MANAWATU DISTRICT COUNCIL

Roading Activity Management Plan

2021-2031

www.mdc.govt.nz

Contents

1. EXECUTIVE SUMMARY

1.1 The Purpose of the Plan

The purpose of this Plan is to improve the stewardship of assets by Council on behalf of its customers and stakeholders and achieve compliance with statutory obligations. This plan specifically does that by:

- Demonstrating responsible stewardship of land transport assets
- Identifying minimum lifecycle (long term) costs to provide the agreed level of service
- Improving understanding of service level standards and options
- Assisting with an integrated approach to activity management throughout the organisation
- Improving customer satisfaction and organisational image
- Managing the risk of failure to deliver the required level of service
- Supporting long term financial planning of the Council
- Clearly justifying forward works programmes
- Improving decision-making based on costs and benefits of alternatives.

1.2 Asset Description

Transportation is a significant essential service for Manawatū District Council. The transportation function represents around 18% of Council's overall annual operating expenditure, with capital works also making up a large proportion of the Council's expenditure.

The following information provides an overview of the assets involved in the Manawatū District transportation activity. The information shown is collated here as a reference resource of the extent of the assets involved.

Asset Register

The Transportation assets are managed in a RAMM (Road Assessment and Maintenance Management) database. Over 85,500 individual asset components are detailed in the database which provides the functionality to undertake following activities:

- Forward works planning
- Valuation
- Remaining useful life monitoring
- Maintenance task dispatching
- Aggregating data for reporting
- Cost code management
- Forecasting.

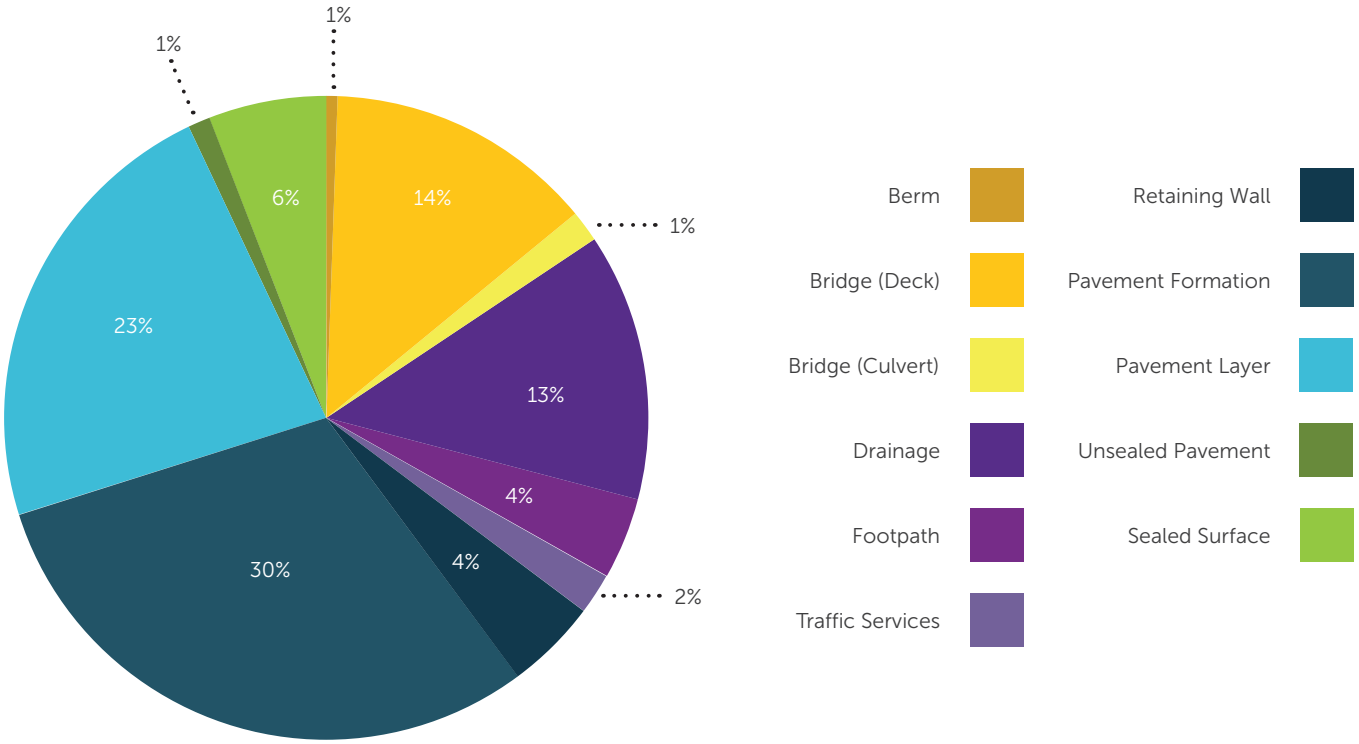
To manage and control data integrity in the RAMM database appropriate access is only provided to competent users.

The following table shows a summary of the replacement costs and depreciated replacement costs of Transportation Assets as at 1 July 2019.

Asset Description/Group	Replacement Cost	Depreciated Replacement Cost
Berm	$4,369,724	$4,369,724
Bridge (Deck)	$95,026,352	$41,412,779
Bridge (Culvert)	$10,833,439	$4,756,749
Drainage	$93,637,592	$32,548,591
Footpath	$29,002,755	$16,182,958
Traffic Services	$14,065,515	$6,234,486
Retaining Wall	$31,668,989	$27,132,454
Pavement Formation	$212,595,378	$212,595,378
Pavement Layer	$160,456,967	$46,904,076
Unsealed Pavement	$7,701,677	$7,701,677
Sealed Surface	$41,031,450	$18,382,398
	$700,389,840	$418,221,270

This chart shows the value of each asset group as a percentage of the total replacement cost. (Rounded to the nearest whole number)

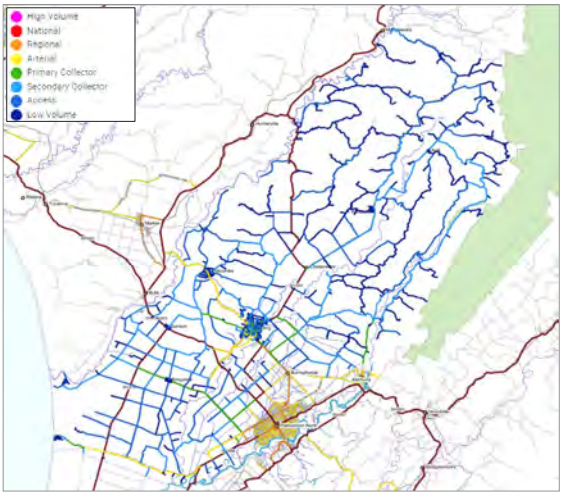
Asset Type by Replacement Cost



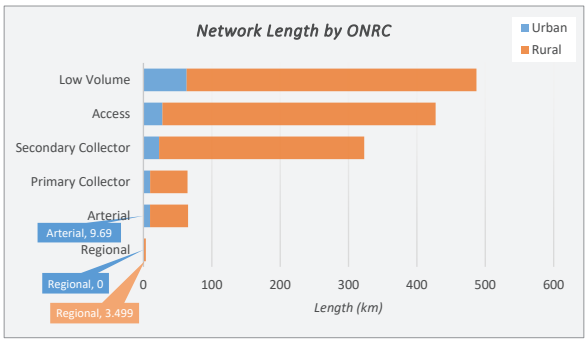
Assets Included in this Plan

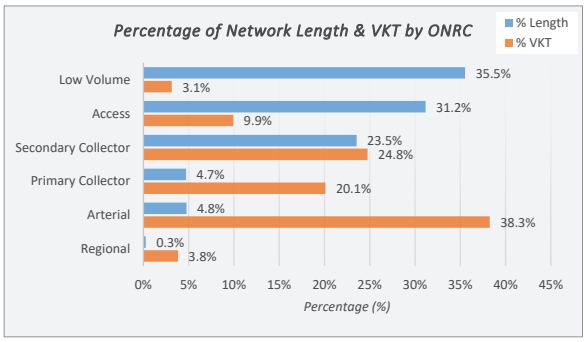
An overview of the transportation services and assets owned by the Manawatū District Council is shown below.

One Network Road Classification Map

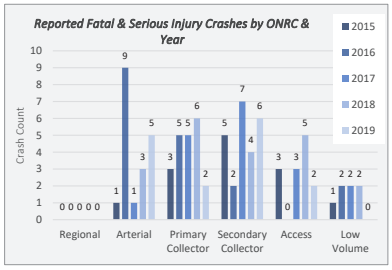


Network Level Overview

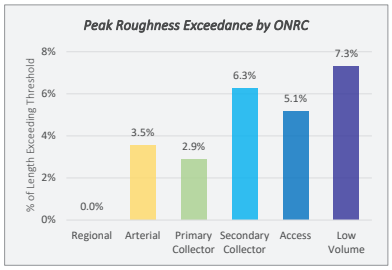




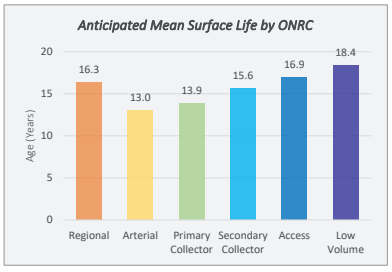
Level of Service Measures



Crash records have changed, including retrospective counts, as there has been an ONRC classification adjustment of the network in Mid- 2020.
Overall, serious & fatal crashes have reduced between the latest 2 full years of data (2018 & 2019), dropping from 20 to 15.



Roughness records have changed as a result of ONRC classification adjustment of the network in Mid- 2020.
Overall roughness of the network remains reasonably static and at a high level of conformance.

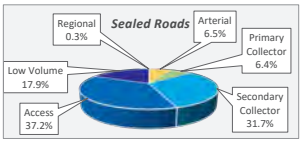


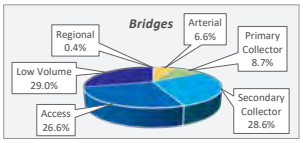
Note: 1st coat seals are excluded from this measure.
Anticipated surface lives have changed as a result of ONRC classification adjustment of the network in Mid- 2020.
Anticipated mean surface life remains comparable with peer networks ,ecepting the newly aligned Regional portion of the netork, which exhibits long life relative to it's classification.

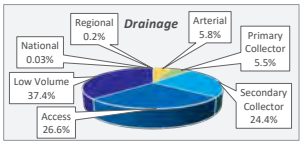
Key Asset Groups

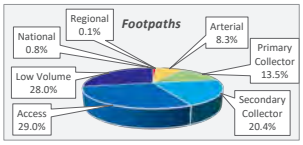
	Asset Type					
ONRC	Sealed (km)	Unsealed (km)	Footpath (km)	Bridge (No)	Drainage (No)	Wall (km)
National High Vol	-	-	-	-	-	-
National	-	-	1.23	-	2	-
Regional	3.50	-	0.13	1	12	-
Arterial	65.26	-	12.21	16	405	0.74
Primary Collector	64.51	-	19.88	21	387	0.19
Secondary Collector	317.93	4.95	30.09	69	1,708	3.14
Access	373.14	54.20	42.90	64	1,862	2.36
Low Volume	179.43	307.65	41.31	70	2,620	3.06
	1,003.77	366.80	147.74	241	6,996	9.49

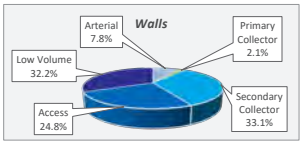
The slight reduction in reported sealed and unsealed network lengths above (in comparison to the previous year) is as a result of improving the quality of the carriageway centreline data to more accurately reflect the road network.











The ONRC CLoS hierarchy has been developed by the Roading Efficiency Group (REG) to define what class of asset is required. The REG has taken the view that uniformly high operating conditions across all roads in the network are too costly to achieve and would not present an economic return on investment. On the other hand, it is impossible to manage an infinite number of standards and performance levels across the network. For this reason and for reasons of equity and transparency, all roads meeting a specific range of functional criteria should achieve a uniform CLoS. The criteria 'bins' to which road sections are assigned are the Road Classifications.

Functional Classification

There are criteria and thresholds for each category, based on the functions the road performs within the network. To be included in a particular category a road must meet the agreed criteria and thresholds, including at least one of either – typical daily traffic (AADT), heavy commercial vehicles (HCV), or bus (urban peak) as appropriate.

The Six Functional Categories Are:

National: These are roads that make the largest contribution to the social and economic wellbeing of New Zealand by connecting major population centres, major ports or international airports and have high volumes of heavy commercial vehicles or general traffic. They must meet the thresholds for 3 criteria, including at least one of the following movement criteria (typical daily traffic, heavy commercial vehicles or buses, urban peak) and at least one of the economic and social criteria (i.e. three in total). To be included in the high volume subset a road must meet one of the high volume criteria for typical daily traffic or HCVs.

Regional: These roads make a major contribution to the social and economic wellbeing of a region and connect to regionally significant places, industries, ports or airports. They are also major connectors between regions and in urban areas may have substantial passenger transport movements. As well as meeting at least one of the following movement criteria (typical daily traffic, heavy commercial vehicles or buses, urban peak) these roads need to meet at least one of the economic and social criteria (i.e. two in total).

Arterial: These roads make a significant contribution to social and economic wellbeing, link regionally significant places, industries, ports or airports and may be the only route available to some places within the region (i.e. they may perform a significant lifeline function). In urban areas they may have significant passenger transport movements and numbers of cyclists and pedestrians using the road. As well as meeting at least one of the following movement criteria (typical daily traffic, heavy commercial vehicles or buses urban peak) they also need to meet at least one other criteria (i.e. two in total). The other criteria should then be considered to provide a local 'ground truthing' check, and in some instances by considering these this may result in a road moving up or down a category to reflect the function of the road.

Primary Collector: These are locally important roads that provide a primary distributor/collector function, linking significant local economic areas or areas of population. They may be the only route available to some places within the region and in urban areas they may have moderate passenger transport movements and numbers of cyclists and pedestrians using the road. These roads need to meet at least one of the movement criteria (typical daily traffic, heavy commercial vehicles or buses urban peak - (i.e. one in total). The other criteria are then be considered to provide a local 'ground truthing' check, and in some instance by considering these criteria, this may result in a road moving up or down a category to reflect the function of the road.

Secondary Collector: These are roads that provide a secondary distributor/collector function, linking local areas of population and economic sites and may be the only route available to some places within this local area. These roads need to meet at least one of the movement criteria (typical daily traffic or heavy commercial vehicles - (i.e. one in total). The other criteria are then be considered to provide a local 'ground truthing' check, and in some instance by considering these criteria, this may result in a road moving up or down a category to reflect the function of the road.

Access: These are all other roads. Low volume roads within this category will fall into the low volume subset.

Movement of People and Goods

Categories/Criteria	AADT	HCV	BUSES	Active Modes	Length (KM)
REGIONAL Meet 2 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses & 1 economic or social)	Urban: > 15,000 Rural: > 10,000	>400	> 40 buses or 2000 people per hour		3.49
ARTERIAL Meet 2 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 5,000 Rural: > 3,000	>350	> 15 buses or 750 people per hour		65.3
PRIMARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 3,000 Rural: > 1,000	>150	>6 Buses or 300 people per hour	Significant numbers of pedestrians and cyclists (urban peak) or part of identified cycling or walking network	64.6
SECONDARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic or HCV)	Urban: > 1,000 Rural: > 200	>25			323.3
ACCESS All other roads	Urban: > 1,000 Rural: > 200	>25			428.1
(LOW VOLUME) Meet low volume Typical Daily Traffic	Urban: < 200 Rural: < 50	<25			490

* Only includes ONRC classified roads.

Overview of Assets Involved

The network is often classified by surface type and whether the roads are in urban or rural areas. The following tables summarise the inventory by those classifications.

Network Summary – Length (km)

	Sealed	Unsealed	Network
Urban	120.97	11.5	132.47
Rural	880.19	355.29	1235.48
Both	1001.16	366.79	1367.95

Network Summary – Proportion

	Sealed	Unsealed	Network
Urban	8.9%	0.8%	9.7%
Rural	64.4%	25.9%	90.3%
Both	73.3%	26.7%	100.0%

The use made of these roads, expressed in terms of the total estimated distance travelled on them (vkt) each year is shown in the table below.

Network Summary Use

VKT	Sealed	Unsealed	Network
Urban	18.99%	0.08%	19.07%
Rural	78.99%	1.94%	80.93%
Both	97.98%	2.02%	100.00%

The tables above show that while 26.7% of the network consists of unsealed roads these contribute to less than 3% of the use of the network.

In 2003 approximately 203 million vehicle kilometres were travelled over the network, this increased to 215 million in 2011. As a result of the boundary adjustment with Palmerston North City Council in 2012, when number of medium to high volume roads were transferred to the administration of the Palmerston North City Council, the number reduced to 176 million in 2013.

Unsealed rural roads are identified as potential candidates for seal extension in respective forward programs. The Council's policy is that these roads have to pass economic threshold criteria before they can be considered for funding.

1.3 Levels of Service

ONRC Levels of Service

The new ONRC Customer Level of Service (CLoS) performance measures challenge systems that have been in place for a long time, so Council has reviewed its previous assumptions and set the new frameworks for the future. Where applicable condition measures are reported in terms of the One Network Roading Classification (ONRC). See ONRC Performance Measures Reporting.

Key areas of focus for the future are outlined below.

Sound Network Condition

The Local Road network is generally in good condition-

- Surface measures are holding in the long term
- Roughness is holding
- Rutting continues to deteriorate both at the extreme end and across the bulk of the network
- Continue monitoring and report trends
- Focus investment strategies to minimise the risk of further deterioration due to rutting.

While savings can be made on surface treatments, additional investment is required in, structures maintenance, drainage and resilience projects to reduce the cost of emergency works and prepare for forestry harvest.

Data Acquisition, Analysis and Use

Council will be using improved network benchmarking metrics to identify and target opportunities for improvement. Council's aim is to enhance the modelling of asset condition and the maintenance and renewal works required to meet service level targets for the least long-term cost to increase its confidence that the current and planned reductions in renewals programmes will be sustainable.

By engaging with the Roading Efficiency Group (REG) Council will be better able to benchmark practices and identify further opportunities for improvement.

Working the Asset

By moving to ONRC levels of service and, in some parts of the network, replacing our assets later in their lifecycle, the local road network may be less frequently renewed. This could result in more patched roads and a less smooth journey for customers on Access and Low Volume. Notwithstanding this, road conditions will be monitored to ensure safety is not compromised.

Condition Monitoring

Council aims to change its approaches to monitoring the condition of pavements and forecasting remaining lives by implementing condition monitoring techniques and lessons learnt from past condition metrics.

Roading Activity Management Plan

The Activity Management Plan (AMP) provides comprehensive guidance on how Council's assets should be maintained and renewed in order to deliver the maintenance and renewal programme proposed here. The plan documents a clear link between service level, infrastructure condition, lifecycle management needs and costs, and has been seen and reviewed from an investment perspective.

Cost Effectiveness of Maintenance and Renewals

As part of the strategy described above, Council will be able to demonstrate cost efficiency per vehicle kilometre travelled (VKT) when compared with other local road networks, (see Appendix B: ONRC Performance Measures Reporting).

1.4 Future Demand

The future demand for services will change over time in response to a wide range of influences, including:

- Local population trends
- Accuracy of predicted future populations
- Local economic trends
- Land use change
- Changing technologies
- Changing legislative requirements
- Changing regional and district planning requirements
- Climate and climate change.

Increasing demand for services over time generates a requirement for the development of additional infrastructure. Expenditure programmes need to be planned to fund the capital works and associated on-going operational expenditure. Alternately, it may be possible to manage demand within the existing system capacity.

Where a reduced demand is forecast it may be appropriate to renew assets with a lesser capacity, operational expenses may decrease or an asset may become surplus to requirements.

The land transport network is responsible for the efficient movement of people and goods throughout the District and to neighbouring districts. The land transport network is a core facility maintained by the Council to assist it in meeting its community outcomes.

Transportation provides particularly strong inputs into the following Community outcomes:

- Manawatū District develops a broad economic base from its solid foundation in the primary sector
- Manawatū and its people are connected via quality infrastructure and technology
- Manawatū's built environment is safe, reliable and attractive.

The present road network was set up many decades ago and has been gradually upgraded to the present standard. It is quite evident, however, that community expectations in the roading area are increasing which will require on-going development of the roading network.

Generally, the network copes with the demands on it. While there is little demand for the supply of new infrastructure, apart from that required in subdivision work, the present network will need considerable redevelopment over the next decade to meet this community's expectation. However, some factors that may force the need for change on the assets or the management of the asset are discussed below and in the following paragraphs:

Increase in Population: This will result in an increase in traffic on the roads which will increase congestion and reduce the level of service provided by the road, as well as increasing wear on the roads which will increase maintenance costs and renewal frequency.

A Change in the Way a Road is Used: The creation of a new sub-division, or the development of new industry in one part of the District, may change how a road will be used. This may mean roads will need to be upgraded to accommodate the changing use.

A Change in the Level of Service Demanded by the Road Users: Over time, communities tend to expect improving service from their assets. Roads and the activities involved in managing the roads therefore, may need to be improved to satisfy these future needs.

A Change in the Strategic Management of the Assets: The Council's policies and management strategies are in continual evolution to keep pace with the changing needs of the community, statutory requirements, funding organisations and Central Government. The trend to more lifestyle blocks in the country-side has also changed the expectation of the travelling public in rural areas. These rural roads are no longer used only by local farmers, but now have a much wider range of people and vehicle types driving on them. This has resulted in factors such as smoothness of ride, loose metal and higher speeds becoming more important to more road users. Changes to policies and management strategies can also have a significant effect on how assets are managed.

The direction of future land use changes and their effects on the roading network are difficult to determine with accuracy, but it is important that the roads likely to be affected are prepared in readiness for these changes.

Demand for new or upgraded facilities arises from the needs of the existing population i.e. meeting the level of service standards, changing habits, and population growth. This demand manifests itself in the need for:

- New roads
- Sealing of unsealed roads
- Widening and alignment improvements
- Upgraded intersections
- New and upgraded bridges
- Appropriate urban facilities in closely settled areas, e.g. street lights, kerb and channel, footpaths.

The Council intends to maintain its awareness of these issues and plans to provide a roading network which meets the communities' expectations. This may involve more seal extension, better ways to provide and maintain unsealed roads, and possible widening of some arterial and collector roads in the District. Funding of all these developments has been recognised in the 10 year plan.

1.5 Lifecycle Management Plan

The activity management process is intended to deliver agreed levels of service in the most cost effective manner to present and future customers. Managing the transportation network infrastructure is simply one of the inputs to this process. At the highest level, the services to be delivered and standards to be achieved are those that contribute towards the achievement of the community outcomes in Council's 10 Year Plan. Gaps between required standards and services and the ability of the network to deliver them are identified and processes are put in place to manage these gaps within acceptable margins. In managing these gaps both asset solutions (such as new or enlarged asset elements) and non-asset solutions (such as use reduction programmes) are considered.

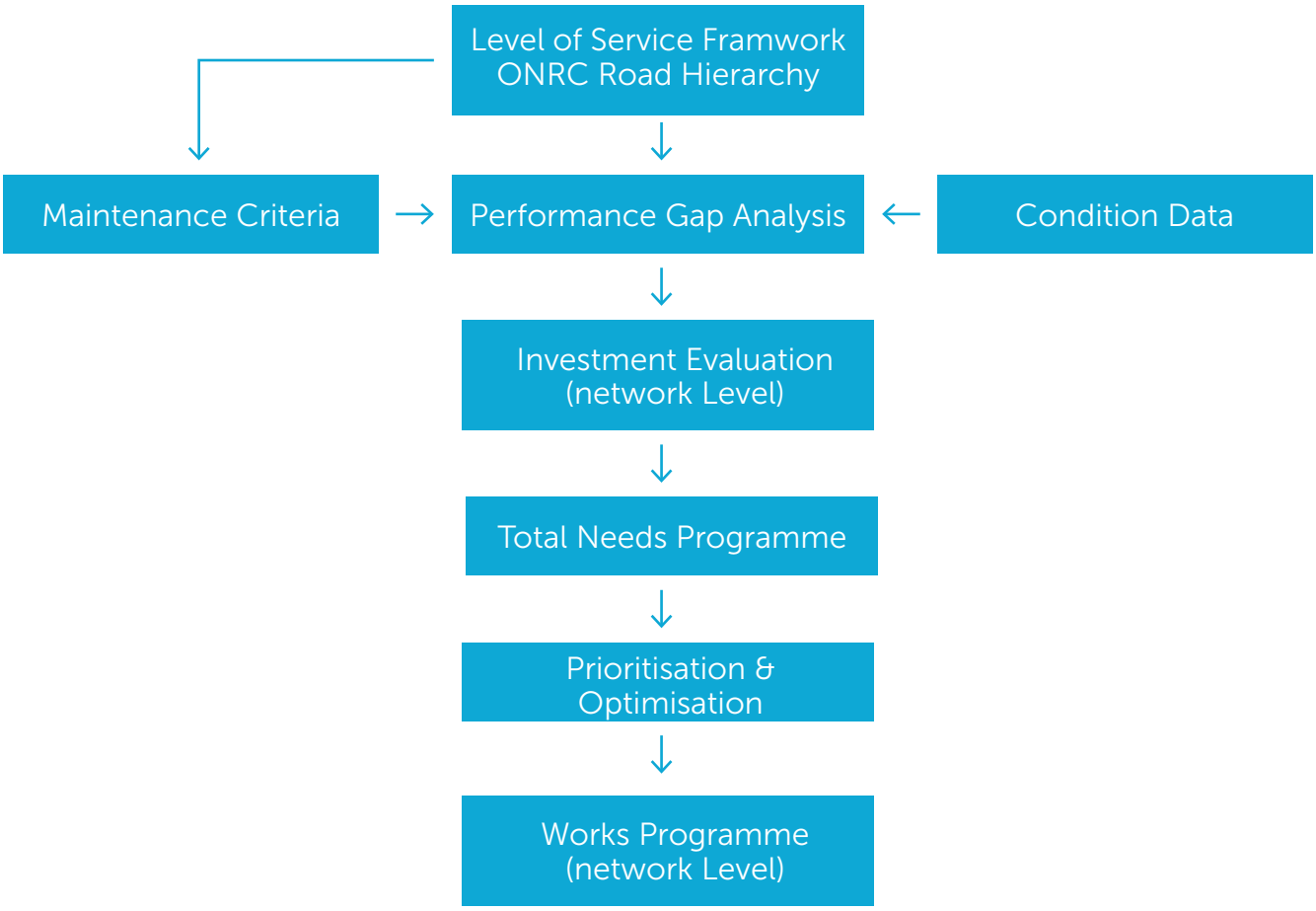
Decisions on the option to be followed in any particular instance are based on a range of factors such as risk assessments, legal requirements, through life costs, customer approval ratings and the ability of the community to pay for system improvements. The detailed considerations behind these decisions are not made or detailed in this AMP, they occur during the early stages of the projects' development as determined by the complexity, scale and potential effects of the problem/issues and the options available to address them.

1.6 Activity Management Practices

The flow chart over the page shows the process of works program development at the network level. The process starts by identifying asset requirements in relation to the ONRC which involves establishing a CLoS hierarchy, setting performance targets and maintenance intervention criteria for the assets for each road class in the road network.

This information is then used in conjunction with the asset condition and inventory data in a performance gap analysis to identify current or future needs. Identifying future needs requires using performance and demand forecast models, appropriate maintenance strategies and models that predict the impacts of maintenance works.

Process of Works Program Development at the Network Level



The needs are then evaluated to identify optimal intervention options, (maintenance and rehabilitation treatments) to close the asset performance gap and establish budgetary requirements. In a generic sense, the options that minimise Council and road user costs, in a life cycle cost context, are considered to be optimal. These intervention options comprise the total needs program.

To ensure an equitable allocation of resources and to achieve Council's desired outcomes, prioritisation and optimisation techniques are used to identify the optimum combination of projects that could be achieved under different funding scenarios. As well as aiming at minimising life cycle costs, the process of optimising and prioritising includes consideration of strategic network requirements and strategic corridor improvements.

The result of prioritisation and/or optimisation leads to the identification of the works program. The final works program includes the funding required for the different maintenance programs, together with details of the specific works. The three year rolling programme for road network maintenance management facilitates the preparation of medium term budgets and the planning of resources and maintenance activities. The three year program is reviewed annually giving consideration to deferred projects from the first year's program, the backlog of needs and the availability of resources.

1.7 Monitoring and Improvement Programme

Identification of Asset Requirements

The identification of asset requirements dictates the standards of performance, condition and capacity and the consequential funding requirements. It requires knowledge of existing asset performance and performance targets to identify the gaps in asset performance.

Performance measures of road assets are aligned with the One Network Roading Classification (ONRC) to deliver consistent community outcomes. Identified asset requirements must therefore correspond to the prescribed CLoS hierarchy taking into account community requirements and the existing network usage, configuration and condition. This involves collecting current condition/performance data and setting network performance targets/intervention criteria for each CLoS class so that performance gaps can be identified and rectified.

Customer Level of Service (CLoS) Framework

CLoS is a term used to describe the quality of services provided by the asset for the benefit of the users. Depending upon the Road Classification a higher CLoS may be required for some parts of the network compared to others. Adopting the CLoS framework helps to achieve consistency in standards along roads of the same strategic importance. This has been identified as an important road user requirement, and provides Council with an efficient systematic approach to managing their assets. The various CLoS have been defined by the Roading Efficiency Group (REG). Council is supporting this approach by implementing the ONRC and associated CLoS and Performance Measures.

Road Hierarchy

The ONRC CLoS hierarchy as developed by the Roading Efficiency Group (REG) to define what class of asset is required.

Functional Classification

There are criteria and thresholds for each category, based on the functions the road performs within the network.

Asset Performance Measures

Target road asset conditions (roughness, rutting, etc.) and road configuration parameters (width, lanes, etc.) have been defined for each CLoS/Roading Category. Performance measures are measurable targets with which current asset condition and configuration are objectively compared to determine road asset requirements. They are used to identify gaps in asset performance, which identify maintenance and/or capacity improvement activities.

Performance measures are defined using physical and dimensional parameters that reflect the operational and structural capacity of the asset. The configuration parameter targets represent the minimum acceptable levels. Condition parameters represent the health and condition state of the asset. The condition parameter performance targets represent the maximum acceptable levels, above which remedial actions are considered. Targets for other aspects such as delineation, safety, availability, accessibility, reliability of travel times, congestion and environmental performance are aligned with a range of ONRC-Performance Measures.

The Performance Measures have been developed in conjunction with the ONRC and associated CLoS outcomes.

For each category of road the minimum (or maximum) acceptable configuration and condition parameters have been set. Performance measures have also been set for an asset network as a whole. They are used to compare the network performance over a defined period, e.g. from year to year, and therefore assess the effectiveness of the adopted activity management practices. For example, efficiency, safety, resilience, amenity, travel time Reliability, and accessibility.

2. INTRODUCTION

2.1 Background

ISO55000 defines activity management as the "coordinated activity of an organisation to realize value from assets". An asset is an item, thing or entity that has potential or actual value to an organisation. Activity management involves the balancing of costs, opportunities and risks against the desired performance of assets, to achieve the organisational objectives. This balancing might need to be considered over different timeframes.

Activity management also enables Council to examine the need for, and performance of, assets and asset systems at different levels. Additionally, it enables the application of analytical approaches towards managing an asset over the different stages of its life cycle (which can start with the conception of the need for the asset, through to its disposal, and includes the managing of any potential post disposal liabilities).

Activity management is the art and science of making the right decisions and optimising the delivery of value. A common objective is to minimise the whole life cost of assets but there may be other critical factors such as risk or business continuity to be considered objectively in this decision making.

2.2 Goals and Objectives of Asset Ownership

The key objective of AMP is to provide a desired level of service in the most cost effective manner while demonstrating responsible stewardship for present and future customers. Activity Management Plans are a key component of the strategic planning and management of Council, with links to the 10 Year Plan and service contracts.

The AMP underpins the 10 Year Plan and consultative processes that have been put in place to engage the community.

The AMP delivers a range of benefits to the community as well as to the provider of the services, the main ones being:

- Maintain, replace and develop assets over the long term to meet required delivery standards and foreseeable future needs at minimal cost
- Continually improve activity management practices and service delivery to the customers
- Comply with statutory requirements.

2.2.1 External Context Ministry of Transport

The Ministry of Transport is the Government's principal transport adviser. The majority of their work is in providing policy advice and support to Ministers.

Through our advice we aim to:

- Improve the overall performance of the transport system
- Improve the performance of transport crown entities
- Achieve better value for money for the government from its investment in the transport system.

The Ministry of Transport help the Government give effect to its policy by supporting the development of legislation, regulations and rules. We also manage and account for funds invested in transport. The delivery of the transport functions is by the New Zealand Transport Agency.

Waka Kotahi NZ Transport Agency (Waka Kotahi)

Waka Kotahi is both a co-investor and manages the state highway operations. The Council, together with other approved Road Controlling Authorities (RCA's), has a very important ongoing relationship with the Waka Kotahi, which is a funding partner to the majority of land transport activities across New Zealand. The Waka Kotahi ensures that equitable and nationally consistent levels of service are achieved over the network and this is funded in a long term sustainable manner. On average Waka Kotahi funds, through a subsidy, 50% of the cost of the Land Transport Programme for all RCA's in New Zealand.

Horizons Regional Council

Changes to the Land Transport Management Act 2003 have given a lead role to Regional Councils in regional transport planning and the Regional Land Transport Programme (RLTP) 2018-212021-24 contains all land transport activities of the District Councils in our Region (Wanganui, Manawatū, Rangitīkei, Horowhenua, Ruapehu and Tararua) and Palmerston North City Council, the Waka Kotahi NZ Transport Agency (state highway division) and Horizons itself. This sets out the transport activities the Region for the purposes of obtaining funding from Central Government.

The programme is made up of prioritized activities and encompasses:

- Maintenance and operation of local roads and state highways
- Roading improvements (local roads and state highways)
- Public transport services and infrastructure
- Road safety activities
- Walking and cycling facilities
- Transport planning.

The Regional Council is also provides the natural resource management functions across the region. Horizons develops policies to guide the management of the Region's environmental resources – land, air, water, and coast. These policies set out the things that need to be done to achieve the environmental outcomes for the Region. Horizons use both regulatory and non-regulatory methods to meet the objectives in its policies regulatory management requires users of environmental resources to apply for resource consent; non-regulatory management involves providing advice, information, education, and funding assistance.

Horizons also monitor the effectiveness of these methods and carry out research into existing and emerging environmental issues.

Our Neighbours

Rangitīkei District Council, Palmerston North City Council and Horowhenua District Councils are neighbouring Road Controlling Authorities. Agreements exist with these authorities which outlines who has specific responsibilities to maintain assets, on various boundary roads. Waka Kotahi is responsible for the State Highways 1, 3, 54 and 56 that traverse through the Manawatū District. A memorandum of understanding exists with Waka Kotahi over responsibilities and obligations.

2.2.2 Internal Context Corporate Goals

Council ensures that all items of program development and implementation align with the strategic direction by;

- Setting maintenance intervention criteria for the different road assets depending on their one network roading classification ONRC
- Using the ONRC customer level of service (CLoS) performance measures
- Aligning the programme with the strategic direction and CLoS outcomes
- Optimising the intervention options when developing the total needs program
- Prioritising candidate projects when developing the works program
- Selecting the types of treatments, materials and construction techniques when implementing the program
- Ensuring that the activity management plan (AMP) follows the strategic direction.

Business Frameworks

Council's road and bridge assets are managed by the Roading Manager who works with the Roading Operations Manager and other roading staff to discharge all his responsibilities for operational, daily, short-term, medium term and strategic planning of the road network and its maintenance. Road network professional services are largely delivered by in-house staff, who are accountable to the Asset Manager.

There are a number of cross- departmental links that are important to the correct functioning of the roading team and management of the roading network. The most significant of these are with the financial and administration services staff.

Council's committee structure is extensive and are established under the Local Government Act 2002. Each township, excluding Feilding, and rural community also has a local Community Committee elected every three years at a specially convened public meeting. The purpose of the committee is to consult with its community and relay local concerns and preferences to the Council or Community Committee. Township services and beautification projects are generally undertaken in conjunction with, or at the behest of, local township committees.

The full list of the Boards and Committees is:

- Āpiti Community Committee
- Bainesse/Rangiotū Community Committee
- Beaconsfield Community Committee
- Cheltenham Community Committee

- Colyton Community Committee
- Halcombe Community Committee
- Hīmatangi Beach Community Committee
- Hiwinui Community Committee
- Kimbolton Community Committee
- Kiwitea Community Committee
- Pōhangina Valley Community Committee
- Rangiwāhia Community Committee
- Rongotea Community Committee
- Sanson Community Committee
- Tangimoana Community Committee
- Waituna West and District Community Committee.

Organisational Culture

An important measure of the quality of Council's activity management is the ability, experience and qualifications of the individuals and companies involved in its preparation. Council employs a limited range of technical staff qualified to carry out the activity management function.

In this context competency refers to applied knowledge, it is not just the knowledge itself. Competencies can be described as: The behaviours that employees must have, or must acquire, to input into a situation in order to achieve high levels of performance.

There are a large number of competencies that the Council requires of its staff to effectively manage its transportation network assets; these are not statements of current individual's skills or competencies; rather, they are statements of the Council's desired competency in the areas and subjects detailed.

Council's People and Culture Group establish the gaps between the competencies of current staff and the competencies required in the organisation. These gaps will be used to guide staff training and development programmes. These inform the recruitment process for staff involved in road activity management when new positions are being filled or replacement staff sought.

To ensure that staff were thinking and working towards a common LTP goal, Council management instigated a LTP planning process early in 2020 for the 2021-24 LTP. The group consisted of the four senior managers, LTP planners, asset managers and accountants.

This group meets regularly and provides direction on issues such as:

- Council priorities
- Agreed assumptions
- Growth projection
- Plan format and style
- Communication and consultation
- Auditing processes.

Financial Sustainability

The Local Government Act 2002 requires Council to prepare a Financial Strategy as part of its Long Term Plan. This Strategy outlines how the Council intends to manage it finances prudently. This means the Council will act with careful deliberation and will always consider the financial implications of decisions on the community.

Council must make adequate and effective provision to meet expenditure needs identified in Annual and Long Term Plans.

The Financial Strategy provides a financial framework for making decisions. Simply, it enables Council to assess proposed spending against rates and borrowing requirements over the whole ten years of the Long Term Plan 10 year plan. It draws together all of the issues in the LTP along with the financial consequences and presents these along with the Council's response.

This will:

- Enable the community to readily identify what the financial issues are
- Provide the community with certainty about how expenditure will be met
- The impacts of proposals on levels of services, rates, debts and investment
- Enable the community to predict how the Council intends to manage the financial issues in the future
- Provide guidance to decision makers when considering implications of financial issues on communities now and in the future.

Council's vision is for a "connected, vibrant, thriving Manawatū - best rural lifestyle in New Zealand". The services and projects outlined in the Long Term Plan will ensure this vision becomes a reality. The provision of services and projects comes at a cost. Council aims to spend within its means, achieving a balance between meeting the needs of the community with its ability to pay.

2.3 Asset Management

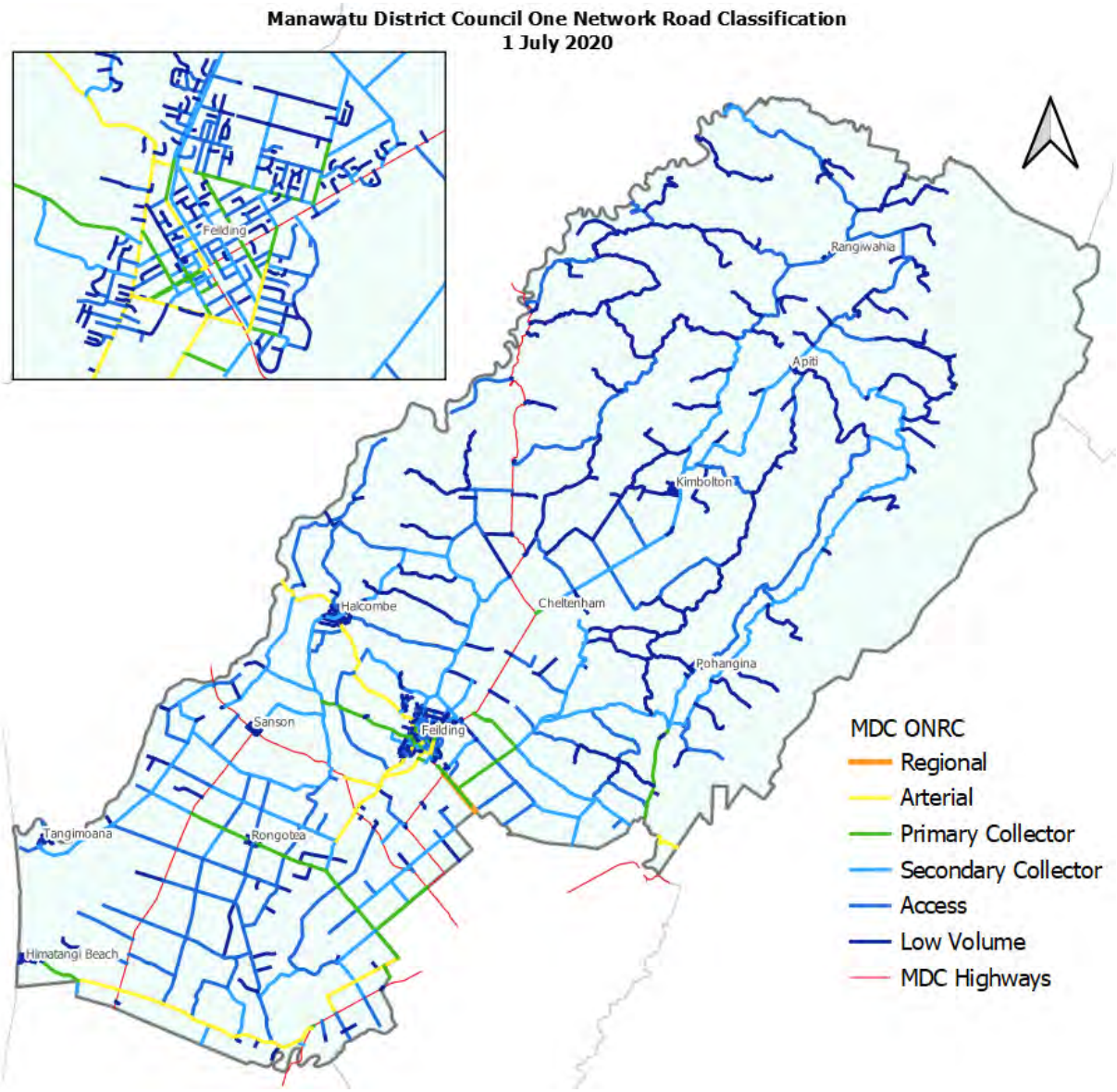
This roading activity management plancovers a 30 year planning period in accordance with the International Infrastructure Management Manual. It is prepared to meet legislative and user requirements for sustainable service delivery and long term financial planning and reporting. This activity management plan uses a 'bottom up' approach for gathering detailed asset information for individual assets to support the provision of activities and programs to meet agreed ONRC Customer Levels of Service in a financially sustainable manner.

2.3.1 Assets Included in this Plan

The inventory of the Transportation services and assets owned by Council is shown below. It includes the land value associated with the assets.

2.3.2 Network Hierarchy

The ONRC CLoS hierarchy has been developed by the Roading Efficiency Group (REG) to define what class of asset is required. The REG has taken the view that uniformly high operating conditions across all roads in the network are too costly to achieve and would not present an economic return on investment. It is impossible to manage an infinite number of standards and performance levels across the network. For this reason and for reasons of equity.



One Network Roading Classification Hierarchy

Categories/Criteria	AADT	HCV	BUSES	Active Modes	Length (KM)
REGIONAL Meet 2 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses & 1 economic or social)	Urban: > 15,000 Rural: > 10,000	>400	> 40 buses or 2000 people per hour		3.49
ARTERIAL Meet 2 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 5,000 Rural: > 3,000	>300	> 15 buses or 750 people per hour		65.3
PRIMARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 3,000 Rural: > 1,000	>150	>6 Buses or 300 people per hour	Significant numbers of pedestrians and cyclists (urban peak) or part of identified cycling or walking network	64.6
SECONDARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic or HCV)	Urban: > 1,000 Rural: > 200	>25			323.3
ACCESS All other roads	Urban: > 1,000 Rural: > 200	>25			428.1
(LOW VOLUME) Meet low volume Typical Daily Traffic	Urban: < 200 Rural: < 50	<25			490

Overview of Assets Involved

The network is often classified by surface type and whether the roads are in urban or rural areas. The following tables summarise the inventory by those classifications.

Network Summary – Length (km)

	Sealed	Unsealed	Network
Urban	120.97	11.5	132.47
Rural	880.19	355.29	1235.48
Both	1001.16	366.79	1367.95

Network Summary – Proportion

	Sealed	Unsealed	Network
Urban	8.9%	0.8%	9.7%
Rural	64.4%	25.9%	90.3%
Both	73.3%	26.7%	100.0%

The use made of these roads, expressed in terms of the total estimated distance travelled on them (vkt) each year is shown in the table below.

Network Summary Use

VKT	Sealed	Unsealed	Network
Urban	18.99%	0.08%	19.07%
Rural	78.99%	1.94%	80.93%
Both	97.98%	2.02%	100.00%

The tables above show that while 26.7% of the network consists of unsealed roads these contribute to less than 3% of the use of the network.

3. LEVELS OF SERVICE

3.1 Customer Research and Expectations

In previous years the community outcomes were shaped by the community. However, amendments to the Local Government Act in 2010 changed the definition of community outcomes from outcomes belonging to and achieved by the community, to "outcomes that a local authority aims to achieve". This is a significant change in emphasis from a community wish-list to a set of outcomes owned – and actively worked towards – by Council. Council believes it is also helpful for the public to understand what Council does and why, and for other stakeholders, including the private sector who both benefit from and contribute to Council activity.

Outcomes and Levels of service are developed to reflect the expectations of the community and regulators. Targets are established which indicate the standard that should be met. Outcomes are relevant across the Transportation activity while Levels of Service statements are more specific.

Statutes that require Council to undertake consultation for Transportation include:

- Local Government Act 2002
- Resource Management Act 1991
- Land Transport Management Act 2003.

3.2 Strategic and Corporate Goals

3.2.1 Significance Policy

Under the LGA 2002, each Council is required to have a Policy of Significance. The requirements for the policy can be seen as being a means for ensuring that in making decisions that Council is:

- Clear about why it is addressing a matter
- Has considered and evaluated the options and alternatives
- Has information on the community view about the matter and the options for addressing it, and particularly it has an understanding of the views and preferences of those persons likely to be affected by, or have an interest in the matter.

A Significant Activity is one that has a high degree of significance in terms of its impact on either:

- The well-being of the people and environment of Manawatū District and/or
- Persons likely to be affected by or with an interest in that activity and/or
- Capacity of the Manawatū District Council to provide for the well-being of the district
- Transportation is considered by the Manawatū District Council as significant activities therefore requires consultation.

The Council's Public Consultation Policy (C301) states that the Council will;

- Clarify its expectations through public consultation
- Allow sufficient time for effective response to its proposals
- Report on public proposals and follow up when necessary
- Maintain the consultative process.

There are a number of instances where the Council will undertake consultation at a District wide or comprehensive level. This generally occurs when there is a requirement to use the Special Consultative Procedure as prescribed in the LGA 2002. This occurs in the following situations:

- Adopting or amending the community plan. The community plan is reviewed every three years with the annual plan giving effect to that plan in the intervening years. The Council must consult on community outcomes at least every six years
- Adopting the annual budget
- Adopting, amending or reviewing a bylaw
- Proposing a change in the way a significant activity is undertaken
- Significant decisions not already provided for in the community plan
- Termination of a service.

The Council will decide that some decisions are significant and will therefore require a more rigorous assessment of options and a more robust consultative process. Those decisions are treated as amendments to the Community Plan and can be dealt with either separately or as part of the Annual Plan process.

To date the transportation levels of service have been in a process of development and refinement. The one network road classification (ONRC) set of levels of service are now established within the district context.

The goal of the ONRC system is to provide road users, whether they are vehicle drivers, riders on passenger transport, cyclists or pedestrians with more consistent customer levels of service across the country. This is important for road users of the network as diverse as freight operators who want to know the costs of operating their vehicles across multiple District networks and how to value journey time consistency and reliability.

3.3 Legislative Requirements

Council has statutory obligations under the Land Transport Management Act 2003 to maintain a roading network within the District. An effective roading network is also essential to ensuring economic and social wellbeing of the community through the provision of access and mobility for people, goods and services.

In order to fulfil Community Outcomes, Vision, Goals and Objectives, Council have adopted a systematic approach to the long term management of its assets by preparing this Activity Management Plan. Council has developed a broad range of documents including strategies to define the broad scope and direction of its activities. Once adopted by Council, no process or action should be inconsistent with it.

Central Government provide a high level of direction and regulation into the transportation sector through Strategies, Plans, Policy Statements and Legislation. A large proportion of these documents are delivered through the Waka Kotahi NZ Transport Agency (Waka Kotahi).

Regionally there is a suite of Plans and Strategies, many of which link with the Horizons Land Transport Strategy.

3.3.1 The New Zealand Transport Strategy (NZTS) and Long Term Strategic View (LTSV)

This provides the Government's over-arching strategic vision for transport "People and freight in New Zealand have access to an affordable, integrated, safe responsive and sustainable transport system".

It is supported by five principle transport objectives:

- Ensuring environmental sustainability
- Assisting economic development
- Assisting safety and personal security
- Improving access and mobility
- Protecting and promoting public health.

To deliver the vision and targets of the Strategy, key components have been identified for government intervention and facilitation by regulation, enforcement, economic incentives, investment, and education as follows:

- Integrated land use and transport planning
- Making best use of existing networks and infrastructure
- Investing in critical infrastructure and the transport sector
- Increasing the availability and use of public transport, cycling, walking and other shared and active modes.

3.3.2 Government Policy Statement on Land Transport

This has a strong focus on driving improved performance from the land transport system and investing in new transport infrastructure. This is primarily articulated through GPS. The GPS sets out the strategic direction for land transport in New Zealand and outlines the results the Government wishes to achieve from allocation of transport funds from the National Land Transport Fund (NLTF). The AMP must be consistent with the GPS.

The Government's strategic direction for land transport is to pursue improved performance from the land transport system by focusing on three core priorities:

- Economic growth and productivity
- Road safety
- Value for money.

The GPS also sets out national land transport objectives and the long term results the Government wishes to achieve under each objective. The objectives seek a land transport system that:

- Addresses current and future demand
- Provides appropriate transport choices
- Is reliable and resilient
- Is a safe system, increasingly free of death and serious injury
- Appropriately mitigates the effects of land transport on the environment.

3.3.3 National Land Transport Programme

This contains all the land transport activities, such as public transport services and road construction and maintenance, which are expected to receive funding from the NZ Transport Agency. The Waka Kotahi is responsible for allocating funding to land transport.

The NLTP targets investments that will help to address the important challenges facing land transport through:

- Improving the efficiency of key transport routes
- Improving public transport
- Easing severe congestion in key urban areas
- Upgrading important freight and tourism routes
- Improving safety
- Improving access to markets, employment and areas that contribute to economic growth.

3.3.4 The National Infrastructure Plan (NIP)

This details the Government's view of the challenges and priorities for infrastructure. The 2021 NIP describes the view to 2051. The vision: By 2051 New Zealand's infrastructure is resilient and coordinated and contributes to a strong economy and high living standards.

3.3.5 Other References

The following documents influence management of the Transportation activity

- Waka Kotahi's Statement of Intent 2021-24 – reinforce the priorities around supporting economic development
- Waka Kotahi's Rules, Policies and Guidelines (including published manuals) – provide guidance to programming planning and funding
- The Road Efficiency Group: One Network Road Classification Guidelines

- International Infrastructure Management Manual.

Legislation is established by Central Government and must be complied with at Local Government Level. Significant legislation and regulations affecting the Transportation activities are provided below.

3.3.6 Civil Defence Emergency Management Act 2002

Requires Council's services to function at the fullest possible extent during and after an emergency, even though this may be at a reduced level. In addition, Council has established planning and operational relationships with regional CDEM groups to deliver emergency management within our boundaries. Transportation is regarded as a critical service and is given special consideration within Council emergency management procedures. Every effort will be given to restore services immediately after an event to at least provide limited access.

3.3.7 Health and Safety at Work Act 2015

New Zealand's key work health and safety legislation is the Health and Safety at Work Act 2015 (HSWA) and regulations made under that Act. All work and workplaces are covered by HSWA unless specifically excluded.

