From: Jenny Lapham
To: [redacted]
Subject: FW: LGOIMA
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Attachments: ActivityManagementPlanWorkingDocumentV15.pdf

Good afternoon [redacted]

Please find attached a copy of the Transport Activity Management Plan , as requested in your e-mail of 16 June 2021. Please note: that this document is a combination of the asset management plan and activity management plan, to meet the requirements of Waka Kotahi NZTA.

Regards

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Dunedin City Council

Transport Activity Management Plan

2021

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1 Executive Summary

1.1.1 Introduction

This Transport Activity Management Plan (AMP) sets out a 30-year plan for the prudent management of Dunedin's $1.7 billion worth of transport assets. It is one of a set of documents that provide the bottom-up detail to guide the Regional Land Transport Plan (RLTP), which in turn reflects the strategic priorities of Central Government and Dunedin City Council (DCC).

It helps inform DCC's strategic plans and business cases for new capital investment, and sets out proposed expenditure for operating, maintaining and renewing existing transport assets. It is developed using the business case approach and is a critical document as it forms the basis of DCC's funding application to Waka Kotahi for the next three years of the National Land Transport Fund (NLTP) from which the DCC is eligible for co-investment (53% - 51%).

This AMP has been developed in the context of Waka Kotahi's One Network Road Classification (ONRC). The ONRC framework was developed by Waka Kotahi and Local Government NZ in order to streamline the operation, maintenance and management of NZ road networks. The ONRC is aimed at assisting authorities set priorities by supporting a nationally consistent approach to classifying road networks and identifying appropriate levels of service to them.

1.1.2 Dunedin's transport network at a glance

Dunedin's transport network is relatively complex in comparison to most provincial centres. It is made up of a diverse range of assets and has an equally high mix of urban and rural roads within a varied topography.

Network summary	Replacement value $m
Roads: 1,768 km total - 1.073 km sealed and 693 km of unsealed.	$985.80
Stormwater: 1,126 km of kerb and channel, 8,622 of catch pits, 5,711 culverts, 826 of other drains.	$287.90
Bridges and walls: 243 bridges, 1,689 retaining walls, 314 sea walls	$201.80
Footpaths and cycleways: 976 km of footpaths and cycleways	$177.70
Streetlighting: 13,656 streetlights, 5 base stations, 3,313 tele-cells	$27.90
Traffic control: traffic controller, signals, signs, markings, intelligent systems.	$14.20
Minor structures: Rails, bollards, barriers, furniture	$18.10
Total	**$1,713.40**

1.1.3 Strategic context

1.1.3.1 A diverse and complex transport network

Dunedin is the second largest city in the South Island, one of the largest territorial authority's in NZ and the principal city in the Otago Region. The city is compact and has functioned largely unchanged for about 50 years. There are long standing issues of severance created by arterial routes through areas of high place value in Dunedin, such as the Tertiary Precinct, Warehouse Precinct, Queens Garden, hospital and retail quarter.

1.1.3.2 Poor safety record

Dunedin holds one of the worst road safety records in New Zealand with Dunedin's road users repeatedly over-represented in terms of road safety risk compared to other territorial authorities. Dunedin has the 10th highest safety risk rating in the country with deaths and serious injuries (DSI's) involving older road users and intersections providing Dunedin's worst record.

1.1.3.3 Rising construction costs, fiscal constraints and a decline in network condition

In recent years construction prices have increased significantly creating financial pressures in delivering renewal and maintenance programmes with limited Waka Kotahi funding and corresponding local share. Decisions on when, where and what to renew and the level of renewal and maintenance backlog that can be accepted while maintaining levels of service with limited funding is a challenging balancing act.

These fiscal constraints have resulted in asset management targets not being met for most renewal activities and technical level of service targets not being met for sealed roads and footpaths. As renewal investment decreases network condition deteriorates and there is increased risk of network disruptions, and higher whole of life costs as the level of maintenance required increases.

1.1.3.4 Population growth and demographics

Dunedin's resident population has increased higher than estimated which has shifted the city from a low growth centre to a medium growth centre. The population at the time of the 2006 census was 118,683 compared to 126,255 at the time of the 2019 census, an increase of 6.38%.

The demographics of Dunedin is unique in that the largest proportion of Dunedin's residents fall into the 15-30-year age bracket, which represented 26.57% of the resident population in 2018. Dunedin's population is also experiencing high growth in the number of residents over the age of 60.

A high representation of older and younger people in Dunedin's population will mean road safety improvement programmes, aimed at understanding and preventing road safety risk for these road users, will continue to be a key consideration in the management of DCC's transport activities.

Population growth will inevitably result in higher vehicle congestion on key commuter and freight routes particularly given the city's current heavy reliance on private vehicle use.

1.1.3.5 Reliance on private vehicle use

Regionally and nationally the transport network is dominated by private vehicle use. By comparison only a small proportion use public transport or active modes as a means of travelling to work. A high demand for private vehicle use will consistently put pressure on the transport network through wear and tear increasing maintenance and renewal needs. The transport network needs to be developed in order to support and encourage safe multi-modal use with suitable accessibility and delineation between vehicles, freight, pedestrians and cyclists.

1.1.3.6 Climate change, weather events and natural hazards

Sea level rise, flooding and storms are predicted to intensify over the next 30 years along with increased slips and erosion, increasing the risk to communities and transport networks. South Dunedin, the most densely populated part of the city, is particularly at risk of sea level rise and rising groundwater levels. Surface flooding is also expected to increase around the Dunedin Airport. Flood events can cause significant costs and place significant pressure on the local contracting market to respond with limited resource available. The July 2017 flood event resulted in $20 million of repair works that took over two years to complete. As weather events become more frequent and severe the networks ability to recover is put under pressure particularly for communities and industries accessible on vulnerable routes with limited alternative access options.

1.1.3.7 Dunedin's economic growth

Dunedin has strong and diverse economic foundations and acts as a major export hub for the lower South Island for the distribution of high value exports supporting industries such as forestry, dairy, fisheries and meat.

In addition, Dunedin has an unprecedented number of major transport and urban development related projects underway or being planned for over the next 10 years. The hospital rebuild in Dunedin's central city will involve the single biggest hospital build ever in New Zealand costing up to $1.4 billion.

Supporting these industries and maintaining key freight routes is vital. There is also opportunity to address Dunedin's key transport challenges to ensure the safe, effective and efficient movement of a diverse range of modes within a compact city centre comprising of varying business and transport needs.

1.1.3.8 The COVID 19 Pandemic

This AMP has been prepared during the COVID-19 pandemic. Though the long-term effects of the pandemic remain unknown transport will have an important part to play in supporting recovery with an ongoing need for transport services to improve access to employment and essential services, particularly for vulnerable communities. Maintaining safe and reliable road and rail freight connections, particularly to Port Otago, is vital.

1.1.3.1 Tourism

The New Zealand tourism market has been seriously affected by the closing of international boarders, and the impact may change the way tourism is viewed in New Zealand. This AMP has been prepared with an expectation that the international tourism sector will recover over time. Domestic tourism has increased as people are unable to holiday overseas, but peaks are limited to school holiday periods.

1.1.3.2 Technological changes

With emerging and new technologies, a step change in thinking will be required to how transport networks are used, serviced, managed and planned for in the future. Transport systems are expected to rely heavily on digital technologies supported by high quality data and information to enable users to plan, book and pay for journeys and to get the most out of existing infrastructure.

1.1.4 Strategic direction and alignment

Most of the Dunedin's transport maintenance, renewal and new capital programmes are subsidised by Waka Kotahi at a funding rate (53% - 51%). This funding is guided by the priorities set out in the Ministry of Transports Government Policy Statement on Land Transport (GPS). The GPS sets out the government's priorities for land transport expenditure. The key priorities in the GPS are:

- **Safety** – Developing a transport system where no-one is killed or seriously injured.
- **Better travel options** – Providing people with better transport options to access social and economic opportunities.
- **Climate change** – Developing a low carbon transport system that supports emission reductions, while improving safety and inclusive access.
- **Improving freight connections** – Improving freight connections for economic development.

The Dunedin Integrated Transport Strategy 2013 (ITS) is an overarching strategy covering the whole of Dunedin's transport system and is designed to enable DCC to review its investment priorities and ensure they are relevant to the current and future needs of Dunedin. It identifies and outlines 'areas of focus' developed from several transport challenges and issues that Dunedin faces. They cover:

- **Safety:** Improving Dunedin's road safety record.
- **Travel Choices:** Providing safe, viable travel options in addition to the car.
- **Accessibility:** Providing a high level of accessibility to key destinations such as education and recreation.
- **Network Resilience:** A resilient network where more people use sustainable modes to travel.

These areas of focus and the key issues strongly align to the goals of the GPS.

1.1.5 Key issues

In developing the business case for this AMP key issues are identified based on evidence accumulated from stakeholder engagement, the strategic assessment and levels of service. These issues are articulated in the following problem statements that identify cause and effect and help build a focused case for investment.

Problem 1: Theme: Safety *"A diverse network, inconsistent layout and competing users results in serious and fatal incidents"*
Problem 2: Theme: Changing User Demand *"Network constraints along with changing demands and provision for private motor vehicles results in poor access for alternative transport demands"*
Problem 3: Theme: Resilience and funding *"Ageing infrastructure, climate events, a lack of funding and vulnerable key routes are a risk to economic and social well-being"*

1.1.6 Strategic response

The DCC takes a programme, policy and risk-based approach in response to the key issues to ensure all options are considered. Many of the responses are interlinked to the issues they seek to address. For example, predictive modelling will assess the safety impact of proposed structural and/or activity changes to the network as well as assess its suitability for various modes and provide opportunity to use networks more efficiently and cost effectively. These strategic responses are outlined below:

Issue	Programme/Funding	Policy	Risk based
Primary – Safety	Targeted safety programme Education programmes Community communications Safety in design Central city/tertiary upgrade Shaping Future Dunedin	Network operating framework Speed limit review	Predictive modelling Prioritisation of investment by ONRC Development of MIS and LOS document in prioritising safety issues
Primary - Resilience	Sustained renewal investment Structures renewals programme Uplift in drainage programme Opportunities for betterment during renewals where assets are no longer fit for purpose Build Waka Kotahi investor confidence	Consider dropping levels of service? Develop a policy to transfer ownership of non-economic roads and road reserve	Development of MIS and LOS document for prioritising renewals and maintenance decisions. Prioritisation by ONRC Risk matrix applied to structural renewals Reduce DCC cost by finding scope to reduce DCC's cost price premium in supplier contracts Predictive modelling
Primary – modal shift	New cycleways programme Bus priority programme Central city/tertiary upgrade Address backlog in footpath renewals Line/signs programme Safety programme Shaping Future Dunedin	Speed limit review Development of Dunedin's network operating framework.	Apply the One Network Framework Integrated approach to planning Application of the MIS to improve signage and line marking Reduction in roads in favour of active mode networks Predictive modelling

1.1.7 The investment required

DCC's proposed funding expenditure for the next three years for 2021/24 is:

	$ million	$ million	$ million	%
	Forecast 2018/21	**Forecast 2021/24**	**Change**	**Change**
Maintenance	31,724	**41,715**	9,991	31%
Renewals	37,183	**69,670**	32,487	87%
New Capital	93,040	**123,442**	30,402	33%
Annualised renewals and maintenance	22,969	**37,128**	14,160	62%

Costs reflect a sustained increase in renewal quantities to address the steady decline in network condition and catch up on a growing backlog of renewals. Costs have been prepared based on contracted rates from the recently procured 10-year maintenance contract. Annualised, the cost of renewals and maintenance equates to $37 million versus $23 million from the previous three years – an increase of $14 million or 62%. This will equate to approximately a 4.5% rise in rate funding.

New capital projects are focused on improving user safety, alternative modes and address social and economic opportunities. Key projects cover:

- Low cost low risk safety improvements
- Tertiary Precinct/George Street Safety and Accessibility Upgrade
- Waterfront Bridge Connection
- Safer Streets Arterial improvements
- Dunedin Tunnels Trial
- Rail Passing Loop
- Princess Street Bus Priority and Corridor Safety Plan
- Harbour Arterial Efficiency Improvements

1.2 Commercial and management case

The DCC is well positioned to deliver to these maintenance, renewal and new capital programmes and can demonstrate that maintenance and renewal activities provide value for money to the rate payer.

Since presenting the previous AMP for the 2018/21 RLTP period the DCC Transport Group has made significant improvements to its delivery, procurement and contract management capabilities addressing all the issues sited in Waka Kotahi's 2017 investment audit and receiving an exemplary audit in 2019.

The Transport Group has consistently delivered to its safety improvement programme and renewal programmes – on time, on budget and within scope.

On-going improvements are being made to asset and activity management systems and processes. The Transport Group scores very highly for asset data quality and is the second highest ranked territorial authority nationally. This supports a robust, evidence-based process for activity management and renewal and maintenance planning.

The Transport Group has advanced the development of Dunedin's Network Operating Framework which in turn will inform the One Network Framework. This is a result of collaborative partnerships and stakeholder engagement through initiatives such as Shaping Future Dunedin. This demonstrates an integrated approach in the future planning of the transport network considering all modes of transport, modal conflicts, safety and accessibility.

The DCC can demonstrate its renewal and maintenance programmes achieve value for money. Maintenance costs per kilometre are in line with the complexity of Dunedin's transport network and its equally high proportion of urban and rural roads. The average life achieved for re-seals are in line, and in some cases above, national and regional averages. Budgets are prepared from the bottom up applying construction rates from recently, competitively tendered maintenance contracts.

1.3 The Improvement Plan and looking forward….

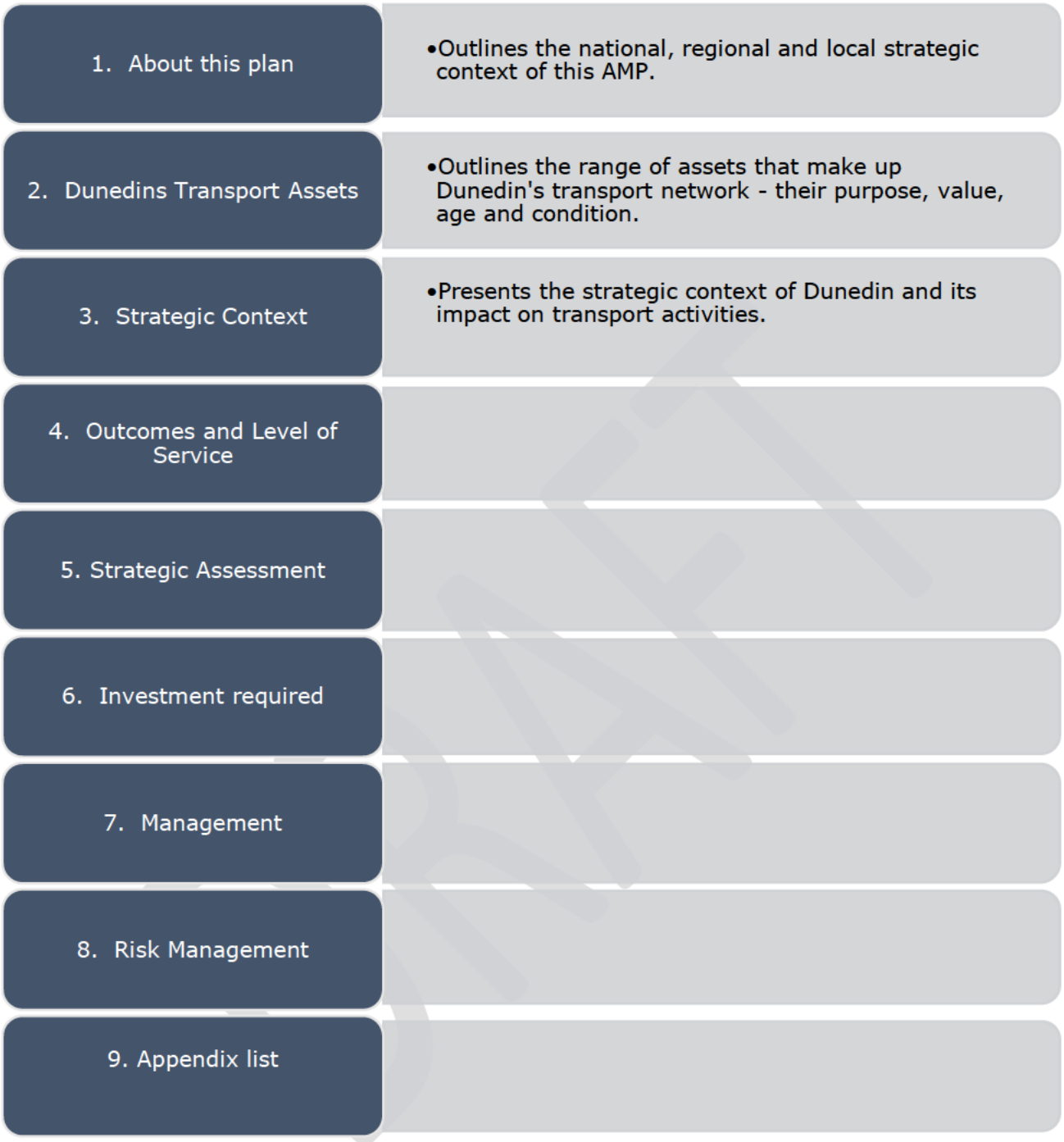
Asset and activity management involves an on-going process of assessment to identify areas for continuous improvement that will inform a suitably prioritised plan of action. The DCC Transport Group has worked hard to regain the investment confidence of Waka Kotahi through higher levels of engagement and addressing audit concerns. Emphasis is now on delivering to core renewal and maintenance programmes to address the decline in network condition but decisions on when, where and what to renew and the level of renewal and maintenance backlog that can be accepted is a challenging balancing act with limited Waka Kotahi funding and rate payer local share.

This will require new thinking and on-going initiatives. These include:

- Reducing DCC's cost price premium and moving to cost reimbursable, collaborative partnership style contract models.
- Rationalisation of delivery and customer service teams and processes.
- Development of Council policies to cost effectively tackle dust suppression on the unsealed network and support re-seal decisions.
- Find opportunity to transfer ownership and/or liability of non-economic roads (Mt Allen Road).

Further initiatives are outlined in the improvement plan (Appendix K)

Figure 1: Outline of the AMP



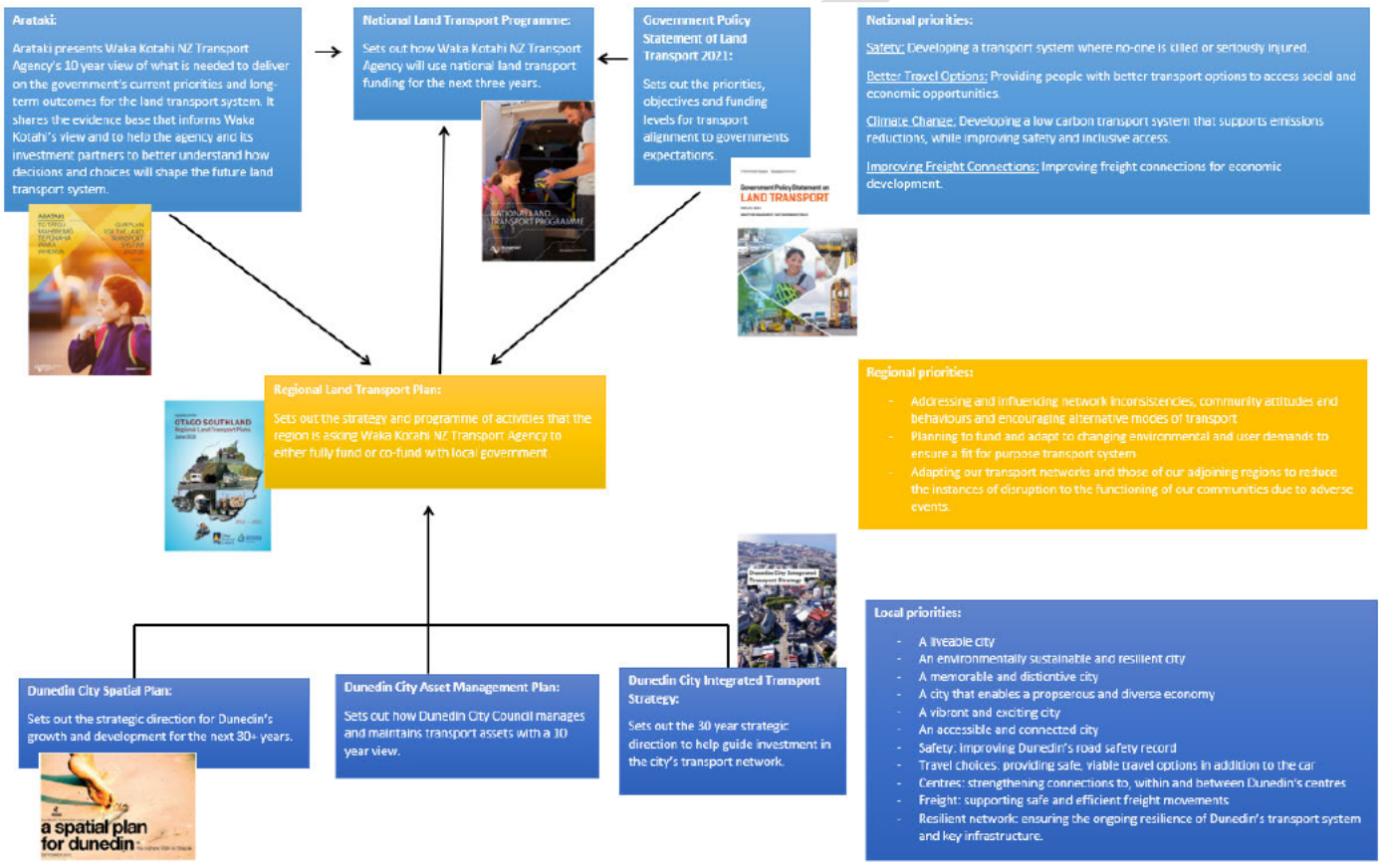
2 About this plan and its strategic context

Dunedin City's Transport Activity Management Plan (AMP) sets out a 30-year plan for the prudent management of Dunedin's $1.7 billion worth of transport assets.

The AMP is one of a set of documents that provide the bottom-up detail to guide the Regional Land Transport Plan (RLTP), which in turn reflects the strategic priorities of Central Government and Dunedin City Council (DCC) as outlined in the below figure.

The AMP is a critical document in that it forms the basis of DCC's funding application to Waka Kotahi for the next three years of the National Land Transport Fund (NLTP) from which the DCC is eligible for co-investment at a subsidy rate of 53% of cost for 2021/22, 52% for 2022/23 and 51% for 2023/24.

Figure XX: The role of the AMP in relation to other plans and strategies for DCC



2.1.1 Government Policy Statement (GPS)

The Land Transport Management Act (LTMA) requires the Minister of Transport to issue the Government Policy Statement on Land Transport (GPS) every three years. The GPS sets out the government's priorities for expenditure from the National Land Transport Fund over a 10-year period, and how funding should be allocated. Regional land transport plans must be consistent with the GPS, and Waka Kotahi must give effect to it with regards to land transport planning and funding.

The key priorities in the GPS on land transport 2021 are:

- **Safety** – Developing a transport system where no-one is killed or seriously injured.
- **Better travel options** – Providing people with better transport options to access social and economic opportunities.

- **Climate change** – Developing a low carbon transport system that supports emission reductions, while improving safety and inclusive access.
- **Improving freight connections** – Improving freight connections for economic development.

These priorities set to achieve the following outcomes for the transport system as described in the Transport Outcomes Framework which applies the Living Standards Framework to the transport system.

- Inclusive access
- Healthy and safe people
- Environmental sustainability
- Resilience and security
- Economic prosperity

2.1.2 Regional Land Transport Plan (RLTP)

The RLTP sets out the region's land transport objectives, policies and measures for at least 10 financial years, as required under section 16 of the Land Transport Management Act 2003. The direction for the RLTP is an essential part of the strategic context for any land transport investment proposal.

The RLTP's are prepared by the Regional Transport Committees every six years. The Land Transport Management Act 2003 sets out in detail the requirements of an RLTP, including the requirement to complete a review of an RLTP during the six month period before the end of the 3rd year of the plan.

RLTP's describe the regions long-term vision and identifies its short to medium term investment priorities to move towards this vision. They also include a regional programme of transport activities proposed for funding over the next three to six years.

RLTPs are the primary vehicle for discussing and agreeing a clear set of regional outcomes, priorities and improvement projects in the land transport space. They describe the gap between where we are and where we need to get to, along with the programme of activities needed to bridge that gap. Therefore, RLTPs tell a powerful story about a region and its aspirations.

The RLTPs are a critical component for Waka Kotahi in developing the National Land Transport Plan (NLTP).

2.1.3 Integrated Transport Strategy (ITS)

The Dunedin Integrated Transport Strategy 2013 (ITS) is one of eight strategies that work together to support the vision that Dunedin is ***"One of the world's great small cities".*** It is an overarching strategy covering the whole of Dunedin's transport system and is designed to enable DCC to review its investment priorities and ensure they are relevant to the current and future needs of Dunedin.

There are five central themes to the document known as the 'Areas of Focus', these were developed from several challenges that Dunedin faces and sets out the direction for future investment.

Areas of focus are as follows:

- **Safety:** Improving Dunedin's road safety record.
- **Travel Choices:** Providing safe, viable travel options in addition to the car.
- **Accessibility:** Providing a high level of accessibility to key destinations such as education and recreation.
- **Network Resilience:** A resilient network where more people use sustainable modes to travel.

The DCC's ITS was adopted in 2013 and is due for a review. This process is expected to commence in 2021.

2.1.4 Arataki

Arataki is Waka Kotahi's 10-year view of what is needed to deliver on the government's current priorities and long-term outcomes for the land transport system. Arataki outlines the context for change, the step changes in existing responses that it believes are needed, and the levers that Waka Kotahi will use, in partnership with others, to shape change. It includes national, pan-regional and regional areas of focus.

The five step changes Arataki identifies are:

- Improve urban form
- Transform urban mobility
- Significantly reduce harms
- Tackle climate change
- Support regional development

The six levers Arataki identifies are:

- Policy and regulation settings
- Spatial and place-based planning
- Network design management and optimisation
- Investment in infrastructure and services
- Economic tools (pricing and incentives)
- Educational, engagement and awareness

Waka Kotahi's focus for Otago will be on supporting urban development in Dunedin and Queenstown to enable thriving communities and encourage an increased use of the public transport system, walking and cycling. Focus will be on creating a safer, more resilient land transport system that supports economic and regional growth as part of the COVID 19 recovery, maintains critical connections and appropriate levels of service.

2.1.5 Activity Management Plan (AMP)

This AMP sets out a programme to prudently manage transportations assets in the long term. It helps inform DCC's strategic plans and business cases for new capital investment, and to set out its proposed expenditure for operating, maintaining and renewing its existing assets.

Activity management planning considers assets in the context of the services they are supporting and clarifies the purpose of holding those assets. Waka Kotahi's stated goal of good asset management is to support the delivery of a level of service in the most cost-effective manner, taking long term sustainability into account.

This AMP is a key accountability mechanism and communication tool demonstrating that sound asset management practices and a business case approach has been undertaken, as the basis of the DCC's investment decision-making, and of its approach to managing transport assets and customer's needs.

This is critical as the AMP will form the basis of DCC's funding application to Waka Kotahi for the three years from 2021/2022 to 2023/2024 and will set the case for investment in DCC's 2021/2022 LTP.

2.1.6 Process for developing this AMP

This AMP is developed using the business case approach and follows The Road Efficiency Group (REG) and Waka Kotahi's guidance on how to apply the business case approach to maintenance, operations and renewals.

The business case approach ensures that work activities and programmes are focused on the right areas and therefore investment decisions are prioritised in the area's they are most needed, providing value for money. The first stage of developing a business case is the strategic case.

This strategic case has two parts. The first part is the strategic context. The strategic context describes the current conditions and/or environment in which Dunedin's transport network exists. It sets out the alignment within the national policy framework, local strategic directions and other organisational priorities.

The second part is the strategic assessment. The strategic assessment sets out the problems, opportunities and challenges for Dunedin and provides a critical review of the network within the context of emerging issues, competing outcomes, and development of performance and reporting measures. It forms the basis for this AMP's programme.

This AMP has been developed in the context of Waka Kotahi's One Network Road Classification (ONRC). The ONRC framework was developed by Waka Kotahi and Local Government NZ in order to streamline the operation, maintenance and management of NZ road networks. The ONRC is aimed at assisting authorities set priorities by supporting a nationally consistent approach to classifying road networks and identifying appropriate levels of service to them.

Under the ONRC framework roads are divided into six classes based on: traffic volumes, connections to important destinations like hospitals, airports or ports, tourist routes and roads that provide the only access for communities. The six classes are shown in the table below.

ONRC class	Regional	Arterial	Primary collector	Secondary collector	Access	Low volume
Typical traffic volumes	Urban >15,000 Rural >10,000	Urban >5,000 Rural >3,000	Urban >3,000 Rural >1,000	Urban >1,000 Rural >200	Urban <1,000 Rural <200	Urban <200 Rural >10,000

The ONRC framework will help local government and Waka Kotahi to plan, invest in, maintain and operate the road network in a more strategic, consistent and affordable way throughout the country. The ONRC defines the nationally expected fit for purpose levels of service for each road classification to better enable delivery improvements and demonstrate value for money. The framework has six customer outcomes: resilience, travel time, reliability, accessibility, amenity, safety and efficiency. These are discussed in more detail in the level of service section of this AMP.

2.1.7 Key Stakeholders in the AMP

In developing this AMP, the following key stakeholders are considered and consulted on.

Table 1: AMP Key stakeholders

Key Stakeholder	Role in Asset Management Plan
Waka Kotahi (NZTA)	Co-investors Key collaborator in the development of this AMP
Ratepayers	Investors Council represents
Ministry of Transport	Sets the national strategy
Iwi	Councils treaty partners
NZ Police	Key stakeholder in the development of the business case
Transport Maintenance Contractor	Key supply partner Key stakeholder in the development of the business case

Key Stakeholder	Role in Asset Management Plan
	Partner in the development of the maintenance intervention strategy and level of service document – key documents in the operationalisation of this AMP and the application of ONRC.
Other Contractors	
Tertiary institution – Polytech and University	Will play an important role in development of key projects in the city – Central city upgrade, tertiary precinct, safety improvements.
Schools	Schools will play an important role in development of key safety projects in the city.
DHB	The new Dunedin hospital will have a significant impact on Dunedin's transport network, particularly in the CBD and have an active role in Shaping Futures Dunedin.
Other business	Businesses will play an important role in the development of key projects in the city – Central city upgrade, tertiary precinct, safety improvements.
Otago Regional Council and Regional Land Transport Committee	Key collaborators in the development of the business case approach Set's the regional strategy
Councillors and Community Board members	Represent the needs of community/shareholders, Allocate resources to meet planning objectives in providing services while managing risks, Ensure service sustainable.
Senior Management	Endorse the development of asset management plans and provide the resources required to complete this task. Adopt council wide asset management strategy and provide corporate support for asset owning departments. Support implementation of this asset management plan and budgets required to cover improvements.

2.2 Council's Strategic Framework

Dunedin's vision is to be ***"One of the world's great small cities".*** To help direct the city's limited resources towards achieving this vision, the Council, along with the community and stakeholders, has developed a strategic framework with key priorities for investment, effort and development.

The framework covers the following eight strategies that align to the Transport Group's projects, programmes and/or performance measures as follows:

Table 2: Transport Groups alignment to DCC's Strategic Framework

	Citywide strategy	Group's relevant projects, programmes or performance measures
Social Wellbeing	A supportive city with caring communities and a great quality of life	The central city upgrade will improve safety in the central city and contribute to a more vibrant and thriving central city environment. The tertiary precinct upgrade will enhance safety and accessibility in this area. The Dunedin urban cycle ways will improve road safety for cyclists. The Low cost/low risk safety improvement programme will improve safety and accessibility for all users. The series of major centres upgrades will increase the level of service in our major town centres outside of the CBD. Bus Priority Programme will support efficient, safe, cost effective and lower carbon travel choice for road users. Considered in all procurement opportunities – key example DCC's ten-year transport maintenance contract that commits to wider social initiatives.
3 Waters	A healthy city with reliable and quality water, wastewater and stormwater systems	n/a
Spatial Plan	A compact city with a vibrant CBD and thriving suburban and rural centres	The central city upgrade will improve safety in the central city and contribute to a more vibrant and thriving central city environment. The series of major centres upgrades will increase the level of service in our major town centres outside of the CBD. The city to waterfront connection will improve accessibility and amenity in the waterfront area and contribute to a more vibrant and thriving city environment.
Economic Development	A successful city with a diverse, innovative and productive economy	The central city upgrade will improve safety in the central city and contribute to a more vibrant and thriving central city environment attracting more people to live, work, study and visit Dunedin. The city to waterfront connection will improve accessibility and amenity in the waterfront area and contribute to a more vibrant and thriving city environment. The tertiary precinct upgrade will enhance safety and accessibility and vibrancy of the streets around Dunedin's tertiary institutions and encourage and support active and public transport use. The series of major centres upgrades will increase the level of service in our major town centres outside of the CBD. An on-going program of renewals will maintain existing levels of service across the transport network, supporting key freight and movement routes that supports the economy.
Ara Toi	A creative city with a rich and diverse arts and culture scene	The Art and Creativity in Infrastructure Policy will embed art and creativity into the infrastructure projects.

Integrated Transport	A connected city with a safe, accessible and low-carbon transport system	The Peninsula connection improvements will improve safety, resilience and walking and cycling options. The city to waterfront connection will improve accessibility and amenity in the waterfront area and contribute to a more vibrant and thriving city environment. An on-going program of renewals will maintain existing levels of service across the transport network, including pavement reseals, pavement rehabilitations, seawalls, retaining walls bridges, footpaths and kerb and channels. The safety improvement program will improve safety and accessibility. Bus Priority Programme will support efficient, safe, cost effective and lower carbon travel choice for road users. The three cycle projects (Safer Streets, Dunedin Tunnels Trail and North East Valley Cycleway) improve safety, connectivity, access and attractiveness of cycling as a mode of transport to key destinations across the city. Our travel demand management and road safety promotion programme will encourage, support and promote road safety and mode shift away from single occupancy vehicles to active or public transport uptake.
Te Ao Tūroa	A sustainable city with healthy and treasured natural environments	Bus Priority Programme supports a cost effective and lower carbon travel choice. Cycling improvements will enable residents to make the most of the active transport network across the city, contributing to lower carbon emissions and a healthy, more active community.
Parks & Recreation	An active city with quality and accessible recreational spaces and opportunities	The Peninsula connection improvements will provide for walking and cycling from portobello Road to Harrington Point. Further development of Dunedin's urban cycle ways will encourage cycling uptake, which will enable more people to safely take up active transport more regularly. The tertiary precinct upgrade will enhance the pedestrian and cycling environment in this area The city to waterfront connection will improve accessibility and amenity in the waterfront area and contribute to a more vibrant and thriving city environment.
Carbon Zero	Carbon Zero by 2030	Bus priority programme supports a lower carbon travel choice of PT. The Peninsula connection improvements and other cycling and footpath supports lower carbon travel choice of cycling and walking. Car parking upgrade supports a more efficient use of parking space. Cycling improvements will also encourage and enable more people to choose cycling as their mode of transport. Our travel demand management programme will encourage, support and promote mode shift away from single occupancy vehicles to active or public transport uptake.

2.2.1 Carbon Zero 2030

In 2019 the DCC declared a climate emergency and committed to a target of becoming carbon zero by 2030. Developing long term supply chain partnerships was identified as a key enabler in supporting this strategic commitment and is a mandatory consideration in the planning for any material infrastructural

procurements and projects. Transport's 10-year road maintenance contract procured in 2020 commits to a variety of long-term sustainability initiatives.

In June 2019, DCC declared a climate emergency. The 'Zero Carbon 2030' target seeks to achieve city-wide net carbon neutrality (excluding biogenic methane) by 2030. The transport sector is Dunedin's most significant, and fastest growing, source of emissions. Trends suggest, however, that with increasing investment in infrastructure to improve the levels of service for transport modes alternative to cars, there is a slow increase in uptake of these modes. For both Transport and 3 waters, improvements in data quality has been identified as a key step in supporting efforts to reduce emissions.

2.3 National Strategic Framework

Several statues and policy documents provide the legislative and policy context for land transport planning and investment at the national, regional and local level. These have informed the development of this RLTP.

2.3.1 Land Transport Management Act 2003

The Land Transport Management Act (LTMA) 2003 is the principle statute guiding land transport planning and funding in New Zealand. The purpose of the Act is to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system. The LTMA sets out the core requirements of regional land transport plans and regional public transport plans for every region.

2.3.2 Resource Management Act (RMA) 1991

The Resource Management Act (RMA) 1991 aims to promote the sustainable management of natural and physical resources and provides the statutory framework for land use planning and the development of regional policy statements, regional plans and district plans. Land use planning can have a significant influence on travel choice and transport network demand. Likewise, transport network investment can shape land use patterns within a region.

2.3.3 Local Government Act (LGA) 2002

The Local Government Act (LGA) 2002 guides local government planning and the way councils carry out their functions. It includes provisions guiding the development of council long-term plans and infrastructure strategies, where the local funding share for transport network investment is identified alongside other local investment priorities. The LGA also sets out consultation principles that are relevant for development of regional land transport plans.

2.3.4 The Climate Change Response Act 2002

The Climate Change Response Act 2002, was amended by the Climate Change Response (Zero Carbon) Amendment Bill in 2019. The Act now provides a framework for New Zealand to develop and implement climate change policies that contribute to global efforts under the Paris Agreement to limit the global average temperature increase to 1.5 degrees Celsius above pre-industrial levels. Key provisions include setting a target to reduce net carbon emissions to zero by 2050. The transport sector will have a key role in contributing to achieving this target and the direction set at a national level has informed the development the RLTP.

2.3.5 Transport Outcomes Framework

This framework takes a strategic, long-term, and integrated approach to transport and makes clear what government is aiming to achieve through the transport system in the long term. The five outcomes are:

- Inclusive access: enabling all people to participate in society through access to social and economic opportunities, such as work, education, and healthcare

- Healthy and safe people: protecting people from transport-related injuries and harmful pollution and making active travel an attractive option.
- Environmental sustainability: transitioning to net zero carbon emissions, and maintaining or improving biodiversity, water quality, and air quality.
- Resilience and security: minimising and managing the risks from natural and human-made hazards, anticipating and adapting to emerging threats, and recovering effectively from disruptive events.
- Economic prosperity: encouraging economic activity via local, regional, and international connections, with efficient movements of people and products.

All these outcomes are inter-related. To make a positive contribution across the five outcomes, the transport system also needs to be integrated with land use planning, urban development, and regional development strategies.

2.3.6 Road to Zero Safety Strategy 2020 – 2030

Road to Zero articulates the government's vision of a "New Zealand where no one is killed or seriously injured in road crashes". The strategy includes guiding principles for design of the road network and road safety decisions, as well as targets and outcomes for 2030. It sets out the five areas of focus for the next decade: infrastructure improvements and speed management; vehicle safety; work-related road safety; road user choices; and system management.

2.3.7 Resource management system review

In 2020, an independent panel appointed by the Minister for the Environment completed a comprehensive review of the resource management system. The review's scope included looking at the Resource Management Act 1991 and its interfaces with the Local Government Act 2002, the Land Transport Management Act 2003, and the Climate Change Response Act 2002 (including the then Zero Carbon Amendment Bill, which has since been enacted and incorporated into the Climate Change Response Act). The review recommended the current Resource Management Act be replaced with three new pieces of legislation: a Natural and Built Environments Act, a Strategic Planning Act and a Managed Retreat and Climate Change Adaptation Act. The panel's report is expected to be followed in 2021 by consultation to develop government policy and a framework to link together the key pieces of legislation.

2.3.8 Urban Growth Agenda

The Urban Growth Agenda is a Government work programme that aims to remove barriers to the supply of land and infrastructure and make room for cities to grow up and out. It has five interconnected focus areas: infrastructure funding and financing; urban planning; spatial planning; transport pricing; and legislative reform.

The National Policy Statement on Urban Development 2020 (NPS-UD 2020) came into effect on 20 August 2020. The NPS-UD supports the objectives of the Urban Growth Agenda by requiring local authorities to ensure there is sufficient zoned development capacity available in the short, medium and long term to meet forecast demand for housing. Dunedin is categorised as a tier 2 urban environment, bringing into effect a range of provisions relating to the amount of development capacity required to be serviceable with infrastructure.

2.3.9 National Policy Statement on Urban Development 2020 (NPS UD)

The NPS UD came into effect on 20 August 2020. The NPS-UD supports the objectives of the Urban Growth Agenda by requiring local authorities to ensure there is sufficient zoned development capacity available in the short, medium and long term to meet forecast demand for housing. Dunedin is

categorised as a tier 2 urban environment, bringing into effect a range of provisions relating to the amount of development capacity required to be serviceable with infrastructure.

This includes investing in transport networks to drive more efficient and liveable urban forms and ensuring active travel that provides health benefits is a more attractive and accessible choice. The NPS UD will enable more compact, multi-unit dwellings to be built close to public transport, services and amenities, as well as Greenfield development opportunities.
This policy direction will provide important context for land use and transport integration policies within RLTPs, particularly for regions with major urban areas and growth pressures. The NPS UD will strengthen the existing requirement for regions to have future development strategies to guide long term planning.

2.3.10 New Zealand Energy Efficiency and Conservation Strategy (NZEECS) 2017 - 2022

Sets the overarching direction for government and specific actions for the promotion of energy efficiency and renewable sources of energy. The current NZEECS includes 'Efficient and low-emissions transport' as one of three priority areas, with an associated target for electric vehicles make up two per cent of the vehicle fleet by the end of 2021.

3 Dunedin's Transport Assets

3.1 Introduction

Dunedin's transport network is made up of a diverse range of assets. They are revalued annually and in 2020 had a total replacement value of $1.7 billion. Assets depreciate by approximately $23.4 million annually or $64 thousand daily.

Dunedin's transport assets are aging with many nearing or having exceeded the end of their useful economic lives. With limited budgets and funding the prudent management of these assets is paramount to ensure investment is prioritised where most needed. A great emphasis is therefore placed on regular inspections and on-going condition assessments applying methodologies most suitable for the asset type being managed and this helps guide renewal investment. These methodologies are explained in more detail in the management section of this AMP.

Table XX: Summary of Asset Valuation

Carriageway		Replacement value	Depreciated value	Annual depreciation	% of value
	1,766 km of roads, of which 1,073km are sealed and 693km unsealed	$m $985.80	$m $699.50	$m $11.70	58%
Stormwater		Replacement value	Depreciated value	Annual depreciation	
	1,126 km of surface water channel, 8622 Catchpits, 5,711 culverts and 826 other drain types	$287.90	$114.60	$3.80	17%
Bridges and Walls		Replacement value	Depreciated value	Annual depreciation	
	243 Bridges, 1,689 retaining walls and 314 sea walls	$201.80	$90.90	$2.30	12%
Footpaths and cycleways		Replacement value	Depreciated value	Annual depreciation	
	976 km of footpaths and cycleways, 22,220 m2 of other (crossings etc)	$177.70	$127.40	$3.50	10%
Streetlighting		Replacement value	Depreciated value	Annual depreciation	
	13,656 Streetlights, 5 Base stations, 3,313 telecells	$27.90	$10.10	$1.00	2%
Traffic Control		Replacement value	Depreciated value	Annual depreciation	
	Traffic controllers, signals, signs, markings, intelligent systems, speed controls and islands	$14.20	$5.30	$0.70	1%
Minor Structures		Replacement value	Depreciated value	Annual depreciation	
	Rails, bollards, barriers, furniture and other	$18.10	$9.20	$0.60	1%
		$1,713.40	$1,057.00	$23.60	

3.2 The Road Network

Dunedin's road network covers 1,767 km's in length with 40% (711 km's) in the urban environment and 60% (1,054 km's) in the rural environment. It is the highest valued asset type with a replacement value of $985.80 million representing 58% in value of transports total asset portfolio.

Arterial and primary collector roads make up 12% of the network but carry 71% of the traffic volumes (VKT).

