has not yet commenced as to date the focus has been on addressing the highest priority issues. However, the Council does recognise the need to investigate the wastewater disposal situation in Outram and this will be programmed in due course.

There is potential for a future project to service Outram with reticulated wastewater, replacing an old stock of septic tanks. This project would cost in the order of $7-10 million ($ today) of new capital and the timing is subject to the establishment of further drivers and significant council decision making as this work is not budgeted. This project has high level of uncertainty.

Power outage resilience

A report will be considered by Council as part of the 2015/16 LTP, which will outline the current level of 3 Waters infrastructure resilience to power supply outage. The mode and time to failure following a power outage of each energy reliant site was considered, defining the current level of service. It is anticipated that the Council will adopt a minimum level of service, and that the associated funds will be made available in line with a proposed 10 year work programme. This project has a high level of uncertainty as it is yet to be considered by elected members.

Stormwater projects

The information in this section outlines major projects that incorporate the projected capital expenditure associated with the management of Dunedin’s stormwater infrastructure assets out to 2044/45. A total capital expenditure of $95 million is anticipated over this timeframe. The level of uncertainty of the projects is highlighted, and an explanation given if uncertainty is high.
Stormwater renewals

Dunedin’s stormwater network will require significant investment over the next 50 years. The city has begun a programme to determine the condition of critical stormwater infrastructure. In conjunction, assets contributing to stormwater network levels of service failures are addressed as and when required. These renewals are planned over the long term (50 years) based on a combination of remaining asset life, cohort condition observations, and programming considerations. Over the medium term (10 years), these hypothetical plans are optimised using actual break and other level of service information to prioritise areas where intervention will best impact overall network performance. To ensure a robust investment programme, each project is subject to detailed engineering appraisal in the short term (three years). At this stage detailed programming is also carried out to ensure the Council’s procurement efficiency is maximised by aligning with parallel infrastructure investment programmes such as road resurfacing, treated water or wastewater network renewals.

The broad nature of this ongoing programme means the level of certainty varies with time. The short term level of uncertainty is low, although this increases over the medium and long term.

Mitigating flooding

$1.4 million has been allocated in the capital budget to enable works and design for the creation of a second stormwater trunk main for the Mason St catchment from Queens Gardens to a new proposed outfall at Cross Wharf. The assumed timing for these projects is 2017/18 and carries a moderate level of uncertainty as further modelling and risk analysis will be applied to ensure best value is achieved. For more information refer to the Mason St Integrated Catchment Management Plan http://www.dunedin.govt.nz/_data/assets/pdf_file/0008/227843/Mason-St-ICMPv1.pdf

The development of several stormwater detention areas to help alleviate bottlenecks and localised flooding issues is required. These types of projects are pursued as opportunities arise, making the level of uncertainty moderate.

Watercourse ownership

A further renewals consideration in the area of stormwater is the management of urban piped watercourses. The City has approximately 305km of watercourse; 98km are under DCC ownership (predominantly Parks and Reserves though six different departments of the Council own watercourses) and 207km are under private ownership. There is very little information held on watercourses, particularly those which are privately owned but the gross replacement cost of all these assets (both Council-owned and privately owned) is estimated at $220M. Prudent asset management would see approximately $2.2 million ($ today) per annum spent on renewing these assets; $740k by Council and $1.5M by private asset owners. There is a high level of certainty that this is not occurring at present and over time this situation means increasing risk to the management of Dunedin’s stormwater. The impacts of climate change will exacerbate this issue as rainfall intensities and subsequently the consequence failure increases in severity. The level of uncertainty of this project is high, as presently the subject is for consideration only.

Power outage resilience

A report will be considered by the Council as part of the 2015/16 LTP, which will outline the current level of 3 Waters infrastructure resilience to power supply outage. The mode and time to failure following a power outage of each energy reliant site was considered, defining the current level of service. It is anticipated that the Council will adopt a minimum level of service, and that the associated funds will be made available in line with a proposed 10 year work programme. This project has a high level of uncertainty as it is yet to be considered by elected members.
Conclusion

The draft Infrastructure Strategy demonstrates that the Dunedin City Council has well developed asset planning and management practices which are supported by a financial strategy that provides for the funding of forecast expenditure.

The 3 Waters and roading and footpaths groups of activity are well engaged with long term asset planning, with the Council adopting a 50 year 3 Waters Strategic Direction Statement and a 30 year Integrated Transport Strategy in recent years. These strategies are underpinned by asset management teams with a commitment to continuously improving asset condition knowledge and management of asset life cycles. This is particularly critical in Dunedin where one of the major infrastructure issues is the age of the assets themselves.

The major issues identified in this strategy are the age of infrastructure and the requirement to renew large numbers of these assets over the next 30 years. A number of activity specific issues are considered in this document as well as a high level summary of asset management practice, capability and capacity to deliver programmed work and issues relating deferrals of renewals.

Consideration of issues shows that there is a need to steadily increase the rate of asset renewal over the next 30 years. While this raises issues of affordability, the financial strategy acknowledges this as a necessity to maintain existing service levels. There is a need to spend more heavily in some activities to catch up on a backlog of renewals. However, it is more prudent to programme this expenditure in the medium term than to risk a longer term more expensive asset failure. The main options for managing infrastructure are summarised below.

Options for managing infrastructure

These are the main options available to the Council for managing infrastructure. The third option which involves funding infrastructure spending to the highest level required is not able to be pursued due to the cost of doing so, the lack of capacity in the sector to deal with the volume of work required and the adverse effects on residents from programming large amounts of work to be carried out at the same time. The two options that are considered in the strategy are options one and two. The second option is the Council’s preferred option.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Impact on Service Levels</th>
<th>Impact on Rates</th>
<th>Other Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>Leave renewals funding at present levels (No changes to the way we manage renewals)</td>
<td>Service levels will trend down over the next 10 years with more breaks in mains, overflows to streams and poorer response times due to the volume of emergency repair work that will be required. This will also drive up operational costs</td>
<td>A decrease in the overall rates requirement</td>
<td>Residents’ satisfaction with the service provided by the Council will be affected</td>
</tr>
<tr>
<td>Option 2</td>
<td>Step up renewals funding as proposed in the LTP and 30 year infrastructure strategy</td>
<td>Service levels will be able to be maintained, without current issues getting significantly worse before they are fixed</td>
<td>This work is being funded within the proposed rates increases in the LTP</td>
<td>Future renewals requirements are spread across a 10 - 30 year timespan. This will mean that the next round of renewals is not all required at the same time and we do not create an ‘infrastructure bubble’</td>
</tr>
<tr>
<td>Option 3</td>
<td>Add additional funding to the draft budgets to catch up backlog more quickly across the first five years of the LTP</td>
<td>The intention of this option is that service levels will be maintained and that the current issues will be fixed faster. Note: The Council may not be able to deliver the work faster due to limited availability of contractors to deliver the work</td>
<td>Increased rates</td>
<td>Overall rates increase well above 3% in the 10 years of the LTP. Funding that has been rated for is potentially not spent. Traffic disruptions due to large number of streets ‘dug up’ at the same time. Service disruptions to large numbers of customers while work is being carried at the same time in different areas of the city</td>
</tr>
</tbody>
</table>