3.3.8 Land Transport Management Act 2003

This document contains particular requirements for content, development of and consultation on the District's Land Transport Programme prior to its adoption by the Council. The original Act was amended in 2008 by the Land Transport Management Amendment Act, which introduced the requirement for a Regional Transport Committee (RTC) to develop a three year Regional Land Transport Programme (RLTP). The Horizons Regional Council is responsible for preparing the Manawatū-Wanganui programme. The programme is required to detail at least the first three financial years' activities, relating to road maintenance, renewals, improvements and public transport services, identified by approved organisations (road controlling authorities) in the region. The regional programme is then submitted to the Waka Kotahi for incorporation into the National Land Transport Programme; 10- year forecasts are also required.

3.3.9 Local Government Act 2002

- Part 6 – Planning, Decision-Making, and Accountability The consultation and community outcomes sections of this part are particularly relevant. Appendix T to this plan contains fuller details on consultation. The community outcomes requirements for this Activity management plan are met through the Council's Long Term Plan process
- Part 7 – Specific Obligations and Restrictions On Local Authorities and Other Persons
- Schedule 10 – Council Plans and Reports The requirement to consider all options and to assess the benefits and costs of each option.

3.3.10 Utilities Access Act 2010

Provides for a coordinated approach to management of the road corridor. The Act requires the Corridor Managers to undertake a planning and access management role, and Utility operators to comply with an approved code of practice.

3.3.11 National Planning Documents and Standards

- Government's Sustainable Development Action Plan
- New Zealand Standard SNZHB 4360:2000 'Risk Management for Local Government'

- The National Land Transport Strategy
- National Energy Efficiency and Conservation Strategy
- The NZ Transport Agency (Waka Kotahi) Maintenance Guidelines for Local Roads
- The New Zealand Coastal Policy Statement 1994
- The (proposed) National Environmental Standard relating to land transport noise from major roads
- NZS 4404: 2004 Land Development and Subdivision Engineering
- SNZ HB 2002:2003 Code of Practice for Working in the Road (NZUAG Roadshare)
- National Land Transport Programme
- National Infrastructure Plan 2011
- The Building Regulations 1992
- The Heavy Motor Vehicle Regulations 1974
- Land Transport Rule: Setting of Speed Limits 2003 (Rule 54001)
- Land Transport Rule: Traffic Control Devices 2004 (Rule 54002).

3.3.12 Horizons Regional Council Strategies, Policies and Plans

Section 75 of the Land Transport Management Act 2003 requires a Regional Transport Committee to produce a Regional Land Transport Strategy (RLTS). The 2021 - 2051 Regional Land Transport Strategy is closely aligned with the objectives of the NZTS and LTMA, tailored for the Manawatū region. It includes strategies to accommodate projected growth in the region and the resulting traffic growth or demands for further transport services.

3.3.11 Council Strategies

- Sustainability Principal
- District Wide Strategy
- Council Infrastructure Strategy
- Manawatū Active Transport Strategy
- Road Safety Action plan
- Procurement Policy.

3.3.12 Council Documents

- Manawatū District Long Term Plan
- Manawatū District Plan
- Feilding Urban Growth Framework
- Council Policies
- Council Bylaws.

3.3.13 Environmental Legislative Obligations

There are a number of legislative mechanisms aimed to avoid or mitigate potential adverse environmental effects associated with the management of the Transport network. These are set at national, regional and district level.

The role of Central Government is one of setting policy for activity management across New Zealand. This is achieved through the following;

- Resource Management Act 1991
- Local Government Act 2002
- Land Transport Management Act 2003
- Land Transport (Road Safety and Other Matters) Amendment Act 2011
- Government Policy Statement
- The Government Policy Statement on Land Transport Funding
- Hazardous Substances and New Organisms Act 1996.

3.3.14 Resource Management Act Plans

The Horizons Regional Council is responsible under the RMA for ensuring that the natural and physical resources of the region (such as the land, air, water and coastal resources) are managed in a sustainable manner.

3.3.15 Horizons Regional Plan

The Horizons One Plan applies to the management of air, land and water resources in the region including: air, soil, rivers and streams, lakes, groundwater, wetlands and the coast. The One Plan identifies natural values of the regions resources and policies for protecting them. It identifies specific management areas related certain streams, lakes, wetlands, aquifers and air quality areas. It also identifies rules that specify whether an activity is permitted or whether resource consent is needed.

3.3.16 District Plan

This provides zoning throughout the district. Certain activities that are permitted in one zone may not be permitted in another. The different types of resource consents are Land use and subdivision. Activities that need resource consent are classified as controlled restricted discretionary, discretionary and non-complying.

3.3.17 Long Term Plan

Council has specified "Environmentally responsible development" in relation to land transport as a community outcome in the Long Term Plan 2021-2031.

3.3.18 Horizons Regional Land Transport Strategy (RLTS)

Sets the strategic direction for transport in the Region by describing the vision, objectives and outcomes that will guide the development of the Region's transport network over the next 30 years. The Strategy covers all forms of land transport, including public transport, local roads, state highways, walking and cycling.

Section 175(2)(h) of the Land Transport Act as amended by the LTMA 2011, states that every regional land transport strategy must give early and full consideration to land transport options and alternatives in a way that avoids, to the extent reasonable in the circumstances, adverse effects on the environment.

It is important to note that the RLTS is a strategic document and does not cover detail at a micro level (i.e. project design). The Strategy however, provides the strategic direction for future projects.

3.3.19 Resource Consents

If the construction of an asset does not meet the development controls outlined in the District Plan or relates to an activity that has the potential to result in adverse effects on the environment, beyond those contemplated by the District Plan provisions, resource consent may be required. An Assessment of Environmental Effects (AEE) is required to support any resource consent applications to the respective Councils when seeking approval to construct, alter or vary the use of a facility or building that is not permitted by the relevant plan.

The AEE process involves the identification and assessment of both the potential and the perceived physical, social and cultural impacts that the proposed works may have on the existing environment, and includes the examination and comparison of options and alternatives for mitigating any identified adverse effects, and the confirmation and recommendations on the preferred options and methodology to carry out the works.

The critical environmental factors requiring consideration may include geological and geotechnical effects of land movement (cut and fill), the ecological and biological effects of vegetation removal or earthworks, and the cultural, archaeological and social effects on the environment of the development. These, together with noise, traffic, and visual effects, may require specialist inputs and consultation with the local communities.

3.4 Customer Levels of Service

3.4.1 The Levels of Service Framework

The One Network Road Classification (ONRC) supports a major shift in the road management framework at national and regional levels. It is a minimum requirement that the ONRC is embedded in investment decision making for the 2021-24 NLTP. The most important concept behind the ONRC is that it places the customer at the heart of every investment decision. The ONRC provides national standards for road activity management, in a step towards ensuring equity and consistency.

The ONRC divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available:

- National – link major population centres and transport hubs
- Arterial – link regionally significant places and industries
- Regional – major connectors between and within regions; often public transport routes
- Primary collector – link significant local populations and industries
- Secondary collector – provide secondary routes, can be the only route to some places
- Access – small roads facilitating daily activities.

Through this simple classification, RCAs and the Transport Agency can now compare the state of roads across the country, and direct investment where it is needed most. Users will see an increase in the quality of some roads, and a decrease in others that have been over-specified in the past. Overall, RCAs and their ratepayers will get the right level of road infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Once a road has been classified under the ONRC, it should be maintained to the Customer Level of Service (CLoS) for roads of its type. The Customer Levels of Service are:

- Mobility (travel time reliability, resilience of the route)
- Safety
- Amenity (travel quality and aesthetics)
- Accessibility (land access and road network connectivity).

3.4.2 Developing Levels of Service

Overarching Principles:

- Over time all roads in a particular category should offer an increasingly consistent, fit for purpose customer level of service for road users
- Value for money and whole of life cost will be optimised in the delivery of affordable customer levels of service
- The customer levels of service will be delivered in the context of an integrated national network, integrating landuse and transport, including all modes and both rural and urban areas
- The customer levels of service will be delivered in the context of a safe system approach, which aims to create a forgiving road system, where human error and vulnerability do not
- Result in death or serious injury.

Foundations

- Customer levels of service are delivered in line with Council's empathy, assurance, response and tangibles principles
- Capacity limits on the network may require actions that shape demand to provide for the cost effective and efficient travel choice needs for customers
- The delivery of customer levels of service for all modes will be optimised by time of day consistent with the principles of network operating planning and activity management planning
- Local factors (e.g. topography, geology, climate, adjacent landuse and 'place' function, population density) may influence delivery of the customer levels of service
- The functional classification and its customer levels of service will be reviewed regularly
- The customer levels of service delivered for any route in the network will consider whether it functions as a critical lifeline for nationally significant infrastructure and its resilience will be delivered by considering a multi-modal, whole-of-network approach
- Access to the transport network by network utility operators and community events will be managed to limit the impact on transport network users.

The associated Customer Levels of Service for each functional category have been developed to reflect the following six fit for purpose outcomes.

Mobility

- Reliability: the consistency of travel times that road users can expect
- Resilience: the availability and restoration of each road when there is a weather or emergency event, whether there is an alternative route available and the road user information provided
- Speed: indicates the optimal speed for each road. The optimal speed is the speed that is appropriate for road function (classification), design (including safety) and use. Optimal speeds support both safety and economic productivity.

Safety

- How road users experience the safety of the road.

Amenity

- The level of travel comfort experienced by the road user and the aesthetic aspects of the road environment (eg cleanliness, comfort/convenience, security) that impact on the travel experience of road users in the road corridor.

Accessibility

- The ease with which people are able to reach key destinations and the transport networks available to them, including land-use access and network connectivity.

3.5 Technical Levels of Service

Fit for purpose Customer Levels of Service (CLoS) outcomes (provisional)			
ONRC	Mobility		
	Travel time reliability	Resilience	Optimal speeds (Safety and Efficiency)
Arterial	Generally road users experience consistent travel times with some exceptions in urban heavy peak, holidays, during major events or during moderate weather events	Route is nearly always available except in major weather events or emergency event and where no other alternatives are likely to exist. Clearance of incidents affecting road users will have a high priority. Road users may be advised of issues and incidents	Higher speeds depending on assessed level of risk. Lower if mixed use, high intersection density, schools, shopping, concentrations of active road users. In urban areas travel speeds depend on assessed level of risk and recognise mixed use, schools, shopping strips and concentrations of active road users
Primary Collector	Generally road users experience consistent travel times except where affected by other road users (all modes) or weather conditions	Route is nearly always available except in major weather events or emergency event and alternatives may exist. Clearance of incidents affecting road users will have a moderate priority. Road users may be advised of issues and incidents	Travel speeds depend on assessed level of risk and recognise mixed use, schools, shopping strips and concentrations of active road users
Secondary Collector	Road users travel times may vary as a result of other road users (all modes), weather conditions or the physical condition of the road	Generally road users experience consistent travel times except where affected by other road users (all modes) or weather conditions	
Access	Road users experience varied travel times as a result of other road users (all modes), weather conditions or the physical condition of the road	Route may not be available in moderate weather events and alternatives may not exist. Clearance of incidents affecting road users and road user information will have a lower priority	Travel speeds depend on assessed level of risk and recognise access and use values, particularly schools, shopping strips and concentrations of active road users
Access (Low Volume)		Route may not be available in weather events and alternatives may not exist. Clearance of incidents affecting road users and road user information will have the lowest priority	

ONRC	Safety	Amenity	Accessibility
Arterial	Variable road standards, lower speeds and extra care required on some roads/sections particularly depending on topography, access, density and use. Road user safety guidance provided at high risk locations. Some separation of road space for active road users in urban areas	Good level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of both road users and land use. Urban arterials reflect urban fabric and contribute to local character. Some separation of road space for active road users for amenity outcomes in urban areas. Clean and secure	Some landuse access restrictions for road users, both urban and rural. Road user connection at junctions with National, Arterial or Collector roads, and some restrictions may apply in urban areas to promote Arterials. Traffic on higher classified roads generally has priority over lower order roads. Some separation of road space for active road users in urban areas to provide network access and journey continuity. Extra care required around activity centres due to mixed use, including goods vehicles. Provision of quality information relevant to Arterial road user needs
Primary Collector	Variable road standards and alignment. Lower speeds and greater driver vigilance required on some roads/sections particularly depending on topography, access, density and use. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Road user safety guidance provided at high risk locations	Moderate level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of all road users and adjacent land use. Urban collectors reflect urban fabric and contribute to local character. Specific provision where active road users present. Clean, safe and secure	Land use access for road users generally permitted but some restrictions may apply. Road user connection at junctions with Arterial or Collector roads, and some restrictions may apply in urban areas to promote Arterials. Traffic on higher classification roads generally has priority over lower classification roads Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Provision of quality information relevant to Collector road user needs

Secondary Collector	Variable road standards and alignment. Lower speeds and greater driver vigilance required on some roads/sections particularly depending on topography, access, density and use. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Road user safety guidance provided at high risk locations	Moderate level of comfort, longer areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of all road users and adjacent land use. Urban collectors reflect urban fabric and contribute to local character. Specific provision where active road users present. Clean, safe and secure	Landuse access for road users generally permitted but some restrictions may apply. Road user connection at junctions with other Collectors or Access roads. Collector road traffic generally has priority over Access road traffic. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Provision of quality information relevant to Collector road user needs
Access	Variable road standards and alignment. Lower speeds and greater driver vigilance required on some roads/sections particularly depending on topography, access, density and use. Road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Road user safety guidance may be provided at high risk locations	Lowest level of comfort, may include extended areas of roughness and unsealed surfaces (on rural roads). Aesthetics of adjacent road environment strongly reflects land use and place function. Strong shared philosophy between active road users (if present) and vehicular traffic. Active road users expect environment appropriate to their needs. Urban areas clean, safe vehicle speed and secure lighting	Access to all adjacent properties for road users. Road user connection at junctions ideally with Collectors and other Access roads. Access road traffic generally has lower priority over traffic on all higher classification roads. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Enhanced accessibility and provision of quality information
Access (Low Volume)			

Non-Financial Performance Measures Rules 2013

Pursuant to and in accordance with section 261B of the Local Government Act 2002, the Secretary for Local Government makes the following rules.

These rules are the Non-Financial Performance Measures Rules 2013 (As they apply to the Roading Asset).

1. Commencement

These Rules come into force on 30 July 2014.

2. Interpretation

In these rules, unless the context otherwise requires, -

Abatement notice means a notice served under section 322 of the Resource Management Act 1991.

Conviction means the conviction of an offence under section 343C of the Resource Management Act 1991.

Enforcement order means an order made under section 319 of the Resource Management Act 1991for any of the purposes set out in section 314 of that Act; and includes an interim enforcement order made under section 320 of that Act.

Financial year means a period of 12 months ending on 30 June.

Flooding event means an overflow of stormwater from a territorial authority's stormwater system that enters a habitable floor.

Flood protection and control works means physical structures owned by local authorities and designed to protect urban and rural areas from flooding from rivers, including ancillary works such as channel realignment or gravel removal.

Footpath means so much of any road as is laid out or constructed by a territorial authority primarily for pedestrians or cyclists; including its edging, kerbing, and channelling, and includes dedicated cycleways.

Infringement notice means a notice issued under section 343C of the Resource Management Act 1991 local authority means a regional council or a territorial authority.

Local authority means a regional council or a territorial authority.

Major flood protection and control works means flood protection and control works that meet two or more of the following criteria:

a. Operating expenditure of more than $250,000 in any one year
b. Capital expenditure of more than $1 million in any one year
c. Scheme asset replacement value of more than $10 million, or directly benefitting a population of at least 5,000 people.

Regional Council has the same meaning as in section 5(1) of the Local Government Act 2002.

Road has the same meaning as in section 315 of the Local Government Act 1974.

Sealed local road network means all roads having a sealed or paved surface within a territorial authority's district subject to the exclusions set out in section 317 of the Local Government Act 1974.

Smooth travel exposure means a measure of the percentage of vehicle kilometres travelled on roads that occurs above the targeted conditions for those roads, calculated in accordance with standard industry methodology.

Stormwater system means the pipes and infrastructure (excluding roads) that collect and manage rainwater run-off from the point of connection to the point of discharge.

Territorial Authority means a city council or a district council named in Part 2 of Schedule 2 to the Local Government Act 2002.

Territorial Authority District means a district in respect of which a territorial authority is constituted; and, in relation to land in respect of which the Minister of Local Government is the territorial authority, means that land Measurement Period Any calculation, measure, number or percentage set out in Part 2 of these Rules must be calculated for a financial year (unless otherwise specified in these Rules).

Sub-part 5 – the provision of roads and footpaths

Performance measure 1 (road safety)

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.

Performance measure 2 (road condition)

The average quality of ride on a sealed local road network, measured by smooth travel exposure.

Performance measure 3 (road maintenance)

The percentage of the sealed local road network that is resurfaced.

Performance measure 4 (footpaths)

The percentage of footpaths within a territorial authority district that fall within the level of service or service standard for the condition of footpaths that is set out in the territorial authority's relevant document (such as its annual plan, activity management plan, Activity Management Plan, annual works program or long term plan).

Performance measure 5 (response to service requests)

The percentage of customer service requests relating to roads and footpaths to which the territorial authority responds within the time frame specified in the long term plan.

Frequency Of Inspections And Response Times For Works

Introduction – Physical Works Response Times

All specified response times are measured from either:

- Engineer notification, or
- Contractor observation, whichever occurs first.

For work items with set response times or determined by the Engineer by instruction or agreement with the Contractor or by approval of the Contractor programme, the response times will apply unless the Contractor has been advised otherwise by instructions or approval of any programme.

Network Inspections

Contractor's Regular Inspections

Road Classification	Frequency
Arterial	Weekly
Primary & Secondary Collector	2 Weekly
Access & Low Volume Access	Monthly

Culvert and Stormwater Structures Inspections

Road Classification	Frequency
All Roads	Annually

Bridge Inspections

Road Classification	Frequency
All Roads	Annually

Night Time Inspections

Road Classification	Frequency
Arterial	Annually
Primary Collector	Annually
Secondary Collector	2 Yearly
Access	3 Yearly
Low Volume	3 Yearly

Final Inspections

Road Classification	Frequency
All Roads	During the last 2 months of the contract period

Response Times

Crash Reports

Road Classification	Response Times
All Roads - Initial Report	24 Hours
All Roads - Detailed Report	14 Days

Incident Response

Road Classification	Response Times
All Roads - Initial/Single Responce	2 Hours
All Roads - Commence Work	As agreed with the Engineer

Surface Defects - Sealed Roads

Road Classification	Response Times
All Roads - Bleeding Bitumen	Refer MS4
All Roads - Other Defects	As per the approved programme

Digouts - Sealed Roads

Road Classification	Response Times
All roads – failures affecting traffic safety and showing signs of rapid deterioration	1 Day
All roads – failures not affecting traffic safety but showing signs of rapid disintegration	5 Days
All roads – other pavement failures	As per the approved programme

Deformation - Sealed Roads

Road Classification	Response Times
All Roads	As per approved programme

Edge Break - Sealed Roads

Road Classification	Response Times
All Roads	As per approved programme

Service Covers - Sealed Roads

Road Classification	Response Times
All Roads	As per approved programme

Unsealed Shoulders - Sealed Roads

Road Classification	Response Times
All Roads	As per approved programme

Barrier Repairs - All Roads

Road Classification	Response Times
All roads – Removal of offensive graffiti	1 Hours
All roads – Removal of other graffiti	7 Days
All roads – Cleaning to restore visibility of barriers	7 Days
All roads – Replacement and painting (where required) of defective or damaged barriers where traffic or public safety is seriously compromised	2 Days for permanent repair. To be temporarily made safe within 2 hours
All roads – Replacement and painting (where required) of defective or damaged barriers where traffic or public safety is NOT seriously compromised	To be temporarily made safe within 2 hours
All roads – other defects	As per approved programme
All roads – new installations	As per approved programme

Vegetation Control – All Roads

Road Classification	Response Times
All roads – Chemical Control, High Vegetation Control and Exotic Seedling Removal	As required to meet standards specified
All roads – Berm Mowing as specified in the appendices	Mowing round to be completed within 6 weeks of start
All roads – Mowing frequency	Four Mowing rounds with timings as agreed with the Engineer. Mowing demand will vary according to seasonal growth rates
Mowing Specification	Maximum height of freshly mown grass - 75mm

Potholes – Sealed Roads

Road Classification	Response Times
Arterial	1 Day
Primary & Secondary Collector	3 Days
Access & Low Volume Access	5 Days

Street Cleaning, Litter, Graffiti and Detritus Removal – All Roads

Road Classification	Response Times
Street Cleaning Urban Areas:	
All roads – Removal of offensive and dangerous litter and debris (e.g. dead animals, vomit, excrement,broken glass etc)	1 Hour
All roads – Removal of other litter and debris	By 8.00am of the day following
All roads – Removal of offensive graffiti	1 Hour
All roads – Removal of other graffiti	By 8.00am of the day following
All roads – Special cleaning for events	As per approved programme or instruction to Contractor
Regular Litter Removal (Patrols):	
Arterial	Weekly (on a regular auditable schedule)
Primary & Secondary Collector	Twice-monthly (on a regular auditable schedule)
Access & Low Volume Access	Monthly (on a regular auditable schedule)
Rural Litter Removal:	
All roads – offensive and dangerous litter (e.g. dead animals, vomit, excrement, broken glass etc)	4 Hours
All roads – other litter	3 Days
Slip Removal:	
All roads – slips greater than 10m3, and/or impacting on roadside drainage, carriageway width and motorist safety	Refer MS4 Incident Response and above (under Incident Response) for the response times
All roads – slips less than 10m3, not impacting on roadside drainage, carriageway width and motorist safety	1 Month

Graffiti Removal:	
All roads – offensive	1 Hour
All roads – other	7 Days
Urgent Response:	
All roads – Any litter or detritus on the carriageway or footpath impacting on traffic/pedestrian safety or flow (e.g. broken glass, diesel spills etc)	Immediately

Drainage Systems – All Roads

Road Classification	Response Times
Arterial	1 Day
Primary & Secondary Collector	3 Days
Access & Low Volume Access	5 Days

Roadmarking – Sealed Roads

Road Classification	Response Times
All roads – new pavement marking, additional marking, removal of redundant roadmarking and installation of new RRPMs	As programmed

Maintenance – Unsealed Roads

Road Classification	Response Times
Pot Holes:	
All roads – areas with multiple pot holes	2 Days
All roads – isolated pot holes	7 Days
Failures:	
All roads – failures affecting traffic safety and showing signs of rapid deterioration	1 Day
All roads – failures not affecting traffic safety but showing signs of rapid disintegration	5 Days
All roads – other pavement failures	As per approved programme
Deformations:	
All roads	As per approved programme
Grading:	
All roads	As per approved programme
Supply and Place Maintenance Aggregate:	
All roads – Subgrade exposure and slippery conditions where road user safety is at risk	1 Day
All roads – Other defects	As per the approved programme

Traffic Signs and Road Furniture – All Roads

Road Classification	Response Times
Cleaning Signs	
All roads	During patrol
Cleaning Graffiti (Offensive):	
All roads	1 Hour
Cleaning Graffiti (Other):	
Arterial	2 Days
Primary & Secondary Collector	2 Days
Access & Low Volume Access	7 Days
Straightening/Securing Signs:	
Arterial	2 Days
Primary & Secondary Collector	2 Days
Access & Low Volume Access	7 Days
Painting of Posts:	
All roads	As per approved programme
Repair or replacement of Regulatory signs:	
Arterial	4 Hours
Primary & Secondary Collector	1 Day
Access & Low Volume Access	2 Days
All other works:	
All roads	As per approved programme

Footpaths - All Roads

Road Classification	Response Times
All roads – Making safe dangerous areas	4 Hours
All roads – Other defects	As per the approved programme

Kerb and Channel – All Roads

Road Classification	Response Times
All roads	As per approved programme

Pavement Rehabilitation - Timeframes for Deliverables

Deliverable	Delivery by:
The schedule of road sections requiring treatment supplied by the Engineer	1 July in the financial year of construction
Detailed construction plans and a schedule for pricing produced by the Engineer and supplied to the Contractor	1/3 of programme produced by 31 August 2/3 of programme produced by 31 October 3/3 of programme produced by 31 December
Contractor to present to the Engineer a priced schedule and works programme for each road section (based on the tendered schedule)	2 weeks from receipt of construction plans
Commencement of annual rehabilitation programme	Dependent on suitable weather conditions and with prior approval from the Engineer
Final Report	30 April
Completion of annual rehabilitation programme	30 April

Reseals – Timeframes for Deliverables

Deliverable	Delivery by:
Reseals Programme supplied to the Contractor	15 July in the financial year of construction.
Contractor to provide design reports for each section of road detailed in the programme, along with a priced schedule and works programme (based on the tendered schedule)	30 August
Commencement of annual chip sealing physical works	After 1 November but dependent on suitable weather conditions and with prior approval from the Engineer
Completion of annual chip sealing	Northern Area (all roads north of a line across the district approximately between Pōhangina and Cheltenham, as agreed with the Engineer) – 28 February Southern Area (all other roads)– 31 March
Completion Report	30 April

Faults, Levels of Service and Response Times

The Contractor is required to undertake network inspections to maintain the levels of service specified in the contract. Additional monitoring and surveillance is carried out by the Council's roading staff and this is used to determine trends and to monitor performance.

Fault	Level of Service	Response Time
Potholes	There shall be no potholes exceeding 30mm in depth in chip seal surfaces, 60mm in depth in Asphaltic Concrete or other porous surfaces, or 120mm diameter in all bituminous surfaces	The Contractor shall inspect all roads and programme the necessary work to ensure that the specified level of service is met at all times All work undertaken shall be recorded and reported through the specified Achievement Reports.
Surfacings	There shall be no surface defects that either present a traffic safety hazard or compromise the integrity of the pavement	The work shall be carried out to meet the specified timeliness, programming and quality parameters
Digouts	Repair of failures shall be carried out on sealed roads as approved by the Engineer	All works shall be completed to the following time frames: Priority Response Pavement defects that may cause a safety hazard to vehicles or where the pavement surface has broken and rapid deterioration is evident – within 1 working day of identification General Programming Pavement defects with the potential to deteriorate rapidly under traffic loading and/or adverse weather – within 5 working days of identification Pavement defects with the potential to deteriorate over the next 30 days – within 30 working days of identification
Surfacings Deformations	Repair of surface depressions shall be carried out on sealed roads on the approval of the Engineer to both the specified timeliness and quality parameters	In the case of Ordered Works, the work shall be carried out to meet the specified timeliness and quality parameters, including all surfacing and reinstating pavement marking and raised pavement markers
Edgebreak	There shall be no edge break exceeding 100mm from the nominal edge of seal or encroaching onto the white edge line	The Contractor must complete all edge break repairs, including all surfacing and reinstating pavement marking and raised pavement markers, in accordance with the specified timeliness and quality parameters

Unsealed Shoulder	There shall be no: Edge rutting exceeding 30 mm in depth Potholes exceeding 200mm in diameter or 35mm in depth Deviation from the widths and crossfalls of the shoulders, feather edges, and tapers High shoulders that would cause ponding of water on the sealed carriageway either during or after rainfall	The Contractor shall inspect all sites and programme the necessary work to ensure that the specified level of service are met at all times
Unsealed Potholes	There shall be no pothole exceeding 35mm in depth or 200mm in diameter on an unsealed road	The Contractor shall inspect all sites and programme the necessary work to ensure that the specified level of service are met at all times
Digouts - Unsealed Roads	Repair of failures shall be carried out on unsealed roads on the approval of the Engineer as soon as practical so as not to jeopardise the safety of the travelling public. Repaired digouts shall produce a smooth riding surface of no lesser quality than the balance of the road for the duration of the contract	The Contractor shall inspect all sites and programme the necessary work to ensure that the specified level of service is met at all times
Unsealed Surface and Shape Maintenance	The running surface of the road shall remain smooth with a safe and acceptable shape, true to grade. (further levels of service specific to faults are specified in the contract)	The Contractor shall inspect all sites and programme the necessary work to ensure that the specified level of service is met at all times

Maintenance requirements for culvert and bridge repairs are discussed later in the Drainage and Bridge Sections.

4. FUTURE DEMAND

4.1 Demand Drivers

The future demand for services will change over time in response to a wide range of influences, including:

- Local population trends
- Accuracy of predicted future populations
- Local economic trends
- Land use change
- Changing technologies
- Changing legislative requirements
- Changing regional and district planning requirements
- Climate and climate change.

Increasing demand for services over time generates a requirement for the development of additional infrastructure. Expenditure programmes need to be planned to fund the capital works and associated on-going operational expenditure. Alternately, it may be possible to manage demand within the existing system capacity.

Where a reduced demand is forecast it may be appropriate to renew assets with a lesser capacity, operational expenses may decrease or an asset may become surplus to requirements.

The land transport network is responsible for the efficient movement of people and goods throughout the District and to neighbouring districts. The land transport network is a core facility maintained by the Council to assist it in meeting its Community Outcomes.

Transportation provides particularly strong inputs into the following Community outcomes:

- Manawatū District develops a broad economic base from its solid foundation in the primary sector
- Manawatū and its people are connected via quality infrastructure and technology
- Manawatū's built environment is safe, reliable and attractive.

The present road network was set up many decades ago and has been gradually upgraded to the present standard. It is quite evident, however, that community expectations in the roading area are increasing which will require on-going development of the roading network.

Generally, the network copes with the demands on it. While there is increasing demand for the supply of new infrastructure, apart from that required in subdivision work, the present network will need considerable redevelopment over the next decade to meet this community expectation. However some factors that may force the need for change on the assets or the management of the asset are discussed below and in the following paragraphs:

Increase in population: This will result in an increase in traffic on the roads which will increase congestion and reduce the level of service provided by the road, as well as increasing wear on the roads which will increase maintenance costs and renewal frequency.

A change in the way a road is used: The creation of a new sub-division, or the development of new industry in one part of the district, may change how a road will be used. This may mean roads will need to be upgraded to accommodate the changing use.

A change in the level of service demanded by the road users: Over time, communities tend to expect improving service from their assets. Roads and the activities involved in managing the roads therefore, may need to be improved to satisfy these future needs.

A change in the strategic management of the assets: The Council's policies and management strategies are in continual evolution to keep pace with the changing needs of the community, statutory requirements, funding organisations and central government. The trend to more lifestyle blocks in the country-side has also changed the expectation of the travelling public in rural areas. These rural roads are no longer used only by local farmers, but now have a much wider range of people and vehicle types driving on them. This has resulted in factors such as smoothness of ride, loose metal and higher speeds becoming more important to more road users. Changes to policies and management strategies can also have a significant effect on how assets are managed.

The direction of future land use changes and their effects on the roading network are difficult to determine with accuracy, but it is important that the roads likely to be affected are prepared in readiness for these changes.

Demand for new or upgraded facilities arises from the needs of the existing population i.e. meeting the level of service standards, changing habits, and population growth. This demand manifests itself in the need for:

- New roads
- Sealing of unsealed roads
- Widening and alignment improvements
- Upgraded intersections
- New and upgraded bridges
- Appropriate urban facilities in closely settled areas, e.g. street lights, kerb and channel, footpaths.

The Council intends to maintain its awareness of these issues and plans to provide a roading network which meets the communities' expectations. This may involve more seal extension, better ways to provide and maintain unsealed roads, and possible widening of some arterial and collector roads in the District. Funding of all these developments has been recognised in the 10 year plan.

4.1.1 Factors Influencing Demand

The issues that influence demand forecasting and the associated development Improvements include:

- Local population trends
- Accuracy of predicted future populations
- Local economic trends and the diversity of industries
- Predicted traffic growth
- Changing technology
- Changing legislation requirements
- Changing community service requirements
- Particular trends that have a significant impact on the road asset include:
- Growth of Feilding township: with new and infill development.

Forestry: Within the Manawatū District, forest establishment trends peaked in the early 1990s and have fluctuated since then. Due to these phases of large scale forest establishment, forest harvest schedules will coincide, changing road usage patterns and placing pressure on rural road maintenance schedules. The size and remote locations of some major forest lots will require road maintenance and harvest regimes that maintain both public use and harvest sustainability.

In the Manawatū District forest establishment will increase future heavy traffic activity on rural roads. This activity will be spread over a number of years. However, usage patterns will be non-linear as forest harvest schedules, log prices, harvest mechanisms and forest ownership dictate harvest patterns and wood availability.

The resulting flow of harvested logs will create differing intensities of road use in certain areas. Impacts on these roads will be varied. In large commercial plantations with a variety of age classes, forestry related traffic will be consistent and steady. In even age plantations, traffic density will be more intense as timber reaches a harvestable age in a closer timeframe.

Forest harvest schedules will be most intense in the period 2021-2030 with the majority of the District's forest estate reaching harvestable age. A number of factors will influence the saleability of these forests. Nationally and internationally these include log and wood related product demand. Locally, saleability will be influenced by forest harvest infrastructure such as staff, machinery (e.g. haulers), accessibility and forecast profit margins.

Across the district, forest stakeholders include small and large private ownership, farm forestry, private syndicate and large commercial forest woodlots.

The topography of land types used for forestry varies significantly in the district. Large commercial forestry operation with multiple age classes are established on coastal sand dune country in the south west, small holdings of 5-20 ha are frequent in areas of more fertile farmland and river terraces while more extensive even age stands exist closer to steeper hill country in the north east of the region in proximity to Rangiwāhia and Rewa.

Forest ownership in the Manawatū District is diverse. Large scale owners account for over 50% of the total forest area, while smaller owners account for a larger number of smaller blocks. While some large even age woodlots occur inland, most larger production forests are coastal and on low relief land, as such they are managed as multiple rotation production forests managed for long term round-wood production and removal. Smaller lots are often even age cohorts and are primarily first rotation forests. In areas of hill country larger even age woodlots exist.

Safety Considerations

Pre-emption of factors influencing road usage quality during peak harvest periods will rely on proactive road maintenance schedules and effective communication between roading engineers, forest managers and public users.

- Public traffic volume, potential traffic interactions, visibility, average speed on carriageway and communication are key determinants of accident causation.
- Road users need to be aware of forest operations and understand daily and weekly traffic flows to minimise accident potential.
- Public meetings/notices, heavy traffic signage, laybys, km markers, vision benching, driveway mirrors and in some cases radio communication are all effective means of minimising accident potential.

Road maintenance schedules

- Base course development will need to allow for appropriate consolidation periods prior to increased forest traffic volume.
- Base course development should allow for seasonal models in harvesting, harvest volumes and also severe weather events.
- Carriageway width needs to allow for appropriate visibility, speed limits, passing areas and overhead obstructions.
- Perimeter road fencing should also be assessed as a factor influencing potential low volume road width.
- Road gradient (especially on tight uphill corners) should be considered in maintenance schedules to minimise base course degradation.
- Culverts and road drainage systems need to be of a grade and quality to withstand increased weight loading, and potentially increased sediment flow from forest operations and severe weather events. The interplay between severe weather and poorly maintained culverts can be crucial in sustainable road use.
- Entry and exit angles from corners, bridges and egress points needs to be considered and allow appropriate distance for heavy traffic entry set up.
- Vision benching should be considered on blind corners and egress points to minimise accident potential.
- Forest managers and roading engineers need to discuss mechanisms for harvest machinery accessibility e.g. haulers. Potential exists for this to be a major limiting factor in the ability to harvest and harvest periods.

The most intense period of wood availability is forecast to occur between 2021 and 2030. Over 50 percent (approx 3000ha) of the district's forest estate will reach harvestable age in this period.

Key figures include:

- 21% of regional tonnage matures in the 2027-2029 period
- 50% of regional tonnage will mature in the 2021-2029 period.

Key high volume egress points potentially influencing low volume roads occur in the following areas:

- Waipuru Road – This road has around 180,000 tonnes reaching harvestable age in the 2027-2029 period
- This equates to 28% of the total regional tonnage in this period
- In the 2021-2029 period Ridge Road and Pōhangina Valley Road will experience an increase in forestry related heavy traffic as approximately 170,000 tonnes of wood reaches maturity
- Wood availability will increase in proximity to East Mangahuia Road in the 2030-2040 period as forests with potential tonnage of over 200,000 tonnes reach maturity.

The largest proportion of continuous forest woodlots occur in coastal areas close to Hīmatangi and Tangimoana. Potentially high volume roads include Lake Road, Tangimoana Road, Tangimoana Beach Road and Hīmatangi Beach Road. These areas are in close proximity to State Highway One and require minimal haulage. Woodlots in this area have a mixed age class spread that allows for a more continuous production forest cycle to occur. Wood availability will be consistent in the 2021-2026 period with around 70-100,000 tonnes of wood available for each harvest period.

Financial Implications

An assessment needs to be carried out on the rural pavement maintenance requirements as a consequence of forestry activities. This body of work would provide an indication of the additional costs over and above the current forward works programme.

Assessing impacts on the Forward Works Programme involves a comparison of the nature and timing of roadworks required with and without the extra heavy vehicle traffic, based on predicted axle loadings. Forecasting required pavement works requires a sound knowledge of the issues involved, solid data and good professional judgement.

An similar assessment carried out by Whanganui District Council revealed that there is very little difference between preventative maintenance and reactive maintenance costs. Both of these, however, were estimated to be $20M over/above their current forward works programmed funding levels of the next 25 years.

The additional costs will need to be budgeted for. Waka Kotahi NZ Transport Agency (Waka Kotahi) financially assists the road maintenance budget (currently 53%), but will require strong and evidentiary data to be persuaded to fund these effects over and above the current funding provisions.

- A pavement impact assessment should be carried out to consider the surface condition and structural capacity of the pavement, and the effect on the forward works programme, and associated costs.
- An increase in afforestation occurred during the early to mid-1990s. The expected log yields per road have been quantified from which maintenance schedules for high volume roads in the region can be derived and prioritised.
- Road usage and egress point forecasts identify both high volume periods and harvest areas. Key wood availability periods exist between 2021 and 2029 when over 50 percent of the region's forests reach harvestable age.
- High volume areas influencing low volume roads are located primarily in the north eastern areas of the district proximate to Rewa and Rangiwāhia. A relationship exists on these roads between distance from State Highway, larger average forest lot size and even age plantations. This relationship has implications for road maintenance schedules. The largest of these is located in Waipuru Road and matures in the 2027-2029 period.
- Coastal forest established along the coastal strip close to Tangimoana and Hīmatangi. carry a large

percentage of regional volume however the road access to State Highways is less technical and more resilient.

- Variable log grade and wood product demand, local mill viability and forest infrastructure (machinery & skilled staff) are all major factors influencing future forest harvest, re-establishment and harvest timeframes.
- Roading maintenance programmes should assess major harvest timeframes, areas and manage road maintenance schedules accordingly. These schedules should include public and forest manager communication, base course and associated road technical considerations including culverting/ drainage.

Dairy Conversion

Conversion of land use to dairying is having an effect, with pavement widths, pavement loadings, and safety all under pressure. These affects have already become evident in the Āpiti areas. Conversion to other intensive land uses not currently known or anticipated may have similar effects, this is one of the potential risks to the Council from Climate Change Problems with inadequate seal widths on sealed roads used by dairy tankers are demonstrated by increasing maintenance demands, and need to be addressed by seal widening improvement programmes. Increasing seal width also improves safety by providing sufficient road space for heavy vehicles to pass in opposing directions. Tankers and other heavy vehicles also create problems on unsealed roads, requiring increased maintenance and grading and generating more dust than most other vehicles.

Agriculture

Farming has, and is expected to continue to have, a significant impact on the District's economy. One of Council's objectives is to ensure that this industry is not adversely affected by changes in Council policy and planning requirements. Farming in the District has responded to climatic and trade uncertainties in recent years by diversifying and, in some cases, subdividing and selling land for residential development. As a result dairying, deer farming and residential development have increased while sheep farming has declined.

Other Industries

Other industries in the district that provide a varied source of employment in the district include:

- Meat processing e.g. AFFCO and Venison meat Packers
- Small to Medium industry e.g. Proliant Plasma processing
- Commercial and Industrial Opportunities e.g. The Warehouse
- Golf Courses e.g. Feilding Golf Club
- Natural Resources – Gravel extraction.

Some of these industries have a lesser effect on the district's overall economy, but are important for providing a variety of employment opportunities within Manawatū. The Council is looking to attract new commercial and industry ventures to the district. This has prompted the expansion of the Feilding Industrial Precinct.

Changing Land Use Patterns

At present road use is directly related to residential development with each household estimated to produce between six and eight vehicle movements/day. As discussed, farm conversions and on-going development of the dairy industry in Manawatū/Taranaki and the Tararua and, to a lesser extent, increasing gravel extraction and processing, are increasing localised heavy traffic movements on routes to and from processing and distribution

hubs. These loadings are particular affecting pavement assets, with significant growth in heavy axle loadings causing increased deterioration. Greater numbers of larger, heavier vehicles also affects the need for geometric improvements, such as seal widening, and can affect the need for seal extensions on affected routes.

Rail Transport

The District is served by one railway line, the North Island Main Truck Railway running between Longburn and Halcombe, and destinations as far afield as Wellington and Auckland. This line also provides access to the Taranaki and Hawkes Bay ports via separate rail lines accessed either in Palmerston North or Marton. These links are parallel to SH 1 to the north and south, SH3 to the west and SH2 to the East. There are disused facilities for loading freight onto or off rail in the District thus, any "competitive" effect between road and rail freight is of little significance to the District's roading network.

Technological Change

Roading is an area where technological changes are occurring with new road materials and traffic management techniques being continually developed. The development of different traffic management techniques, for example restricting particular traffic movements and encouraging the use of arterial roads, in conjunction with more restrictive property-access provisions can help ensure that efficient traffic flows are maintained and capacity is optimised.

The development of alternative road materials can significantly reduce maintenance cost and lessen disruption to traffic by increasing pavement life and improving surface texture. An example is the use of fabric or polymer modified bitumen in reconstruction and rehabilitation work to increase the flexural capacity of the surface and extend pavement life.

Heavy Vehicles

Given the strong agricultural base of the district and proximity to Palmerston North, Napier, Taranaki and Wellington there are a significant proportion of heavy vehicles using the network. While the State Highways carry the highest number of heavy vehicles, there are roads managed by MDC that MDC's arterial routes also carry large numbers of heavy vehicles. These routes include:

- Arterial routes
- HPMV approved routes
- HPMV Routes.

The 2010 amendments to the VDM rule included:

- Road controlling authorities would be able to issue overweight permits to cover the transport of divisible loads such as general freight and cargo. Currently, overweight permits are only issued to indivisible specialist loads generally limited to 44 tonnes
- High-productivity vehicles would be allowed long-term permits to operate on approved routes at weights up to 53 tonnes and lengths up to 22 metres
- Vehicles below 44 tonnes would be able to operate at higher axle limits without permits
- Operation over 53 tonnes and 22 metres would require overweight and over dimension permits
- Overweight permits.

The high productivity freight routes identified within Manawatū District are listed below.

- Kawakawa Road, Feilding
- Awahuri Road, from Kawakawa Road to Stewart Road, Feilding
- Stewart Road, from Awahuri road to SH3, Awahuri.

In October 2011 the Minister of Transport official lifted the 44 tonne weight limit of laden milk trucks by one tonne to 45 tonnes until the end of the year throughout New Zealand.

Other External Influences

Oil cost increases can affect road users directly, but also the road maintenance and construction industry due the high use of oil based bitumen products in these activities.

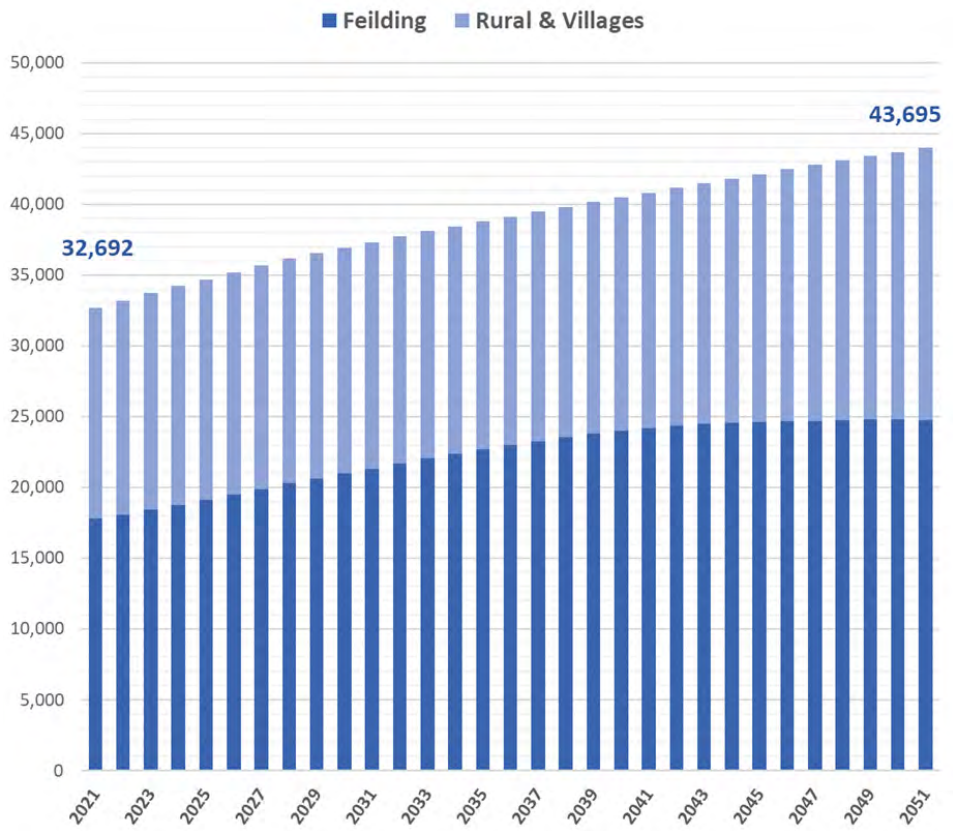
From time to time legislative, and quasi-legislative requirements, such as the 2008 New Zealand Transport Strategy change or establish new key targets associated with aspects of the network or its use; for example, increasing the use of walking and cycling and public transport, or the reduction of road trauma and greenhouse gases. These changes put a different focus on the need for improvements projects and the willingness and ability of Waka Kotahi to fund works that do not directly achieve targets; for example, a greater commitment to fund walking and cycling improvements may be made compared to new road construction improvements.

4.2 Demand Forecasts

4.2.1 Population Growth

That the population of the Manawatū District will increase from 32,692 residents in 2021 to 43,695 in 2051, as illustrated in Figure 1.

Population growth 2021 to 2051



Alternative 1: That the resident population of the Manawatū District will increase more rapidly than forecast in Figure 1.

Impact	**Moderate** Significantly higher population growth may impact negatively on levels of service as infrastructure has insufficient capacity to meet demand. Infrastructure may need to be extended or new infrastructure installed earlier than planned to accommodate additional growth.
Likelihood	**Possible** Population forecasts are based on the medium growth scenario published by Infometrics (August 2020). These forecasts have considered anticipated changes in international migration as a result of COVID-19 in addition to projected labour force growth, and infrastructure and construction investment flowing into the district and wider region. Favourable conditions for our food producers in addition to high levels of investment and strong jobs growth in the region are expected to support levels of net migration to the District over the 10 Year Plan period. This is supported by the availability of land and a greater range of lifestyle choices in the District relative to neighbouring Palmerston North. The expansion of Ōhakea Air Force Base and the relocation of an estimated 280 families from Whenuapai to the region is further expected to drive population growth in the district to 2031. The above factors are reflected in the population growth scenario adopted as a basis for the 2021-31 10 Year Plan. While the projections are based on the best information available, uncertainty is elevated due to the closure of national and international borders, a lack of certainty on when borders will reopen, and how migration trends will change in response to the impacts of COVID-19.
Overall Risk	**Guarded (6)**
Reasons & Financial Effect of Uncertainty	Significantly higher population growth than expected will put pressure on existing infrastructure and services. Council may need to find ways of raising the extra revenue required, or consider lower levels of service. Higher than expected population growth will also mean that Council receives more development contributions. This will help to partially offset higher expenditure on servicing this growth.
Mitigating Factors (if applicable)	Council regularly reviews population growth and development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, actual growth will be assessed against projected growth enabling review of the need for, and timing of capital expenditure over the 10 Year Plan period. Growth projects may be brought forward due to excess demand or reducing capacity in existing infrastructure networks.

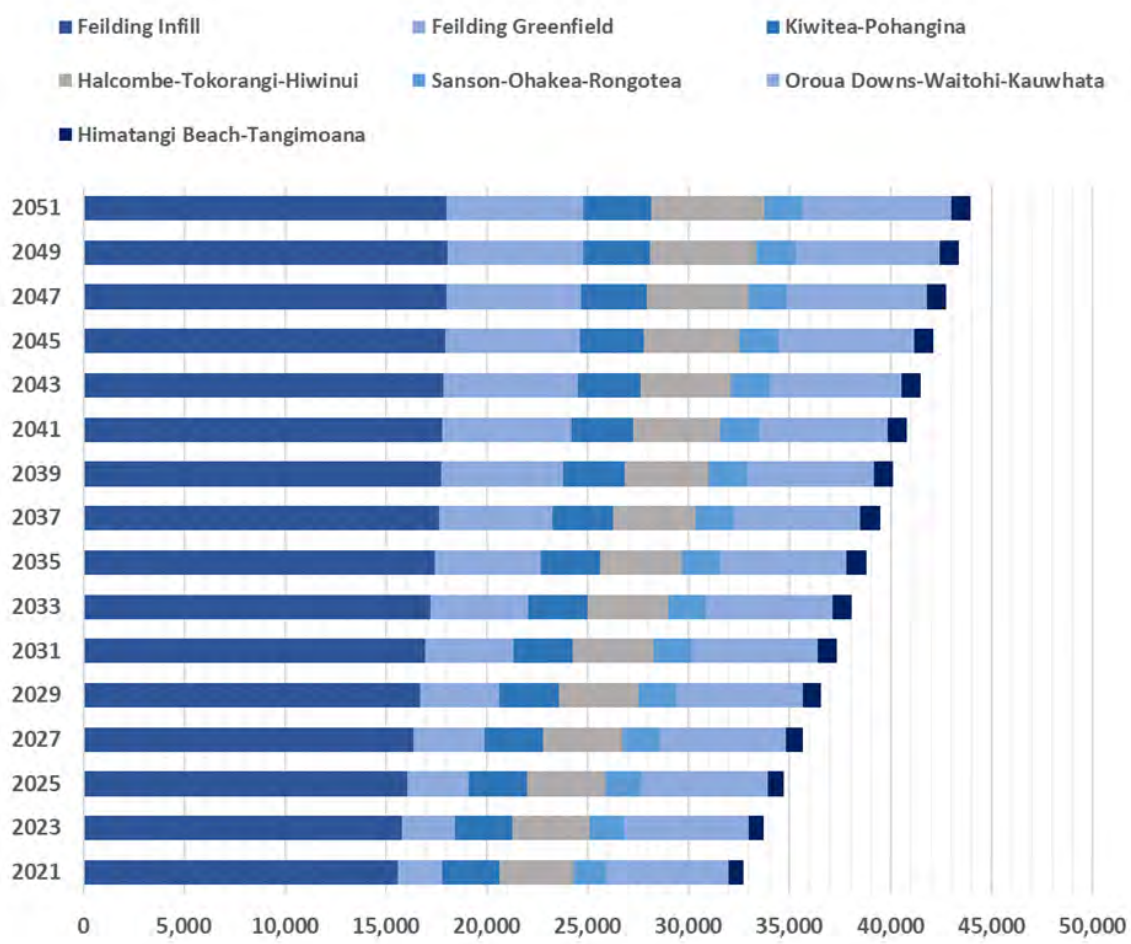
Alternative 2: That the resident population of the Manawatū District will increase more slowly than forecast in Figure 1.

Impact	**Minor** Significantly lower population growth than forecast will mean that Council's revenue from rates and development contributions will be less than forecast. This may mean that planned infrastructure investment is deferred. Decreased rates revenue may also increase costs for current ratepayers to fund capital projects and service delivery.
Likelihood	**Possible** Population forecasts are based on the medium growth scenario published by Infometrics in August 2020. These forecasts have considered anticipated changes in net international migration driven by COVID-19 alongside projected growth in the labour force, and infrastructure and construction investment flowing into the district and wider region. While the projections are based on the best information currently available, uncertainty is elevated due to the closure of national and international borders, a lack of certainty on when borders will reopen, and how migration trends will change in response to COVID-19. The additional layer of uncertainty imposed by COVID-19 has increased the likelihood of lower than forecast population growth from unlikely to possible.
Overall Risk	**Guarded (3)**
Reasons & Financial Effect of Uncertainty	Lower rates of population growth could increase the costs per property of delivering agreed levels of service. Lower than expected population growth will also mean that Council collects less revenue through development contributions. This will require Council to revisit the need for, and timing of capital projects to support growth.
Mitigating Factors (if applicable)	Council regularly reviews population growth and development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, actual growth will be assessed against projected growth enabling review of the need for, and timing of capital expenditure over the 10 Year Plan period. Growth projects may be delayed due to the availability of supply or capacity in existing infrastructure networks.