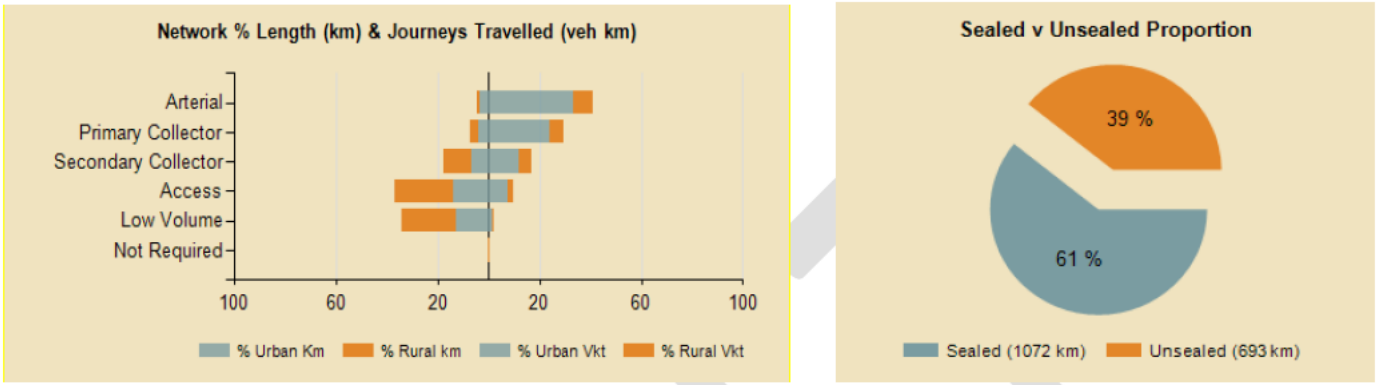
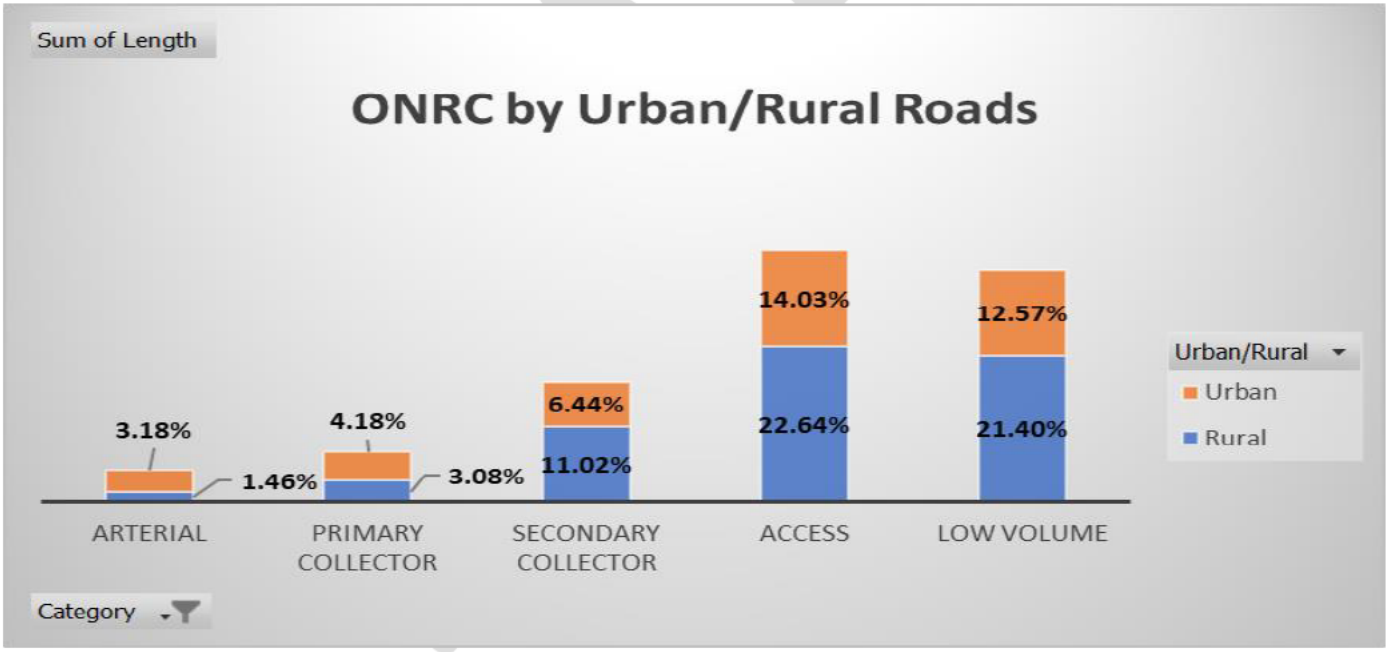
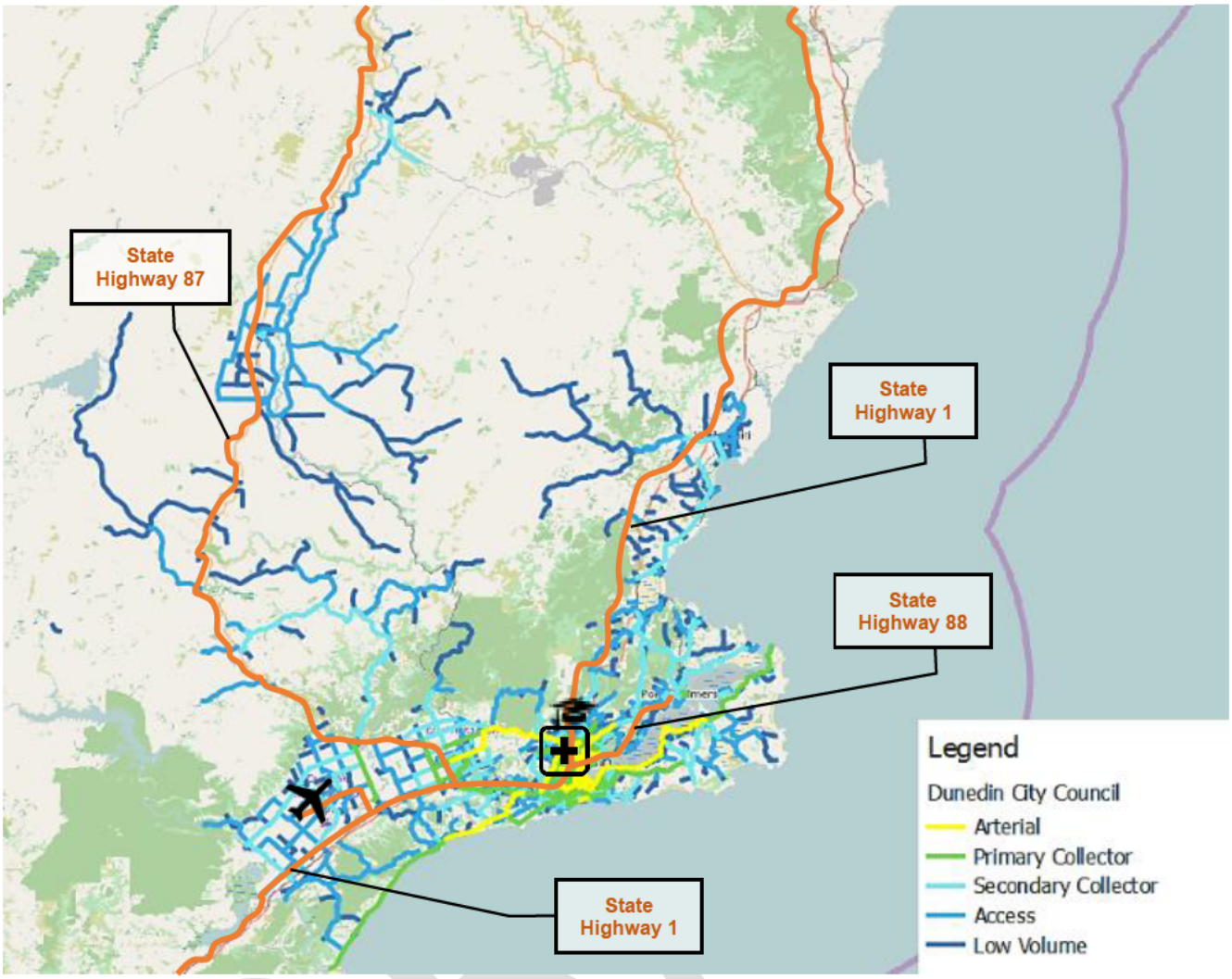


Figure 2: Road Network by ONRC



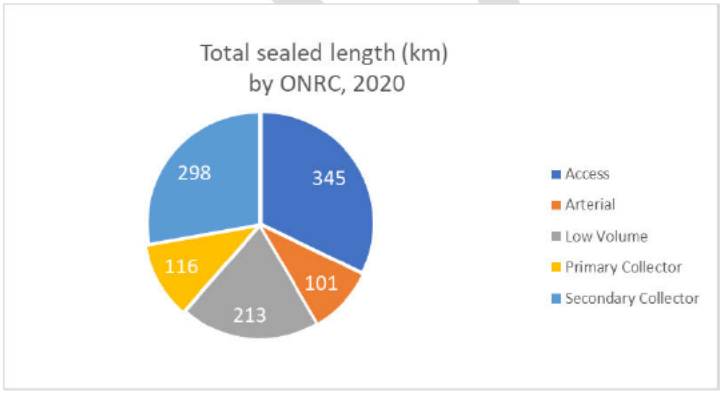
The figure below provides a geographical view of the road network by ONRC road classification in conjunction with the state highway network and shows Dunedin has a high proportion of both rural and urban roads.

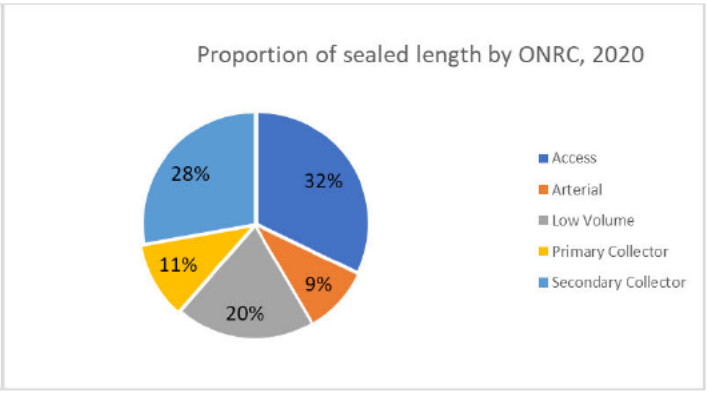
Figure 3: Geographical view of the DCC and highway network by road classification



3.3 Sealed road network

The sealed road network is 1,073 km's long and makes up 61% of the total road network. It is broken down by ONRC category as follows:



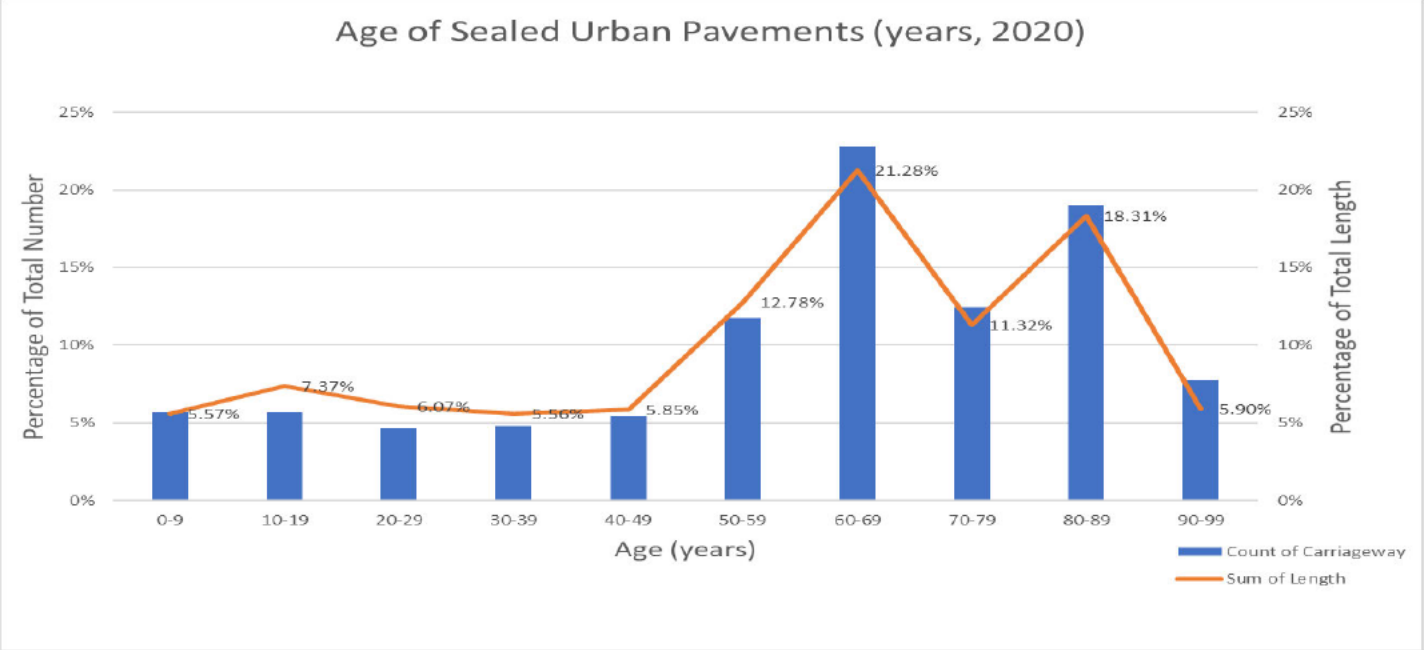


3.3.1 Sealed pavements – age and condition

A sealed pavement is the structure beneath the surface of the road that supports its strength and form. When pavements fail remedial work can be extremely costly involving re-habilitation work. Timely road maintenance treatments to protect the pavement and prevent costly failure is essential.

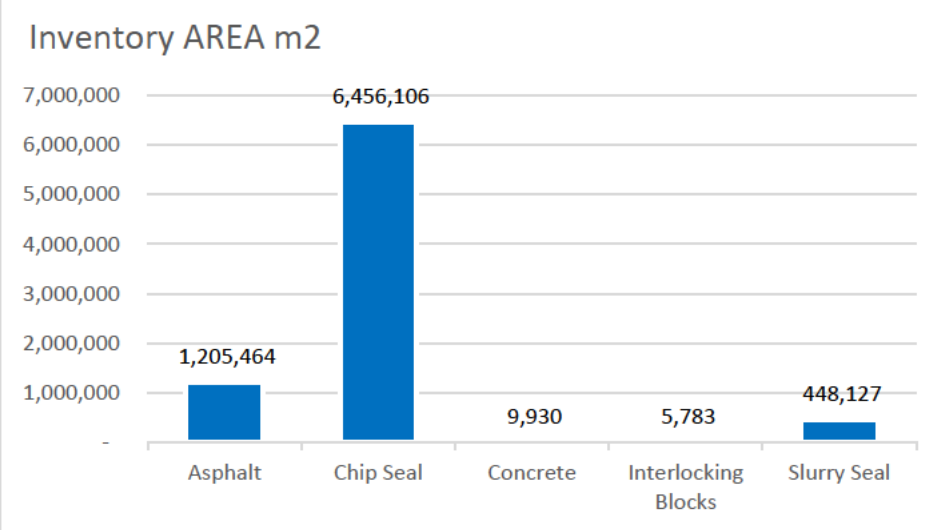
Most of Dunedin's sealed pavements have a theoretical useful life ranging from 60 to 100 years. As the table below shows 57% of pavements are aged 60 years and over. This emphasises the importance of on-going inspections to detect faults and intervene early.

In 2020 the Transport Group embarked on an extensive programme of deflection testing. Deflection testing measures the deflections of the pavement to an imposed load. High deflections indicate a weak pavement and lower defections stronger pavements. These results and an on-going programme of testing will be used in the management of Dunedin's pavements to help ensure treatments are applied when and where most needed with lives maintained for as long as possible.



3.3.2 Surface material – age and condition

As outlined in the figure below most of the sealed network surface is constructed with chip seal.



Based on condition data collected over the past 5 years road condition appears to be in decline. The roughness of the road is increasing for all of Dunedin's road categories, including urban and rural. In comparison to its peers Dunedin also performs badly. Smooth travel exposure for urban roads has sat below target (DIA level of service measure) for the past 11 years and has slowly declined.

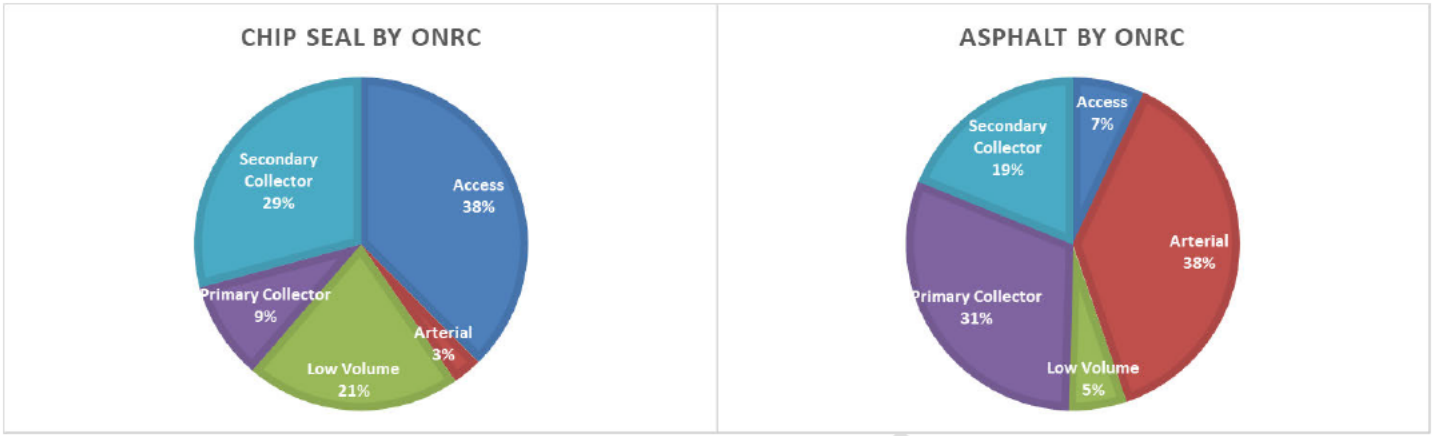


Figure 6: Smooth travel exposure trend over time – trend over time

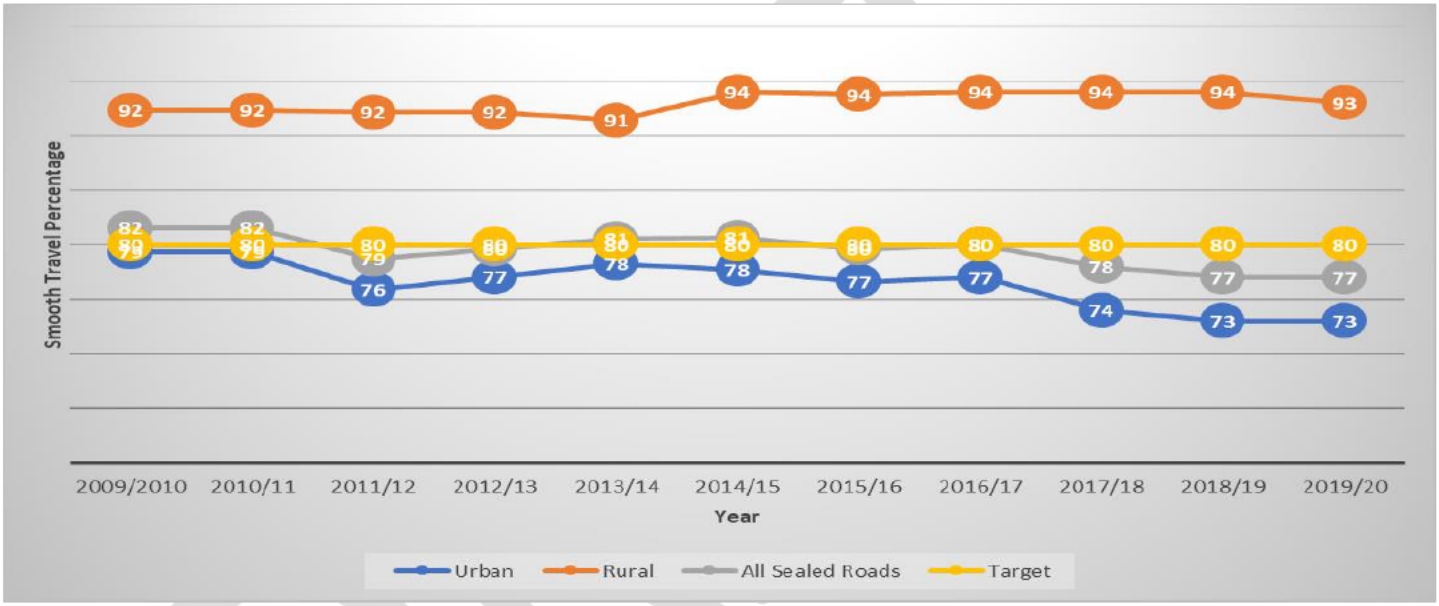


Figure 6: Trend in Smooth Travel Exposure by ONRC category

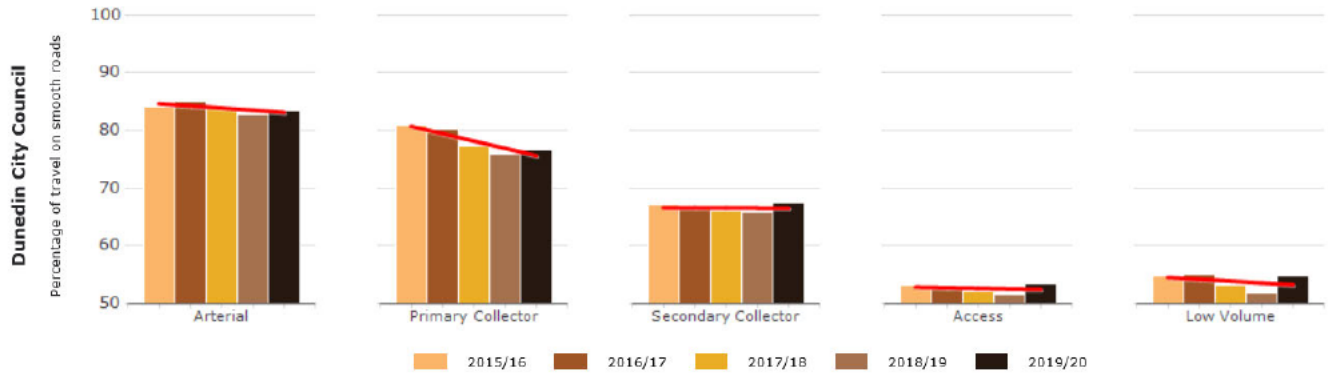


Figure 6: Comparative Smooth Travel Exposure (Source: ONRC reporting tool)

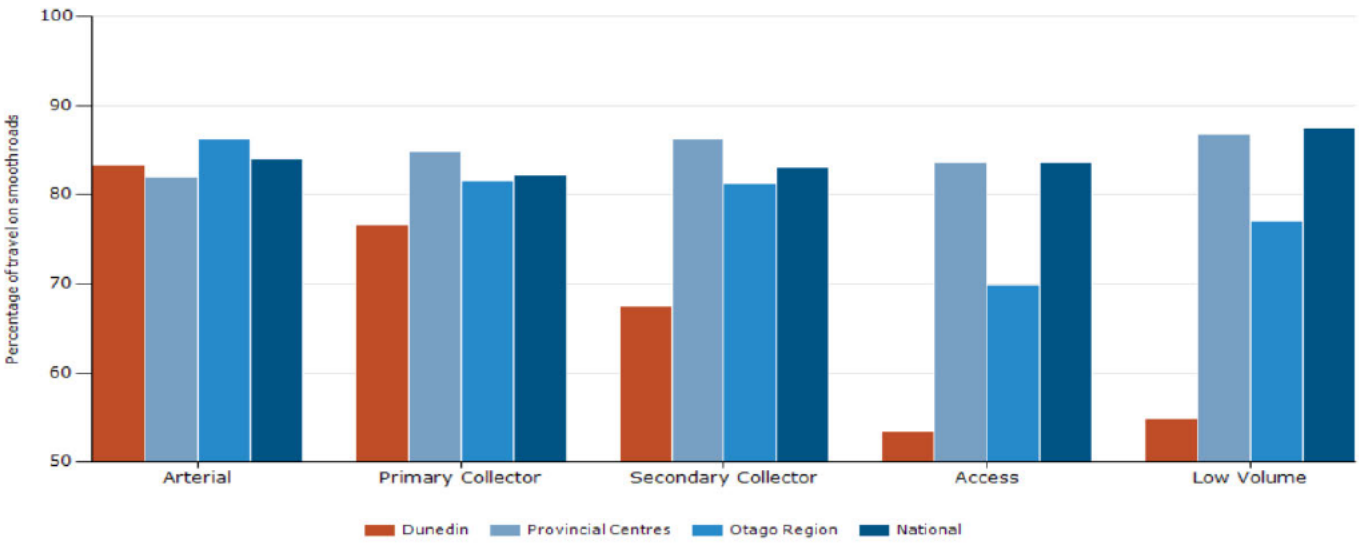
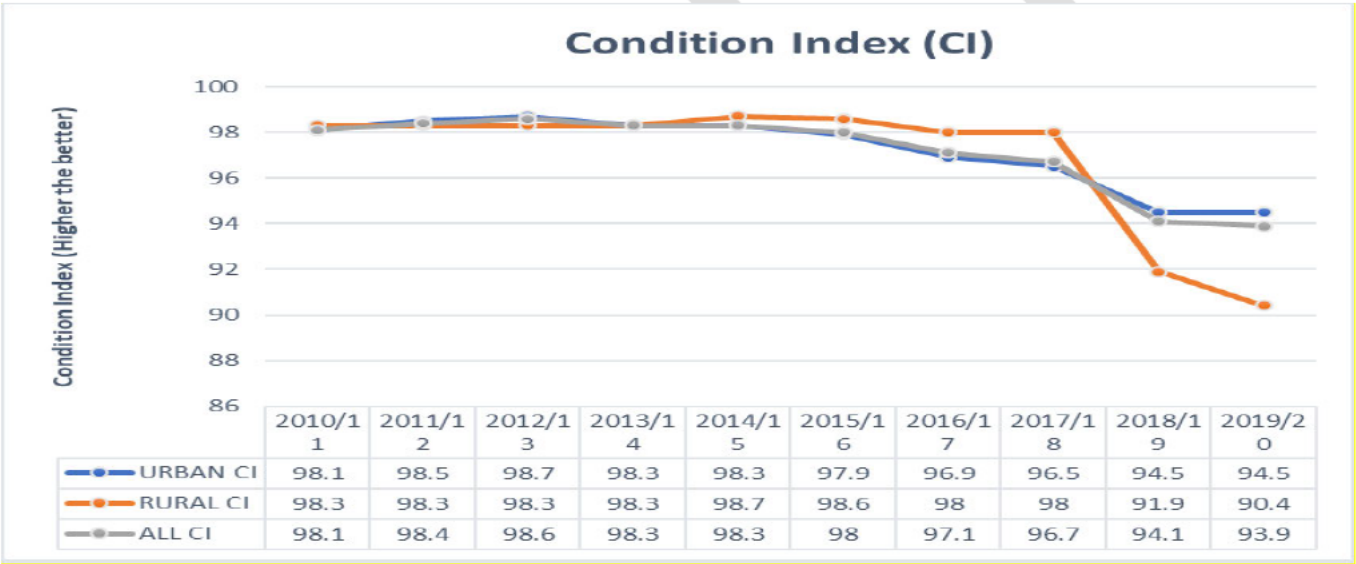


Figure 4: Surface Condition Index



	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
URBAN CI	98.1	98.5	98.7	98.3	98.3	97.9	96.9	96.5	94.5	94.5
RURAL CI	98.3	98.3	98.3	98.3	98.7	98.6	98	98	91.9	90.4
ALL CI	98.1	98.4	98.6	98.3	98.3	98	97.1	96.7	94.1	93.9

3.4 Drainage

Stormwater assets comprise of 1,126 km's of kerb and channels, 8,622 mud tanks and 5,711 culverts and are the second highest valued asset type with a replacement value of $287.90 million representing 17% of the total value of the asset portfolio.

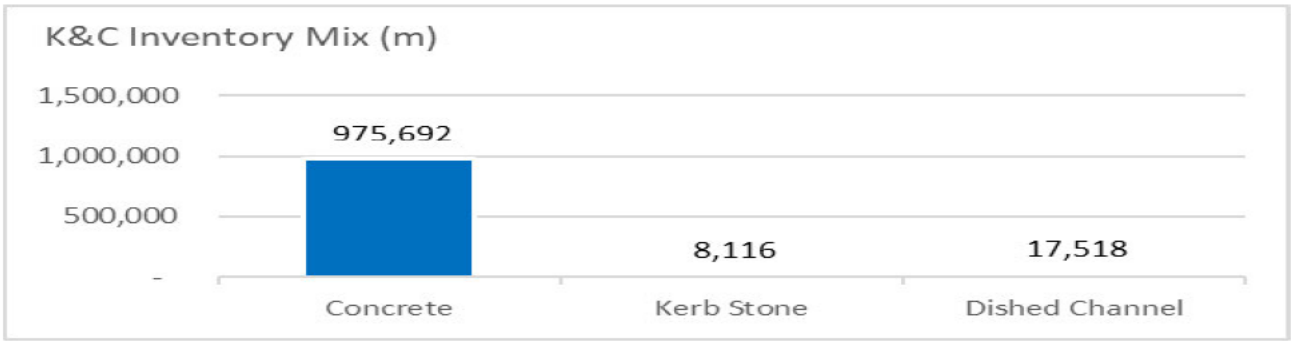
They are an essential component of the transport network by directing and controlling water flows, providing adequate drainage and keeping road structures dry thus maintaining the roads serviceability and preventing pavement and surface damage.

3.4.1 Kerb and channel

3.4.1.1 Construction of kerb and channel

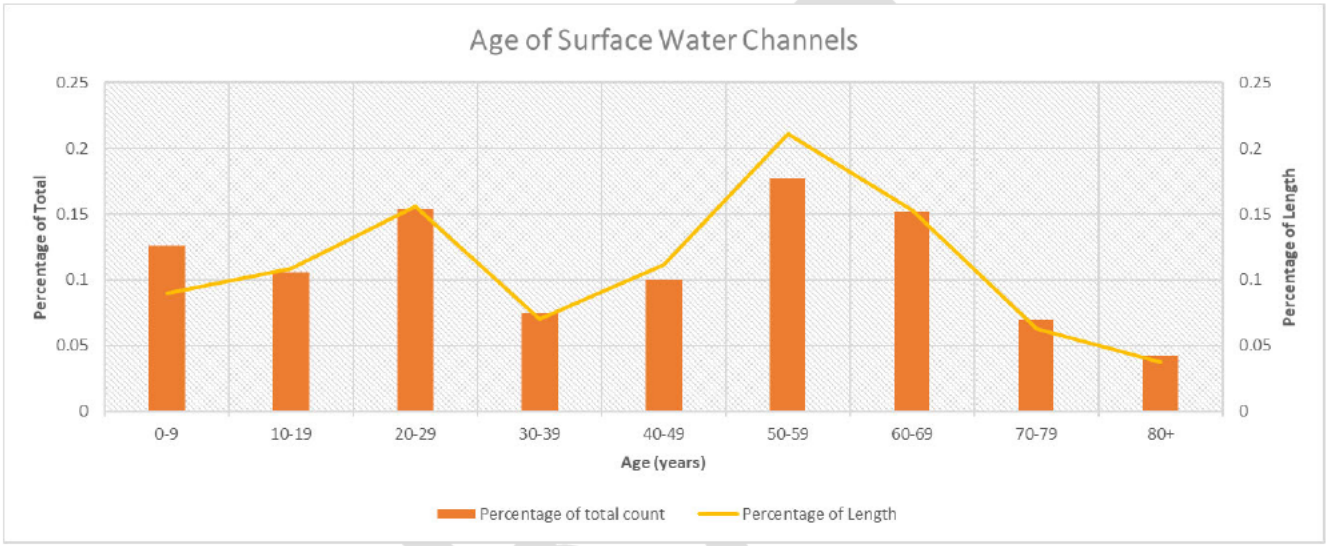
Kerb and channel are largely constructed in concrete with some kerbstone and dish channel as outlined in the table below.

Figure 5: Kerb and Channel inventory mix



3.4.1.2 Age of Kerb and Channel

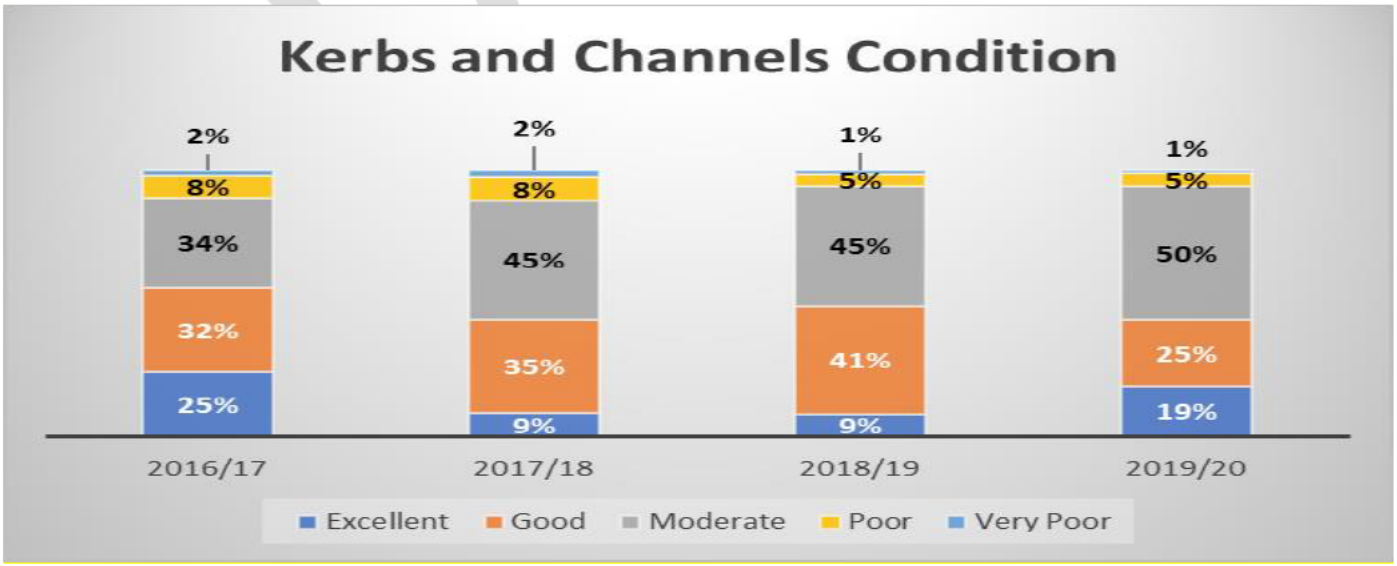
The expected standard age for kerb in channel is between 60 to 100 years and as the figure below shows approximately 25% are over the age of 60 years.



3.4.1.3 Condition of Kerb and Channel

Kerb and channel condition are showing signs of decline. In 2019/20 6% of the network was in poor to very poor condition and without sustained investment this is expected to rise as more reach the end of the useful economic lives.

Figure 6: Kerb and channel condition (RAMM data)

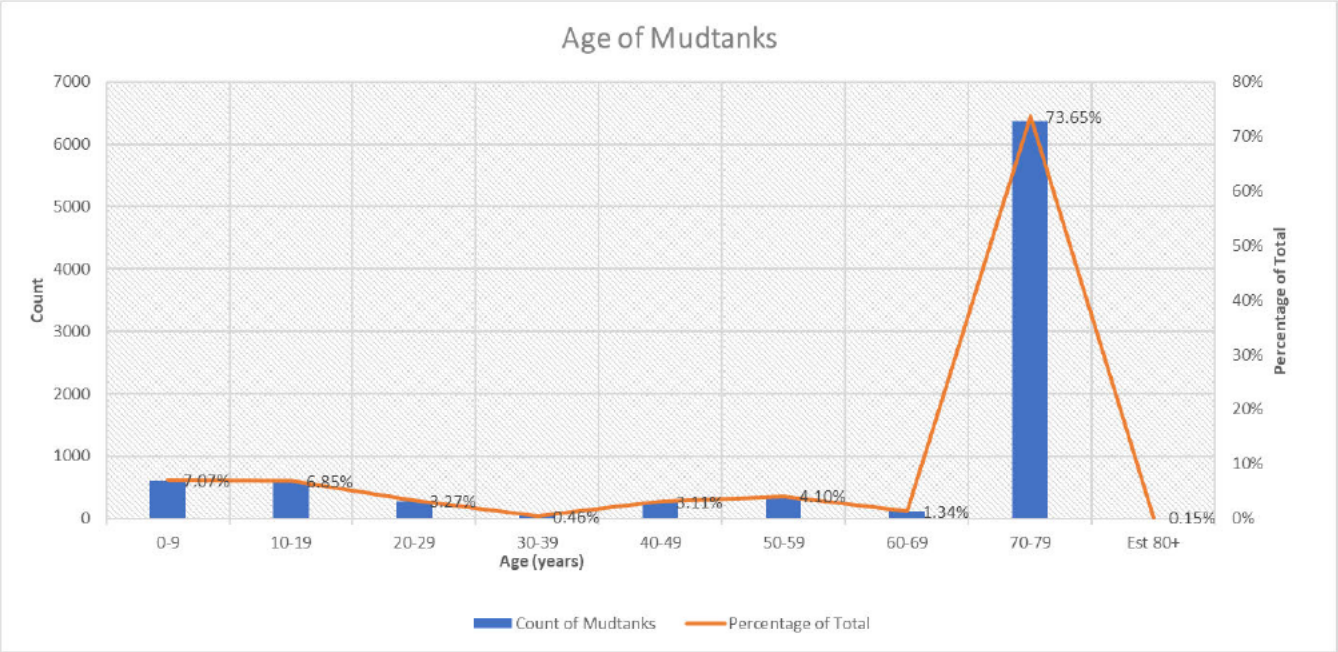


3.4.1 Mud tanks

3.4.1.1 Construction, age and condition of mud tanks

Mud tanks are largely constructed in concrete. The expected standard age for mud tanks is 80 years. As the graph below indicates a significant proportion (74%) is aged from 70-79 years thus nearing the end of their estimated useful lives.

Mud tanks are inspected regularly and graded in accordance to their serviceability. They inform maintenance works such as cleaning and clearing. In terms of structural condition this is largely unknown but if adequately maintained structures would be expected to live well beyond their estimated lives.



3.5 Bridges, sea walls and retaining walls

Dunedin has 243 bridges, 1,689 retaining walls and 314 sea walls. They make up the third highest value asset type with a combined replacement value of $201.80 million representing 12% of the total value of the asset portfolio.

Collectively they are managed through a routine programme of visual inspections in line with Waka Kotahi's policy guidelines (NZTA S6). These inspections inform maintenance and renewal needs.

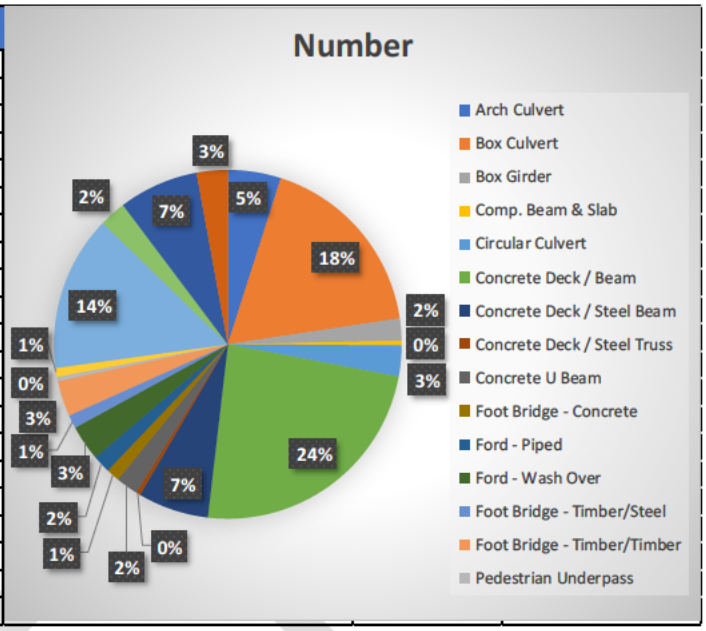
3.5.1 Bridges

3.5.1.1 Construction of bridges

A breakdown of bridge by construct type is provided in the figure below. Many of Dunedin's bridges tend to be made of stone, wrought iron and steel with some early examples of reinforced concrete. In many parts of New Zealand early bridges were made of timber and have a shorter estimated life and have either already been replaced with modern bridges or are on local authority bridge replacement programmes. If suitably maintained the AMP does not anticipate the requirement for any bridge replacements for Dunedin.

Figure 7: Construction breakdown of bridges

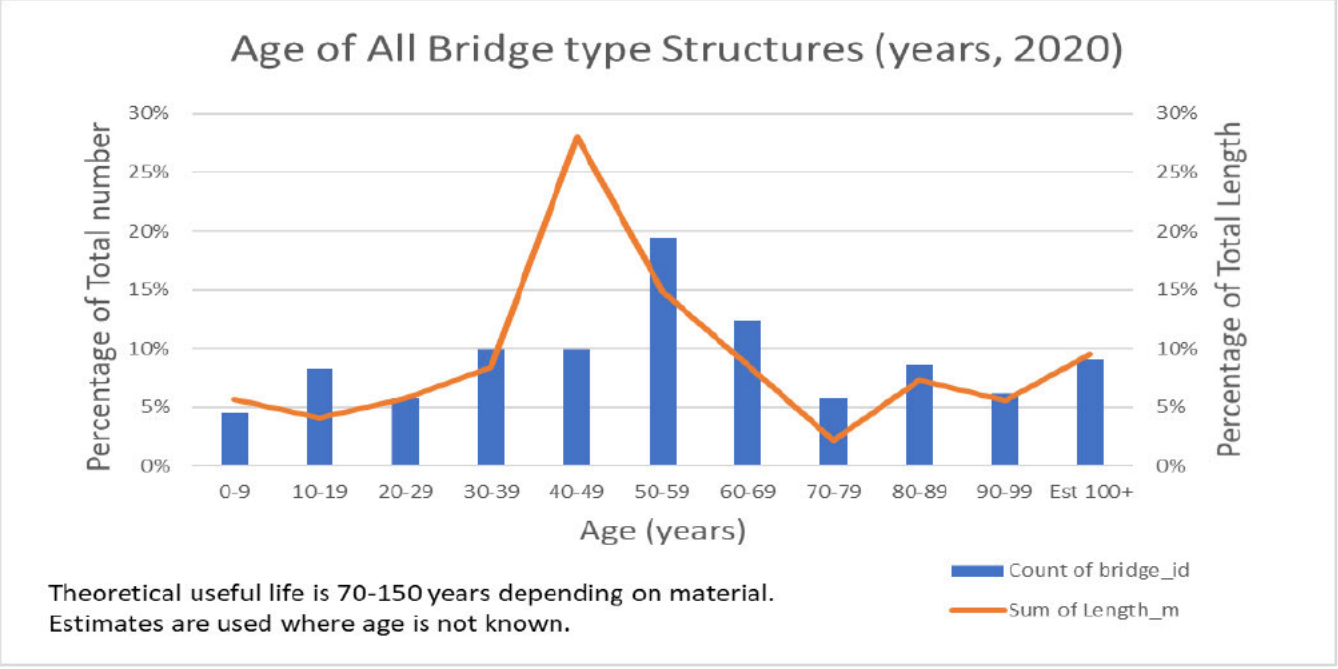
Bridge Type	Number	Length (m
Arch Culvert	12	61
Box Culvert	43	191
Box Girder	5	928
Comp. Beam & Slab	1	8
Circular Culvert	7	43
Concrete Deck / Beam	58	1305
Concrete Deck / Steel Beam	16	312
Concrete Deck / Steel Truss	1	31
Concrete U Beam	5	56
Foot Bridge - Concrete	3	24
Ford - Piped	4	66
Ford - Wash Over	8	114
Foot Bridge - Timber/Steel	3	280
Foot Bridge - Timber/Timber	8	242
Pedestrian Underpass	1	2
Steel Girder	2	47
Concrete Slab	35	330
Timber Deck / Beams	6	42
Timber Deck / Steel Beams	18	504
Wash Over	7	164
Total	**243**	



3.5.1.2 *Age of bridges*

The theoretical useful lives of bridges vary but replacement is deterioration driven and the aim is to have them last beyond their estimated lives as long as loadings are controlled and components are suitably maintained.

Figure 8: Age breakdown of bridges



3.5.1.3 *Condition of bridges*

As bridges are constructed from various materials the condition of bridges is monitored on a component level. In general, the Dunedin bridge network is in reasonable condition. The proposed programme suggests repairs to components and routine inspections to ensure deterioration is carefully monitored.

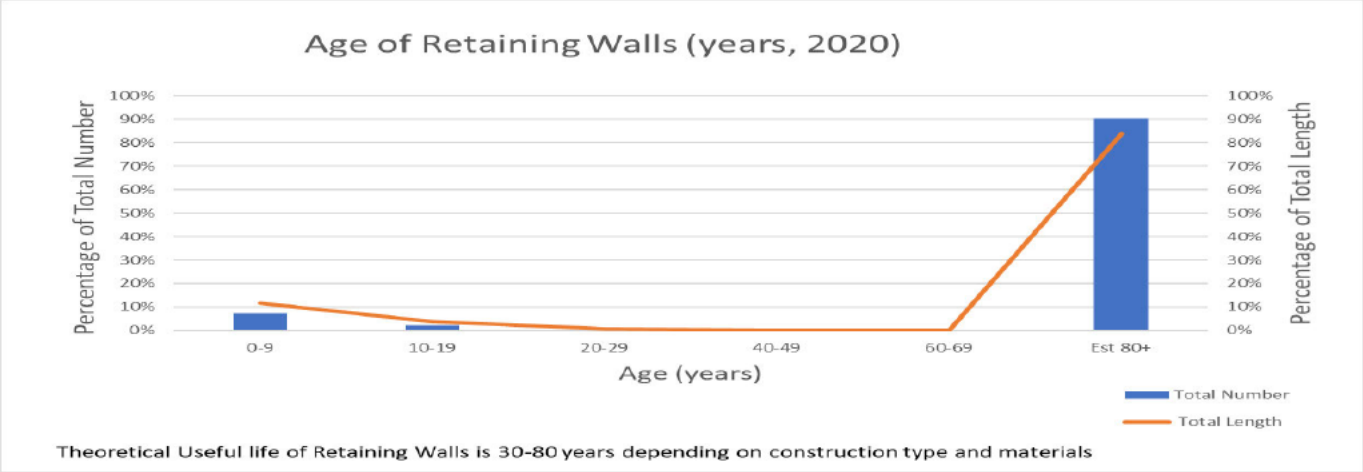
3.5.1 Sea walls

Most of Dunedin's seal walls are made of stacked stone and maintenance generally requires the restacking of stone when required. They have no estimated replacement date and are expected to last

if they are fit for purpose. The St Clair sea wall has design deficiencies so is regularly monitored and maintained and currently is structurally sound.