4.2.2 Population Distribution

That population distribution across the Manawatū District will occur as illustrated in figure 2.

Figure 2: Population Distribution



Alternative 1: That population distribution across the Manawatū District will differ substantially from forecast population distribution.

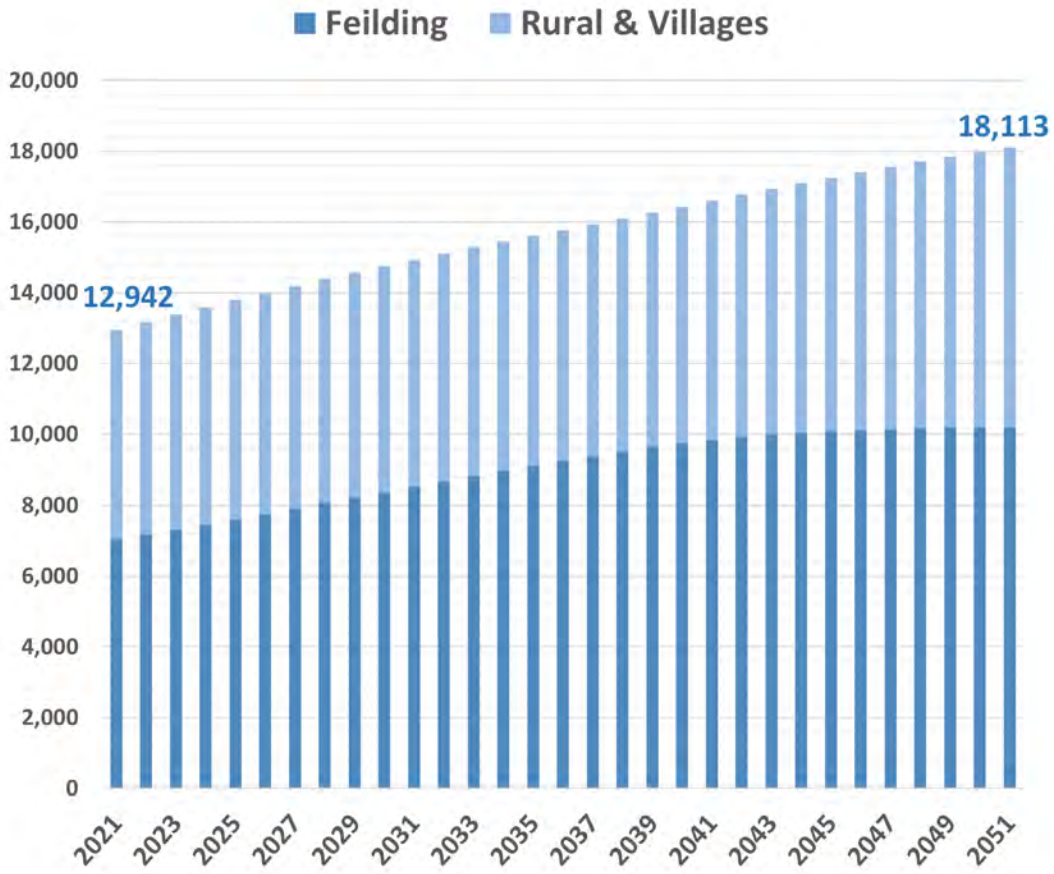
Impact	**Minor** The pattern of residential development across the Manawatū District is relevant when considering the nature and location of land supply to service growth, the types of services required, the timing of capital investment and the installation of infrastructure to support growth. Should actual patterns of population distribution differ substantially from forecast, this would impact on the location and delivery of services, and the timing and scale of capital projects.
Likelihood	**Possible** Patterns of population distribution are driven by a range of factors including labour demand, net migration, central government legislation, Regional and District Plan regulations, market conditions, land supply, housing affordability and levels of investment. While the most up-to-date information has been used to develop the population distribution model, it is likely that some factors will change. These changes may influence the overall pattern of development across the district over time.
Overall Risk	**Guarded (3)**

Reasons & Financial Effect of Uncertainty	If the actual pattern of development differs considerably from forecast development, the timing and scale of growth projects will need to be revisited. Where investment occurs in areas where growth is not realized, this will impact on the affordability of service delivery and the ability of Council to recover growth expenditure from development contributions.
Mitigating Factors (if applicable)	Council regularly reviews population growth and development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, the scale and spatial characteristics of population growth will be assessed against projected growth enabling review of the need for, location of, and timing of capital expenditure over the 10 Year Plan period. Growth projects may be delayed or relocated to meet demand from the pattern of population growth across the district.

4.2.3 Household Growth

Assumption: That the number of households in the Manawatū District will increase from 12,942 in 2021 to 18,113 in 2051 as illustrated in Figure 3 below.

Figure 3: Household Growth



Alternative 1: That the number of households in the Manawatū District in 2051 will be significantly more than forecast in Figure 3.

Impact	**Moderate** Demand for land and infrastructure will be greater than anticipated. This may mean that additional land needs to be rezoned and new infrastructure provided to meet this demand.
Likelihood	**Possible** Household forecasts are based on the medium growth scenario published by Infometrics (August, 2020). These forecasts have considered anticipated changes in net international migration driven by COVID-19 alongside projected infrastructure and construction investment flowing into the district and wider region. Favourable conditions for our food producers in addition to high levels of investment and strong jobs growth in the region are expected to support levels of net migration to the District over the 10 Year Plan period. This is supported by the availability of land and a greater range of lifestyle choices in the District relative to neighbouring Palmerston North. The expansion of Ōhakea Air Force Base and the relocation of an estimated 280 families from Whenuapai to the region is further expected to drive household growth in the district over the life of the 10 Year Plan period. The above factors are reflected in the household growth scenario adopted as a basis for the 2021-31 10 Year Plan. While the projections are based on the best information available, uncertainty is currently elevated due to the closure of national and international borders, a lack of certainty on when borders will reopen, and how migration trends will change in response to the impacts of COVID-19. Recent household growth data and the district's proximity to Palmerston North supports a relatively strong growth scenario versus historical averages.
Overall Risk	**Guarded (6)**
Reasons & Financial Effect of Uncertainty	Household growth generally results in new subdivisions and therefore an increase in the rating base. This spreads the costs of providing Council services, providing no major infrastructure investment is required. Growth in the number of households will increase the number of connections to reticulated water, wastewater and stormwater networks. There will also be increased stormwater runoff to manage from hard surfaces in urban areas. We may not have sufficient land available in the range of locations needed to provide the level of choice demanded by the market.

Mitigating Factors (if applicable)	Council regularly reviews development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, actual growth in households will be assessed against projected growth enabling review of the need for, and timing of capital expenditure over the 10 Year Plan period. Planned rezoning and investment in growth infrastructure may be brought forward to reflect greater than anticipated demand.

Alternative 2: That the number of households in the Manawatū District in 2051 will be significantly less than forecast in Figure 3.

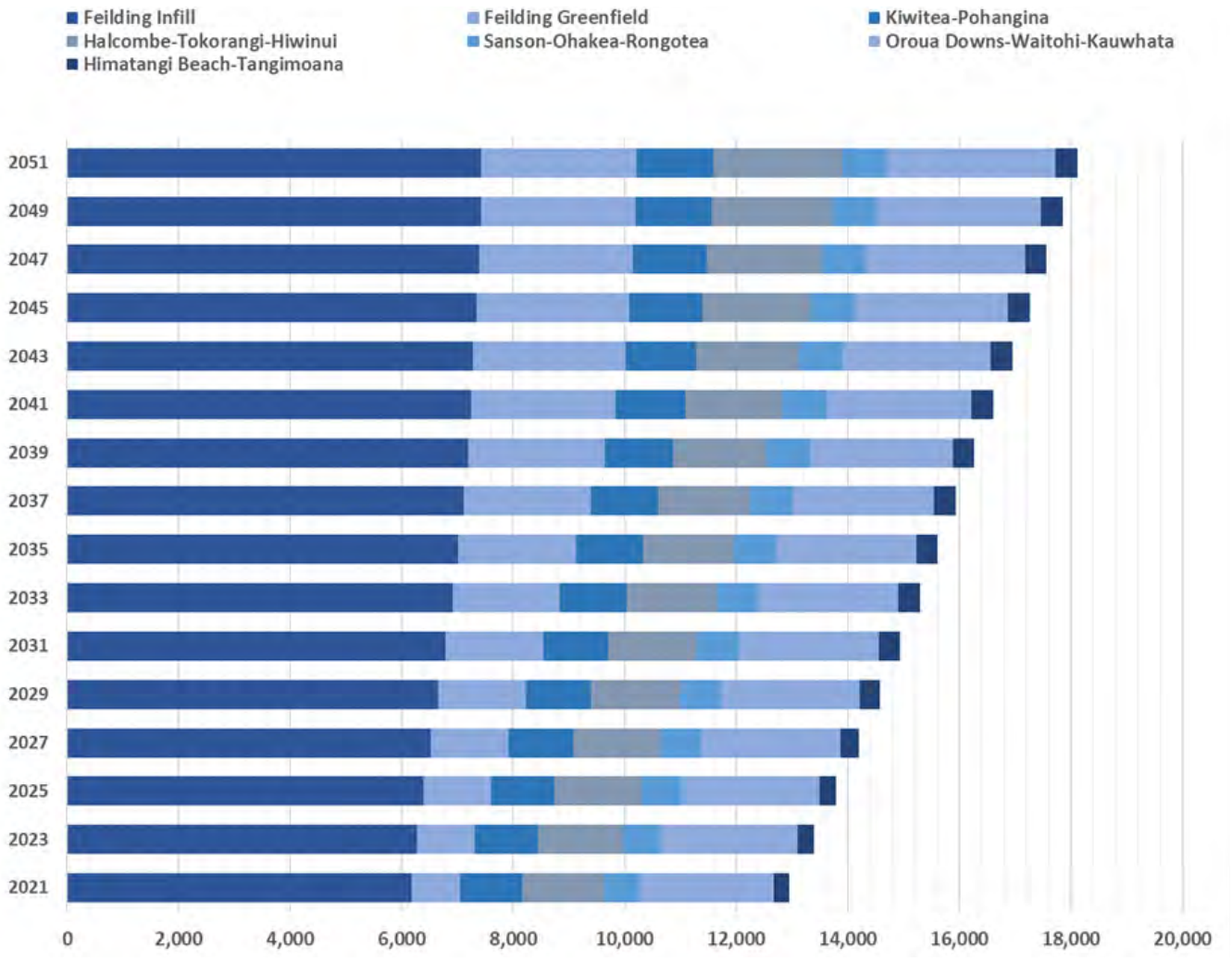
Impact	**Minor** Demand for land and infrastructure will be less than anticipated. This may mean that additional land has been rezoned and new infrastructure provided well in advance of demand, which could impact on Council's ability to fund levels of service.
Likelihood	**Possible** Household forecasts are based on the medium growth scenario published by Infometrics (August, 2020). These forecasts have considered anticipated changes in net international migration driven by COVID-19 alongside projected infrastructure and construction investment flowing into the district and wider region. While the projections are based on the best information available, uncertainty is currently elevated due to the closure of national and international borders, a lack of certainty on when borders will reopen, and how migration trends will change in response to the impacts of COVID-19. If population growth is significantly less than forecast or if the average household occupancy rate is higher than forecast, the number of new households is likely to be lower than forecast.
Overall Risk	**Guarded (3)**
Reasons & Financial Effect of Uncertainty	If the number of households in the urban areas do not increase as forecast, then there will be limited increases in the rating base. This will mean that the costs of providing the planned levels of service for network infrastructure will be higher per connection and there will be more rating pressure on existing households and businesses.

Mitigating Factors (if applicable)	Council regularly reviews development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, actual growth in households will be assessed against projected growth enabling review of the need for, and timing of capital expenditure over the 10 Year Plan period. Reduced development pressure will mean that available land is not exhausted as quickly. Planned rezoning and new infrastructure may be delayed until such time as demand warrants the expenditure.

4.2.4 Household Distribution

Assumption: That residential development in the Manawatū District will occur as illustrated in figure 4.

Figure 4: Residential development



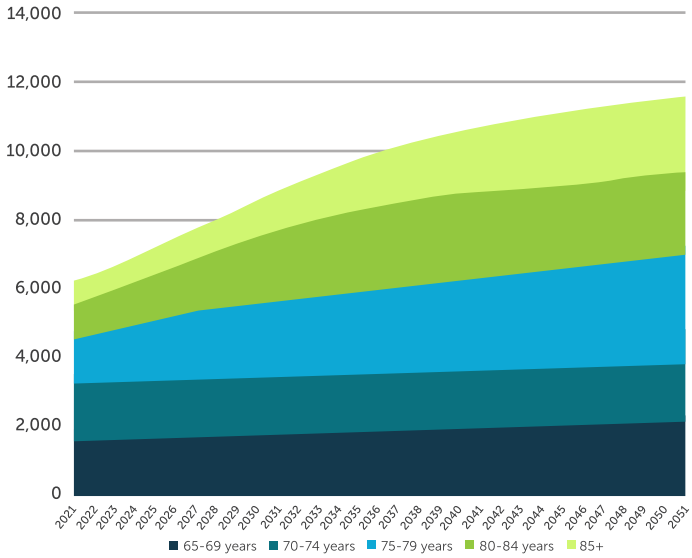
Alternative: That residential development in the Manawatū District will differ substantially from forecast development.

Impact	**Minor** The pattern of residential development across the Manawatū District is relevant when considering the nature and location of land supply to service growth, the types of services required, the timing of capital investment and the installation of infrastructure to support growth. Should actual patterns of household growth differ substantially from forecast, this would impact on the location of, and delivery of services, and the timing and scale of capital projects.
Likelihood	**Possible** Patterns of household distribution are driven by a range of factors including labour demand, net migration, central government legislation, Regional and District Plan regulations, market conditions, land supply, housing affordability and levels of investment. While the most up-to-date information has been used to develop the household distribution model, it is likely that some factors will change over time. These changes may influence the overall pattern of development across the district over time.
Overall Risk	**Guarded (3)**
Reasons & Financial Effect of Uncertainty	If the actual pattern of development differs considerably from what is forecast, the timing and scale of growth projects will need to be revisited. Where investment occurs in areas where growth is not realized, this will impact on the affordability of service delivery and the ability to recover the costs of growth expenditure from development contributions.
Mitigating Factors (if applicable)	Council regularly reviews population growth and development trends through the following processes: 1. Monitoring and reporting under the National Policy Statement – Urban Development (NPS-UD); 2. Annual Estimated Resident Population (ERP) from Statistics New Zealand; 3. 10 Year Plan process Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan Process. In addition, subdivision and building consent data is used for annual updates to the schedule of works contained within Council's Development Contributions Policy. Through the above processes, the scale and spatial characteristics of household growth will be assessed against projected growth enabling review of the need for, location of, and timing of capital expenditure over the 10 Year Plan period. Growth projects may be delayed, brought forward, or relocated to meet demand from the pattern of household growth across the district.

4.2.5 Ageing Population

Assumption: That the number of residents aged 65 and over will increase from 6,208 (19.1% of the total population) in 2021 to 11,595 (27.5% of the total population) by 2051, as described in Figure 3 below.

Population aged over 65



Alternative 1: That the number and proportion of residents aged 65 years and over in the Manawatū District will be significantly more than forecast.

Impact	**Moderate** A major shift towards older people is likely to change the mix of services demanded from Council, and the ability to pay for those services. Council will come under increasing pressure to limit rate increases.
Likelihood	**Unlikely** An older population overall is reasonably certain. The actual outcomes are highly dependent on the age mix of the migration trends, natural increase, and employment prospects both in the District and wider Region.
Overall Risk	**Guarded (4)**
Reasons & Financial Effect of Uncertainty	Council may need to alter the mix of services delivered over time. This is Unlikely to result in new activities, but rather the types of services and facilities. This would include recreation assets and services, roading design and footpaths. Affordability of rates will increase in importance as a greater proportion of ratepayers will be on fixed incomes. Affordability is a key factor considered in setting rates limits in the Financial Strategy. Increased focus on wellbeing will require Councils to allocate additional resources to the delivery of services to support an ageing population.

Mitigating Factors (if applicable)	Council reviews demographic trends based on census data every five years and based on estimated resident population data from Statistics NZ every 12 months to June. Council's overall strategic direction with respect to changes in population demographics is reviewed every three years as part of each 10 Year Plan process. Quarterly monitoring and reporting to Council provides interim trends on matters that impact upon population wellbeing, including housing availability and affordability. Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan process. Changes in demands for Council services is not new and is part of the political process. The range of Council services utilised by older people is not significantly different from younger people. While the need for organised active team sports as traditionally catered for may decline, there will still be a demand for open spaces, walkways, pools, halls etc.
Information sources	StatsNZ forecast (2013 (base) –latest updates from 2019).

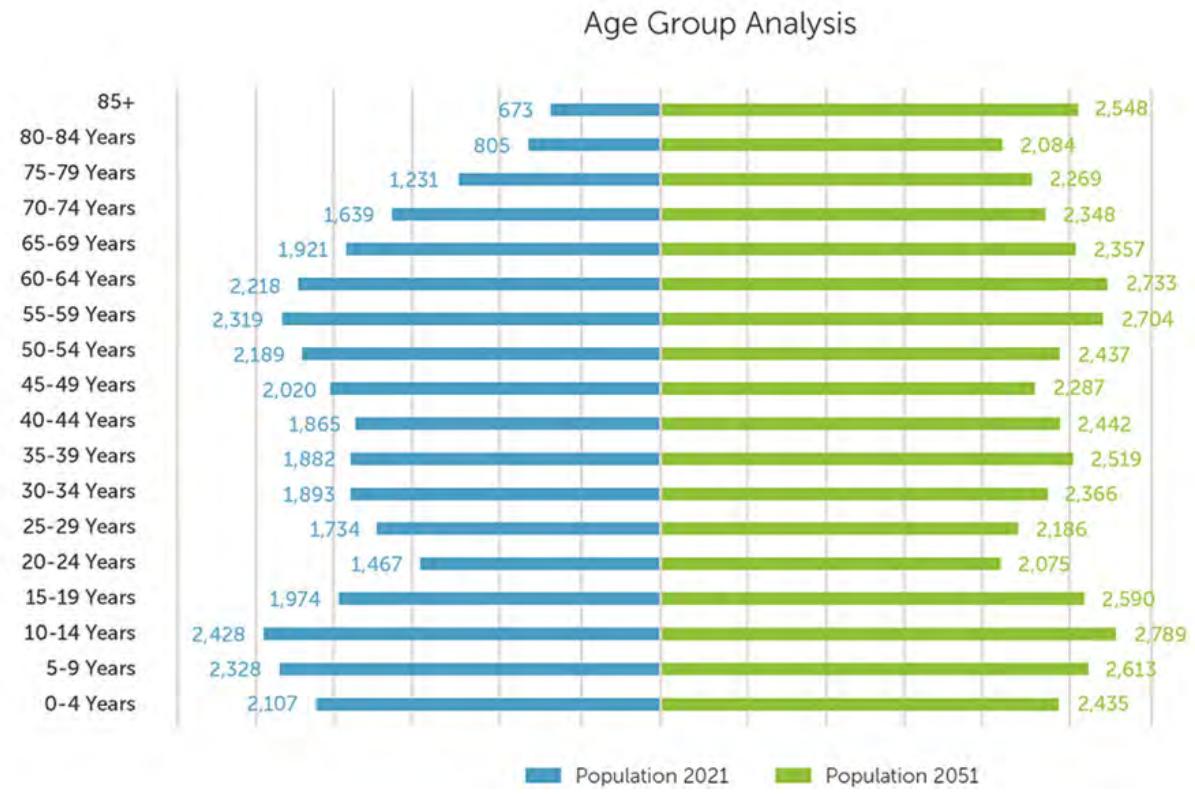
Alternative 2: That the number and proportion of residents aged 65 years and over in the Manawatū District will be significantly less than forecast.

Impact	**Minor** A smaller than predicted demographic shift towards older people will mean that there is less pressure on Council to alter levels of service or the types of services and activities delivered.
Likelihood	**Unlikely** An older population overall is reasonably certain. The actual outcomes are highly dependent on the age mix of the migration trends, natural increase, and employment prospects both in the District and wider Region.
Overall Risk	**Low (2)**
Reasons & Financial Effect of Uncertainty	A lower than forecast demographic shift towards older people will mean less demand to alter current services and facilities in the short-term.
Mitigating Factors (if applicable)	Council reviews demographic trends based on census data every five years and based on estimated resident population data from Statistics NZ every 12 months to June. Council's overall strategic direction with respect to changes in population demographics is reviewed every three years as part of each 10 Year Plan process. Quarterly monitoring and reporting to Council provides interim trends on matters that impact upon population wellbeing, including housing availability and affordability. Major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan process.
Information sources	StatsNZ forecast (2013 (base) –latest updates from 2019).

4.2.6 Demographic Change

Assumption: That the demographics of the Manawatū District will follow the Infometrics medium growth scenario (August 2020) over the period 2021 to 2051 as described in Figure 5 below.

Figure 5: Demographic change



Alternative: That the demographics of the Manawatū District will differ significantly from the Infometrics medium age group projections (August 2020) to 2051 as described in Figure 5.

Impact	**Minor** The forecast demographics of the Manawatū District Community is relevant when considering the types of services, projects and activities delivered by Council. If the actual demographics differ significantly from forecasts, this will influence demand for Council facilities, including parks, reserves and sports facilities. Greater than forecast growth in the young adult to middle age brackets could place pressure on housing availability and the delivery of services to support young families. Greater than forecast shifts towards older demographics could change the mix of services demanded from Council, and the ability to pay for those services.

Likelihood	**Possible** The demographic forecasts from Infometrics medium series indicates increases in the total number of residents across all age brackets. However, increases as a percentage of the total District Population are predominantly forecast in the 70+ age groups. The forecast increase in older residents is relatively certain and is supported by analysis of trends and generational characteristics. In the middle age brackets, demographic forecasts show the proportion of total residents aged between 35 and 39 years increasing between 2021 and 2033 and the proportion of residents aged between 40 and 44 years increasing between 2026 and 2040. The forecast increases in these age brackets is supported by trends revealed in the live and work survey (2018 Census). Labour demand to enable the construction and operation of major regional projects such as the Regional Freight Hub, Ōhakea Expansion, the Rural Ring Road and the demand for new housing is expected to further drive population growth in the middle age brackets. Given the number of factors that contribute to population demographics it is not possible for Council to have a high level of certainty around these forecasts. However, as the demographic forecasts from Infometrics take into consideration anticipated growth based on known regional projects, the likelihood that these forecasts prove false is considered "possible."
Overall Risk	**Guarded (3)**
Reasons & Financial Effect of Uncertainty	Uncertainty in the future demographic characteristics of the Manawatū District impacts on the ability to plan for the needs of future communities and the priority that Council places on certain projects and services in its future planning.
Mitigating Factors (if applicable)	Council reviews demographic trends based on census data every five years and estimated resident population data from Statistics NZ every 12 months to June. Council's overall strategic direction with respect to changes in population demographics is reviewed every three years as part of each 10 Year Plan process. Quarterly monitoring and reporting to Council provides interim trends on matters that impact upon population wellbeing, including housing availability and affordability. In addition, major projects and significant changes to levels of service are assessed against affordability annually through the Annual Plan process. The above processes will enable Council to respond to changes in the demographic characteristics of the district over time, including the prioritisation of projects and service delivery to meet the needs of the community.

4.2.7 Land Use Change

Assumption: On the basis of current and anticipated Government Legislation, current land uses will not change significantly over the next 3 years. However, some changes in land use are anticipated between years 4 and 10 of the 10 Year Plan, and significant land use change is expected in the District between 2032 and 2051.

The types of land use changes anticipated in the medium to long term include:

- Some diversification of land use from agricultural activities towards forestry and other low emissions land uses and innovation and technology to reduce on farm emissions from livestock farming to meet our obligations under the Zero Carbon Act, the Paris Agreement and for carbon credits
- Constraints on expansion of agricultural activities due to more stringent discharge requirements in the One Plan and Governments freshwater reforms, including the National Policy Statement – Freshwater Management

- Highly versatile land will be retained for productive uses, including land conversions for food production on suitable land, as growers relocate from neighbouring Districts including the Horowhenua due to inability to meet the discharge requirements of the One Plan
- Land use change from rural to industrial between Feilding and Palmerston North as the Palmerston North City Council's North East Industrial Zone develops as a freight and industrial hub following construction of the Regional Freight Hub, the rural ring road and the Manawatū Gorge replacement road
- Areas of native vegetation will be protected from development and areas of land within urban areas will be set aside for revegetation to meet the requirements of the National Policy Statement for Indigenous Biodiversity and the Regional Biodiversity Strategy
- Changes in housing preferences including the shifting rental/ownership split, different forms of housing in recognition of rising housing costs, and more mixed-use activity.

Alternative 1: That current land use in the District will change more rapidly, or in different locations or ways than anticipated.

Impact	**Moderate** Rapid changes in land use could result in unanticipated demand for new reticulated services and the need to undertake additional road maintenance or improvement works. New activities can generate additional employment that can increase the rate of population and household growth and stimulate economic activity. If additional rural land needs to be rezoned to accommodate residential or industrial development this would impact on the District Plan Review Programme and may alter priorities for infrastructural investment.
Likelihood	**Unlikely for years 1 – 3, Possible for years 4 to 10 and Likely for years 11 to 30** The interplay between new legislation, National Policy Statements under the Resource Management Act 1991 and Horizons One Plan mean that land use change in the moderate to long term is inevitable, but there is a high level of uncertainty about where, how and when that land use change will take place. The level of uncertainty increases over time as new targets are set in legislation and through National Policy Statements and plans. Certain changes in land use are undesirable for our District, such as shifts from agricultural use to forestry or carbon farming. Council may therefore introduce controls through the District Plan or other mechanisms to slow or restrict land use change to certain types or locations. The rate of land uptake for residential and industrial development is dependent on several factors including population growth, household growth, migration patterns, inward investment and economic prosperity. Significant changes in any of these factors will affect when additional land needs to be rezoned. While Council is aware of current land use trends, including rural land being used more intensively than it was in the past, these trends may slow or reverse as new requirements are introduced to the District Plan and to the One Plan to ensure compliance with legislative requirements. Council is also aware that large areas of forestry in the District will reach harvestable age between 2021-2030.
Overall Risk	**Guarded for years 1 to 10 (4-6) and Moderate for years 11 to 30 (8)**

Reasons & Financial Effect of Uncertainty	Significant changes in land use will likely impact on the roading network, particularly in rural areas. Additional expenditure may be required to ensure that roads are fit for purpose. Significant changes in land use may also impact on Council's investment and priorities for infrastructural investment, particularly in relation to extensions to reticulated networks. The attraction of new industrial activities to the District may place increased demand on water, wastewater and stormwater networks, including the capacity of the Feilding Wastewater Treatment Plant to treat trade waste.
Mitigating Factors (if applicable)	Council monitors land use change through the monitoring and reporting requirements of the NPS-UD. This includes monitoring of land use, subdivision and building consents. The zoning of land and the activities permitted on land is managed through the District Plan Review, informed by expert advice and investigations. New infrastructure and roading needed to support residential and industrial growth are controlled through Structure Plans that have been incorporated into the District Plan through the Plan Change process and will be funded by development contributions. A new growth strategy is proposed to be developed in Year 3 of the 10 Year Plan. This will help to guide future rezoning and give effect to new legislative requirements, including the National Policy Statements for Highly Productive Land, Urban Development and Indigenous Biodiversity. The cost for new services to support new residential, industrial or commercial areas will be partially funded by development contributions. Rural land is largely self-serviced so changes in land use will not alter demand for reticulated networks, but may impact on roading. Council has already anticipated increased pressure on the rural roading network, with increasing numbers of heavy vehicles to service intensive farming and forestry harvest. As a result, additional funding has been set aside for road maintenance and renewals in the Roading Activity Management Plan. Council monitors, reports and submits on new legislative requirements as they are notified by Government. Additional budget has been included within the 10 Year Plan in anticipation of the new responsibilities and resource implications of new legislative requirements.

Alternative 2: That current land use in the District will persist or that land use change will occur at a much slower rate or in fewer locations or ways than forecast.

Impact	**Minor** Less significant land use change will mean less demand for new reticulated services and road maintenance or improvement works. Continuation of current land uses, or a more gradual change in land use than anticipated will mean greater stability in economic and social performance due to our capability and capacity being maintained within established industries. Slower land use change in our District compared to neighbouring territorial authorities may mean that our District is slower in adapting to climate change and other legislative requirements. It may also mean that the District has not capitalised on regional projects and developments or new and emerging industries and may therefore be comparatively disadvantaged.

Likelihood	**Unlikely for years 1 to 30** As a lot of the forecast land use change is as a result of new legislative requirements, it is unlikely that there would be little or no land use change over the life of this 10 Year Plan and the 30-year period of the Infrastructure Strategy. However, given the number of different factors that influence land use change, it is possible that the rate of change, and the location and nature of change is different and less significant than forecast. For land use change to occur at a slower rate than forecast, a significant shift in central government policy direction would be required.
Overall Risk	**Low (2) for years 1 to 30**
Reasons & Financial Effect of Uncertainty	Slower or less significant land use change will mean less demand on the roading network and other Council-owned infrastructure. Investment to facilitate or manage land use change may need to be deferred.
Mitigating Factors (if applicable)	Council monitors land use change through monitoring and reporting requirements under the NPS-UD. This includes monitoring of landuse, subdivision and building consents. The zoning of land and the activities permitted on land is managed through the District Plan Review, informed by expert advice and investigations. Funding within the 10 Year Plan that is intended to service land use change and new legislative requirements can be reduced through subsequent Annual Plans and 10 Year Plans if it is not required.

4.2.8 Climate Change

Assumption: That the intensity and frequency of extreme weather events, such as flooding, drought or heavy snowfall, will increase as a result of climate change, in line with projections released by NIWA following the IPCC Fifth Assessment Report.

Alternative 1 That climatic changes in the Manawatū District, including the intensity and frequency of extreme weather events, are more extreme than predicted by NIWA based on the IPCC Fifth Assessment Report.

Impact	**Major** Any significant climatic changes would affect demand for Council services and could adversely affect infrastructure. Effects of climate change that are a concern for Council are primarily increased incidences of extreme weather. Risks include more frequent or costlier storm damage from flooding, and that stormwater standards will not be met. This would increase costs from repair works, and also possibly lead to demand for increased levels of service. Other risks include impacts on the economic and social wellbeing of our communities through more frequent or severe flooding, drought and/or heavy snowfall. Such events also cost Council in terms of infrastructure repair, Civil Defence and emergency management response to events, and community assistance (such as provision of a supplementary water supply).

Likelihood	**Unlikely** Ministry for the Environment and NIWA reports have predicted change in weather patterns including wind, rainfall, drought and snowfall. There is more certainty that weather patterns in the short term due to climate change will have predictable impacts that can be provided for through our Asset Management Plans and Activity Management Plans. There is less certainty about impacts of weather patterns in the long term as predictions are less reliable.
Overall Risk	**Moderate (8)**
Reasons & Financial Effect of Uncertainty	Significant impacts are not expected to be frequent in the next few decades. Council has a policy of holding depreciation renewal reserves. Insurance claims from damages associated with extreme weather are likely to rise as the incidence of these events increases in the future. This is expected to increase the costs of insurance cover. Operating programmes to mitigate impacts of climate change such as reducing peak demand for Water and leak detection in Wastewater are already underway and are built into the operating budgets of Council.
Mitigating Factors (if applicable)	Financial impacts will be mitigated by ensuring adequate insurance cover and appropriate maintenance is undertaken as a preventative measure. Major flood protection works (stopbanks) have been completed for the lower Manawatu, the Kiwitea Stream and Ōroua River flood control scheme. These stopbanks are designed to withstand the current 1% Annual Exceedance Probability (AEP) flood event, 1 in 100-year flood. Technology is always changing and it is likely that new and cost effective plant and materials will be available to meet some of the challenges in the future.

Alternative 2 That climatic changes in the Manawatū District, including the intensity and frequency of extreme weather events, are less extreme than predicted by NIWA based on the IPCC Fifth Assessment Report.

Impact	**Minor** If climatic changes are less extreme than predicted, expenditure on infrastructure repairs and maintenance will be lower.
Likelihood	**Unlikely** Ministry for the Environment reports have predicted change in weather patterns including wind, rainfall, drought and snowfall. There is more certainty that weather patterns in the short term due to climate change will have predictable impacts that can be provided for through our Asset Management Plans and Activity Management Plans. There is less certainty about impacts of weather patterns in the long term as predictions are less reliable.
Overall Risk	**Low (2)**
Reasons & Financial Effect of Uncertainty	Fewer significant weather events such as flooding, droughts or heavy snowfall, means that expenditure on infrastructure repairs and maintenance and insurance claims from weather events will be lower. Renewal reserves will need to be retained to address climate change impacts in the longer term.
Mitigating Factors (if applicable)	Financial impacts will be mitigated by ensuring adequate insurance cover and appropriate maintenance is undertaken as a preventative measure.

4.2.9 Emergency Events

Assumption: The Manawatū District Council is prepared to respond to emergency events over the life of the 10 Year Plan. However, a catastrophic event, such as a major earthquake, will exceed Council's financial provision to respond.

Alternative: That an emergency event occurs that exceeds Council's financial ability to respond.

Impact	**Major to Severe** Manawatū District Council and other businesses in the district could be subject to a break in business continuity in the event of a catastrophic emergency event. Council services including water (treatment, drinking), the road network and wastewater networks and treatment could be disrupted for considerable periods of time. Depending on the severity or timing of emergency events, Council may not have enough staff to manage recovery and response. A series of emergency disasters may exhaust Council reserves and prudent borrowing ability. There is a risk that Council may not have access to Government support in the future. Emergency events elsewhere in New Zealand and across the world may mean that there are periods of time where insurance cover is unavailable, or unavailable for certain types of event. The repair or renewal of lower priority infrastructure may be delayed due to a lack of borrowing ability and the need to focus resources on high priority projects.
Likelihood	**Unlikely** The top 10 hazards for the Manawatū District, in order of priority, are severe earthquake, river flood, tsunami, drought, landslide (widespread hill country), human pandemic, animal epidemic, transportation incident (HAZNO spill), rural fire (widespread) and high wind/storm event. The likelihood and consequences of an event is different for each hazard. This complicates efforts to assign a single likelihood score; however, the chances of an emergency event occurring in the District that exceeds Councils ability to respond, such as a strong earthquake, is considered low. Earthquake forecasts from GeoNet in December 2017 provide a best estimate of 30% (unlikely) of a magnitude 7 or higher earthquake occurring within the Central North Island within the next 10 years.
Overall Risk	**Moderate (12) to High (24)**
Reasons & Financial Effect of Uncertainty	A catastrophic emergency event would impact on Council by demanding immediate funding. This would reduce the resilience of the Council for meeting future unforeseen costs. Additional borrowing would impact on future rating levels.
Mitigating Factors (if applicable)	The Council is preparing a detailed business continuity plan, which outlines both crisis response and recovery. Civil Defence emergency planning is in alignment with business continuity preparedness. The Council also continues to be part of the Manawatū-Wanganui Civil Defence and Emergency Management Group working to ensure preparedness for any emergency event, co-ordinate a response and support recovery. Council has a $5 million buffer between our financial strategy and the Borrowing Management Policy to ensure we have adequate borrowing facilities in case of emergencies. Catastrophic emergency events are assumed to attract Government and private charitable sector support.

4.2.10 Transportation Funding – Assumption One

Assumption: That the Council will receive funding from Waka Kotahi NZ Transport Agency (NZTA) for the maintenance and renewal of roads.

Alternative 1: That roading maintenance and renewal projects will not secure Waka Kotahi NZTA funding.

Impact	**Major** The land transport network is a core facility maintained by the Council to assist it in meeting its Community Outcomes through enabling the efficient movement of people and goods throughout the District and into neighbouring districts. The removal of Waka Kotahi funding for roading maintenance and renewal projects would impose substantial additional costs on Council and threaten the affordability of providing a roading network that is both fit for purpose and meets the expectations of the community.
Likelihood	**Rare** Waka Kotahi NZTA has not signaled the removal or further reduction of subsidies to local government for the maintenance and renewal of local roads.
Overall Risk	**Guarded (4)**
Reasons & Financial Effect of Uncertainty	The removal of subsidies for roading maintenance and renewal would limit the capacity of local government to respond to the changing needs of the community in addition to placing a substantial burden on Council budgets.
Mitigating Factors (if applicable)	The Council intends to maintain its awareness of any issues that impact on the ability of Council to access Waka Kotahi NZTA funding. Funding for the changing needs and expectations of the community has been recognized in the 10 year plan.

Alternative 2: That there are delays in finalising Waka Kotahi NZ Transport Agency funding, impacting on Council's delivery of maintenance and renewal projects.

Impact	**Minor** A delay in funding could temporarily delay projects or put pressure on Council roading budgets. These considerations are built into Council planning processes to ensure the impact on the community is minor.
Likelihood	**Possible** Capacity constraints in central government in addition to budget constraints could affect the timing of funding to support local government maintenance and renewal of roads.
Overall Risk	**Guarded (3)**
Reasons & Financial Effect of Uncertainty	Significant changes in land use will likely impact on the roading network, particularly in rural areas. Expenditure may need to expanded or brought forward to ensure that the communities' expectations are met and that local roads are fit for purpose.
Mitigating Factors (if applicable)	The Council intends to maintain its awareness of any issues that impact on the timing of Waka Kotahi NZTA funding. Funding for the changing needs and expectations of the community has been recognized in the 10 year plan.

4.2.11 Transportation Funding – Assumption Two

Assumption: That the Council will receive 52% of the cost of roading maintenance and renewal projects from Waka Kotahi NZTA over the year to June 2022 followed by 51% over the remainder of the period of the 10 Year Plan.

Alternative: That the total level of Waka Kotahi NZTA funding for maintenance and renewal of roads is reduced.

Impact	**Major** The land transport network is a core facility maintained by the Council to assist it in meeting its Community Outcomes through enabling the efficient movement of people and goods throughout the District and into neighbouring districts. Any further reduction in the level of Waka Kotahi NZTA funding for the maintenance and renewal of the local roading network will have a major impact on Council budgets and the affordability of maintaining a roading network that is safe and efficient, and meets the expectations of the community.
Likelihood	**Rare** Waka Kotahi NZTA announced a reduction in the rate of subsidy to the Manawatū District for the maintenance and renewal of roads in August, 2020. It is considered highly unlikely that Waka Kotahi NZTA would reduce funding further over the life of the 10 Year Plan.
Overall Risk	**Guarded (4)**
Reasons & Financial Effect of Uncertainty	Further reduction in the rate of subsidy for roading maintenance and renewal would limit the capacity of local government to respond to the changing needs of the community in addition to placing a substantial burden on Council budgets.
Mitigating Factors (if applicable)	The Council intends to maintain its awareness of any issues that impact on the level of Waka Kotahi NZTA funding. Funding for the changing needs and expectations of the community has been recognized in the 10 year plan.

4.3 Demand Impact on Assets

4.3.1 Dealing with Demand Forecasting Uncertainty

Traffic Counts

Traffic counts provide the basic information to support capacity planning. Council has a comprehensive traffic count programme in place which is managed through the RAMM. Classified Counts (number and type of traffic) are used. There are a number of reference sites which are surveyed annually to ensure trends are tracked, while all other roads are surveyed every three years. The information is held in RAMM and is readily accessible.

Predicted Traffic Growth

The predicted traffic growth for the District is approximately 1.7% per annum, which is typical for a rural roading network and is generally in line with growth rates regionally. Traffic growth can be independent of population growth as it can be influenced by other sources both external and internal to the District. There can still be traffic growth even if population growth is static. Some individual roads and routes in the District may experience a higher growth rate due to increased localized residential, and commercial development. For example, the population of Feilding is predicted to increase from its current population to over 14,000 by 2020.

Consequently, there will be a significant effect on the roading infrastructure, both the local roading network and on State Highway 54. The main arterial and collector roads connecting Feilding to Palmerston North will similarly have increasing demands placed on them to cater for increased traffic growth from those who wish to live outside the main metropolitan area of Palmerston North, but still rely on daily trips to Palmerston North for work and other requirements.

Asset Context and Achievements to Date

The land transport network is required to provide for the safe and efficient movement of people and goods throughout the District and to neighbouring districts. Its performance directly influences the economic viability and sustainability of the District, the wider Manawatū region, and indeed the Country. The District's land transport network is a core strategic facility and is maintained (excluding state highways) by the Council to assist it in meeting its Community Outcomes. It provides particularly strong inputs into the achievement of Community Outcomes.

The road network was set up many decades ago and has been gradually upgraded to the present standard. However, it is quite evident that community expectations in the roading area are increasing, which requires regular reviews of levels of service and programmes for the continual improvement and development of the roading network. Another significant driver of improvements comes from the expectations of new residents in the District. Generally the network has been coping with the demands on it, but this is expected to change.

New infrastructure has been continually added to the network from new urban subdivisions since the District was established in 1989, reflecting the high population growth rates over that period. The majority of new urban infrastructure is vested at no initial cost to the Council by private developers, however the Council is then responsible for the on-going maintenance and renewal of this infrastructure in perpetuity.

Parts of the present network will need considerable redevelopment over the next decade, and beyond, to meet community and growth expectations. The factors that will force the need for change on the assets or the management of the asset are:

Increasing Population

This will result in an increase in traffic on the roads, which will increase congestion and reduce the level of service provided by the road. The additional traffic generated will increase wear on the roads, which will increase maintenance costs and reduce renewal frequencies.

Changes in the Way Roads are Used

The creation of new urban subdivisions, or the development of new industry in one part of the district, may change how an individual road or roads, or even a sub-network will be used. This may mean roads will need to be upgraded to accommodate the changing use.

Changes in the Level of Service Demanded by the Road Users

Over time, communities tend to expect improving service from their assets. Agreed levels of service for roads, and the activities involved in managing the roads, will help to control this tendency but level of service may nevertheless need to be improved to satisfy these future needs. The trend to more lifestyle blocks in the countryside has also changed the expectation of the travelling public in rural areas where rural roads are no longer used only by local farmers, but now carry a much wider range of people and vehicle types. This has resulted in factors such as smoothness of ride, loose metal, dust and higher speeds becoming more important to more road users.

Similarly, more people wish to cycle, and to have safe alternatives to cycling, on the District's typically narrow rural roads. These people seek wider carriageways, cycle lanes and off-road pathways to address their needs.

Increases in fuel costs will put pressure on the Council to provide or facilitate more affordable and sustainable transport solutions for the District's residents. This may require additional public transport services, and an investment in walking and cycling infrastructure to cater for short trips — and even longer commuter trips to Palmerston North. However, there are disconnections between what can be realistically provided in the District's urban and rural areas and in the nearby areas of Palmerston North City.

Changes in the Strategic Management of the Assets

The Council's policies and management strategies are continually evolving to keep pace with the changing needs of the community, statutory requirements, funding organisations and central government's requirements. Changes to policies and management strategies can also have a significant effect on how assets are managed

The directions of future land use changes and their effects on the roading network are always difficult to determine with accuracy, but it is important that the roads likely to be affected are identified and prepared in readiness for these changes at the appropriate times, before levels of service degrade too far. More importance is being placed on the integration of land use and transportation systems to provide long-term sustainable solutions. The Council is actively involved in regional strategic planning initiatives to help it assess and plan for the demands of further growth in a sustainable way, across all its assets and responsibilities, including the transportation network.

Demand for new or upgraded facilities arises from the needs of the existing population i.e. meeting the level of service standards, changing habits, and population growth. This demand manifests itself in the need for:

- New roads
- Sealing of unsealed roads
- Widening and alignment improvements
- Upgraded intersections
- New and upgraded bridges
- Appropriate urban facilities in closely settled areas, e.g. street lights, kerb and channel, footpaths
- New cycleways and walkways.

The Council intends to maintain its awareness of these issues and plans to provide a transportation network that meets the communities' expectations. This will involve implementing improvement projects, walking and cycling lanes, seal widening and selected public transport infrastructure facilities in conjunction with routine maintenance and renewal of its roading network.

The funding of all these works has been recognised in the financial forecasts in this Plan and will be utilised in the formulation of Manawatū's LTP.

4.4 Demand Management Plan

4.4.1 Supply-Side Demand Management Plan

Change 27

This provides for the strategic residential growth of the North Eastern part of Feilding, Plan change 45 being the precincts boarding the west and north of Feilding, and the operative change 52 for the industrial area of Feilding. The broad objective and policy framework put in place by the Plan Changes will manage business as well as residential growth, however the zoning of specific blocks of land primarily relates to new residential development areas around each of the existing Feilding township. Outline Development Plans (ODPs) have been developed for inclusion into the District Plan as part of the plan change process. These seek from the outset to achieve good urban design and sustainable outcomes by establishing how each block will spatially develop across all infrastructural assets, and how these developments will link to existing and other new areas. One of the key elements required to be shown on the ODPs are roading, walking and cycling routes and networks.

Minor Improvements

The funding of improvements is catered for in the subsidised Land Transport Programme as Activity Class 5 – Improvement of Local Roads . Activity Class 5 includes Waka Kotahi Work Categories 322 to 325 and 341 and can include substantial projects such as new bridges, and new roads, in addition to road reconstruction and minor improvements. Individual projects generally have to meet assessment criteria under Waka Kotahi's Project Evaluation Manual to be eligible for funding.

The exceptions are those in Work Category 341 – Minor Improvements, Safety and other related roading improvement projects up to a value of $1,000,000 per project can be funded from this category, from a bulk allocation that was equivalent to 5% of the value of the Council's Land Transport Maintenance and Renewal Programmes. This equated to approximately $507,000 per annum.

The Council operates a Hazards and Deficiency Database that lists and prioritises these projects for funding from this allocation.

Wherever possible the Council utilises subsidised funding sources to carry out major works. If major transportation projects are not eligible for subsidised funding, the Council then considers fully funding these as projects in order to achieve them. A Hazard and Deficiency Database is used to evaluate and rank projects based on a risk reduction, traffic and cost basis.

As part of the development of this database, consideration was extended to intersection lighting, intersection seal-backs and other safety-related projects that were not previously considered for funding in this manner. Other projects are regularly put forward for inclusion following identification through the work of the Council's Transport and Road Safety Coordinator. As a consequence of these changes, a number of similar projects, of a relatively low cost, were ranked at the top of the list of projects. The Council decided to spread the work over a number of work types to achieve some degree of parity both on the type of work and how it is distributed across the network and District in a more equitable manner, this has meant that the priorities determined by the deficiency database process are not rigidly followed.

New Improvements Planning

The LTP process stipulated by the Local Government Act 2002 requires the Council to plan and forecast its activities for long periods into the future, and to publish and consult on its intentions at three-yearly intervals. In the periods between LTP's it is required to follow a simpler Annual Plan procedure. There is no real scope under this system for making significant changes to major LTP programmes at Annual Plan time unless there are exceptional circumstances.

The Land Transport Management Amendment Act 2008 introduced a requirement for road controlling authorities to prepare three-yearly Land Transport Programmes. However, the requirement for territorial local authorities to do so is only an indirect one in that major projects need to be prioritised and co-ordinated on regional basis in order to obtain funding from the National Land Transport Programme and a Regional Land Transport Programme is required as an input to the National Land Transport Programme. The Regional Transport Committee performs this prioritisation task and achieves the regional consensus necessary to develop and confirm the Regional Land Transport Programme.

The Council operates a Projects Database that lists potential individual improvement projects from sources such as township committees or community boards, staff and councillors. These requests may also arise from public enquires and projects not usually expected to be contained in other forward more formal programmes, e.g. seal extensions and seal widening programmes etc. Typically, these requests are associated with township renewal and improvement works such as footpath extensions, new kerb and channel, individual street lights and street upgrades. Renewal recommendations are not part of this process, other than their interaction with street upgrading in some instances.

Local Priorities

As part of the development of LTP, the District's communities, via their respective Community Committees, are provided the opportunity to rank proposed improvement projects in order of their preferences. These preferences are then considered by the Council in the preparation of the LTP and Annual Budgets. Usually these proposals include mainly minor improvement works, like footpath extensions and new street lights; however, other works such as street upgrades, that strictly speaking are renewal works, are included to simplify the consultation and consideration processes and to ensure that the communities are fully informed.

Where roading projects are likely to be approved as part of the National Land Transport Programme (NLTP) they are incorporated into the Council's Land Transport Programme. The proposed Land Transport Programme is approved by the Council before submission to the Waka Kotahi.

Wherever possible the Council utilises subsidised funding sources to carry out major works. If major transportation projects are not eligible for subsidised funding, the Council then considers fully funding these as projects in order to achieve them. A Hazard and Deficiency Database is used to evaluate and rank projects based on a risk reduction, traffic and cost basis.

As part of the development of this database, consideration was extended to intersection lighting, intersection seal-backs and other safety-related projects that were not previously considered for funding in this manner. Other projects are regularly put forward for inclusion following identification through the work of the Council's Transport and Road Safety Coordinator. As a consequence of these changes, a number of similar projects, of a relatively low cost, were ranked at the top of the list of projects. The Council decided to spread the work over a number of work types to achieve some degree of parity both on the type of work and how it is distributed across the network and District in a more equitable manner, this has meant that the priorities determined by the deficiency database process are not rigidly followed.

There is also a need to be financially prudent on what funding can be provided to the township/roading programme to ensure future rates movements minimised. The simplest way to minimise rate movements (increases) is to minimise the capital spend on items that are discretionary in nature.

Accordingly there is no discretionary funding included in the LTP at this draft stage. Once we know what the core on general rates/funds is Council may be able to provide some form of discretionary project funding.

Subdivision Commitments

The nature of subdivision developments, and the corresponding needs for subdivision commitment expenditure, can be difficult to define and predict over a 10-year programme period. This is also comes about from the large differences in lead times between receipt of proposals for major developments and their practical completion.

Subdivision commitments can only be determined on a case-by-case basis once applications are lodged and approved. Consent conditions, under the Resource Management Act 1991, requiring financial contributions for roading upgrades conditions can be contested by the developer. The time taken to work through these processes can present a problem in forecasting the works and finance required to meet them. The approach taken in this Plan to address this problem is to:

- Programme specific works when they are confirmed and quantified
- Programme indicative finance where specific works or projects are not yet identified or quantified
- Base financial projections on constant-dollar historical expenditures on subdivision commitment works, tempered by consideration of the Council's accepted growth predictions for the various towns and localities within the district.

While predicted growth discussed above refers to people, it is expected that average dwelling-occupancy rate will continue to decline over resulting in the numbers of dwellings increasing at a slightly faster rate than the residential population over the period.

Trip generation is typically modelled on the number of trips generated per household, which for assessment purposes currently ranges between 6 and 10 trips per day. Another recent influence is that most households in the District now have more than one vehicle. Therefore, trip generation or traffic growth is expected to increase faster than the population. An aim of initiatives like Travel Demand Management (TDM) is to manage the increase in trips by facilitating non-car based solutions such as walking and cycling, and public transport.

Assumptions

It is reasonable to assume that the Council will need to fund a share of subdivision road works related to development in about the same proportions as present. However despite the uncertainty surrounding prediction of subdivision commitments discussed above, some of the commitments in the immediate years (years 1 to 2 and possibly 3) of the programme are known, because of the lead-times between receipt of proposals for major developments and their practical completion. These known projects will be programmed as specific items in the forward programme while retaining a lesser provision for currently unknown commitments.

The demographic changes around dwelling occupancy will have only a very small effect on the total number of dwellings required in the short to medium term; and as far as the forecasting of subdivision commitment funding is concerned, they can reasonably be ignored.

Development Contributions

Development contributions are contributions required from developers to help offset the effects of growth they have induced on the network. They are levied under the Local Government Act 2002 and Council's Development Contribution Policy.

Financial contributions are amounts or works required of developers to avoid, remedy or mitigate the adverse effects of their developments on the environment, built or natural. They are levied under the Resource Management Act 1991

Works that include a growth component can be considered for a development contribution – based on the cost of providing additional capacity for growth. Providing additional capacity for an enhanced level of service as well, may still attract a growth component but it will be of a lesser proportion.

At the time of writing of this Plan, there are no financial or development contributions for growth related work outside the immediate environs of proposed development.

Financial Contributions are levied for specific works that need to be carried out on roads adjacent to new developments, where the standard of the road is inadequate for the development. The costs of these works are shared with the Council, based on projected traffic volumes.

Subdivision Approvals and Commitments

Roads, because of their fundamental role in providing access to and from, and often within, properties, are directly affected by changes in land use and subdivisions. Some of these affects may be very minor and some can be significant either locally or at a network level.

Subdivisions reflect the underlying land use zoning. If the zoning status of land changes, through the Manawatū District Plan or private plan changes, this can result in areas being subdivided and developed for residential, rural residential, business/commercial and industrial purposes. This can drive the requirement for existing roads and streets to be upgraded and new infrastructure to be constructed and vested in the Council.

Developers usually pay the full cost of roading and development works within new subdivisions. However, when the Council anticipates that a proposed local road will have wider use in network, such as a collector or arterial road, it will contribute towards the incremental cost of any additional width.

New roading assets are vested in the Council upon completion of the subdivision and the issuing of titles to the new lots. The Council, as ultimate owner and operator of these assets, specifies minimum design criteria and checks construction at critical stages.

This process requires developers inter alia to obtain engineering approval for the proposed works from Council staff prior to construction. This includes providing fully detailed plans and specifications for the approval. Not until approval is obtained can physical construction work, including roading, street lighting, and utilities installation and construction, proceed.

The Developer must have all completed works inspected and approved by the Council before a Section 224(c) Certificate is issued. When the certificate is issued the new assets are vested in Council.

New roads and other associated infrastructure like footpaths, street lights etc are recorded and added to the RAMM network inventory upon receipt of the assets from the developer.

Where a new development fronts an existing legal road improvements will often be needed to be made to it; sometimes improvements are required to other parts of the wider network, separate from the subdivision. These improvements can include footpaths, kerb and channel, access improvements, increased seal width, and improved sight lines and improvements to adjacent intersections.

For each development, the Council considers the need for roading improvements directly associated with the subdivision and, where improvements are justified; engineering staff seek to have appropriate conditions inserted in the relevant consents. These can be established and applied through either the Resource Management Act 1991 (to avoid, remedy or mitigate the adverse effects of a particular development) as Financial Contributions.

The Council prefers to utilise its development contribution policy, introduced in the 2006 Long Term Council Community Plan, for establishing upgrading contributions for any improvements remote from the subdivision.

Under the provisions of these Acts, and case law, the Council is often not able to require a developer to pay the full cost of an upgrade to an existing road, and is required to share the cost of the works. In some cases the Council will apportion costs on the basis of contributing traffic, however generally a minimum 50% contribution is sought as it would inappropriate for the Council to commit itself to significant expenditure on the basis of a low contribution.

Existing roads are upgraded as a result of new subdivisions or changes in land use if the additional traffic generated is significant enough to warrant a contribution being imposed on the developer to mitigate its adverse effects on the network.

Until recently, the nature of subdivision development was that the Council had little, if any, control over the timing or implementation of any project. Recent strategic planning initiatives such as the greater Feilding Urban Growth Framework are attempting to control the amount and staging of growth ensure that it, and the supply of supporting infrastructure, is sustainable and achievable.

The development of Structure Plans have provide greater certainty in the urban form likely to develop and deemed appropriate. This enables coordinated planning to occur and opportunities for lead infrastructure to be provided by Council and funded by development contributions (e.g. Lowes Road).

Subdivision Development

Developers pay the full cost of development within new subdivisions, with new assets being vested in Council upon completion and the issuing of subdivision titles. However, on-going maintenance and renewal of the new roads and associated assets built in these developments is the responsibility of the Council.

Improvements will often be made to the existing road network in association with subdivision, for example new footpaths and kerbs and channels, access improvements, increased seal width, improved sight lines, etc. Typically, these are works that are directly associated with the subdivision itself, and have been 50% Council funded, 50% developer funded.

The policy for development contributions that may be charged for future subdivisions is established at a Council wide level, as provided for under the Local Government Act 2002 and Development Contribution Policy.

Level of Service Improvements

From time to time significant safety problems arise at particular points on the network. For example, the severity or number of crashes at a particular intersection might increase to the extent that a major improvement project is necessary and justified.

On existing roads these types of interventions are generally not considered improvement backlogs; rather, they are usually newly justified improvement works. However, they could form part of a backlog if they have been identified for longer than it would usually take to programme and fund a new project, and remain programmed. As discussed eligible projects up to a cost of $1,000,000 can be funded through a block allocation in the Council's subsidised Land Transport Programme.

Programming Level of Service Improvements

The new improvement programmes reflect a balance between what is affordable and what is achievable with the funding currently, or expected to be, available.

Most road network level of service gaps are known and are relatively small in the context of the whole network. These are compensated for in the day-to-day administration of the asset. When this cannot occur, additional funding is sought to address the gap. This normally occurs when the Council's Land Transport Programmes is compiled and submitted to the Waka Kotahi for approval. However, the Waka Kotahi usually requires any such requests to be "evidence based" before approving any additional funding. See Section 10 Programme Prioritisation and Optimisation and Section 12 Capital Projects for a description of the approach.

The Improvement Plan includes a number of individual tasks over sub-asset groups to review and identify any potential level of service backlogs that are outside normally acceptable time variances/ lead times.

Significant Land Use Changes

Council is currently undertaking a review of the District Plan. One of the initial parts of the review has involved consideration of urban growth requirements around Feilding. A total of four residential growth precincts and one industrial growth precinct were identified in the Feilding Urban Growth Framework Plan.

To date Precincts One, Two and Three from the framework plan have been through the public plan change process under the Resource Management Act (1991). These areas are located to the west of Feilding and detailed structure plans have been prepared. The combined total yield of three precincts is 1860 new residential lots at minimum lot sizes between 800m2 and 2000 m2.

The expected yield will result from some rezoning completed immediately and from areas identified for deferred zoning that will remain rural and be rezoned to residential as demand requires.

Further research and analysis is being undertaken on the additional residential growth precinct located around Pharazyn Street/Reids Line (Precinct Four) and the industrial growth precinct at Kawakawa Road (Precinct Five). These areas will provide an additional yield of 1600 residential lots and an additional 97ha for future industrial land use.

Planned Upgrades

For roading the large majority of expenditure is on planned renewals and maintenance. The largest single project capital costs are to replace the bridge structures across the district as they reach the end of their useful lives. These renewals are programmed in over the next 30 years and beyond.

This strategy reflects the current upgrade programme in the short to medium term. As these infrastructure assets are long term investments the majority of investment required in the long term will be plant and pipe renewals, and forecast work required to lift standards in response to the renewal of resource consents.

Council also has a focus on economic development, and on ensuring the associated infrastructure capacity is available for commercial / industrial land and residential growth in Feilding. Plans for growth areas were developed through the Feilding Urban Growth Framework Plan and an ongoing review of the District Plan.

Summary

Council has the following long term strategy:

- Ensure rural townships are vibrant and thriving by providing affordable infrastructure with some spare capacity that meets current relevant mandatory and resource consent standards for quality and security of supply
- Maintain the existing roading network to current levels of service, including renewing bridges and other roading assets
- Gradually upgrade the quality of urban streets that need major renewals
- Meet new resource consent standards for Feilding and meet Manawatū River Accord commitments for all urban areas
- Ensure capacity is available to support the development of the wider Manawatū as Food HQ for New Zealand, and specifically food innovation and processing in the District
- Plan for the renewal of all assets as set out in the AMPs
- The current upgrade programme and the identified Feilding growth precincts will cater for forecast growth over the next 30 plus years
- Funding for the forecast expenditure and loans will fit within the Financial Strategy rating and debt limits for the first 10 years, and will be consistent with the Financial Strategy funding strategies for years 11 to 30.

The main areas of specific concern are:

- Waughs Road through to Bunnythorpe and Palmerston North
- Access onto State Highway 54 at North Street/Pharazyn Street Feilding, and Turners Road Feilding for both the growing residential and industrial areas
- The main internal collector and arterial roads and streets within Feilding to cater for traffic growth from new residential subdivisions and other new land use developments
- The cost of replacing the entire network managed by Council is $563 million excluding land values of $65 million.

The direction of future land use changes and their effects on the roading network are difficult to determine with accuracy, but it is important the roads likely to be affected are prepared in readiness for these changes. Conversion of land use to dairying is having an effect, with pavement widths, pavement loadings, and safety all under pressure. These affects have become evident in Āpiti. Conversion to other intensive land uses may have similar effects, this is one of the potential risks to the Council from climate change problems with inadequate seal widths on sealed roads used by dairy tankers are demonstrated by increasing maintenance demands, and need to be addressed by seal widening improvement programmes.

Demand for new or upgraded facilities arises from the needs of the existing population i.e. meeting the level of service standards, changing habits, and population growth. This may cause demand for:

- New roads
- Sealing of unsealed roads
- Widening and alignment improvements
- Upgraded intersections
- New and upgraded bridges
- Appropriate urban facilities in closely settled areas, e.g. streetlights, kerb and channel, footpaths.

The Council intends to maintain its awareness of these issues and plans to provide a roading network which meets the communities' expectations. This may involve more seal extension, better ways to provide and maintain unsealed roads, and possible widening of some arterial and collector roads in the District. Modest funding of all these developments has been recognised in the AMP.

The main challenges facing the roading network are not related to traffic growth. Across the network there is considerable spare capacity to cater for additional traffic flows. The challenges relate more to:

- Our roading network is old and was not built to handle heavy traffic
- The impact of exotic forestry harvesting on remote rural roads
- Securing funding for network improvements
- Long term funding from Waka Kotahi for the current budgeted proportion of maintenance and renewal costs (not considered an issue in the medium term)
- The One Network Road Classification (ONRC) recently introduced by Waka Kotahi has resulted in changes to levels of service
- Renewing the large number of bridges in the future.

5. LIFECYCLE MANAGEMENT PLAN

5.1 Background Data

5.1.1 Programme Prioritisation and Optimisation

Prioritisation is a method of putting proposals on a priority list indicating which are to be funded first.

Optimisation allocates resources to gain the most benefit or return possible in the given context. It focusses on evaluating what are considered to be the most important aspects of asset management. These aspects relate to minimising total life-cycle costs while meeting community and broader social expectations.

5.1.2 Aims of Prioritisation and Optimisation

In a generic economic sense, the option that minimises Council and road user costs, in a life cycle context, is considered to be optimal. An optimisation and/or prioritisation model is required to aid in the ranking of capital and maintenance projects to enable the optimum allocation of resources. In reality, this model will be indicative only and a number of iterations through the model may be required to achieve the final funding scenarios.

As well as minimising life cycle costs, the process of optimising and prioritising includes consideration of strategic network requirements and the accumulation of benefits from strategic corridor improvements. Prioritisation and various funding scenarios act interdependently through the planning and evaluation and the previous phases. The prioritisation and funding scenarios identify the forward works program. The prioritisation and optimisation process is difficult when prioritising involves political decision making where questions such as those below must be answered:

- Should higher priorities be given to the roads that contribute directly to the Region/District's economy? If benefits can be clearly demonstrated and quantified, the priorities of projects may be resolved by using WOLCC. However, this may not always be the case because it is not possible to quantify some community benefits
- Should funding priorities be directed toward remote areas recognising the equity issues in transport? The concern is that the ONRC CLoS and Performance Measures for Low Volume Access Roads commit Council funding levels that may be politically unacceptable
- Is it desirable to allow road conditions to deteriorate to meet ONRC CLoS and Performance Measures? In the short term it may be acceptable to allow deterioration provided the general road condition does not fall below the assigned CLoS. Some business rules may need to be developed to allow relatively small sections of these roads to exceed the assigned CLoS for short periods.

Priority ranking under budget constraints across:

- Budget heads
- Administrative areas
- Safety
- ONRC hierarchies.

The above priority ranking may be complicated by the competition between political objectives and ONRC CLoS and Performance Measures.

5.1.3 Decision Support Systems

Council uses a variety of Decision Support Systems (DSS) which include:

- Gap analysis tools
- Economic evaluation tools
- Prioritisation and optimisation tools to assist in the development of the funding scenario and works program
- Performance management tools
- Various levels of reporting requirements.

5.1.4 Decision Support Levels

DSS support decision making at a number of levels of the activity management hierarchy. These levels are referred to as strategic, program and project management levels. The activities and analysis involved in each of these levels are highlighted below.

5.1.5 Strategic level (Waka Kotahi)

- Policy analyses e.g. ONRC
- Setting standards
- Budget allocations
- Constrained 'top-down' network analyses
- Determine funding to meet policy and standards
- Receive budget requests, compare with funding
- Allocation of budgets.

5.1.6 Program level (Council)

- Gap analyses
- Identify pre-selected works
- Unconstrained 'bottom-up' sub-network analyses
- Prioritised and costed wish-list of works
- Budget request
- Formal submission of budget request to Waka Kotahi
- Receipt of budget allocation and condition standards
- Budget allocation by Work Category
- Divide allocated budget by Work Category
- Works programming by Work Category
- Constrained 'top-down' sub-network analyses.

5.1.7 Project level (Council)

- Selection of treatment options, e.g. detailed economic life cycle cost analyses.

5.1.8 Identification of Asset Requirements

The identification of asset requirements dictates the standards of performance, condition and capacity and the consequential funding requirements. It requires knowledge of existing asset performance and performance targets to identify the gaps in asset performance.

Performance measures of road assets are aligned with the One Network Roading Classification (ONRC) to deliver consistent community outcomes. Identified asset requirements must therefore correspond to the prescribed CLoS hierarchy taking into account community requirements and the existing network usage, configuration and condition. This involves collecting current condition/performance data and setting network performance targets/intervention criteria for each CLoS class so that performance gaps can be identified and rectified.

5.1.9 Customer Level of Service (CLoS) Framework

CLoS is a term used to describe the quality of services provided by the asset for the benefit of the users. Depending upon the Road Classification a higher CLoS may be required for some parts of the network compared to others. Adopting the CLoS framework helps to achieve consistency in standards along roads of the same strategic importance. This has been identified as an important road user requirement, and provides Council with an efficient systematic approach to managing their assets. The various CLoS have been defined by the Roading Efficiency Group (REG). Council is supporting this approach by implementing the ONRC and associated CLoS and Performance Measures.

5.1.10 Road Hierarchy

The ONRC CLoS hierarchy has been developed by the Roading Efficiency Group (REG) to define what class of asset is required. The REG has taken the view that uniformly high operating conditions across all roads in the network are too costly to achieve and would not present an economic return on investment. On the other hand, it is impossible to manage an infinite number of standards and performance levels across the network. For this reason and for reasons of equity and transparency, all roads meeting a specific range of functional criteria should achieve a uniform CLoS. The criteria 'bins' to which road sections are assigned are the Road Classifications.

5.1.11 Functional Classification

There are criteria and thresholds for each category, based on the functions the road performs within the network. To be included in a particular category a road must meet the agreed criteria and thresholds, including at least one of either – typical daily traffic (AADT), heavy commercial vehicles (HCV), or bus (urban peak) as appropriate.

5.1.12 Asset Performance Measures

Target road asset conditions (roughness, rutting, etc.) and road configuration parameters (width, lanes, etc.) have been defined for each CLoS / Roading Category. Performance measures are measurable targets with which current asset condition and configuration are objectively compared to determine road asset requirements. They are used to identify gaps in asset performance, which identify maintenance and/or capacity improvement activities.

Performance measures are defined using physical and dimensional parameters that reflect the operational and structural capacity of the asset. The configuration parameter targets represent the minimum acceptable levels. Condition parameters represent the health and condition state of the asset. The condition parameter performance targets represent the maximum acceptable levels, above which remedial actions are considered.

Targets for other aspects such as delineation, safety, availability, accessibility, reliability of travel times, congestion and environmental performance are aligned with a range of ONRC-Performance Measures.

The Performance Measures have been developed in conjunction with the ONRC and associated CLoS outcomes For each category of road the minimum (or maximum) acceptable configuration and condition parameters have been set.

Performance measures have also been set for an asset network as a whole. They are used to compare the network performance over a defined period, e.g. from year to year, and thus assess the effectiveness of the adopted activity management practices. For example, Efficiency, Safety, Resilience, Amenity, Travel time reliability, and Accessibility.

5.1.13 Community Consultation

Implementing the ONRC, associated CloS and Performance Measures as the basis for identifying asset requirements incorporates the informed view of the stakeholders and the rest of the community.

Council consultation with stakeholders and the community is a requirement of the Local Government Act 2002 and is an essential part of the planning and policy development of the whole road system. Community consultation continues throughout the whole Integrated Activity management process. Formal community consultation is conducted in accordance with Sections 82 and 83 of the Local Government Act 2002.

When conducting community consultation to determine acceptable intervention criteria for condition parameters, it is important to consider the distinction between the perceived condition of the asset as 'seen' by the users and the condition of the asset as determined by measurement and the analysis of condition data, particularly the structural condition of the asset.

5.1.14 Setting Performance Targets/Intervention Criteria

Council's performance targets/intervention criteria are set by legislative requirements, Council's goals and objectives including equity, the ONRC, associated CLoS, and Performance Measures, road user requirements (e.g. comfort, economy and general ease of use), engineering and safety standards, economic analysis, existing road standards, historical performance trends and budgetary limitations. As a consequence, Council has developed strategies and makes policy choices regarding the degree to which an equity objective should be pursued to complement an economic efficiency objective when defining road CLoS outcomes.

5.1.15 Maintenance Intervention Criteria

These are based on features that are measured in an objective and repeatable manner. Further, as the intervention criteria apply across the entire network, they must be affordable from a network funding level perspective. Setting of affordable intervention criteria for a 30 years' time horizon for a network can be difficult given future funding uncertainties. Therefore different funding scenarios with different sets of intervention criteria have been developed.

Routine maintenance intervention criteria are more specific than the approach taken in developing infrastructure preservation programs. Setting routine maintenance intervention criteria involves establishing, for different classes of asset (roads, structures, roadsides, traffic signals and on-road electrical assets), the maximum acceptable routine maintenance inspection periods, severity and extent (intervention levels) of condition parameters that can be tolerated and times within which condition parameters are to be repaired (response times).

Intervention levels are specified in Council's Road Maintenance Contract and define the value (extent and severity) of a condition parameter, which triggers either maintenance investigation or maintenance activity. An intervention level will identify a defect as either acceptable or unacceptable. The latter will require further consideration of the defect in relation to its location with respect to the asset, safety issues, the possibility of continuing deterioration and increased repair cost and the economics of not undertaking repairs.

Response times are specified in the Road Maintenance Contract stating the maximum period between the time the defect/condition parameter was detected and the maintenance action was undertaken. Response times are based on the severity and extent of the defect/condition parameter and the level of asset usage.

Periodic maintenance and rehabilitation: Intervention levels are established for combinations of condition parameters to trigger investigation into major infrastructure preservation activities. For example, intervention levels are set for road surface roughness to trigger investigation into pavement rehabilitation. The optimum intervention level for road roughness is determined using a whole of life cycle costing analysis which includes ONRC Performance Measures (Amenity).

On the other hand, pavement resealing operations are usually triggered using a number of criteria/condition parameters, which may include, seal age, extent of surface distress (cracking and patching), rutting and roughness.

5.1.16 Approaches to Setting Maintenance Intervention Criteria

Risk assessment: Maintenance intervention criteria and asset performance targets, particularly those related to reactive maintenance activities, are established using a risk management approach to best meet reasonable community expectations within the available budget. Maintenance intervention levels and response times vary across the road network in line with relevant risk factors such as the nature and volume of traffic using the road, operating speed, the susceptibility of assets to deterioration, the cost effectiveness of repairs and the competing priorities for funding.

Risk assessment combined with engineering judgement and community input is the most common process used by Council in establishing intervention criteria for most condition parameters of road assets. The Waka Kotahi Z/44 risk management methodology is used to determine the likelihood of an incident or failure and its consequences in order to establish the overall risk assessment. The risks considered are related to user safety, asset integrity, damage to other assets, utilisation of assets and environmental risks.

Economic Analysis: Council invests in a wide range of activities that help to achieve land transport outcomes and deliver value for money. Council does this by using the resources made available through the Financial Assistance Rate provided from the National Land Transport Fund and the revenue it gathers through rates.

The Transport Agency's Economic Evaluation Manual (EEM) provides procedures to evaluate the economic efficiency of Council's investment proposals in line with the Transport Agency's Assessment Framework. The EEM's procedures sit within the investment policy framework set out in the Transport Agency's Knowledge Base.

The EEM employs a whole of life cycle costing economic analysis procedure to compare competing investment options over a given time period to identify the option that results in the minimum total life cycle cost. Since Council aims at minimising the cost of maintaining its assets over their whole life cycle, it uses the EEM, where possible, to set the optimum intervention criteria that achieves the minimum total life cycle cost. The EEM considers benefits and costs expressed in quantitative money values.

The EEM analysis to set intervention criteria is limited to preservation and rehabilitation works of road pavements. This limitation is due to a lack of reliable life cycle deterioration and works effects prediction models for the other assets. In practice, however, the final selection is based on available funds, equity considerations, community expectations in terms of CLoS and engineering judgement regarding the reliability and accuracy of the prediction models for road deterioration and works effects.

5.1.17 Road Asset Condition Monitoring

Asset inventory and current condition data is a central aspect of road asset management. Inventory data such as; reference number to road segments, road name, road category, road length, lane width and other dimensions, road location, road traffic (lane or overall), pavement age, seal age, shoulder and table drainage, are important for locating the asset and are used for predicting the asset performance over time and determining the cost of closing performance gaps.

A High Speed Data Survey will be carried out every two years on Arterial, Collector (primary and Secondary) and Access Roads with traffic counts greater than 500 AADT. The data collected and reported on includes;

- Skid Resistance (both left & right wheelpaths in 10m averages)
- Texture (left, right & Mid wheelpaths in 10m averages)
- Rutting (both left & right wheelpaths expressed in 20m averages)
- Roughness (left, right & Land IRI and NAASRA in 20m and 100m averages)
- Alignment Gradient, Crossfall and curvature (in 10m averages)
- GPS NZMG & NZTM (in 10m averages)
- Digital HD Widescreen Video (5m frames)
- Associated reports, including Skid Resistance & Texture Exception report.

The condition of the asset is described by a set of attributes. The quality of these attributes changes over the lifetime of the asset. Sound decisions about interventions and investments rely to a large degree on knowledge of the current condition and the rate of change in the condition of the asset.

Condition monitoring is the continuous periodic quantitative assessments of the actual physical condition measurements of all asset classes (e.g. pavement roughness, bridge strength, signage reflectivity). The set of condition parameters to be measured and assessed describe the long term performance of each type of asset. The performance of a road asset is assessed in terms of its function (safety, serviceability, physical appearance, quality of service) and structural condition (load-carrying capacity, structural integrity, durability). Pavement roughness, for example, is a functional performance measure and an indicator of structural condition while skid resistance is a measure of the safety function.

Interpreting Performance Measures results requires a good understanding of the asset's failure modes, the timing, consequences and associated risks of the failure and an understanding of how the condition of the asset affects the quality of services it is intended to provide and the perceptions of the users. The parameters selected must be able to be: assessed or measured in an objective, accurate, verifiable and affordable manner used selectively for modelling to forecast deterioration and estimate future condition.

Condition monitoring processes provide relevant information at an affordable price. They include a number of methods including measurement of specific parameters (e.g. rut depth) or visual examination by qualified staff (resulting in a condition rating on a predetermined scale).

5.1.18 Network Segmentation and Data Aggregation

Network segmentation and data aggregation are used to characterise the road network for the various possible forms of Whole of Life Cycle Cost (WOLCC) analysis. The input data is representative of the network and appropriate to the level of analysis being undertaken. The analysis varies from a strategic level to the development of project level recommendations on individual road segments.

The two key interrelated steps are road network segmentation and data aggregation:

Road network segmentation subdivides the road network into manageable and homogeneous lengths.

Data aggregation is the aggregation of the road inventory and condition information into the defined segments in order to adequately reflect the characteristics of the road segment.

The above two processes are inter-dependent. Further data aggregation is then conducted by transforming the road inventory and condition data into uniform segments that were defined during segmentation.

The segmentation of road networks can be rigorous and repeatable, based on either engineering judgement, or the use of a fixed pre-determined length. Segmentation of pavement lengths is based on homogeneity where at least some of the relevant condition and use parameters are relatively constant and statistically representative values of the relevant condition and use parameters. A combination of the two approaches is used as a practical means to gain representative segments.

5.1.19 Performance Gap Analysis

An analysis was carried out to reveal performance deficiencies or gaps in the network where the asset is below the ONRC-CLoS and Performance Measures.

The gap analysis was done to develop the 2018-21 Long Term Plan and a 30 year rolling program for road network maintenance management. This facilitates the preparation of long term budgets and the planning of resources and maintenance activities. These long term programs are reviewed annually giving consideration to projects deferred from the first year's program, the backlog of needs and the availability of resources.

The gap analysis was performed considering asset ONRC-CLoS and Performance Measures in terms of configuration, condition and operational performance. Separate funds were allocated to the different programs including investment, rehabilitation and periodic maintenance. The activities under these programs are co-ordinated to ensure efficient utilisation of Council resources and funds.

The gap analysis established the required investment plan by projecting the road asset parameters to determine the required ONRC-CLoS and Performance Measures to estimate future needs. The processes of gap analysis and investment planning and evaluation is not carried out in isolation, they interact and the output from one process is used as input into the other.

5.1.20 General Aspects of Investment Planning and Evaluation

Investment planning and evaluation identifies where and when to invest resources in the most cost-effective manner on the road network for the road users. This is undertaken in the context of the following:

- The Strategic Assessment which covers initiatives such as, sustainability, a growing economy, etc
- The Strategic Priorities that define what needs to be done
- Key Results Areas (KRAs) statements that quantify progress in meeting Strategic Priorities.
- Performance Measures are identified in response to the goals and objectives and indicate the condition state of the network and form a reference for future network condition states
- Technical tools and data allow objective evaluation and optimisation to select the appropriate strategy from various alternatives to maintenance and/or improve road network performance
- Monitoring and feedback is needed to assess the impact of past and present investments on the road network.

The last activity above is an essential input to the performance gap analysis.

5.1.21 Formulation of Total Needs Program

This step identifies intervention options to close the asset performance gaps. These intervention options comprise the total needs program. It is expected that owing to resource constraints, only a portion of the total needs program will receive funding. To ensure an equitable allocation of resources and to achieve Council's objectives, the total needs program is prioritised.

The formulation of the total needs program involved the following process for each asset performance gap.

Investment planning: investigating intervention options including engineering and management solutions such as road use policy initiatives, preventive or periodic maintenance, rehabilitation, reconstruction, construction, education, incentives, or penalties. During this process maintenance works are integrated with capital upgrades to ensure efficient and sufficient investment of funds.

Investment evaluation: defining and broadly costing phases of potential projects and identifying the optimal intervention option to close the gap. Evaluation is applied to all programs including the routine maintenance program. Coordination of these programs takes into consideration that if rehabilitation, reconstruction or replacement is due then routine maintenance for the same segment could be excluded. The total needs program is the final list of projects created from the above process.

Budget scenarios define for the activity management model the amount of money that can be spent in any particular year of the analysis. The model uses the allocated money to optimise the network. That is, a single strategy is selected for each of the analysis sections based on the overall benefit to the network as a whole and on the available funds. The result of prioritisation and/or optimisation and funding scenarios lead to the identification of the works program.

5.1.22 Maintenance Treatments and Strategies

Maintenance Treatments: are actions Council takes on a given asset to either reduce the deterioration rate or to repair the effects of deterioration. A set of generic maintenance treatments are used for network level analysis to determine the optimum options for each performance gap and the required budget for keeping the network at the defined ONRC CLoS and meet the Performance Measures. These treatments are selected and programmed based on common intervention practice by Council.

Depending on the purpose of treatment selection, the approach to carrying it out varies. The two main approaches considered are as follows:

- Network level approach – used for planning and priority programming, including selecting network investment strategies and screening to identify major defective sections of the network
- Project level approach – used for treatment selection and/or design and evaluation of maintenance effectiveness.

Within the above two approaches, two different types of treatment selection processes are used:

- Scheduled – that is, a fixed amount of a given maintenance type per year or a given maintenance type at fixed intervals of time
- Condition-responsive – that is, maintenance intervention when the asset condition is predicted to reach a specified intervention level.

Scheduled maintenance tends to be undertaken for the more unpredictable works such as environmental maintenance, e.g. drain clearing, or where the cycle of deterioration is relatively rapid (vegetation growth, unsealed road grading, etc.). Condition-responsive methods are used in most other situations.

Maintenance Strategies: maintenance strategy or treatment intervention strategy is where a major treatment occurs in a particular year, during the life cycle of the asset, possibly combined with a secondary treatment in a later year which can also be combined with ongoing preventive maintenance and reactive maintenance treatments. Each strategy has an associated present value cost and a present value benefit. The benefit is measured by the impact of each of the treatments contained in the strategy on the performance.

The application of the treatment or treatments are specified by time or condition level (intervention level or criteria). A set of maintenance strategies (treatment types and timing) for each asset, for use at network level analysis, has been developed for different ONRC category and associated CLoS together with relevant treatment intervention criteria.

A whole of life cycle cost analysis is used to determine the strategies that achieve minimisation of total life cycle costs at network level. The selection of the optimum maintenance strategy for each ONRC category and associated CLoS is based on economic criteria and/or multi-criteria.

Determining the optimum set of maintenance strategies requires performing a number of analyses using Council and Waka Kotahi business rules for maintenance management. This process involves reviewing historical records on expenditure, maintenance practice and effects of past and current strategies on budget and asset performance.

For each gap, the optimum maintenance strategy applicable to the ONRC category and associated CLoS is applied and related costs are determined. The intervention options are then listed and ranked considering using economic criterion. The maintenance interventions defined by Council and Waka Kotahi are used to select appropriate treatments to meet Performance Measures.

5.1.23 Approaches to Prioritisation

The road network components of most interest, and of high priority, are:

- those that are the most expensive (in terms of life cycle costs)
- those that are key contributors to performance (to satisfy stakeholder needs)
- those that are the most prone to deterioration or need ongoing maintenance investment.

The components of the highest priority include road formations (cuttings, embankments and the sub-grade), drainage, pavements (the road surfacing and structural layers that support the traffic loading), safety and bridges.

Council's approach to prioritisation is based on asset preservation. The process utilises the Pavement Condition Index (PCI), a numerical index between 0 and 100 which indicates the general condition of a pavement. PCI is a function of strength, roughness, rutting and the consequences of routine maintenance application.

New capital works are often initially prioritised in terms of Benefit Cost Ratio (BCR) but a final decision on which

projects will be funded follows the Business Case Approach.

5.1.24 Optimisation Techniques

The optimisation employs optimum intervention standards, which take into account whole of life cycle costs. The intervention standards identify projects which are inspected and listed in the expenditure scheduling system for the total needs program "the long list". The funds for these projects are then allocated on priority.

The approach for prioritising projects is transparent and objective. Not all externalities and possibilities are taken into account in this model, but it does serve as a guide to project suitability and provides an objective indication of the benefits gained or forgone by including alternate programs. To achieve the true benefits of Integrated activity management both capital and maintenance works are considered together in a transparent process.

Council takes a top-down approach to optimisation. The top-down approach first determines the desired goals (ONRC CLoS, intervention levels, capacity, etc.) for the entire network then selects the individual projects based on those goals. The top-down approach is considered to be the most expeditious because the individual projects are determined after the network goals are set.

5.1.25 Funding Policy

The ultimate limiting factor governing decisions on which projects can be included in Council's Long Term Plan, the Regional Land Transport Plan and the National Roading Programme is the level of available funding. Setting this level of funding is a complex matter requiring numerous iterations of the process. When seeking Waka Kotahi subsidies Council has to ensure that it can meet the local share before submission.

Council's Financial Strategy guides decision-making from the outset and provides guidance for resolving the complex issues that need to be addressed during preparation of the roading infrastructure program.

5.1.26 Backlog of Needs

The change in the backlog of needs presents the impact of funding decisions. Backlogged needs are defined as the management sections or items to which maintenance and rehabilitation should have been applied, but which were not funded. This is presented by the amount or percent of asset area or number of items backlogged. This amount is calculated by subtracting the quantity of assets selected for funding in the optimisation process from the quantity of assets identified as needing work in the needs analysis.

5.1.27 Deferred Funding Needs

Deferred funding shows the amount of money that was needed for maintenance and rehabilitation but was not available, resulting in the funding being deferred until some later time. The deferred amount is calculated by subtracting the funds allocated in the optimisation process from the amount of funds estimated to undertake the work identified in the needs analysis process.

5.1.28 Stop-Gap Maintenance

The amount of stop-gap maintenance is another measure that can be used to demonstrate the impact of different funding scenarios. Stop-gap maintenance is used to describe maintenance and some rehabilitation treatments that are applied to keep a pavement section in serviceable condition until the funding required to correct the underlying problem is available.

These treatments are applied to backlogged pavement sections that are in such a poor condition that they cannot tolerate any further funding deferral and need some money spent on them to keep them serviceable. These sections can be described either in terms of the amount or percent of asset area to which stop-gap maintenance is applied or in terms of the additional funds needed.

5.2 Operations and Maintenance Plan

5.2.1 Introduction

Council ensures that all items of program development and implementation align with the strategic direction by;

- setting maintenance intervention criteria for the different road assets depending on their One Network Roading Classification ONRC
- using the ONRC Customer Level of Service (CLoS) Performance Measures
- aligning the programme with the strategic direction and CLoS Outcomes
- optimising the intervention options when developing the total needs program
- prioritising candidate projects when developing the works program
- selecting the types of treatments, materials and construction techniques when implementing the program
- ensuring that the Activity Management Plan (AMP) follows the strategic direction.

The activity management process is intended to deliver agreed levels of service in the most cost effective meaner to present and future customers. Managing the transportation network infrastructure is simply one of the inputs to this process. At the highest level, the services to be delivered and standards to be achieved are those that contribute towards the achievement of the community outcomes in Council's Long Term Plan. Gaps between required standards and services and the ability of the network to deliver them are identified and processes are put in place to manage these gaps within acceptable margins. In managing these gaps both asset solutions (such as new or enlarged asset elements) and non-asset solutions (such as use reduction programmes) are considered. Decisions on the option to be followed in any particular instance are based on a range of factors such as risk assessments, legal requirements, through life costs, customer approval ratings and the ability of the community to pay for system improvements. The detailed considerations behind these decisions are not made or detailed in this AMP; rather, they occur during the early stages of the projects' development as determined by the complexity, scale and potential effects of the problem / issues and the options available to address them.

5.2.2 Operational Objectives and Intervention Levels

In order to fulfil Community Outcomes, Vision, Goals and Objectives, Council have adopted a systematic approach to the long term management of its assets by preparing this Activity Management Plan.

The key objective of AMP is to provide a desired level of service in the most cost effective manner while demonstrating responsible stewardship for present and future customers. Activity Management Plans are a key component of the strategic planning and management of Council, with links to the LTP and service contracts.

The AMP underpins the Long Term Plan (LTP) and consultative processes that have been put in place to engage the community. The AMP delivers a range of benefits to the community as well as to the provider of the services, the main ones being:

- Maintain, replace and develop assets over the long term to meet required delivery standards and foreseeable future needs at minimal cost
- Continually improve activity management practices and service delivery to the customers
- Comply with Statutory Requirements.

5.2.3 Developing Maintenance Plans and Procedures

Activity Management Systems

The primary activity management system in use is RAMM (Road Assessment and Maintenance Management), which is the main repository for all of the Councils roading asset inventory and condition rating information. RAMM software has been developed over a number of years and is used by most Road Controlling Authorities in New Zealand to manage their roading assets.

This system, combined with integrated predicted deterioration modelling functions and asset valuation modules, provides the asset information to produce this plan, and operate and manage the network. The software is developed and supported by RAMM Software Ltd, Auckland.

Monitoring, Supervision and Quality Assurance

Council actively monitors the performance of the contractors, internal professional services unit and consultants to ensure that the performance standards defined in contracts are continually achieved. Contract C/4-1005 Road network Maintenance includes specific network surveillance and condition monitoring as part of the overall network monitoring program.

Monitoring: The following table lists the main asset and condition monitoring

Asset Category		Monitoring
Roads	Road Pavement	Network Inspection: Inspections by road maintenance contractor ranging from weekly to monthly based on road type Daily monitoring by Council Roading staff RAMM Rating: All sealed roads carrying >=500 veh/day – rated annually as per RAMM processes 50% of the remaining sealed local road network rated annually so that all are rated once every two years Roughness, skid resistance, surface texture, pavement rutting surveys on major routes and other roads carrying < 500 veh/day are conducted three yearly Unsealed roads are currently not rated
	Footpaths	Annual inspection of 100% of network by roading staff and contractor RAMM Condition rating of 100% of Network at 3 year intervals (last in 2016)
Drainage	Culverts (<3.4m2)	Annual visual inspection by road maintenance contractor
	Kerb and Channel	Annual inspection of 100% of network by roading staff and contractor RAMM Condition rating of 100% of Network at 3 year intervals (last in 2016)
	Sumps	As part of cyclic cleaning programmes
Structures	Bridges, Large Culverts (>3.4m2), Retaining Structures	Routine visual inspection included in network inspection by road maintenance contractor and Council roading staff Detailed inspection every 12 months, and during and following natural events Detailed 6 yearly structural inspection on rolling cycle
Safety Facilities	Road Markings, Edge Marker Pegs, Raised Reflective Markers	Routine visual inspection included in network inspection by road maintenance contractor and Council roading staff. Road Markings are repainted annually
	Signs, Guardrails, sight rails	Routine visual inspection included in network inspection by road maintenance contractor and Council roading staff
	Street Lights	Regular night time inspection and annual daytime inspection by street light maintenance contractor and council staff

Supervision: Regular auditing of contractors and consultants performance is undertaken to ensure performance measures are being met (as detailed earlier in this section of the plan). The Council roading team audits contractors performance by measurement and inspection of work, and of the roading assets.

The Council's roading team has engineers who are dedicated to the operations and performance of the road network maintenance contract. They provide an important conduit between the contractor and the engineer to contract in the identification and resolution of any problems or issues as they occur.

The Council's roading team have daily contact with the contractors to;

- Keep informed of where the work is being done
- Inspect work on a daily basis resolving any issues on site
- Report to the Engineer on the work being done
- Approve work to the Contractor
- Clarify contract issues
- Have a crucial role in developing and maintaining the partnering approach and relationships essential to the successful management of long term contracts, e.g. the road maintenance contract.

Quality Assurance: All main contractors, stipulated as part of any contract, are required to submit for approval a Quality Assurance Plan(s) prior to the commencement of the contract that establishes standard and specific quality procedures relevant to the work being conducted. This is particularly relevant for the main on- going road maintenance, road marking and street lighting contracts. For term period contracts, the Quality Assurance Plan(s) are reviewed updated each year of the term of the contract.

5.2.4 Operational Process Plans

Categories of Road Maintenance Programs

The main objective for Council is to maintain its assets at appropriate CLoS and structural integrity at the lowest possible cost (Council and user costs) without creating any significant adverse impacts on the environment, user safety and community activities.

The program development process involves identifying infrastructure needs, determining the maintenance works program and funding needs to ensure adequate performance of existing assets. Council's maintenance programs fall under four categories namely; (1) Emergency and Resilience Improvements, (2) Maintenance-Routine, (3) Maintenance-Renewals, (4) Minor Improvements. The activities carried out under these programs are defined below.

Emergency and Resilience

The response to a defined, major, short-duration natural event that has reduced or will reduce customer levels of transport service significantly below those that existed prior to the event and results in unforeseen, significant expenditure. Resilience improvements are non-routine work required to protect the serviceability from damage, and to minimise the threat of road closure arising from natural phenomena.

Maintenance-Routine

Comprises those activities for which deferment is not an option, with public safety identified as the highest priority. These activities include; Sealed pavement maintenance, Unsealed pavement maintenance, Routine drainage maintenance, Structures maintenance, Environmental maintenance, Traffic services maintenance, Cycle path maintenance, Level crossing warning devices, Network and asset management.

Maintenance Renewals

Comprises those activities which are required to improve/preserve asset functional integrity to meet road infrastructure performance targets and reduce future deterioration. These activities are designed to reduce future deterioration by timely surface interventions that limit the need for expensive rehabilitation while also ensuring that general safety levels are maintained. They include; Unsealed road metalling, Sealed road resurfacing, Drainage renewals, Sealed road pavement rehabilitation, Structures component replacements, Traffic services renewals.

Minor Improvements

Provide for the construction/implementation of low-cost/low-risk improvements to the transport system to a maximum total cost for approval per project of $1,000,000. Routine maintenance activities do not form part of the works program as they are mostly reactive in nature and triggered by defect development, incidents or user complaints and require short response times. Further, their allocated budget is based on expenditure in previous years and/or contractual lump sum amounts with the budget remaining relatively stable over the years.

Developing annual and medium (three to five years) term works programs for asset maintenance and renewals is based on current and predicted asset needs and/or performance gaps as measured by the ONRC Performance Measures Reporting Tools.

5.2.5 Outline of Program Development Process

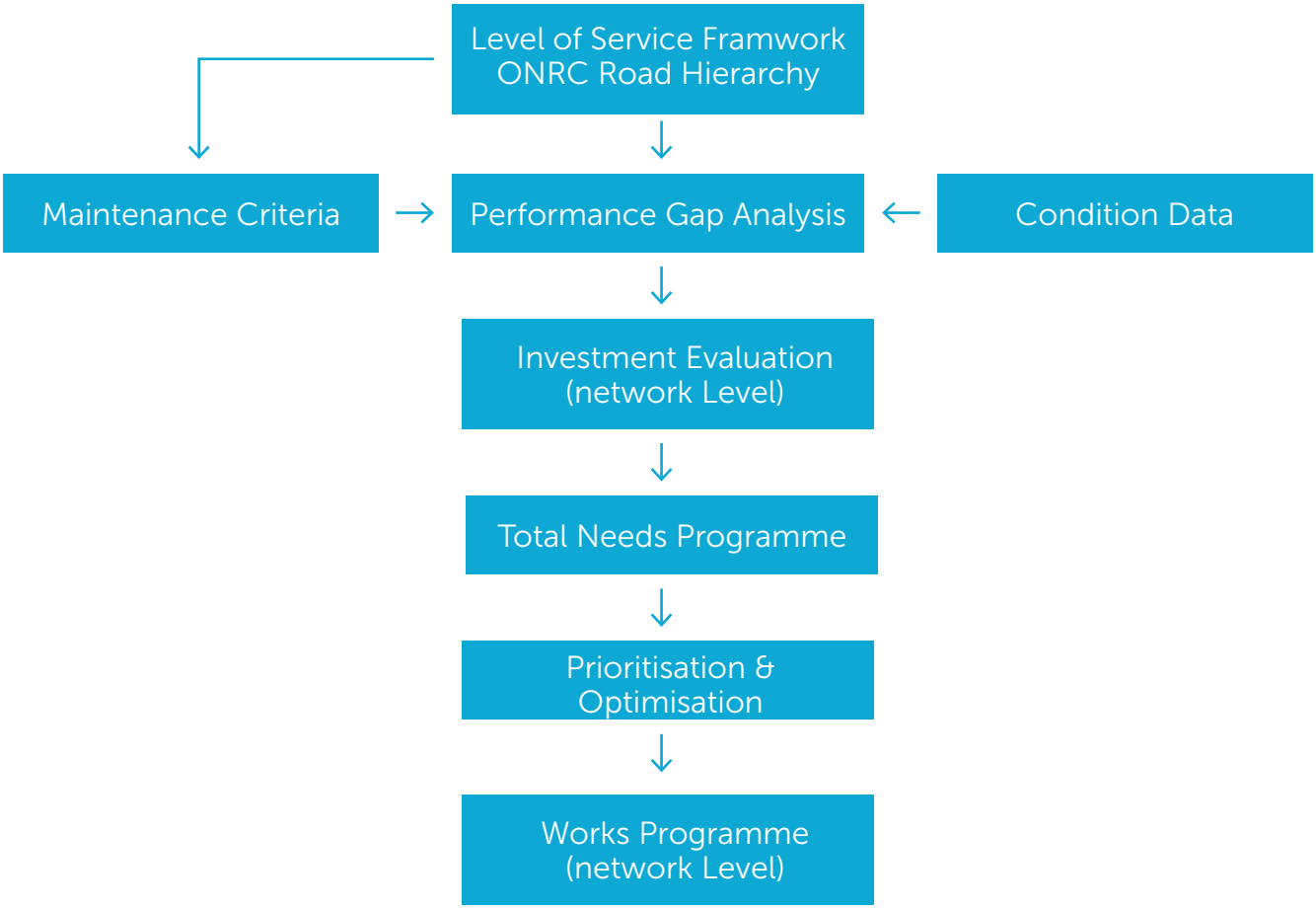
Separate funds are allocated to the different programs including investment, rehabilitation and periodic maintenance. To ensure efficient utilisation of Council's resources and funds, the activities under these programs are co-ordinated. The reasons for separating out maintenance are as follows;

- A large proportion of road maintenance work is of a routine and fixed nature and is not subjected to assessment and appraisal
- Periodic maintenance, e.g. resealing, is usually a case of timing and treatment selection with the aim of minimising the whole of life cycle costs, including road user costs, for the whole road network
- Major rehabilitation projects are appraised to identify the rehabilitation needs using a whole of life cycle cost minimisation. For each identified maintenance project, Net Present Value (NPV) calculations are carried out to rank the selection and timing of rehabilitation treatments
- Growth projects are appraised and developed using the Business Case Approach
- The flow chart below shows the process of works program development at the network level. The process starts by identifying asset requirements in relation to the ONRC which involves establishing a CLoS hierarchy, setting performance targets and maintenance intervention criteria for the assets for each road class in the road network.

This information is then used in conjunction with the asset condition and inventory data in a performance gap analysis to identify current or future needs. Identifying future needs requires using performance and demand

forecast models, appropriate maintenance strategies and models that predict the impacts of maintenance works.

Process of Works Program Development at the Network Level



The needs are then evaluated to identify optimal intervention options (maintenance and rehabilitation treatments) to close the asset performance gap and establish budgetary requirements. In a generic sense, the options that minimise Council and road user costs, in a life cycle cost context, are considered to be optimal. These intervention options comprise the total needs program.

To ensure an equitable allocation of resources and to achieve Council's desired outcomes, prioritisation and optimisation techniques are used to identify the optimum combination of projects that could be achieved under different funding scenarios. As well as aiming at minimising life cycle costs, the process of optimising and prioritising includes consideration of strategic network requirements and strategic corridor improvements.

The result of prioritisation and/or optimisation leads to the identification of the works program. The final works program includes the funding required for the different maintenance programs, together with details of the specific works.

The three year rolling programme for road network maintenance management facilitates the preparation of medium term budgets and the planning of resources and maintenance activities. The three year program is reviewed annually giving consideration to deferred projects from the first year's program, the backlog of needs and the availability of resources.

5.2.6 Network/System Level Management

Network/system level management decisions affect the maintenance programs for the entire system. The management system considers the needs of the network as a whole and provides information for a District-wide program of new construction, maintenance, and rehabilitation. The goal of this level is to optimise the use of funds over the entire system.

5.2.7 Project Level Management

Project level management is where specific maintenance treatment/approach alternatives are examined on a technical and economic basis in order to make decisions about which specific maintenance treatment/approach will be used for each project. At this level, detailed consideration is given to the alternative design, construction, maintenance and rehabilitation activities for specific maintenance projects.

For maintenance and rehabilitation this is accomplished by comparing the NPVs of several alternatives with their associated life cycle activities and selecting the alternative that provides the highest net benefits for the least net total cost over the projected life of the project.

For minor improvements (under $1,000,000), the primary most cost effective sites are identified and ranked in order of importance against the rest of the network. The development of capital projects will follow the business case approach.

5.2.8 Linkage Between Program Development and Annual Planning Cycle

The strategic planning process is conducted on a cyclic basis, linked to Council's planning and funding cycles. The linkage occurs as follows:

The annual planning process commences with an asset performance gap analysis. During this stage, the set of committed projects is restated, while infrastructure needs are identified. These investment needs result in the total needs program. All necessary overhead costs are included as part of the investment.

Optimisation and/or prioritisation of investment options results in the identification of revenue requirements. Such requirements are presented to the funding providers (Council and Waka Kotahi) and a process of negotiation takes place. Depending on the outcome of the negotiations and various funding scenarios, investment options and prioritisation may be reviewed.

When Council is satisfied with the revenue requirements for the funding scenarios, the requirements become the works program that is submitted to Waka Kotahi. Following budget submission, the next annual cycle commences. The actual funding allocation process typically spreads over a few months.

5.2.9 Program Development

The decision-making process for road activity management is a combination of bottom-up and top-down approaches. It is bottom-up in the sense that needs are generated from the component level, and it is top-down in the sense that budgets are dictated by Waka Kotahi's requirements and Council as part of the political process.

Council has adopted a combination of these approaches in developing the maintenance works program. The program is developed at the District level by Council staff based on guidelines prepared by the Waka Kotahi. Waka Kotahi considers the Council's submissions and makes funding allocations, as appropriate, under each work category to the District. On receipt of allocations, Council reviews priorities and determines the works that should proceed determined through economic and business case analysis.

5.2.10 Information Management Systems

Current Council information systems used in the roading and street services function are outlined below. Other activity management systems are used by other asset managers within the Council. Linking and integration of systems is a corporate function.

Information Management Systems	
System	**Current Business Practice**
Asset Registers	RAMM Reliable asset registers available for most assets except berms and markings
Financial System	Ozone Job costing system available, via general ledger system Costs allocated at activity level only Inflation adjustment application Asset valuation generated in RAMM formulated from the database inventory
Maintenance Management	Maintenance records held in RAMM, direct entry by the Maintenance contractor
Contract Management	Maintenance standards specified in maintenance contracts RAMM and manual works order systems for unscheduled or out of contract work
Condition/Performance Monitoring	Good performance and condition information for major asset groups, i.e. pavements, bridges
Customer Enquiries	Customer service system in place
Work Planning	RAMM treatment selection analysis undertaken Bridge repairs identified and programmed Minor asset groups defect analysis less developed
Risk Management	No corporate risk management strategy in place AM plan to include risk register and analysis
Optimised Renewal Strategy	RAMM treatment selection module available for pavements Effective lives assigned to all asset groups
Forward Works Programme	Forward programmes developed for major road improvement projects, seal extensions, seal widening and bridge renewal. Development based on a good assessment of needs confirmed under consultative processes
Integration of Systems	Extensive use of RAMM throughout planning and operations All databases have GIS type interfaces or functionality
Plans and records	Hard copy plans held for most major project and improvement works. (availability reduces as further back in time) All new plans/as-builts on digital systems, and on consents information system
GIS	GIS used for spatial representation of assets

5.2.11 Accounting/Financial Systems

All expenditure on infrastructure assets falls into one of three categories:

- Operations and maintenance
- Renewals
- New improvement works and disposals.

5.2.12 Financial Management System

All Council activities are required to have their financial results reported externally in a way that complies with generally accepted accounting practice (GAAP) in New Zealand. The Finance Team ensures that GAAP is complied with by regular updates to the Council's Accounting processes, and the on-going formal and informal training and education of staff in departments throughout the Council.

The activity relies on the Council's core financial systems which include: Ozone accounts payable, time entry, purchase orders, general ledger, accounts receivable, cash receipting, bank management and rates, plus inputs from other Local Government regulatory systems such as Person/Property, Infringements, Licensing, and Consents.

5.2.13 Requests for Service (Public Enquires and Concerns)

To assist reactive maintenance, Council deploys a Customer Service via Origen. Contact Centre Transactions (CCT) requests for service are received through Council's Contact Centre during business hours and the Palmerston North City Council after hours service centre. CCTs are presently recorded via the Origen system and forwarded to the appropriate council staff or maintenance contractor for action. The CCTs are recorded with the appropriate details (name, location, issue, priority etc) to enable tracking for resolution etc.

The receiving officer/maintenance contractor is required to action the enquiry within a specified period. Once the issue is resolved to council's requirement the details are updated with completion time/date and any issues etc. The information in this system has been interrogated to produce the information in the Levels of Service section of the AMP.

Performance Rating – Residents Survey: The Council undertakes both customer surveys and assessments of the complaints/service request records to obtain information on the delivery of levels of service to customers. This research identifies areas that are performing well, those that require improving or require intervention. Also of significant value to Council is regular meeting minutes with various Community Committees and Boards throughout the District which provide wide ranging information and highlight any particular issue to be addressed. This information compliments the regular management inspections of assets undertaken by Council and their agents.

Service Requests: Customer contacts and requests are recorded in the corporate Ozone Service Request system. The records information pertaining to a particular item, a facility to request services and provides Council with a monitoring facility for response times to requests from Customers. The tracking of a type of activity can be monitored against contractor performance or whether a significant issue is/or has occurred within the District.

5.2.14 Activity Management Systems

Maintenance works programs for road assets are developed using Road Assessment and Maintenance Management (RAMM) software. This software is used by Council to manage Road Inventory Assets and Condition for their Network. RAMM is the complete package for asset maintenance, valuation, assessment, Forward Work Planning as well as inventory-based asset management. It also includes a range of report and analysis applications which complement the management functions.

RAMM is a tool for organising all the activities that go into providing and operating assets, ranging from the collection, processing and analysis of data, the identification of current and future needs and the development of rehabilitation and maintenance programs to implementation of the programs.

The ONRC functional classification and Performance Measures help to improve efficiency of decision making, provide feedback regarding the consequences of decisions and allow the testing and optimisation of different budgets.