3.5.2 Retaining wall

Most of Dunedin's retaining walls were made many years ago and do not meet the current design requirements and many are masonry walls or concrete slope facings rather than structural retaining walls. Many provide resistance to surface erosion, rain and weathering but are not able to retain saturated retained material. As such many may be at risk of failure during high rainfall events and are routinely inspected and monitored for movement and condition.



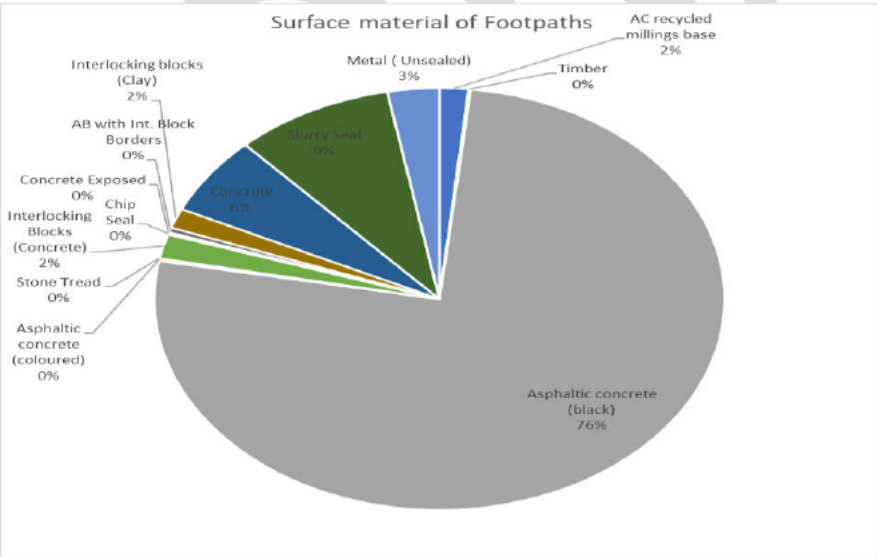
Theoretical Useful life of Retaining Walls is 30-80 years depending on construction type and materials

3.6 Footpaths

3.6.1 Construction of footpaths

Dunedin has 976 km's of footpaths made of predominantly asphalt (76%) and a smaller proportion of concrete, metal and slurry as outlined in the figure below.

Figure 9: Construction breakdown of Footpaths



3.6.2 Age of footpaths

The life expectancy of footpaths varies depending on their construction type. Asphalt footpaths have a life expectancy of approximately 25-30 years, slurry 10 years whereas concrete footpaths have a life expectancy of approximately 60 years.

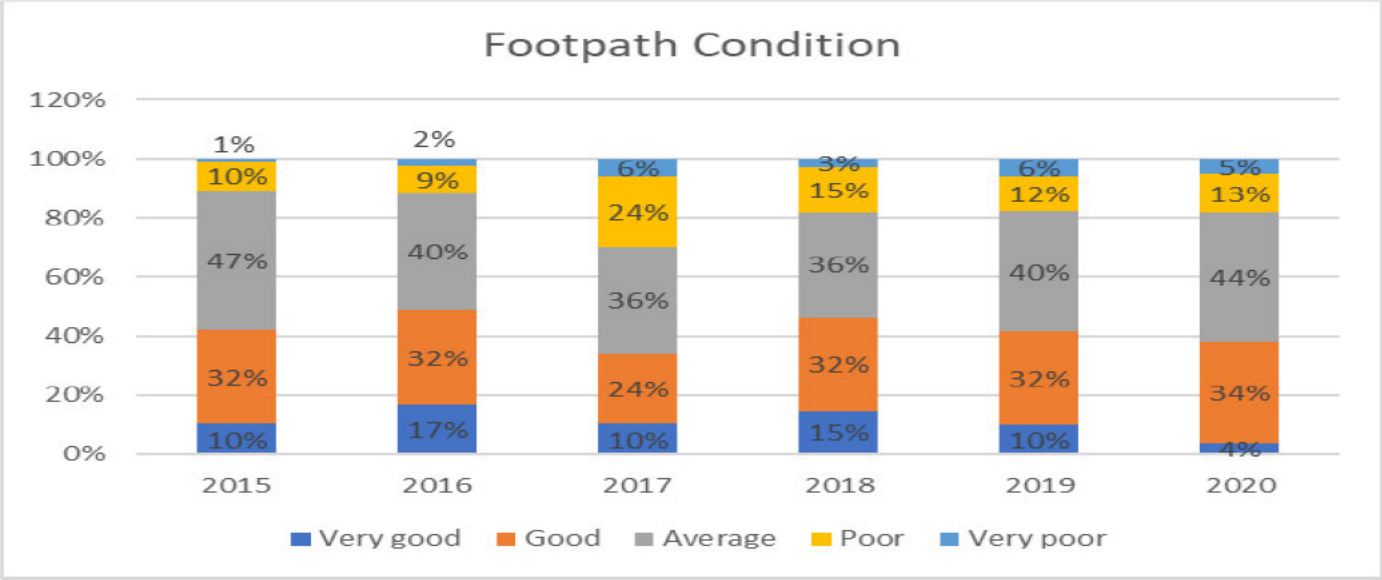
The age of footpaths by construction type and condition are provided in the tables below. They show that in total a high percentage of footpaths have exceeded or are nearing the end of their economic life. Asphalt footpaths, that represent 76% of footpaths, have approximately 23% nearing the end of their expected economic life. Concrete footpaths, that make up 6% of footpaths, have approximately 48% exceeding their expected economic life. Slurry seals, that represent 9% of footpaths, have 84% exceeding or nearing the end of their expected economic life.

Figure 10: Footpath ages by construction type

3.6.1 Condition of footpaths

In terms of condition a reasonably high proportion of footpaths are in poor to very poor condition. In the past 3 years this represented 18% of the network and there are signs the network is deteriorating with a higher proportion of footpaths moving into average condition from good to very good.

Figure 11: Footpath condition



4 Strategic Context

4.1 Introduction

This section of the AMP focuses on the strategic context of Dunedin and its impact on Transport activities. The strategic context can be summarised into the following key areas and demand drivers:

- The transport network environment
- Continued poor performance for safety
- Fiscal constraints and rising construction costs
- Population growth, demographic make-up and changes
- Heavy reliance of private vehicle use
- Climate change and weather events
- Economic growth
- Hospital re-build and other major projects
- COVID-19 pandemic
- Growth in assets
- Technological changes

4.1 The transport network environment

Dunedin is the second largest city in the South Island, one of the largest territorial authority's in New Zealand (covering an area of approximately 3,340 km2) and the principal city in the Otago Region. Approximately 95% of the total area of the city is zoned rural, with the urban area of Dunedin being relatively compact. From a road network perspective 40% is in the urban environment in and around Dunedin's central business district (CBD) and surrounding residential areas. 60% is in the rural environment.

Dunedin's CBD is at the head of the Otago Harbour and comprises of several residential and industrial land uses. Ribbon developments, minor settlements and Dunedin's historic port spread around the edges of the harbour. The central city network has functioned largely unchanged for about 50 years and there are long standing issues of severance created by arterial routes through areas of high place value in Dunedin, such as the Tertiary Precinct, Warehouse Precinct, Queens Garden, hospital and retail quarter.

The remainder of the city's urban area extends out over undulating hills and along narrow valley systems to the west and south, onto the Otago Peninsula and across the Taieri Plains (approximately 15 km from the CBD). Many of the hills between the CBD and outer suburbs are narrow and steep, rising quickly to over 100 -200m above sea level.

4.1.1 Impact on transport activities - cost

Dunedin manages an equally high mix of urban and rural networks in comparison to many RCA's and this drives the cost of maintenance with urban roads being more expensive to maintain than rural. This is most notably seen when benchmarking costs against provincial peers – see Level of Service Section.

4.2 Continued Poor Performance in Safety

Dunedin holds one of the worst road safety records in New Zealand with Dunedin's road users repeatedly over-represented in terms of road safety risk compared to other territorial authorities. Deaths and serious injuries (DSI's) involving older roads users and intersections provide Dunedin's worst record and although there have been some improvements to statistics this is yet to be a sustained with Dunedin having the 10th highest risk rating in the country.

Table 3: Dunedin's overall risk rating (Source: Communities at risk register 2017)

	2013	2014	2015	2017	2018	2019
National Risk rating (D&SI)	7th highest	6th highest	6th highest	5th highest	6th highest	10th highest

Table 4: Dunedin's risk rating by category (Source: Communities at risk register 2017)

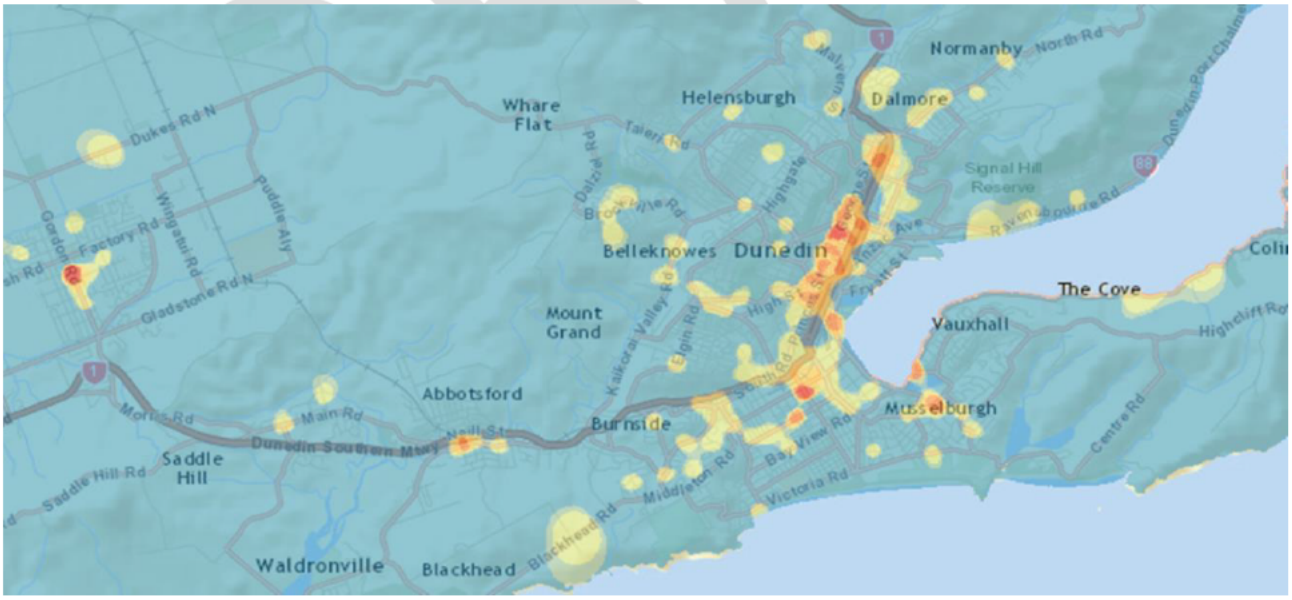
	2013	2014	2015	2017	2018	2019
Older road users	3rd highest	3rd highest	2nd highest	Highest	Highest	2nd highest
Young Drivers	2nd highest	4th highest	Highest	2nd highest	9th highest	14th highest
Pedestrians	3rd highest	2nd highest	14th highest	10th highest	15th highest	11th highest
Cyclists	5th highest	5th highest	14th highest	17th highest	21st highest	27th highest
Distraction	7th highest	3rd highest	4th highest	2nd highest	2nd highest	9th highest

Table 5: Dunedin's intersection risk rating (Source: Communities at risk register 2017)

	2013	2014	2015	2017	2018	2019
All Intersections	Highest	Highest	Highest	2nd Highest	Highest	2nd highest
Urban Intersections	3rd highest	2nd highest	Highest	2nd highest	3rd highest	4th highest

The below 'heat map' shows vulnerable road user crashes in Dunedin's urban area (pedestrians and cyclists from 2013). It uses a colour spectrum with yellow as the lowest and red as the highest concentration of crashes. As the map indicates Dunedin's CBD area has the highest concentration of crashes followed by smaller hot spots in South Dunedin, Mosgiel and Musselburgh.

Figure 12: Heat map showing vulnerable road user crashes, orange - red being the most intensive crash areas. (Source: NZTA, Safer Journeys Risk Assessment)



4.2.1 Impact on DCC's Transport Activities – Safety considerations

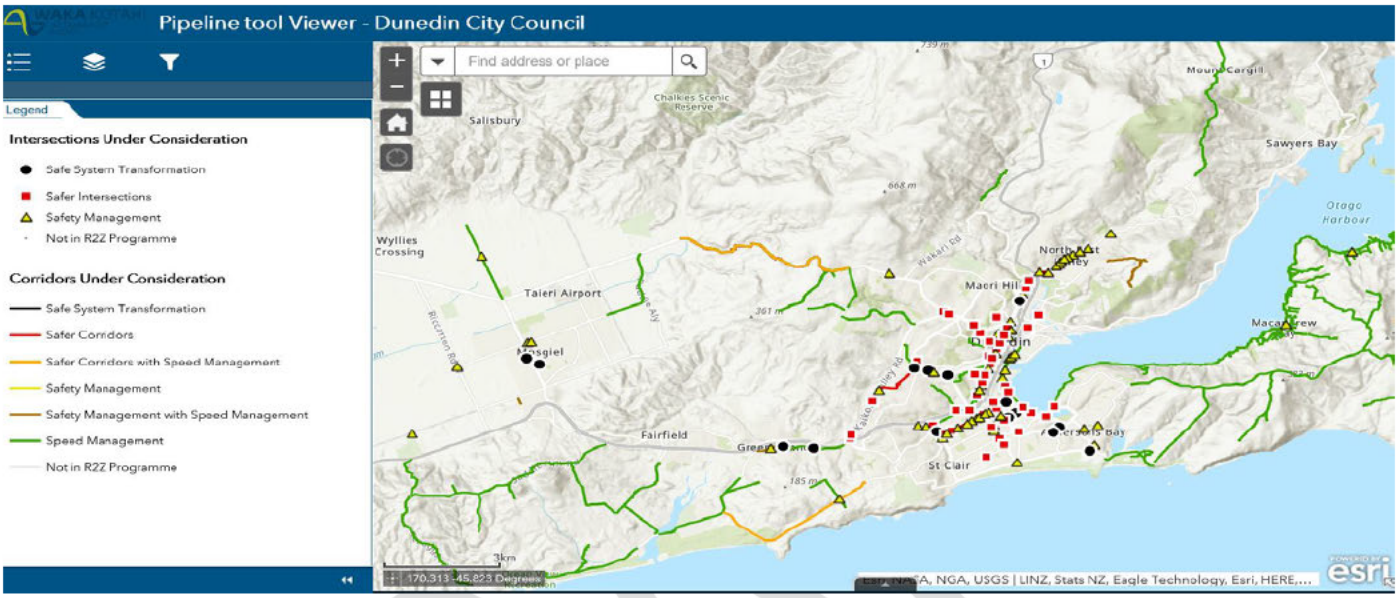
The DCC has been working closely with Waka Kotahi in developing a programme of safety improvements through the analysis of crash statistics, community feedback and engineering assessments. Sites of

concern have been identified and proposed solutions have been mapped on Waka Kotahi's pipeline tool viewer – a safety programme planning tool.

The figure below gives a geographical view of sites- some of which will be addressed in the proposed safety programme. Interventions cover intersection improvements, speed management, footpath improvements and traffic calming measures for areas with high pedestrian usage such as schools.

Any other renewal work undertaken will also be assessed from a safety improvement perspective for example improvements to pedestrian crossings or kerbs to make the network safer for vulnerable users.

Figure 45: Map showing areas of concern on the network. (Source: NZTA, Pipe line Tool)



Several capital projects new and underway and planned for in the LTP and RLTP address safety issues. They cover:

- LED Project.
- Central City Upgrade.
- Peninsula connection.
- Tertiary Precinct.
- Harbour pedestrian bridge connection.
- Low cost and low risk projects involve – kerb improvements, mobility crossings, implementing safety improvements around schools, traffic calming measures, improving lay outs of high-risk intersections (improved line marking, signage, sightline improvements), trial roundabouts.
- Shaping future Dunedin Transport initiatives.

4.3 Fiscal constraints and rising construction costs

During the 2018/21 RLTP period contract prices increased significantly. This placed pressure on the Transport Groups ability to meet asset management renewal targets and address the growing backlog in renewals with limited Waka Kotahi funding and corresponding local share.

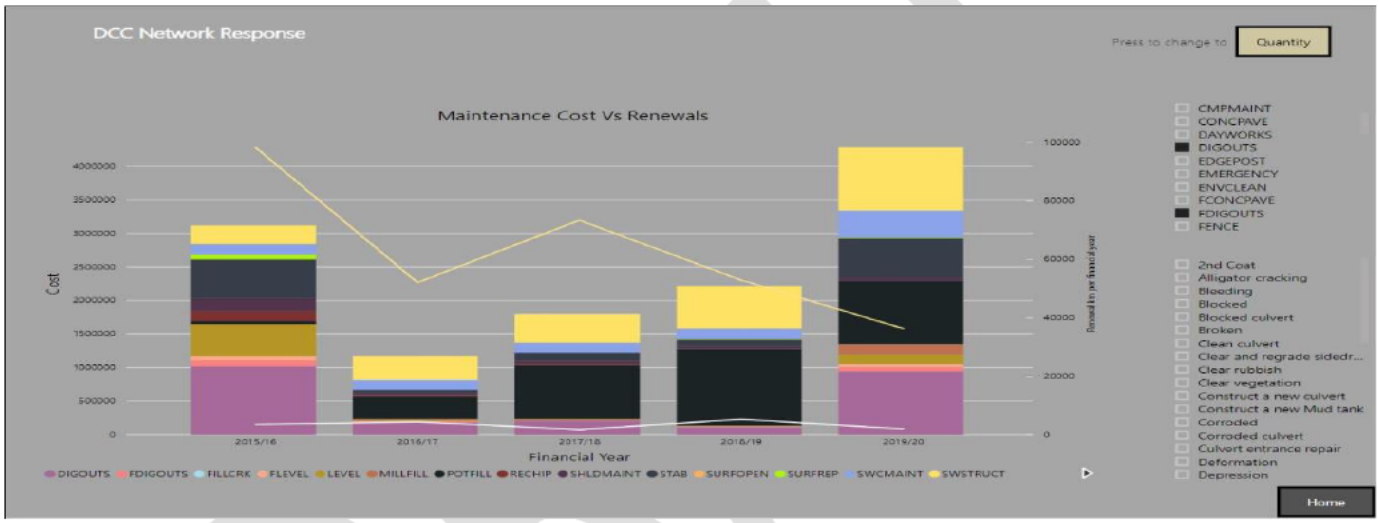
Decisions on when, where and what to renew and the level of renewal backlog that can be accepted is a challenging balancing act in order to maintain levels of service within limited budgets. Asset management targets have not been met for most renewal activities and level of service targets have not been met for the sealed road network and footpaths (see level of service section). Expensive activities such as pavement and drainage renewals have been re-prioritised in favour of road surface renewals, but this is not sustainable in the medium to long term with the network already experiencing a growing number of unplanned failures.

4.3.1 Impact on transport activities – safety

A poorly maintained transport network poses a safety risk for users particularly on higher speed zones and rural roads. Smooth travel exposure has been in decline on both rural and urban roads and below the DIA and level of service target measures. The condition of the network is being monitored carefully however the prioritisation of renewal investment will become more challenging as the backlog of renewals increases.

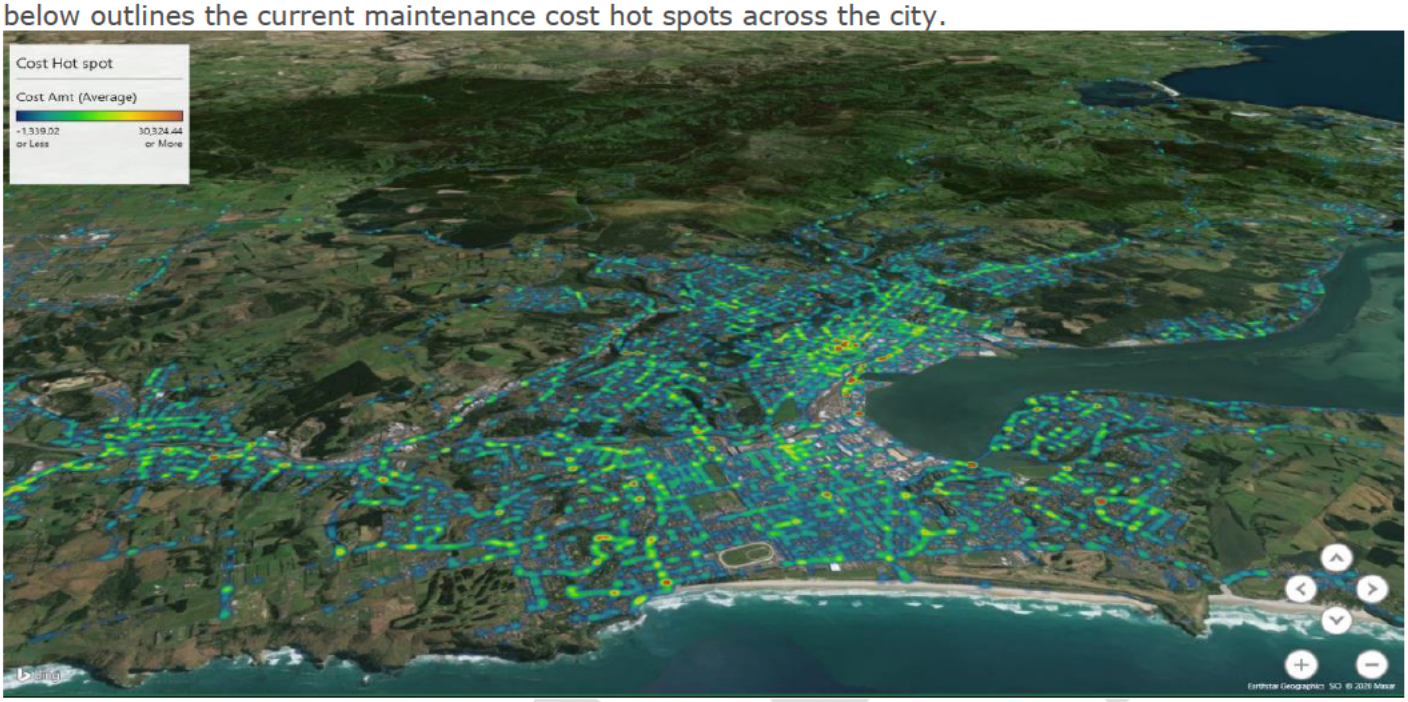
4.3.2 Impact on transport activities – condition and whole of life costs

As outlined in earlier sections of the AMP the condition of the transport network is deteriorating. Insufficient renewal investment will compromise the life of an asset and will increase maintenance needs leading to higher whole of life costs . The below graph shows the maintenance cost for heavy ordered and routine works in conjunction with the cost of renewals. Maintenance costs indicate the networks need or consumption and this has increased significantly over the past four years. By comparison renewal investment has steadily decreased for re-seals and flat lined for rehabilitations.

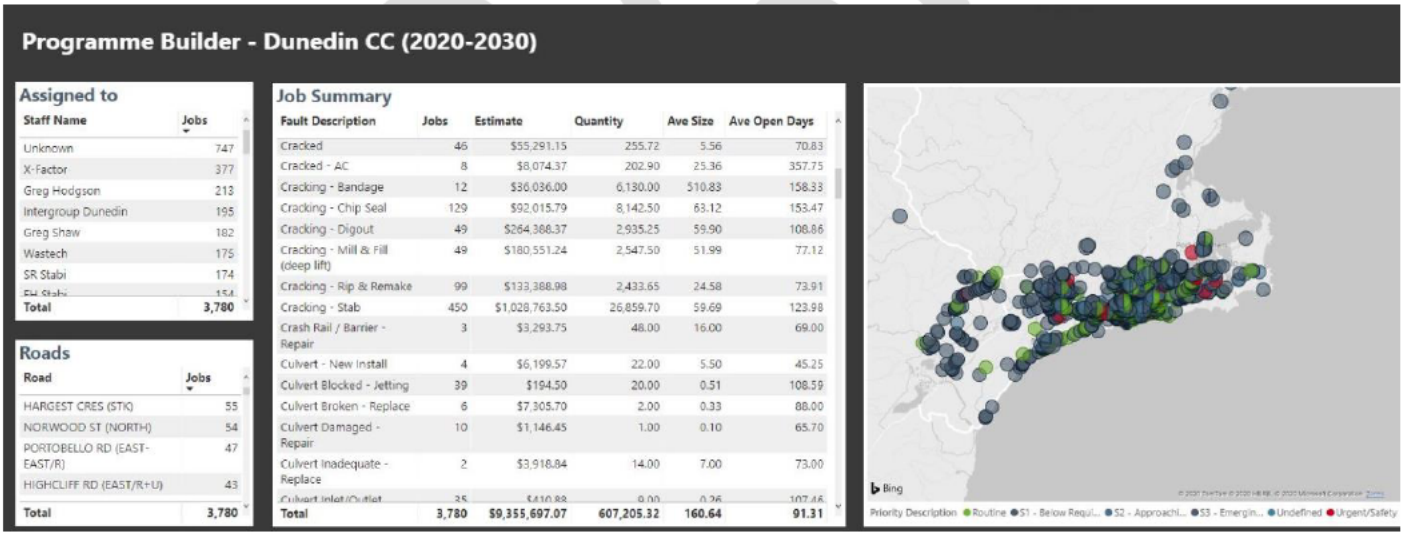


4.3.1 Impact on transport activities – increased network disruptions.

As the need for maintenance increases so too does the instances of network disruption. The image below outlines the current maintenance cost hot spots across the city.



The below is an image from the programme builder from the transport maintenance dashboards. Currently the programmed and identified works is sitting and $9.4 million.



Programme Builder - Dunedin CC (2020-2030)

Assigned to

Staff Name	Jobs
Unknown	747
X-Factor	377
Greg Hodgson	213
Intergroup Dunedin	195
Greg Shaw	182
Wastech	175
SR Stabi	174
FH Stabi	154
Total	3,780

Roads

Road	Jobs
HARGEST CRES (STK)	55
NORWOOD ST (NORTH)	54
PORTOBELLO RD (EAST-EAST/R)	47
HIGHCLIFF RD (EAST/R+U)	43
Total	3,780

Job Summary

Fault Description	Jobs	Estimate	Quantity	Ave Size	Ave Open Days
Cracked	46	$55,291.15	255.72	5.56	70.83
Cracked - AC	8	$8,074.37	202.90	25.36	357.75
Cracking - Bandage	12	$36,036.00	6,130.00	510.83	158.33
Cracking - Chip Seal	129	$92,015.79	8,142.50	63.12	153.47
Cracking - Digout	49	$264,388.37	2,935.25	59.90	108.86
Cracking - Mill & Fill (deep lift)	49	$180,551.24	2,547.50	51.99	77.12
Cracking - Rip & Remake	99	$133,388.98	2,433.65	24.58	73.91
Cracking - Stab	450	$1,028,763.50	26,859.70	59.69	123.98
Crash Rail / Barrier - Repair	3	$3,293.75	48.00	16.00	69.00
Culvert - New Install	4	$6,199.57	22.00	5.50	45.25
Culvert Blocked - Jetting	39	$194.50	20.00	0.51	108.59
Culvert Broken - Replace	6	$7,305.70	2.00	0.33	88.00
Culvert Damaged - Repair	10	$1,146.45	1.00	0.10	65.70
Culvert Inadequate - Replace	2	$3,918.84	14.00	7.00	73.00
Culvert Inlet/Outlet	35	$410.88	9.00	0.26	107.46
Total	3,780	$9,355,697.07	607,205.32	160.64	91.31

Priority Description: Routine, S1 - Below Requi..., S2 - Approachi..., S3 - Emergin..., Undefined, Urgent/Safety

4.3.2 Impact on transport activities – A sustainable community

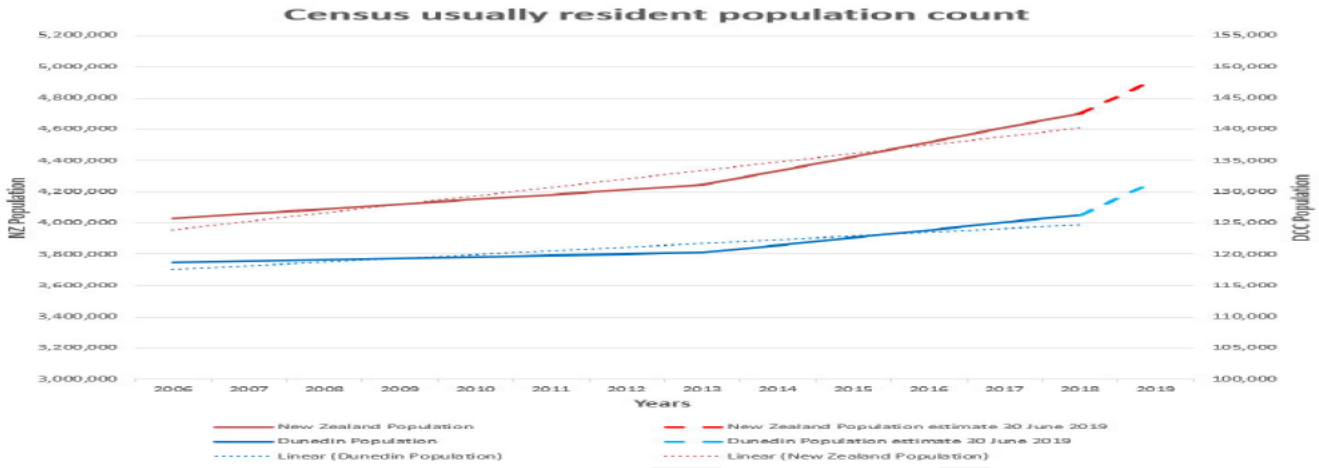
Under-investing in renewals is not a sustainable approach for infrastructure so intrinsically linked in supporting the success of our communities – environmentally, economically and socially. A poorly maintained transport network will result in increased unplanned failures disrupting essential services, freight movements and important links across communities and nationally.

4.4 Population growth, demographics

In recent years Dunedin's resident population has increased higher than estimated shifting the city from a low-growth centre to a medium growth centre. The population at the time of the 2006 census was

118,683 compared to 126,255 at the time of the 2019 census, an increase of 6.38%. Stats NZ's population estimate as at 30 June 2019 show that the population in both New Zealand and Dunedin is increasing – 4.62% and 4.31% respectively – with Dunedin's population now estimated to be 131,700.

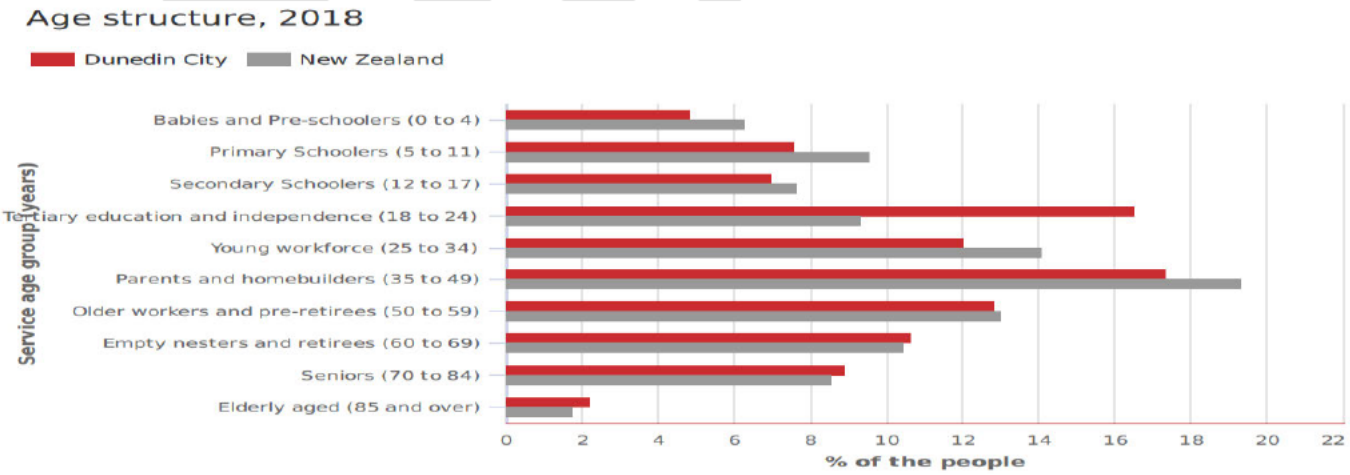
Figure 13: Population changes since 1996 (Source: NZ Census)



Most of the population growth that has occurred over the past 12 years has been in the number of residents over the age of 60, with 60-64 and 65-69-year brackets both increasing by 45% while the number of people in the 70-74 years and 85+ years have increased by 37% and 38% respectively. Although this is where most of the growth has come from, residents aged 60 years and older make up just under 22% of the population.

The largest proportion of Dunedin's residents fall into the 15-30-year age bracket, which represents 26.57% of the resident population in 2018. This is likely due to the presence of the University of Otago. The figure below illustrates Dunedin's high proportion of younger residents in relation to New Zealand as a whole.

Figure 14: Ages structure (Source: Statistics NZ)



4.4.1 Impact on DCC's transport activities - Safety

Dunedin's road users feature highly in terms of road safety risk compared to those in other territorial authorities particularly when it comes to older and younger road users.

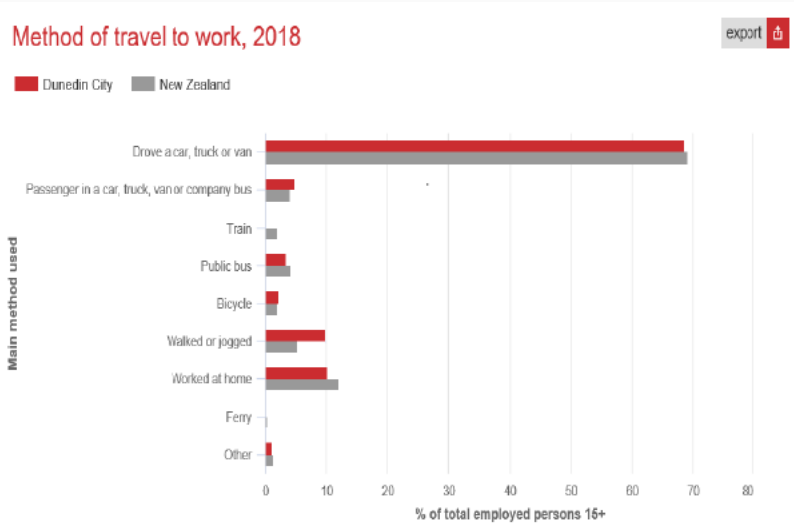
A high representation of older and younger people in Dunedin's population will mean road safety improvement programmes, aimed at understanding and preventing road safety risk for these road users,

will continue to be a key consideration in the management of DCC's transport activities and in the road safety improvement programme.

Population growth will inevitably result in higher vehicle congestion on key commuter and freight routes particularly given the city's heavy reliance on private vehicle use.

4.5 Heavy reliance of private vehicle use and catering for alternative modes

Regionally and nationally the transport network is dominated by private vehicle use. According to the 2018 census data 68.5% of the community within Otago used private or company vehicles as the means of travelling to work. By comparison, public transport comprises only a small proportion of total trips to work (3.4%) with a higher proportion by foot or by bike (12%). These proportions are an improvement on the previous censor with a larger proportion of people walking or jogging to work (9.9% compared to 5.2%)



Several permanent cycling counters have been installed on the approach to the city centre and provide a further indication of commuter and recreational cycle numbers. The counters were established in 2014/15 and show steady and increasing cycling numbers on all locations.

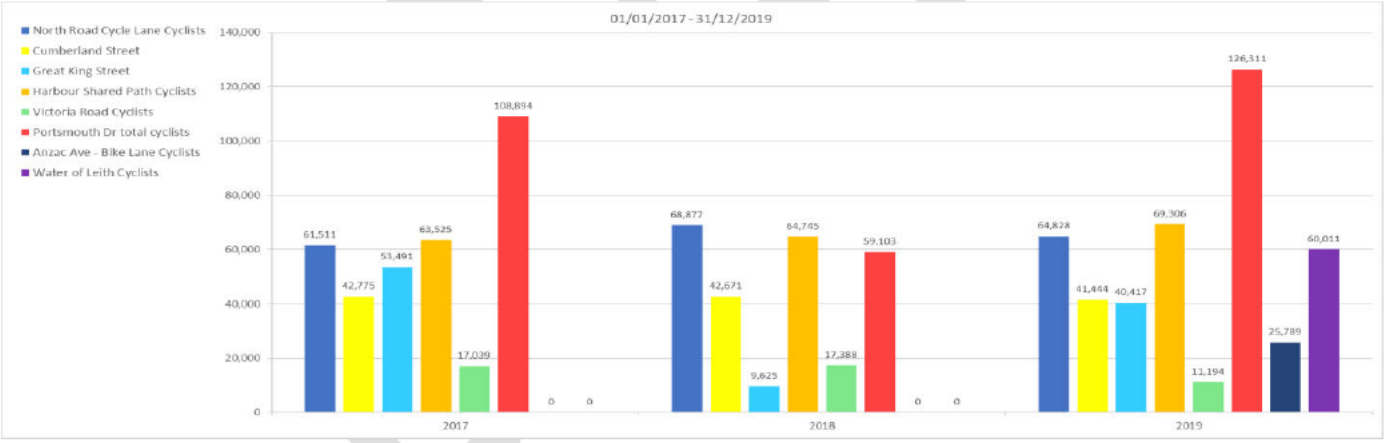
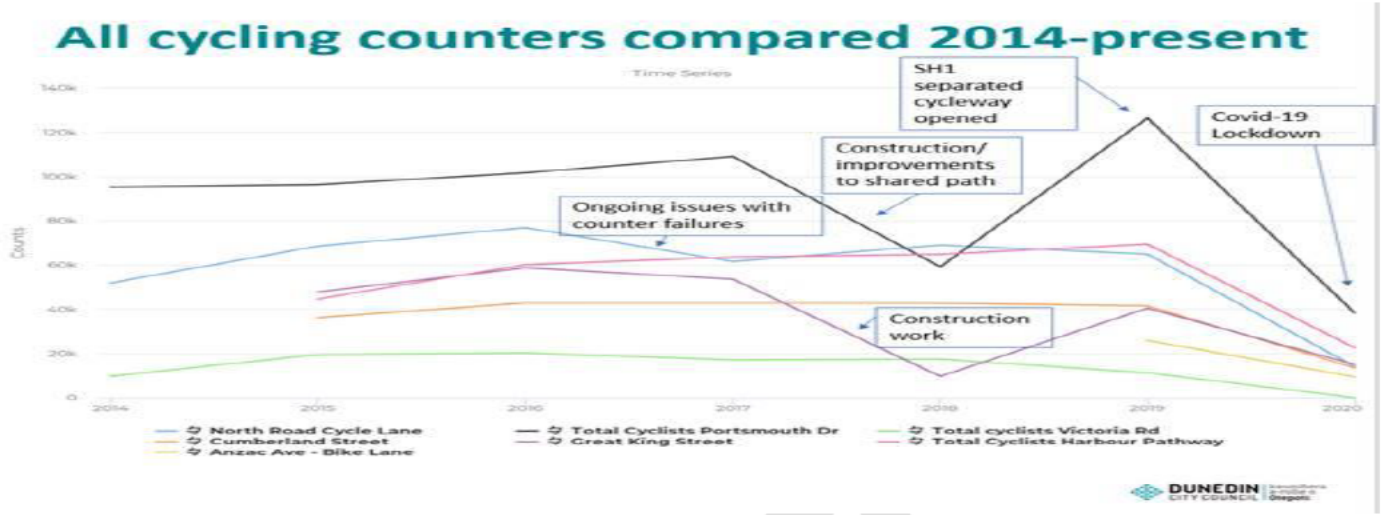
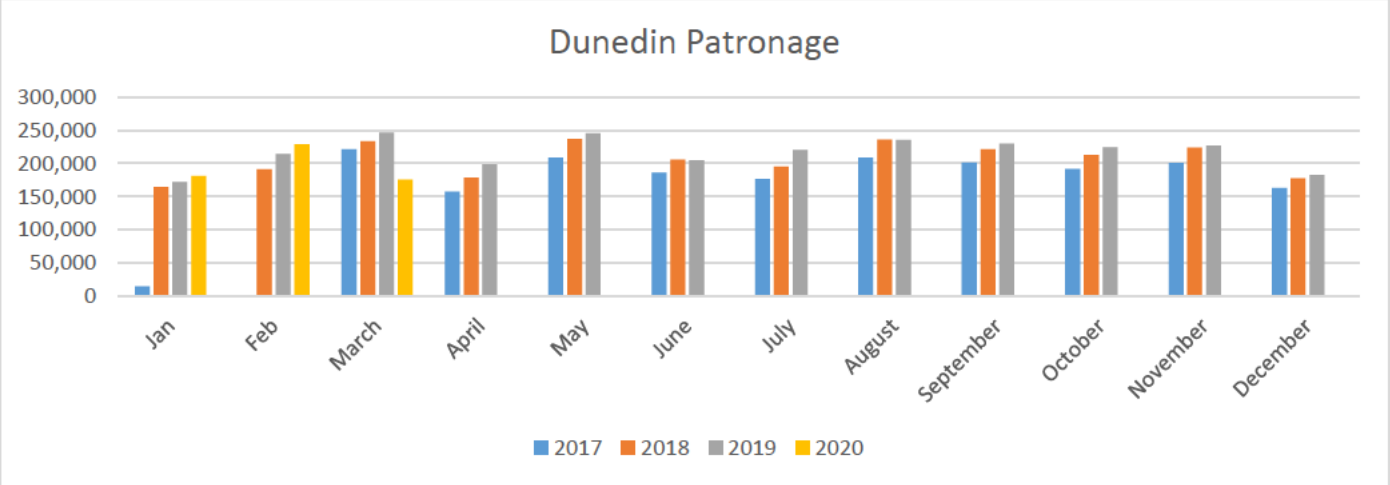


Figure 15: Cycling count numbers (Source: Cycling count data, Eco Counter)



In March 2019 the city established the central city bus hub and in 2020 there was the implementation of a cheaper and simpler fare and card system with the introduction of the Bee card. Both initiatives appear to have encouraged further uptake of public transport with bus patronage steadily increasing in the city.

Figure 16: Dunedin Bus Patronage (Source: Otago Regional Council)



4.5.1 Impact on DCC's transport activities – Safety

Safety is a key issue in addressing the city's over-reliance on private vehicle use and encouraging the uptake of active modes or public transport. Bus routes navigate through steep and narrow road corridors and areas of heavy congestion during peak time in and around the CBD. Routes need to be designed to facilitate safe travel for all modes with suitable delineation between public transport, vehicles, pedestrians and cyclists.

4.5.2 Impact on DCC's transport activities – Catering for changing user demand

A high demand for private vehicle use will consistently put pressure on the transport network through wear and tear increasing maintenance and renewal needs and subsequent costs.

Further work is required to design and configure the network in a way that does not discourage lower carbon travel modes. Proposed projects such as the central city upgrade, harbour link, further cycle improvements and opportunities born from Shaping Futures Dunedin will seek to address this.

The DCC will continue to support ORC with public transport. A level of service review is underway as part of DCC's 20/21 LTP process. It is proposed that these level of service measures have a stronger emphasis on understanding how the Dunedin transport network supports public transport use.

4.6 Climate change, weather events and natural hazards

Sea level rise, flooding and storms are predicted to intensify over the next 30 years along with increased slips and erosion, increasing the risk to communities and transport networks. South Dunedin, the most densely populated part of the city, is particularly at risk of sea level rise and rising groundwater levels. Surface flooding is also expected to increase around the Dunedin Airport.