RAMM is divided into information management systems and decision support systems. Figure 5-4 shows the elements of the pavement activity management System (AMS). It is not critical that the whole AMS is fully integrated, provided the different modules/elements are interfaced appropriately.

The elements incorporated into the AMS are dependent on Council's needs. Selecting the most appropriate combination of AMS elements for Council involves considering a number of conditions including District size, organisational structure, past management and decision making practices, stability, planning horizons, resources and fixed investments. Council also estimates the amount of resources it needs when implementing an AMS.

RAMM is used to analyse the high volume of detailed information required for a variety of activity management functions. RAMM has connectivity with other Council information databases so that information can be easily transferred e.g. Intramaps and Ozone. GIS enables identification and an asset from the office or the field as well as facilitating the scheduling, reporting and coordination of maintenance activities.

RAMM Software: Is the Council's prime inventory system for its roading assets is the RAMM (Road Assessment and Maintenance Management System) database. The RAMM system is web-based and the councils data is hosted by by RAMM Software Ltd. The system is available simultaneously to users in the Council and to its contractors, consultants and data-maintainers. The RAMM "Mapping Interface" is used but it is not linked to the corporate GIS system.

The database is updated constantly following maintenance and renewal work activities this enables forward work programmes to be developed, for both the short and long term.. This programmes provide analysis, prediction and costing of major pavement renewal works such as reseals and sealed road pavement rehabilitations, in addition to other works such as kerb and channel and footpath renewals.

Road network maintenance data is entered directly by the contractor and used for activity management and contract management purposes.

The Council also uses the RAMM system to undertake valuation of the asset, using the Asset Valuation Module.

Inventory: An extensive range of inventory items can be recorded using RAMM under the following broad headings:

Heading	Inventory Item
Carriageway	Road name/location Descriptions/dimensions Summary traffic volumes and loads Ownership
Treatment lengths	Condition Maintenance activities Pavement type Treatment-intervention cots
Traffic	Traffic volume Traffic mix
Carriageway Surfacings	Description/dimensions Location/age/surfacing
Pavement Structure	Pavement layer Rehabilitation
Kerbs and Channels	Location Type Descriptions/dimensions Ownership
Footpath and Berms	Location Descriptions/dimensions Surfacings Ownership
Drainage	Dimensions/type Location/maintenance Ownership
Traffic Facilities	Location/type Quantity/maintenance Ownership
Bridges and Major Culverts	Components Dimensions Restrictions Ownership
Route Data	Features Location/type
Street Lighting	Pole location/material/type/dates/ownership Lamp type location/dates/ownership Bracket type/dates

Asset Valuation	ORC ODRC AD Expected life RUL Effect of condition on life Replacement asset type How asset element is measured (volume, area etc) Predicted depreciation
User-defined items	In addition RAMM can cater for an unlimited number of user defined items

RAMM also has built-in functionality:

- To record requests for service and track their progress and completion
- To issue works orders
- For pending work to be recorded by location and asset element
- For the contractor to sign-off repairs as they are completed and update the asset data base accordingly
- For collection and updating of data
- For interpretation of problems and issues on-site – though the availability of all data held on the asset element.

RAMM Condition Rating: Condition rating is part of the RAMM system. Condition rating survey frequencies meet the Transport Agency requirements as per Planning and Investment Knowledge Base. Roughness and condition rating surveys of all sealed roads will be undertaken at least every second year. Condition rating surveys of all sealed roads carrying more than 2000 vehicles per day will be undertaken annually.

Each sealed road section's condition is accessed and recorded, based on a visual assessment of pavement condition (20% of sealed road rating surveys at 200m intervals) and roughness data from a mechanical/electronic survey of the road.

Roughness is measured using a NAASRA/IRI roughness meter or laser profile meter attached to a vehicle while a team of two on foot usually collects visual data.

Road condition is measured by recording absolute values for defects rather than condition indices or scores. For example, the number of potholes is recorded in each inspection length. The defects measured are cracks, deformation, surface texture, disintegration, edge defects and surface roughness. Condition of other asset groups is stored in appropriate spreadsheets, i.e. footpaths, kerb and channel etc.

RAMM Treatment Selection: The absolute values of defects and distress are used in a costing algorithm in RAMM which takes into account the faults measured, carriageway roughness, traffic volumes and maintenance cost, to determine overall costs of alternative treatments. All unit costs are determined by the user.

Treatment alternatives vary depending of the type of pavement, as outlined in the following table, and are reported for the current and subsequent years.

Treatment Alternatives	
Treatments	**Options**
Flexible Thin Sealed Pavements	Continued routine maintenance Resurfacing Smoothing Strengthening
Structural Asphaltic Pavements	Reconstruction Milling and replacing unstable surface mix Thin overlay Thin overlay over a stress absorbing membrane layer (SAMI) Stress absorbing membrane reseal (SAM) Conventional reseal Continued general maintenance
Rigid Pavements	Rigid pavements are not currently catered for in the analysis module of RAMM . Rigid pavements are bridge decks. These are inspected and analysed separately by bridge specialists

Treatment Selection Logic: Treatment options are ranked based on BCR for pavement renewals, and priority indicators (PI) for resurfacing. Priority indicators (PI) are calculated by dividing the additional cost in maintaining a pavement for an additional year by the cost of resurfacing, to give a first year rate of return. The need for renewal of a pavement is checked against the required BCR. If the BCR is not satisfied it is then checked for a reseal. If a reseal cannot be justified then the treatment is to continue maintenance.

A preferred pavement renewal option and a preferred non-pavement renewal option is determined and then the two preferred options compared to determine the overall preferred option.

Life Cycle Cost and Pavement Performance Models: The RAMM system does not include performance prediction modes and life cycle costs are not determined. However, dTIMS provides the ability predict long term pavement deterioration and to optimise treatment selection in conjunction with sound engineering judgement.

Bridges – Inventory: All major inventory information on bridges is held within a separate database developed and maintained by the Council's bridging advisors, Opus International Consultants Ltd. This data includes:

- General — name, foundations type, superstructure type, and deck type
- Dimensions — span length, width and waterway area
- Loadings — design loading, restrictions and posted limits
- Inspections — date, full inspection data, general assessment (appearance etc.), superstructure condition, piers and abutments and waterway adequacy.

Consideration is being given to moving this data to the RAMM database.

Bridges - Condition Assessment: Each bridge is surveyed and inspected at least once every 6 years. All inventory information is captured and a full inspection performed in accordance with Waka Kotahi bridge assessment criteria. This provides the base information necessary to manage repairs and maintenance of the bridges.

The experienced personnel undertaking the bridge inspections assign the repair priorities. Priority levels are set on the basis of:

- Public Safety
- Traffic movement
- Maintaining structural integrity
- Future costs if the work is not done.

Subsequent inspections can be added to the database so a history of inspections is held for future reference. This is particularly important in the assessment of the performance of the asset in terms of particular trends and demands that develop and the corresponding effect on the asset.

The bridge inspection results are also used, by the inspectors, to assess the load-carrying capacity of each bridge. Where the capacity is reduced, by a bridge's condition, to less than normal highway loadings or a restriction on heavy-vehicle speed is required then the Bridge Inspection report includes an appropriate recommendation, in accordance with Section 11 of the Heavy Motor Vehicles Regulations 1974, regarding the imposition of restrictions.

Bridges in very poor condition are scheduled to be inspected at shorter intervals, based on their condition and expected rates of deterioration.

Bridges - Data use: The Council's bridging information is readily downloaded into spreadsheets for further manipulation. Costs can be attributed to the repairs and from this forward maintenance strategies can be determined with likely costs. This is then used to form contract work instructions.

Usually all the work identified cannot be undertaken in one year due to budgetary constraints. Under the repair prioritisation system the most urgent repairs are carried out first, with less urgent repairs programmed over subsequent years.

Data Quality: The assessed current completeness of activity management data is as follows:

Asset Classification	Suitable asset classification system adopted for asset
Asset Identification	Unique ID numbers allocated in RAMM for most assets
Asset Attributes, Spatial Data	Aerial photos available for the District
Plans available for most bridges and recent construction projects	
Asset Attributes, Textual Data	Pavements- >100% complete and ~95% accurate (RAMM)
	Bridges- >100% complete and ~95% accurate (RAMM)
	Footpaths- >100% complete and ~95% accurate (RAMM)
	Street lights- >100% complete and ~99% accurate (RAMM)
	Kerb and channel- >100% complete and ~95% accurate (RAMM)
	Signs- > 100% complete and ~95% accurate (RAMM)
	Markings- > 95% complete and ~95% accurate (RAMM)
	Minor culverts- 50% complete and 50% accurate (RAMM)
Maintenance Data	Routine maintenance activity and costs available from contracts

	Unscheduled maintenance work records available in hard copy form
Historical Condition and Performance Data	Good historical records for pavements and bridges only
Future Prediction Data	Good knowledge of future demographic and traffic trends
Future Prediction Data	Good knowledge of future demographic and traffic trends
Life Cycle Costs	Renewal and new improvement costs for common items known from recent experience

Geographical Information Systems: Council uses MapInfo, QGIS and Intramaps as for its GIS requirements. The GIS systems have some linkages with RAMM system to enable public access to some data.. Further RAMM datais made available to all Council Staff via Intramaps and used extensively through all Councils activities.

IT Responsibility: The responsibility for asset information security rests with the IT department administrators. The data is backed up at regular intervals and backup files are stored in secure lock-ups. Each system has a stepped password access system in place, allowing some staff to view the data only, and others to add and edit it. Data manuals are available that explain the various procedures.

Contract Management Systems: Maintenance Contracts are predominately managed using RAMM, however, some small value contracts are managed externally from RAMM (e.g. Road Marking). Management responsibility is assigned to specific staff members who are responsible for contract supervision and contract payments within their delegated authority.

Contracts contain detailed specifications, and those in period contracts continually evolve, being adjusted to reflect changes in best appropriate practice, need and other circumstances.

Although the Council does not have any formal contract management systems, it follows industry best practice in this area.

RAMM houses all the data required to develop maintenance, rehabilitation and improvement programs. The asset information system stores and updates data for effective use. The data management processes support the decision support system and a common reference system enables data integration.

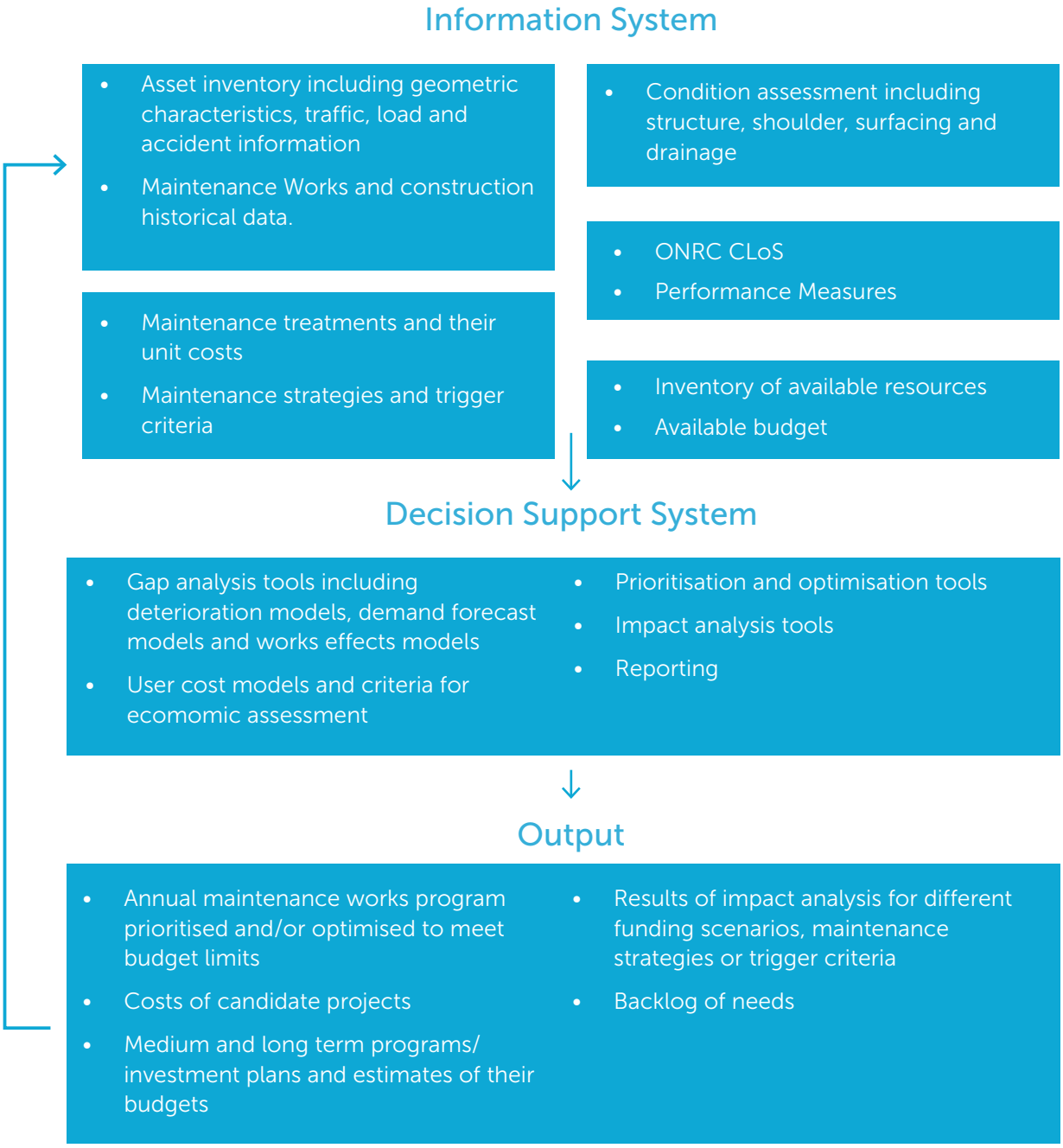
The Information System includes the following components:

- Asset reference system, which allows the identification and location of individual components of the road network
- Asset register, which lists the information relating to various aspects of the assets such as inventory, condition, traffic and other road use data, historical records of construction and historical records of routine maintenance, periodic maintenance and rehabilitation, etc

Other information required within the system includes:

- Key operational and performance data
- Maintenance data (available treatments and costs and benefits)
- Unit costs (maintenance and rehabilitation)
- Inventory of available resources
- Performance records
- ONRC and associated CLoS and Performance
- Technical standards including the asset configuration
- Asset valuation.

Elements of the pavement Activity Management System (AMS)



5.2.15 Planning for Emergencies, Crises and Incidents

Climate Change

New Zealand's climate varies significantly from year to year and from decade to decade. Human-induced long term trends will be superimposed on these natural variations and it is this combination that will provide the future climate extremes to which New Zealand society will be exposed.

The Ministry for the Environment has produced a document entitled "Climate Change and Long Term Planning" which advises that, "Projections of New Zealand's future climate indicate:

- Temperatures increase on average by 1 deg C. by 2040 and 2 deg C by 2090
- Rainfall has a pattern of increases in the west (up to 5 percent by 2040 and 10% by 2090) and decreases in the east and north (exceeding 5 percent in places by 2090). There is marked seasonality in the rainfall distribution pattern changes
- Seal levels will rise
- Decreased frosts
- Increased frequency of high temperatures
- Increased frequency of extreme daily rainfalls
- Higher snow lines and possible reduced snow coverage
- Possible increase in strong winds
- Wetter in the west and south, drier in the north and east
- Increase in frequency and severity of extreme events (e.g. heavy rainfall, storm surges, drought and very high temperatures).

The document also states 'Key principles for responding to climate change – local government is required to operate under a range of principles that are set out in law or have evolved through good practice and case law. The principles should also be kept in mind when adapting to the effects of climate change. The key principles are:

- Sustainability
- Consideration of the foreseeable needs of future generations
- Avoidance, remedy or mitigation of adverse effects
- Adoption of a precautionary approach
- The ethic of stewardship/Kaitakianga
- Consultation and participation
- Financial responsibility
- Liability
- Resilient communities
- Spill.

The following mitigation measures may be considered when taking into account climate change:

- Have regard to projections during planning phases
- Cognisance of areas located as being potential hazard zones
- Specialist advice.

Natural Hazard Management

The Manawatū District and surrounding regions are exposed to a number of natural hazards. From an activity point of view hazards have the potential to cause major disruption and need to be taken into account.

Information on the risk posed by natural hazards is sparse for the Manawatū District. In conjunction with the Horizon Regional Council the Council has developed a database of natural hazards.

Horizon Regional Council's One Plan sets outs responsibilities for natural hazard management relevant to the Manawatū District. The plan to minimise risks of natural hazards through;

- Raising public awareness of the risks of natural hazards through education, including information about what natural hazards exist in the Region, what people can do to minimise their own level of risk, and what help is available
- Making territorial authorities responsible for developing objectives, policies, and methods (including rules) for the control of the use of land to avoid or mitigate natural hazards in all areas and for all activities except land-use activities in the coastal marine area, erosion protection works that cross or adjoin mean high water spring and land-use activities in the beds of rivers and lakes for the purpose of avoiding or mitigating natural hazards
- Identifying flood ways and other areas known to be inundated by a 0.5% annual exceedance probability flood event in District Plans, and controlling land-use activities in these areas.

Lifeline Risks

Engineering lifelines are infrastructure that support life and business in our community. Lifelines Projects aim to minimize the impact of natural hazards on infrastructure networks and reduce the time that networks may be out of services.

Lifeline Risks considered here are:

- Earthquake
- Meteorological Events
- Mass Movement
- Coastal Hazards
- Climate Change.

The term natural hazards covers situations where water, air and ground movement have the potential to adversely affect human life and property. They can also have adverse effects upon structural assets and the natural values of areas. The hazards most relevant to the Manawatū District are flooding, earthquakes, land slippage, coastal erosion/deposition and tsunamis (tidal waves). Events such as storms, tornadoes, and volcanic ash showers may also happen, but land use planning could do little to reduce their effects. The potential threats to the Manawatū District are outlined more fully in the Council's Civil Defence Plan.

The first way of reducing adverse effects on people, property and natural values from hazard events is to reduce the severity of the event itself, for example by planting stream catchments to reduce the speed of water runoff. The second is to avoid damage by keeping residents and development away from the hazard. The third method is to try and modify the effects of the hazard, eg by constructing stop banks to confine floodwaters.

When it comes to hazard avoidance, the level of risk determines the amount of development which is "acceptable". For example most people would agree that houses should not be built in places which flood every year, but the risk may be acceptable on a property which is flooded every two hundred years.

Natural Hazards in the Manawatū District

The hazards most relevant to the Manawatū District are flooding, earthquakes, land slippage, coastal erosion/ deposition and tsunamis (tidal waves). These may result in natural hazards occurring at two levels:

- District wide - Large-scale natural hazards which affect all or large parts of the District, e.g. a major earthquake
- Localised - Natural hazards which affect a smaller area of the District, e.g. flooding in a township or a landslip.

Flooding is a commonly occurring major natural hazard that results when the natural and modified drainage systems fail in a particular rainfall event. The risk of flooding is influenced by a number of factors such as:

- Weather systems
- Hydrological factors (catchment size, rainfall intensity and infiltration)
- Hydraulic factors
- Soil type
- Land use
- Ground saturation.

Storm events and the resulting flooding can result in significant adverse effects on both residents and the environment. These effects may include:

- Personal injury or loss of life, property and possessions or livelihood
- Disruption of utilities and transportation networks
- Impacts on the environment may include vegetation and habitat loss, erosion and sedimentation in waterways, and soil and water contamination.

Flooding hazards within the Manawatū District have principally occurred within the Feilding and Southern areas of the District. Horizon Regional Council is also modelling the flood risks for Feilding.

Flood Prone Areas

Flooding can be caused from stormwater ponding in low-lying areas; or waterbodies overflowing their normal channel in high rainfall events. Townships known to experience localised flooding include:

- Feilding – overflow of the Makino Stream, Ōroua River and the Kiwitea Stream
- Rongotea – School drain and stormwater ponding
- Kairanga/Bainesse – Taonui Flood Basin stormwater ponding
- Tangimoana – stormwater ponding.

Manawatū District is bounded by two major rivers. Both the Rangitīkei and Manawatū Rivers. The Ōroua and Pōhangina Rivers traverse centrally through the District as well. All the four rivers/streams may break out of their channels in major floods. Horizons Regional Council has done considerable work modelling likely outbreak point and flood channels for flooding of all four rivers and streams.

Flood action plans, prepared by Horizons Regional Council, outline a management of spillway operations into defined areas of high flow river levels of the Ōroua River and the Makino Stream. These documents are as follows:

- Makino Flood Action Plan
- Taonui Basin Flood Action Plan.

Low-lying townships in southern Manawatū may also be vulnerable to flooding from tsunami. Historically, tsunami that affect New Zealand's coastline are triggered by earthquakes off the coast of South America or Japan. Horizons Regional Council has also modelled the Southern Areas of Tangimoana and Hīmatangi Beach to assess the risks associated with varying tsunami events. The modelled effects would be sea water encroachment into the settlements and for water to travel up the mouths of rivers such as the Rangitīkei river and the Kaikokopu Stream.

However, although the probability is low for any particular location, other parts of the Pacific rim frequently experience more destructive tsunamis. In 2012/13 two warnings were issued to New Zealand Coastal environments due to earthquakes off South America and the Soloman Islands. Although no effects were noted, the probability exists of further activity affecting New Zealand.

A flooding risk assessment was included as part of the Manawatū-Wanganui Lifelines project and included in the table following. The assessment considered major lifeline services and the effects of Natural Hazards on them.

Landslides

Landslides are generally caused by slope saturation and can include mudslides, debris flow or avalanches, rock falls and rock slides. Increased ground saturation can be caused by intense rainfall, changes in groundwater and water level changes in rivers, earth dams lake banks and the coastline. Generally flooding and landslide events are closely linked as they both result from heavy rainfall, stormwater runoff and ground saturation.

The risk of landslide is influenced by a number of factors such as:

- Underlying geology
- Proximity to rivers, lakes and the coast
- Past and present land use including vegetation changes
- Infrastructure development.

Landslides can result in significant adverse effects on the road network including blocking roads by material dropping onto the road or loss of the road because the supporting country and the road slip away.

Earthquakes

New Zealand is considered amongst the most seismically active places on earth, as it is located on an active boundary of two tectonic plates.

Active Faults/Earthquakes

In central New Zealand, motion of the Pacific Plate relative to the Australia Plate occurs at approximately 40 mm/year in the direction of approximately 260°. The forces involved in plate movement are immense and cause rock of the Earth's crust to buckle (fold) and fracture (fault) in the general vicinity of the boundary between the plates. There are four known active faults in the vicinity of the Manawatū Region and all have the potential to cause strong shaking.

These active faults are:

- Wellington Fault – laying 27km southeast of Feilding
- Ruahine Fault – laying 24km southeast of Feilding
- Northern Ohariu Fault – laying 28km southwest of Feilding
- Mt Stewart-Halcombe Fault – laying 4km to the south of Feilding.

A Seismic Earthquake risk assessment was included as part of the Manawatū-Wanganui Lifelines project and included in the table following. The assessment considered major lifeline services and the effects of Natural Hazards on them.

Volcanic Activity

Ruapehu is one of New Zealand's most active volcanoes, with ten eruptions since 1861. The eruptions aren't the only threat, there is a more serious threat from the volcanic mudflow called a lahar. In between eruptions, a lake forms in the volcano's caldera from melting snow. If a previous eruption has deposited a dam of ash, rocks and mud in the lake's natural overflow point, then the lake becomes dangerously full, held back only by the temporary dam.

Mount Ruapehu has erupted at least 10 times since 1861, and has produced numerous lahars – the most recent of which occurred on 18 March 2007.

Volcanos and Volcanic Eruptions

Gases, Lahars, Tephra, Earthquake, Landslips: The New Zealand region is characterised by both a high density of active volcanoes and a high frequency of eruptions. Volcanic activity in New Zealand occurs in six areas , five in the North Island and one offshore to the northeast in the Kermadec Islands. The volcanos of note to the Manawatū District is the cone volcanos of Mt Ruapehu, Mt Tongariro, Mt Ngauruhoe, Mt Egmont/Taranaki, and the caldera volcano of Lake Taupo. Typically, a number of types of hazards will result from a volcanic eruption. Each hazard poses different risks affecting different areas. This is the key difference between eruptions and the other principal natural hazards, floods and earthquakes. The most threatening hazards include pyroclastic falls, pyroclastic flows and surges, lava extrusions (flows and domes), lahars, debris avalanches and volcanic gases.

Pyroclastic fall deposits consist of material which rains out from an eruption column. Large fragments (blocks and bombs) follow ballistic trajectories and are highly damaging. These fragments rarely land more than two kilometres from the vent. Finer material (ash and lapilli) is convected upwards in the eruption column before settling out downwind to form pyroclastic fall deposits. Fine ash can be deposited hundreds to thousands of kilometres from its source, and volcanic ash is the product most likely to affect the largest area and the most people during an eruption. These particles commonly have sharp broken edges and volcanic ash is therefore highly abrasive. Volcanic ash clouds will block out sunlight and total darkness may result where moderate to heavy falls of ash occur. A community's infrastructure provides the services and linkages which allow society to function.

These 'lifelines', such as electricity, water, sewerage and roads are vulnerable to damage from ash falls. Falls of volcanic ash, for example, have the potential to disrupt electricity supply. Loss of supply commonly occurs when ash is wet, as a result of rain during or immediately after the ash fall.

Contamination of open water supplies occurs, even in relatively small ash falls. Both turbidity (suspended material) and acidity are the most common problems affecting water supplies but they will usually return to normal levels within a few hours or days unless ash falls are prolonged. Hazardous chemicals from ash can mix with small volumes of water such as roof-fed water tanks, stock water troughs and shallow surface water bodies, causing chemical contamination above safe guidelines for drinking water. Volcanic ash falls can cause severe damage to sewage and stormwater systems. Ash is easily washed off impervious surfaces, such as roads, carparks and buildings, into these systems.

Volcanic ash falling on roads is extremely disruptive to transportation, reducing visibility. The ash is easily raised in clouds by passing vehicles and this presents an ongoing visibility hazard.

Wet ash can turn into mud, causing further problems with vehicle traction. Fine ash causes clogging of air filters resulting in cars overheating. Vehicle brakes are susceptible to damage and ash may also enter the engine causing wear on moving parts, which reduces vehicle life. Even minor ash fall (<1mm) will close airports. Ash has damaging effects on other electrical or mechanical systems.

A Volcanic risk assessment was included as part of the Manawatū-Wanganui Lifelines project and included in the table following. The assessment considered major lifeline services and the effects of Natural Hazards on them.

Business Continuity

Business Continuity is a progression of disaster recovery, aimed at allowing an organisation to continue functioning after (and ideally, during) a disaster, rather than simply being able to recover after a disaster. The following plans have been developed to ensure business continuity:

Effects and Responsibilities Plan – Effects and Intervention for Transportation: The principal objectives for the Transportation Lifelines Response plan associated with Manawatū District Council Transportation are:

- Possess a management tool that identifies natural hazards for Transportation
- Identify the consequences of the natural hazards
- Identify immediate remedial actions
- Define restoration levels, priorities and issues
- Identify long term risk management issues.

Civil Defence Emergency Management

The Civil Defence Emergency Management (CDEM) Act 2002 requires Local Authorities to coordinate Plans, Programmes and Activities related to CDEM across the areas of Risk Reduction, Readiness, Response and Recovery. It also encourages cooperation and joint action within regional groups.

A Lifelines Response Plan has been prepared for key Council services including Transportation. The Plan considers natural hazard events including earthquake, flooding, volcanic and mass movement (land slip).

Emergency Works

Under the road maintenance contract the Contractor is required to attend to all emergency work as soon as existing sites can be made safe and may be required to establish emergency patrols during periods of expected damage to facilities.

Emergency works may arise from adverse weather events like storms that result in wind damage, flooding, slips and snow. Work associated with these events is generally completed, even if this means that there is expenditure over the budget or other routine work is deferred to keep overall expenditure within budget. This is particularly relevant for safety related works and works that are needed to restore and reopen roads.

The Council applies to Waka Kotahi for additional funding for emergency and permanent reinstatement work resulting from weather events under Work Category 141 – Emergency Reinstatement. This funding allows the Council to repair carriageway damage caused by severe weather to at least as good a standard as previously existed before the weather event.

5.2.16 Operational Structures and Support

Operations

Asset operations are activities that do not have a direct physical effect on asset condition but are necessary to keep the asset appropriately utilised by the timely and professional input of engineering knowledge and the use of activity management systems. This activity distinguishes it from maintenance activities, which directly affect asset condition and performance. Costs such as power supply to street lights and professional services are often defined as operational costs.

Professional Services

Professional services for most renewal and new improvement works are regarded as project related and form part of the overall cost of those projects.

The current structure of the infrastructure services originated from a review undertaken by Morrison Low and associates in 2002. This review recommended the creation of the in-house professional services unit and this was established in 2003. Roading professional services were the primary driver, but the utility groups of water, wastewater and storm-water were also incorporated. The Strategic activity management functions are a separate function operating in the infrastructure group. A further revision of this structure, in 2009, saw the development of a shared services function that provided infrastructure activity management and professional services provided for the Rangitīkei District Council.

The Strategic Activity management unit is responsible for providing strategic long term planning functions, such as the preparation of Activity Management Plans, input into the Long Term Plan, and the Infrastructure Strategy.

The Waka Kotahi NZ Transport Agency provides the guidance, via the Programme and Funding Manual, for the setting of fees for Professional Services. Generally professional services provides for the service fees relating to maintenance and operations. Operational fees include the professional services necessary to:

- Manage the roading network, including all maintenance activities
- Prepare contracts for the works and services needed to deliver the agreed levels of service
- Legalise existing road reserves
- Produce project feasibility report (PFRs) for capital projects
- Investigate rehabilitation
- Manage preventative maintenance.

Waka Kotahi Work Category 151 – Network and activity management under the Council's subsidised Land Transport Programme is where funding is sourced for professional services for Maintenance and Operations of Local Roads. This category does not include emergency reinstatements.

For the other main activity classes associated with the Council's subsidised Land Transport Programme Renewal of Local Roads, and New and improved Infrastructure for Local Roads, professional services costs form part of the individual work category budgets that fall under these categories.

Professional services costs are incurred by the Council's Transportation Strategic activity management team, and any external consultants the Council engaged. These activities are all subsidisable provided the works themselves are subsidisable.

Professional services costs for non-subsidised activities are fully funded by the Council, including professional services and system costs for all unsubsidised maintenance, renewal or improvement works.

Staff Structure

Council's road and bridge assets are managed by the Roading Asset Manager who works with the Roading Operations Manager and other roading staff to discharge all his responsibilities for operational, daily, short-term, medium term and strategic planning of the road network and its maintenance. Road network professional services are largely delivered by in-house staff, who are accountable to the Asset Manager.

There are a number of cross- departmental links that are important to the correct functioning of the roading team and management of the roading network. The most significant of these are with the Financial and Administration Services staff.

Staff Competencies

An important measure of the quality of Council's activity management is the ability, experience and qualifications of the individuals and companies involved in its preparation. Council employs a limited range of technical staff qualified to carry out the activity management function.

In this context competency refers to applied knowledge, it is not just the knowledge itself. Competencies can be described as: The behaviours that employees must have, or must acquire, to input into a situation in order to achieve high levels of performance.

There are a large number of competencies that the Council requires of its staff to effectively manage its transportation network assets; these are not statements of current individual's skills or competencies; rather, they are statements of the Council's desired competency in the areas and subjects detailed.

Establish the gaps between the competencies of current staff and the competencies required in the organisation. These gaps will be used to guide staff training and development programmes. Inform the recruitment process for staff involved in road activity management when new positions are being filled or replacement staff sought.

LTP Planning

To ensure that staff were thinking and working towards a common LTP goal, Council management instigated a LTP planning process early in 2020 for the 2021-51 LTP. The group consisted of the four senior managers, LTP planners, asset managers and accountants. This group meets regularly and provides direction on issues such as:

- Council priorities
- Agreed assumptions
- Growth projection
- Plan format and style
- Communication and consultation
- Auditing processes.

Council and Committee Structure

Council's committee structure is extensive and are established under the Local Government Act 2002. Each township, excluding Feilding, and rural community also has a local Community committee elected every three years at a specially convened public meeting. The purpose of the committee is to consult with its community and relay local concerns and preferences to the Council or Community Committee. Township services and beautification projects are generally undertaken in conjunction with, or at the behest of, local township committees. The full list of the Boards and Committees is:

- Āpiti Community Committee
- Bainesse/Rangiotū Community Committee
- Beaconsfield Community Committee
- Cheltenham Community Committee
- Colyton Community Committee
- Halcombe Community Committee
- Hīmatangi Beach Community Committee
- Hiwinui Community Committee
- Kimbolton Community Committee
- Kiwitea Community Committee
- Pōhangina Valley Community Committee
- Rangiwāhia Community Committee
- Rongotea Community Committee
- Sanson Community Committee
- Tangimoana Community Committee
- Waituna West and District Community Committee.

Audits

To establish and ensure the on-going improvement of the quality of Council's systems, audits of financial, technical and performance systems are routinely implemented by Waka Kotahi, Audit New Zealand and Vertitek (streetlight inventory audit on behalf of the electricity retailer).

Financial Audits

The Local Government Act requires that independent annual financial audits be undertaken on the operations of Council – such audits may include all significant activities such as Activity Management Planning. The auditor's opinions are included in the Annual Report.

Information System Audits

System audits are undertaken at regular intervals to access the appropriateness and performance of activity management systems, data and processes.

Audits should identify the current status of activity management processes, systems and data and produce targets for Activity management practices to be achieved in following years.

Technical Audits

Technical audits (peer reviews) are undertaken by Waka Kotahi at regular intervals to assess and identify compliance with statutory requirements.

Performance Audits

Performance audits will establish whether the stated objectives for the operation of the asset have been achieved. Measurement of the success of the operation of the asset will be assessed using the results of:

- Customer satisfaction surveys
- Key service criteria objectives compliance
- Benchmarking surveys.

These measurements will determine the public view of how well the levels of service have been achieved, an objective measure against stated key service criteria and national measures of relative performance. The performance audits will also be used in on-going customer consultation regarding future standards and requirements of the customers in the provision of service.

The collation of this data is often undertaken as part of Waka Kotahi national role in monitoring performance of transportation agencies.

5.2.17 Operational Improvements

When a nonconformity or incident occurs in assets, activity management or activity management system Council will:

- React to the nonconformity or incident as applicable, take action to control and correct it and deal with the consequences
- Evaluate the need for action to eliminate the causes of nonconformity or incident by

- Reviewing the nonconformity or incident
- Determine causes of nonconformity or incident
- Determine if similar nonconformities exist, or could potentially occur
- Implement any action needed.

Root Cause Analysis: (RCA) is a technique that examines why the problem occurred in the first place. It seeks to identify the origin of a problem using a specific set of steps, with associated tools, to find the primary cause of the problem, to determine:

- What happened
- Why it happened
- What can be done to reduce the likelihood that it will happen again.

Identifying Systemic Issues: these are, problems or changes in Council/Waka Kotahi policy or practice that affects, or has the potential to affect, a number of customers. It may be caused by, but isn't limited to, one or more of the following:

- a system change
- an alteration in performance levels (e.g. quality of supply, access to call centre)
- a policy or procedure change
- a lack of policy or procedure
- a lack of clear regulatory guidelines
- regulatory non-compliance
- the conduct of an energy or water provider's employee, agent, servant, officer or contractor
- the action of a stakeholder (e.g. legislative or regulatory change leading to misunderstanding or misapplication of the change).

If any systemic problems are identified, a plan is implemented to correct the potential faults before failure occurs. Continuous improvement: is a method for identifying opportunities for streamlining work and reducing waste. Continuous improvement can be viewed as a formal practice or an informal set of guidelines that has the following principles:

- Improvements are based on small changes, not major paradigm shifts or new inventions
- Ideas come from Council and Contractor's employees
- Incremental improvements are typically inexpensive to implement
- Council and Contractor's employees take ownership and are accountable for improvement
- Improvement is reflective
- Improvement is measurable and potentially repeatable.

5.3 Developing Renewal Programmes

5.3.1 Sealed Road Pavement Rehabilitation (Work category 214)

These programmes provide for the replacement of, or restoration of strength to, sealed pavements where other forms of maintenance and renewal are no longer economic. To qualify for inclusion in this work category, the work must be the long-term least-cost option for Council calculated in terms of present value (PV). Council must undertake benefit and cost appraisals of individual projects and make copies of the evaluations available as requested by the Transport Agency. A simplified procedure is provided for pavement rehabilitation in the Economic Evaluation Manual.

5.3.2 Road Improvements

Road improvements include activities over $300,000 implementation cost per activity that target a specific increase in levels of service in part of a roading network.

The road improvements activity classes include Local Road Improvements under the following work categories:

- Work category 321 – New traffic management facilities
- Work category 322 – Replacement of bridges and structures
- Work category 323 – New roads
- Work category 324 – Road improvements
- Work category 325 – Seal extension
- Work category 331 – Property purchase – state highways
- Work category 332 – Property purchase – local roads
- Work category 333 – Advance property purchase - local roads
- Work category 341 – Minor improvements
- Work category 357 – Resilience improvements.

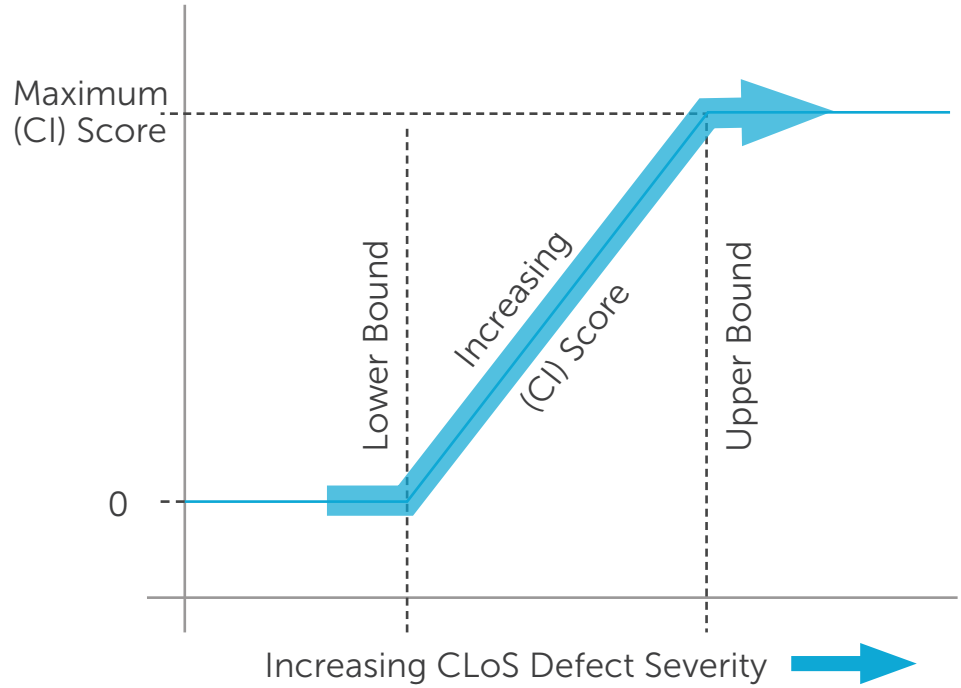
The required benefit and cost appraisal methodology for road improvements is benefit-cost analysis and the required measure is the benefit-cost ratio (BCR). The Transport Agency requires Council to use the Transport Agency Economic Evaluation Manual (external link) procedures and templates to determine the BCR for road improvement activities.

5.3.3 Predicting Future Condition and Performance

Council uses High Speed Survey Data to monitor and project over time the network condition. The projected condition is based on collected data which includes: Texture, Roughness, Rutting and Location Co-Ordinates.

A Pavement Condition Index (PCI) Score is applied for each CLoS. This is based on a linear scoring system between lower and upper bounds for each CLoS.

Individual CLoS (CI) Scoring System



CLoS Score

CLoS	Lower Limit	Upper Limit	(CI) Score
Texture depth (mm)	0.7	0.4	0 to 75
Rutting (mm)	10	20	0 to 100
Roughness (NAASRA)	110	160	0 to 80
	Maximum Combined (PCI) Score		255

The (PCI) Score is the sum of the individual (CI) Scores at each location. The total (PCI) Score at each location is then classified as follows:

PCI Score	Condition	Classification
Less than 50	Satisfactory, No Action	GREEN
Between 50 and 75	Minor Deterioration; Observe	AMBER
Greater than 75	Increasing Deterioration; Investigate	RED

This 'traffic light' grading system can be plotted by road length and on GIS mapping software, allowing easy identification of sections that warrant either:

- Observation at the onset of pavement degradation or
- Investigation of more significant pavement issues that will assist with programming and application of effective maintenance solutions.

Pavement Condition Index Score

Road Name:	Beattie Street			
Survey Date:	19/02/2015	to	19/02/2015	
Length Assessed:	1040m	No of Data Points:	52	

	Mean PCI	Counts where 50 > PCI > 75	%' age where 50 > PCI > 75	Counts where PCI > 75	%' age where PCI > 75
Overall Combined	10.85	1	1.9%	4	7.7%

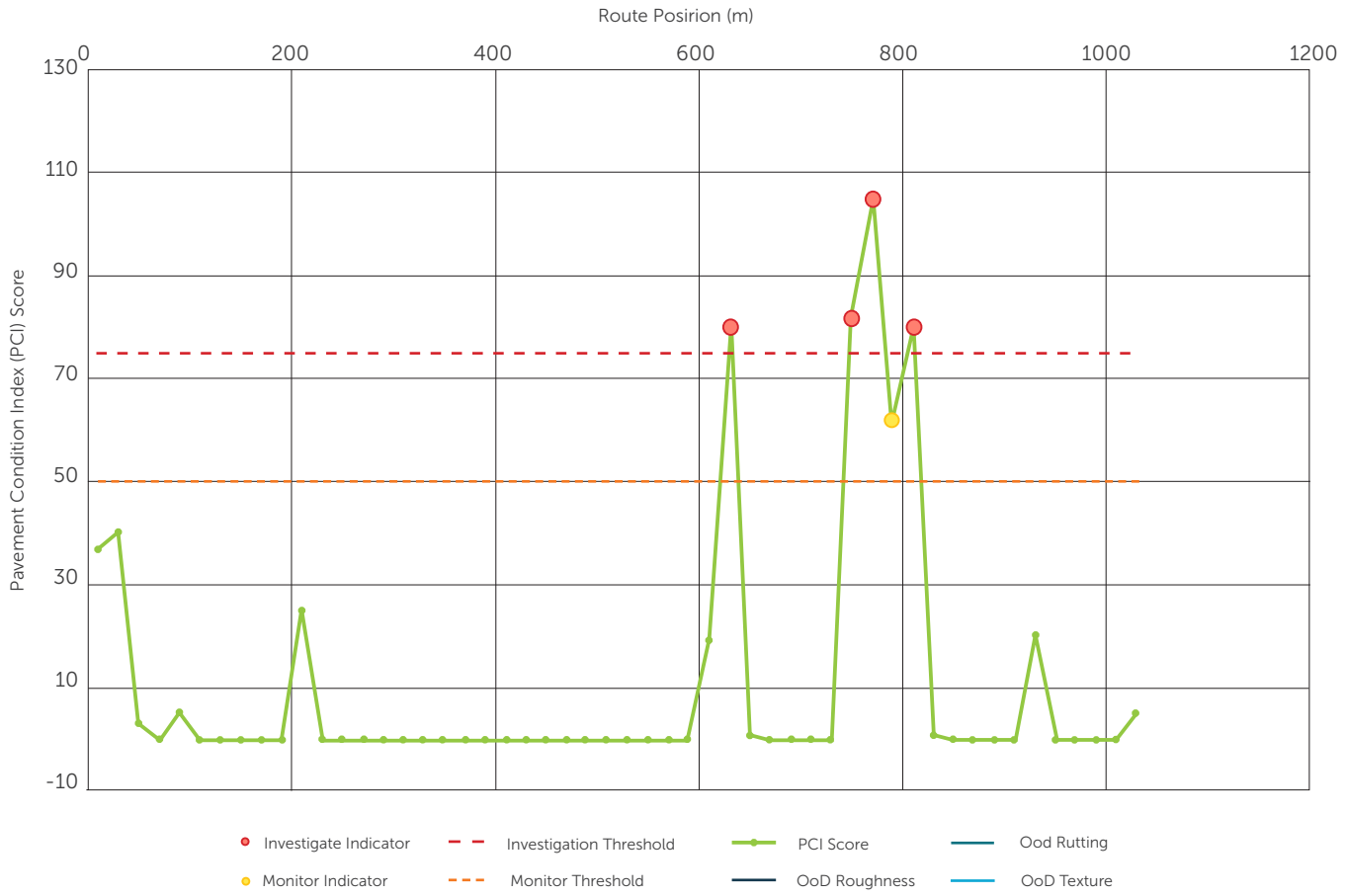
Combined scores, assessed against overall PCI thresholds

	Mean Element Score	Counts	% Btn Lower % Upper	Counts	% Exc Upper Threshold
Roughness	8.45	8	15.4%	3	5.8%
Rutting	2.40	6	11.5%	0	0.0%
Texture	0.00	0	0.0%	0	0.0%

Individual Defect Scores, assessed against Element Score Range Thresholds

(PCI) Score Plot Along Length of Road

Condition Index Plot: Beattie Street - Date Range 19-02-15



5.4 Capital Investment Planning

5.4.1 Introduction

Council uses the NZ Transport Agency's Business Case Approach (BCA) to guide its planning, investment and project development processes. The BCA is used to develop business cases for investment through the National Land Transport Programme (NLTP). The BCA provides flexible building blocks which can be adapted to particular situations and proposed investments.

The Transport Agency assesses investment proposals in the 2021-24 National Land Transport Programme (NLTP) using the information contained in the business cases and supporting information submitted in Transport Investment Online (TIO). After the business case has been assessed and passed, the information is then distilled down to two ranking factors,

Results Alignment - the alignment of the proposal's key transport issues with the Government Policy Statement on Land Transport (GPS), and

Cost-benefit Appraisal - how efficient resources are used to deliver benefits from the proposed solution.

The information relating to developing assessment profiles is organised by activity class groupings. Waka Kotahi provides guidance on each of the two factors within the groupings.

5.4.2 Identifying and Scoping Capital Projects

The NZ Transport Agency assesses business cases at the end of the strategic case, programme business case and single-stage business cases phases (or after both the indicative and detailed business case, if they are done separately). This assessment uses the business case investment questions and the Investment Assessment Framework (IAF). The investment questions ensure that the business case will be effective and the IAF checks alignment to the strategic priorities outlined in the Government Policy Statement on Land Transport (GPS).

5.4.3 Developing New Build Programmes

The business case is developed by answering the questions in the table below. They don't all need to be answered at each phase, but the more advanced the business case is the more questions need to be answered. For the most up-to-date Business Case Approach guidance, visit the NZ Transport Agency website.

Problem	Benefits	Strategic response	Solution
Strategic case		Programme business case	Single-stage business case, or indicative and detailed business cases
Is it clear what the problem is that needs to be addressed (both the cause and the effect)? Yes / Maybe / No	Have the benefits that will result from fixing the problem been adequately defined? Yes / Maybe / No	Have a sufficient range of strategic alternatives and options been explored (demand, productivity and supply)? Yes / Maybe / No	Consistent with the strategic alternatives and options, have a reasonable range of project options been analysed? Yes / Maybe / No
Is there evidence to confirm the cause and effect of the problem? Yes / Maybe / No	Are the benefits of high value to the organisation(s) (furthering its (their) objectives)? Yes / Maybe / No	Is it clear what strategic alternatives and options are proposed and the rationale for their selection? Yes / Maybe / No	Is the proposed solution specified clearly and fully (all business changes and any assets)? Yes / Maybe / No
Does the problem need to be assessed at this time? Yes / Maybe / No	Will the KPIs that have been specified provide reasonable evidence that the benefits have been delivered? Yes / Maybe / No	Are the proposed alternatives and options the most effective response to the problem (comprehensive and balanced)? Yes / Maybe / No	Is the proposed solution the best way to respond to the problem and deliver the expected benefits? Yes / Maybe / No
Is the problem specific to this investment (or should a broader perspective be taken)? Yes / Maybe / No	Are the KPIs both measurable and totally attributable to this investment? Yes / Maybe / No	Are the proposed alternatives and options feasible? Yes / Maybe / No	Can the solution really be delivered (costs, risks, timeframes, governance, etc)? Yes / Maybe / No

5.4.4 Compiling the Capital Investment Strategy

The strategic case phase is about defining and understanding the problem or opportunity, and showing there will be substantial enough benefits to justify investment to investigate the problem further. Essentially, it asks 'Is there a case for change?'

The main purpose of the strategic case is to confirm whether:

- there is a compelling case for change to investigate further; that is, there is evidence that suggests there is a problem, and indicates the scale of the problem
- key stakeholders are aligned and behind the need to address an agreed problem
- agreement is forming on what a good –outcome looks like and what benefits could be gained before effort is expended on investigating solutions.

Strategic cases avoid wasted effort where agreement is not reached, or where stakeholders agree that the problem is not significant enough to proceed. This decision can be made at any point during development of the strategic case.

Strategic cases should clearly answer the following questions:

- What is the problem? Investment logic mapping (ILM) or other workshops used to gain an understanding of the actual problem (cause and consequence)
- Do the benefits of addressing the problem justify further investigation?
- How big is the problem? Examine existing evidence and information
- Is the issue important? to Council and its stakeholders (alignment with organisational goals, policies, strategies, etc).

It is essential that you craft your strategic case carefully so that it is clear and concise. The desire to tell a compelling story that will convince investors to commit limited public funds must be balanced against the need to be objective and maintain the integrity of the business case.

It is also important to put the investment story in a national context. The strategic case will be assessed along with many others seeking investment from a contestable national fund that has a finite amount of money.

5.4.5 Net Present Value Analysis

The present value of future costs of options are determined and compared to identify the long term least cost option.

The method is recommended to determine if replacement/renewal is more cost effective than on-going maintenance. Where the future costs of the do-minimum exceeds the costs of replacement/renewal then the net present value of the option can be assessed in the cost benefit appraisal as the best present value end of life approach. In certain cases the use of benefit streams rather than future costs may be more appropriate.

5.4.6 Benefit Cost Evaluation Methods

Approaches to Investment Evaluation

The NZ Transport Agency's Economic Evaluation Manual (EEM) is the industry's standard for the economic evaluation of land transport activities for New Zealand. The EEM sets out economic evaluation procedures and values used in calculating benefits and costs, necessary for applications seeking investment where a benefit cost appraisal from the Transport Agency is mandatory.

Decision making at the strategic, program and project level operates with different degrees of sophistication as follows:

- Current status–the current condition is the driver in decisions, and is often associated with a worst first approach to investment
- Whole of life cycle costing–future performance is the main driver in decision making, and requires condition prediction modelling over the whole of life analysis period
- Risk analysis –also involves consideration of multi-criteria but investment options are evaluated using a risk assessment method.

5.4.7 Cost Effective Analysis

Business Case Approach

The Transport Agency requires Council to use a business case approach to guide its planning, investment and project development processes. It is a principles-based approach that clearly links Council's strategy to outcomes, and defines problems and their consequences thoroughly before solutions are considered. This approach ensures a shared view of problems and benefits early in the transport planning process without requiring that the work has to be done in a particular way.

A business case approach encourages early engagement with stakeholders to confirm:

- The fit with strategy and need to invest
- The way forward with short-listed options
- That the best value option is affordable and deliverable and that the risks are acceptable.

New programmes/activities in the 2018–21 National Land Transport Programme are required to follow the business case approach.

A project's business case is built progressively – starting with a strategic case, then a programme business case, progressing to an indicative business case and finally a detailed business case – with decision points along the way that determine whether the investment is worthwhile in relation to the desired outcome. And at every step of the way, there's a strong connection between strategy and outcomes.

Strategic Case - sets the strategic context and presents a shared understanding of the scale and significance of problems, the outcomes sought and the benefits desired. This stage is a central pillar to subsequent business case stages and enables the Transport Agency to provide early investment signals to our partners. Investment logic mapping (ILM) is at the heart of this stage.

Programme Business Case - identifies an optimal mix of alternatives and options, but doesn't look at detailed solutions at this stage. The preferred programme could include a broad mix of activities that might be delivered by multiple parties over a period of time. This business case will receive official Transport Agency support, including assessment of strategic fit. An anticipated effectiveness and efficiency assessment is also undertaken at a programme level.

Indicative Business Case - further develops specific activities. It provides a long list to short list of options and it recommends a preferred way forward as part of the short-listed alternatives. An indicative business case receives official Transport Agency support, including assessment of strategic fit and effectiveness, with anticipated efficiency assessment.

Detailed Business Case - confirms an activity that comes from the detailed programme (previously called 'package') of activities and confirms the overall assessment profile. It includes a more detailed reporting of economic, financial and commercial aspects of the activity.

5.4.8 Multi-Criteria Analysis (MCA)

Asset Optimisation and Prioritisation Framework

Decision-making by Council entails identifying and assessing options with quantified and unquantified impacts, in a context of multiple objectives, constraints and uncertainty. Inevitably, a high level of subjectivity and judgment is involved, no system of decision-making can change this. However, the Programme Business Case approach provides a structured framework which breaks the decision-making process into stages and makes good use of data and analysis. This reduces complexity, adds consistency, rigour and transparency, and ensures that the best use is made of information.

There are a number of steps between performing the gap analysis and finalising the works program. The 'best' option for each gap is chosen after an analysis of different funding options and scenarios. These analysis of scenarios considers asset optimisation and prioritisation or a combination of both.

Asset optimisation aims to maximise asset life and benefits (economic, social, safety, environmental or otherwise) while minimising the life cycle costs. Optimisation affects decision-making throughout the life of the asset from planning to renewal or disposal. Asset optimisation also takes into account the road use and infrastructure strategy, demand management and sustainability.

The whole of life cycle cost (WOLCC) evaluates the total costs to be expended on an asset over its entire life span, expected life or service potential. The WOLCC economic analysis tool considers the costs, in present day value (PV), to Waka Kotahi, Council and the community throughout the life of the assets. The costs include annual maintenance costs, the timing and cost of future investments, such as rehabilitation, reconstruction and construction for additional capacity, and community costs such as road user costs. WOLCC compares alternative options with different economic lives. WOLCC is used to establish intervention levels for each ONRC category of road, taking into account traffic levels and geographical differences.

- The framework is simple and transparent, minimising both the level of information required and the necessary computation so that auditing and ease of use are maximised
- The framework is used for initial optimisation/prioritisation of a number of projects
- The results of the optimisation/prioritisation process are used to rank projects.

The results of the outcomes developed from the framework are considered carefully for their credibility and whether there are other possible outcomes that are not provided by the framework. The long term program is developed by expanding this process to include previous years' gaps that have not been filled due to insufficient funding and ongoing committed projects are also taken into consideration.

Ranking of Projects - Council ranks projects in order of importance based on a value-for money rating. The value-for-money rating incorporates:

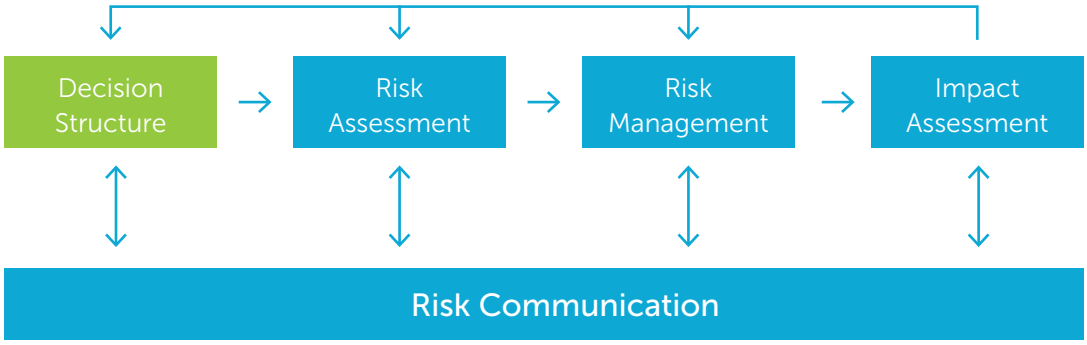
- Economic benefits using optimisation to minimise total life cycle costs which cover agency costs, road user costs and other costs
- Adjustment for factors such as economic, environmental, safety and social which can only be measured subjectively
- A calculation of the life-cycle costs of various maintenance and rehabilitation treatments for the asset. In addition to engineering solutions, other solutions not involving physical works are also considered
- Waka Kotahi's Economic Evaluation Manual is used. The EEM sets out economic evaluation procedures and values used in calculating benefits and costs, necessary for applications seeking investment where a benefit cost appraisal from the Transport Agency is mandatory

- Non-quantifiable factors including economic, social, safety and environmental factors
- An iterative process to develop the optimum works program dealing with constraints such as funding levels
- Development and management of a multiple year program
- "Ground truthing" the framework to verify the results emerging from this process.

Funding Scenarios - After the total needs program has been subjected to an optimisation and/or prioritisation process, a number of funding scenarios are generated to reflect a number of possible funding levels. The long term program is then "smoothed out" to remove any unnecessary spikes in expenditure.

5.4.9 Risk-Based Decision Making Considerations

Risk-based decision making is made up of five major components, which are shown in the figure below.



Risk-based decision making involves a series of basic steps. The steps can be used at different levels of detail and with varying degrees of formality, depending on the situation. The key to using the process is in completing each step in the most simple, practical way to provide the information the decision maker needs. Some situations are so complex that detailed risk assessments are needed, but most can be addressed with more simple risk assessments. It is a process that organizes information about the possibility for one or more unwanted outcomes into a broad, orderly structure that helps decision makers make more informed management choices.

5.4.10 Other Decision Making Considerations The Forward Works Program

The final works program shows the funding available for routine, preventative and periodic maintenance, as well as funding for rehabilitation and construction, including details of specific works for funding. As a final step in the program development process the ranking list is reviewed to ensure that the high level policy decisions are reflected in the projects chosen for funding.

Renewal Forecasts

Council prepare forward programmes for the resurfacing of sealed roads annually from information from RAMM. Unsealed roads are monitored continually and work programmes are revised throughout the year in response to changes in need exhibited by the road surface, especially through the winter.

Specific Forecasting Assumptions

Initially the need for renewal works may not be so obvious compared to those associated with maintenance but the consequences of not recognising, planning and forecasting for the appropriate interventions can create a significant and expensive long term problem.

- The Council's policy is all new developmental roading shall be sealed. This affects expected future renewal costs
- Annual sealed road renewal costs will increase proportionately, and annual metal road renewal costs will decrease proportionately, with the length of seal extension completed in the previous financial year
- There will be no growth in unsealed road length. This is a reasonable assumption, as the Council's policy is all new developmental roading shall be sealed.

Traffic Capacity

As a whole, the network is not stressed, in terms of its ability to cope with present and foreseen demands. However, there are sections where its capacity is under pressure. This is evident from the following:

- Inadequate seal width for current traffic volumes and types of traffic evidenced by the increased need to repair the edges of some roads (e.g. edge break, edge rutting repairs), by an increase in concerns over safety of passing of heavy vehicles and an inability to pull onto the shoulder on some roads
- Lack of safe travelling-space for both cyclists and motor vehicles on some routes
- Concerns over the inability of opposing vehicles to pass safely on some increasingly busy unsealed roads and the lack of visibility for following-vehicles on these roads.

A "Whole of Life" approach with a 30 year horizon has been taken to capture a representative portion of pavements that will reach the end of their life cycle. This approach is consistent with the legislative requirements for Infrastructure Strategies which require (as a minimum) 30 year forecasts and is also consistent with the role of the AMP. The decision making is evidence based., and an optimised programme of works has been developed that represents best value for money.

The Programme Optimisation process selects the right things to do at an appropriate level of investment (i.e. not over capitalising or over investing in treatments for the level of service or economic/social value of a road. Then implements them in the right way, at the right time and for the right price.

The Programme Optimisation process

- Addresses the Strategic Key Results Areas, Operational Measures and Performance Measures
- Sustains the network i.e. the major spend items are appropriate and tally with RAMM data
- Provides an appropriate level of treatment
- Ensures costs are reasonable (compared to other AOs with similar mixes of roads)
- Meets business case requirements
- Demonstrates how the ONRC is implemented as business as usual by 2018
- Identifies a long list of possible alternatives and options
- Develops a range of possible programmes, their benefits, consequences and potential costs
- Identifies a preferred programme of activities to progress.

5.5 Asset Details

The following sections discuss the assets with detail around their specific lifecycle management requirements. The level of detail required for this plan varies as some asset groups have expansive technical requirements based on large amounts of data while others have minimal requirements with relatively low levels of management intervention required by the council.

The asset groups and their principal components are:

Road Pavements

- Formation - the existing/ modified material supporting the sub-base and basecourse layers
- Sub-base – the lower structural layer between the formation and basecourse
- Basecourse – the top structural layer of the pavement
- Shoulders – grass and metal between seal edge and drainage feature
- Top surface – the bitumen bound chip seal or Asphaltic Concrete surface.

Drainage

- Culverts – pipe system under roads to convey stormwater run-off
- Kerb and channel – concrete lined channels on urban streets/roads to control runoff
- Sumps and Soak holes – collection structures to control discharge of run-off
- Open water channel – earth formed v-drain beside rural roads.

Storm Water Channel (or Surface Water Channel)

- Kerb and channel – concrete lined channels on urban streets/roads to control runoff
- Deep and shallow surface water channels, predominantly on rural roads to control carriageway drainage.

Bridges

- Abutments – fixed platform to support deck ends
- Piers – mid point columns to support decking
- Deck spans – the trafficable platform atop the abutment and piers
- Large Culverts – pipe area greater than 3.4m2 of cross sectional area.

Retaining Walls

- Carriageway formation and support and protection structures.

Traffic Services

- Signs – the message board to convey safety and directional information
- Posts – wooden or steel post to support the sign
- Markings – painted lines on road surface
- Islands – traffic control structures at intersections
- Rails – road side site visibility and safety protection rails (fencing)
- Street Lighting.
    - Luminaires – light fitting including control gear and lamp
    - Poles – concrete or steel column to support the lamp
    - Brackets – supporting the luminaire atop the pole.

Footpaths

- Concrete, Paved, Asphaltic and unsealed pedestrian pathways.

Environmental

- Vegetation Control – control or grass and noxious plants
- Emergency Works – snow clearing, flood damage reinstatement, or other natural response
- Stock Underpasses – below ground structures to enable stock to pass under the road
- Street Cleaning – Detritus removal.

Operation and Asset Management

- Activity management – strategic management of the roading network
- Systems – RAMM database to manage roading inventory
- Road closure – Council approved activities for community or sport events

- Traffic Management – function of operating on legal roads safely
- Corridor Access – permit approval system to operate of roads.

The lifecycle management plans for each asset group detail the methods and actions planned to deliver the agreed levels of service while optimising life cycle costs. The life cycle management plans cover:

- Asset Information identifying
- The scope and nature of assets
- The current condition of assets
- The current capacity and performance of asset relative to the adopted level of service
- Demand projections and risk
- Management of, and standards for, all asset life cycle work activity – operations, maintenance, renewals, new improvements and disposals
- Costs and timing of identified work and forecast needs for all asset life cycle work activities (maintenance, renewal, development and disposal) required to action the adopted life cycle activity management strategies.

The following table summarises asset types, their unit/s of measure, the number of database records held in the Council's RAMM Database and the quantity of assets recorded.

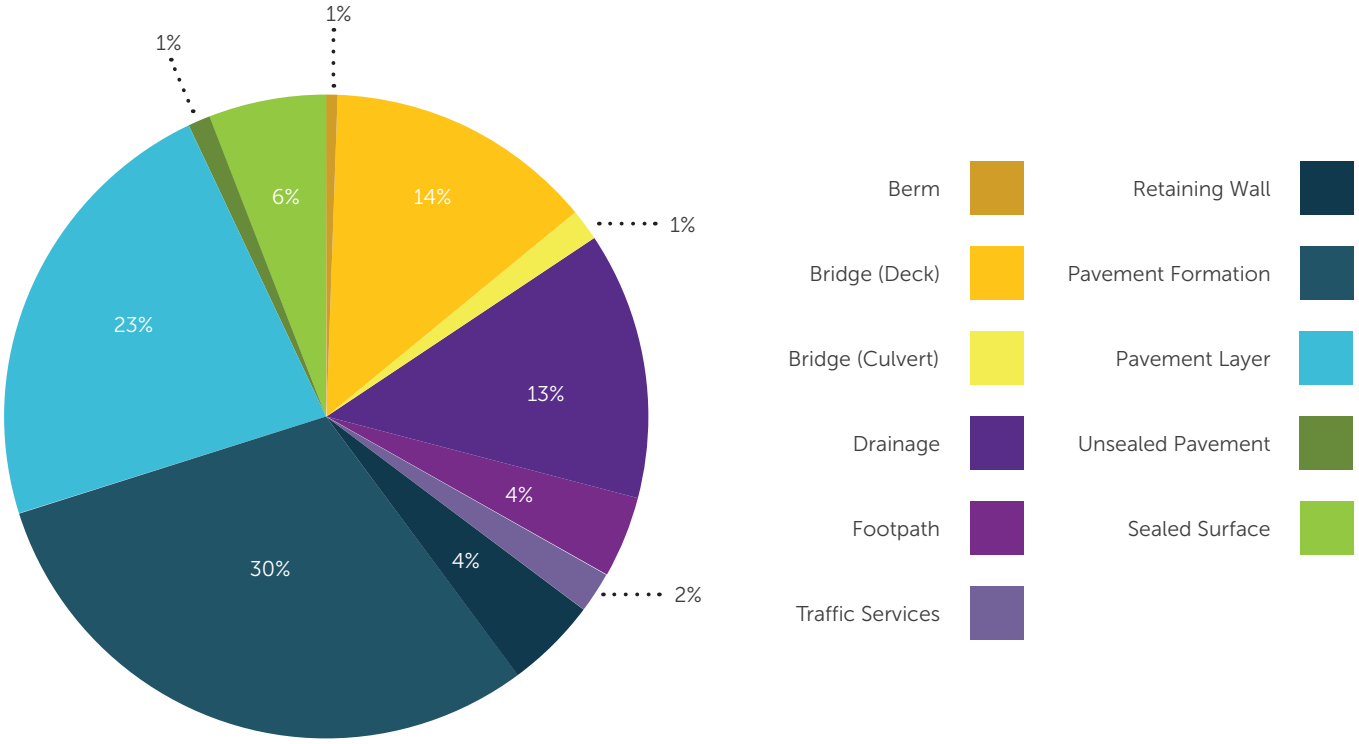
RAMM Data Table	Unit of Measure	Database Records	Quantity
Berm	M^2	1511	452,370m^2
Bridge (Deck)	M^2 M	241	241 (incl large culverts
Crossing	Each	1968	5211
Drainage	M Each	6942	194367m 1341
Drainage Wall	M M^2 Each	234	234
Feature	Each	15	15
Footpath	M^2	1329	148,540m^2
Island	M^2	199	199
Marking - Painted	Lump Sum (Contract value)	NA	148,111m
Marking - Other	Each	295	14,743
Railing	M	2096	29,239m
Retaining Wall	M M^2	503	9,476m 19,360m^2
Shoulder	M^2	4799	9476m^2
Sign	Each	9551	9565
Streetlight - Bracket	Each	1670	1670
Streetlight - Light	Each	1706	1706

Streetlight - Pole	Each	1016	1016
SW Channel	M	5508	2,426,213m
Traffic Facility	Each	551	6088
Treatment Length - Formation	M^3	1734	7,521,949m^2 see note 1
Treatment Length - Pavement	M^3	1744	7,529,518m^2 see note 1
Treatment Length - First Coat	M^2	674	3,313,480m^2
Treatment Length - Surface Structure	M^2	1449	5,932,450m^2
Treatment Length - Unsealed	M^2	222	1,445,257m^2

Note 1 : Quantity shown is based on surface area of the treatment length, the actual quantities valued will be higher due to assumptions for extra width and depth factors

The following chart shows the proportion of asset replacement cost by asset class as at 1 July 2019. Full valuation details are reported in the 1 July 2019 MDC Transportation Valuation Report.

Asset Type By Replacement Cost



Assets of similar type have been grouped to reduce clutter in the chart. Drainage includes Surface Water Channels, Footpath includes Crossings, Traffic Services includes Features, Islands, Marking, Railings, Signs, Streetlights and Traffic Facilities.

5.5.2 Berm

Overview of Assets

The Berm is the grass area between the kerb edge and the property boundary in urban areas. Berms are identified by the type of plant cover. For the majority of Berms, the plant cover is grass but there are some areas planted with shrubs or flowers.

Modern subdivision construction methods normally allow for an area of grassed berm either side of the footpath but there are many other combinations depending on the position of the footpath and drainage channels.

Berms are formed when the road is constructed or reconstructed and their renewal is normally included in these programmes.

There is an expectation that residents will maintain berms outside their properties so there is little ongoing maintenance required by the Council.

The following table summarises the information held for Berms.

Berm Type	Area (m²)
Cover	17.1
Flowers	209.4
Flowers, Shrubs	167.4
Flowers, Shrubs, Cover	870.4
Grass	443329.4
Grass,Cover	102.1
Grass, Flowers	2504.8
Grass,Flowers, Shrubs, Cover	135
Grass, Shrubs	1035.9
Shrubs	3998.8
Grand Total	452370.3

5.5.3 Bridge

The purpose of road bridges is to provide continuous all weather access over rivers, streams and uneven terrain, and grade separation over railway lines and other roads.

Waka Kotahi's definition of bridge includes structures such as major culverts if they have a waterway area greater than 3.41m2, for a round pipe this is equivalent to a the pipe having a radius of greater than 1.04m or 42 inches.

Overview of Assets

The Council maintains 241 bridges (including 100 major culverts) ranging in size from 2.1m Diameter culverts to bridges to up to 140m in length.

Bridge data is stored in councils RAMM database in the Bridge Table. Although large culverts are maintained as bridges they are still deemed to be drainage assets with the asset information being stored along with other drainage assets in the Drainage Table. For ease of maintenance there is a link between the two tables, so large culverts appear in the bridge table along with bridges.

Data on the following types of bridges and culverts is held in the RAMM Database:

Bridge Type	Total of Bridge Type	Length (m)
Aluminium Culvert	1	3
Armco Culvert	5	11
Armco Culvert (Arch)	3	20
Cast In Situ Concrete Beams Concreate Deck	13	347
Cast in Situ Concrete Deck Slab	1	7
Concrete Arch Bridge	1	11
Concrete Arch Culvert	2	6
Concrete Box Culvert	31	172
Concrete Deck Slab (Cast in Situ)	1	22
Concrete Hollowcore	2	53
Concrete Pipe	11	64
Concrete Pipe Culvert	8	86
Drainage Culvert	1	9
Galvanised steel cul	1	2
Insitu Concrete Arch	2	20
Insitu Concrete Beam	25	237
Insitu Concrete Box	37	230
Insitu Concrete Slab	5	37
Inverted Concrete T-Beams Concrete Deck	4	38
Precast Concrete Berm	18	596
Precast Concrete Box	2	19
Precast Concrete Deck Slabs	1	9
Precast Concrete Hollowcore Deck units	1	13
Precast Concrete I-Beams Concrete Deck	8	409
Precast Concrete T-Beams Concrete Deck	1	8
Precast Units - Slab	3	95
Precast Units Only	9	149
Rock tunnel	3	83
Steel beam insit dck	22	616
Steel beam pc/tim dk	3	54
Steel Beams (Castellated) Concrete Deck	2	43
Steel Beams Concrete Deck	7	153
Steel Beams Precast Concrete Deck Planks	2	40
Steel Beams/Through Truss Timber Deck	2	164
Steel Through Truss Steel Deck	1	32
Suspension	1	109
Suspension Bridge Steel Beams Concrete Deck	1	98
Grand Total	241	4065

There are nine bridges that straddle the District's boundaries. Three are state highway bridges which the Council has no responsibility for, the responsibility for the other six bridges is shared as follows:

Road Name	Bridge Name	Plate Year	Management Responsibilituy
Saddle Road	Saddle Road Bridge	2006	MDC/PNCC
Otara Road	Otara Bridge	1962	MDC/RDC
Mangarere Road	Mangarere Bridge	1966	MDC/RDC
Kawhatau Valley Road	Powerhouse Bridge	1975	MDC/RDC
Ruahine Road	Mangaweka Bridge	1899	MDC/RDC
Halcombe Road	Kakariki Bridge	1968	MDC/RDC

Some significant bridges provide access for agricultural transport while others provide for tourism and recreational activities. Other significant major river bridges in the District are on state highways and are administered by Waka Kotahi.

Bridges range in age from those constructed in the last decade to those constructed in the late 1800s. Most original bridges over the larger rivers were replaced with modern concrete and steel structures in the latter 30 to 40 years of the 20th Century, however some older timber deck bridges remain in service.

Large Culverts generally serve smaller water courses and are of concrete construction of varying quality depending on their age. 86% of the Districts bridges were constructed between 1930 and 1979.

Bridges are constructed from various materials, timber was used on older structures with concrete and steel being used as time progressed.

Typically, timber was used for decks and steel for the superstructure. Piles utilised either material. This has created some difficulty with the long-term maintenance of bridge structures, as the different materials age and deteriorate at different rates.

Nearly all bridges are now constructed from concrete, utilising high quality precast components. Smaller timber bridges are being replaced with precast box culverts that can be quickly put into position.

Timber, including Australian hardwood that was the early material of choice for most bridges, is the least durable of all the materials available and is prone to rot, insect attack and natural defects such as cracking, splitting and in the case of timber decks, surface abrasion. Steel is more durable but is subject to rust and consequently must be well protected by surface coatings to prevent deterioration.

Concrete structures while potentially the most durable can suffer from carbonation and chloride attack, which can allow internal reinforcing steel to rust or concrete to degrade. Poor or inappropriate structural detailing and construction of concrete structures can significantly influence their longevity and the potential for expensive rehabilitation work during the life of the structure.

This is more prevalent in older structures where these types of defects have become evident by the passage of time. Key issues relating to the management of road bridges are:

- Older timber bridges reaching the ends of their practical and serviceable life spans
- Higher demands on older bridges from heavier and more traffic than originally anticipated when built, e.g. forestry, dairy, stock transport at 44t and 50t gross compared with 16t to 20t 40 years ago
- Maintenance liabilities with some types of older bridges from poor detailing and construction methods
- Increasing awareness of safety related issues with older bridges, e.g. single lane, inadequate approaches,

guard railing

- Striking the correct engineering and social balance between an appropriate level of service and cost, e.g. bridge replacements or refurbishments
- Obtaining financial assistance (subsidy) for replacements or new bridges
- Obtaining resource consent for major works in or adjacent to watercourses under the Resource Management Act.

Operational and Maintenance Processes Asset Performance Data

The correlation between current condition and remaining useful life could be more closely aligned. Currently the remaining useful life is assigned when assets are valued using a standard table relating to construction dates and type of construction. Improvement could be made in this data so it is more aligned with condition rather than the construction date.

Maintenance Strategy

The objective of the works program is to identify maintenance projects consistent with the overall Activity Management Plan.

It is important that the developed works program and bridge strategy are consistent and realistic in terms of the overarching policy, goals and timeframes established by Council in this overall AMP.

In the context of bridge activity management the optimisation of works program is aimed at ensuring that the available budget is used in the best way to ensure that the risk and the possible consequence of any reduction in the level of service due to structure performance is minimised.

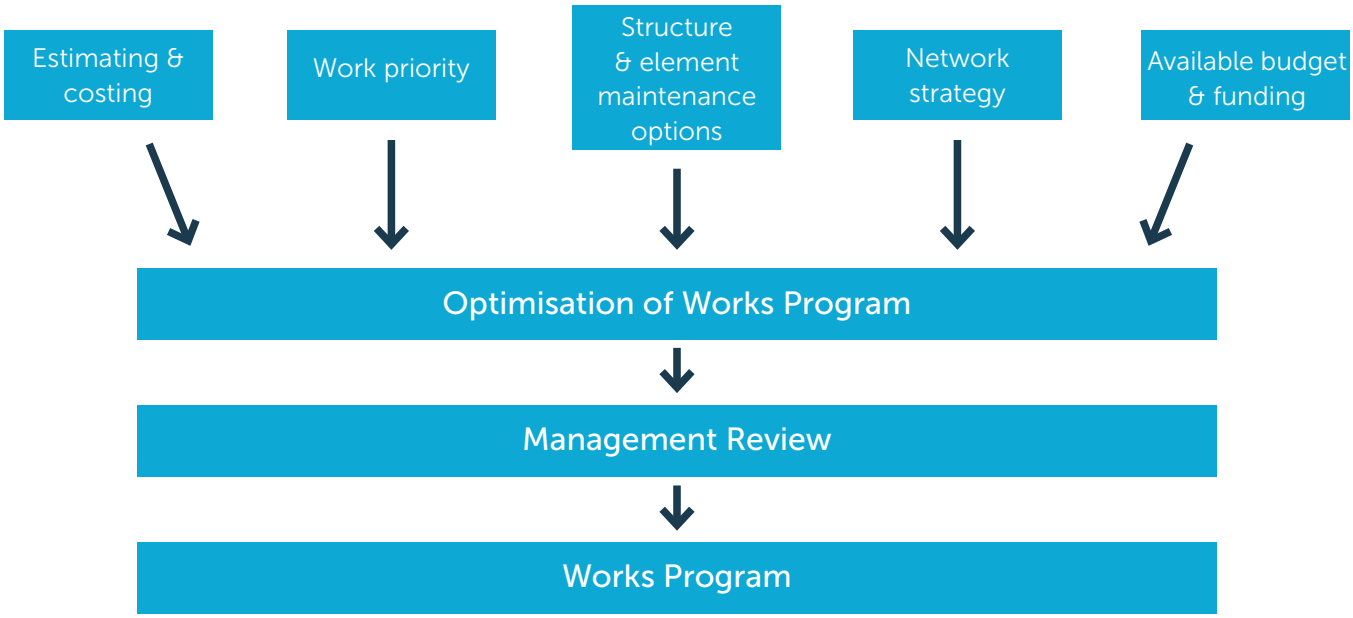
The 'best way' is identified by assessing the merit of various possible sets of maintenance projects proposed for the program against the policy, aims and objectives of the road authority. Optimisation of the works programme is therefore achieved by identification and selection of the set of projects accorded the most merit.

At the strategic level the key objectives/goals for bridge activity management are:

- Plan and develop an integrated, safe, responsive, and sustainable bridge system
- The Activity Management Plan establishes the need for sound Activity Management Planning, with a focus on long-term asset sustainability.

Maintain, operate and protect the road bridge system. Achieving this goal is the purpose of the life cycle management section of the Activity Management Plan – 'asset integrity' is a fundamental outcome.

Each of the elements shown in Figure 7 that are inputs to the works program may be individually analysed and optimised to provide an overall benefit greater than the sum of the parts. The optimisation of the works program is necessarily one of iteration and feedback in the quest for the best practical, economic and sustainable solution to many competing needs and objectives. As a consequence, the factors to be considered are many and varied and dependent on business practice.



Factors to be considered in the Optimisation Process include those relevant to:

- CLoS
- Standards
- network screening to identify candidate works/projects
- production of a long list of priority works/projects with ranking based on economic criteria, under budget constraint
- determining the necessary work program to meet performance objectives
- economic (and financial) feasibility of alternatives for rehabilitation, new investment or capacity expansion.

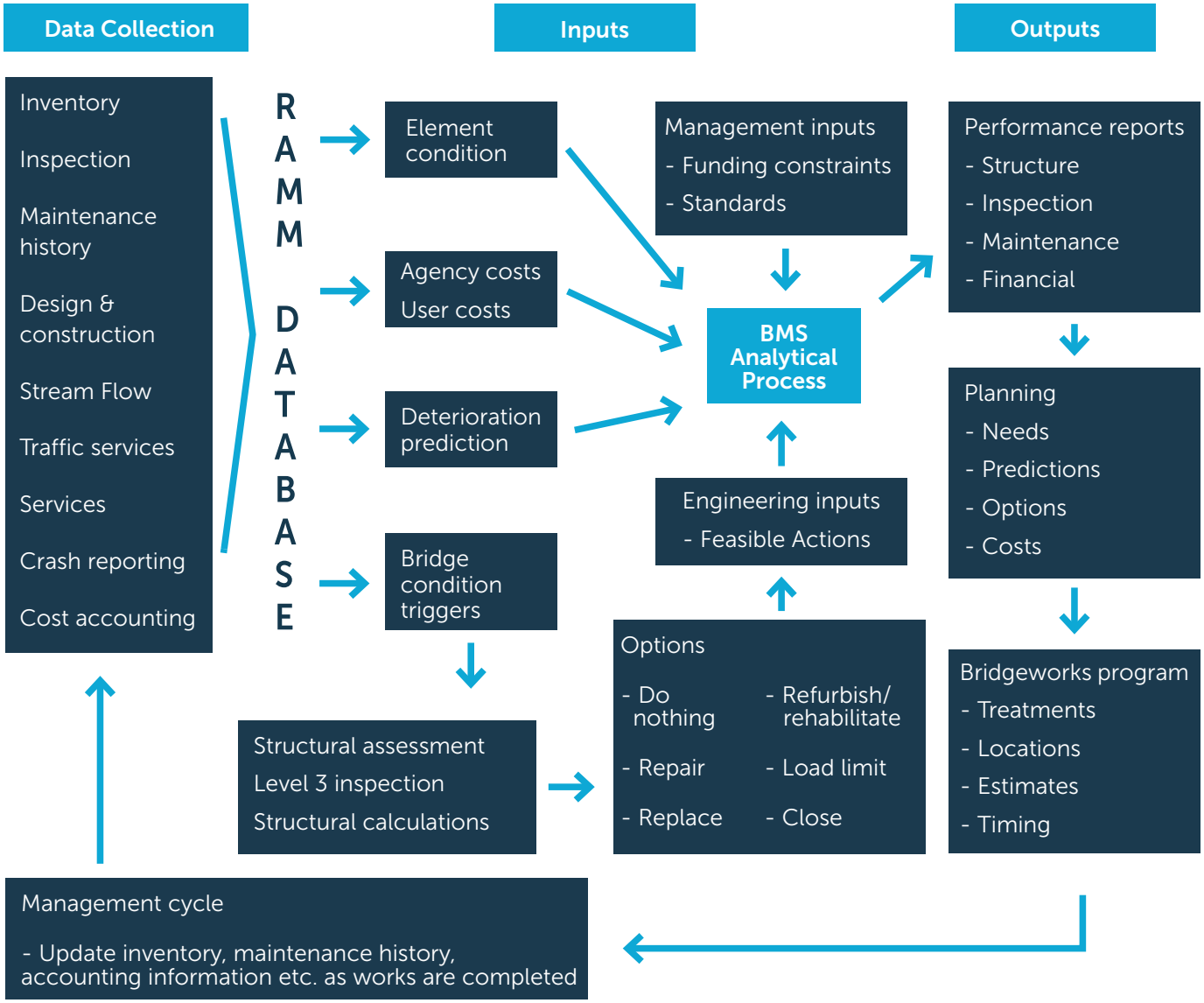
At a practical level, factors to be considered include those that determine:

- costs for the agency and user – from RAMM database
- bridge condition – from RAMM database
- deterioration prediction – from RAMM database
- funding constraints and minimum conditions – from management inputs
- feasible actions – from engineering inputs.

The database contains information derived from the following activities:

- inventory
- inspection
- maintenance
- construction
- traffic surveys
- accident reporting
- cost accounting.

The structure of a Council's bridge management system is shown below.



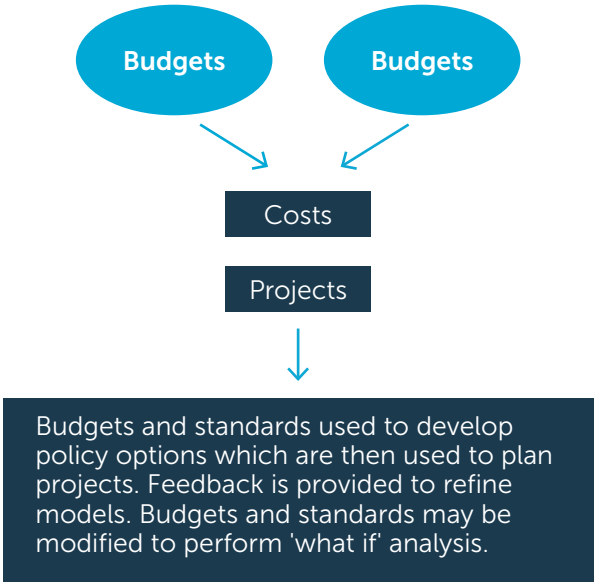
Program Optimisation

The bridge works program is developed in a systematic way. In general terms this is achieved through the application of a Bridge Management System (BMS).

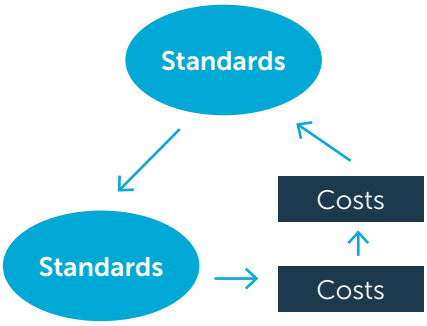
The BMS is a tool that assists with information collection, storage and analysis. It is designed to support decision-making about optimal use of resources for bridge asset management. The BMS should provide reports that support the choice of the most beneficial set of bridge works for the works program.

Optimisation determines the most beneficial strategy for bridge elements using lifecycle cost analysis or an equivalent procedure. Operated under various budget constraints, the system provides an indication of the effect of delayed maintenance on future element conditions and budget needs.

Optimisation may be either a top-down or a bottom-up approach. Each approach has its advantages and drawbacks.



Budgets and standards used to develop policy options which are then used to plan projects. Feedback is provided to refine models. Budgets and standards may be modified to perform 'what if' analysis.



Standards assist in planning projects. Planned projects are totalled to generate costs which are then compared to budgets. Budget constraints are used to adjust the standards and modify the plan.

Waka Kotahi Work Category

General Bridge Maintenance and Renewal activities are included in the Structures group and are managed under Waka Kotahi Work Categories 114 for Maintenance and 214 for Renewal activities. Large scale renewals are included in Work Category 322 Replacement of Bridges and Structures.

Inspection Programme

Scheduled bridge inspections are undertaken in accordance with Waka Kotahi requirements, this is done under contract by specialist bridge inspectors. Bridge inspection staff undergo structured training to ensure consistent results are reported. The inspection cycle is bi-annually for general inspections and on a six-year cycle for detailed structural inspections. The reports supplied include recommendations for any required maintenance or structural repairs.

Routine visual inspections are undertaken by the road maintenance Contractor under the Road Maintenance Contract and occur as part of the Contractor's general network inspection cycle. Inspections are also undertaken during and after events that might threaten the safety or performance of bridges, such as floods, earthquakes or overloading. The bridge inspection report includes recommended repair options, which are prioritised by the bridge inspector.

Council engineering staff assess the report findings and the required work is either given to the road maintenance contractor to programme, price and action once approved by the Engineer, or contracts are let for more specialist structural repairs to be undertaken.

The Engineer is in the position of being able to co-ordinate the amount, type and cost of more complex and expensive work over the whole asset.

Maintenance programmes are developed from the schedules of defects identified during the inspections by both the Contractor and the Engineer. Repair treatments and priorities are determined by considering the impact on:

- Public safety (top priority)
- Traffic movement and road hierarchy
- Maintaining structural integrity and serviceability
- Future costs if the work is not done.

The works in the bridge maintenance programme are the most cost effective responses to the needs identified. From an activity management perspective, the additional criteria are also required, and are applied to:

- Protect the investment in assets by extending the life of the structure
- Minimise repair costs.

In addition to the work identified through the routine inspections discussed above, other types of maintenance work can include:

- Repairing structural defects, e.g. concrete spalling, corroded fastenings, rotten timber, undermining of foundations
- Repairing or replacing damaged components, e.g. wheel guards and handrails
- Restoring protective coatings, e.g. painting
- Restoring or cleaning deck expansion joints
- Watercourse training
- Repairing road approach and abutment settlements
- Cleaning around bearings.

Deferred Maintenance

The impact of deferred maintenance is:

- The inability to carry the design flows with a corresponding decrease in levels of service with respect to stormwater control, or
- The inability to carry normal traffic loads.

The results of the current detailed structural inspection to be undertaken will determine with improved certainty the extent of any possible deferred maintenance.

Maintenance Standards

- Waka Kotahi Bridge Inspection and Maintenance Manual
- Relevant New Zealand and other standards for design, construction and workmanship.

Asset Condition

All bridges are maintained a safe condition appropriate to their location, the road hierarchy and posted carrying capacity.

Condition inspections are undertaken in accordance with the Waka Kotahi Bridge Inspection and Maintenance Manual, taking into account such factors as structural integrity, defects, safety and appearance. The Bridge Inventory in the RAMM database is used for recording condition information and maintenance actions.

Bridge structural inspections are scheduled to occur at six-yearly intervals with less intensive inspections undertaken bi-annually by specialist bridge inspectors.

Based on current condition assessment information this shows the majority of the Council's bridge assets are generally in good or average condition. The assessment information used to determine condition rating is due to be updated as part of the next detailed inspection.

Bridge Expected Condition

Further work is required to produce a more accurate correlation between condition rating data and remaining useful life. One option for doing this is to structure Council requirements for information collected whilst carrying out inspections so that asset related data is checked and updated along with the collection of condition related data which may correspond to amendment of the remaining useful life of the bridge.

Weight Capacity

The imposition of weight and/or speed restrictions extends the remaining life until renewal or replacement is possible. It should not be expected that restricted bridges would be replaced just because a restriction has been imposed. For some bridges other solutions may be appropriate, because replacement may be uneconomic or unnecessary, especially if they provide access to a single property or very few private properties.

Restricted Load Bridging Assets

In 2010 the Vehicle Dimension Mass Rule was introduced to allow the freight industry to move freight safely, on fewer vehicles, within an appropriately regulated and permitted environment. This was proposed as part of Central Government's direction to make the freight industry more efficient, free up capital for increased economic productivity and create more jobs. An increase of maximum vehicle loading from 44 tonne to 50 tonne was approved under the new rule.

Council undertook a review of all bridge structures to ensure they complied with the revised heavy vehicle weight limits, the following table sumarises bridge restrictions at 9/7/20.

Road Name	Bridge Name	Bridge No.	Waterway Name	Weight Restriction	Max Speed Limit
Coulter Line	Unnamed	S37	Ōroua River	44,000kg Overweight - Do not Cross	N/A
Mangarere Road	Mangarere Bridge Suspension	S142A	Rangitīkei River	34,000kg 6,500kg limit per axle Overweight - Do not cross	25kph
Otara Road	Otara Bridge	S173C	Otara River	44,000kg Overweight - Do not Cross	30kph
Pōhangina Valley East Road	Unnamed	S199	Porewa Stream	Overweight - Do not cross	N/A
Pōhangina Valley East Road	Unnamed	S201	Te Ekaou Stream	Overweight - Do not Cross	N/A
Pōhangina Valley East Road	Unnamed	S203	Konewa Stream	Overweight - Do not cross	N/A
Ruahine Road	Mangaweka Bridge	S250B	Rangitīkei River	6,000kg 3,000kg limit per axle Overweight - Do not cross	10kph
Umotoi North Road	Unnamed	S299B	Horopito Stream	44,000kg Overweight - Do not cross	N/A

Traffic Capacity

Most bridges on major roads are of sufficient size to accommodate anticipated traffic growth rates. The majority of these bridges are relatively modern and have two lanes.

Most single lane bridges are on low volume rural roads. Current and projected traffic demands show no significant issues that warrant bridge replacement or upgrading from one to two lanes, although from a safety perspective two lane bridges are preferable. Usually the additional cost in providing two lanes is not warranted on roads with low traffic volumes.

Single lane bridges have less traffic volume capacity and provide a lower level of service than bridges with two lanes. However, not all single lane bridges are deficient in terms of the level of service they provide, on many roads a single lane bridge is all that is required.

The increasing emphasis being placed on providing for other modes of transport, such as walking and cycling, is highlighting potential safety problems with some bridges. These typically arise on longer bridges on rural roads (or road bridges on popular recreational routes) when the bridges are not wide enough to enable pedestrians / cyclists to safely traverse them in conjunction with other traffic.

In some instances, the design of replacement bridges needs to consider whether any additional width is warranted to allow for the passage of over width farm machinery in remote areas where there is no practical detour. To avoid safety problems care is required in these circumstances to ensure that the replacement bridge is clearly either single or dual lane.

Smaller bridges in rural areas are susceptible to increased traffic volumes and weights from the developments in these areas e.g. forestry and dairy farming. This could potentially have a flow through effect when forests reach maturity and are logged.

Waterway Capacity

There are no significant problems with waterway capacity. Any minor problems are generally isolated to the smaller bridges. As with traffic capacity, any upgrading in waterway capacity warrants consideration only when these bridges are replaced at the end of their serviceable lives.

In the hill country areas, river channels are well contained in gullies and other natural low points. Peak flows can arrive at some sites very quickly and at high velocity, dependent on the intensity and duration of the storm event in the contributing catchment area. This can put significant pressure on waterway protection works and abutments, which can result in damage or losses. The unstable nature of silty soil types found in the northern parts of the district also has an impact on the bridge structures located in those areas during severe weather events.

In the southern low lying parts of the district low grades dictate meandering rivers and streams which are susceptible to flooding after high rainfall in the northern catchment areas.

Bridge Renewal/Replacement Plan

Asset renewal is undertaken when a bridge, or a significant component of a bridge, has reached the end of its economic life. This is measured by either its condition or performance.

The types of renewal works undertaken include:

- Replacement of an entire bridge
- Replacement of individual major bridge components e.g. deck beams, piers
- Rehabilitation of bridge components that restores the structural integrity of components, e.g. reinforcing repairs.

Renewals are undertaken for the following reasons:

The entire bridge has deteriorated to the extent that it no longer has the strength to carry its design loads (normal traffic) safely. (As all bridges were built to carry the normal maximum legal load that prevailed at the time, current lack of capacity is generally the result of deterioration or government imposed increases in axle and vehicle weight limits).

Major components have worn or decayed to the extent that they are preventing the bridge carrying its design loads.

The waterway's characteristics have altered to the extent that the bridge can no longer pass the design flood flows.

Flood or earthquake damage has displaced or irrevocably damaged the bridge.

Major vehicle impact damage.

When a bridge is replaced with a significantly wider or stronger structure the portion of work that is effectively increasing the level of service is classified as an improvement work.

Renewal and replacement needs are identified, and renewal priorities allocated, from inspections and in particular specific structural inspections. The economics of renewing these bridges are then reviewed by looking at the net present value of the various options, including the "do minimum" option, for a 25-year analysis period.

Waka Kotahi have recognised the problem of the increasing amount of deferred bridge renewals and developed evaluation criteria relating to "Bridge Replacements on Low Volume Roads" allowing easier and simpler funding justification of individual bridge replacements. These requirements are detailed in SP2 of the Waka Kotahi EEM . This procedure now allows funding of the Council's individual bridge replacements, to a value of $200,000, to be more easily justified. Despite this some bridge replacements may not be justified, for example if a detour less than 5km long is available.

Bridge renewal costs include the cost of the consents required for the bridge's construction.

Uneconomic Bridges

The Waka Kotahi, in addition to the criteria allowing funding of bridge replacements on low volume roads, also has a general policy regarding uneconomic bridge renewals. A bridge is considered uneconomic by the Waka Kotahi "where the ratio of the total cost of the work to be undertaken per AADT is greater than or equal to $8,000 per vehicle". However, under this policy financial assistance will be provided for the most cost effective maintenance option.

Economic assessment of bridge renewals also requires the corresponding portion of road serving the bridge. to be considered. The Waka Kotahi policy goes on to state: "On application, the [Waka Kotahi] will consider the eligibility of non-maintenance activities on uneconomic roading facilities for financial assistance on a case by case basis."

There are no bridges currently considered uneconomic in the District.

Bridge Replacements

Bridge replacements are assessed on a "case by case" basis. Council is aware that ratepayers do not appreciate a bridge not being replaced, as it is deemed an unacceptable reduction in level of service. In rural areas, bridges in more remote areas are used for moving stock and farm machinery along public roads, and are seen as vital for this purpose. In the case of moving stock, the use of fords or long detours is usually not an acceptable alternative.

Bridge Renewal Forecast

The assessment of long-term renewal needs requires an understanding of the performance and condition of each of the bridges, especially those of the larger and more complex structures.

Bridge Renewal is budgeted under Waka Kotahi Work Category 322 –Replacement of Bridges and other structures and major components. Council's bridge renewal strategy prioritised 49 bridge renewals. There is

one finalised replacement plan for Ruahine Rd, however, all other bridges identified are closely monitored under the bridge inspection programme.

The assessment of long term renewal needs is based on the currently assessed expected useful life, however, these may alter depending on how the structure is managed long term. For example, a renewal of a particular component of the bridge may extend its effective life beyond that assessed at this time.

From analysis of Council's RAMM data the long term theoretical renewal requirements for the bridge network were established. The expected useful lives used to establish this data are detailed in Council's Road Asset Valuation Report and are generated in the RAMM database.

As the replacement cost bridges and large culverts is significant it is important that future financial forecasts for their replacements are as accurate as practicable.

Bridge New Improvements

The background influences and methodologies applying to bridge new improvements are essentially the same as those detailed for pavements.

New Improvement works fall into the following categories:

- Construction of new structures to allow land development or to achieve traffic efficiencies by providing links across significant features (waterways, grade separation – roads under and over, etc)
- Upgrading of existing structures to carry increased traffic or heavier loads than they were originally designed for.

Provision of new bridges as part of land developments. These are normally fully funded by the site developer.

Development Strategy

Council will only consider constructing a significant new bridge if the project is subsidised by the Waka Kotahi.

The total benefits to road users and the land transport system, cost benefit ratios and first year rates of return are all calculated using the economic evaluation procedures found in the Waka Kotahi's Economic Evaluation Manual. If prioritisation is required it will normally be by ranking projects in terms of the Waka Kotahi's funding criteria.

Council may contribute to the cost of a non-subsidised bridge on a public road if there are strong reasons why it should be built, and provided the cost to the Council does not exceed its share if the bridge had been subsidised, though the Council may contribute less where there is reduced benefit to the wider public.

New bridges can also be funded through Development Contribution and Financial Contribution levies on new land development and subdivisions. These can be required in situations where a bridge is necessary to improve the roading connectivity between and within new and expanding development areas.

5.5.3 Crossing

Overview of Assets

Crossings are the vehicle or pedestrian access ways between the road edge and property boundary, pedestrian pram crossings are also included in this data set. Crossing are recorded based on their type – beveled kerb crossing, heavy duty vehicle crossing, pram crossing, etc.

Pedestrian Pram crossings are an integral part of the Footpath they are managed in the same manner, this is discussed later in this section under the Footpath Section.

Vehicle crossings that provide access to private properties are installed to Council specifications by approved contractors when properties are developed or subdivided. The cost of the crossing is borne by the property owner or developer and the completed crossing is vested to the Council. The exception to this is where the Council undertakes an urban street upgrade which includes new or replacement footpaths and vehicle crossings.

The following table summarises the information held for Crossings;

Crossing	Crossing Total
Bevelled Kerb crossing	1005
Bridge crossing	160
Crossing - no drainage required	3
Culvert Pipe in Drain	2
Double Sized Bevelled Kerb crossing	49
Flush Pedestrian Tile Crossing	3
Grate Crossing	15
Half Bevelled Kerb crossing (kerb to footpath)	40
Heavy Duty crossing	79
Other	2
Pedestrian Pram Crossing	631
Grand Total	1989

5.5.4 Drainage

Lifecycle Management – An Overview

The purpose of drainage assets is to contain and then convey surface water away from the carriageway keeping the road sub-surface dry to minimise water damage. Water logged pavements deteriorate rapidly so good drainage is necessary to minimise premature pavement failure and the associated maintenance costs.

Good drainage performance generally requires:

- Catchment coverage - In urban areas surface water channels and ponding areas should have kerb and channel and piped stormwater systems installed. Kerb and channel at the edge of the carriageway protects and defines the seal edge as well as collecting stormwater
- Stormwater carrying capacity - Capacity of the kerb and channel is not a problem as long as sufficient sumps and outlets are installed. This is one of the reasons low profile kerbs can be used as the standard profile for new construction, unless a specific stormwater design requires the use of a standard high profile channel

- Water tightness - The channels need to be able to carry the water to the sumps and outlets. Old or damaged channels allow water to get into the subgrade, and over time cause failures to the adjacent pavement, these channels need to be repaired or replaced before serious pavement damage occurs
- Conformity with current standards - Deep channels cause safety problems in urban areas as they are not easily negotiated by pedestrians or other footpath users, e.g mobility scooters and wheel chairs
- Ease of cleaning - Channel covers used for crossings over deep kerb and dish channel can cause problems when cleaning as debris can be caught underneath the covers. Dish channel and non- standard channels also cause problems when cleaning with mechanical cleaners
- Ease of crossing installation - Non-standard profiles cause problems with crossings. The shape of the channel is often such that a cut down cannot be used or standard sump-covers do not fit. As a result, special covers need to be made or standard covers are installed with the approaches modified to allow their use, in both these cases costs increase.

In urban areas drainage assets are generally constructed of concrete and convey surface water to reticulated storm water systems. Surface water channels, catchpits, culverts and sump leads are deemed roading assets up to the point where the flow of water joins the reticulated storm water system.

In rural areas drainage assets are designed to convey water to the nearest natural or formed water course via roadside drains and culverts where it is necessary to direct water under the road or driveway entrances.

Horizons One Plan – Stormwater Discharge

With respect to the management of stormwater runoff from the roading activity, the Horizons One Plan defines the activity to be in accordance to the discharge of stormwater into surface water pursuant to s15(1) RMA or onto or into land pursuant to ss15(1) or 15(2A) RMA, and any ancillary takes or diversions of stormwater pursuant to s14(2) RMA forming part of the stormwater system. All activities are monitored to ensure that no new, or existing discharge activities are adversely affecting, or causing affect to the quality of the receiving environment.

Overview of Assets

The following table shows the type and number of different Drainage asset recorded;

Drainage	Quantity
1050 Dia Manhole	4
1800 Dia Manhole	3
900 Dia Manhole	1
Acco Grate Covered Drain	3
Bagged Concrete Headwall	125
Catchpit	3
Catchpit 150 Litre per Sec Super Sump	3
Catchpit type 1	432
Catchpit type 2	101
Catchpit type 3	1054
Culvert	4487
Drop Chamber	72
Flap - Back Flow Preventer	2
Flume	26
Flume down batter	7
Ford	1
Headwall (old powerpoles)	1
Headwall > 2100mm Dia Pipe	5
Headwall 1050mm - 2100mm Dia Pipe	8
Headwall 600mm to 1050mm Dia Pipe	5
Headwall up to 600mm Dia Pipe	17
Manhole	33
Other	1
Outfall Culvert	4
Pump	1
Pump Chamber	3
Pump Station	1
Redundant Culvert - Dont Maintain	20
Rock Rip Rap	1
Rock Wall (Handplaced)	18
Side Culvert	347
Side drain	363
Small Sump 300mm x300mm Grate	14
Soak pit	4
Spillway	2
Subsoil drain	17

Sump	20
Sump Lead	30
Tapered Culvert End with Grate	8
Water Race	1
Grand Total	7248

Distinction between Roading and Utilities

Urban

Council has made a clear distinction between the stormwater collection, treatment and disposal requirements of the Utility Networks and Transportation Networks assets in urban areas.

Roading Drainage Assets: These are the initial carriageway collection facilities within road reserve associated with catering for drainage from the carriageway that deliver the stormwater to a point of mains reticulation, treatment and/or disposal, they can also carry stormwater from roofs in some urban areas . These assets include:

- Kerb and channel*
- Surface Water Channels (mostly rural drains)*
- Culverts*
- Catchpits (sumps)*
- Bubble up sumps*
- Piped connections between the above.

Utility Stormwater Assets: These are the reticulation, treatment and disposal facilities both inside and outside road reserves and include:

- House lot laterals (reticulation)
- Manholes (reticulation)
- Main disposal pipe work (reticulation)
- Formed swales or drains (treatment)
- Soak holes (disposal)
- Interceptors (treatment)
- Wetlands, retention ponds (treatment)
- Discharge from wetlands, retention ponds etc. (disposal).

NOTE: Assets marked * are currently recorded in RAMM and are considered to be roading assets.

Most facilities located beyond the boundary of the legal road reserve in an urban areas are assumed either to be Utility stormwater assets or owned privately, for example systems within private rights of way. However, compliant discharges from these systems are accepted into road drainage collection systems.

Rural

In rural areas carriageway drainage is purely a transportation/roading responsibility as there is little threat to subsurface water quality from any carriageway runoff due to the inherent treatment systems that occur with the side swales and open drains that are commonly present. The exception is any rural or rural-residential subdivisions where a specifically consented stormwater system occupies legal road reserve.

Operations and Maintenance Plan

Waka Kotahi Work Category

Drainage Maintenance and Renewal activities are funded under Waka Kotahi Work Categories 113 for Maintenance and 213 for Renewal activities.