4.6.1 Impact on DCC's Transport Activities – resilience

As weather events become more frequent and severe the networks ability to recover is put under pressure particularly for communities and industries accessible on vulnerable routes with limited alternative access options. Such examples include:

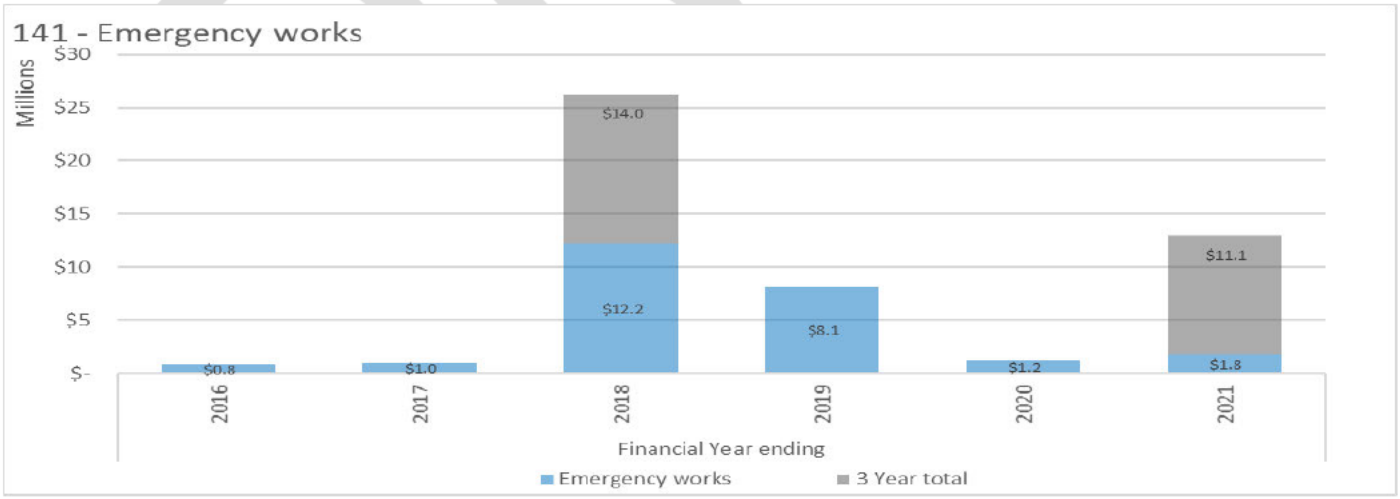
- Port Otago at Port Chalmers – heavy freight accesses the port via state highway 88. Blueskin road is the only alternative route frequently compromised during severe weather and not suitable for heavy vehicles.
- The coastal community of Aromoana (260 residents) is only accessible via one coastal road prone to coastal erosion.
- Northern coastal roads from Seacliffe through to Waikouiti.
- Inundation of flood water on the Taieri plains
- Straith Taieri, George King memorial access

All routes have been subject to unplanned road closure following significant weather events which have cut off communities and compromised freight routes.

4.6.2 Impact on DCC's Transport Activities – Cost and the markets ability to respond

When emergency events occur their cost and the resource required to repair can be significant. The flood event in July 2017 resulted in significant costs in excess of $20 million. It also placed significant pressure on the local contracting market to respond with limited resources available at short notice. This in turn puts pressure on suppliers to meet planned programmed works as resource is stretched.

Figure 17: Emergency works costs due to weather events (Source: DCC Financial system)



4.7 Dunedin's economy

Dunedin has important economic foundations. These include:

- The University of Otago and Otago Polytechnic, and a reputation for high quality education, innovation and research.

- Dunedin acts as a major export hub for the lower South Island for the distribution of high value exports supporting industries such as forestry, dairy, fisheries and meat.
- High valued built and natural environment.
- 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.
- Development of the new hospital rebuild.

Statistics indicate a steady growth in the Dunedin economy. Berl's 2014 Economic Profile of the Otago Region and Dunedin City shows GDP growth was 2.2% (national, 3.2%) and employment growth was 2.4% (national, 3.1%).

One of Dunedin's main economic strengths is its tertiary education, medical and related research businesses. Employment in the education and health care industry make up just over a quarter (26.4%) of all employment in Dunedin. This reflects the importance of Dunedin's education assets. The University of Otago alone has been estimated to contribute to around 15% of the city's GDP.

Outside the city centre Dunedin contains vast tracts of productive, rural land and a diversity of natural environments. Approximately 95% of the total area of Dunedin is zoned rural and this rural environment contributes to the economy through farming, forestry and tourism. For the areas surrounding the urban centre, primary production and processing continue to be key economic drivers and high-quality access to the city's port and airport is important to the success of both the Otago and Southland economies.

Port Otago at Port Chalmers is New Zealand's 5th largest port (by value) and a key link in New Zealand's international supply chain as a regional hub for the export of high value products including meat, dairy, timber, fish, horticulture and other agriculturally based products. In 2015 the Port exported over $3,500 million worth of mainly primary commodities originating from the Otago and Southland regions, with growth expected to continue.

Port Otago recently embarked on a two-year capital programme to prepare for the imminent arrival of larger container and cruise ships to New Zealand. One significant increase is predicted to come from the forestry sector. City Forests alone have over 16,800 hectares of planted forests (or around 8 million trees) located within 80km radius of the city. In the 2016-2017 financial year, City Forests harvested over 277,000 cubic metres of wood from its forests, and the company is managing its forests for long-term sustainable clear fell levels of between 270,000 and 300,000m3 per year. This will translate into an increase in log truck activity through the district to the port from several parts of the network.

A long industrial tradition within Dunedin has contributed to an industrial workforce that has strong capabilities in its technical knowledge, particularly in the manufacturing and engineering sectors. Using this to its advantage, the focus of many industries has been to seek opportunities to specialise and focus on niche markets.

Another important sector is the advanced computer-based software and creative technologies sector. An opportunity for this industry was enhanced by Dunedin winning 'Gigatown' in 2014 and securing it the fastest internet connection in the Southern Hemisphere. These industry sectors provide a great opportunity for Dunedin to grow new, future orientated, high value, high growth businesses.

4.7.1 Impact on transport activities – Freight

Maintaining key freight connections is essential to support industry and the distribution of goods. Freight and logging, places significant pressure on the road network and for aging pavements, showing a decline in condition, this is of concern. The installation of a logging weigh station in the harbour basin resulted in substantial road failure causing sections of the sealed road to turn to gravel as the pavement could not sustain the increased loads. This is to be addressed by a pavement rehabilitation in 2021 at a cost of $1 million. This was unplanned and not budgeted for and will be fully funded by the DCC with no co-investment from Waka Kotahi available.

4.7.2 Impact on transport activities – Safety

Maintaining key freight routes and supporting industry through the distribution of goods and services is challenging in a geographically compact city that encompasses varying community needs. Encouraging the use of active modes or public transport is challenged if users feel unsafe and there is not adequate delineation between freight and active modes. Careful consideration needs to be made in developing Dunedin's transport network, so it is safe and caters for community needs while maintaining key freight routes.

4.8 Hospital re-build and other major projects planned for the city

Dunedin has an unprecedented number of major transport and urban development related opportunities and projects underway or being planned for over the next 10 years most notably being the hospital rebuild.

The Dunedin Hospital rebuild replaces the existing hospital in the CBD and will involve the single biggest hospital build ever in New Zealand costing up to $1.4 billion. It will have a significant impact on Dunedin's CBD creating many opportunities for the community and at its peak it is estimated there will be up to 1,000 workers on site.

Major projects are also planned for in DCC's LTP (2018-28) including the Central City Safety and Accessibility Upgrade and Tertiary Precinct Safety and Accessibility Upgrade. All projects will have an element of cycle network improvement and active mode facility upgrades.

4.8.1 Impact on Transport Activities - Safety

Whilst these projects present a once in a generation opportunity in shaping the future of Dunedin key transport challenges need to be addressed to ensure the safe, effective and efficient movement of a diverse range of traffic converging into a compact city centre composing of a central business district, educational facilities, an industrial precinct and the Dunedin hospital.

This will involve ensuring key freight routes supporting industry and the distribution of goods to the port are maintained while servicing the transport needs and varying modal choices of other businesses, commuters, students and emergency services.

Shaping Future Dunedin Transport (SFDT) is a collaborative partnership between Waka Kotahi, DCC and The Otago Regional Council. It seeks to address these challenges and improve how people move into, out and around the CBD. SFDT has identified changes to the transport network that will ensure the new Dunedin Hospital is highly accessible and well connected to the rest of the central city whilst at the same time providing a future focussed, accessible transport system enabling placemaking and liveability outcomes for the city. It builds on the city's liveability programme aimed at improving pedestrian, cycle and public transport networks to facilitate mode shit and safety, urban amenity improvements focused on placemaking and providing a quality experience, parking changes and safety interventions.

4.9 The COVID 19 Pandemic

This AMP has been prepared during the COVID-19 pandemic. The long-term effects of the pandemic remain unknown.

In early 2020, Waka Kotahi reviewed the implications for land transport in New Zealand as a result of COVID-19. This review found that Southland and the majority of Otago are comparatively well-placed to recover from the pandemic, in part due to the scale of primary production. Large centres, like Dunedin and Invercargill, have some resilience due to the role of education, healthcare and government services, although current border restrictions are impacting the tertiary sector as international students are unable to enter New Zealand for study.

The Waka Kotahi review concluded that, outside of the Queenstown Lakes and Central Otago Districts, no significant changes are expected in the nature, scale and location of transport demand over the medium to long-term. For most of the combined Otago and Southland region, the 10-year outlook, because of the COVID-19 pandemic, remains largely unchanged. However, the review noted significant

levels of uncertainty regarding the scale and duration of COVID-19 impacts, particularly in the medium-long term.

4.9.1 Impact on Transport Activities – Supporting the economic recovery

Transport will have an important part to play in supporting recovery. There is an ongoing need for transport services to improve access to employment and essential services, particularly for vulnerable communities. Maintaining safe and reliable road and rail freight connections, particularly to Port Otago, is vital.

Growth predictions may change, and population fluctuations from incoming visitors, seasonal workers and students will cease, at least while borders are closed. Post COVID-19, the predicted rate of growth is likely lower than expected in tourist destinations, however other areas may well grow more rapidly than expected due to increased demand for housing as New Zealander's return home and others seek to immigrate.

4.9.2 Impact on Transport Activities – Tourism

The New Zealand tourism market has been seriously affected by the closing of international boarders, and the impact may change the way tourism is viewed in New Zealand. This AMP has been prepared with an expectation that the international tourism sector will recover over time, although a return to previous levels of activity are not expected within the first three to six years and is dependent on when border restrictions lift. Domestic tourism has increased as people are unable to holiday overseas, but peaks are limited to school holiday periods.

The reduction in tourist numbers provides the opportunity to re-evaluate the way the combined Otago and Southland region's tourism sector operates, and to question whether a return to large numbers of relatively low value visitors is the best outcome for the future. The opportunity to envisage what a new tourism approach might look like and how to move people about the region needs to be a high priority in the immediate future. The pandemic also highlights the need for tourism reliant districts to diversify their economy.

4.10 Growth in Assets and addressing the housing crisis

Transport asset growth occurs through:

- DCC transport capital projects
- Vested assets – generally roads and associated assets such as streetlights in new growth areas. These are generally built by developers but the responsibility for operating, maintaining and renewing these assets transfer to DCC.
- State Highway projects which can result in roads being transferred to DCC to manage and maintain as local roads.
- Cycleways and shared paths constructed by the Transport Agency are also transferred to DCC to manage and maintain.

Dunedin is experiencing a housing crisis with house demand far out-weighing house supply and development is required to meet this demand. This has seen a significant increase in sub-division consents and Council's 2GP is currently looking at the re-zoning of undeveloped land in residential areas to encourage higher density in the development.

4.10.1 Impact on DCC's transport activities

Increased housing and sub-divisions will see a rise in population density, traffic and transport demands. New sizable sub-divisions are being developed around the peninsula which will see an increase in transport demands along the key commuter routes into the city centre.

4.11 Technological changes

Emerging and new technological changes expected during the next decade will offer new travel choices. This includes mobility as a service, on-demand travel options such as on-demand shuttles and intelligent transport systems.

4.11.1 Impact on DCC's transport activities – step change in thinking

These technologies may reduce carbon emissions, the reliance on private transport and improve network management. They could provide feasible shared transport options helping people get around and improve access to services in the city. Such transport systems will rely heavily on digital technologies supported by high quality data and information to enable users to plan, book and pay for journeys and to get the most out of existing infrastructure. This will involve a step change in thinking how transport networks are used, serviced, managed and planned for in the future.

5 Outcomes and Levels of Service

This section sets out the DCC's levels of service for the transport network and how they align to the strategic objectives set out in Councils strategies, the GPS, ONRC and the problems statements identified in this AMP (see strategic assessment section).

Council sets levels of service in consultation with its community as part of the LTP process. They describe the standards which Councils delivers in its management and maintenance of the network and are a requirement of the Local Government Act 2002. They consist of a service statement, a measure and a target. The result is transparency for the public and other stakeholders that the network can support lifestyle and business needs, and confidence in the DCC's management of the network. These are described in further detail under the LTP section of this chapter.

Levels are also set nationally through the One Network Framework (ONRC). This is part of a classification system that divides NZ roads into six categories based on how busy they are and their importance in terms of connectivity to key destinations. It is a tool developed by the Road Efficiency Group (REG) in partnership with Local Government to enable national consistency to how transport networks are managed and compared. This is discussed in further detail in the ONRC section of this chapter.

5.1 Level of service review and strategic alignment

As part of the 2021/22 LTP process the DCC is reviewing the suitability of its levels of service measures. In undertaking this work the Transport Group documented the strategic alignment of the current GPS, ONRC, DCC's strategic goals, the problem statements defined in this AMP and the corresponding level of service performance measures. This resulted in the following proposed changes:

- The addition of technical, non-subjective measures.
- The addition of level of service measures that better align with Councils strategic objectives pertaining to travel options and choice.
- The addition of lead measures in relation to safety.
- Separate performance measures for smooth travel exposure on urban and rural roads in recognition of their varying environs.

The below table documents this strategic alignment and details the proposed changes to the performance measures in the LTP. These are colour coded as follows:

	Level of service measure is maintained
	Level of service measure is removed
	Level of service measure is proposed for inclusion

Figure 18: Strategic Alignment of objectives and levels of service

Strategic Objectives									
GPS	**Safety** – developing a transport system where no-DSI's	**Better travel options** – Providing people with better transport options to access social and economic opportunities		**Improving freight connections** – improving freight connections for economic development	**Climate Change** – Developing a low carbon transport system that support emission reductions, while improving safety and inclusive access				
RLTP	**INSERT RLTP**								
Integrated Transport Strategy	**Safety – improving Dunedin's road safety record**	**Travel Choices – Providing safe, viable travel options**	**Accessibility – providing high level of accessibility to key destinations**	**Freight – supporting efficient travel**	**Resilience – a resilient network where more people use sustainable modes to travel.**				
AMP Problem statements	**Safety**	**Changing User Demand**		**Resilience**					
DCC Corporate goals		**Carbon Zero 2030**					**Treaty of Waitangi**		
ONRC	**Safety**	**Accessibility**		**Accessibility**	**Resilience**			**Amenity**	**Cost Efficiency**
Measures									
Integrated Transport Strategy	By 2014 the number of DSIs to have decreased by 50%	The % of Dunedin census respondents who cycle, walk or take a bus to work increases from 16% at 2016 to 40% by 2024		Average weekly household expenditure on transport by 2024, has been maintained at 2013 levels (measured as a percentage of total average weekly household expenditure.		A significant increased proportion of the total freight load that passes through Dunedin will be transported by rail by 2024.			
	Injury crashes have reduced by 20% (compared to 2013 levels) in Dunedin's centres)								
LTP – Customer	% of residents satisfied with the condition of street lights.>=75%	% of residents satisfied with the condition of the footpaths >=60%		% of residents satisfied with the suitability of n/w to cyclists >= 30%	Travel time surveys - cars			% of residents satisfied with overall roading and maintenance =>60%	
		% of residents satisfied with the ease of pedestrian access throughout the city.>=65%	Travel time surveys – bus's						
	% of residents satisfied with the condition of street lights.>=75%	% of residents satisfied with parking availability. +45%							
		Objective measure – Parking occupancy based on a sample survey. The sample survey would be replaced by an electronic system measuring utilisation once in place.							
	No. of high-risk intersections addressed by safety programme	Increased cycle count movements.							
LTP – DIA measures	Reduction in DSI	% of footpaths within the LOS standard adopted by Council – less than 15% in poor/very poor condition.			Smooth travel exposure – in total				
					% of sealed network resurfaced (6%)				
					Service requests addressed in timely manner – greater than 90%/5 working days.				
					STE – by urban/rural. Would have a higher target for rural to account for the higher speed environment. (AT aims at a target of 92% for STE on rural roads)				
ONRC	DSI			Proportion of n/w not available to heavy vehicles.	Unplanned closures with a detour provided			Smooth travel exposure	Chip seal /Asphalt resurfacing (length /area)
	Collective risk				Number of instances when road access is lost			Peak roughness	Chip seal / asphalting resurfacing (Cost and Av life)
	Personal risk								Maintenance Costs

5.2 ONRC Levels of Service

The ONRC's performance framework, with measures and targets, determines how the categories and customer levels of service translate into specific maintenance, operational and investment decisions. This performance framework gives local government the opportunity to benchmark results nationally.

Performance measures and corresponding service levels, discussed below, cover the following six customer outcome areas explained as follows:

- **Safety** – How the road user experiences safety of the road,
- **Resilience –** The availability and restoration of road function when there is a weather or emergency event (unplanned), whether there is an alternative available and the road user information provided.
- **Amenity –** Travel quality and travel aesthetics. The level of travel comfort experienced by the user and the aesthetic aspects of the road environment and impact on the travel experience of the road users.
- **Accessibility –** The ease with which people can reach key destinations and the transport networks available to them, including land use access and network connectivity.
- **Travel time reliability –** The reliability of travel time on key routes during peak use and whether demand is satisfied.
- **Cost efficiency -** Provides an indication of the relative costs and efficiency of the network compared with other networks.

5.2.1 Safety

Dunedin holds one of the worst road safety records in New Zealand with Dunedin's road users repeatedly over-represented in terms of road safety risk compared to other territorial authorities. Dunedin's collective and personal risk rating is the highest for all road categories in comparison to the national, provincial and Otago region. DSI's involving older roads users and intersections provide Dunedin's worst record and although there have been some improvements to statistics this is yet to be a sustained with Dunedin having the 10th highest risk rating in the country.

Figure 19: Comparative collective risk - Total number of reported crashes per kilometre over the past 10 years on the network (Source: ONRC performance measures reporting tool)

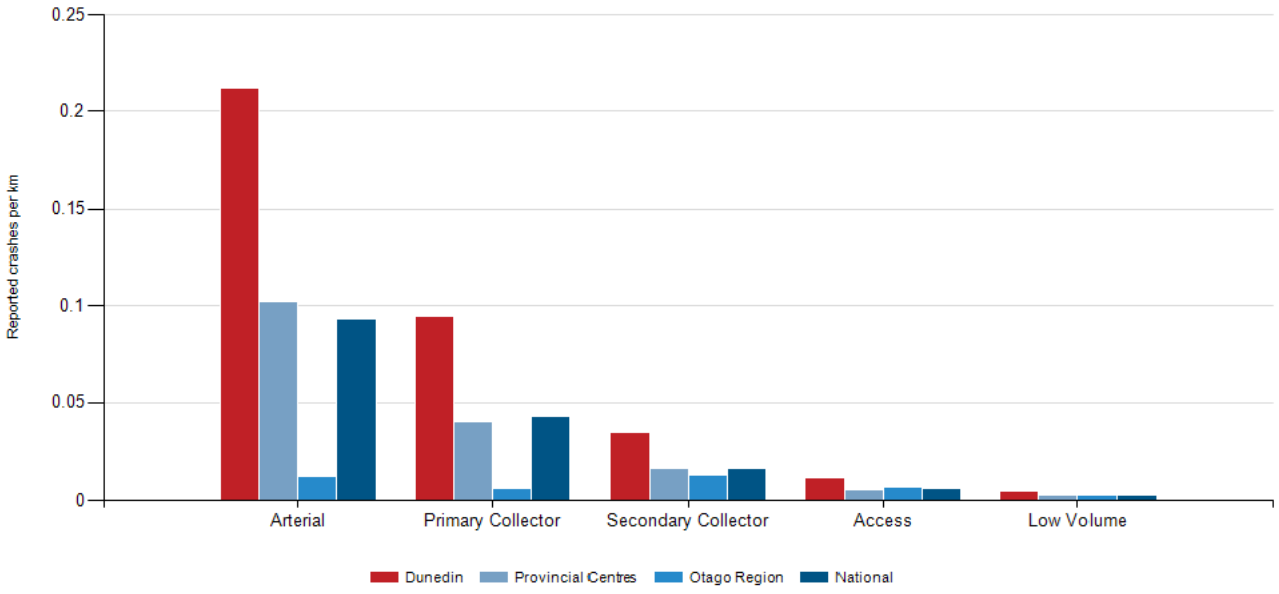
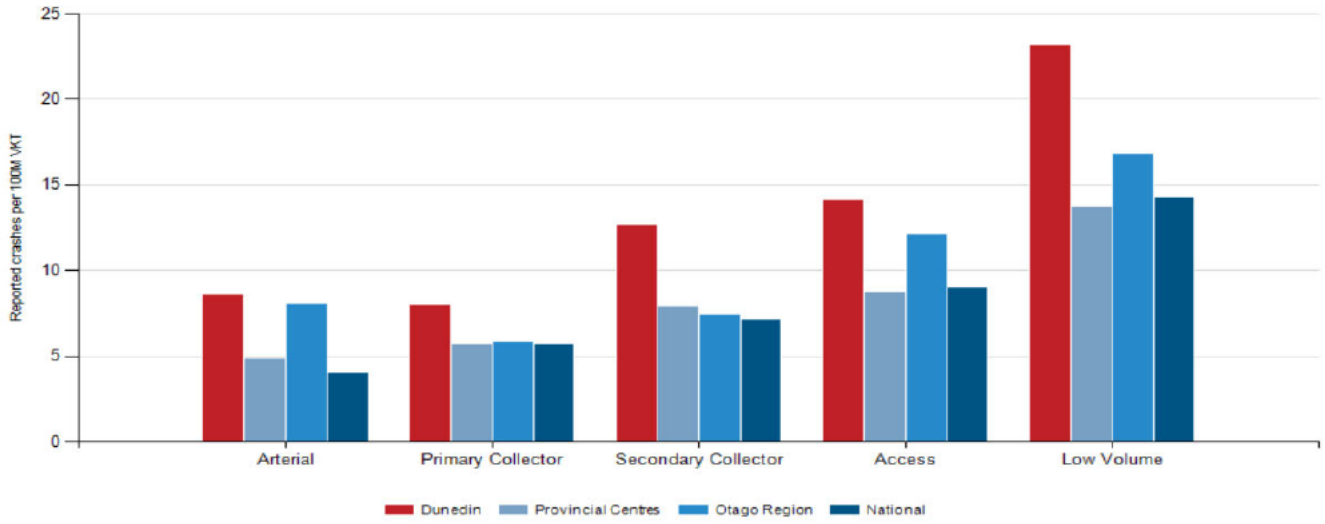


Figure 20: Comparative personal risk - total number of reported crashes by traffic volume over the past 10 years on the network (Source: ONRC performance measures reporting tool)



For all road categories, accept access, DSI's have declined over the past 5 years.

Figure 21: Serious injuries and fatalities by road classification (ONRC performance measures reporting tool)

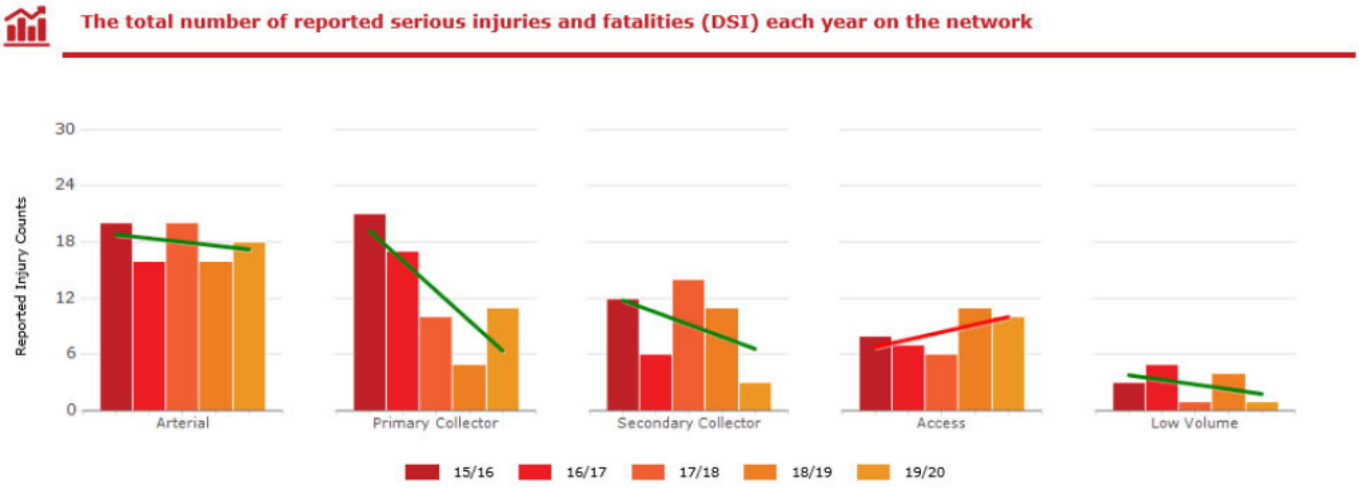


Table 22: Total number of reported serious injuries and fatalities (ONRC performance measures reporting tool)

DSI Counts	Arterial	Primary Collector	Secondary Collector	Access	Low Volume	Total
2015/16	20	21	12	8	3	64
2016/17	16	17	6	7	5	51
2017/18	20	10	14	6	1	51
2018/19	16	5	11	11	4	47
2019/20	18	11	3	10	1	43

Table 23: Comparative trend in reported serious injuries and fatalities over the past 5 years (ONRC performance measures reporting tool)

Trend (Percentage of DSI per year)	Arterial	Primary Collector	Secondary Collector	Access	Low Volume
Dunedin City Council	-2.22%	-25.00%	-14.13%	9.52%	-17.86%
Provincial Centres	2.79%	-1.37%	1.58%	2.95%	0.67%
Otago Region	-9.17%	-5.32%	-8.65%	5.36%	-7.24%
National	-1.89%	-1.21%	-0.52%	-0.05%	-6.96%

Peer Groups include Local authorities only.
Regions and National include Local Authorities and State Highways.

5.2.1 Resilience

The measures for resilience cover:

1. Unplanned closures with a detour provided
2. The number of instances where road access is lost

These measures are in development and will be valuable when reviewed over a period of time to understand trends and when comparing results with other RCA's.

In 2019/20 there were two road closures where detours were provided. One was on an arterial and the other on a secondary collector road.

There were 25 unplanned road closures with no detour provided. Below is a breakdown by road classification and the number of vehicles affected by the closure.

Financial Year	Arterial		Primary Collector		Secondary Collector		Access		Low Volume	
	Road Closures	Vehicles affected	Road Closures	Vehicles affected	Road Closures	Vehicles affected	Road Closures	Vehicles affected	Road Closures	Vehicles affected
2019/20	1	8076	0	0	4	136771	11	3951	9	23819

5.2.2 Amenity

The measures for amenity cover:

1. Smooth travel exposure (STE)
2. Peak and Average Roughness

These measures have been collected over many years providing trend and comparative information. The results tell us that Dunedin's roads are becoming rougher and are rougher in comparison to other RCA's. In part this will be due to Dunedin's topography and high urban environment however the trend over time is of concern and indicate a decline in network condition.

By ONRC category Dunedin's higher volume roads perform better than the lower volume roads.

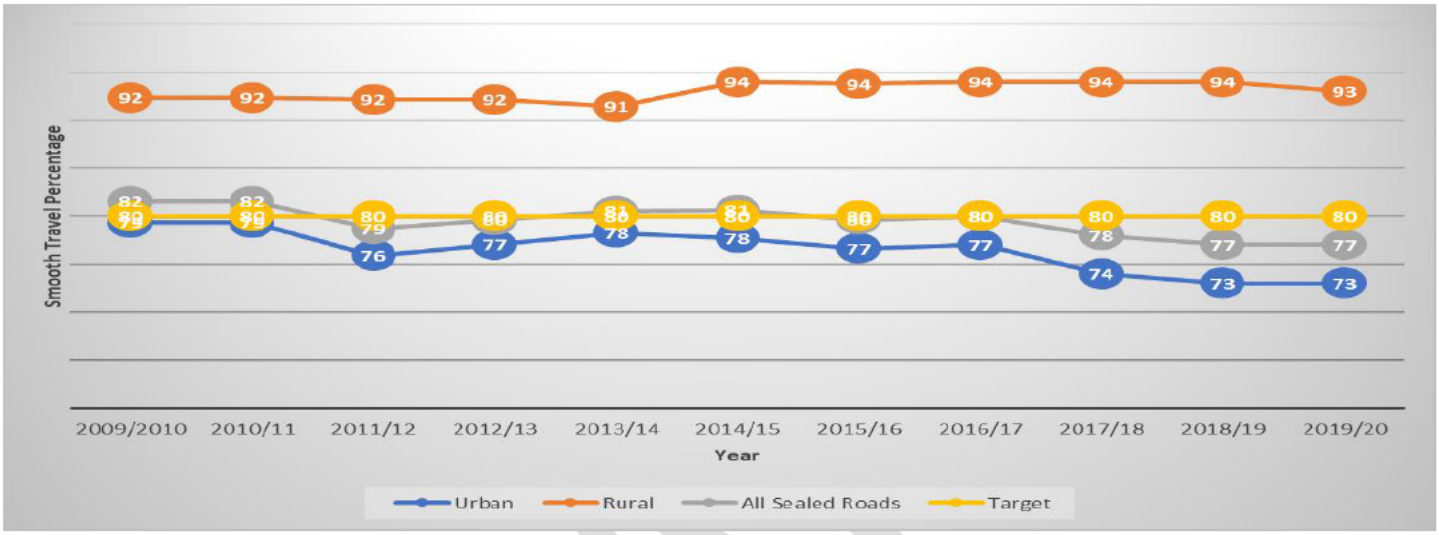
5.2.2.1 Smooth Travel Exposure

Smooth travel exposure is the percentage of vehicle kilometres travelled on sealed roads considered smooth. The standard measure of road roughness was developed in 1969 by the National Association of Australian State Road Authorities and is known as the NAASRA count. The higher the percentage of smooth travel exposure the higher the proportion of road considered smooth.

Dunedin's average smooth travel exposure over the past 11 years has slowly declined and for the past 3 years smooth travel exposure has sat below the DIA target of 80%. This is most notable for the urban network with smooth travel exposure at its lowest at 73%. The rural network is at 93%.

An improvement plan item is for Council to review the current level of service target of 80% and consider separate targets for urban and rural roads in recognition of their differing environs. For example, you would aim for higher speed zones in the rural roads to have higher smooth travel exposure for safety reasons. Urban roads can be rougher due to the frequency of utility covers.

Figure 24: The percentage of travel on roads smoother than the threshold (Source: ONRC performance measures reporting tool)



Dunedin's sealed roads are rougher for all road categories compared to national and regional averages particularly for lower volume roads. This highlights DCC is targeting investment appropriately on higher volume roads, but investment is not enough for the whole network. For all of Dunedin's road categories road roughness has increased.

Figure 25: SMT Total roads with NZ comparatives (Source: ONRC performance measures reporting tool)

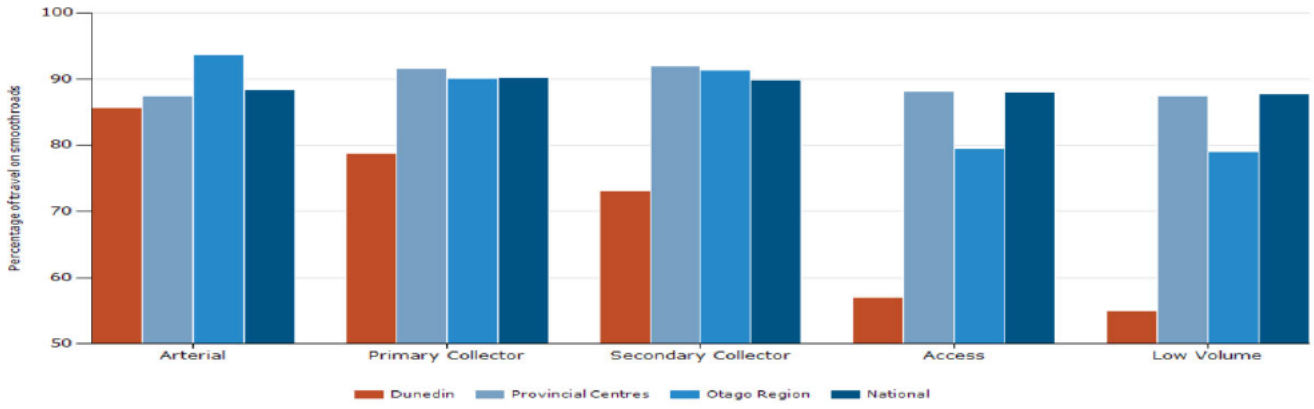


Figure 26: SMT Urban roads with NZ comparatives (Source: ONRC performance measures reporting tool)

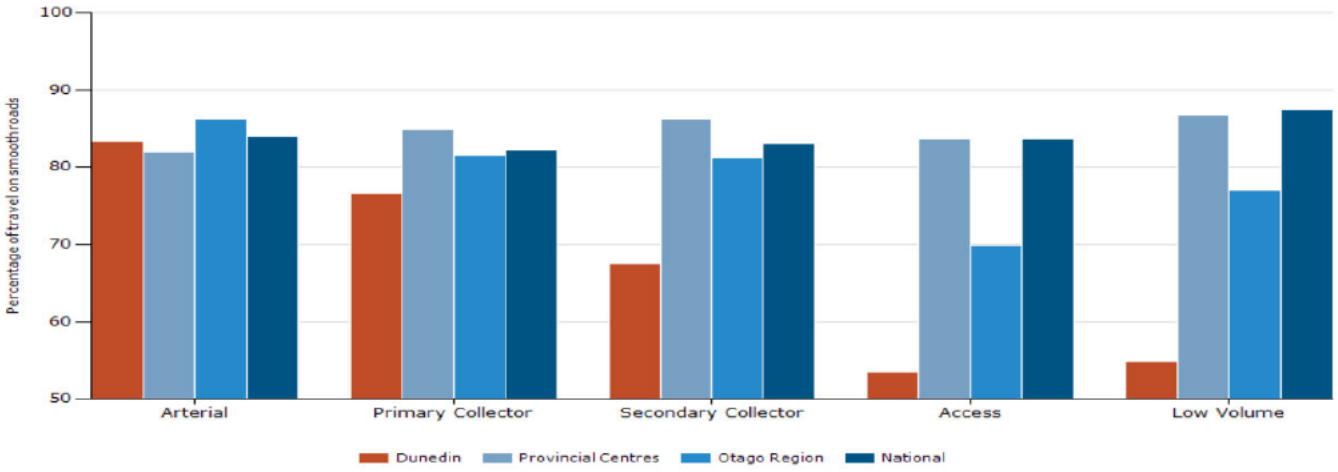


Figure 27: SMT Rural roads with NZ comparatives (Source: ONRC performance measures reporting tool)

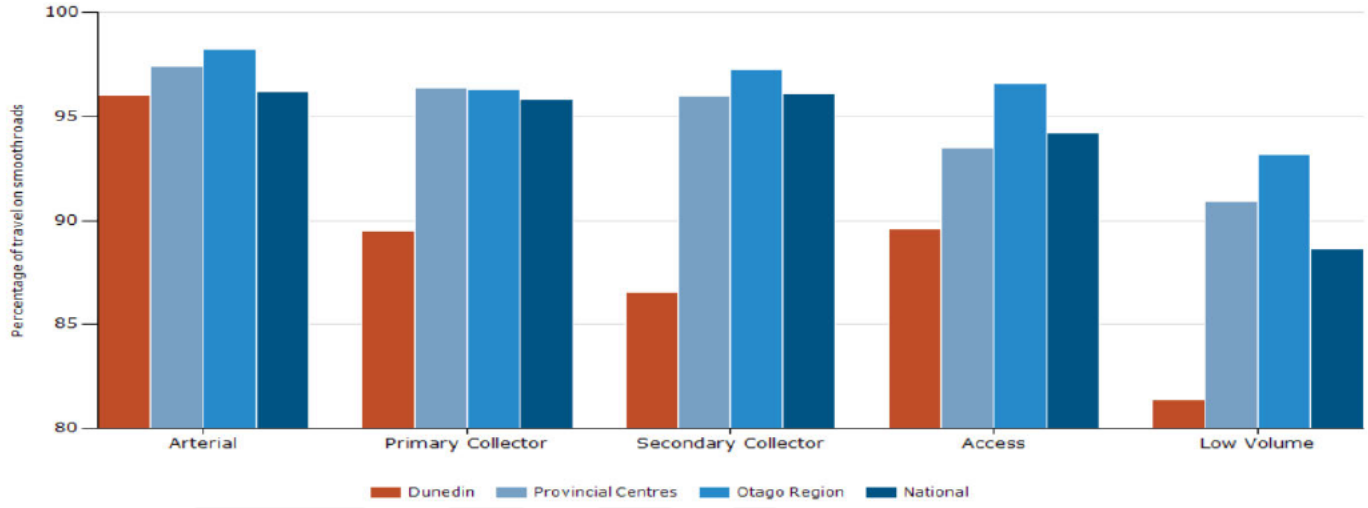
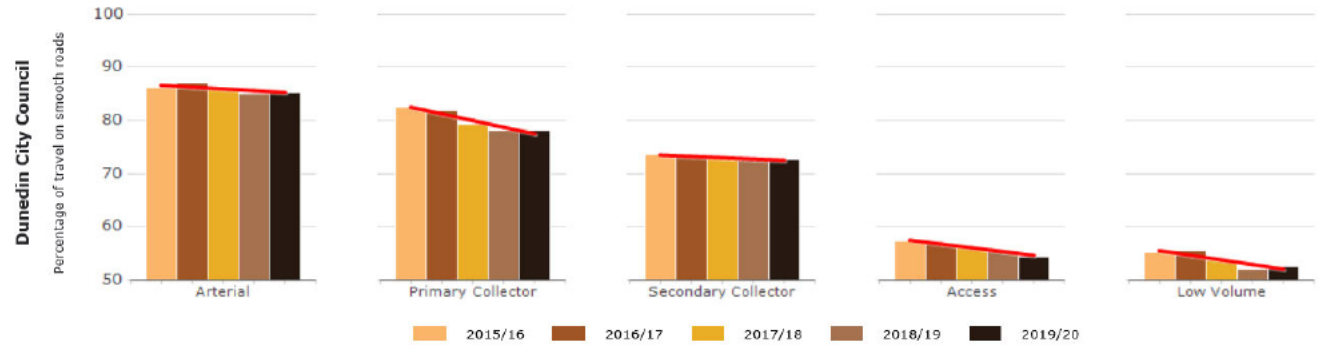


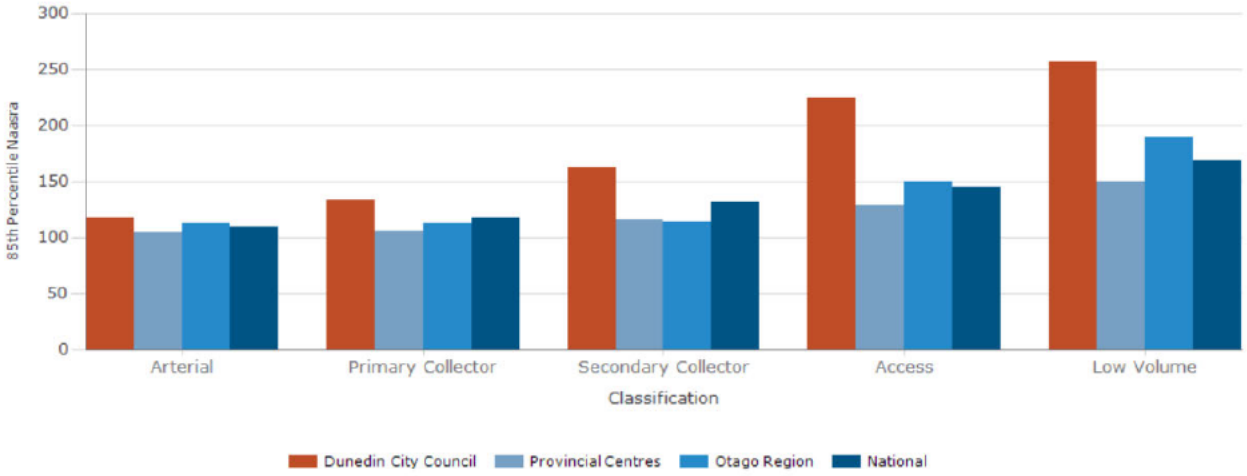
Figure 28: Percentage of travel on roads smoother than the threshold for each traffic grouping (Source: ONRC performance measures reporting tool)



5.2.2.2 Peak Roughness

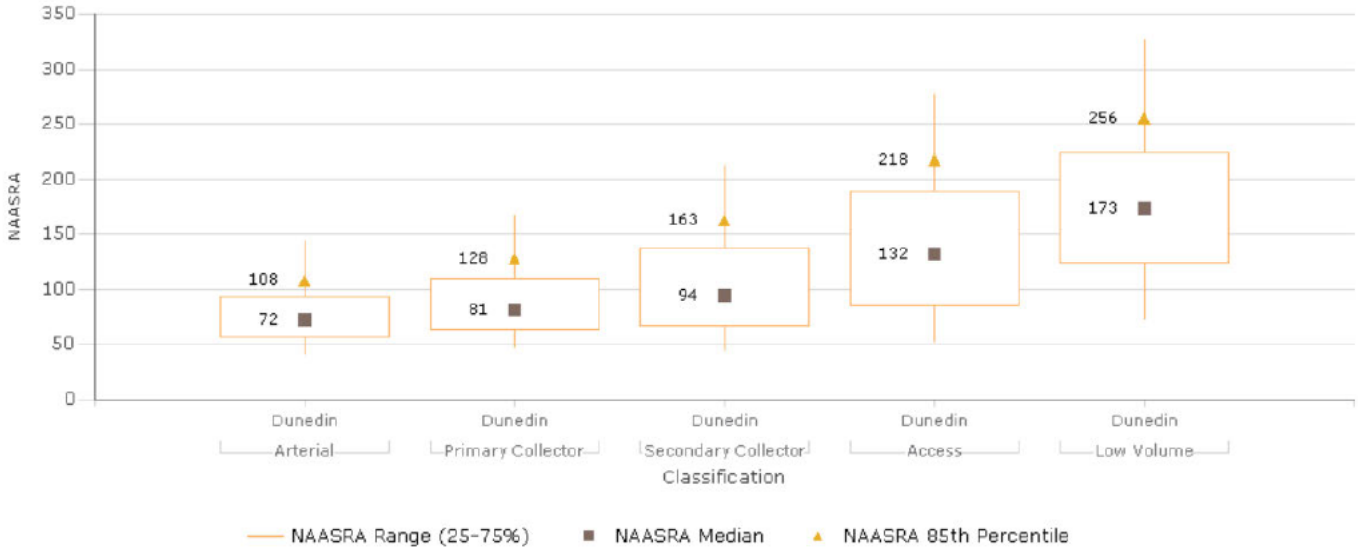
Peak roughness is another measure of roughness focusing on the worst 15% of sealed roads. Dunedin's roughest 15% of roads are rougher than comparative national and regional averages particularly on lower volume roads.

Table 6: 85th Percentile comparison (Source: ONRC performance measures reporting tool)



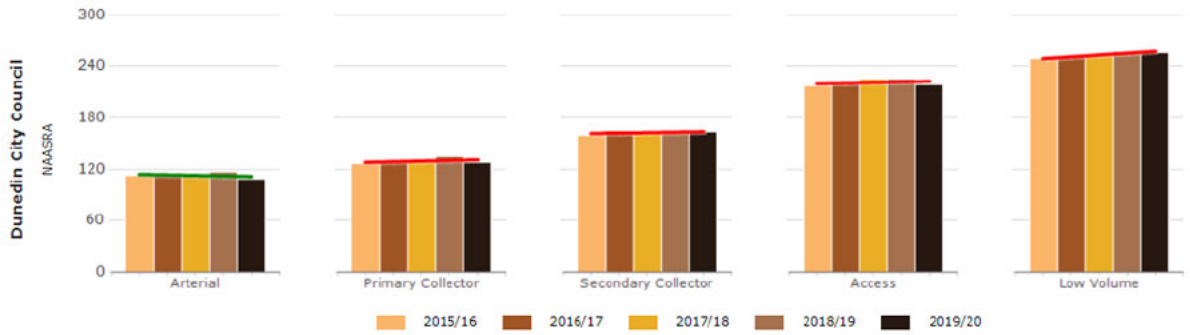
When looking more closely at the actual number of counts within the DCC network the figure below shows the medians again increasing as the classification lowers. The size of the box demonstrates the range of counts (from the 25th to the 75th percentile) and the reading above the box shows the 85th percentile. The Arterial roads have the smallest range of spread and this increases as the classification lowers indicating that lower volume roads have a higher range of "rough" counts versus higher volume roads.

Figure 29: 85th Percentile roughness of DCC roads (Source: ONRC performance measures reporting tool)



For all sealed road categories roughness of roads in the 85th percentile is increasing accept arterial which has shown a slight decrease.