Service Delivery and Rationale

Routine Works include:

- Cleaning of culverts, including inlets and outlets, slot drains, subsoil drains, shoulder cutouts (or placing as required), flumes, sock drains, and roadside drains other than water channels
- Cleaning of minor blockages in water channels that can be accomplished (in the opinion of the Engineer) with hand tools
- Cleaning of vehicular access culverts
- Cleaning of grates and sump tops
- Cleaning of sumps, manholes, cesspits, and catchpits/soakpits
- Cleaning/replacement of culvert markers including placement of the relevant culvert number.

Further information relating to street cleaning is in the located at the end of this section under the Environmental Management heading. The following sections discuss Culverts, Catchpits, Kerb and Channel an Surface Water Channels which are sub asset groups of the drainage asset base.

Drainage – Culverts

Lifecycle Management – An Overview

The purpose of culverts is to convey natural watercourses or stormwater across the road without adversely affecting the pavement or surface of the road or disrupting its use. They are distinguished from bridges by having formed bases in place of the stream bed (water flowing under bridges flows in a natural bed).

Culverts have a waterway area less than or equal to 3.41m2 or 1040 mm radius. Culverts larger than this are classified as bridges and are often referred to as either "bridge culverts" or "major culverts".

Culverts are generally long life assets that show little sign of deterioration until failure if they have been correctly installed. The exceptions can be:

- Armco (galvanised steel) culverts carrying peaty or swampy water, which is often quite acidic. In these circumstances, the acidity attacks the galvanising and removes it over a decade or so, leaving an unprotected steel surface thus shortening the culvert's life

- Older butt jointed concrete culverts that do not have the modern spigot and socket rubber-ring sealing system between the pipes. Butt jointed pipes can allow water to escape, eroding the surrounding pavement formation, which can, in turn, create subsidence of the carriageway or can contribute significant land slope failures causing sections of road to drop out on hillsides.

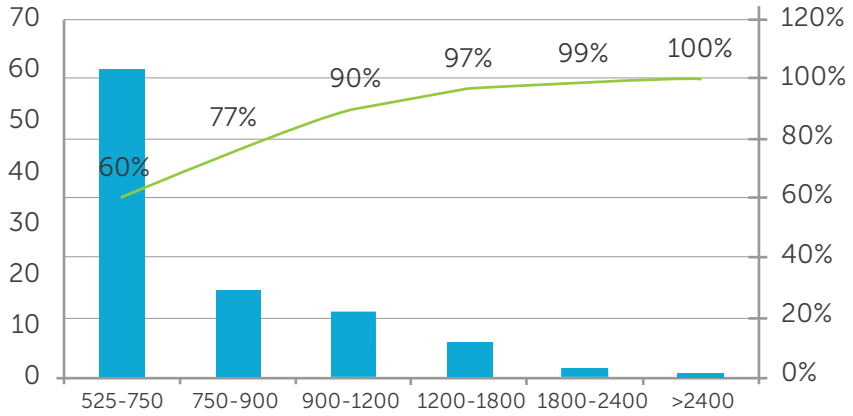
Overview of Assets

Culvert asset details are recorded in the Council's RAMM database and are stored in the same table as other drainage assets.

The following table summarises the information held for Culverts

Culvert	Quantity	Culvert Length	No. of Bridge Culverts
Arched	3	32.5	3
Box Shaped	167	2002.1	54
Circular	4254	55406.5	16
Triple Circular	5	34.7	3
Twin boxes	8	58.7	8
Twin circular	48	651.8	12
Water Drive - Lime Stone Rd (ONLY)	1	20	1
Waterdrive (hand dug)	1	100	1
Grand Total	4487	58306.3	98

The Pareto Chart below shows the distribution of pipe diameters, 77% of which are less than 900mm in diameter



Service Delivery and Rationale

Operations and Maintenance Plan: Culvert maintenance is the work necessary to keep the waterway clear of debris throughout the length of the culvert, its approach and discharge channels.

Council takes a proactive approach to culvert maintenance, through regular inspections and appropriate maintenance.

The requirement for culvert replacement and renewal is often identified from failure, creating the need for reactive maintenance.

Maintenance Inspections: The contractor is required to inspect all culverts as required to maintain the agreed level of service noted above. The inspections identify when maintenance cleaning is required and also replacement from failure which causes blockages that are identified when the culverts cannot deliver the level of service. Occasionally the Engineer may direct a culvert replacement as part of an upgrade of a storm-water drain or water race system.

The maintenance contractor is required to confirm culvert details in the asset register, and update the location and condition rating data held. This information is to be used to create an inspection program for high-risk culverts and to provide the structure for future condition ratings and inspections. To date the inspections have been undertaken, with results recorded in RAMM, the program for future inspections is in development.

The results of the condition rating has provided a list of culverts that are in very poor condition and require programmed replacement, this is detailed further in the renewals section.

Culverts are cleaned where possible in conjunction with each inspection. Debris, including all litter, rubbish, detritus, flotsam and vegetation is removed from culverts so that normal water flow is maintained and care is taken so that the culverts are not damaged during cleaning operations. Culvert inlet and outlet structures and the areas immediately adjacent to these are also cleaned.

Unplanned Maintenance: The road contractor is required to maintain an effective communication system and level of preparedness to ensure emergency works are undertaken as soon as possible after notification.

Planned Maintenance: Damaged and malfunctioning assets identified by Council staff, contractor reports or the public are programmed for repair according to the following criteria:

- Public safety
- Accelerated deterioration of the adjacent pavement is occurring, or is likely to occur
- Inconvenience occurring to road users, pedestrians and/or property owners
- Untidy appearance
- Optimisation of complementary work scheduling.

Culverts that cross private entranceways , or side culverts, are the responsibility of the property owner, however, these are maintained at council discretion if blockage poses a threat to the carriageway.

Deferred Maintenance: The impact of deferred maintenance is accelerated deterioration of culverts, which can affect the structural integrity of the road pavements. Blockages in culverts can create a build-up of water, which can flow over carriageways creating a safety hazard and potentially damaging the carriageway

A backlog of maintenance work has been identified though a recent condition rating and is detailed in the following pages under Asset Condition and Renewal Plans. Previously culvert inspections were carried out as part of other network inspections where maintenance requirements were only identified when blockages occurred. The backlog is due to a change in the way MDC manages culvert maintenance rather than an intentional deferral of maintenance work

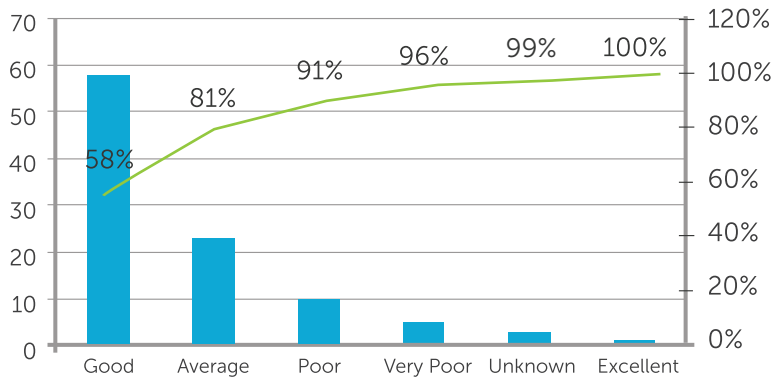
Maintenance Standards: Currently there are no specified maintenance standards for culvert maintenance outside the maintenance contract. Work is carried out in accordance with good work practice using materials and profiles that conform to the adjacent sections of channel but also comply with the relevant current standards and specifications.

Renewal/Replacement Plan

Culverts are renewed when they are unable to perform their functions safely and satisfactorily to the agreed level of service. This can occur through breakage, corrosion, blockage, change in run off characteristics requiring a greater waterway capacity, and lack of length (often caused by end breakage over the years).

The need for replacement is determined by inspection and the monitoring of performance during periods of heavy rainfall.

Asset Condition: The results of a recent condition rating inspection are displayed in the Pareto Chart below which shows that over 81% of culverts are in average or better condition.



As a subsurface asset, problems are often not apparent until these manifest themselves indirectly. For example, a breakage under the carriageway may result in localised settlement or slumping of the road surface. Usually when this occurs, it is evidence of a fault or defect that has been developing over some time. Problems are aggravated and failure rates increase when traffic loadings increase.

Asset Performance: Performance issues for culverts relate to:

- Pipe capacity
- Variable performance caused blockages
- Downstream channels being impeded by fences and debris build up beyond the road reserve
- The adequacy of supporting stormwater collection and disposal systems
- The types of pipes and jointing systems used
- Increasing heavy traffic volumes are contributing to early failures, e.g. dairy tankers in rural areas where older culverts may have been installed to a lower specification that would normally occur now.

In addition, there can be safety issues around the lack of adequate barrel length restricting the flow of traffic by narrowing the carriageway.

Expected Lives: Drainage assets have default service lives of 80 years, this default value is applied for valuation purposes and does not factor variables like differing standards of construction and operating conditions which dictate service life and often premature failures. For example, an older type culvert installed under a carriageway with high volumes of heavy traffic movement would likely fail earlier than the same type of culvert installed where there is no heavy traffic.

The expected life calculation is reliant on an accurate construction date for each asset so its end of life can be assumed. Most Council culvert data lacks accurate construction dates so this assumption cannot be made with certainty. An arbitrary date is added to assets with no construction date for valuation purposes, but as this is added across the board, there is little confidence in the valuation data for these assets. An item is included in the improvement plan to construe construction dates from known information for other assets in similar locations.

Renewal Plans: Future renewals will be based on the results of the current and future condition rating inspections.

Failed culverts will be replaced as needed and with adjustments to the budget made at the time. Expenditure forecasts prepared subsequent to such renewals will consider their effects.

Asset Improvement and Development Plan: New culverts required by developments are included in their pavements. These may be required to connect between sumps and stormwater treatment facilities. However, there is a difference between what is defined as a roading asset and that defined as utility stormwater asset.

The need for other new culverts generally arises from the need to improve or resolve identified drainage issues or as part of street upgrade and area wide pavement rehabilitation projects.

There is no formally identified need for new culverts that might be required to maintain the current levels of service.

Drainage –Sumps and Catch-Pits Lifecycle Management – An Overview

Sumps and catchpits are used to remove stormwater from kerb and channel or other surface water channels when there is no suitable open watercourse available. Sumps by definition connect to a pipe and usually contain a silt trap. Sumps are also referred to as "catchpits" as a generalised description. Where there are no reticulated stormwater systems or natural flow paths stormwater is sometimes disposed of through soak holes. In urban areas "bubble up" sumps may be used to transfer water from a private property to the kerb and channel if there is no reticulated storm water system available, these systems use water pressure to force the storm water up through the sump to the kerb and channel.

The operation and maintenance of soak holes in urban areas is now seen as part of the Utility Stormwater asset because of the specific operational and maintenance requirements to maintain water quality standards. In rural areas carriageway drainage is purely a roading responsibility as there is little threat to subsurface water quality from any carriageway runoff, due to the inherent treatment systems that occur with the side swales and open drains that are commonly present.

The design of urban sumps has changed in recent times, to improve the trapping of sediments and contaminants. This has required the use of submerged outlets and other techniques before discharging to other treatment and disposal systems like swales, soakage basins and wetlands alongside the carriageway.

Overview of Assets

The following table summarises the information held for Sumps and catch Pits.

Sumps and Catchpits	Quantity
Catchpit	3
Catchpit 150 Litre per Sec Super Sump	3
Catchpit type 1	432
Catchpit type 2	101
Catchpit type 3	1054
Drop Chamber	72
Sump	20
Grand Total	1685

Data has been collected at different times with the different terminology used for similar assets. Assets details for those identified as sumps needs to be validated and added to the appropriate and consistent catchpit category, this is an item in the improvement plan.

Service Delivery and Rationale

Operations and Maintenance Plan: Maintenance requirements are easily accommodated under the road maintenance contract and respective street cleaning operations therefore it is sensible to have these retained and managed as roading assets.

Deferred Maintenance: The impact of deferred maintenance is the inability to carry the design flows with a corresponding decrease in levels of service with respect to stormwater control.

The maintenance contract is structured to ensure the level of service is maintained, there is currently no deferred maintenance.

Maintenance Costs: Street Cleaning activities are only partially funded under Waka Kotahi Work Category 113 – Routine Drainage in the Council's Land Transport Programme. Only 30% of the total expenditure of street cleaning within 2m of the edge of carriageway is eligible for funding. The remaining 70% has to be fully funded by the Council. This is included in the financial forecasts.

Renewal/Replacement Plan

Sump renewals, because they are so closely tied to kerb and channel renewal, and are relatively low cost items, are not programmed or budgeted separately.

Occasionally the need for replacement is determined by inspection and the monitoring of drainage performance during periods of heavy rainfall, however, sumps are normally renewed when the kerb and channel they serve is renewed. Parts of the original sumps may be reused, e.g. the piped outlets, this is done on a case-by-case basis and generally for practical rather than cost reasons.

The primary reason for renewing sumps is usually a consequence of street upgrade projects. As the sumps are unlikely to be replaced in their existing positions when kerb and channel are realigned and it could be argued that in this circumstance the new improvement works category is most appropriate. However, as the capability to receive stormwater in the approximate location that is being renewed, it is more appropriate to consider this work renewal.

Asset Condition: Sumps are generally in serviceable condition. They are not subject to any condition rating inspections but are inspected and cleaned regularly, this ensures they remain in a serviceable condition.

Asset Performance Data: There are no performance issues with sumps as long as they regularly cleaned. The greatest issue is build-up of leaf debris on their grates occurring in autumn. This can be a particular problem when strong winds and heavy rain coincide. This is a maintenance issue and is resolved through additional maintenance at the appropriate times.

More regular cleaning is also resulting from their increasing function to entrap sediments and contaminants as part of a consented stormwater treatment and disposal system in urban areas.

Expected Lives: As detailed above the replacement of sumps and catchpits is normally dependent on when the associated kerb and channel is renewed. The expected life of sumps and catchpits is aligned with kerb and channel and is set at 80 years.

The expected life calculation is reliant on an accurate construction date for each asset so its end of life can be assumed. Historical sump and catchpit data lacks accurate construction dates so this assumption cannot be made with certainty. An arbitrary date is added to assets with no construction date for valuation purposes, but as this is added across the board, there is little confidence in the valuation data for these assets. An item is included in the improvement plan to construe construction dates for kerb and channel assets, once this information is obtained construction dates for the associated sumps and catchpits will also be added.

New Sumps

New sumps required to service new kerb and channel in new developments are included in the costs of those works. These initial costs are borne by the developer with ongoing maintenance costs becoming councils responsibility once the assets are vested to council.

Kerb and Channel

The Council's RAMM database records information on surface water assets. Kerb and channel and other surface water channels are identified separately as they have differing attributes, maintenance requirements and valuation methodology.

Kerb and channel is a specific type of surface water channel. Its purposes are to:

- Provide a path for stormwater runoff from the carriageway, footpaths, berms and adjacent properties, protecting the pavement from water ingress, and consequential structural deterioration
- Allow the convenient and safe movement of pedestrian and vehicular traffic

It also has an important secondary purpose:

- To enhance the convenient and safe movement of pedestrians and traffic by separating these two streams of road users.

The use of concrete kerb and channel, as opposed to earthen surface water channels (also referred to as swales) is a recognised and accepted sign of urban development. With the flat profile of the district's towns, ponding can occur if well-formed channels are not used. Apart from its functional role, kerb and channel also protects the carriageway seal edge from the higher exposure to traffic within the urban area. It is a requirement of the District Plan that all new urban subdivisions have formed kerb and channel. In some of the smaller and more rural orientated townships kerb and channel may be seen as unnecessary, or not be wanted by the residents.

Kerbing is also installed at some rural intersections, bends and corners in conjunction with other road improvement works, such as minor improvements at intersections, seal extensions and seal widening. Kerbing in these situations protects the edge of seal from edge break problems in these high-wear areas while also providing positive drainage of stormwater runoff. In addition, kerbs delineate corners of an intersection to a higher degree than a plain seal edge.

All new kerb and channel is either standard profile kerb and channel, or mountable kerb and channel and is generally slip formed in situ. Mountable kerb and channel is used in the majority of situations, although it does not have the carrying capacity of standard kerb and channel, this is not considered to be a problem as suitability assessment is carried out during the design phase of construction.

Standard profile kerb and channel is used if there is a wish to match it with existing installations or if there is a requirement to have a higher stormwater capacity.

The mountable kerb and channel profile channel is less obtrusive than standard kerb and channel and allows normal residential vehicle access without the need to cut the kerb and install a dedicated vehicle crossing. It is the Council's policy to provide kerb cut downs on the low profile kerb and channel in specific situations, such as crossing points for pedestrians, rights of way and commercial entranceways where there is a large amount of traffic, e.g. shopping malls and warehouses.

Kerb and dish channel is difficult for pedestrians, especially the elderly and mobility impaired to cross, and it can trap cycles and car tyres, is difficult to clean, its bridge crossings trap debris and are sources of ponding during heavy rain and it is unsightly. Nevertheless, Council regards it as filling a function and its policy is to replace it only when condition dictates, or as part of a street upgrade project.

The key issues relating to kerb and channel are:

- Implementation of a kerb and channel extension strategy that identifies missing sections or sections that need to be provided
- Determination of the amount of deferred maintenance and renewals of kerbs and channels
- Provision of appropriate stormwater collection, treatment and discharge facilities where necessary
- Compliance with Resource Consent conditions, imposed when maintaining, renewing and providing stormwater facilities
- Resource Consent conditions imposed on developers that will become the Council's responsibility when the assets themselves are vested in the Council by the developers and any resource consents transferred to it
- Asset data integrity (e.g. lack of accurate construction dates).

Overview of Assets

The following types of Kerb and Channel are utilised in the District, asset details are recorded in RAMM in the Surface Water Channel table.

Kerb and Channel	Kerb and Channel Length (m)
Dished Channel (Concrete)	3999
Dished Channel (Half pipe)	51
Kerb & Channel (Concrete)	146954
Kerb & Dished Channel (Concrete)	513
Kerb Only (Concrete)	2774
Mountable Kerb & Channel (Concrete)	12899
Mountable Kerb Only (Concrete)	299
Grand Total	167489

Service Delivery and Rationale

Operations and Maintenance Plan: Clean hard-surfaced channels carry stormwater more efficiently. Kerb and channel cleaning is therefore an important activity and is not just done for aesthetic reasons i.e. to make the channels look tidier. This work is carried out as part of the overall roading maintenance contract, which specifies the frequency and standard of cleaning.

There are periodic maintenance requirements that are not extensive enough to be classed as renewals, in particular, it is often necessary to repair stormwater outlets and occasionally to repair short lengths of

broken or failed kerb and channel. These works are identified by the contractor, condition rating inspections, Council staff, or from ratepayer concerns or complaints. The work is carried out under the Road Maintenance Contract.

Condition Inspections: The Council's staff and the road maintenance contractor report any defects observed in day-to-day road maintenance activity. Condition surveys are undertaken annually by an independent contractor with results stored in the RAMM database.

Unplanned Maintenance: The road contractor is required to maintain an effective communication system and level of preparedness to ensure emergency works are undertaken as soon as possible after notification.

Planned Maintenance: Damaged and malfunctioning assets identified by Council staff, contractor reports or ratepayers are programmed for repair according to the following criteria:

- Public safety
- Accelerated deterioration of the adjacent pavement is occurring, or is likely to occur
- Inconvenience occurring to road users, pedestrians and/or property owners
- Untidy appearance
- Optimisation of complementary work scheduling.

Deferred Maintenance: The impact of deferred maintenance is an accelerated deterioration of kerbs, channels and pavements with a corresponding low level of service with respect to appearance and stormwater control. They also become difficult to clean and can attribute to pavement deterioration.

Maintenance Forecast: The forecast cost of maintaining kerb and channel is largely derived from past experience.

Renewal/Replacement Plan: Replacing isolated sections of kerb and channel can be impractical, as it is likely also require the partial reinstatement of the adjoining footpath and pavements, and it is therefore best performed as part of an integrated programme. Kerb and channel renewals therefore usually take place in conjunction with the upgrading or reconstruction of the adjacent pavement sections, footpaths and berms, usually as part of street upgrade projects.

Strategy and Funding Mechanism: An appropriate renewal programme will be funded – maintenance costs will increase if renewals are deferred. Maintenance costs will increase in proportion to the increase in kerb and channel length.

Renewal Strategies: Street upgrade projects are usually seen as township projects, and as such become part of the identification and prioritisation processes that the Council engages in with Township Committees when it prepares its forward programmes. However, there are usually good engineering reasons supporting such programmes, often related to the state of the kerb and channel, and that can be significant contributors to the prioritisation process.

Renewal Standards: While much of the old channel is located at 3 metres from the road boundary, its replacement is optimised to meet current engineering and planning standards. This can require the width of the adjoining carriageway to be reduced from its original 14m or so to 11m or less, in accordance with the road's hierarchy and the corresponding standards.

Older streets also often have an area of metal or grassed shoulder between the edge of the formed carriageway and the old channel. In these circumstances the replacement kerb and channel is likely to be positioned at the immediate edge of the carriageway and a new berm and footpath created behind it. This has lower through life costs and is also more practical and aesthetically pleasing.

Replacement kerb and channel is installed to the same standards as new, using appropriate engineering standards and the same cross sectional profiles.

Renewal Programme: To establish a renewal programme there is a need to undertake specific inspections of the worst channels as identified by the annual RAMM condition rating. The economics of renewing these lengths should then be reviewed and the renewals programmed appropriately. Renewal of kerb and channel

is justified when more than 30% of the length of the channel is broken or damaged beyond practical, repair or there is extensive damage to the adjacent carriageway.

There is also a need to validate existing construction date data to enable renewal forecasting. Under the current Waka Kotahi criteria, renewals can only generally be considered for funding if the condition of the kerb and channel is contributing to the deterioration of the adjoining pavement formations and the work will reduce future maintenance costs. On these bases there currently are few renewals that can be justified for funding.

A renewal programme is to be developed as described above and is an identified task in the in improvement Plan. An element of this task is to maximise any potential to fund renewals through the subsidised Land Transport Programme using Waka Kotahi Work Category 213 – Drainage Renewals.

Renewal Plans: Current condition rating data shows that 77m of kerb and channel is due for replacement as it is in very poor condition. As this length is represented as a percentage of broken channel per length surveyed the actual length that is replaced may vary due to site specific requirements. For example, if it is more sensible to replace an adjoining length in poor condition or to extend the replaced length for growth or aesthetic reasons.

Condition and Performance

Asset Condition: The extent of deterioration of kerb and channel depends on age, method of construction, the quality of materials and location (damage can be caused by heavy traffic driving over kerb, tree roots etc). The main factor causing deterioration is age, with the bottom of the channel failing (in particular in the older dish channels), allowing water to soak into the sub-grade and the adjacent Base-course of the pavement.

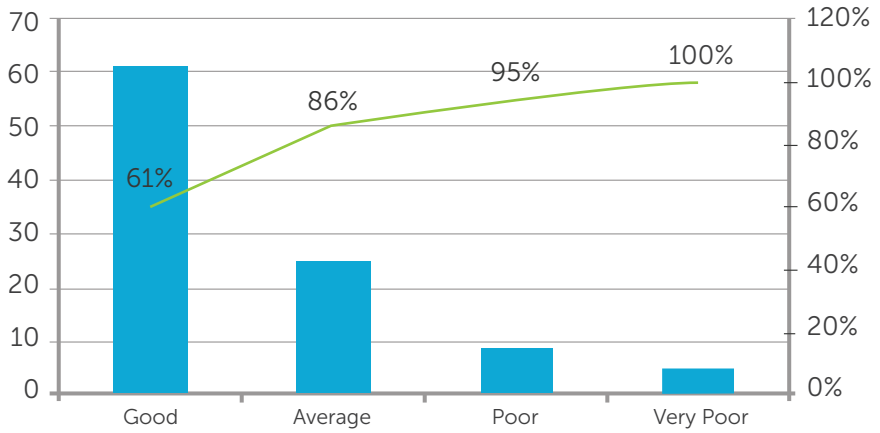
Physical inspections of sealed carriageways are undertaken at regular intervals and a rating system is used to quantify defects, including kerb and channel defects. Using this system, an indication of the general condition of the surface water channel is assessed from rating data using the fault "broken channel".

Each surface water channel is given a condition rating based on the percentage of the channel length that is broken, as detailed in the following table. The condition rating is based on selected fundamental fault types; it does not take account of other defects such as cracking, spalling of concrete and poor vehicle crossings that can detract from the level of service.

Score/Rating	Condition Description	% of Length Broken Channel (m)
1	Excellent	<5
2	Good	>=5 and <10
3	Average	>=10 and <20
4	Poor	>=20 and <30
5	Very Poor	>=30

Kerb and channel in excellent condition cannot be shown as there is no value recorded if no defect is present, therefore if no defect recorded it is assumed that the condition is excellent.

The following chart shows defects found during a recent sealed road condition rating survey. Defects are recorded as detailed above as a percentage of each section of kerb and channel, the length of defects found totals 1672m which is approximately 1% of all kerb and channel.



The Pareto Chart above shows that 86% of kerb and channel is in average or better condition. This is expected as most was constructed within the last 40 years to good standards and quality.

Renewal/repair of the assets in very poor condition is needed, followed by renewal of the assets in poor condition as their condition deteriorates.

Expected Condition: Expected condition is based on condition ratings, as the overall percentage of faults found is just over 1% of the entire length of the asset, the assumption that kerb and channel assets are in very good condition can be made with confidence.

To forecast expected condition accurate construction dates are required, as this information is not currently available these forecasts cannot be made.

Asset Performance: for kerb and channel assets relate to:

- The profile of the channel – older dish channel has more capacity but is more prone to disintegration and blockage
- Variable performance caused by different and substandard vehicle crossings on older styles; e.g. blockages and breakages
- The integrity of the channel, which is dependent on standard and quality of construction. Older types are more likely to be substandard
- The effects of impact damage associated with vehicles at entranceways, and heavy vehicles elsewhere
- Poor gradient or other alignment problems
- Blockages from debris build up
- The adequacy of supporting stormwater collection and disposal systems, e.g. sumps and pipe reticulation.

A more proactive approach to identifying and replacing sections of substandard kerb and channel is needed. Substandard sections need to be accessed for repair or reconstruction, together with footpath rehabilitation works, to complement adjoining work. Kerb and channel condition and footpath condition are major factors in the consideration of street upgrade projects. Renewal of both of these assets is considered complementary work, and there are practical and economic advantages in renewing both at the same time and in conjunction with street upgrading works whenever it is reasonable to do so.

Expected Lives: When new kerb and channel is constructed, the associated RAMM record is assigned a default service life of 80 years. Condition is monitored regularly with renewals and maintenance work based on condition rather than age.

Older assets do not have accurate construction dates so forecast based on age is not possible. An item has been added to the improvement plan to estimate construction dates for older assets based on other known construction dates for assets in the same area.

Asset Improvement and Development Plan New Kerb and Channel:

New sections of kerb and channel are acquired when:

- New sections of kerb and channel are constructed in townships by the Council where there was no kerb and channel previously (kerb and channel extension)
- New kerb and channel constructed by the Council as part of rural intersection improvements (quadrant kerbing)
- New kerb and channel is vested in the Council after it has been constructed in new subdivisions by private developers.

Development Strategy: Criteria used for justifying new kerb and channel include:

- Evidence of ponding/flooding
- Incompatibility with agreed urban standards
- High cost of maintaining existing stormwater control
- The need for carriageway edge definition and/or separation of footpath/pedestrian areas from a carriageway.

Priorities are allocated following evaluation of pedestrian usage, safety issues, stormwater control needs and the number of residential properties to be served. However, Township Committees play a significant role in determining relative priorities when township improvement projects are considered.

New kerb and channel extension can be combined with new footpath extension, and associated berm improvements, to provide an integrated and comprehensive upgrade to a section of berm. This type of work mostly comes about where roading upgrade contributions have been applied on consented subdivision developments.

Development Programme: The timing of new subdivisions, and the amount of kerb and channel that is constructed in them, is dictated by respective private property developers and is strongly influenced by market forces. This work is not funded by Council unless a roading upgrade contribution has been sought as part of a consented subdivision or a Council activity or project eventuates from the consent.

Apart from those works associated with street upgrades, other opportunities to provide new kerb and channel include improvements to the carriageway such as seal widening in urban areas, area wide pavement rehabilitation projects and as part of subdivision commitments.

Deep and Shallow Surface Water Channels Lifecycle Management – An Overview

The primary purpose of all surface water channels is to provide a path for stormwater runoff from the carriageway, footpaths, berms, and sometimes the adjacent properties, to:

- Protect the pavement from water ingress, and consequent structural deterioration
- To allow the convenient and safe movement of pedestrian and vehicular traffic
- Deep and shallow channels are generally unlined except in very exceptional circumstances where there is a requirement to prevent sub-surface water infiltration/ exfiltration or erosion of the channel.

The Council's RAMM database records information on shallow and deep surface water channels. The information is stored in the same database table as for other surface water assets but they are identified separately as they have differing attributes, maintenance requirements and valuation methodology.

Shallow surface water channels are shallow trafficable depressions formed with the invert 2.0m to 3.0m from the carriageway edge and 150mm to 300mm below the edge of the carriageway. Their sides are tapered back to the existing berm with a target slope of around 1:10. These types of channels are referred to as swales.

Deep surface water channels are often referred to as drains. Both types of surface water channel are predominately found in rural areas with the use of swales and drains being common in the outlying urban settlements.

Land drains are part of a wider public drainage network. Their primary function is to drain private land and to convey drainage water and stormwater to receiving water bodies. The proportion of stormwater originating from roads and ending up in land drains is very low.

Overview of Assets

The value of the Shallow and Deep Surface Water Channels is included in the total valuation figure for all Surface Water Channels shown above in 8.4.1 Introduction.

The following types of deep and shallow surface water channels are utilised in the District, asset details are recorded in RAMM in the Surface Water Channel table:

Surface Water Channels	Surface Water Channel Length (m)
Other Type	4878
Rock Lined Drainage Channel	379
SWC (Deep, >200 Below Seal Edge)	945102
SWC (Shallow, <200 Below Seal Edge)	1311311
Grand Total	2261670

Service Delivery and Rationale

Operations and Maintenance Plan: Maintaining surface water channels is an important part of rural road maintenance, poor surface water drainage can contribute to premature pavement failure and ponding of excess water can cause safety hazards. All maintenance on earthen surface water channels is carried out under the Road Maintenance as part of sealed and unsealed roads maintenance work.

Condition Inspections: The Council's engineering staff and the road maintenance contractor report any defects observed in day-to-day road maintenance activity. RAMM rating surveys on sealed roads record whether high shoulders are present, which provides a good indication of the current effectiveness of the corresponding surface drainage systems.

Unplanned Maintenance: The road contractor is required to maintain an effective communication system and level of preparedness to ensure emergency works are undertaken as soon as possible after notification.

Planned Maintenance: Damaged and malfunctioning assets identified by Manawatū District Council staff, contractor reports or the public are programmed for repair according to the following criteria:

- Public safety
- Accelerated deterioration of the adjacent pavement is occurring, or is likely to occur

- Inconvenience occurring to road users, pedestrians and/or property owners
- Untidy appearance
- Optimisation of complementary work scheduling.

Shallow SWC – Swales: To address the performance issues, high shoulders on the carriageway sides of swales are periodically removed. This is done on a cyclic basis in conjunction with pre-reseal repairs on sealed roads and remetalling, grading and other pavement renewal works on unsealed roads. The swales themselves are also reformed and improved as part of this complementary work.

Currently high shoulder removal work and swale reformation is classified as maintenance. However, because of its longer-term cyclic nature it can also be considered a renewal.

Deep SWC – Drains: Adequate maintenance will keep these channels functioning indefinitely. They are cleaned by mechanical excavation when the build-up of detritus is sufficient to impair their performance. Some drains are also sprayed to control vegetation, especially woody type weeds.

Cut Outs: Cut outs are channels cut through sections of high shoulder to allow water to drain off the carriageway. These are in place on sections of road that require shoulder removal but have not yet had the work approved but are usually on unsealed roads. The cut outs should be shaped so that vehicles are able to drive through them if necessary. This is usually done by the grader while maintenance grading in the area.

Operational and Maintenance Processes

Maintenance Forecast: The maintenance of unlined surface water channels is budgeted under Waka Kotahi Work Category 113, Routine Drainage Maintenance in the Council's Land Transport Programme

Deferred Maintenance: The impact of deferred maintenance is accelerated deterioration of unlined surface water channels and the adjacent pavements, with a corresponding lower level of service with respect to ride and stormwater control. It can also be a safety issue if water is sufficiently wide spread and deep to cause vehicles to aquaplane and lose control.

Condition, Performance and Capacity

Shallow SWC – Swales: Swales generally maintain their shapes reasonably well. However, there is a gradual deterioration over time because of the build-up of vegetation, soil, and sometimes road metal, along the edge of the carriageway causing "High Shoulders". This occurs on both rural sealed and unsealed roads but is more rapid on the latter where it is exacerbated by normal maintenance grading.

The effect of grading is to build up the edge of the berm, which then retains a proportion of the stormwater on the road surface for longer than would otherwise occur. This allows a greater opportunity for water to seep into the pavements' structural layers, and on metal roads it combines with passing traffic to develop large potholes rapidly.

Vegetation in the invert of the swale has little direct effect on a channel's performance. As long as the channel is not clogged, vegetation has a positive effect as it can filter out contaminants and improve water quality before it goes sub surface either naturally or via soak holes.

Based on knowledge and condition assessment, the current condition of swales is:

- They are generally in good condition where recently formed
- High shoulders are present, to varying extents
- Where the seals are in the last part of their life cycles or where they were not removed before the last reseal
- On metal roads.

Deep SWC – drains: Deep drains within the road reserve can serve one of the following functions. They can be:

- Road Drains, built to carry large volumes of water running off the road or to protect the road from high ground-water levels
- Land Drains, draining adjacent land but not serving any additional road function
- Shared Drains, as the name implies the benefits are shared between the property owner and the road. Maintenance is a matter of negotiation.

Drains generally deteriorate slowly. The major issue they face is slow accumulation of sediment as material is precipitated from stormwater and loss of capacity through growth of vegetation. Both of these problems are controlled by routine maintenance. Based on knowledge the current condition of drains as they may affect the roading asset, they are generally in good condition, with no known recurring problems caused by inadequate maintenance.

Asset Performance Data: Performance issues for swales and similar earthen surface water channel assets relate to:

- The effects of impact damage associated with vehicles at entranceways
- Substandard culverts, built with or without the proper authority from the Council
- Blockages from debris build up
- The adequacy of the receiving stormwater collection and disposal systems, e.g. soak holes, culverts, drains and streams.

Renewals Plans

There is currently no renewal plan for swales and drains as this has been considered as a maintenance activity.

New Unlined SWC: There is no current requirement for new road drains (deep SWCs). New swales are formed if the adjacent section of rural carriageway:

- Is showing deterioration from ingress of water to the pavement structure
- Is subject to ponding caused by the inability of stormwater to flow off the surface onto the adjacent berm
- Is scoured by stormwater
- Has high shoulders removed.

Otherwise, they are provided as part of cyclic maintenance work in advance of reseals and unsealed road remetalling and pavement during renewal work.

Development Strategy

Priorities are allocated following consideration of costs, effects on pavement life, other programmed works, safety issues, and stormwater control needs. Because the work is so intimately bound with other maintenance activities, it has traditionally been regarded as a maintenance activity.

Development Standards: The location of new swales in the carriageway cross section is determined largely by the road's hierarchy and the associated width standards.

The procedure employed where the existing roadside is maintained to a high standard by the adjacent property owner, is to reinstate the trimmed area to a condition that allows it to be mown to the previous standard once vegetation re-establishes. Rural roadsides are not re-sown with grass after high shoulder removal. However, the removal of high shoulders and the formation of any swales in these situations still needs to accomplish a continuous well-draining profile to ensure good drainage along the whole section of the road.

Roadside berms, when disturbed by roading activities are generally left in a condition that allows mowing with a tractor mounted mower.

Development Programme: The timing of new rural subdivisions, and thus the swales they contain, is under control of the respective property developers and is strongly influenced by market forces. This work is not funded by the Council and is not programmed in this, or any other Council plan.

5.5.5 Feature

Overview of Assets

Features are generally structures which have been installed in the road reserve to enhance the aesthetic appeal of the area. An example is stone features installed by developers at the entrance to subdivisions. Once the subdivisions are vested to Council, ownership these assets fall under the control of the council and they form part of the transportation asset base.

There is little requirement for ongoing management of features assets.

The following table summarises the information held for Features:

Feature	Total Features
Fence - Hardwood and Wrought Iron	2
Stone Wall Feature at Entrance - Large	5
Stone Wall Feature at Entrance - Small	4
Tree Planter (CBD)	4
Grand Total	15

5.5.6 Footpath

The majority of footpaths are constructed of concrete, other materials include asphalt, paving stones, chip seal and metal.

Overview of Assets

The type of surface used is dependent on life cycle cost considerations, pedestrian volumes and the amenity value of the location e.g. shopping and commercial areas.

The following table shows the type and number of Footpaths recorded:

Footpath Type	Footpath Length (m)
AC Panel with Tile Boarder	325
Asphaltic concrete (black)	18551
Concrete	121678
Interlocking blocks	1758
Limestone Path	2489
Metal	98
Monier Tile Herringbone	1273
Seal	2745
Grand Total	148917

Service Delivery and Rationale

The maintenance contract includes all footpath maintenance work including safety repairs or other minor ordered repairs as required. Ordered work includes:

- Pothole repair
- Replacing footpath battens
- Grass edge trimming
- Weed control
- Cleaning (removal of moss/lichen)
- Repair of surface defects prior to footpath resurfacing
- Filling depressions and slumps, and the reinstatement of utility trenches.

Fault information is gathered for each section of footpath with the number of faults recorded in the RAMM database.

The following fault categories are used;

- Settlement
- Bumps
- Depressions
- Crack
- Scabbing
- Pothole.

Waka Kotahi Work Category

Footpaths are managed under Waka Kotahi Work Category 125 for Maintenance and Renewal activities.

Maintenance Strategy

Maintenance needs are mainly identified during contractor and MDC staff inspections. Other sources are also used, such as RAMM rating surveys, public and community committee requests.

The consequences of inadequate maintenance are:

- Reduced safety
- Accelerated footpath deterioration and additional consequential costs; and/ or
- Lower level of service (ease of use, appearance).

Footpath maintenance is prioritised using the following criteria:

- Available budget
- Optimisation of complimentary work scheduling
- Safety of pedestrians
- State of surface affects ease of use e.g. rough surface, potholes
- Likelihood that the area of distress may expand and require more expensive intervention
- Aesthetics (e.g. minor water ponding/untidy appearance).

Maintenance Plans

Once faults are identified they are included in work programmes. The amount of work carried out on footpath maintenance is based on physical need and the Council's approved budgets. The quantity of work carried out is based on prioritising the worse sections and working within the available annual budgets.

Renewal/Replacement Plan

Renewals are carried out to:

- Return paths to their original condition
- Provide for safe passage and ease of use for pedestrians, as appropriate to the facility
- Provide a surface that requires minimal lifecycle maintenance.

Renewal is required when a path has deteriorated to the extent that:

- The required level of service is not being delivered
- Continued maintenance is not economical.

Justification of renewal work is also influenced by:

- The condition of the kerb and channel adjoining the footpath - Replacement of substandard kerb and channel will also require the reinstatement of the footpath, generally to an extent consistent with full reconstruction.
- The advantages of co-ordinating with other nearby works, such as street upgrading, urban road reconstruction or renewal of other utility services
- The types of renewal work undertaken to renew these facilities include:
- Resurfacing, where the existing formation is sound, to provide a smooth, waterproof, surface by:
- Overlaying with asphaltic concrete on existing surface
- Resealing with bitumen and chip or slurry on existing chip seal
- Resurfacing with asphaltic concrete on existing chip seal
- Removing the existing surface and laying new surface over existing Base-course
- Reconstructing substandard sections of path, where the existing formation is unsound, by replacing any timber battens, Base-course and surfacing.

Work needs are identified following identification of work. Priorities are based on:

- Level of service deficiencies/path performance, including safety issues – differential settlement, cracks, potholes etc
- Physical condition
- Co-ordination with other works, such as kerb and channel replacement, installation of underground wiring by utility companies, underground utility renewal, and street upgrading
- Likelihood of accelerated deterioration.

Asset Condition

Footpath condition rating information is currently not available from RAMM.as the results from footpath condition rating surveys do not relate to footpath condition. An item has been added to the improvement plan to make better use of this data so the number of and type of faults that are recorded can be translated into a more meaningful condition rating score, and so be used for renewal forecasting.

Asset Capacity

Expansion of the footpath network requires a deeper understanding of pedestrian movement according to how the towns are changing according to how people are using retail areas, businesses and community services.

As the extent of the asset increases and other influences change with time, it is likely that it will be necessary to revise the current approach to prioritising this work. In particular, a combination of the present system inspections and the use of rating data collected for RAMM on footpaths is more likely to indicate the expected condition of footpaths. It will provide a better indication of the need to increase expenditure on maintenance and renewals.

Renewal Standards

Renewal works comply with the standards for new works as detailed in Council's standard specification for footpath construction.

Generally sections of footpath are renewed on a like for like basis, however consideration is given to change the type of material used if the change will better suit the site.

Renewal Programme

The required level of renewal varies depending on the:

- Levels of service provided by the paths
- Condition profile of footpaths
- Age profile of paths
- Proximity of trees
- Level of on-going maintenance required
- Economic lives of the materials used
- Effects of underground wiring.

Renewal Forecast

To enable long term renewal forecasting an accurate construction date is required. This information is lacking in Council's footpath data base. There is an item in the improvement to estimate construction dates for footpaths and other assets based on known construction of other infrastructure in the same areas.

Forecast Footpath Surface Condition

The data collected for RAMM on footpaths details the condition of footpaths and indicates any likely need to increase expenditure on renewals/maintenance. Ideally, this should be used in conjunction with annual inspections when prioritising work based on budget allocations for maintenance work.

Asset improvement and Development Plan

The Council's Active Transport Strategy and its Action Plan is the most significant driver of new footpath and cycleway improvement projects.

- In general, other new paths are acquired through
- New paths being constructed by Council where no path previously existed
- New footpaths vested to council in new subdivisions.

Development Strategy

The footpath and cycleway/pathway development strategy is to:

- Carry out the projects and other activities required to implement Council's Active Transport Strategy
- Develop other new footpaths where there is a clear community need and strong community support for them
- Provide footpaths and cycleway linkages that have been identified through Council initiatives, such as township structure plans, neighbourhood accessibility plans and in planning for new urban subdivisions
- Promote and encourage third party initiatives to establish formed walking and cycling pathways for both commuter and recreational purposes
- Ensure opportunities are taken to establish walking and cycling facilities when upgrading existing or planning new roading infrastructure projects.

The criteria used for advancing and prioritising footpath and cycleway development projects are: Achievement of Council's Active Transport Strategy's goals and objectives:

- Pedestrian and cyclist safety
- The locality, proximity and suitability of alternative paths
- The vehicle operating speed on adjacent carriageways
- Providing and enhancing connectivity e.g. between new urban subdivisions
- Township and Community Board committee priorities (within their jurisdictions only)
- The ability to co-ordinate with other works to provide a package of complementary works to meet demand e.g. roads, walking, cycling, public transport etc
- Promotion of sustainable transport options.

Development Programme

The timing of new subdivisions and thus, the paths they contain, is under control of the respective property developers and is strongly influenced by market forces. This work is not funded by the Council and is not programmed in this, or any other, Council plan. Where possible funding for projects will be sought through the Waka Kotahi subsidised Work Categories 451 and 452, Pedestrian Facilities and Cycle Facilities respectively. The funding eligibility criteria specifically excludes projects that are purely for recreational purposes and that have no other benefits such as the promotion of sustainable transport options. As another of the criteria for eligibility, projects should achieve an economic benefit cost ratio of 1 or above.

Other supporting education, promotion and enforcement aspects associated with the Strategy are funded in other work categories, primarily Work Category 432 – Community Programmes.

Management Programme Maintenance Standards

Technical and materials standards are generally those specified for on-carriageway works. However, care is required to avoid making new tripping hazards, to avoid creating nuisances caused by "wet tar" that can track into shops and homes, and avoidance of loose chip on footpaths and cycleways with smooth surfaces such as concrete or asphaltic concrete.

Deferred Maintenance

There is no intentionally deferred maintenance; once the improvement task of belter utilising the condition rating data maintenance may be deferred based on priority and available budgets.

5.5.7 Island

Overview of Assets

Traffic Islands are painted areas or raised concrete delineation devices, generally at intersection or in the centre of wide carriageways. Islands can be painted directly onto the road surface or can be constructed of entirely of concrete, concrete edged pavers or concrete edged landscaped areas.

If the island uses painted road markings only, without raised kerbs or other physical obstructions, it is called a painted island. When traffic islands are painted for longer lengths, they are referred to as traffic medians, shown as a strip in the middle of a road acting as a divider between lanes over a much longer distance. When making a right turn out of a junction, drivers will often drive into painted median refuge and wait for space before entering traffic, as a way of crossing one lane of traffic at a time. Some traffic islands may also serve as refuge islands for pedestrians wishing to cross a road or State Highway.

Painted Islands are managed and recorded along with other Painted Road Markings.

The following table shows the type and number of Raised Islands recorded;

Island Type	Total Island
Median	31
Painted Kerb block	13
Pedestrian Island	42
Rotary	5
Roundabout	8
Side	68
Splitter	27
Grand Total	194

Areas of grass and gardens inside some Islands are maintained by the Council's Parks and Property contractor.

Island Surface	Total Surface
Area of Grass	54
Hard Surface - Block	19
Hard Surface - Concrete	86
Monier Boarder with Centre Garden	1
Planted Landscaping	34
Grand Total	194

Service Delivery and Rationale

Islands have reflective white painted surfaces on the boarders, for safety considerations these surfaces need to be repainted on a regular basis so are included in the annual Pavement Marking Contract which encompasses all Pavement Markings throughout the district.

Painted Islands are renewed on an annual cycle along with there Painted Road Markings.

The condition of traffic islands are assessed during routine inspections undertaken by the Contractor, with the results reported to Council. There is no formal condition rating system for this traffic services assets; condition is assessed both visually, and in accordance with the appropriate key performance indicators.

Waka Kotahi Work Category

Islands are included in the Traffic Services group and are managed under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities.

5.5.8 Marking

Painted pavement markings are provided consistently throughout the district to identify road features, hazards and to provide general information to road users as follows;

- Road markings
- Road centre lines, lane lines, no overtaking lines/no passing lines
- Edge lines and shoulder markings
- Median markings, cycle lanes, parking areas
- Traffic Islands, intersection markings
- Messages and symbols
- Pedestrian crossings
- Railway level crossings
- Fire hydrants
- Raised reflective pavement markers (RRPM)
- Audio Tactile Pavement Markings.

Overview of Assets

Basic detail on Road Markings is held in the RAMM database. However, as the annual road marking work is tendered separately from other maintenance work it is more efficient for contractors and MDC staff to manage using a spreadsheet rather than the RAMM database. The RAMM database is updated periodically from the spreadsheet so detail of any additions are captured.

Marking Type	Unit	Total
Reflectorised Paint	M	572331
Raised Pavement Marker	Ea	14942
Thermoplastic	M	6176

Service Delivery and Rationale

Painted pavement markings are remarked annually with this task being treated as a renewal item. The use of a separate contract reflects this asset's more specialised needs in terms of plant, materials and required operator skills.

The key issues relating to markings are:

- The quality of road marking materials and application
- Establishing relevant customer levels of service for road markings
- Establishing economic and meaningful performance measures for signs and markings
- Problems with markings adhering to fouled surfaces
- Maintaining road markings in areas of high wear
- Providing a consistent appropriate standard of road marking on all roads in the district, relative to their hierarchy and use.

Waka Kotahi Work Category

Islands are included in the Traffic Services group and are managed under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities.

Strategy

Maintenance needs are identified through inspections of the roading network by the contractor and Council staff. Maintenance activities are also carried out as a result of other pavement maintenance operations, for example road marking following surface patching after a pavement repair.

Operational and Maintenance Processes

The majority of this work is carried out under a separate renewals contract. However the maintenance contract does specify in several of the pavement repair sections that the contractor is responsible to reinstate any required pavement marking.

Renewal/Replacement Plans

Repainting of all marking is carried out on a cyclic basis over a 12 month period using the Waka Kotahi P/12 method based specification. This work is treated as renewals with the asset having a 12 month effective life

The standard of road marking in the performance specification is based on five criteria:

- Colour (daytime and night time)
- Daytime Visibility
- Night time Visibility (dry and wet)
- Skid Resistance
- Durability.

The measurement of each of these criteria is set out in the specification, along with the values to be achieved. The contractor is required to carry out regular inspections and measurements to ensure that the road marking meets the standard set in the specification. If it does not meet the standard then the marking is repainted. The reinstatement of road markings after reseals and reconstructions is carried out as part of the resealing contract.

5.5.9 Railing

Rails that provide road side site visibility and safety protection. There are two different types, sight rail and guard rail.

- White timber posts and boards, used as visual aids
- Lightweight steel armco barriers, used as physical barriers.

A sight rail is one or more timber boards, secured by posts driven into the ground, positioned approximately 500mm – 1,000mm above the ground, most commonly along the edge of a carriageway bend. They act as a visual aid to road users defining the edge of carriageway around an approaching bend or a section of road with limited shoulder width. As with road line marking, sight rails are also painted white.

Overview of Assets

Railing Type	Total Railing	Total Length (m)
Bridge Approach Rail	17	230
Bridge Rail	28	1068
Concrete	64	723
Concrete Post with Steel Tube	4	36
Concrete Post with Timber Rail	1	5
Culvert Rail	14	125
Guard rail	28	829
No Rails	62	473
Pedestrian Handrail	11	31
Sight rail	231	4085
Sight Rail - 2 Rails	423	4879
Sight Rails - 3 Rails	240	2266
Sight Rails - 4 Rails	116	858
Sight Rails 5	3	11
Steel Post with Timber Rails	1	79

Steel Tube and Post barrier	63	1478
THRIE Beam Steel Guard rail	2	39
Timber	93	1174
Timber Post with Steel Tube	1	8
Unknown Type	612	7933
W Section Guard rail	59	3445
Grand Total	2073	29775

Unlike a guard rail barrier system, sight rails have no real structural ability and the posts will only provide a minimum amount of restraint under a vehicle collision.

The condition of sight rails are assessed during routine inspections undertaken by the Contractor, with the results reported to Council. There is no formal condition rating system for this traffic services assets; condition is assessed both visually, and in accordance with the appropriate key performance indicators.

Sight rails are also routinely inspected to ensure cleanliness, clarity and damage. Sight rails are routinely painted by the contractor and reported accordingly. Occasionally, repair work may be required due to a road traffic collision which may include replacement of timber boards or posts.

A guard rail is a light weight steel barrier system built along the edge of a carriageway to act as a vehicle restraint. They are generally selected for construction in areas with a greater risk of an incident occurring, such as a bend with a significant speed reduction or steep drop.

If a vehicle travelling around the bend loses control for any reason, crosses the edge of carriageway line and strikes the barrier, the steel will deflect and the vehicle impact energy is dissipated. As a result, the vehicle will be pushed back towards the road, which greatly reduces occupant risk. The lightweight posts used are designed to provide a forgiving impact and minimise vehicle damage where possible. Guard rail installations have differing types of end terminal systems which are designed to minimise damage and subsequent injury from impact with the start or end of the guard rail. Some terminal systems are designed to collapse on impact while others are designed to deflect the vehicle.

Service Delivery and Rationale

The routine maintenance involved with crash barrier systems is minimal for the contractor however, renewal work can be very time consuming and expensive. The guard rail barrier sections are designed to act as a single system, therefore damage to one section can mean several sections actually need to be replaced in order for the barrier to function correctly.

Waka Kotahi Work Category

Islands are included in the Traffic Services group and are managed under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities

5.5.10 Retaining Wall

The purpose of a retaining wall is:

- To provide structural support and lateral restraint to the carriageway
- To provide structural support to land adjacent/above the carriageway, preventing material slipping down and blocking the drainage channel or road.

If the land directly above a road carriageway collapses due to bad weather or a serious weather event, the slip material is cleared away and the adjacent bank reshaped at an appropriate gradient to prevent further collapse. This is known as a road retreat. In certain circumstances, such as a confined road width on a hillside, a retreat is not possible and a retaining wall may be constructed to either prevent material from further collapse or support the roads from collapsing to a lower level. This is more common in the northern parts of the district where the terrain is often unstable and susceptible to land slips.

Emergency response and reinstatement work such as this is normally managed separately as it qualifies for a higher subsidy rate than general maintenance. Most retaining wall installations form part of an emergency reinstatement programme created after a serious weather event.