Figure 30: 85th Percentile trend (Source: ONRC performance measures reporting tool)



5.2.3 Accessibility

The measures for accessibility cover:

1. The proportion of the network not available to heavy vehicles
2. Number of instances where signs and markings do not comply (data currently being collected)

These measures are in development and will be valuable when reviewed over a period of time to understand trends and when comparing results with other RCA's.

In Dunedin 25.3% of low volume roads is not accessible to heavy freight.

Figure 31: Percentage of network not accessible to heavies (Source: ONRC performance measures reporting tool)

Financial Year	Arterial		Primary Collector		Secondary Collector		Access		Low Volume	
	Class 1 HCV	50Max	Class 1 HCV	50Max	Class 1 HCV	50Max	Class 1 HCV	50Max	Class 1 HCV	50Max
2019/20	0.0%	0.1%	0.0%	0.0%	3.2%	3.2%	0.0%	0.0%	25.3%	25.3%

5.2.4 Cost efficiency

The cost efficiency measures provide valuable insights into how cost-effective RCA's transport activities are in comparison to others and enable RCA's to explore the key drivers causing the differences.

The measures for cost efficiency cover:

- Chip seal re-surfacing lengths and area's
- Chip seal re-surfacing average life and cost
- Asphalt re-surfacing lengths and area's
- Asphalt re-surfacing average life and cost
- Metalling quantities – in development
- Maintenance costs per lane km – in development

The cost efficiency measures demonstrate that Dunedin's renewal and maintenance investment provides value for money. The average life of re-seals is high across all road categories and maintenance costs per kilo metre is in keeping with a network with a high urban component.

Dunedin's cost per kilometre for chip-seal and asphalt surfacing is higher compared to national and regional averages for most road categories, however Dunedin's network has a high urban road component in comparison to other provincial centres. The urban mix is important when comparing

networks as urban roads require more maintenance and are costlier to maintain than rural roads. This is demonstrated in the figures below.

Figure XX: Cost drivers of urban roads

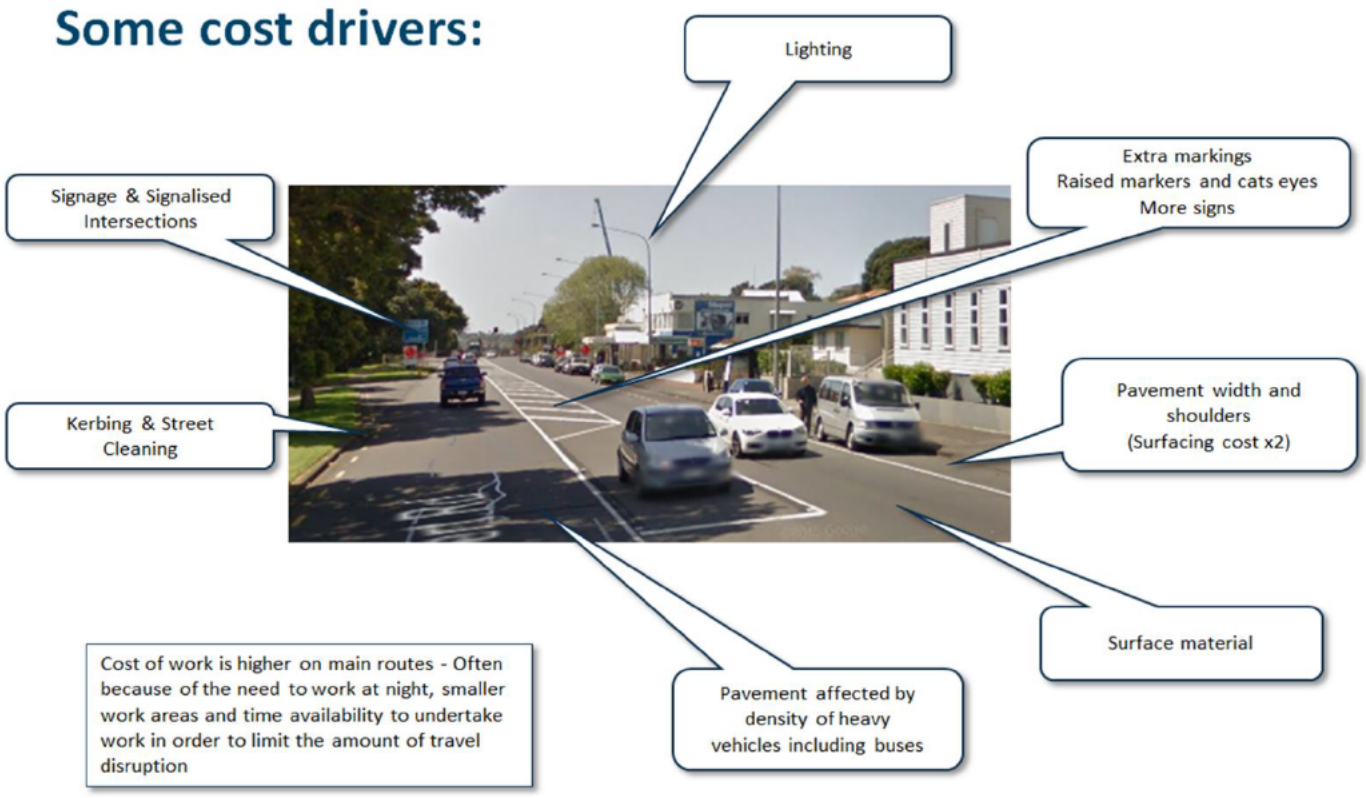
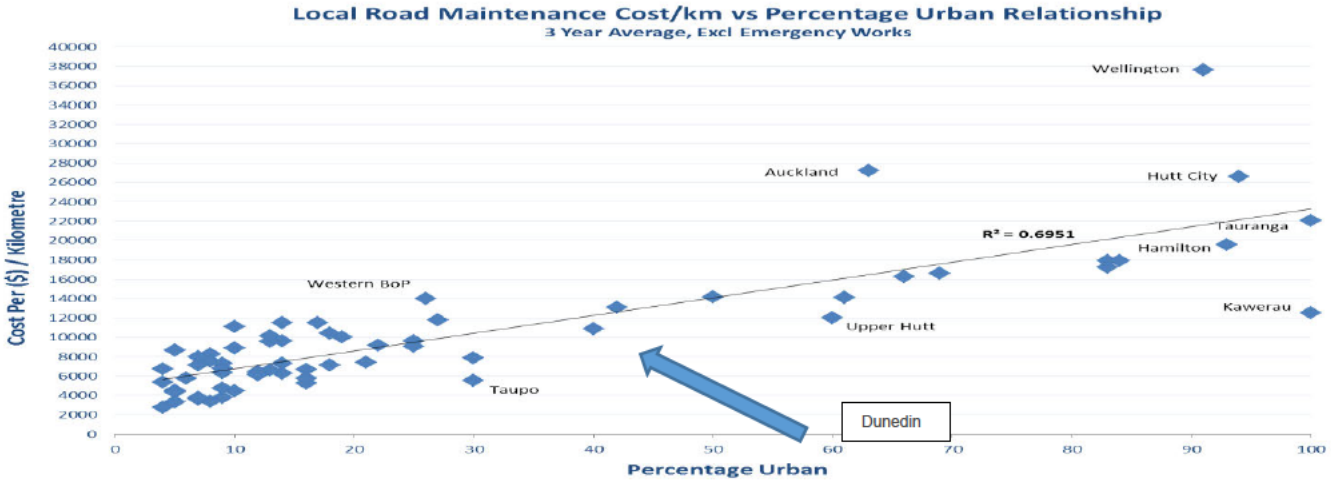


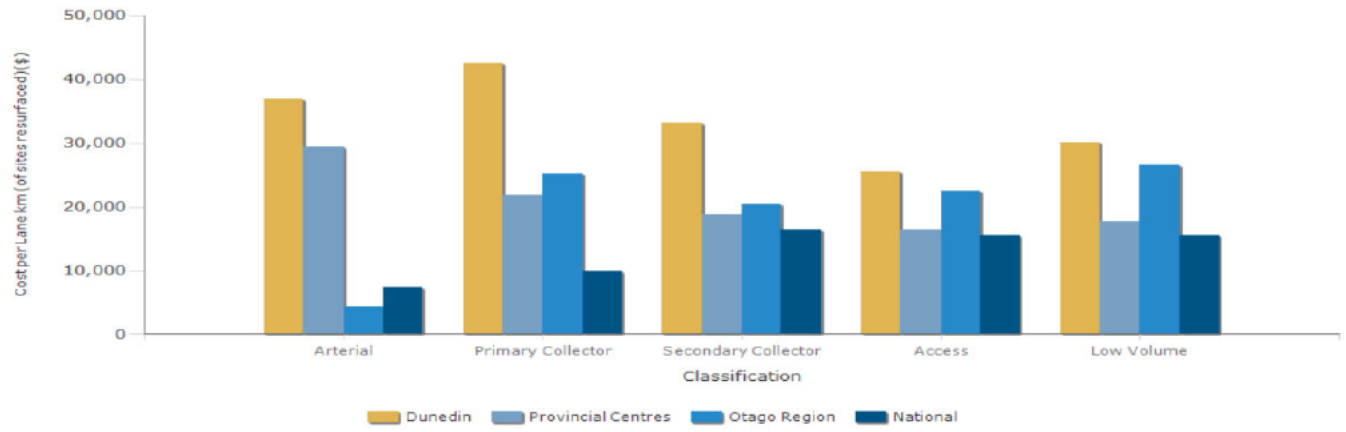
Figure XX: Comparative Maintenance Costs per km of network (NZTA achievement return data)



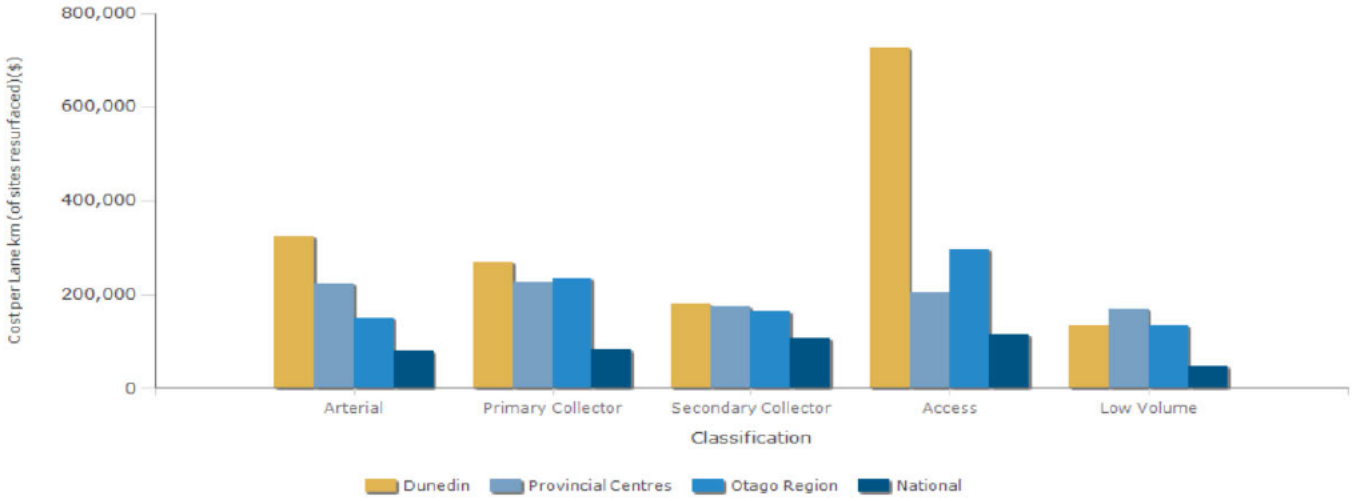
The contracting prices Dunedin can achieve may also be impacted by a relatively limited contracting market. Dunedin does not have a wider pool of contractors to choose from that other regions and cities may have such as Auckland, Wellington and Christchurch.

In terms of average life achieved for re-seals Dunedin's performs well in comparison to national, regional and provincial averages. Chip seals achieve a higher average life for all road categories accept arterial which are within national averages. Asphalt achieves longer lives across all road categories.

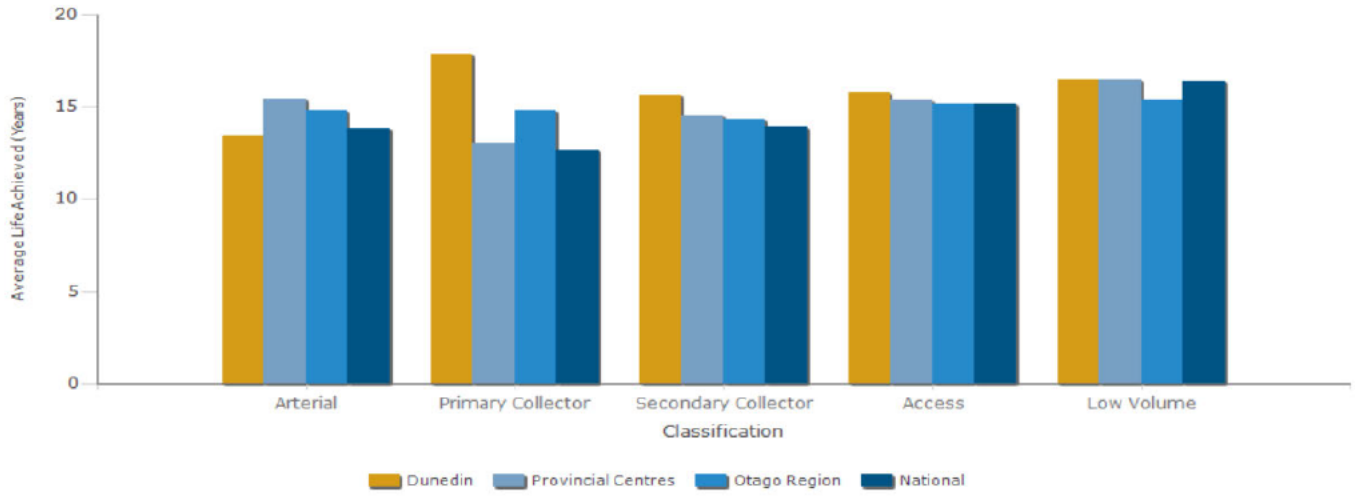
FigureXX: Chip seal surfacing cost per lane km (ONRC reporting tool)



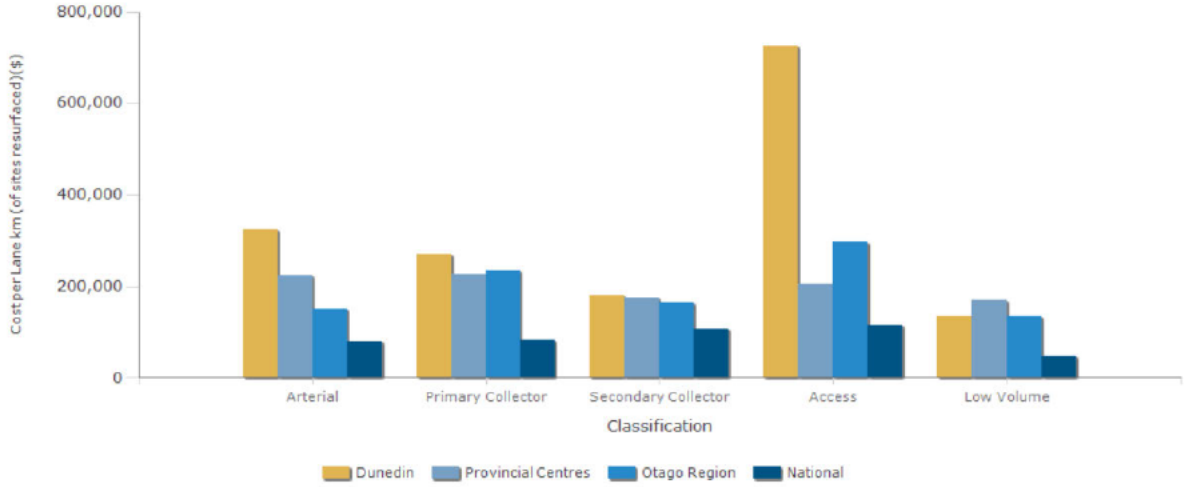
FigureXX: Asphalt surfacing cost per lane km – Urban (ONRC reporting tool)



FigureXX: Average life achieved for chip seal – All roads (ONRC reporting tool)



FigureXX: Average life achieved for chip seal – All roads (ONRC reporting tool)



5.3 Development of ONRC to the ONF

The ONRC is currently being enhanced to cater for alternative modes such as people that are walking, riding a bike or taking public transport and to reflect that transport corridors are not just for travelling through but places where people stop, socialise and enjoy doing business. This also aligns ONRC more closely with the Government's outcomes focus areas recognising the value of integrated land and transport planning for creating greater liveability and prosperity and acknowledges the distinct geographical challenges of the country's transport network.

Work is currently underway to progress the design of the One Network Framework (ONF) with the aim to launch ONG nationally in February 2021 and embed the ONF in all reporting tools and Waka Kotahi investment and planning processes for the 2024-2027 NLTP funding cycle.

5.4 Long Term Plan Levels of Service

Levels of service are set as part of Council's Long-Term Plan. They provide a measure and set a target against the following key outcomes which are relatable to the ONRC performance measure outlined above:

- The transport network facilitates safe travel
- The transport network facilitates active travel
- The transport network facilitates comfortable travel
- The transport network facilitates accessibility
- The transport network facilitates efficient travel
- Car parking is available and meets the needs of users
- The transport network facilitates sustainable maintenance
- The transport is maintained in a responsive manner

Levels of service fall under two categories – Customer and Technical. Customer levels of service derive from the results of Councils annual resident opinion survey (ROS)and technical levels of service are defined at a national level by the Department of Internal Affairs (DIA) which also allows for a commonality of measures across councils so performance can be compared analysed and understood.

In total they comprise of 13 performance measures of which Transport consistently fails in 8. As a department it also performs poorly in comparison to Council's other departments. This is most notable from the on-going results of the ROS and the DIA measures for footpath condition, smooth travel

exposure and % of the road being re-surfaced each year where the target of 6% has not been met in over 6 years.

Customer Levels of Service

Performance Measure	Data Source	Target 2019/20	Actual 2019/20	Actual 2018/19	Actual 2017/18	Actual 2016/17	Actual 2015/16	Actual 2014/15	Achievement
The transport network facilitates safe travel									
Percentage of residents satisfied with condition of the streetlights throughout the city.	ROS	≥75%	**65%**	65%	64%	68%	67%	78%	**Not achieved**
The transport network facilitates active travel									
Percentage of residents satisfied with the suitability of the road network for cyclists throughout the city.	ROS	≥28%	**31%**	34%	28%	28%	28%	30%	**Achieved**
Percentage of residents satisfied with condition of footpaths throughout the city.	ROS	≥57%	**49%**	45%	44%	51%	51%	57%	**Not achieved**
Percentage of residents satisfied with the ease of pedestrian access throughout the city.	ROS	≥65%	**67%**	68%	70%	72%	75%	73%	**Achieved**
The transport network facilitates accessibility									
Percentage of residents satisfied with parking availability in the central city (This measure was changed to measure satisfaction rather than dissatisfaction from 2015/16)	ROS	≥45%	**20%**	22%	28%	33%	35%	34% (Very dissatisfied or dissatisfied)	**Not achieved**
The transport network facilitates efficient travel									
Percentage of residents satisfied with condition of roads throughout the city.	ROS	≥60%	**30%**	35%	39%	49%	52%	53%	**Not achieved**
Car parking is available and meets the needs of users									
Percentage of residents satisfied with availability of metered on-street parking in he central city. (measure changed to measure 'satisfaction' from 2015/16)	ROS	≥40%	**23%**	25%	32%	36%	39% (ROS Satisfied or Very satisfied)	34% (ROS Dissatisfied or Very Dissatisfied)	**Not achieved**

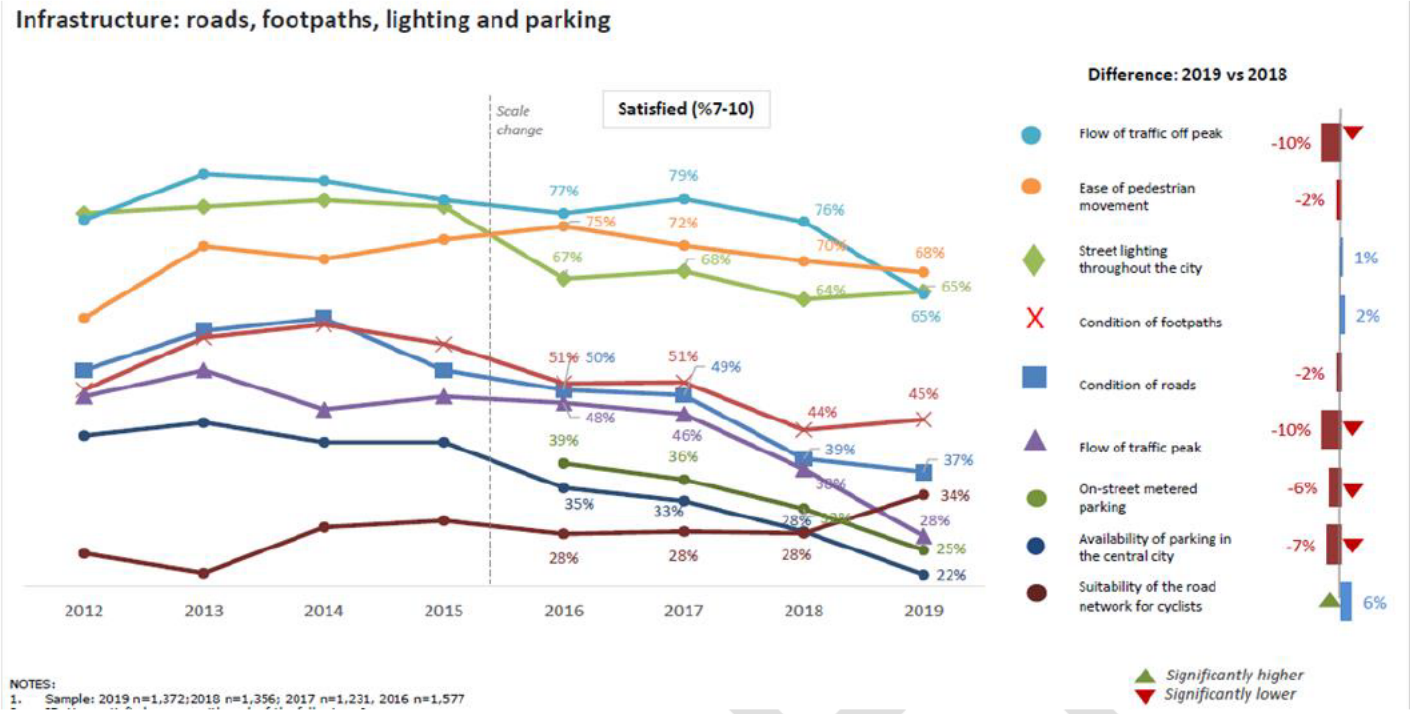
Technical Measures of Performance

Performance Measure	Data Source	Target 2019/20	Actual 2019/20	Actual 2018/19	Actual 2017/18	Actual 2016/17	Actual 2015/16	Actual 2014/15	Achievement
The transport network facilitates safe travel									
The change from the previous financial year in the number of fatalities and serious injury crashes on the local road network expressed as a number. (DIA Mandatory Reporting Measure)	NZTA Dunedin City Road safety report	Reducing	**9 Fewer crashes with fatalities or injuries**	3 fewer crashes with fatalities or injuries	2 more crashes with fatalities or serious injuries	7 fewer crashes with fatalities or serious injuries	1 more crashes with fatalities or serious injuries	New Measure	**Achieved**
The transport network facilitates comfortable travel									
The average quality of ride on local sealed road network measured by smooth travel exposure. (DIA Mandatory Reporting Measure)	RAMM, NZTA	Smooth travel exposure >=80%	**77%**	77%	78%	80%	80%	81%	**Not Achieved**
The transport network facilitates sustainable maintenance									
Percentage of sealed road network that is resurfaced. (DIA Mandatory Reporting Measure)	Work achieved reports	Target (m2) equating to 6% of network	**4.16% of the network**	5.11% of the network	5.80% of the network	4.45% of the network	5.80% of the network	New Measure	**Not achieved**
The transport network facilitates active travel									
Percentage of footpaths within the level of service standard adopted by the Council in its Asset Management Plan. (DIA Mandatory Reporting Measure)	RAMM Rating	≤15% of network is rated poor or very poor	**18%**	15%	27%	22.5%	13%	New Measure	**Not achieved**
The network is maintained in responsive manner									
Percentage of service requests relating to roads and footpaths to which the response is provided within five working days. (DIA Mandatory Reporting Measure)	Customer Service Agency Records	≥90%	**93%**	94%	97%	86%	72%	New Measure	**Achieved**
The transport network facilitates efficient travel									
Average travel time by vehicle on five key urban routes at peak time (am):									
Route 1-St Clair to Octagon	Travel Time Survey	Route 1: <15 min	**Route 1: 10.1 min**	Route 1: 10.1 min	Route 1: 9.5 min	Route 1: 9 min	Route 1: 10 min	Route 1: 10 min	**Achieved**
Route 2-Normanby to Octagon	Travel Time Survey	Route 2: <15 min	**Route 2: 10.8 min**	Route 2: 10.2 min	Route 2: 9 min	Route 2: 9 min	Route 2: 10 min	Route 2: 10 min;	**Achieved**
Route 3-Mosgiel to Octagon	Travel Time Survey	Route 3: <22 min	**Route 3: 17.5 min**	Route 3: 18.3 min	Route 3: 18 min	Route 3: 17 min	Route 3: 17 min	Route 3: 17 min	**Achieved**
Route 4-Brockville to Octagon	Travel Time Survey	Route 4: <15 min	**Route 4: 8.4 min**	Route 4: 8.2 min	Route 4: 7.47 min	Route 4: 7.41 min	Route 4: 8 min	Route 4: 8 min;	**Achieved**
Route 5-Waverley to Octagon	Travel Time Survey	Route 5: <15 min	**Route 5: 10.9 min**	Route 5: 10.5 min	Route 5: 10.5 min	Route 5: 9 min	Route 5: 14 min	Route 5: 12 min	**Achieved**

5.5 Customer satisfaction

The below graph presents the results since 2012 and shows that overall satisfaction is trending down and sharply from 2018, with just over one third of residents (35%) satisfied and 30% either very or somewhat dissatisfied.

Table 7: Resident Opinion Survey 2019



6 Strategic Assessment

Having presented Dunedin's strategic context an assessment was undertaken in collaboration with key stakeholders to identify the key underlying issue's impacting Dunedin's transport network. This assessment was under taken during investment logic mapping (ILM) workshops involving transport staff across all disciplines, supply partners, Council representation, Waka Kotahi, REG and representation from Shaping Future Dunedin.

Firstly, the team reviewed the problems identified in the previous AMP to test their relevance considering the key strategic changes that had subsequently occurred such as the hospital rebuild, Dunedin's housing crisis, economic and population growth, safety record and funding challenges.

The team agreed that although the key themes remained the same being – safety, changing user demands and resilience some minor changes were made to recognise the following:

- Dunedin's transport network was developed many years ago and as such has a biased provision for motor vehicle use. This has acted as a barrier to encourage the uptake of alternative modes including public transport and active modes.
- A lack of funding had impacted the resilience of the transport network due to historic under investment in renewals which was compromising levels of service. This was most notably evident when reviewing the level of renewal investment and the subsequent decline in asset condition.

The revised problems therefore became as follows (changes highlighted):

Problem 1: Theme: Safety *"A diverse network, inconsistent layout and competing users results in serious and fatal incidents"*

Problem 2: Theme: Changing User Demand *"Network constraints along with changing demands **and provision** for private motor vehicles results in poor access for alternative transport demands"*

Problem 3: Theme: Resilience and funding *"Ageing infrastructure, climate events, a **lack of funding** and vulnerable key routes are a risk to economic and social well-being"*

6.1 Safety

Dunedin continues to have a poor record in road safety. The network is diverse ranging from high volume urban roads, right through to low volume rural roads. In some cases, the transition between urban and rural is very abrupt. The central city is compact and caters for a wide range of user groups such as cyclists, pedestrians, cars and heavy freight. The University, Polytechnic, Hospital, business and industrial districts are in the central city with state highway 1 running through the middle.

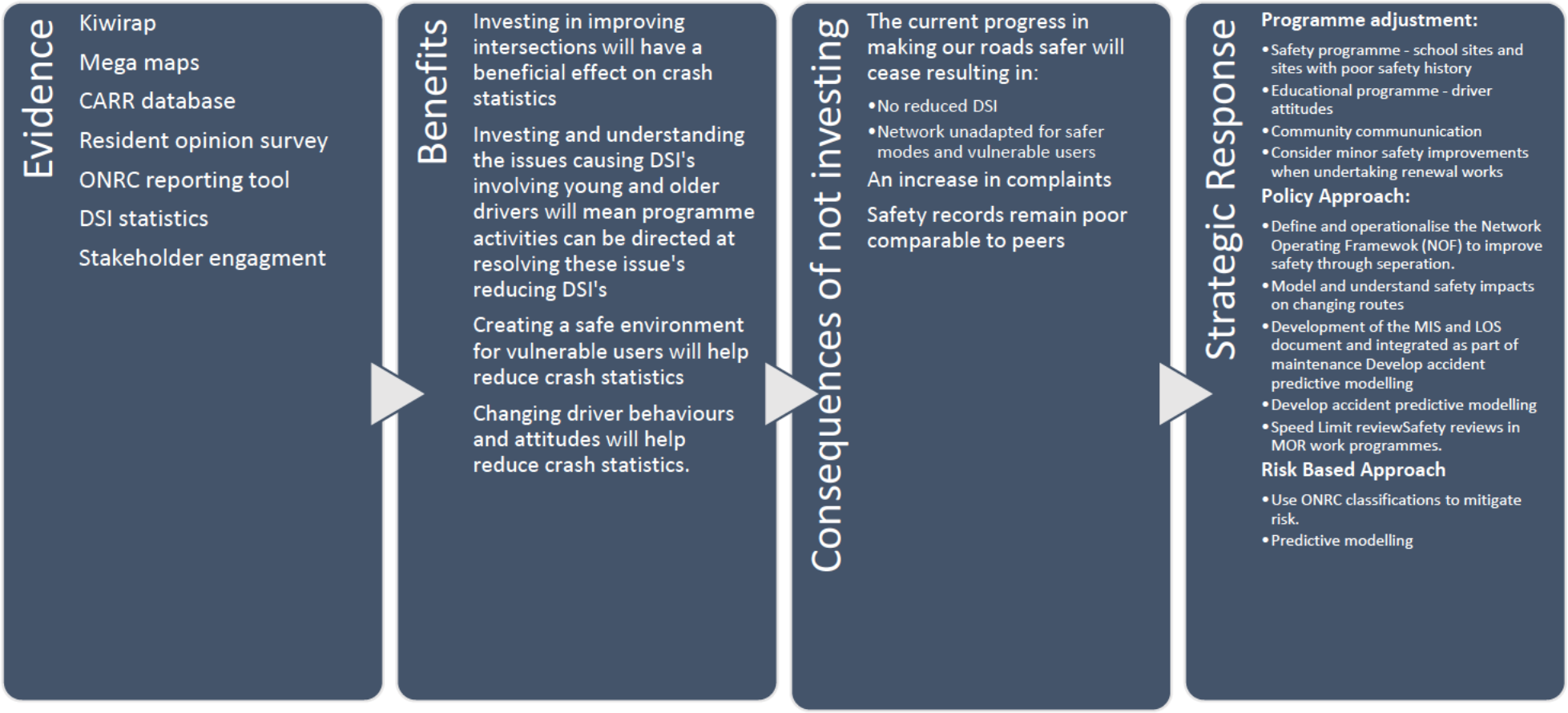
An analysis of crash statistics indicates the following key issues contribute to Dunedin's safety record:

- Intersections
- Older drivers
- Young drivers
- Distractions

The figure below further maps out the process undertaken at the Investment Logic Mapping Workshop and links to ONRC and DCC reporting measures.

Figure 32: Strategic Case - Safety

Problem Statement: A diverse network, inconsistent layout and competing users results in serious and fatal incidents.



KPI	Base line 2017	Results 2018 - 2019	Commentary
• **Customer** • % of residents satisfied with condition of street lights >75% • **Technical** • Reduction in DSI • **ONRC** • Reduction in collective risk • Reduction in personal risk • **CARR** • Reduction in risk ratings • **LEAD INDICATORS** • % of safety improvements considered in renewals works. • Complete planned School safety improvements.	• **Customer** • Actual 68% - Not achieved • **Technical** • 2 more - Not achieved • **ONRC** • Collective/personal - high in relation to peers - Not achieved • **CARR** • 5th highest for DSI risk rating - Not achieved • 2nd highest - Intersections - Not improved • 1st highest - Older users - Not achieved • 2nd highest - Younger users - Not achieved • 10th highest - Pedestrians - Not achieved • 17th highest - cyclists - Not achieved • 2nd highest - distractions - Not achieved	• **Customer** • 2018 - 64% • 2019 - 65% • **Technical** • 2018 - 2 more • 2019 -3 fewer • **ONRC** • Collective/personal risk - remains high - Not achieved • **CARR** • 10th highest for DSI risk rating - Improved • 2nd highest - intersections - Not improved • 2nd Highest - Older users - Improved • 14th highest - Younger users - Improved • 11th highest - Pedestrians - Improved • 27th highest - cyclists - Improved • 9th highest - distractions - Improved	• Dunedin safety records remain high in comparison to the 67 other territorial authorities with the ranking of 10th highest in the country. • Areas's of concern involve older road users, intersections, younger users and distractions. • Most notable improvement has been seen in Dunedins risk rating with cyclists moving from the 5th highest in 2013 to now being the 27th highest in 2019. This coincides with the city's increased investment in cycle improvements. • With evidence suggesting a direct correlation with safety improvements and a reduction in DSI's Lead KPI indicators have been identifed on acheiving planned programme. • Dunedin is yet to see a sustained improvement in safety statistics following a long period of poor performance.

6.2 Resilience

Dunedin's infrastructure is ageing. The topography and geology of the area means that routes are vulnerable to closure following a natural event such as earthquakes or heavy rainfall that can cause flooding and coastal erosion.

Exasperating the issue has been DCC's inability to fund renewals to suitable levels which has resulted in a decline in network condition. This has consequently resulted in increased unplanned maintenance costs, asset failure and network disruption.

The DCC has had to rely more heavily on resorting to reactive, heavy maintenance in order to address asset failure versus an optimal programme of renewals. This approach is unsustainable over time and will result in higher whole of life costs.

Table 8: Evidence on Dunedin's resilience

Evidence Source	Description	What it says about Dunedin	Key Issues to Address
ORC Natural Hazard Database (Dunedin City District)	Detailed reports on the various hazards that exist in the Dunedin area.	• Identifies and assesses the potential impact of natural hazards around Dunedin. • Highlights where slip hazards could impact road infrastructure. • Highlights where access could be lost due to slips. • Identifies communities and areas at risk from flooding events	• Vulnerable communities: Maintaining access to remote communities • Vulnerable routes
Lifelines Study	Identifies key routes and assesses the potential impacts of natural hazards.	• Identifies the type of hazards That could affect Dunedin: o Earthquake o Flooding o Landslide o Meteorological o Tsunami and storm Surge • Identifies key routes and communities that could be affected. • Identifies contingency routes.	• Vulnerable communities: Maintaining access to remote communities. • Vulnerable key routes.
RAMM Data	Database of road assets holding key information on age and condition.	• Large stock of ageing infrastructure including: o Bridges o Culverts o Mud tanks o Surface water channels	• Ageing Infrastructure • Infrastructure that is no longer fit for purpose given increase and rising significance of weather events. • Ensure renewal works, particularly for assets such as footpaths, kerb and channel, pavements where condition appears to be deteriorating, meets the lifecycle needs and further deterioration beyond acceptable standards is avoided.
NZTA Flood funding application following a significant 1 in 100 weather even in July 2017.	Significant weather events occur annually and result in land slips, damage to the network and limited road access.	• Two occurrences in recent years of significant 1 in 100 weather events resulting in additional emergency funding to be sought from NZTA o June 2015 o July 2017	• An assessment of the network, following the June 2017 weather event, has estimated recovery works in excess of $11million to address road damage, slips, bridge and retaining wall repairs to reinstate the network. Service in some areas significantly compromised and requiring traffic management

The benefits of addressing these issues and consequence for not are tabled below:

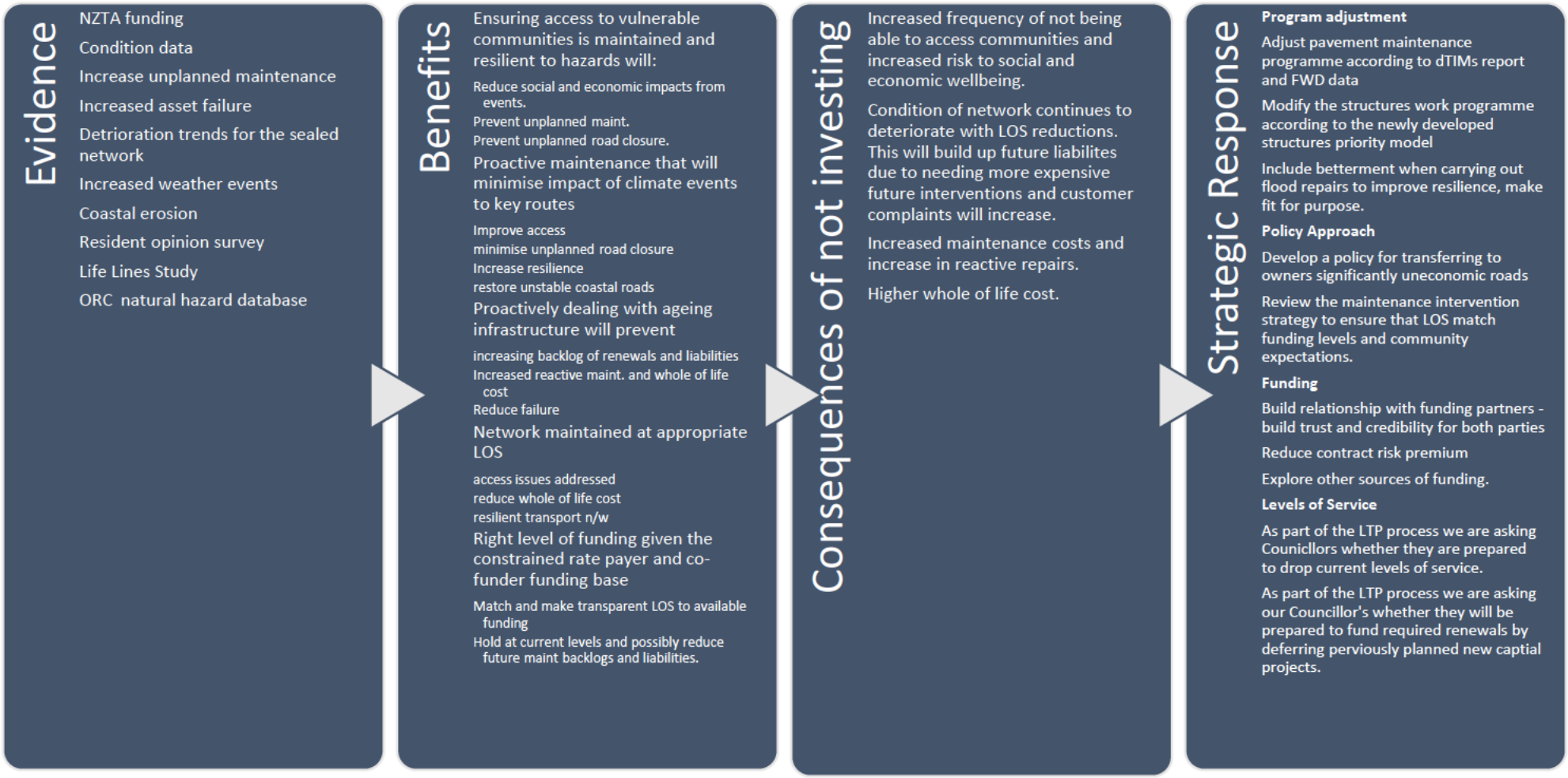
Table 9: Key resilience issues, benefits and consequences

Key Issue	Benefits	Consequences
Vulnerable communities	Ensuring that access to vulnerable communities is maintained and resilient to hazards will: • Reduce the social and economic impact from such events. • Prevent unplanned maintenance. • Prevent unplanned road closures.	If access routes are not well maintained to vulnerable communities: • They could be more regularly cut off. • Increasing social and economic impacts on the community. • Increase in unplanned maintenance costs and road closures.
Vulnerable key routes	Investing in proactive maintenance that will minimise the likelihood of natural hazards impacting key routes will: • Improve access. • Minimise unplanned road closures. • Increase the resilience of Dunedin.	Not maintaining key access routes and State Highway alternative routes: • Could delay response in the event of a natural disaster. • Increase unplanned maintenance costs. • Increase unplanned road closures.
Ageing Infrastructure	Proactively dealing with ageing infrastructure will help prevent: • Increasing back log of renewals. • Increased unplanned maintenance work and costs	Not dealing with ageing infrastructure could have the potential to: • Cause spikes in the renewals programmes which could be difficult to fund. • Increase maintenance costs and further damage to the network if not maintained in a timely fashion.
Significant weather events	Network is maintained at appropriate services levels • Access issues addressed and reduction in unplanned road closures. • Reduced unplanned maintenance work and costs • Maintain a resilient transport network.	Required service levels are not met: • Access issues and protracted unplanned road closures • Increased traffic management requirements on areas of the network where access is compromised increasing costs and causing traffic delays. • Increased unplanned maintenance • Further deterioration of the network if damage is not repaired in a timely fashion.

The figure below further maps out the process undertaken at the Investment Logic Mapping Workshop and links to ONRC and DCC reporting measures.

Figure 33: Strategic Case – Resilience

Problem Statement: Ageing infrastructure, climate and seismic events, a lack of funding and vulnerable key routes is a risk to economic and social well-being.



KPI	Base line 2017	Results 2018 - 2019	Commentary
• **Customer** • % of residents satisfied with overall roading maintenance - 60% • **Technical** • Smooth travel exposure>=80% • % of sealed n/w surfaced - 6% • % of footpaths within LOS adopted by Council in AMP <= 15% of n/w is rated poor or very poor • **ONRC** • Smooth travel exposure • Peak roughness • **LAG** • Increased unplanned maintenance • **LEAD** • Acheiving % targets for reseals and rehabs as determined by dTIms.	• **Customer** • Actual 49% - Not achieved • **Technical** • Smooth travel exposure - 81% Achieved • % of sealed n/w surafaced - 4.33% - Not achieved. • % footpaths in poor or very poor condition - 22.5% - Not achieved. • **ONRC** • Smooth travel exposure - 81% - Achieved.	• **Customer** • 2018 - 39% - Not achieved • 2019 - 35% - Not achieved • **Technical** • Smooth travel exposure • 2018 - 78% - Not achieved • 2019 - 77% - Not achieved • % of n/w sealed • 2018 - Not achieved • 2019 - Not achieved • % of footpath network in poor/very poor condition • 2018 - 27% - Not achieved • 2019 - 19% - Not achieved • **ONRC** • Smooth travel exposure - Not achieved	• Customer satisfaction of the transport network continues to trend downward. As a department Transport is a stand-out poor performer for Council. • Dunedins terrain and urban environment will contrribute to the roads roughness however the continual downward trend in smooth travel exposure indicates condition is deteriorating. • The DCC has been unable to meet renewal targets for the last 6 years.

6.3 Changing User Demand

This problem statement recognises that Dunedin's transport network was developed many years ago and as such has a biased provision for vehicle use making Dunedin very accessible by car. Ample low cost or free parking and relatively short travel times all contribute to Dunedin's motoring convenience.

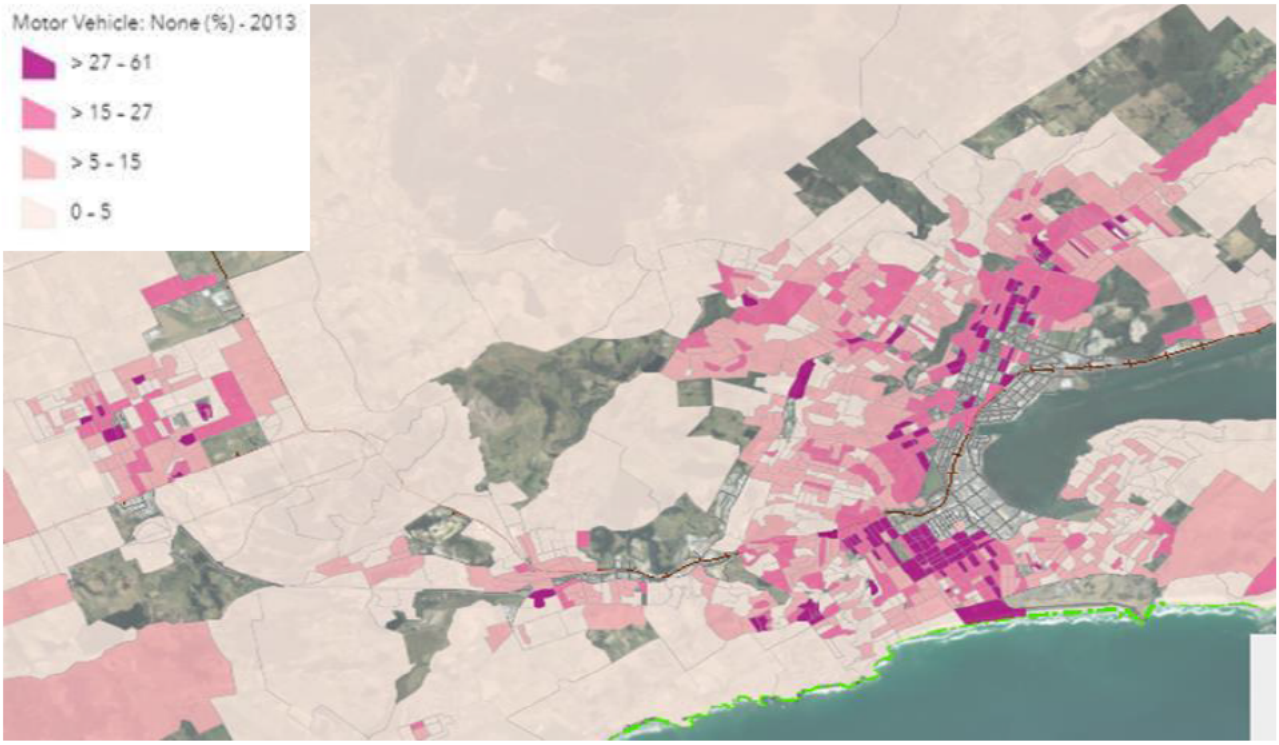
In addition, the configuration of the network has not been suitably designed for active modes comprising of narrow road corridors and a busy, compact central city all needing to cater for a wide range of users with limited delineation. This therefore makes safety a concern creating further barriers for the uptake of active modes such as cycling.

Introducing change to accommodate active modes has also been challenged because the car has been privileged for such a long time. But the landscape is changing, the environmental context and drive for more active transport infrastructure to support mode shift and improve road safety for vulnerable road users is getting stronger, from grass roots/community level, as well as local and central government.

Furthermore, some population growth and increased traffic is expected as a result of increased infrastructure investment and amenity expectations, lifestyle and educational choices. Further, disruption from major central city infrastructure projects is expected to lead to heightened congestion in peak times. While Dunedin has hilly topography, many hill suburbs are within easy walking or cycling distance of the CBD, and E-bikes make Dunedin hills accessible to more people.

Development of Dunedin's Strategic Cycle Network is specifically identified as a strategic priority in the ITS. The goal of the ITS is to increase the percentage of people who walk, cycle, and take public transport to work from 16 percent to 40 percent by 2024. Committing to the goal of increasing the mode shift of active/sustainable transport will contribute to the ITS, the city's environmental commitments, reduce congestion and improve the health of those incorporating physical activity into their daily commute. Investment in providing safe and attractive infrastructure for active modes will raise the profile of active transport and contribute to the mode shift goal.

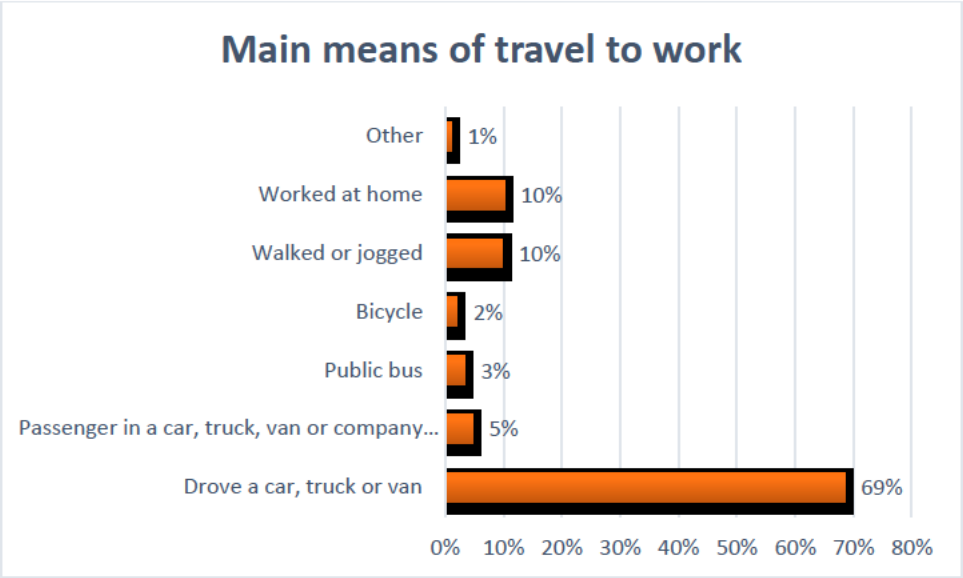
Data from the Census also shows that 9.4% of households in Dunedin do not have access to a vehicle. This is higher than the NZ average of 6.1%. In some parts of South Dunedin, North Dunedin, North East Valley, Mosgiel and Port Chalmers more than a third of households did not have access to a motor vehicle. North Dunedin and North East Valley are home to high numbers of students who live within easy walking distance of the University and Polytechnic, which may contribute to the low car ownership in these areas.



- There is a growing population, largely to the south of the city in areas beyond walking distance, but within cycling distance of the CBD.
- There is low vehicle ownership, particularly in areas of high deprivation, but high car dependence contributing to social exclusion for those without cars.
- Dunedin has a high population of 15-24 years olds that are generally fit and able to walk and cycle. Many of this group are tertiary students living in areas within proximity to the University and Polytechnic and low car ownership
- Dunedin's arterial roads are very wide and offer direct routes to key destinations where road space could be reallocated to active modes without significant impacts on vehicle travel times.
- There is a reasonable climate for walking and cycling.
- There are few crossing points for pedestrians, particularly on arterial roads where traffic volumes are high, and crossing distances are long. This reduces the attractiveness of public transport.

The routes proposed in this SSBC will contribute to a more connected network that will help make it easier for people to travel to key destinations. Work on the review of the Strategic Cycle Network will reiterate the need for connected routes, identify gaps in the current network, and provide direction for future investment to help achieve the 40% mode share for active modes in Dunedin.

Figure 34 Main means of travel to work, Dunedin City (2018 Census)



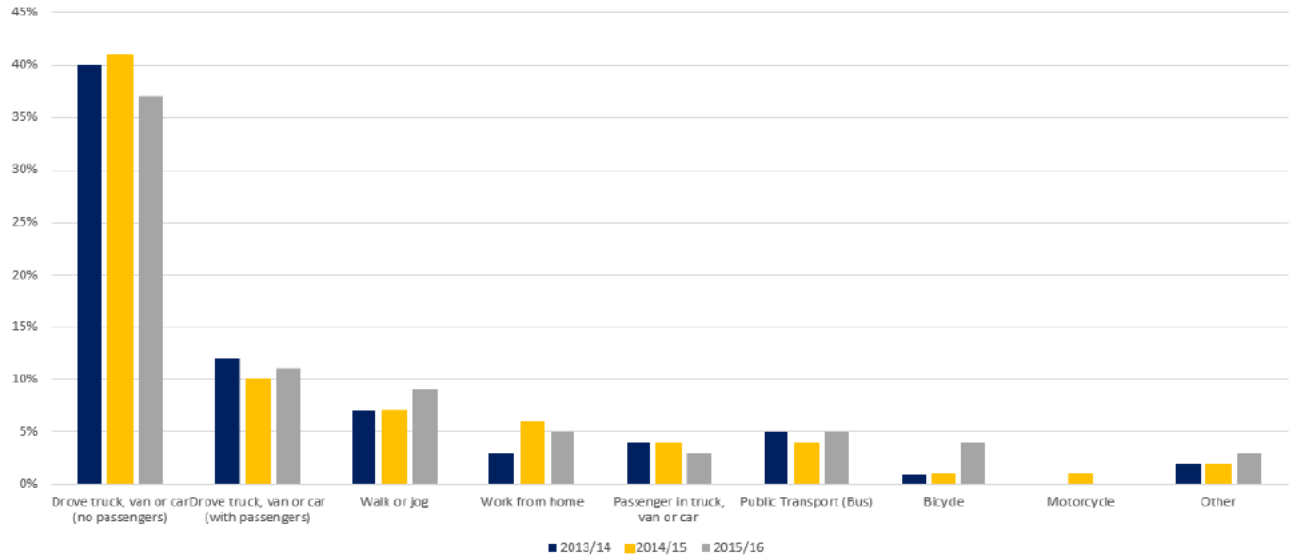
Despite the perception that people do not want to use public transport, walk or cycle, Dunedin has a solid bus network. In recent years routes have changed to be more direct with improved frequencies. The recent construction of a bus hub has provided a central location for bus users and improves the legibility of the system. Since 2017 buses on all routes have been able to carry two bicycles. Additionally, the Covid-19 crisis has acted as a catalyst to simplify the bus fare system. Since March this year, the buses are free of charge and ORC implemented the new Regional Integrated Ticketing System (RITS) system using the Bee card and are going to introduce a $2 flat fair trial[2].

For many residents within the harbour basin and within the compact central city of Dunedin, walking is a viable transport option. As shown with the high proportion of walking (10%) as the main means of travel to work in Figure 5. In comparison to the whole of New Zealand, where 5% of people said they walk as their main means of travel to work.

Table 10: Evidence on Dunedin's changing user demands

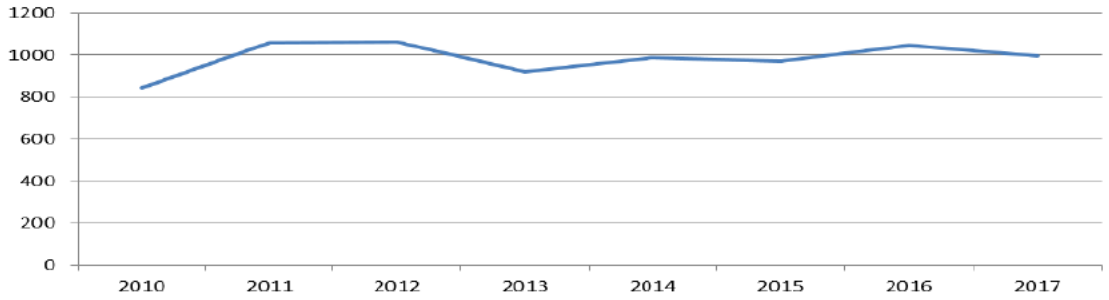
Evidence Source	Description	What it says about Dunedin	Key Issues to Address
DCC Annual Report (2015/16)	Journeys to work information detailing what is the preferred mode over last 3 years	• A distinct preference for private motor vehicles • Active modes of transport (cycling and walking). a minority of the journeys. • Alternative modes not attractive.	• Travel choice • Network efficiency • Safety for active modes.

Figure 35: Journeys to work, Dunedin City (Source: DCC Annual Report 2015/16



Cycle Traffic Counts	Average daily cycle traffic counts over the last 7 years	• Cycle numbers steady with a small decline last year despite population growth • High motor vehicle use in conflict with cyclists.	• Travel choice • Network constraints • Network efficiency • Safety for cyclists

Figure 36: Average daily cyclist traffic counts for Dunedin City (Source: DCC traffic counts)



Bus Patronage (ORC)	Total number of bus users per year for past 10 years	• Trend down in bus use from 2012 • Bus use not an attractive alternative to private motor vehicles	• Travel choice • Network efficiency
Integrated Transport Strategy (ITS)	Strategic investment document for DCC transportation	• Poor provision for alternative modes (bus, cycling and walking) make them unattractive • Road design unsafe for active modes. • Historical focus on providing primarily for private motor vehicles	• Travel choice • Network constraints • Network efficiency • Safety for active modes.

Table 11: Changing user demands, benefits and consequences

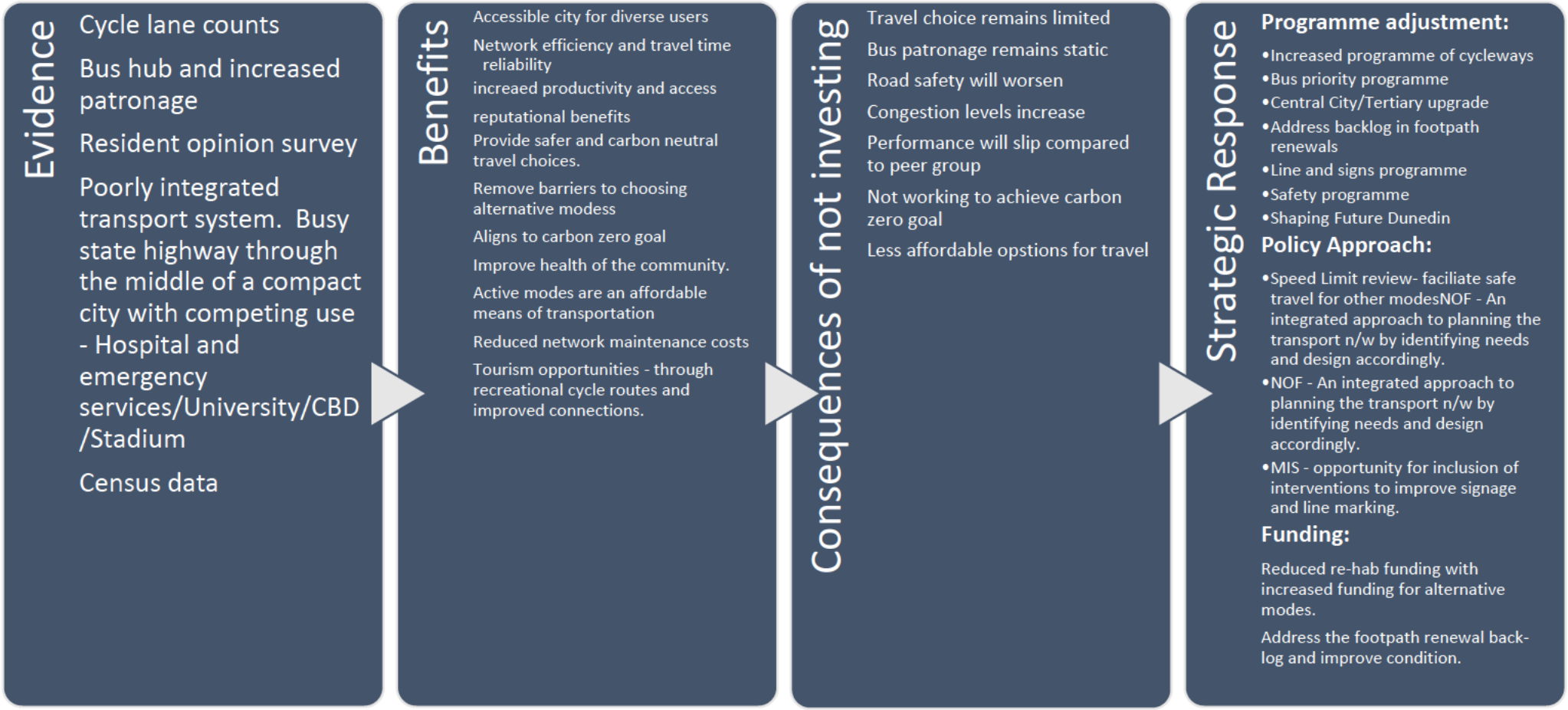
Key Issue	Benefits	Consequences
Travel Choice	Greater travel choice can result in:	Not investing in a network that enables greater travel choice can result in:

	• More accessible city for different users through providing viable transport choices. (tourists, students, elderly, workers etc.) • Better network efficiency and travel time reliability at peak times.	• Increasing use of private motor vehicles creating greater network demand. • City less accessible for different users. • Increasing congestion and poor travel time reliability.
Network Efficiency	More efficient network can enable: • Better travel time reliability. • Increase in productivity and access. • Reputational benefits for Dunedin.	If network efficiency is not addressed, it could result in: • Greater future cost to manage growth. • Poor network efficiency and travel time reliability. • Lack of sustainable transport choices.
Network Constraints	Investing in dealing with the network constraints can help: • Promote alternative modes of transport. • Increase travel time reliability. • Increase safety in the network.	If the network constraints are not dealt with it could result in: • Lack of demand for active modes increasing private vehicle use. • Poor network efficiency and travel time reliability.

The figure below further maps out the process undertaken at the Investment Logic Mapping Workshop and links to ONRC and DCC reporting measures.

Figure 37: Strategic Case – Changing user demands

Problem Statement: Network constraints along with changing user demands and provision for private motor vehicles results in poor access for alternative transport demands.



KPI	Base line 2017	Results 2018 - 2019	Commentary
• **Customer** • % or residents satisfied with network for cyclists >=28% • % of residents satisfied with the condition of footpaths >=57% • % of residents satisfed with the ease of pedestrian access throughout the city >=65% • **LAG** • Increased bus patronage • Decreased reliance on motor vehcle	• **Customer** • Actual 28% - achieved • 51% not achieved • 72% - achieved • **LAG** • Bus patronage ??? Waiting on numbers from ORC • reliance on motor vehicles	• **Customer** • **suitability for cyclists** • 2018 - 28% - Achieved • 2019 - 34% - Achieved • **Satisfied with footpaths** • 2018 - 44% - Not achieved • 2019 - 45% - Not achieved • **Ease of ped. access** • 2018 - 70% - Achieved • 2019 - 68% - Achieved • **LAG**	• KPI's and level of service measures have relied heavily on community feedback received through the annual ROS survey. • A review is underway as part of the LTP process (see Level of Service Section) to introduce measures that are less subjective, stronger strategic alignment to safety, accessibility, modal choice and efficiency.

The investment required

6.4 Introduction

This section outlines the investment required and explains the key changes from previous years. This is presented by activity as explained in the below table:

Categories	Definition	Activities with examples of the work undertaken

Renewals	Replaces an asset or extends its useful life	• **Footpaths**
		  ○ Re-surfacing or reconstruction
		• **Metalling**
		  ○ Replacing aggregate, restoring pavement strength
		• **Re-surfacing**
		  ○ Chip seal, second coat seals an asphalt seals
		• **Drainage**
		  ○ Repair of culverts, kerb and channel
		• **Pavement rehabilitation**
		  ○ The replacement or restoration of strength to sealed pavements.
		• **Structure component replacement**
		  ○ The renewal of components of structures such as bridge decks and other material damaged components.
		• **Traffic Services**
		  ○ Replacing traffic signs, signals, marker posts,

Maintenance	Maintains the condition of an asset but does not extend its useful life	• **Sealed pavement maintenance**
		  ○ Pot hole repairs, pavement dig-outs, patching
		• **Unsealed pavement maintenance**
		  ○ Grading unsealed roads, running course maintenance, spot metalling
		• **Routine drainage maintenance**
		  ○ Cleaning/repairing mud tanks, kerb channels
		• **Structures maintenance**
		  ○ Repairs to bridges, seawalls and retaining walls including painting, cleaning, guardrail and other component repairs
		• **Environmental maintenance**
		  ○ Clearing vegetation, litter collection, snow/debris clearing, graffiti removal
		• **Traffic Services**
		  ○ Lighting, traffic signs, road delineation, signs and pavement markings
		• **Operational traffic management**
		  ○ Traffic signals maintenance and power, variable signs
		• **Cycle path maintenance**
		• **Footpath maintenance**

Network Management	General management and control of road network.	Traffic counts, condition ratings, general network management (staff), systems, inspections and validations, professional services and legal costs.
New Capital	Creates a new or improved asset	New cycleway, intersection upgrade, safety improvements.

6.5 Programme overview

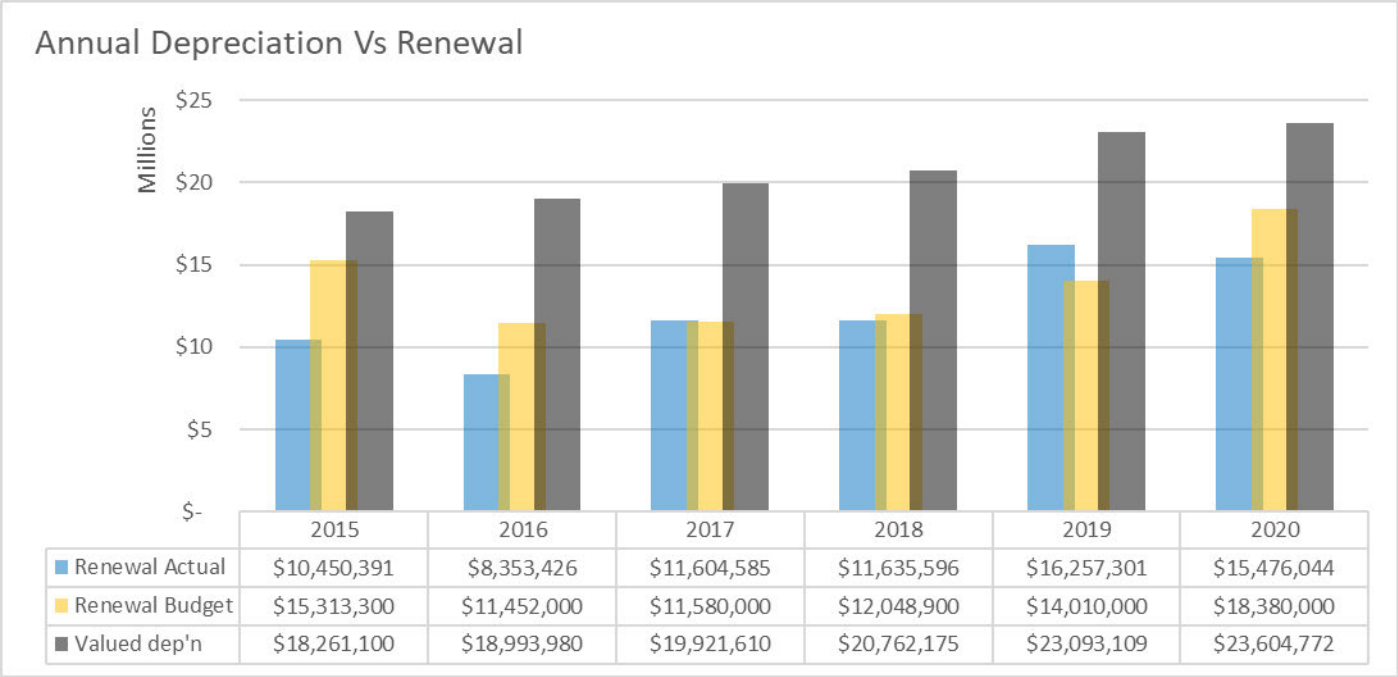
A significant portion of DCC infrastructure has reached a point where the whole of life investment solution is to renew. This requires a step change in renewal investment to achieve a lower whole of life cost in the long term.

Renewal investment has been below asset management targets for all activities for many years. During the 2015/18 RLTP period this was largely due to a lack of capability and capacity across the Transport Group which was subsequently addressed following its re-structure in 2017. During the 2018/21 RLTP period the Group consistently met budgeted delivery targets ($) particularly in the safety improvement programme however during that same period contract prices increased significantly. This meant the quantity of planned renewals remained below asset management targets in order to balance the books considering limited Waka Kotahi funding and corresponding local share.

Considering these funding constraints decisions on when, where and what to renew and the level of backlog that can be accepted is a careful and challenging balancing act factoring in several factors such as risk, levels of services, stakeholder demands, movement, public perception and condition. As such programme planning relies heavily on physical inspections and inputs from a broad spectrum of field staff, specialised services and stakeholders to support optimised decision making. In recent years activities such as re-habiliations and drainage renewals have been prioritised below re-seals, heavy maintenance options and in all cases less expensive treatments are considered and chosen first.

The below graph outlines actual renewal spend versus budget and deprecation. Depreciation acts as an indicator for asset consumption and it shows consistent and material under-investment by over 30% per annum. In 2021 this is forecasted to worsen with anticipated renewal spend of $11.5 million – less than half of the annual depreciation.

Figure 38: Annual depreciation versus renwal costs



	2015	2016	2017	2018	2019	2020
Renewal Actual	$10,450,391	$8,353,426	$11,604,585	$11,635,596	$16,257,301	$15,476,044
Renewal Budget	$15,313,300	$11,452,000	$11,580,000	$12,048,900	$14,010,000	$18,380,000
Valued dep'n	$18,261,100	$18,993,980	$19,921,610	$20,762,175	$23,093,109	$23,604,772

Renewal quantities for the past six years are presented in the below graphs for reseals, footpaths and kerb and channel and show they have been consistently below asset management targets. This has led to a corresponding decline in asset condition, levels of service and an increase in deferred renewals.

The 2021 AMP therefore proposes sustained renewal investment. In 2021-24 this represents a 49% cost increase on the Waka Kotahi approved programme for 2018-21 and a 38% cost increase on Council's 2018-21 forecasted spend.

Costs are driven by

- Increased renewal quantities– for road surfacing, pavements and footpaths.
- Increased construction costs since preparing the 2018/21 RLTP budgets by approximately 40%.
- Costs have been prepared using actual contract prices from the recently procured 10-year maintenance contract.

Figure 39: Renewal Quantities

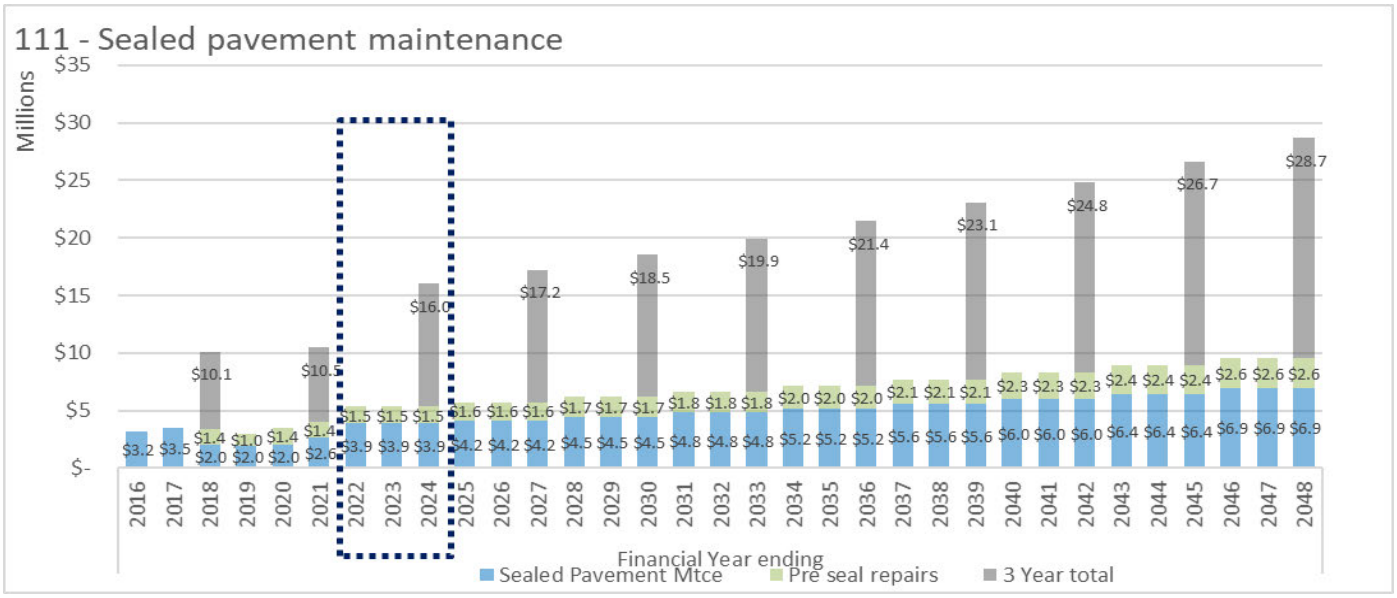
Table 13: DCC's proposed investment programme 2021-2024

		Total 2021 - 24	Final Funding 2018 - 21	Variance to 18/19 approved funding 2021 - 24	Current LTP Forecast 2018-21	Forecast variance 2018-21	Funding variance 2018-21	Commentary
Maintenance								
111 - Sealed pavement maintenance	Routine pavement repairs	**11,622,988**	**10,474,247**	(1,148,741)	**10,474,247**	(1,148,741)	-	18/21 forecasted spend is $10.5 million. Activity in this area has been scaled back in order to keep within the maintenance budget bottom line during fiscally challenging times with limited Waka Kotahi and local ratepayer base funding. The 21/24 forecast is $16 million and reflects contract prices and quantities from the recently procured 10 year maintenance contract.
	Pre-reseal repairs	**4,409,182**	-	(4,409,182)	-		-	
112 - Unsealed pavement maintenance		**2,720,710**	**2,798,376**	77,666	**2,798,376**	77,666	-	18/21 forecasted programme spend is $2.8 million. The 21/24 programme forecasts spend of $2.7 million in line with the 18/21 forecast.
113 - Routine drainage maintenance	Street Cleaning	**879,259**	**2,228,242**	1,348,983	**2,228,242**	1,348,983	-	18/21 forecasted programme spend is $2.9 million. The 21/24 programme forecasts spend of $2.9 million in line with the 18/21 forecast.
	Drainage Maintenance	**2,013,645**	**637,900**	(1,375,745)	**637,900**	(1,375,745)	-	
114 - Structures maintenance	Bridge maintenance	**891,285**	**949,017**	57,732	**949,017**	57,732	-	18/21 forecasted programme spend is $949k. The 21/24 programme forecasts spend of $891k in line with the 18/21 forecast.
	Retaining wall maintenance	-	-	-	-	-	-	
	Maintenance other structures	-	-	-	-	-	-	
121 - Environmental maintenance	Vegetation control	**3,476,996**	**4,322,820**	845,824	**4,322,820**	845,824	-	18/21 forecasted programme spend is $5 million. The 21/24 programme forecasts spend of $5.6 million and reflects contract prices and quantities from the recently procured 10 year maintenance contract.
	Winter maintenance activities	**1,888,495**	**624,400**	(1,264,095)	**624,400**	(1,264,095)	-	
	Other environmental maintenance	**251,764**	**24,100**	(227,664)	**79,940**	(171,824)	(55,840)	
122 - Traffic services maintenance	Traffic services power supply	**2,856,520**	**5,220,870**	2,364,350	**5,220,870**	2,364,350	-	18/21 forecasted programme spend is $6.5 million. The 21/24 programme forecasts spend of $9.3 million a $2.8 million increase (43%) and reflects contract prices and quantities from the recently procured 10 year maintenance contract. The most notable increase has been for line marking costs which has increased by $2.5m.
	Traffic services maintenance	**6,426,604**	**1,259,800**	(5,166,804)	**1,259,800**	(5,166,804)	-	
123 - Operational traffic management	Maintenance of operational infrastructure	**2,229,736**	**1,429,125**	(800,611)	**1,444,125**	(785,611)	(15,000)	18/21 forecasted programme spend is $1.5 million. The 21/24 programme forecasts spend of $2.3 million a $743k increase (52%) and reflects contract prices and quantities from the contract.
	Management and operation of traffic systems	-	**42,000**	42,000	**42,000**	42,000	-	
124 - Cycle path maintenance		**126,633**	**111,174**	(15,459)	**111,174**	(15,459)	-	18/21 forecasted programme spend is $111k. The 21/24 programme forecasts spend of $127k a $15k increase (14%). Costs are expected to increase for this activity as we continue to increase cycle ways in the city.
125 - Footpath maintenance	Footpath Maintenance	**1,788,568**	**1,485,956**	(302,612)	**1,485,956**	(302,612)	-	Forecasted footpath maintenance spend for the 18/21 programme is $1.5 million. The 21/24 programme forecasts spend of $1.8 million and reflects contract prices and quantities from the recently procured 10 year maintenance contract.
	Footpath Renewal	**14,688,761**	**7,882,583**	(6,806,179)	**8,032,583**	(6,656,179)	(150,000)	Forecasted footpath renewal spend for the 18/21 programme is $8 million. Activity in this area has been scaled back in order to keep within budgets during fiscally challenging times with limited Waka Kotahi and local ratepayer base funding. The 21/24 programme forecasts spend of $14 million to catch up on previous years under investment and address the declining condition of footpaths. The required treatment option is also driving cost. Most renewal sites (85%) require a rip and re-surface treatment with the option to over-lay exhausted.
131 - Level crossing warning devices		**132,801**	**115,677**	(17,124)	**100,677**	(32,124)	15,000	
140 - Minor events		-		-	-	-	-	
		56,403,947	**39,606,287**	(16,797,660)	**39,812,127**	(12,182,638)	205,840	
Network Management			-				-	
151 - Network and asset management	Network management (incl inspections)	**13,500,000**	**13,192,557**	(307,443)	**13,197,056**	(302,944)	(4,499)	
	Network user information	-	-	-	-	-	-	18/21 forecasted programme spend is $13.2 million. The 21/24 programme forecasts spend of. $13.5 million an increase of 2%.
	Management of asset inventory systems	-	-	-	-	-	-	
		13,500,000	**13,192,557**	(307,443)	**13,197,056**	(302,944)	4,499	
Renewals			-	-			-	
211 - Unsealed road metalling		**3,931,199**	**1,857,600**	(2,073,599)	**2,320,850**	(1,610,349)	(463,250)	Forecasted metalling spend for the 18/21 programme is $2.3 million. Activity in this area has been scaled back in order to keep within budgets during fiscally challenging times with limited Waka Kotahi and local ratepayer base funding. This has resulted in many roads having less than the required surface metal as maintenance is focused on spot metalling which, while saving costs in the short term, is not the most cost effective and efficient approach in the long term. The 21/24 programme forecasts spend of $3.9 million and seeks have a more sustained and pro-active method for renewal being area focused reducing cartage and mobilisation costs over time while bringing the required surface metal back to acceptable levels.
212 - Sealed road resurfacing	Chip sealing	**10,561,435**	**10,559,389**	(2,046)	**15,237,711**	4,676,276	(4,678,322)	Forecasted renewal spend for the 18/21 programme is $15.3 million. Waka Kotahi funding for this activity was $10.6 million a shortfall of $4.7 million. The DCC funded this difference through the deferral of other renewal activities and the postponement of planned new capital projects. Despite this additional local share renewal spend remains below the levels required. DIA renewal targets have not been met 6 years running and over the past 3 years re-seals have averaged 4.92% of the network per annum versus a target of 6%. This has resulted in a backlog of renewals contributing to a downward trend in asset condition as shown in DCC's most recent DtIMS report and condition ratings. The 21/24 programme forecasts spend of $19.3 million and seeks to address this through sustained investment in re-sealing averaging 6.38% per annum of the network in the next 3 years.
	Thin asphaltic surfacing's	**8,275,649**	-	(8,275,649)	-	(8,275,649)	-	
213 - Drainage renewals	Culverts renewals	**2,245,609**	-	(2,245,609)	-	(2,245,609)	-	Forecasted renewal spend for the 18/21 programme is $10.2 million. Waka Kotahi funding for this activity was $9.7 million a shortfall of $500k. The DCC funded this difference through the deferral of other renewal activities and the postponement of planned new capital projects. The 21/24 programme forecasts spend of $12.3 million to address historic under-investment in Kerb and Channel renewals and improve condition. It proposes a sustained investment of renewals averaging 0.79% of the network per annum versus the historic 0.60%.
	Kerb and channel renewals	**11,534,197**	**9,734,204**	(1,799,993)	**10,165,204**	(1,368,993)	(431,000)	
214 - Sealed road pavement rehabilitation		**9,126,300**	**2,577,006**	(6,549,294)	**3,577,006**	(5,549,294)	(1,000,000)	Forecasted renewal spend for the 18/21 programme is $3.6 million. Waka Kotahi funding for this activity was $2.6 million a shortfall of $1 million. DCC have under-invested in this activity due to funding and budgetary constraints. This has led to network failure, increased re-active maintenance and drops in levels of service. The DCC fully funded a re-hab project on a failed stretch of urban road that had been impacted by increased logging activity. There are other sections of high volume roads in the city where failure re-occurs due to pavement instability and we are holding with heavy maintenance. The 21/24 programme of $9.2 million seeks to address these priority sites.
215 - Structures component replacements	Bridge renewals	**2,305,125**	-	(2,305,125)	**1,070,000**	(1,235,125)	(1,070,000)	
	Retaining wall renewals	**3,073,500**	**3,386,838**	313,338	**3,386,838**	313,338	-	Forecasted renewal spend for the 18/21 programme is $4.5 million. Waka Kotahi funding for this activity was $3.4 million a shortfall of $1.1 million. DCC fully funded the shortfall through the deferral of other renewal activities and the postponement of planned new capital projects. The 21/24 programme of $5.9 million addresses high priority repairs identified and programmed from annual structural inspections. It does not address medium priority sites.
	Other structure components replacements	**553,230**	-	(553,230)	-	(553,230)	-	
221 - Environmental renewals		-	-	-	-	-	-	
222 - Traffic services renewals		**3,375,125**	**1,185,319**	(2,189,806)	**2,188,204**	(1,186,921)	(1,002,885)	18/21 forecasted programme spend is $2.2 million. The 21/24 programme forecasts spend of $3.4 million a $1.2 million increase (54%) and reflects contract prices and quantities from the recently procured 10 year maintenance contract and allows for the replacement of street light columns and outreach arms. A condition assessment of all street light columns and outreach arms was undertaken as part of the LED rollout and this budget allows for the replacement of those identified as being in very poor condition.
		54,981,370	**29,300,356**	(25,681,014)	**37,945,813**	(17,035,557)	(8,645,457)	
		124,885,317	**82,099,200**	(42,786,117)	**90,954,996**	(33,930,321)	(8,855,796)	
				52%		**41%**		

6.6 Maintenance Costs

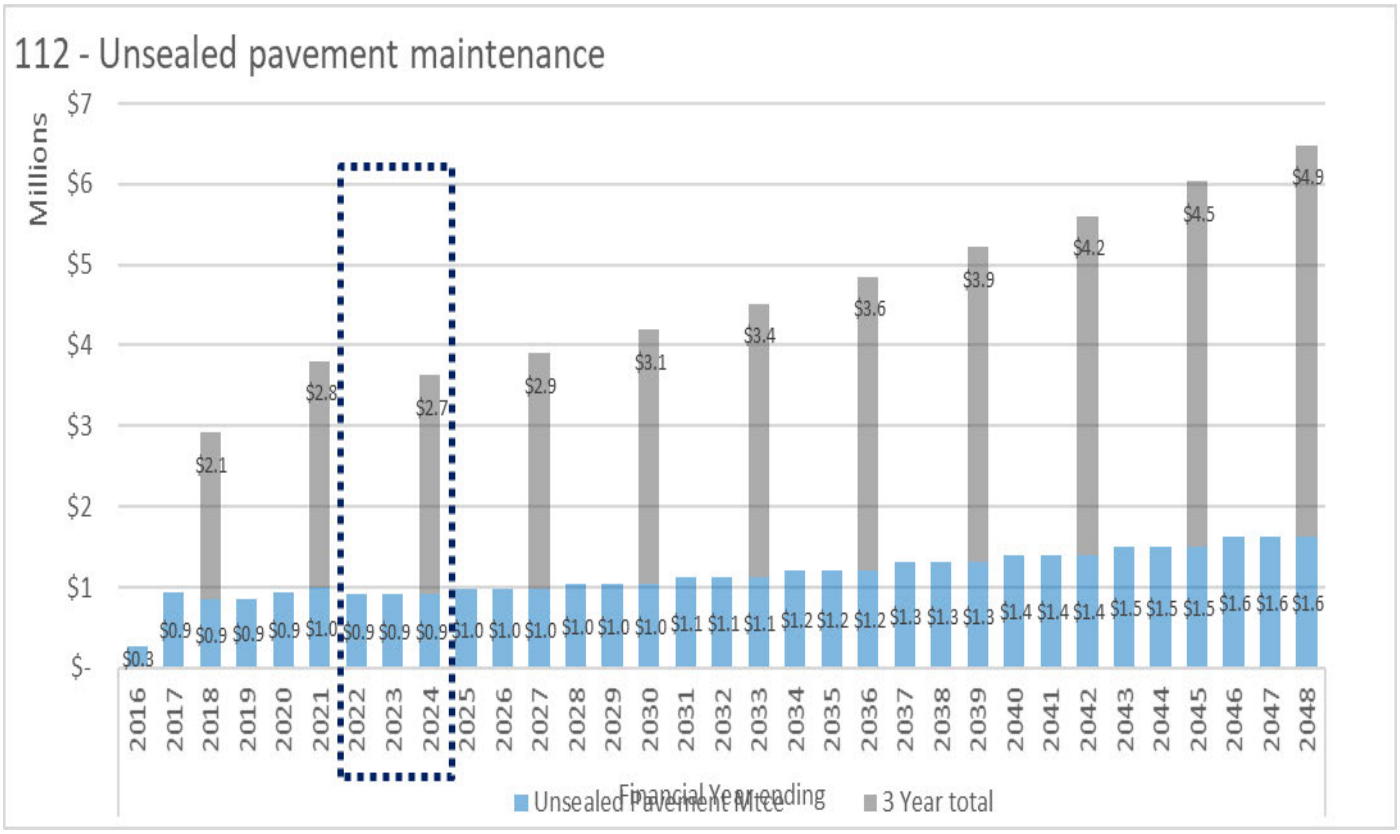
6.6.1 Sealed pavement maintenance

The proposed programme is $16 million versus a previous year's programme of $10.5 million, a $5.5 million increase or 52%. The increase represents a change in contract prices from the recently procured 10-year maintenance contract.



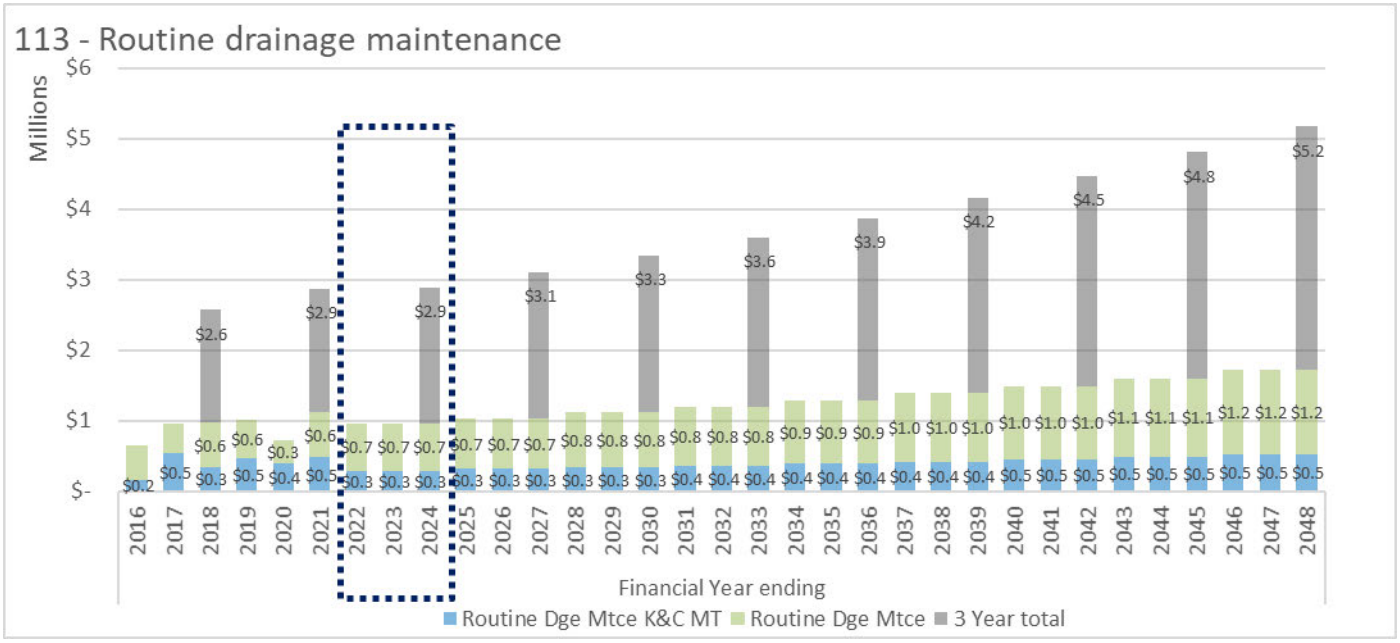
6.6.2 Unsealed pavement maintenance

The proposed programme is $2.7 million versus a previous year's programme of $2.8 million, a $100k decrease. The programme represents rates from the newly procured 10-year maintenance contract.



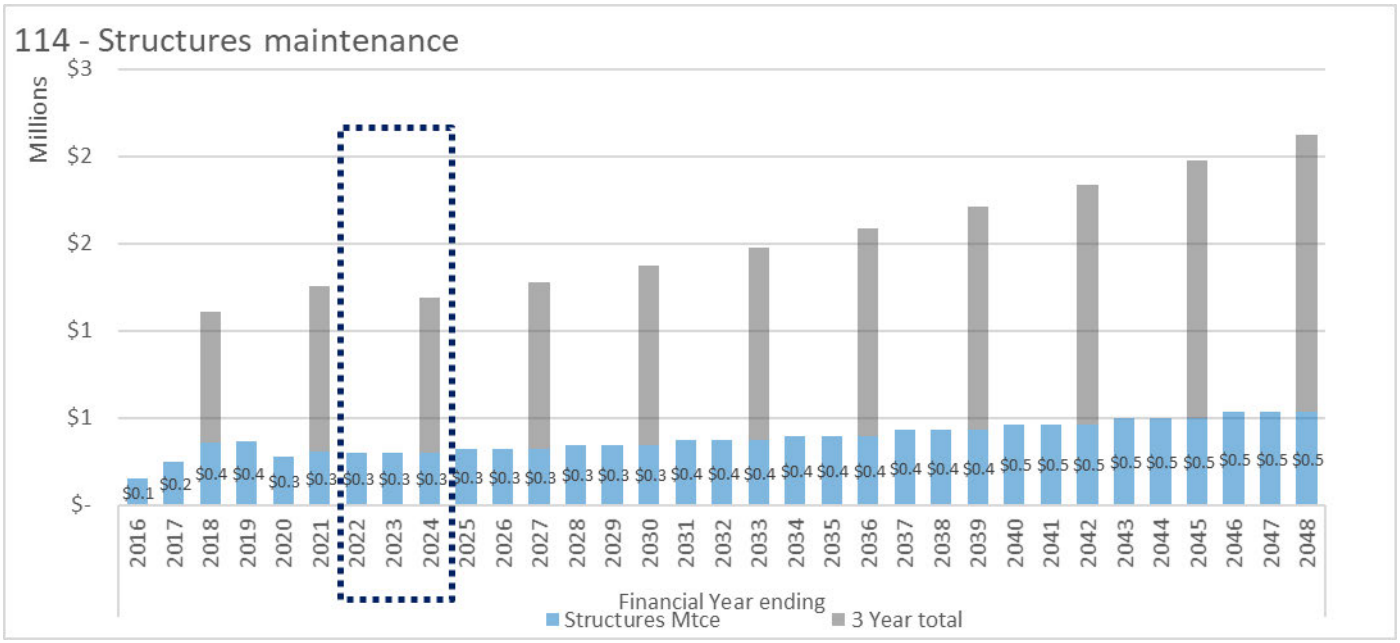
6.6.3 Routine drainage maintenance

The proposed programme is $2.9 million in line with the previous RLTP.



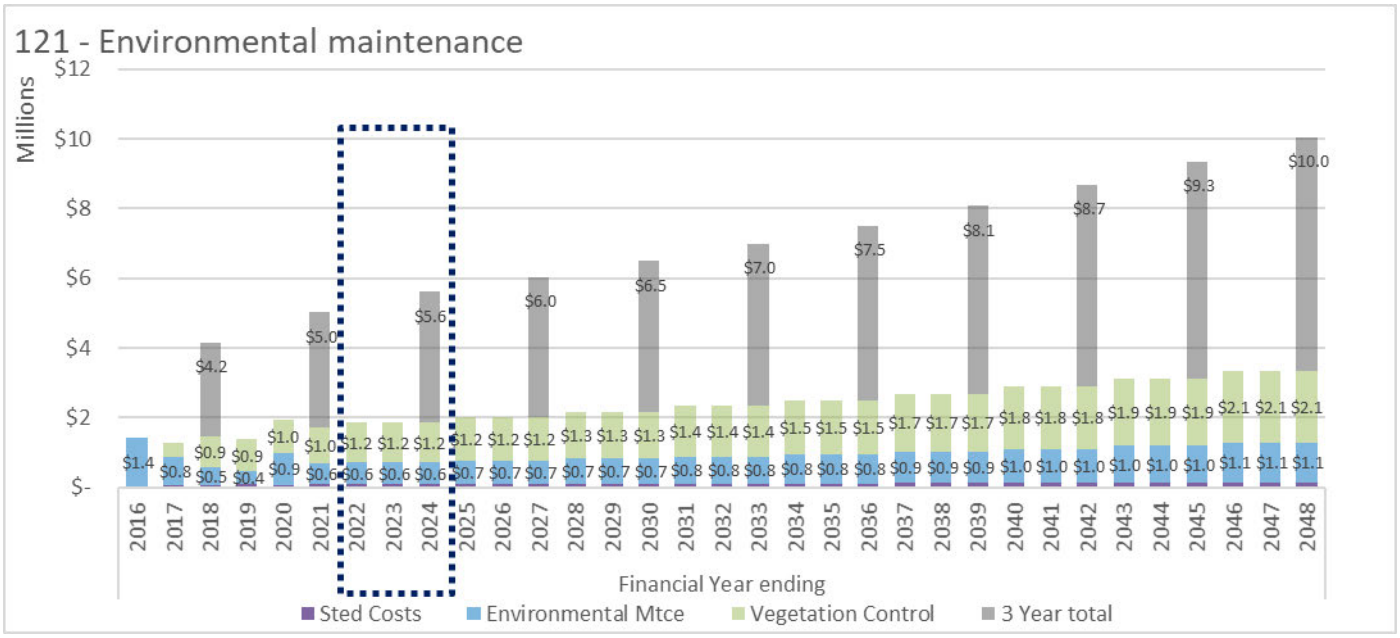
6.6.4 Structures maintenance

The proposed programme is $890k versus a previous year's programme of $939k, a $49k decrease. The programme represents rates from the newly procured 10-year maintenance contract.



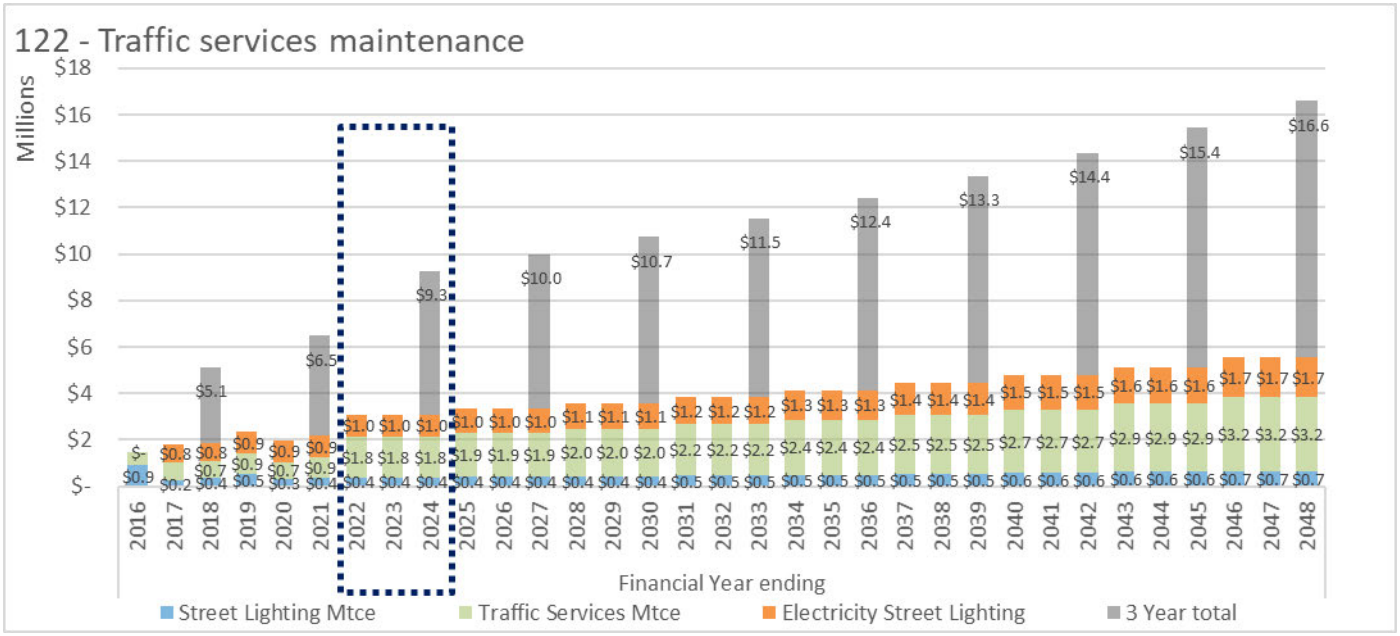
6.6.5 Environmental maintenance

The proposed programme is $5.6 million versus a previous year's programme of $5 million, a $600k increase. The programme represents rates from the newly procured 10-year maintenance contract.



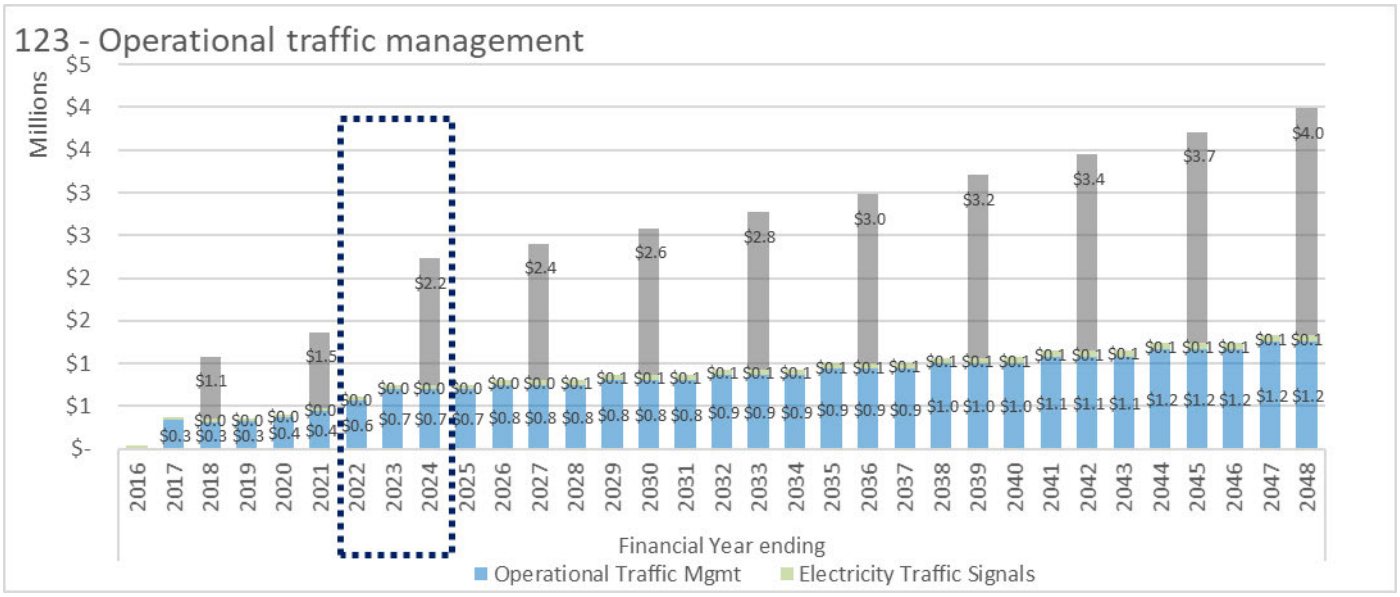
6.6.6 Traffic services maintenance

The proposed programme is $9.3 million versus a previous year's programme of $6.5 million, a $2.8 million increase (43%). The programme represents rates from the newly procured 10-year maintenance contract. The most notable increase has been for line marking costs ($2.5 million).



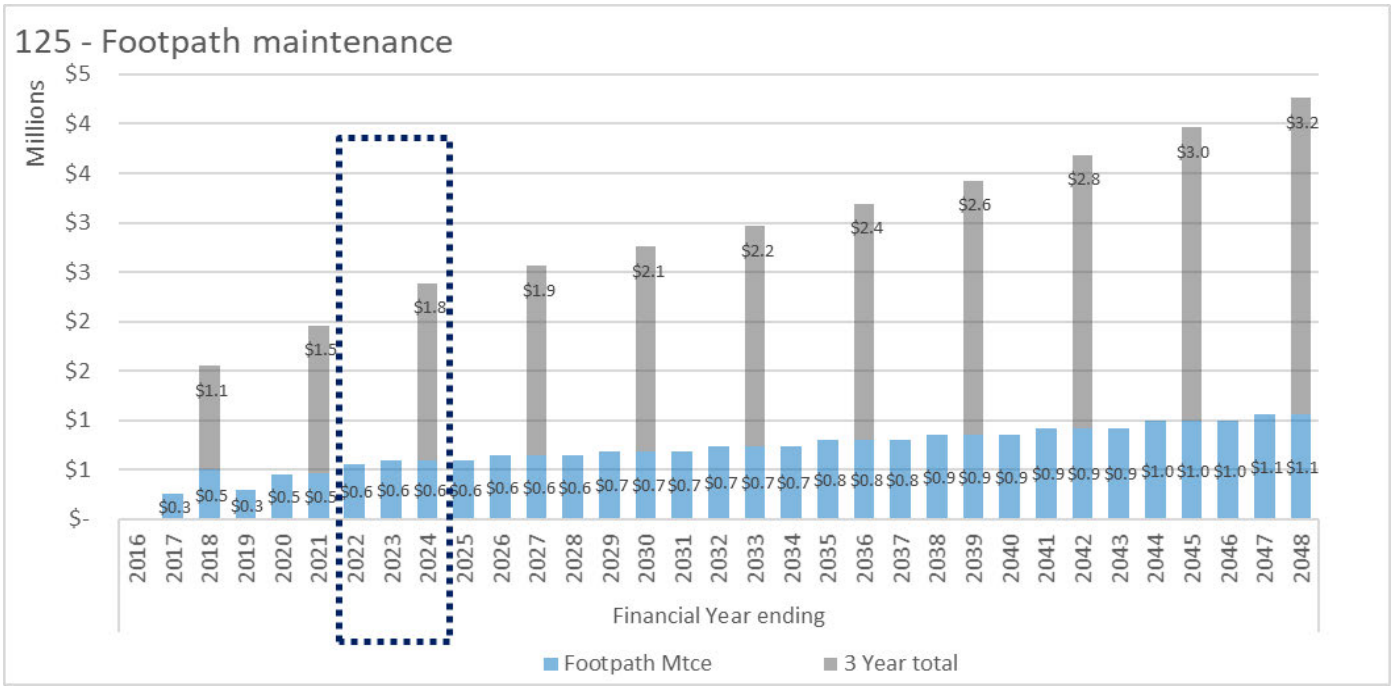
6.6.7 Operational traffic management

The proposed programme is $2.2 million versus a previous year's programme of $1.5 million, a $743k increase (52%).



6.6.1 Footpath maintenance

The proposed programme is $1.8 million versus a previous year's programme of $1.5 million, a $302k increase (20%). The programme represents rates from the newly procured 10-year maintenance contract.



6.1 Renewals

6.1.1 Footpaths

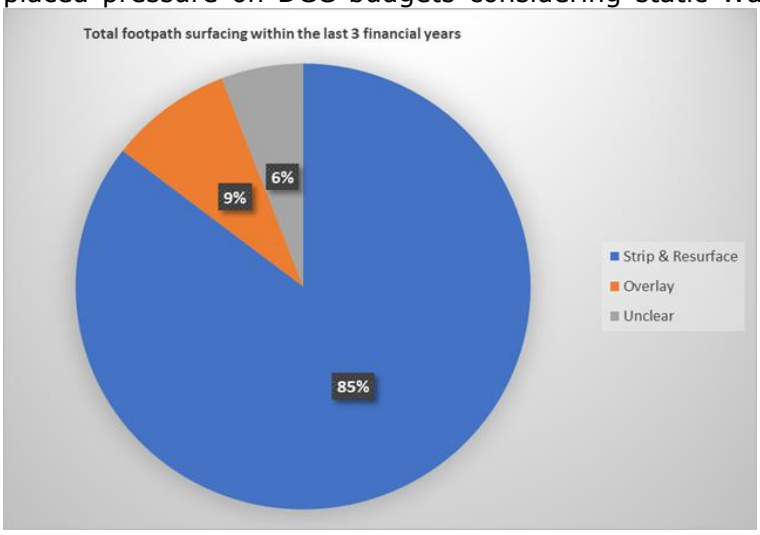
The footpath renewal programme has been derived through a rigorous programme of annual condition ratings followed by on-site field validations to verify results and finalise the programmes proposed.

The 2021/24 RLTP programme proposes investment of $4.9 million per annum, $14.7 million in total, versus a previous 3 years of $8.3 million – an increase of $6.4 million or 78%.

Historic investment in footpath renewals have been low resulting in deteriorating condition and level of service and DIA targets not being met.

The 2021/24 RLTP programme proposes to increase renewal quantities by renewing 4% of the network per annum in line with asset management targets which have not been achieved in the past 6 years. In dollar values this accounts for a $5.3 million increase.

Since preparing the 2018/2021 RLTP budgets contract prices for footpath renewals increased significantly. When tendering the footpath renewal contract in 2018 rates increased by 45% and this placed pressure on DCC budgets considering static Waka Kotahi funding and limited local share. In addition, 85% of sites involve the more expensive strip and re-surface treatment (see pie graph) with the choice of cheaper alternative treatments, such as overlays, having been exhausted.



The AMP proposes a sustained investment of renewals starting at 4% per annum of the network during the 2021/24 programme. It applies unit rates from the current contract – a breakdown of which is supplied in the cost variance analysis table below.

Table 14: Footpath cost variance analysis 2021-2024

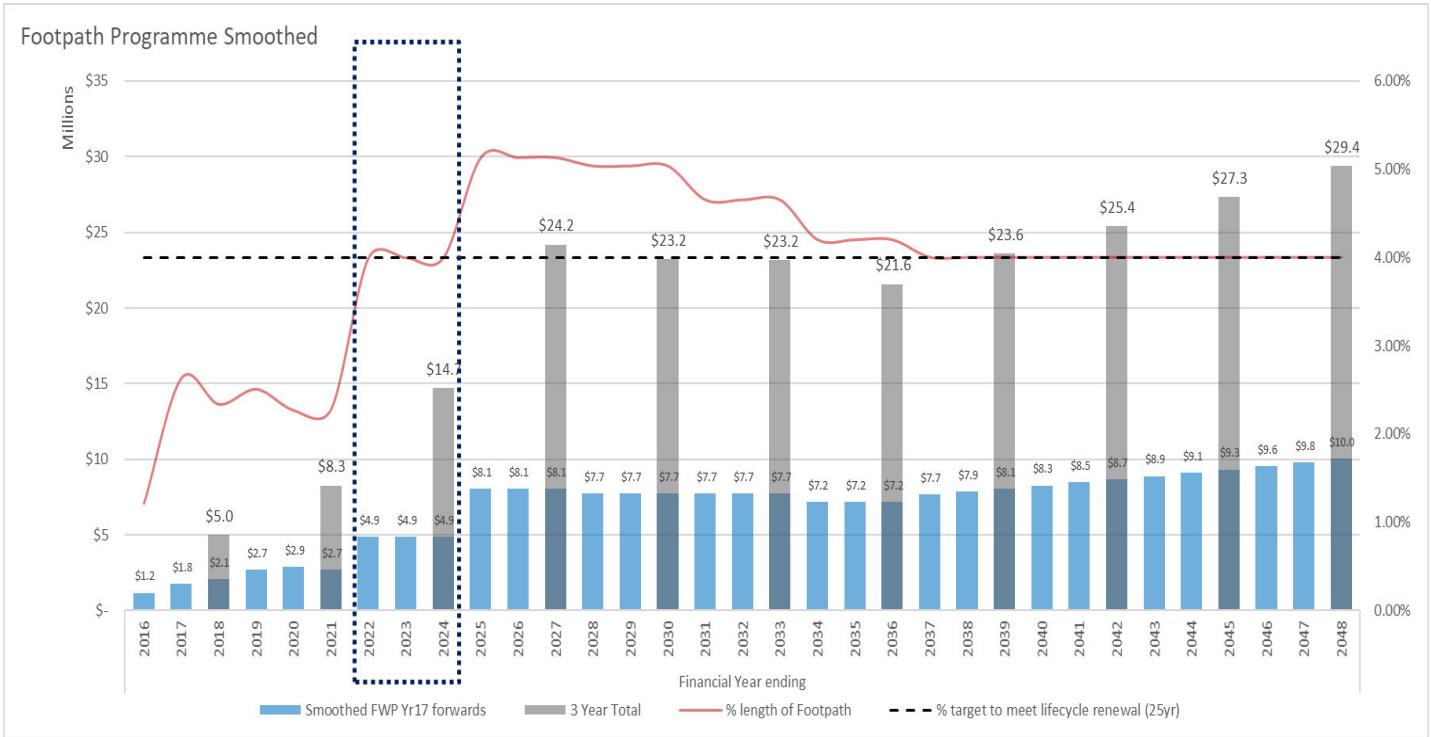


Table 15: Footpath renewals – price/quantity analysis

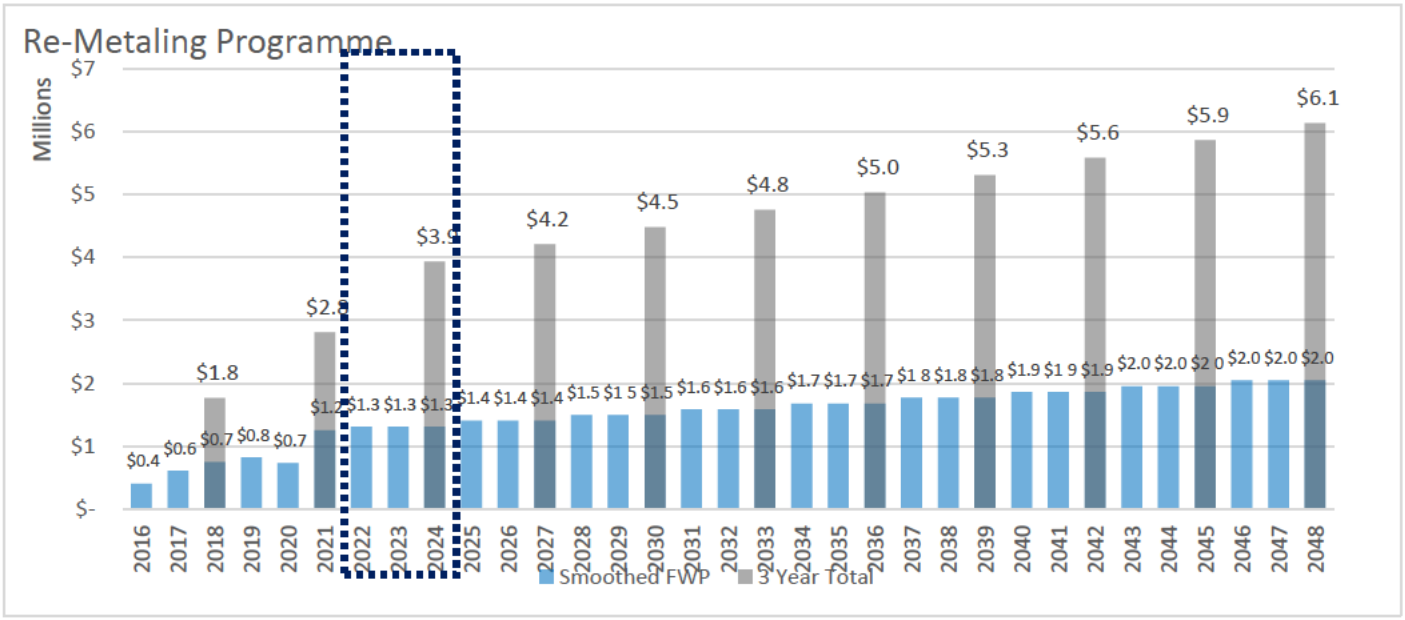
								Year on year variance	
Footpath Programme Length (km)				2015-2018	2018-2021	2021-2024		2018-2021	2021-2024
		Asphalt		59,739	67,767	97,223		8,028	29,456
		Concrete		82	105	1,062		23	957
		Int. Blocks		437	847	2,519		410	1,672
		Metal		-	-				
		Stone		-	-	-			
		Timber		16	33	8		17	- 25
		High		112	434	926			
		Medium/high		1,393	1,474	6,128			
		Medium		7,480	8,765	15,618			
		Low/medium		39,394	47,389	69,408			
		Low		11,896	9,450	8,732			
		(Blank)		-	1,240	-			
Footpath Programme Cost $m				**60,274**	**68,752**	**100,812**		**8,478**	**32,060**
		Asphalt		4,766,336	7,691,726	12,579,392		2,925,390	4,887,665
		Concrete		12,290	19,251	217,652		6,961	198,401
		Int. Blocks		213,832	552,112	1,895,253		338,281	1,343,141
		Metal		-	-	-			
		Stone		-	-	-			
		Timber		1,787	4,290	1,260		2,503	- 3,030
		High		10,208	182,978	223,332			
		Medium/high		121,266	186,075	2,320,855			
		Medium		648,434	995,174	2,697,572			
		Low/medium		3,178,639	5,367,233	8,472,173			
		Low		1,035,699	1,317,267	979,625			
		(Blank)		-	218,653	-			
Footpath Programme Cost per m ($)				**4,994,245**	**8,267,380**	**14,693,557**		**3,273,135**	**6,426,177**
		Asphalt		79.79	113.50	129.39		33.72	15.88
		Concrete		149.32	183.66	204.99		34.34	21.33
		Int. Blocks		489.02	651.92	752.33		162.90	100.41
		Metal							
		Stone							
		Timber		114.60	130.00	157.35		15.40	27.35
		High		91.38	421.85	241.06			
		Medium/high		87.07	126.22	378.76			
		Medium		86.69	113.54	172.72			
		Low/medium		80.69	113.26	122.06			
		Low		87.07	139.39	112.19			
		(Blank)							
Overall				**82.86**	**120.25**	**145.75**		**37**	**26**

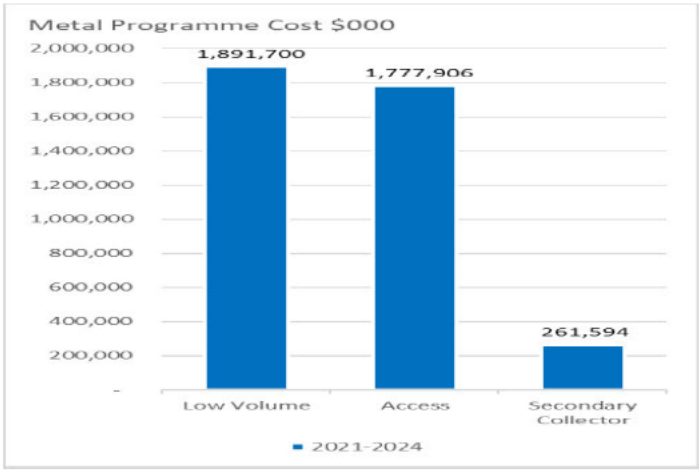
Variance analysis - impact on price and quantity by treatment type	2018-2021			2021-2024		
	Price	Quantity	Total	Price	Quantity	Total
	$	$	$	$	$	$
Asphalt	2,014,145	911,245	2,925,390	1,076,478	3,811,187	4,887,665
Concrete	2,827	4,134	6,961	2,235	196,165	198,401
Int. Blocks	71,229	267,052	338,281	85,037	1,258,104	1,343,141
Metal	-	-	-	-	-	-
Stone	-	-	-	-	-	-
Timber	240	2,263	2,503	903	- 3,932	- 3,030
Overall	**2,088,441**	**1,184,694**	**3,273,135**	**1,164,653**	**5,261,524**	**6,426,177**

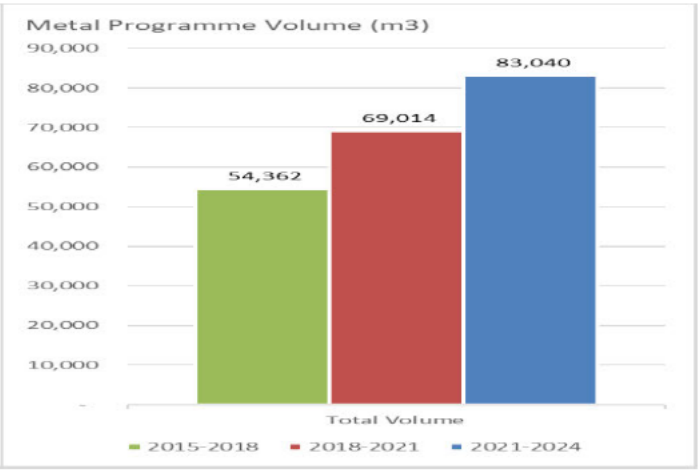
6.1.2 Metalling

The 2021/24 RLTP programme proposes investment of $1.3 million per annum, $3.9 million in total, versus a previous 3 years of $2.8 million – an increase of $1.1 million or 40%.

This increase is largely due to an increase in proposed quantities to address prior years under investment and reflects current contract rates acquired through the recently tendered 10-year maintenance contract.







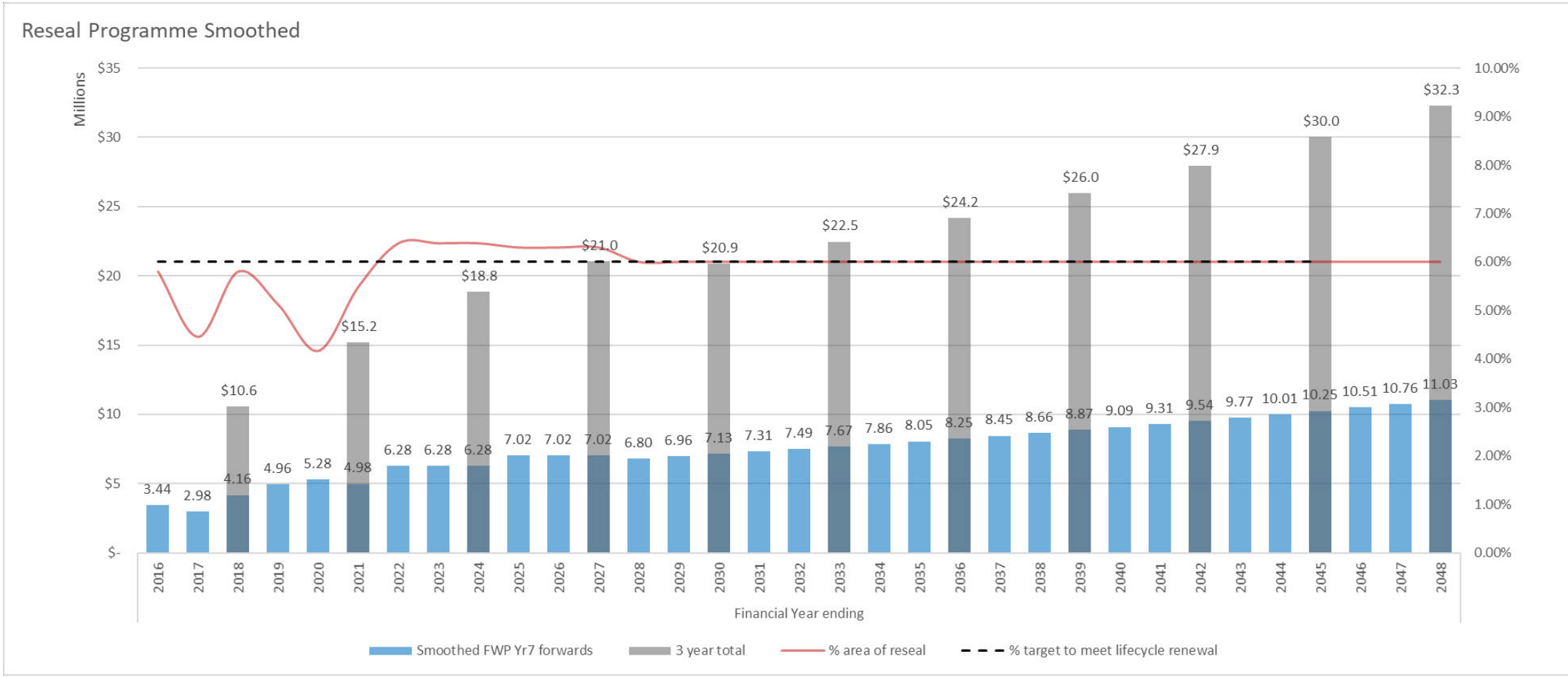
6.1.3 Resurfacing

The re-surfacing programme has been derived using DtIMS modelling supported by a rigorous programme of annual condition ratings with on-site field validations to verify ratings and finalise the programmes.

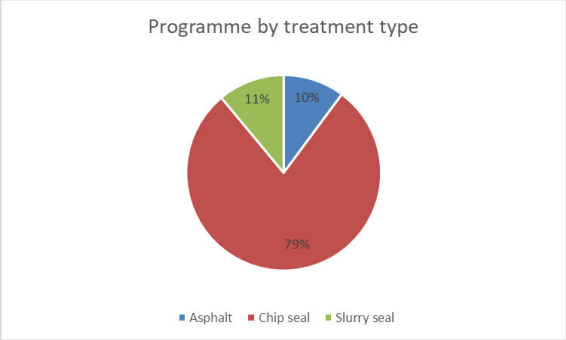
The 2021/24 RLTP programme proposes investment of $6.2 million per annum, $18.8 million in total, versus a previous three years of $15.2 million – an increase of $3.6 million or 24%.

The programme proposes a sustained investment aiming to renew 6.38% per annum of the sealed network for the first six years versus asset management, level of service and DIA targets of 6% which has not been achieved in the past six years. This is to catch up on the growing quantity of deferred renewal sites and address the steady decrease in road condition (see level of service and strategic assessment sections of this AMP).

Table 16: Reseal Programme – historic and forecasted



6.1.4 Resurfacing pricing and quantity analysis for the 2021/24 programme

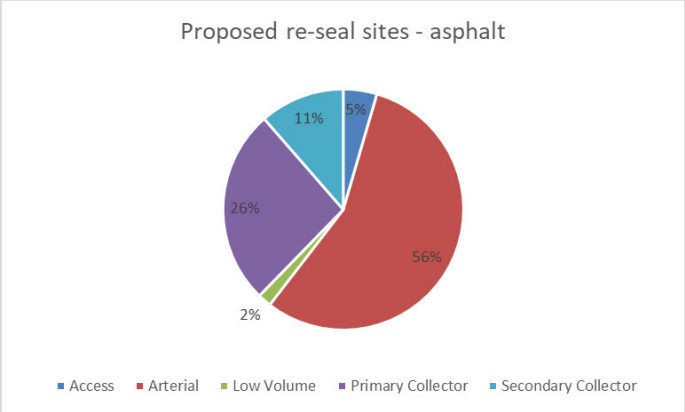


The programme comprises of primarily three treatment types – chip seal, asphalt and slurry. Chip seal is the predominant treatment option and accounts for 79% of the proposed programme and is the cheapest treatment type at an average of $7.96 per square metre versus $38.90 for asphalt and $12.82 for slurry.

Asphalt surfaces are popular for residents due to its amenity and low noise appeal and property developers prefer this surface over chip seal. It is however more expensive by a factor of 4 or more, depending on the specific design mix and thickness layer so it is important to control the use of asphalt areas to where its superior strength provides value for money. This is in typically high volume or high stress areas such as cul-de-sac heads, roundabouts and intersections. This approach is supported by DCC's draft reseal policy currently under review (see management section of this AMP).

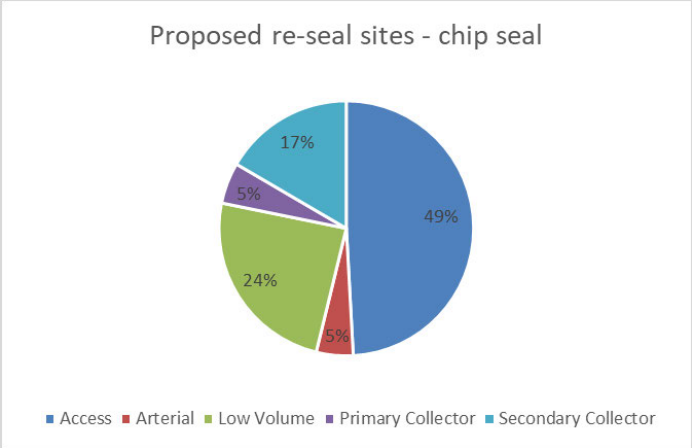
The following section provides an analysis of the 2021/24 programme in comparison to the 2018/21 programme by the three treatment types.

6.1.4.1 Asphalt



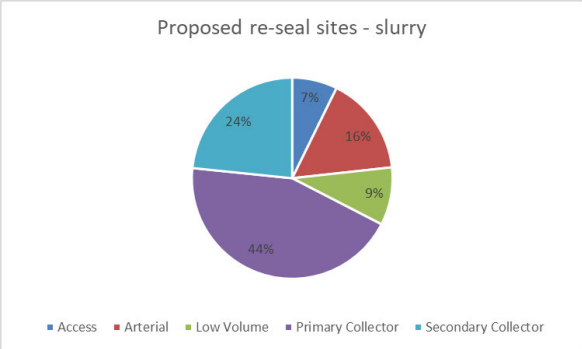
In dollar terms the asphalt programme has increased by $135k. An improvement in contract rates (12%) is resulting in a favourable variance of $679k. This has been off-set by the need to increase quantities, confined to those area's outlined above, resulting in an adverse variance of $815k.

6.1.4.2 Chip Seal



In dollar terms the chip seal programme has increased by $2.5 million. An improvement in contract rates (0.19%) has resulted in a marginal favourable variance of $15k. This has been off-set by the need to increase quantities resulting in an adverse variance of $2.5 million.

6.1.4.3 Slurry seal



In dollar terms the slurry seal programme has increased by $1.1 million. An improvement in contract rates (7.74%) has resulted in a favourable variance of $85k. This has been off-set by the need to increase quantities resulting in an adverse variance of $1.2 million.

Table 17: Reseal Programme – price/quantity analysis

					Year on year variance		
Programme AREA (m2)		2015-2018	2018-2021	2021-2024	2018-2021	2021-2024	%
	Asphalt	72,550	144,779	165,722	72,228	20,943	*12.64%*
	Chip Seal	1,178,873	969,231	1,282,416	- 209,642	313,185	*24.42%*
	Concrete	-	-	-	-	-	
	Interlocking Blocks	-	-	-	-	-	
	Slurry Seal	149,749	85,395	180,075	- 64,354	94,680	*52.58%*
	Access	436,103	350,288	650,713	- 85,815	300,426	*46.17%*
	Arterial	177,594	191,943	181,518	14,349	- 10,425	*-5.74%*
	Low Volume	203,111	196,474	332,417	- 6,637	135,943	*40.90%*
	Primary Collector	196,183	241,039	189,822	44,856	- 51,217	*-26.98%*
	Secondary Collector	388,181	219,661	273,742	- 168,520	54,081	*19.76%*
Programme Cost $m		**1,401,172**	**1,199,405**	**1,628,213**	**- 201,767**	**428,808**	***26.34%***
	Asphalt	2,114,974	6,311,381	6,446,735	4,196,408	135,353	*2.10%*
	Chip Seal	6,667,031	7,730,770	10,209,505	1,063,740	2,478,735	*24.28%*
	Concrete	-	-	-	-	-	
	Interlocking Blocks	-	-	-	-	-	
	Slurry Seal	1,803,966	1,179,166	2,307,826	- 624,800	1,128,659	*48.91%*
	Access	2,572,877	3,095,419	5,387,810	522,542	2,292,390	*42.55%*
	Arterial	2,482,732	3,844,599	4,796,260	1,361,866	951,661	*19.84%*
	Low Volume	1,285,136	1,561,274	2,766,765	276,137	1,205,491	*43.57%*
	Primary Collector	1,693,297	4,010,002	3,154,901	2,316,706	- 855,102	*-27.10%*
	Secondary Collector	2,551,928	2,710,025	2,858,331	158,096	148,306	*5.19%*
Programme Cost per m2 ($)		**10,585,971**	**15,221,318**	**18,964,066**	**4,635,347**	**3,742,747**	***19.74%***
	Asphalt	29.15	43.59	38.90	14.44	(4.69)	*-12.06%*
	Chip Seal	5.66	7.98	7.96	2.32	(0.02)	*-0.19%*
	Concrete						
	Interlocking Blocks						
	Slurry Seal	12.05	13.81	12.82	1.76	(0.99)	*-7.74%*
	Overall	7.56	12.69	11.65	5.14	(1.04)	*-8.96%*
	Access	5.90	8.84	8.28	2.94	(0.56)	*-6.73%*
	Arterial	13.98	20.03	26.42	6.05	6.39	*24.20%*
	Low Volume	6.33	7.95	8.32	1.62	0.38	*4.53%*
	Primary Collector	8.63	16.64	16.62	8.01	(0.02)	*-0.10%*
	Secondary Collector	6.57	12.34	10.44	5.76	(1.90)	*-18.15%*
Overall		**7.56**	**12.69**	**11.65**	**5.14**	**(1.04)**	***-8.96%***

Table 18: Reseal Programme – RLTP period variance analysis quantity/price

Variance analysis - impact on price and quantity by treatment type	2018-2021			2021-2024		
	cost $	quantity $	Total $	cost $	quantity $	Total $
Asphalt	1,047,734.03	3,148,673.66	4,196,408	- 679,361.09	814,714.39	135,353
Chip Seal	2,735,885.72	- 1,672,146.00	1,063,740	- 14,578.38	2,493,313.15	2,478,735
Concrete	-	-	-	-	-	-
Interlocking Blocks	-	-	-	-	-	-
Slurry Seal	263,814.75	- 888,614.80	- 624,800	- 84,748.24	1,213,407.40	1,128,659
Overall	**4,047,434**	**587,913**	**4,635,347**	**- 778,688**	**4,521,435**	**3,742,747**

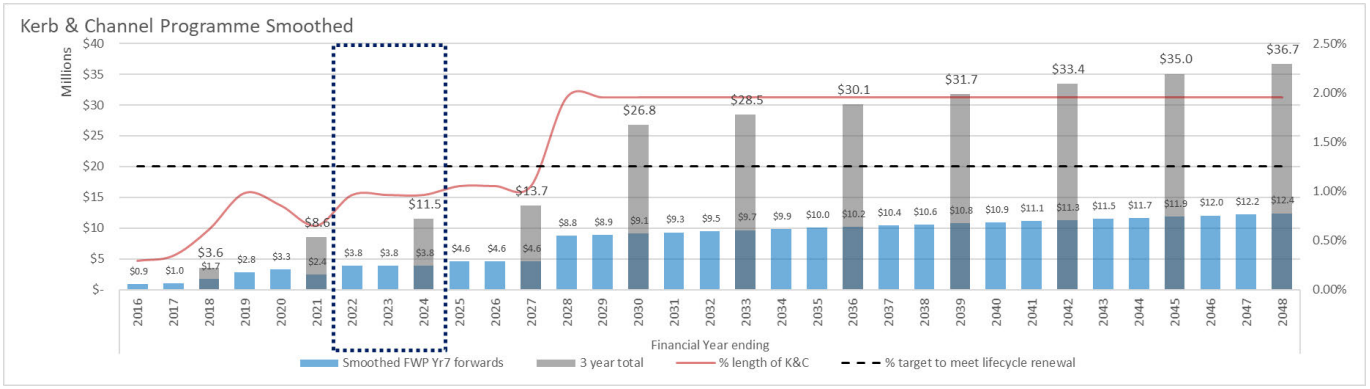
6.1.5 Drainage

The drainage programme has been derived by a rigorous programme of annual condition ratings supported by on-site field validations to verify ratings and finalise the programmes.

The programme comprises of kerb and channel, culvert and other drainage renewals. For kerb and channel, the proposed investment is $3.8 million per annum, $11.5 million in total, versus a previous 3 years of $8.6 million – an increase of $3.0 million or 26%. For culvert and other drainage renewals the proposed investment is $748k per annum, $2.2 million in total, in line with prior the 3 years.

As with all renewal activity the kerb and channel programme proposes a sustained and targeted investment aiming to renew 0.96% per annum of the network for the first three years a slight increase of 0.13% on the prior three years. It then seeks to increase investment in later years to address an anticipated growing back-log of deferred renewals.

Proposed culvert renewals are $2.2 million in line with prior years spend. Culverts are renewed when they fail.



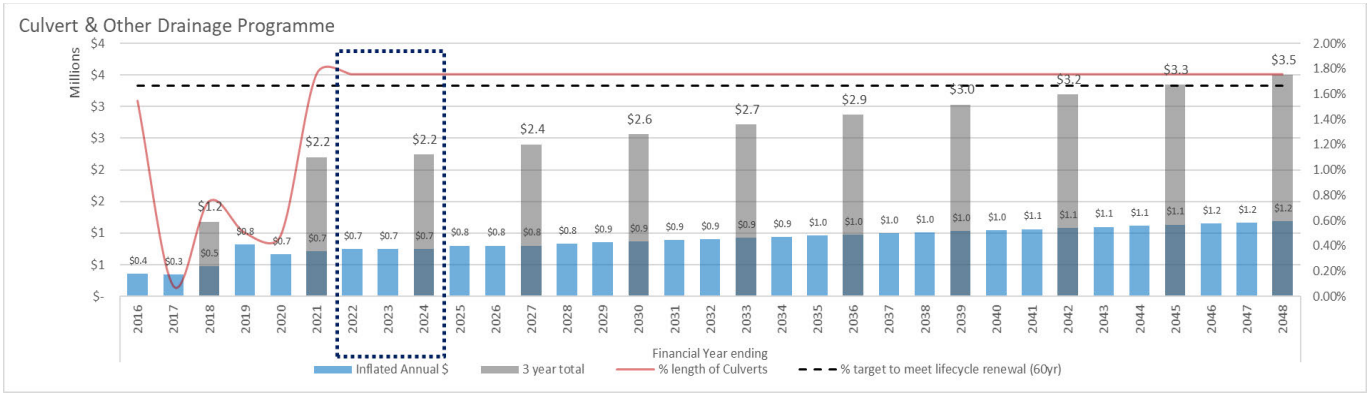


Table 19: Kerb and Channel Programme – price/quantity analysis

					Year on year variance		
K&C Programme Length (km)		2015-2018	2018-2021	2021-2024	2018-2021	2021-2024	%
We mean (m)	Concrete	12,166	23,932	28,005	11,767	4,073	*14.54%*
	Kerb Stone	43	399	804	355	405	*50.40%*
	Dished Channel	303	564	122	261	- 442	*-362.22%*
	Access	6,236	8,545	8,034	2,309	- 511	*-6.36%*
	Arterial	1,120	3,697	3,918	2,577	221	*5.64%*
	Low Volume	1,765	6,950	6,570	5,185	- 380	*-5.78%*
	Primary Collector	1,989	2,184	2,737	196	553	*20.19%*
	Secondary Collector	1,402	3,518	7,527	2,116	4,009	*53.26%*
	Other	-	-	145	-	145	*100.00%*
K&C Programme Cost $m		**12,512**	**24,895**	**28,931**	**12,383**	**8,072**	***27.90%***
	Concrete	3,482,317	8,195,967	10,989,543	4,713,650	2,793,575	*25.42%*
	Kerb Stone	19,925	175,749	495,762	155,824	320,014	*64.55%*
	Dished Channel	87,571	182,559	48,892	94,988	- 133,667	*-273.39%*
	Access	1,775,418	2,915,743	3,317,824	1,140,325	402,081	*12.12%*
	Arterial	320,821	1,176,555	1,576,347	855,734	399,792	*25.36%*
	Low Volume	504,837	2,357,960	2,615,526	1,853,124	257,566	*9.85%*
	Primary Collector	581,769	819,599	1,105,850	237,830	286,250	*25.89%*
	Secondary Collector	406,968	1,284,417	2,860,850	877,449	1,576,433	*55.10%*
	Other	-	-	57,800	-	57,800	*100.00%*
K&C Programme Cost per m ($)		**3,589,813**	**8,554,275**	**11,534,197**	**4,964,462**	**2,979,922**	***25.84%***
	Concrete	286.24	342.46	392.41	56	50	*12.73%*
	Kerb Stone	459.16	440.70	616.62	- 18	176	*28.53%*
	Dished Channel	288.98	323.74	400.76	35	77	*19.22%*
	Access	284.69	341.21	412.97	57	72	*17.38%*
	Arterial	286.35	318.23	402.33	32	84	*20.90%*
	Low Volume	286.08	339.28	398.10	53	59	*14.77%*
	Primary Collector	292.51	375.19	404.04	83	29	*7.14%*
	Secondary Collector	290.31	365.07	380.08	75	15	*3.95%*
	Other						
Overall		**$286.91**	**$343.61**	**$398.68**	**$56.70**	**$55.07**	***13.81%***

Variance analysis - impact on price and quantity by treatment type	2018-2021			2021-2024		
	cost	quantity	Total	cost	quantity	Total
	$	$	$	$	$	$
Concrete	683,963	4,029,688	4,713,650	1,195,388	1,598,187	2,793,575
Kerb Stone	- 801	156,625	155,824	70,159	249,855	320,014
Dished Channel	10,533	84,455	94,988	43,433	- 177,099	- 133,667
Overall	**693,694**	**4,270,768**	**4,964,462**	**1,308,979**	**1,670,943**	**2,979,922**

6.1.6 Pavement re-habilitation

The proposed programme has been derived using the modelling work under taken in the 2019 DtIMS report (see appendix G) and supported by a network wide multi speed deflectometer testing undertaken completed in 2020 (see management section). This report sites that in general pavement condition is below the acceptable levels with a high number of hold pavements, very high roughness levels, generally low structural numbers and increasing rates of roughness progression.

The 2021/24 RLTP programme proposes investment of $2.9 million per annum, $9.1 million in total, versus a previous 3 years of $3.6 million – an increase of $5.5 million or 152%.

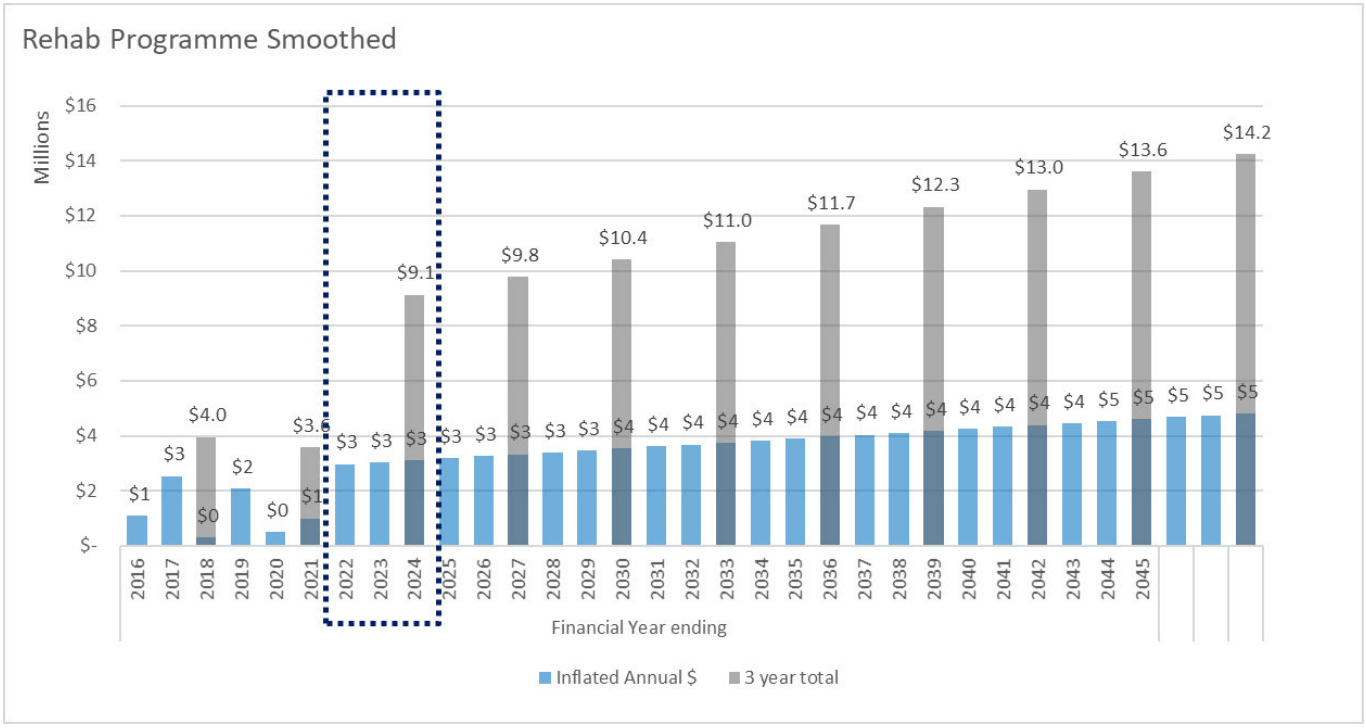
Since preparing the 2018/2021 RLTP budgets re-hab rates increased significantly and this placed pressure on DCC budgets considering static Waka Kotahi funding. As a result, DCC has continued to under-invest in pavement renewals during the 2018/2021 period in order to balance the books adopting a strategy of applying heavy maintenance, such as large dig-outs, when unplanned asset failure has occurred.

Dunedin has seen a rise in reactive maintenance as a result particularly following a weather event which has resulted in unplanned road closure and failure on some busy arterial roads. As outlined

above there are obvious areas of concern particularly on those roads that carry a higher volume of freight and bus movements.

A programme of FWD and MSD testing was rolled out during 2020 and we are awaiting those results. They will provide a network wide picture of the road network's underlying stability. This will further support and prioritise required investment.

The 2021/24 aims to re-hab 0.4% of the network per annum. This equates to an average pavement life of around 230 years.



6.1.7 Structural component replacement

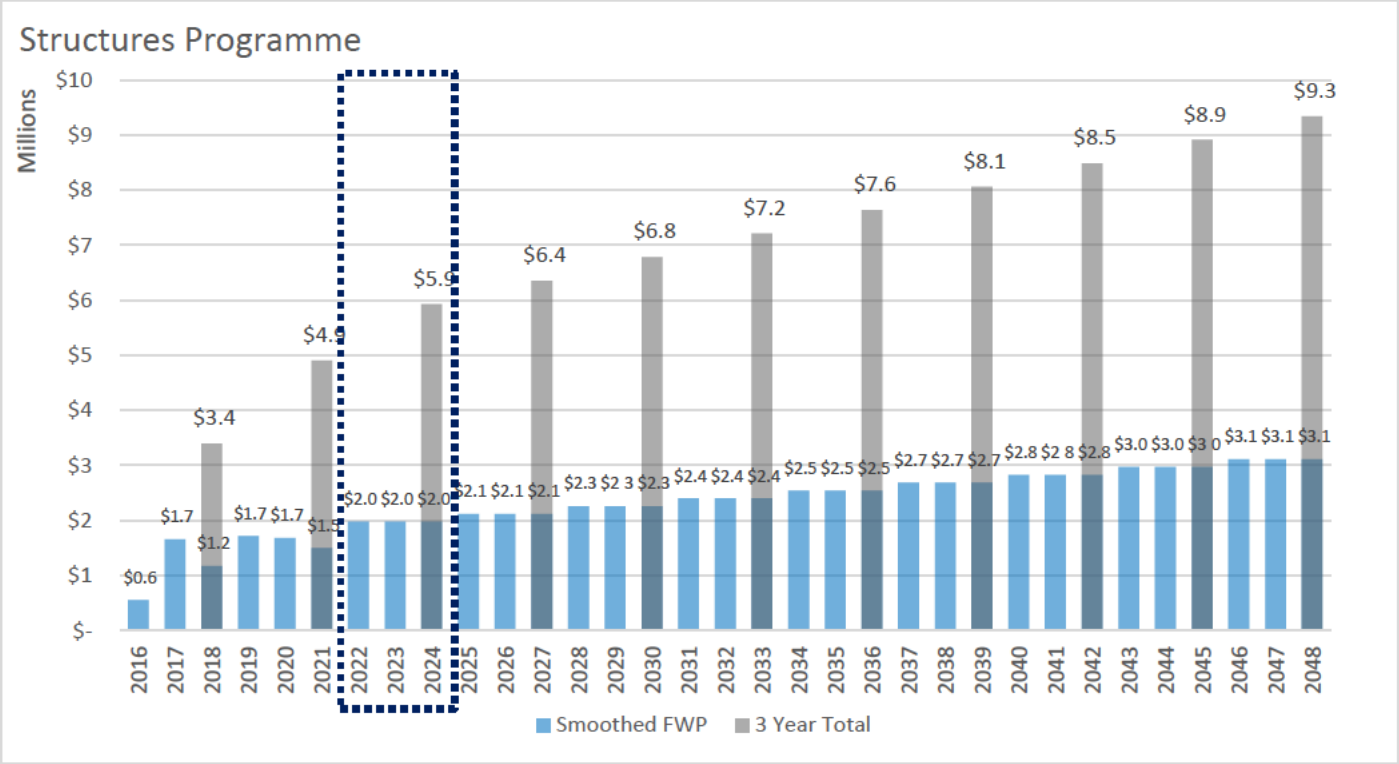
The structural component replacement programme has been derived from a rigorous inspection regime conducted by DCC's structural engineer consultants, Opus. Inspections are in accordance with NZTA S/6 and national best practice. These assets include bridge structures, retaining walls and sea walls with retained heights greater than 1.5 meters. This work informs structural maintenance and renewal programs which is suitably prioritized applying a risk base approach (see management section).

The 2021/24 RLTP programme proposes investment of $1.9 million per annum, $5.8 million in total, versus a previous 3 years of $4.9 million – an increase of $900k or 19%.

The programme comprises of high priority works identified during annual inspections. Priority is derived applying the following factors:

1. Increased cost if the work is deferred.
2. Reduction in the level of service and safety risk if the defect is not addressed.
3. Structural significance.
4. Value for money in terms of return on the DCC maintenance investment.

Various treatment options are always considered for all sites to come up with the most cost-effective choice. A good example of this is the patch painting of a bridge at a cost of $125k (Henley Ferry) versus a full paint at an estimated cost of $500k. (see appendix L - Structural Assets Maintenance Recommending Report).

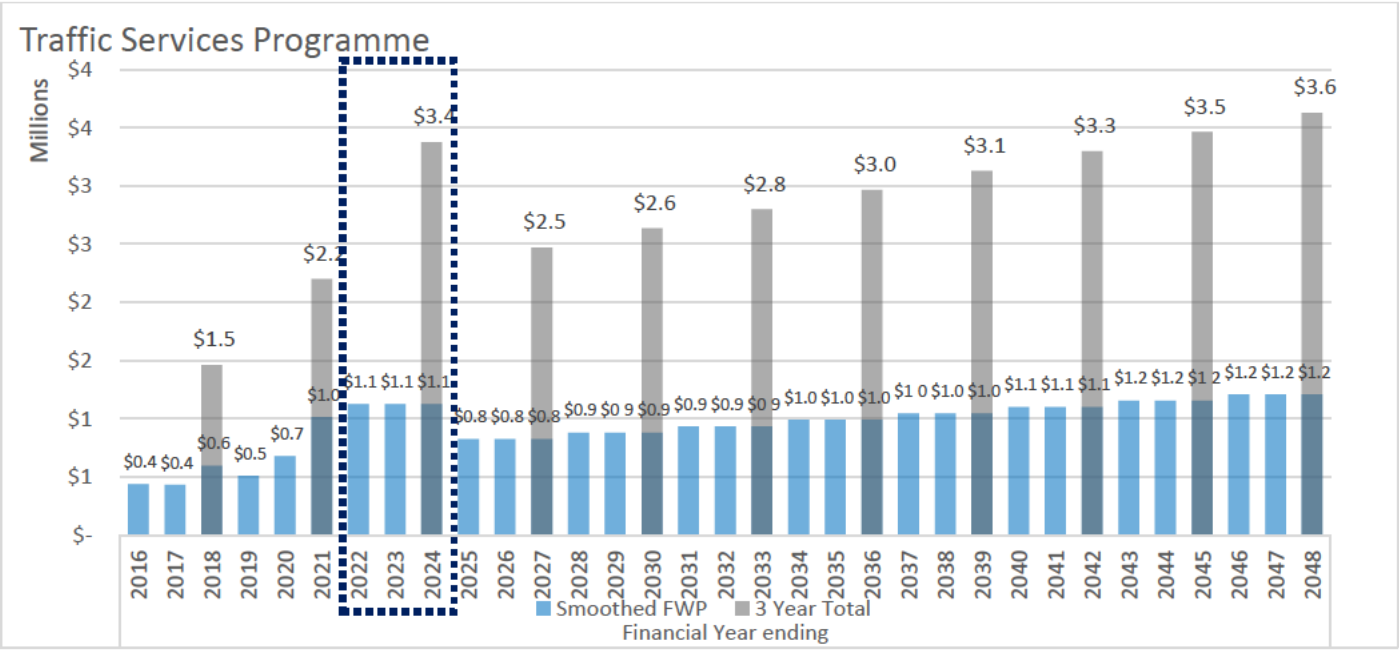


6.1.8 Traffic services

The traffic services programme covers the renewal of signs, markings, street lights and signals. Most activities are delivered through the recently procured 10-year maintenance contract and therefore the budget is comprised of using those recent rates and estimated quantities.

The 2021/24 RLTP programme proposes investment of $1.1 million per annum, $3.3 million in total, versus a previous 3 years of $2.2 million – an increase of $1.1 million or 50%.

This increase is due to a one-off replacement of existing street light poles and outreach arms identified in very poor condition as part of an audit carried out during the LED rollout.



6.2 Key Financial Assumptions

- Budgets have been prepared from the bottom/up applying recently procured contract rates for all renewal and maintenance activities.
- An annual inflation rate of 2.45% is applied.
- Contingencies have not been applied to cost estimates.
- Re-seal programmes do not assume a 'like for like' replacement. Programmes have been reviewed on a site by site basis. Asphalt is only applied where it provides value for money (see appendix m – Draft Asphalt Policy).

6.3 Revenue and Financing Policy

Section 102 (4) (a) of the Local Government Act 2002 requires each council to adopt a Revenue and Financing Policy. This Policy must state DCC's policies in respect of the funding of both capital and operational expenditure.

Further information can be found in DCC's Revenue and Financing Policy.

6.4 Forecast Reliability and Confidence

Where up to date asset condition is known forecast reliability and confidence is reasonably high. This is largely due to the following:

- Condition assessments are routinely undertaken using tried and tested methods. These assessments are further tested through a robust validation process involving expertise across the delivery and maintenance teams and external peer review (Waka Kotahi)
- Maintenance intervention strategy methodologies are applied.
- Unit costs applied are from current contract rates.
- Predictive modelling techniques are applied (DtIMS) every 2 years for roads and will be rolled out for footpaths and kerbs. This is to test investment implications to asset performance and to help determine and support the proposed programme.
- Net present Value calculations have been undertaken for candidate re-habilitation sites.

7 Management

7.1 DCC Transportation Group

Ownership and responsibility for delivering this plan lies with DCC's Transportation Group. The Group's primary function involves:

- Planning to ensure the city's long-term transportation needs are met
- Maintaining the condition of the existing network within service level expectations
- Renewing assets that have reached the end of their functional life and constructing new assets where required
- Managing the safe operation of the road network through traffic controls and education
- Regulating and issuing consents for the appropriate use of the transport network.

7.1 DCC's approach to asset and activity management

7.1.1 On-going change improvements and Waka Kotahi Investment Audit 2019

Asset and activity management involves an on-going process of assessment to identify areas for improvement that will inform a plan of action (improvement plan) that is suitably prioritised and resourced involving a process of on-going engagement with staff and relevant stakeholders. Improvement items are prioritised considering various factors, Examples include:

1. The Groups current maturity level's
2. A variety of risk factors such as - Social, political, environmental, monetary and legal
3. Resource available
4. Inter-dependencies

A key priority since the Groups previous AMP was to re-gain the investment confidence of Waka Kotahi addressing the issues cited in their 2017 investment and technical audit.

Since the re-structure of the Transport Group in 2017 the Group embarked on several change improvements addressing these issues. These are documented in the attached improvement plan (Appendix F).

In April 2019 Waka Kotahi conducted its follow up investment audit which cited substantial improvement and The Group was commended for its immediate response in addressing these issues receiving the highest possible assessment rating for financial processes, procurement procedures and professional services.

Table 20: NZTA Audit improvement areas with Transport Groups response and assessment

Audit Area	Requirement	2017	2019
Financial processes	The DCC has good financial systems in place to effectively manage NXTA's investment in the delivery of its land transport programme.	Significant improvement needed	Effective
Procurement	The DCC acts in accordance with its endorsed procurement strategy and NZTA's procurement requirements.	Unsatisfactory	Effective
Contract management	The DCC has good contract management practices in place	Some improvement	Some improvement

Other notable achievements outlined in the improvement plan include:

- Delivering to planned renewal and safety improvement programmes – on time, on budget and within scope.
- Development and Waka Kotahi endorsement of Council's procurement strategy.
- Introduction of the Maintenance Intervention Strategy to support the operationalisation of the AMP.
- Integration of ONRC into the Transport maintenance contract.
- Risk Framework developed.
- On-going RAMM data improvements – DCC is now has the highest ranked data quality report (Appendix D)
- Procurement of the 10-year maintenance contract – collaborative model.

At a corporate level other change improvements have occurred which have enhanced These cover:

- Establishment of Council's procurement team
- Development of Council's contract and procurement policy
- Establishment of the Long term technical, engineering and specialist support panel
- Development of Council's Asset Management policy

7.2 DCC's approach to asset management

While on the path of continual improvement the following approaches will underpin the planning and management of Dunedin's transport network.

7.2.1 One Network Approach

Wherever practical DCC and Waka Kotahi work collaboratively to plan, coordinate and manage Dunedin's transport network as a single system. DCC and Waka Kotahi are working together in developing Dunedin's Network Operating Framework and Shaping Futures Dunedin. There is Waka Kotahi representation in tender evaluation teams for key procurements including the 10-year transport maintenance contract and the LED upgrade.

7.2.2 Travel demand management

Travel demand management maximises the use of the existing road networks' capacity by managing demand. Measures aim to address specific issues in ways other than by increasing the road networks' capacity. Time based parking restrictions/clearways to accommodate peak time traffic flows, traffic signal phasing and bypass routes are key examples of these for the Dunedin City network.

7.2.3 The application of One Network Road Classification and One Network Framework

ONRC was set as a result of the 2012 government policy statement on land transport and of ministerial taskforce recommendations. It supports a nationally consistent approach to classifying road networks and identifying levels of service to them.

ONRC has three elements as follows:

- Classifying all national roads in categories based on function
- Implementation of national performance measures and targets
- Provide nationally consistent levels of service by road classification

This framework is a key factor in the decision-making process DCC uses in managing its transport assets, levels of service and investment decisions. Maintenance intervention strategies, the prioritisation of renewals and level of service standards are set and documented in the maintenance intervention strategy with consideration given to ONRC.

All assets stored in Transportations asset database (RAMM) is categorised by its ONRC category and regularly reviewed.

Cost efficiency measures are reported, analysed and bench marked against comparative councils. In developing the programme case these are reviewed and analysed to understand potential differences and sense check proposed investment.

ONRC is currently being updated to the One Network Framework (ONF) in line with the national response across the public sector to reduce harm, take a stronger multi-modal approach, and improve community wellbeing. It is also responding to the recognition that shared, integrated planning approaches between transport and planners will result in better outcomes.

This 'systems thinking' allows us to link strategies and policies together and support a more holistic decision-making that in turn improves the liveability of places. Shaping Future Dunedin is a key example of this approach. It's aim is to improve how people move into, out and around central Dunedin in light of the new Dunedin Hospital rebuild.

7.2.4 One Network Framework and Dunedin's Network Operating Framework (NOF)

At the time of writing this AMP The Transport Group was in the process of developing a Network Operating Framework (NOF) for Dunedin. This is a tool that will be used to inform future transport planning decisions through the analysis of the current transport network, and it's needs considering all modes of transport and modal conflicts. It provides a collaborative and integrated approach to managing the transport system and consists of operational strategies and objectives to provide effective network management for all users. A copy of the NOF is provided in Appendix B.

Its development is in response to the city's various strategic challenges and opportunities such as the major capital projects planned for the city, safety issues and modal shift.

Shaping Future Dunedin will go a long way in shaping this framework. It will be applied to all future transport projects to support:

- Engagement and understanding with stakeholders.
- Transparency in decision-making.
- A focus shift to people and goods.
- Optimised decision-making (around efficiency and mobility).
- A 'one network' approach.
- Integrated planning.
- A bringing together of planners, engineers and operations into the same arena.

The work on NOF is in line with and will inform the city's One Network Framework (ONF). The ONF has evolved from the ONRC framework and aims to align it more closely with the government outcomes focus areas. ONF recognises the value of integrated land and transport planning for creating greater liveability and prosperity and acknowledges the distinct geographical challenges of New Zealand's transport network.

It introduces a are more granular 'movement and place' approach to road classification that will strengthen consideration to different mode priorities, surrounding land use, community wellbeing, economic activity and growth aspirations for the future.

The Transport Group is fully committed to the development of these frameworks and to lead, support and advocate this change across the sector. The Transport Group is actively involved in the REG Working Groups at a national level with representation in the Evidence and Outcomes and Strategic Delivery Working Groups.

7.2.5 DCC's Asset Management Policy and Asset Management Working Group

In November 2019 the DCC adopted its asset management policy (Appendix C). It reinforces the DCC's commitment of creating a culture of valuing asset and activity management by mandating the adoption of asset management systems and practices consistent with ISO 5500 (International Standard for Asset

Management). It requires an asset working group, which was established in 2019, comprising of representatives across the organisation whose purpose is to promote excellence in asset management and develop, recommend and monitor asset management improvement strategies across the organisation – maturity of which is reported up to Executive Leadership Team annually.

7.2.6 Infrastructure Services Strategy Plan

During 2020 DCC's Infrastructure Services teams developed its strategy plan for 2020-2021 (Appendix O). It encompasses a set of goals identified as making the biggest difference to improving the way the teams work. The goals are:

1. Improve our H&S Systems and Practices
2. Improve our Asset Management Systems and Processes
3. Improve our Contract, project and programme management skills and capability.

These goals will inform the teams future workstreams and training needs and support a culture of continuous improvement.

7.2.7 Quality Assurance of Asset Data

Treasury's 2015 National Infrastructure Plan identified a need for increased asset management maturity across the infrastructure sectors. Key to this is maintaining a high level of asset data quality.

Waka Kotahi in collaboration with REG and local government is delivering asset management data standards (ADMS) as a way of defining and describing land transport assets, their attributes, characteristics, properties, location and performance to enable efficient and effective end-to-end life cycle asset management.

The DCC is committed to ensuring asset data is kept to a high quality and there is a programme of initiatives the on-going change improvements to data quality. Most Councils, including the DCC, store, maintain and manage transport assets and asset data in RAMM. Each year REG publishes an Asset Management Data Quality report whereby the data quality of each RCA is assessed against a suite of data quality metrics. The results of these reports show that DCC's asset data is of a very high standard and nationally is the second highest ranked territorial authority for data quality (Appendix D)

7.2.8 Maintenance Intervention Strategy

To provide a safe, fit for purpose and cost-effective transport system that delivers to the issues and levels of service outlined in this AMP the network needs to be maintained to specified standards. As part of the new 10-year maintenance contract the DCC and its maintenance supply partner have developed maintenance intervention strategies and supporting level of service standards.

These strategies and standards are under continual review and will evolve as part of a collaborative process of continual improvement. They outline agreed maintenance requirements for given situations on the network and preferable treatments.

It supports and justifies the application of consistent and appropriate treatment solutions that considers road hierarchy, condition, whole of life cost and future planning.

7.2.9 Whole of Life Optimisation

This approach involves minimising the total cost of ownership over the life of an asset for the levels of service provided. Typical areas of expenditure that are included in calculating the whole-of-life cost of owning an asset include maintenance, renewal and rehabilitation, depreciation and cost of finance, and replacement or disposal costs.

Where possible the Transport Group uses optimised decision-making to minimise the total cost of asset ownership by providing an optimal balance between renewals and maintenance investment, levels of service and risk.

7.2.10 Industry best practice

DCC uses International Infrastructure Management Manual guidelines for asset management practice. DCC adopts asset management systems and practices that are in line with ISO 55000 (International Standard of Asset Management) as outlined in DCC's Asset Management Policy.

7.2.11 Smart buyer assessment

The DCC has developed a nationally recognised market approach to procurement. In July 2016 the DCC established a Procurement Team who, in partnership with the council's infrastructure teams, embarked on a programme of continuous procurement improvement. This saw the establishment of several initiatives including:

- NZTA endorsed Procurement Strategy (see Appendix I).
- Development of the DCC's Procurement and Contract Management Policy (see Appendix Q).
- The establishment of a Long-Term Engineering and Support Services Panel (LTES) which has supported the timely delivery of quality capital projects while ensuring fair and equitable procurement across the professional services sector.
- Building capacity and capability across Council's capital delivery and asset management teams.
- The establishment of a Project Management Office in delivering complex, new capital projects.
- Industry engagement through market briefings are the norm to enhance supplier engagement including contractor and consultant Market Briefings.
- Sustainability Policy (Social and Environmental, including Iwi and workforce capability requirements)

The cultural change that has occurred through these initiatives has allowed procurement approaches and processes to drive greater market economic benefits while supporting wider strategic goals. Key to this is the DCC's development of a contract management policy and procurement strategy that works to ensure contracts deliver to broader strategic outcomes.

This progress is reflected in the scores achieved on the REG Smart Buyer Tool (Appendix A). The DCC Transport Group uses the REG Smart Buyer Tool to annually test behaviours in relation to procurement and how they compare to industry best practice. It demonstrates how the organisation has matured from one "that is not rocking the boat when it comes to pursuing value for money" (score 42) to an organisation "that has embraced Smart Buyer principles but can still improve" (score 55).

Opportunities for on-going improvement will continue to be pursued as documented in the improvement plan.

7.2.12 Asset Condition methodology

Condition is the main indicator used to understand how transport assets are performing. Condition is a physical assessment of an asset's remaining service potential. The below outlines the methodology for collecting condition data for key asset types. This data is stored and regularly updated in DCC's asset database (RAMM) and is used to inform forward work programmes that are further validated through detailed inspections by a team of suitably qualified staff engineers before final programmes are finalised.

7.2.12.1 Sealed carriageway (pavements and surfacing)

The DCC conducts on-site condition assessments of 50% of its sealed carriageway each year. The condition assessments are based on recording the number of faults within a section of road. The types of faults captured, and definition of those faults, is governed by the New Zealand Institute of Highway Technology NZIHT 'Road Condition Rating' manual. The data captured is loaded into the Transport Asset database (RAMM) and used to generate numerical condition indices of 1 to 5 with 1 being excellent condition and 5 being very poor condition.

In addition to the on-site condition assessments a rating is conducted automatically using high speed data which involves driving a van equipped with various sensors that detects road surface texture and faults such as rutting, roughness, cracking, scabbing, flushing and potholes. Arterial, primary and collector roads are assessed annually with the remainder of the network biennially (half each year). As with the on-site manual condition assessments the data captured is loaded into RAMM and used to generate the 1-5 numerical condition indices.

To assess the strength of the road below the surface (pavement) deflection testing is carried out. Deflection testing measures the deflections of the road to an imposed load. High deflections indicate a weaker pavement and lower deflections indicate a stronger pavement.

Deflection testing is undertaken through Falling weight deflectometer (FWD) testing or through Multi-speed deflectometer (MSD) testing. Both measure road deflections through falling a static weight onto sections of the road (FWD testing) or from sensors placed on a moving load (MDS testing).

At the time of writing the AMP the DCC had completed a programme of testing for the entire sealed network. These results are being populated in RAMM and will be used to identify areas of risk regarding pavement strength and help inform and prioritise pavement investment decisions.

7.2.12.2Kerb and Channel

On site condition assessments are undertaken each year on arterial and primary collector roads and for the remainder of the roads biennially.

Faults are captured and stored into RAMM in the same way as the sealed carriage way condition assessments with the 1 to 5 rating.

The DCC recently reviewed its methodology for capturing kerb and channel condition and some change improvements were made. This resulted in the condition being recorded against the carriage way they related to it is now recorded against the kerb sections themselves as there was not always correlation.

7.2.12.3Footpaths

Footpaths are rated at the same time as carriage way sections as part of the site condition assessments and the numerical condition indices applied are based on the identified faults.

7.2.12.4Bridges, Seawalls and Retaining Walls

In 2018/2019 the Group engaged suitably qualified structural Engineers to facilitate the end to end assessment and asset management of DCC's structural assets. Inspections are carried out in accordance with NZTA S/A and has been used to inform evidence based prioritised maintenance and renewal programmes.

Due to the varying complexity and components of structural assets overall condition indicators, such as a 1 to 5 rating, is not available nor considered best practice to apply with the priority of repairs is considered a proxy for condition

8 Risk Management Plan

8.1 hTransport asset risks

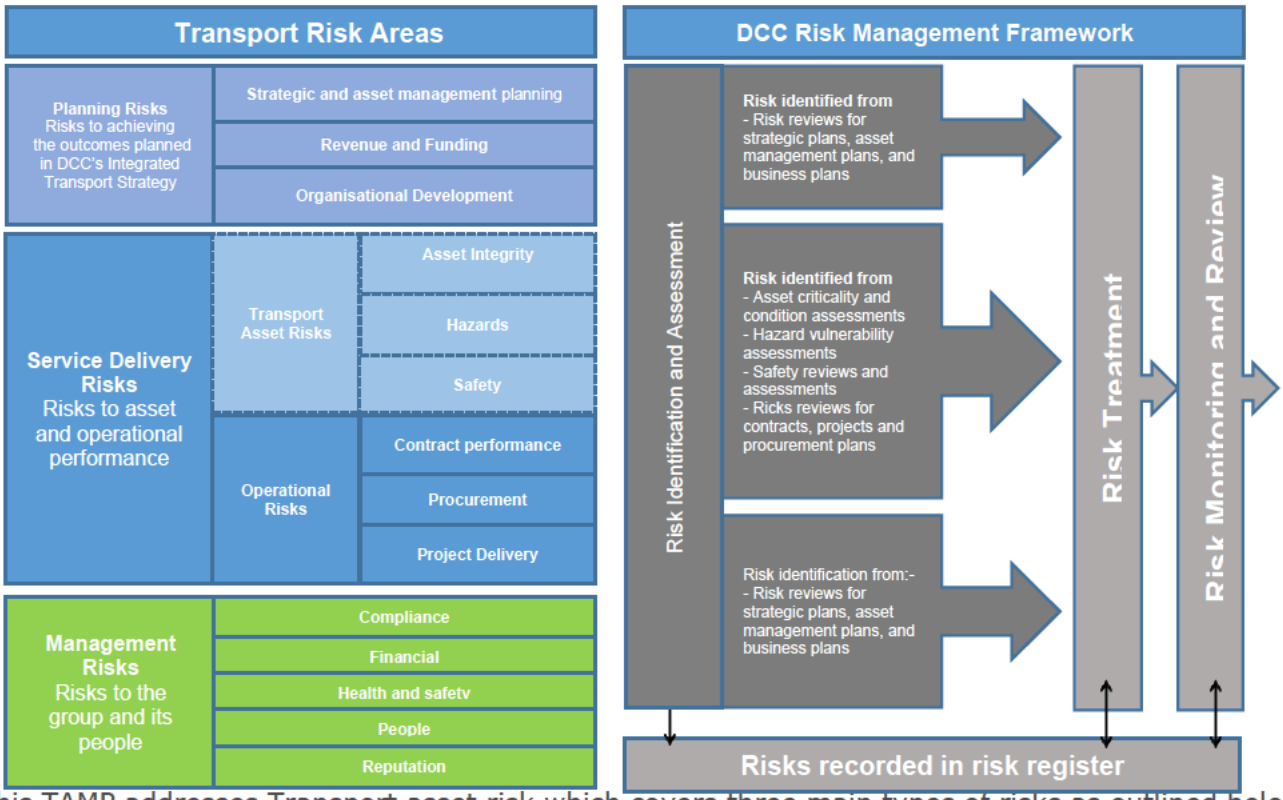
The risks associated with DCC's transport assets may lead to:

- Injury or death to transport users, operators or members of the public
- Reduced access for network users to travel options, including unavailable or reduced routes
- Damage to other infrastructure or property
- Reduced amenity of the transport network
- Impacts on travel efficiency
- Increased operating costs (due to increased asset deterioration)
- Increased costs to repair assets or restore services, potentially affecting DCC's to fund services
- Environmental impacts

The DCC Transport Group is in the early stages of developing an Asset Risk Management Plan, which identifies the key transport asset risks, and sets out how DCC manages and controls them.

A framework has been developed as an overarching guide for identifying the types of risk, the cause of these risks and the key controls required to mitigate against these risks. This framework will act as a guide for the Group in managing risk, including prioritising and assigning who is accountable for managing that risk, and will inform relevant supporting reporting outputs. These in turn will feed into DCC's corporate risk requirements.

Figure 40: DCC transport group risk framework



This TAMP addresses Transport asset risk which covers three main types of risks as outlined below.

8.2 Transport asset risks and controls

The three main types of transport asset risk are as follows:

- **Asset Integrity:** the risk of asset failure, disruption or function or reduced levels of service arising from deterioration of asset condition through age, general wear and tear, exposure to environmental conditions, and damage caused by vehicle crashes, contractors, or other events. Asset integrity risk is a function of asset age and condition (which reflects the likelihood of asset failure), and asset criticality (which reflects the importance of an asset within the transport network and the actual or potential consequences of the asset failing or not providing the required level of service). Integrity is a key risk factor for all network structures including bridges, sea walls and drainage structures.

- **Hazards:** the risk of damage or disruption to the transport network arising from unplanned events, including natural and anthropogenic hazards. The risk of unplanned events is a function of the transport of the transport network's exposure and vulnerability to hazards, and the network's capacity to respond effectively and return transport services to normal following an unplanned event. The combination of the network's vulnerability and its capacity for response and recovery defines the network's resilience. Hazards may arise from a loss of asset integrity, e.g. structural failure, potholes etc. They also arise from mixing high-energy transport modes with low energy modes, such as the intersection of rail with vehicles and vehicles with cycles and pedestrians.

- **Safety:** the risk of injury or death to transport users. Safety is a function of several factors including the road design and alignment, speed environment, safety standards, the condition of transport assets, driving conditions, vehicle condition, and user behaviour (including drivers, pedestrians, and cyclists). The national Safer Journeys Strategy to 2020 sets out a plan to achieve a safe road system that is increasingly free of deaths and serious injuries, through safer roads and roadsides, safer speeds, safer vehicles and safer road use. The safer roads and roadside component of this strategy relates closely to transport asset risk, including how transport assets may contribute to, or control, the risk of incidents and crashes occurring (e.g. surface skid resistance, guard rails, barriers, mode separation etc).

Risk controls include activities designed to avoid or prevent risks or reduce the likelihood of risks occurring; activities that identify when risks have occurred or are likely to occur; and activities that respond to risks when they do occur. DCC employs all these types of risk controls throughout its transport assets' lifecycles.

The key asset risk control activities that DCC uses are as follows:

Safety in Design: ensuring safety is considered during the design process of constructing renewals, improvements and new assets.

Maintaining asset integrity: this includes operational activities maintenance, renewal and asset condition monitoring and reviews. All these activities protect assets, slow down asset deterioration, rectify asset defects, identify actual and potential asset failures, and restore asset level of service.

Reducing asset vulnerability: this includes identifying assets that may be vulnerable to certain hazards and renewing or improving those assets to mitigate the risk.

Improving asset safety: this includes identifying locations on the transport network where there is a high risk of vehicle crashes or other incidents that may impact on transport user safety and renewing or improving the transport assets at these locations to mitigate the risk.

Planning for incident response and recovery: this includes the plans and arrangements The Transport Group has in place to ensure there is an effective response to incidents and emergencies on the network, and that the transport users are safeguarded, and normal services restored following an incident.

Monitoring, reporting on and improving asset risk management: this includes the processes that The Transport Group uses to monitor its asset risk profile at a strategic level, and to identify specific issues or risks in each risk area, as well as the management actions required to address these issues and risk.

In addition to the above control risk activities the Transport Group carries insurance for loss of or damage to transport assets arising from certain insurable events.

Table 21: Summary of asset failure modes, causes and controls

Potential modes of asset failure (loss or integrity)	Potential impacts on transport assets	Key Controls
• Deterioration or failure of building fabric • Loss of structural integrity • Failure of supporting structures • Degradation of appearance or amenity • Component, equipment or core services failure • Loss of shape, skid resistance or surface integrity (pavement) • Blockage or missing lids or grates (storm-water systems) • Incorrect, non-compliance or non-visible signs or markings.	• Third party contractor damage • Age-related deterioration • Changes to requirement or standards • Collision or impact • Components or fixtures failure • Cumulative surfacing treatments • Cumulative traffic loading • Excess storm-water flows • Dirt, grim, rubbish build up • Incorrect bitumen content • Overpressure (retaining walls) • Over-weight vehicle loading • Scour • Obstruction or blockage • Seismic loading • Services outage • Traffic systems software failure • Vandalism or theft • Vegetation growth or root penetration • Wave damage • Wind loading or damage	• Corridor access request procedure • Over-weight and over-dimension requests • Routine inspections • Programmed condition assessments • Maintenance (preventative and reactive) • Renewal (preventative and reactive) • Incident and response recovery • Transport Group risk registers

Table 22: Summary of key hazards, impacts and controls

Hazard types	Potential impacts on transport assets	Key Controls
• Earthquake • Severe weather, including heavy rainfall, cyclones or	• Structural damage to bridges and their	• Identification of assets or locations with high hazard exposure

tornadoes, causing wind damage, flooding, coastal inundation and wave dahmage, and rainfall-included landslips • Tsunami • Fire, including vehicle fire • Terrorism • Failure of third-party infrastructure	abutment, retaining or sea walls, or wharves • Scouring around bridge abutments or piles • Structural or building fabric damage. • Inundation or flooding of coastal assets • Carriageway damage or blockage • Blockage of storm-water systems • Popped manholes creating a safety hazard • Power outages or short circuits affecting streetlights, traffic signals, CCTV, vehicle management • Fire	• Identification of critical lifelines routes and facilities • Seismic screening programme (bridges, major culvers, retaining and sea walls) • Facility surveillance and security • Lifelines group • Civil defence system • Insurance coverage

Table 23: Summary of high safety-risk locations, safety critical assets and controls

Types of high-safety-risk locations	Potential impacts on transport assets	Key Controls
• Intersections • Schools • Speed advisory curves • Level crossings • Bridges • High-speed environments • High volume areas • High pedestrian-volume public spaces	• Compulsory and warning signs • Markings and traffic signals • Pavement surfacing • Pavement alignment and camber • Lighting • Barriers, guard rails and fences • Emergency egress	• Maintaining asset integrity through operational, maintenance and renewal activities • Crash reduction studies • Safety around schools • Planned safety improvements • Urgent safety improvements • Transport Group risk registers

8.3 Asset criticality and risk tolerance

The Transport Groups main principal is to meet service levels and manage risk while minimising whole-of-life costs. To provide guidance on the decision making of prioritising the timing of maintenance and renewal interventions assets are being defined based on criticality.

Asset criticality reflects the importance of an asset within the transport network, and the actual or potential consequences of the asset failing which is determined by several factors, including:

- The degree to which failure of the asset would impact on the safe and efficient operation of the transport network.
- Asset location and functional significance, considering road classifications, traffic volumes, critical lifelines routes, key public transport or freight routes, and public profile.
- The potential to damage or disrupt other infrastructure or property, or damage the environment, and the cost of repairing the asset.

The higher the criticality of an asset the lower the tolerance for risk. Conversely greater toleration will apply in relation to less critical assets.

This will guide the timing of renewals and maintenance following an event and in addressing a backlog of works. This in turn will influence the asset investment required and when.

8.4 Monitoring reporting on transport asset risks

Regular monitoring, reviewing and reporting is an important part of the risk management process, as it ensures that new risks and changes are identified and managed

The transport Groups risk management reporting process is under development. Currently the Group is developing risk registers where asset risks, their controls and treatments are recorded and assigned to appropriate owners. These are then reported up as required.

8.5 Road safety

To reduce the number of deaths and serious injuries on Dunedin's network the Transport Group collaborates with several key stakeholders including the:

- New Zealand Police
- New Zealand Transport Agency
- Ministry of Transport
- Accident Compensation Corporation
- Otago University
- Schools
- KiwiRail
- Port Otago

The Transport Group also engages with members of the public who contact council on specific safety concerns.

An evidence based-approach is taken when assessing road safety matters and intervention methods generally involve engineering, education and enforcement. The table below summarises the Transport Groups road safety action plan which is currently being developed.

Table 24: Road safety action plan safety interventions

Type of intervention	Key actions	Detailed activities

Engineering	Increase safety engineering	Develop a crash risk assessment rating and priority for all arterial roads and on local roads that have a high crash-risk Implement a prioritised programme of safety engineering projects Implement safety engineering measures at high-crash-risk locations Use meetings to coordinate activities between key stakeholders
	Improve speed management	Develop a speed management policy around safer and survivable speed Use fixed safety cameras at intersections and other high-risk areas Specify safe urban design and engineering measures for pedestrians, vehicle drives, cyclists and public transport users in and around town centres, schools and residential areas
	Improve intersection safety	Initiate safety audits and crash reduction studies at high-risk intersections Implement engineering improvements at and around the intersections
	Improve pedestrian safety	Implement upgrades of pedestrian facilities Improve safety measures around highly pedestrianized areas and shared zones
	Improve cyclist safety	Implement safe cycle facilities for key cycle routes
	Improve public safety	Upgrade railway level crossings to make them safer Upgrade major arterials with priority bus routes Improve security at bus shelters
Education	Improve safety knowledge	Implement road safety education campaigns to raise awareness of road safety, public transport safety and pedestrian safety Implement enforcement campaigns to reduce the incidents and effects of road trauma Implement a school safety plan and programme Implement a wailing and cycling safety plan programme Encourage public transport operators to improve safety on the road

		Initiate a crash-reduction study to identify areas where there are clusters of crashes and investigate intersection crashes Initiate a fatal crash investigation study to investigate fatal crashes, and identity contributing factors and plan for improvements.
Enforcement		

9 Appendix List

Appendix A	**Smart Buyer Self-Assessment**
Appendix B	**Network Operating Framework Report**
Appendix C	**DCC's Asset Management Policy**
Appendix D	**Asset Management Data Quality Report 19.20**
Appendix E	**Opus Structures Report 19.20**
Appendix F	**Asset Valuation Report 2020**
Appendix G	**DtIMS Report 2019**
Appendix H	**NZ Transport Agency Investment and Audit Report 2019**
Appendix I	**DCC's Procurement Strategy**
Appendix J	**Forecasting Model – to be attached**
Appendix K	**Improvement Plan**
Appendix L	**Structural Assets Maintenance Recommending Report**
Appendix M	**Draft Asphalt Policy**
Appendix N	**Revenue and Financing Policy**
Appendix O	**Infrastructure Strategy Plan**
Appendix P	**Cohort data**
Appendix Q	**Procurement and Contract Management Policy**