Construction of a new retaining wall follows the following process:

- Identification of the site - normally from inspection by council staff or the maintenance contractor
- Design - this usually involves appointment of a structural engineer and sometimes geo technical reports on land stability
- Compliance - resource consent applications are lodged if required
- Tender - following a weather event where multiple walls are required, council will release tenders for individual sites or bundled work as is seen fit at the time. Contracts for individual or smaller value walls may be given to preferred contractors by direct appointment
- Construction - contractors are supervised by MDC staff during the construction phase.

Information held for retaining walls dates back to 1990, there are retaining walls that were installed before this time but Council does not hold any data for these assets. Existing retaining walls, constructed before accurate activity management was adopted, become increasing difficult to identify and maintain due to vegetation growth and further minor land slippage. MDC plans to validate existing data and as part of this process, some older retaining walls may be discovered. However, due to the difficulties in locating old sites this is not a specific task identified in the improvement plan.

Key issues relating to retaining walls are:

- Carriageway drainage - poor drainage is a major factor in destabilisation of the land supporting the carriageway, or the land above the carriageway
- Emergency response - generally when a severe weather event occurs there are many sites where new retaining walls are required, this involves a coordinated approach for emergency and long-term reinstatement
- Construction time - new walls need to be designed by structural engineers and the time between the need arising and a new wall being completed can be lengthy. Temporary reinstatement can be costly and disruptive to road users

- Resource consent - often retaining walls are required in riverbeds and their installation can affect waterways. Resource consent requirements and applications can cause further delays to construction
- Maintenance of unknown walls - old walls can be difficult to locate when no data is held, as these walls are not included in any inspection program, their maintenance or renewal requirements are unknown
- Unstable terrain - the nature of the terrain in the northern part of the district causes an ongoing need for walls in some areas.

Occasionally a new retaining wall needs to be built on land outside the council owned road reserve. Generally, land owners are cooperative and allow the construction, however, land can be acquired under the Public Works Act 1981.

Overview of Assets

The Council holds data for retaining walls. Differing methods of design and construction are adopted for new retaining walls depending on the requirements for the site.

Retaining Wall Type	Total Retaining Wall	Retaining Wall Length
Anchored	7	92
Angle	12	238
Cantilever	129	2090.8
Concrete Ground Beam	2	97
Counterfort	1	
Double Crib	13	274
Gabion	64	1518
Gravity	40	666.7
Landscape - Low Strength Timber	5	246
Lean Out Cantilever	5	160
Lean Out Tie Back	12	187.4
Mass Block	3	60
Reinforced Earth	1	15
Rock	18	560
Sheet Pile	1	12
Single Crib	18	268
Stepped Tie Back	56	1125.1
Terramesh	22	440
Tie Back	95	1505
Grand Total	504	9555

Operations and Maintenance Plan

Once retaining walls are established they generally require little maintenance. As retaining walls are constructed to stabilise land, the nature of the stability of land surrounding them is inherently poor. Therefore, visual inspections are occasionally carried out by the road maintenance contractor however, a more thorough inspection may be performed by a road engineer if any subsidence or movement is noted.

Currently there is no specific inspection regime in place, however, the maintenance contractor inspects the entire network regularly and this identifies any retaining wall failures. If any significant structural maintenance is required, this will be tendered to and undertaken by, a contractor who specialises in structural repair work.

The road maintenance contractor is required to undertake regular inspections of the entire road network. Slips and dropout sites (where the land supporting the carriageway slips away) are identified from these inspections.

After assessment, reinstatement of a site identified from these inspections may require design and construction a new retaining wall.

Waka Kotahi Work Category

Retaining Walls are included in the Structures group and are maintained under Waka Kotahi Work Categories 114 for Maintenance and 215 for Renewal activities.

Strategy

Maintenance needs are normally identified by contractor inspections or by MDC staff who actively monitor performance of existing retaining walls during their own network inspections.

Retaining wall maintenance is tied closely to drainage maintenance, as poor drainage contributes to erosion and undermining of the carriageway structure. Drainage requirements are assessed for each retaining wall during the design phase and this must be monitored to ensure further damage does not occur. Good drainage can prevent slips and dropouts and the need for reinstatement with retaining walls.

Emergency Response

During a severe weather event, Council staff monitor rainfall and rising river levels, particularly in the northern catchment areas and tributaries of the Ōroua River and the Makino Stream. The road engineers will accompany the maintenance contractor on a thorough inspection of the entire road network during and after these events. This will ensure any sections of road that have become blocked, due to the ground material directly adjacent to the carriageway slipping onto the carriageway, are identified and cleared as quickly as is practicable.

Renewal/Replacement Plan

No replacements are anticipated based on current knowledge.

Asset Condition

As noted previously, no information is recorded in RAMM for retaining walls prior to 1990. The condition of the recorded retaining walls is very good however; the accuracy of this information may be subject to scrutiny and not a completely clear representation of the entire asset base due to the possible condition of unrecorded retaining walls. Visual inspections of the road network are carried out with the intention of locating and recording any existing retaining walls within the road network, not currently entered into RAMM.

Asset Capacity/Performance Data

When considering the selection of design for a retaining wall, an assessment and evaluation must be made by the engineer to determine the wall is fully functional but not excessively costly.

Generally, as the ability of the retaining wall increases, the price will increase accordingly. The chart above shows that 90% of the retaining walls currently monitored are in either an excellent or a good condition. This clearly demonstrates that when considering the current asset capacity and performance, their design criteria was completely adequate and the assets are fully capable of withstanding the necessary loading from road traffic.

Renewal Standards

Renewal work is extremely unlikely with retaining walls, as a loading safety factor is incorporated into the design process to ensure the wall will act correctly even under conditions more extreme than it was originally envisioned.

In the unlikely event that a wall begins to develop a horizontal movement, a full inspection of the wall will be carried out to determine if movement or failure is occurring. The inspection may conclude that movement or minor damage is within acceptable limits and further monitoring is required. If not, an individual component or member can be selected for replacement by a specialist contractor.

Expected Lives

All retaining walls, regardless of construction method or material, have a default useful life of 80 years. This default life is used for forecasting, valuation and depreciation purposes. In reality, once a retaining wall has stood the test of time it is unlikely to be replaced unless there is further land movement at the location, or other works dictate its replacement.

Renewal Plans

There are currently no renewal plans in place.

Upgrade Process

Retaining walls are upgraded for the following reasons:

- As part of an area wide pavement rehabilitation or seal widening projects
- Most retaining walls in the District are located in the northern part of the district in areas with low growth, so upgrade of retaining walls for this reason is rare
- Further slippage or subsidence of land occurs
- This could be as a result of a previous "do minimum" option, an under designed retaining wall or failure of drainage systems.

5.5.11 Shoulder

The shoulder is the trafficable surface between the edge of seal and the feather edge of the carriageway. Shoulder data applies to rural areas only. Generally shoulders are unsealed.

Overview of Assets

The shoulder table holds the dimensions and material types.

Shoulder Type	Total Length
Grass	2375471
Metal	124985
Other	6796
Seal	106
Grand Total	2507358

Operations and Maintenance Plan

Shoulder Maintenance and Renewal work is generally undertaken in conjunction with other work on the adjacent Drainage Channels or Road Pavement. Complementing work activities include;

- Pavement Rehabilitation
- Surface Resealing
- Re-Metalling and Shape Correction (unsealed roads)
- Drainage Channel maintenance or renewal
- Sealed Pavement Maintenance (e.g. edge break repairs or pre-reseal repairs).

Waka Kotahi Work Category

Shoulder maintenance and renewal is generally included with the parent activity Work Category

5.5.12 Sign

The purpose of road signage is to contribute significantly to a safer road network. The use and design of signage is controlled by statute. The current statutory regulation controlling them is Land Transport Rule: Traffic Control Devices 2004, Rule 54002/7.

Most of the signs used New Zealand roads are based on international symbolic signs. Symbolic signs are used because they are quick to read and easy for all drivers to understand. Road signs are generally made of reflective material, making them easier to read at night.

The key issues relating to signs are:

- Providing a consistent appropriate standard of signage on all roads in the district, relative to their hierarchy and use; and
- Damage caused to signs by vandalism and traffic accidents.

Road signs are installed across the district in a consistent manner with the following main purposes;

To summarise regulatory instructions that road users are required to obey e.g. speed limits and controls at intersections:

- Chevrons to indicate abrupt changes in road direction
- Warning of temporary or permanent hazards that may not be self-evident
- Indicating directions and distances to destinations
- Indicating road user services and tourist features/establishments
- Indicating other information of general interest to road users.

Overview of Assets

Signs are recorded with posts as components of the parent sign, a single sign an have multiple posts but can also share a post with other signs in cases where multiple signs are installed on the same post.

The following table shows the type and number of Signs and Posts recorded

Sign Type	Total Sign	Total Post
Guide	101	180
Hazard Markings	2336	659
Information General	1886	1686
Information Miscellaneous	48	65
Information signs	12	13
Miscellaneous	63	71
Motorist Services	47	49
Outdoor Recreational Symbol	1	1
Permanent Warning	3442	3555
Regulatory General	1137	1092
Regulatory Heavy Vehicle	20	20
Regulatory Parking	168	161
Street Name Plate	291	287
Temporary Warning	139	135
Tourist	37	56
Warning Miscellaneous	16	15
Grand Total	9742	8045

Service Delivery and Rationale

Operations and Maintenance Plan

Maintenance and inspection duties for the Traffic Services assets described in this section are carried out under the Road Maintenance Contract. On this basis, the service delivery and renewal/replacement sections normally expected for a sub asset have been combined in this instance.

The Maintenance Contract specifies:

- Minimum maintenance standards
- Frequency of routine inspections
- Response times to correct defects.

Waka Kotahi Work Category

Signs are included in the Traffic Services group and are managed under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities.

Operational and Maintenance Processes

The Contractor is required to maintain an effective level of preparedness including temporary traffic signs to ensure emergency signage works can be undertaken to comply with the levels of service stated in the maintenance contract.

The scope of routine works within the road maintenance contract has separate requirements for the different asset groups described in this section.

Council carries out monthly audits to ensure the contractor is correctly carrying out their routine works. The request for service system is used by the public to report a problem with a road sign, which is directly sent to the maintenance contractor.

Signs deteriorate through weathering, which causes both loss of reflectivity and fading of sign colours. However most signs are replaced because of damage resulting from vandalism and vehicle accidents.

Warning, regulatory and information signs are generally in good condition because the majority of the signs are relatively new because of previous upgrade programmes. The large number of new signs that eventuated came about because of the lack of signs prior to this and because of the replacement of non-conforming or substandard existing signs.

Under the maintenance contract, the contractor was required to carry out a detailed condition rating and inspection on Council road signs.

Asset Performance Data

Performance issues for signs relate to coverage, accuracy of placement, visibility, reflectivity and conformity with standards.

Upgrading of the asset over time has reflected the importance placed on road safety and the higher levels of service expected by the travelling public.

In 2014 Manawatū District Council undertook a Traffic Safety Review of a number of high use rural roads. The review identified a number of deficiencies and recommended areas for improvement to bring the standard of signage and delineation to the level of current standards. The recommendations are being progressively implemented.

All new signs are installed or painted in accordance with MoTSAM, which in turn, complies with the requirements of the Traffic Control Devices Rule.

Renewal/Replacement Plans

Obsolete, damaged, sub-standard and non-conforming traffic signs assets identified during inspections are programmed for replacement subject to funding provisions in the following priority order:

- Public safety
- Traffic volumes
- Convenience of road users.

Deferred Maintenance and Renewals

The impacts of deferred maintenance and renewals may lead to loss of legibility/definition of the sign or marking. In the case of missing or removed signs, information provided by the road sign is not provided. All of these circumstances lead to a decrease in the levels of safety provided by the network.

There are no deferred maintenance or renewal issues at present.

Upgrade Process

New signs are installed to provide information and improve road safety. Problem sites are continually surveyed and appropriate signage installed, with priorities being broadly assigned in accordance with the roads' hierarchies and traffic volumes.

New signs and markings are often vested in the Council from new urban subdivisions undertaken by private developers.

5.5.13 Streetlight

The purpose of street lighting is to ensure the council's street lighting and amenity installation continues to operate safely, efficiently and effectively over its economic life with minimum failures and outages.

The first street lights were installed in the district around 60 years ago on a relatively small scale and only in town centres. Since that time, advancements in technology along with increasing ratepayer expectation and implementation of lighting standards has driven continuous improvement and expansion of the asset base.

Street lights are provided for a variety of reasons, ranging from lighting at specific rural intersections to improve traffic safety, lighting of high traffic volume areas, lighting residential and rural streets and roads and lighting of amenity areas such as pedestrian pathways and parks.

Council manages street light assets located on local roads as well as those located on urban state highways, which are managed under delegated authority from Waka Kotahi.

Historically street lights have been mounted on other utility poles like telecom and electricity network poles. Over the past 40 years new urban subdivisions have utilised underground power and telecommunications services, requiring street lights to be mounted stand-alone lighting poles. The developers who construct these subdivisions often utilise decorative light fittings and poles to enhance the streetscape. The installations that are then subsequently vested to Council can have higher maintenance and renewal needs and demands. As part of the subdivision approval process the developer must submit the proposed compliant lighting design and gain council approval before installation of the lighting assets to be vested, this gives Council control over the quality and type of assets it will inherit.

The key issues relating to the management of street lighting are:

- Specialist industry, most local authorities have limited in house knowledge forcing reliance on consultants and contractors
- Changing technology means identifying opportunities for optimising street lighting power consumption and maintenance requirements
- Reliance on the electricity network owner to maintain the street lighting power supply cables, network outages impact on council levels of service
- Lighting standards that reflect the intended use and road hierarchy
- The need for a development of a street lighting upgrade and renewal programme
- The impacts of any future overhead wiring undergrounding programmes
- The effect of decorative urban street lights vested in the Council, by urban subdivision developers, on renewals and maintenance budgets.

As the District's communities have become more concerned about personal safety and property protection, there has been an increase in public interest regarding the standard of lighting provided throughout the district.

Council follows Waka Kotahi's M30 Specification and AS/NZS 1158 Street Lighting series of standards. These set out recommendations for lighting systems for roads and other outdoor public areas, primarily to provide a safe and comfortable visual environment for both vehicular and pedestrian movement at night.

Urban street lights installed under the AS/NZS 1158 standard have differing purpose. On higher volume roads, or V Category roads, the road user is the main consideration and the design is based around lighting the road. On residential streets with lower traffic volume, or P Category roads, there is more emphasis placed on security and pedestrian safety, so lighting the whole road reserve is considered.

The asset base also includes some lighting in reserves and other amenity areas. Although costs for these lights are administered by different council departments the maintenance and management is undertaken under the same contract as for all other MDC street lighting.

Rural lights are primarily for flag lighting at road intersections and other significant locations such as rural halls and schools. In some cases, residents of the smaller more rural townships in the district prefer to have little to no street lighting, which is more in keeping with the rural environment.

Overview of Assets Involved

Streetlights are componentised to 3 asset sub types these are the pole, bracket and light:

- Pole, this can be a utility network owned pole or a standalone street light pole.

Pole Type	Total Pole Type
Electrical distribution	669
Lighting unit	1023
Telecom	1
Grand Total	1693

- Bracket, the steel arm mounted to the pole to support the luminaire, in the case of steel standalone poles the bracket is an integral part of the pole but it is still identified as a separate component.

Bracket Type	Total Bracket Type
Column mounted large bracket	196
Column mounted small curved	273
Cross Arm Mounted Steel Pipe	556
Curved Oclyte 1m	215
Curved Oclyte 2m	12
Curved Oclyte 3m	95
Curved Oclyte 4 m	1
Curved Oclyte 900mm	50
Decorative Curved	73
Eliptical Octlyte	2
Kimbolton CBD Light Bracket	1
Mitred single outreach arm	18
Oclyte Curved 1.5m 5 deg tilt	7
Post top mounted	61
Power pole front mounted	102
Triple arm outreach	3
Twin arm for spun concrete	23
Twin Curved Oclyte	5
Grand Total	1693

Light, lighting unit which comprises of control gear and lamp. There are two types of light currently in use, High Pressure Sodium (HPS) and Light Emitting Diode (LED). HPS are older technology lights which were used from the 1990's until LED technology became affordable in around 2017. LED streetlights have many advantages over HPS, mainly lower energy consumption and maintenance requirements.

Light Make	Total Light Type
HPS	**219**
Betacomm	50
Kendelier	137
Schreder	17
Sylvania	15
LED	**1474**
AEC	293
Betacomm	9
CREE LEDway	27
LED Roadway Lighting	568
OrangeTEK	575
Schreder	2
Grand Total	1693

Ownership

Council owns the majority of the dedicated stand-alone street light poles, others are owned by Waka Kotahi and some are some privately owned. Where a street light is supported by a utility company's pole or by another other structure not owned by Council, the light and its bracket are included in the asset register, but not the pole or building. However, in these cases the nature of the support and its owner are noted.

Brackets and Luminaires are predominantly owned by Council and Waka Kotahi with some privately owned street lights identified.

Many privately owned street lights were installed before Council took ownership of the asset base, when consideration of long term maintenance and power costs were not a factor. An example would be a street light installed at the end of a private right of way, which may serve only two or three properties. These street lights are generally connected to the same electrical circuit as Council and Waka Kotahi assets, but as they are identified by owner, they are excluded from any Council funded maintenance and energy cost payments.

The street light inventory is maintained in the RAMM database. This allows continual updating of asset information as maintenance and renewals are undertaken and provides accurate information to predict future maintenance and renewal requirements.

Asset ownership is identified in the database so costs associated with Waka Kotahi street lights can be separated, and so owners of other assets which are not maintained by Council, are easily identified.

The following table shows the different light owners and the total number of lights associated.

Light Owner	Total Light Owner
Community Hall	10
Council 'Amenity'	68
Council 'Car Parking'	33
Council 'Parks & Reserves'	90
Council 'Properties'	9
Council 'Road Lighting'	1693
Festive Lighting	22
Manawatū Community Trust	16
Not Connected to Network	7
Waka Kotahi Rural	2
Waka Kotahi Urban	194
Private	65
Private 'School'	7
Grand Total	2216

Although all light owners are shown in the table above further discussion in this document is centered on the 1693 Council Road Lighting assets.

Service Delivery and Rationale

Operations and Maintenance Plan:

The street light maintenance contractor is required to:

- Provide an immediate response to hazards
- Undertake monthly inspections of the entire network at night, to ensure all luminaries are operating, undertake necessary repairs to non-functioning lights
- Develop maintenance programmes from the schedules of defects identified during the inspections
- Monitor asset condition by undertaking planned daytime inspections, action routine maintenance and report on any unexpected maintenance requirements.

Undertake routine shear base pole maintenance to ensure correct security of mounting bolts.

- Ensure no lights malfunction continuously and that there are no areas where continual intervention is necessary
- Repair, on demand and within the specified response timeframes, faulty, accident damaged or vandalised lanterns, lamps, control gear, columns (poles) and associated equipment
- Repair options and priorities are determined by considering the impact on
- Public safety (top priority)
- Traffic movement
- Future costs if the work is not done.

When street lighting assets are renewed, any components that can be used as spare parts are retained in storage. Other surplus assets generally have no commercial value and are disposed of by the contractor.

Waka Kotahi Work Category

Streetlights are included in the Traffic Services group and are managed under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities.

Operational and Maintenance Processes

The maintenance requirements for the MDC streetlight network have greatly reduced since the phasing out of the majority of older technology High Pressure Sodium Streetlights (HPS) which have been replaced with more efficient LED technology. This is discussed in more detail under the Accelerated LED Replacement Programme.

With the reduced need for monthly maintenance MDC has not needed a formal streetlight maintenance contract which has traditionally been in place for periods of up to five years.

To undertake the required maintenance MDC engages an approved contractor on an as needed basis for general repairs, scheduled maintenance, inspections and minor renewal work.

Light Type	Total Light Type
HPS	219
LED	1474
Grand Total	1693

Renewal/Replacement Plan

Asset renewal is undertaken when a street light or a significant component of a light has reached the end of its economic life. Renewal requires replacement of either the complete installation or individual components of the installation e.g. luminaire, bracket or pole. Renewals are generally programmed to coincide with street upgrades.

- Strategy and Funding Mechanism
- Renewal Strategy

There are no legislative requirements for manufacturers to supply spare parts for the lanterns beyond any given period. The Council will attempt to account for this in their design review, to ensure products are of suitable quality and that they are sourced from reputable suppliers.

The selection of protective coating on steel poles can be galvanised or painted. With painted poles, the paint is applied over an already galvanised surface. Although paint deterioration is not detrimental to the life of the pole, painting is carried out to maintain the aesthetic look of the pole, as most are decorative.

Pole life expectancy is also influenced in part by the soil conditions. Acidity and water in particular can reduce pole life significantly; the resulting underground corrosion can go unnoticed if not checked by excavation around the pole base. As part of Council's street light maintenance strategy all steel poles fitting the criteria will be excavated and inspected during the next daytime condition rating.

New poles have a thick enamel type coating covering the entire ground planted section of the pole. This is a significant improvement over previous pole coatings. The manufacturer supplies a limited replacement guarantee period of 20 years for the pole coating system that pushes the expected life of these poles out from 30 to 50 years.

Renewal needs of other components are identified from the planned inspection programme. The strategy for renewal of street light assets, or components of those assets, is to:

- Renew faulty or damaged assets when renewal is more economic than repair. This includes unavailability of spare parts
- Renew faulty or damaged lanterns that are of technically obsolescent types
- Renew faulty or damaged assets that do not meet current design/safety standards.

Work is prioritised according to public safety, co-ordination with other works, eliminating obsolesce, improved light outputs and cost savings such as reduced energy consumption.

The amount of street lighting renewal work depends on:

- Their age profiles
- Their condition profiles
- The level of on-going maintenance
- The economic lives of the materials and components used
- The availability of replacement parts and fittings.

Accelerated LED Replacement Programme

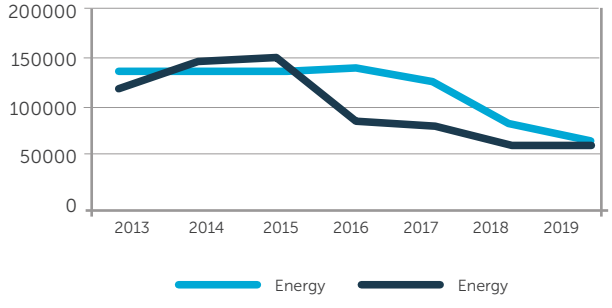
Enhanced Waka Kotahi funding assistance for the replacement of older technology streetlights with LED streetlights was made available mid-way through the 2015-2018 National Land Transport Programme (NLTP) and for the duration of the 2018-2021 NLTP.

MDC has taken advantage of this assistance and the majority of Council (Roading) owned streetlight luminaries have been renewed with modern LED type luminaires and are less than 3 years old, with the remainder programmed for replacement before the end of 2021.

This bulk renewal will cause a funding spike when these lights reach the end of their economic life which is expected to be in 20 to 30 years. However, the enhanced Waka Kotahi funding assistance outweighs this with payback on Council investment in less than less than three years.

The graph below shows the marked reduction in energy and maintenance costs since LED street lights were introduced. Further cost savings will be achieved through 2020 and 2021 as the remainder of the older technology street lights are phased out.

Annual Street Light Energy and Maintenance Costs



LED Benefits

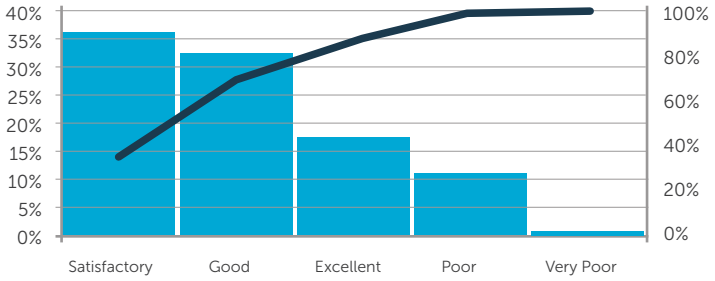
Asset Condition

The overall assessment of asset condition is undertaken using the following condition grading criteria.

Rating Value	Approximate Remaining Life
Excellent	20 - 30 Years
Good	15 - 20 Years
Satisfactory	10 - 15 Years
Poor	1 - 10 Years
Very Poor	0 - 1 Year

Condition ratings are undertaken annually by the maintenance contractor, poles, luminaires and brackets assessed individually. Results from the condition ratings are stored in the RAMM database.

The Pareto Charts below show that the Poles, Luminaires and Brackets are generally in good to excellent condition.



Condition of Poles, Luminaries and Brackets

The contractor formulates and supplies Council with a report based on the condition rating results, the reports form the basis of renewal and maintenance programmes.

The main cause of deterioration of street lights is related to age, which in turn is related to exposure to the elements. For example moisture causes the breakdown of electrical connections and components and acidic or wet ground conditions can accelerate corrosion of steel poles.

Light output of HPS lamps depletes over the life span of the lamp which ranges from approximately 3 to 5 years. Once light output deteriorates most luminaires can be returned to their optimal or as new condition by installation of a new lamp and diffuser. In some cases internal electrical components may also be needed, generally as a result of damage through moisture ingress. Most HPS type streetlights will be phased out by 2021.

LED street lights are not expected to suffer any noticeable level of deterioration with the only maintenance required between installation and renewal being the cleaning of the LED lens on the underside of the luminaire. The frequency of the cleaning cycle is dependent on the environment where the street light is installed. The Council expects the frequency of the cleaning cycle to be in excess of seven years.

Brackets and poles suffer from corrosion problems and are also subject to vehicle collision damage. The deterioration of painted surfaces on decorative poles can lead to unsightliness.

Asset Capacity/Performance Data

Street light capacity and performance issues relate to light intensity, colour, reliability, safety and the areas of the townships covered.

Performance of street lights can be a simple go/no-go test, the light either works or it does not. As the majority of luminaires are less than three years old it can be assumed that the luminaires are operating to their optimum performance level unless other factors impede function, vandalism for example. However, this approach only considers the function of individual lights and does not consider areas which may be under-lit due to wide spacing of luminaires. This is a common issue where street lights are mounted on power poles, as the common spacing between power poles less than the optimum for most street lights. Design criteria varies between sites but to illustrate this issue an average optimum spacing between luminaires may be 60m where power pole spacing is normally around 40m. In urban areas street lights are often installed on every second pole at spacing of around 80m.

The installation of lights onto existing utility poles, without the additional cost to install separate underground street light circuits and standalone poles, is very cost effective where this option is available.

It is acknowledged that the majority of the older street light installations do not perform to the current lighting standard. All new installations, undertaken by Council and those vested to Council by private developers, are required to meet current standards. The standards are considered for renewal work, where the existing pole is utilised to mount a replacement luminaire, but in most cases the lighting level required is not achievable due to the pole spacings.

Deficient installations will be progressively phased out as part of wider integrated works such as street upgrades when existing overhead services are placed underground, or when outdated lights are replaced along a street.

The Council accepts that unless large gains can be made lighting installations will remain as they exist.

The table below lists expected minimum life of the lamps that are used on the network.

Lamp Model	Quantity	Lamp Life to 5% Failure (Hrs)	Lamp Life (Approx Years)
100w SON-T (HPS)	7	17,000	4
110w SON (HPS)	1	17,000	4
150w SON-E(HPS)	45	12,000	3
150w SON-T (HPS)	78	20,500	5
250w SON-T (HPS)	2	20,500	5
70w SON-E (HPS)	41	12,000	3
70w SON-I (HPS)	14	10,000	2
70w SON-T (HPS)	38	17,000	4
LED 22w – 97.5w	1692	88,000*	20

Table 15: Expected minimum life

* LED module, manufacturers specify 20 years minimum life expectancy with no reference to and percentage of expected failures within this timeframe.

Renewal Standards

When a number of adjacent lights are renewed at the same time, the lighting standards appropriate for that road are considered. Generally, the standard will not be met without the installation of new poles to enable luminaires to be spaced accordingly. Council does not require adherence to the lighting design criteria set out in the standards for renewal of lights fitted to existing poles.

When individual light fittings are renewed, the new fitting is generally the most appropriate modern engineering equivalent of the failed fitting. Replacement poles will generally be lightweight galvanised sectional-steel poles of appropriate height. Exceptions to both of these practices occur when the adjacent poles are of a decorative type, in which case appropriate decorative poles and luminaries are used.

Expected Lives

Renewal of street lights is budgeted under Waka Kotahi Work Category 222 – Traffic Services in the Council's Land Transport Programme.

The expected lives of components are as follows:

- Luminaire – 20 years
- HPS Lamp – 4 – 5 years
- Standard galvanised pole and bracket – 30 years
- Tough Coat galvanised pole – 50 years
- Concrete pole – 70 years.

Deferred Renewals

There are currently no deferred renewals for street lighting assets.

Asset Improvement and Development Plan

Street lights are acquired or upgraded in the following circumstances:

- When new lights are provided by the Council where no street lights previously existed
- When the Council street lights are installed and vested in the Council as part of a new urban subdivision
- Through work to improve the level of service arising from
- Improvements in association with the street upgrading programme
- Minor safety improvements
- Improvements in association with undergrounding of overhead utility reticulation
- Recommendations from township committees
- Public requests on the discretionary street lighting funds.

The undergrounding of existing overhead wiring is an important issue that can have a significant effect on the development of the street lighting asset. Utility companies rarely remove overhead wiring in the townships of their own accord. Instead, this is usually a result of the Council wanting to upgrade a street and improve its overall amenity by the removal of overhead wiring and associated utility poles.

When Council undertakes a project where new underground street light cables are installed the cost is borne by Council but on completion, the cables are vested to Powerco who agree to maintain the cables for the rest of their economic lives.

LED Technology

The use of Light Emitting Diodes (LEDs) has become the standard for new street lighting installations in New Zealand. Their use in residential streets and open spaces is proving to be a very cost effective option due to decreased energy and maintenance costs.

In most cases LED luminaires consume at least two thirds less energy than equivalent HPS luminaries. There are also significant savings made through reduced maintenance as the only planned maintenance the LED fittings require is occasional cleaning of the luminaire optical surface.

The information shown previously in Table 12 shows the savings that the Council has made since 2015/2016 by progressively installing LED streetlights

Development Strategy

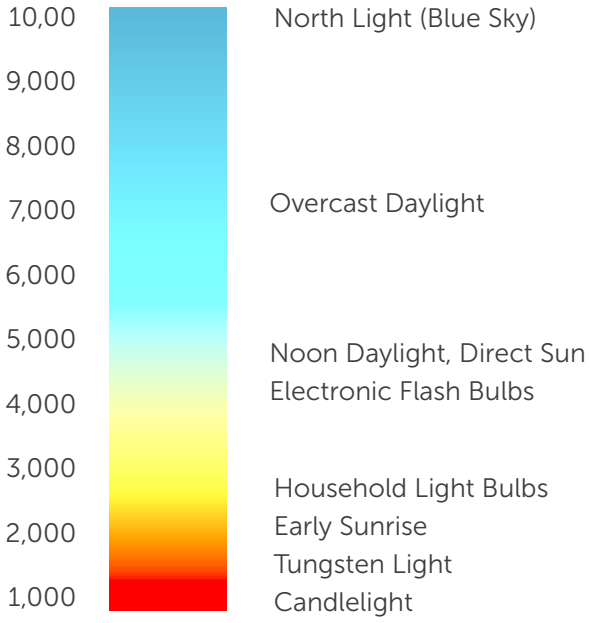
The street lighting development strategy is to:

- Install lighting to improve road safety where a lighting problem is identified
- Specify installation of LED luminaires as a retro-fit option in place of existing HPS luminaires
- To upgrade the lighting in residential streets to current standards when carrying out street improvements (where appropriate)
- To upgrade lighting in residential streets to current standards where possible when renewing obsolete fittings. (Often the existing obsolescent lights will be too far apart, even for more efficient modern fittings, and in these circumstances some new lights and sometimes new poles are required)
- To light rural intersections, where justified by safety concerns
- Upgrade urban lighting to meet current levels of service, especially where there are concerns about public safety.

Development Standards

Light colour is an important consideration in selecting light fittings. The image below shows the Kelvin Scale (k) which grades colour 'temperature' and is used as performance criteria for light output.

Colour Temperatures in the Kelvin Scale



The LED street lights throughout the district are rated at 4000k which is a crisp white light that allows better perception of colour at night in comparison to HPS streetlights. HPS lamps emit light at 2700k which is a more orange light that does not render colours as well, making recognition of objects harder or slower in comparison to 4000k light.

Consideration of light colour temperature was when specifying the replacement LED streetlights, lights that produce white light to enhance safety for both motorists and pedestrians was preferred.

The following standards are applicable to the renewal of existing street lights and new street lights and installations:

- Current version of AS/NZS 1158 (excluding lighting design criteria for luminaire renewals)
- Waka Kotahi M30 Specification and Guidelines for Road Lighting Design
- All new installations, upgrades and maintenance must comply with the Electricity Act 1993 and Electricity Regulations 1993 and subsequent revisions
- Pole selection based on location, frangible in urban areas, shear base where appropriate in areas with speed limits above 70kph
- Lighting Design and Intensity
- LED technology is to be specified for all new installations
- Street lighting design shall be in accordance with AS/NZS 1158 Street Lighting series of standards. These set out requirements for lighting systems for roads and other outdoor public areas, primarily to provide a safe and comfortable visual environment for both vehicular and pedestrian movement at night
- Where lighting is provided for off-road walkways in townships, lighting shall be to the appropriate standard while not being over intrusive on neighbouring properties. This may require fittings different from those on trafficable roads.

Management Programme

All lights, brackets and poles are maintained by an external contractor. For economy and efficiency reasons, the contract includes the lights on urban state highways administered by Waka Kotahi and lights under stewardship by other council departments. The Waka Kotahi reimburses the Council with the cost of maintaining and operating these lights on its behalf and costs associated with other council departments are portioned as identified by the asset owner.

Power for street lighting is based on the rated consumption of each light and the hours the lights are operating for. This information is supplied under an agreement with the Energy provider and paid directly by the Council.

5.5.14 Traffic Facility

Traffic Facility assets are predominately edge Marker Posts although the RAMM Traffic Facility table also houses some data on different traffic delineation devices such as bollards and speed deterrents.

Overview of Assets

The following table shows the type and number of Traffic Facility assets recorded;

Traffic Facility	Total
Edge Marker Post	6068
Modular Plastic Kerb with EMPs attached	8
Modular Speed Cushion	1
Plastic Speed Hump	3
Timber Bollard	10
Grand Total	6090

Service Delivery and Rationale

Edge Marker Posts are replaced by the maintenance contractor when needed generally following damage from road users or the mowing activity. Damaged or non-reflective Edge Marker Posts are identified during the contractors regular network fault inspections and remedial action is taken in line with the requirements of the Maintenance Contract.

Asset details are recorded in RAMM when new Edge Markers are installed but due relative low value of the entire asset the data is not updated when they are replaced. For activity management and Valuation purposes Edge Marker posts are treated as a single asset which is always in average condition or half way through its intended life.

Other Traffic Facility assets such as traffic calming speed humps are generally only installed following concern from residents or road users around motorist behavior.

Waka Kotahi Work Category

Traffic Facilities are included in the Traffic Services group and are manage under Waka Kotahi Work Categories 122 for Maintenance and 222 for Renewal activities.

5.5.15 Treatment Length (Pavement Layers and Surface)

Roads are segmented into treatment lengths which are continuous sections of road which have the same dimensions and construction characteristics. This segmentation allows for efficient activity management as treatment lengths can be likened to individual assets even though they form part of the entire road network.

Changes in the top surface and pavement construction characteristics are the most frequently used method of segmenting road lengths into manageable treatment lengths. As condition deteriorates treatment lengths are further segmented to allow separation of sections that need intervention.

Overview of Assets

As at 1 July 2019 there were 1744 Treatment Lengths recorded for the network length of 1368km, each treatment length has a set of the following components which make up physical construction of the road:

- Surface Structure, the current top surface of sealed roads
- Pavement Unsealed, the metal running course surface on unsealed roads
- Pavement Layer First Coat, the lowest layer of chip seal on sealed roads. This layer of chip seal is applied to seal the pavement when roads are built or reconstructed
- Pavement Layers, the compacted layers of metal that give the road structural strength
- Formation, the levelled base of the road on which the pavement layers are placed.

Nearly all new pavements that have been added to the network in recent times have come about from new roads and streets vested to Council by private developers undertaking new subdivisions.

Surface Structure - Sealed Roads

The prime purpose of the top surface is to shed water, preventing it entering the structural layers underneath. The top surface also protects the top structural layer (Base-course) from the abrasive effects of traffic and provides the frictional properties required for safe vehicle use. There are two types of road surfaces in the District, thin bitumen surfaces (sealed surfaces) and metal surfaces (unsealed).

All of the District's rural sealed roads have chip sealed surfaces with a very small number having thin asphaltic concrete surfaces, both these surfaces are classified as thin surfaced flexible pavements; there are no structural asphaltic concrete, or other structural pavements. Often sealed roads were sealed by "dressing up" and sealing the previously unsealed road. This can lead to some of these roads deteriorating more quickly when they are subject to rapid changes in vehicle loading; for example, when a beef or sheep farm is converted to dairying the advent of tanker-traffic increases the quantity and weight of vehicles on the road network

The most common surfacing used is a chip seal, which comprises stone chips embedded in bitumen sprayed onto the Base-course. This surfacing provides the most cost effective and best performing surfacing for thin flexible pavements in the District (i.e. thin pavement layers over sub-grades of a moderate to high strength). It is a very cost effective surfacing due to the availability of stone that can be extracted from local rivers or pits, and crushed to the appropriate size.

When the pavement basecorse is new or reconstructed a First Coat Seal is applied, this has a relatively short design life due to the thickness of seal (remembering that the sealed surface's main purpose is to protect the pavement). A Second Coat seal is then applied which has a longer life, following that the surface is resealed at longer regular intervals. All seal design lives are dependent on by traffic volume and the seal design characteristics.

An average cycle between reseals, when the pavement needs a further chip seal layer applied to maintain the integrity of the surfacing, is 16 years.

Asphaltic Concrete road surfacing comprises an approximately 30mm thick dense layer of mixed bitumen and small stone aggregate applied to the Base-course surfacing. It is known for its smooth black finish and is used predominately in new urban subdivisions for its aesthetic properties. It is also used in high wear and high traffic areas because of its durability.

Pavement - Unsealed Roads

Unsealed roads are quite dynamic in their performance and can have higher maintenance costs than sealed roads. This is because they require more regular intervention to maintain their surfaces and shapes because of the influences of weather and traffic. Unsealed roads have poorer riding characteristics than sealed roads and can create dust nuisances.

The principal maintenance activities on unsealed roads are application of a running course of AP20 metal and periodic grading to maintain an even running surface for vehicles to travel on. The rate of metal loss can vary between 5 to 10mm per annum depending on the use and location of the road and climatic conditions.

A typical problem with running course is that as a loose metal that can quickly migrate from the wheel paths, where it is needed the most, to the side of the carriageway under the action of vehicle wheels. While grading does reposition the metal this constant intervention can be considered inefficient.

Pavement Layers

Pavements are the structural and wearing course layers of a road. They are regarded as the core components of the roading network's trafficable carriageways. A major failure of a section of pavement can result in the road becoming dangerous and/or impassable.

Current practice is to provide additional strength to a road when it is sealed and to design the pavement for a standard 25-year life, however, the variability of conditions throughout the District prevents a blanket approach being taken to the structural design of roads.

The purpose of each road pavement is to provide an element of the network that is:

- of the vehicles and people using it
- Has a suitable all weather surface that is appropriate to its location and function in terms of skid resistance, noise reduction and smoothness
- Has a structure suitable to carry legal weight, and most cases over weight, traffic.

Pavement Layers consist of the following principal components,

- Sub-base, this is a structural metal course laid and compacted on excavated and prepared sub grade, devoid of any organic matter or materials that could consolidate or settle. The sub-base is usually a coarser type of graded gravel, or metal. Typically, it is a pit run material no larger than 65mm in diameter in layers on average 250mm thick. The subgrade and sub base layers are identified in the asset valuation table by Subgrade Formation
- Base-course, this is laid and compacted over the sub-base but to a higher standard. It is the main load-carrying component of the pavement. It also provides the final alignment and shape of the pavement and accepts the surfacing. The base is made of crushed rock that conforms to a "grading envelope". The size grading allows it to be placed and compacted to higher tolerances than the sub-base. In practice, it is placed in a layer 100mm to 150mm thick, or thicker when high loadings are expected. It is usually specified as M4 AP40, the M4 designation referring to the Waka Kotahi specification of that name and the AP40 designation to a material that will pass through a 40mm aperture sieve. The base-course layer is identified in the asset valuation table by Pavement Formation
- Pavement First Coat, this is the first layer of seal applied over the finished base-course, this and the subsequent Second Coat Seals and Reseals become part of the pavement structure when they are no longer the current top surface.

Formation

Formation consists of the bulk earthworks required to provide the shape and a firm platform for the structural components of the road to be built on and, for the purposes of this section of the Plan, the land on which the carriageway is built and land held for future road construction.

Operations and Maintenance Plan Strategy Operations and Maintenance Goals

General maintenance work is classed as priority work where:

- The safety of road users may be compromised
- The required level of service has fallen below the prevailing level for the adjacent parts of that section of road
- It is likely that the area of distress may expand so that the road is incapable of providing the required level of service and a renewal or upgrade will then be required
- The scope of repair work would change to be become significantly more expensive, if left to deteriorate further.

Subsequent maintenance, renewal or new improvements work depends on the completion of the planned maintenance repair.

A suitable level of preparedness for prompt and effective response to asset failures and emergencies is maintained by ensuring the availability of suitably trained and equipped staff and service delivery contractors. This is provided through specific requirements detailed in maintenance and other roading contracts.

The initial, practical and objective response to asset failures is to restore service as quickly as possible by the most economic method available. This may mean having to make temporary repairs to maintain a level of service if the repairs or renewals are time consuming to complete.

The Council's operations and maintenance strategy is to implement the most cost effective maintenance options through:

- Adequate monitoring the condition and performance of assets
- Investigation of any system deficiencies which are outside the parameters of the target level of service
- Identification of the most appropriate work required to correct defects.

To achieve this, assets are monitored through routine proactive inspections, testing, and analysis of customer complaints and condition reports. Service levels are managed by assessing the consequences of asset failure and assessing the levels of customer expectation. Asset ownership costs are minimised by identifying, evaluating and introducing new technologies and equipment that may improve operational and management efficiencies.

Exposure to risk is managed by maintaining up to date fault detection systems and providing a prompt and effective response to system failures. This exposure is also minimised by maintaining insurance on key insurable assets, undertaking structural checks of key assets and controlling environmental impacts.

A partnering approach is sought and encouraged between the Council's staff, consultants and contractors; its aim is to make effective use of resources, systems and procedures by taking collective ownership of these matters and transportation network.

Waka Kotahi Work Category

Treatment Length assets are included in the following Waka Kotahi Work Categories for Maintenance and Renewal activities;

- 111 Sealed Pavement Maintenance
- 112 Unsealed Pavement Maintenance
- 211 Unsealed Metaling (renewal)
- 212 Sealed Road Resurfacing
- 214 Sealed Road Pavement Rehabilitation.

Pavement Maintenance Plan

The Council's contract specifications establish the adopted technical levels of service, which in turn deliver the agreed customer levels of service, thus applying the Long Term Plan's Community Outcomes to transportation.

Roading work is required to conform to a number of funding guidelines, which are set out in an annual Land Transport Programme Relationship Protocol between the Council and Waka Kotahi.

Council staff and contractors work to ensure that the road network is maintained to the specified standards while staying within the approved budgets. Individual carriageways may be below the specified standard for short periods, but this is only permitted if the road user is not unduly affected.

For example, minor patching work may be undertaken to hold over a pavement until the full repair is done. If the work is urgent it will be done, even if this means that there is expenditure over the budget or other less important work has to be deferred to keep overall expenditure under budget. Safety related work always takes priority.

Generally, the budgets have been based on historical and predicted trends, and set at levels that permit the maintenance work necessary during the year to be done.

Agreement is established around three sets of maintenance guidelines, achievement of which is measured against:

- Safety
- Asset preservation
- Road user satisfaction.

These measures, and progress towards these achievements, are reported to Waka Kotahi at regular intervals by the Council.

Response times are set in the maintenance contracts, and the actual performance of customer-raised queries is recorded through the Council's Service Request System.

The contractor receives requests for service through this system, and notifies of the completion of a request utilising the same system. Regular audits are undertaken to identify any outstanding issues and to ensure that the work has been done as required and that it meets specification.

Reactive Maintenance and Response

A suitable level of preparedness is maintained allowing prompt and effective unscheduled responses to emergencies and asset failures. This is achieved by ensuring the availability of suitably trained and equipped staff and service delivery contractors.

The initial response to asset failures is to restore service as quickly as possible using the most practical and economic method available. Temporary repairs will only be made if major repairs or renewals are time consuming to complete. Response requirements for routine maintenance activities and emergency events are listed in specific maintenance contracts.

Renewal/Replacement Plan Renewal Goals

The overall objective for rehabilitating and renewing pavements and pavement surfaces is to apply the correct treatments at the optimum times so that the required level of service is delivered and total life cycle costs minimised. The required level of renewal will vary depending on:

- The age profile of carriageway surfacing and structure
- The condition profile of carriageway
- The level of on-going maintenance demand
- The differing economic lives of the materials used
- Traffic growth.

Pavement Capacity

The bulk of the network is coping well with the current traffic volumes and loadings. It only requires routine maintenance and scheduled end-of life renewals like resurfacing, for it to deliver the agreed levels of service.

Pavement strength is rarely a problem on sealed roads carrying low volumes of heavy vehicles on good sub-grades.

Old sealed pavements that have had no previous rehabilitation were generally built on existing unsealed formations with no specific sub-base and a minimum of Base-course (often about 100mm). They are generally coping well with current volumes of light traffic, however these roads do not perform well with higher volumes of heavy vehicle use (log extraction, for example).

Sealed pavements in the District usually fail for one of the following reasons:

- They have an old seal with poorer quality pavement metal than normal
- They are higher volume arterial roads, particularly in urban areas
- They are on rural roads that were seal-widened 20 or more years ago when the additional width was often constructed to a lower standard than the existing sealed surface.

Failure of these sections can be a driver for renewal of rural carriageway sections.

Rehabilitation usually consists of a granular overlay on rural road roads, or a reconstruction on urban roads where the additional depth of metal cannot be accommodated within the existing levels established by the kerb and channel.

Identification of Work Pavement Structural Layers

Treatment sites and forward work programmes for sealed roads are identified through: Analysis of road inventory and condition information held in the RAMM System

RAMM Treatment Selection. This module of RAMM identifies carriageway sections based on analysis of life cycle data, traffic volumes and pavement condition for a broad range of treatment options. It provides a forecast over a two-year period for short term planning processes. Contractor and Council staff inspections.

Unsealed roads usually require pavement renewal for one of two reasons:

- Failure of the pavement structure, this is similar to that occurring on sealed pavements
- Insufficient renewal of the metal surface, resulting in traffic running on the pavement structural layers, eroding and damaging them.

Unsealed roads pavement renewals are identified through inspection, network knowledge and maintenance issues, as discussed previously.

Sealed Surfacings

Council has historically operated a rolling forward works programme based on the expected life of the surface to identify reseal sites. From 2014, RAMM and inputs from condition rating surveys have been used to assess the surface condition and then generate the forward works programmes based on these results and visual inspection by council staff.

The strategy adopted for renewing sealed surfaces is to reseal pavements as close to the possible to the end of each seal coat's economic life. This is determined by the condition of the pavement and demonstrated by factors such as:

- Crack initiation because of brittle binder
- Loss of binder adhesion and stone loss
- Lack of water proofing resulting in potholes and other failures
- Loss of macro texture resulting in loss of skid resistance
- Loss of surface integrity, especially if the existing seal has been subject to potholing, trenching, edge break and dig-out repairs.

The following factors affect material selection:

- Traffic volume, percentage of heavy vehicles, and road geometry, and adjacent land use zoning
- The flexibility of the existing road formation; e.g. thick asphalt is a semi-rigid material and requires special design if laid on a flexible foundation, or on a pavement formation of insufficient strength to accommodate vehicle loading stresses
- The proximity of dwellings to the carriageway and potential for noise nuisance
- Road pavements that are structurally sound, but have unacceptably rough surfaces, can be rehabilitated by the application of a levelling coat of asphalt
- A trend towards increased use of thin asphaltic concrete surfacing on main roads in townships to reduce surface roughness, traffic noise and bitumen tracking to improve street amenity value.

Nevertheless, after consideration of all these factors, chip seals remain the predominant sealed surfacing on urban and rural roads in the District. Use of asphaltic concrete surfacing is increasing in urban areas. It is expected that there will be a steady increase in the length of urban roads with this surfacing because of its popularity with developers and ratepayers and increasing scuffing problems in high-wear areas, attributable to larger trucks.

Roads for resealing are identified or selected as follows:

- Potential reseals are short listed according to
- Second coat seal requirements (i.e. the need to reseal over first coat seals resulting from seal extensions, and seal widening projects, reconstruction and rehabilitation works)
- RAMM Treatment Selection Algorithm output
- Seal life cycles
- Individual road section maintenance histories.

All short listed sites are inspected by suitably qualified and experienced staff and the priorities suggested from the preceding steps adjusted as appropriate.

Co-ordination with other works such as utilities maintenance and renewal works, i.e. the reseal is delayed to incorporate any first coat seals that result from these works.

Overview of Renewal Practices

Pavement renewal on sealed roads is often carried out because of failure of the pavement resulting in a rough surface and poor ride. Roughness and other pavement condition factors are uses to assist assessment of sites requiring pavement renewal. Roughness counts high enough to cause sufficient discomfort or increased road user costs are unlikely to qualify for pavement renewal on this basis alone, renewals are more likely to result from an inherent structural failure of the pavement.

Rutting of sealed surfaces is a better indication of pavement life, and that the onset of rapid rutting is a reliable indicator of the end of a pavement's life. There is more research being carried out on this subject nationally at present. The Council will continue to monitor this research with a view to enhancing its ability to forecast renewal requirements.

Council is often unable to obtain sufficiently high benefits to justify pavement rehabilitation on a benefit cost ratio basis. However, the roads that will require renewal works typically have high maintenance costs, and rehabilitation of these sections is usually justified using least-cost analysis techniques . Similar problems are not encountered with obtaining financial support for resealing. The types of renewal work undertaken are discussed below.

Reseals

As seals become old they become more brittle and tend to fracture under traffic loadings, this allows the ingress of water and leads to the formation of potholes, and in the worst cases, to failure of the pavement structure.

The predominant resealing technique used is chip sealing. It is used predominately on rural roads. Asphaltic concrete (AC) (hotmix) is used as a more resilient surface where there are high turning stresses, e.g. at cul-de-sac heads, intersections, retail, commercial and industrial areas. They are also chosen for use in urban areas from both an aesthetic perspective, to reduce road noise to adjoining properties, and address the issue of tracking bitumen in hot weather which can cause damage to floor coverings when it is carried into buildings on the soles of footwear in retail areas.

Granular Overlay/Rehabilitation

These techniques are used where only parts of the pavement are exhibiting distress and it is more cost effective to repair only these areas. The life of a sealed pavement is extended by construction of an additional layer of base-course finished with a sealed surface. This technique is generally referred to as an Area Wide Pavement Treatment and us used predominately on roads without kerb and channel.

This technique can be unsuitable where there is existing kerb and channel, such as in urban areas, as it builds up the crown of the road or street so that the resulting cross-fall becomes too steep preventing residents' vehicles from accessing their properties without "bottoming out". In these circumstances it is usually more efficient to carry out a full reconstruction as described below and replace the pavement, and often the kerb and channel, to the appropriate levels.

Full Reconstruction

This is the removal of the existing Base-course and/or sub-base and its replacement with new metal courses and a new sealed surface. This is the most likely technique used on urban streets and generally involves renewal of kerb and channel, and in some cases catch-pits and pipes to storm-water mains, footpaths and berms.

If a full reconstruction is carried out this is often undertaken in conjunction with replacement of other utility services such as storm water and sewer mains.

Renovation

This increases the strength of existing Base-course/sub-base materials by chemical stabilisation such as adding a stabiliser (hydrated lime or cement) and re-compacting. This involves the pavement being ripped in-situ and re-laid in place by heavy plant. This technique can incorporate blending in of new materials and stabilisation measures. This is used when the existing pavement formations can be reused in a reconstituted manner.

Smoothing

Irregularities in the road surface, where the structural condition of the carriageway is sound, are smoothed by placing additional (thick) surfacing on an existing sealed surface to smooth out irregularities. The materials used depend on traffic volumes/road geometry and road condition. The most commonly used materials are cold emulsion mix and asphaltic concrete (hotmix). Waka Kotahi Work Category 214 - Sealed Road Pavement Rehabilitation and 324 - Road Reconstruction are the specific categories that encompass these types of work. They have previously been generally referred to and categorised as Shape Corrections.

Standards and Specifications

The Council's standards and specifications for renewals reflect the best and most appropriate use of current technologies, in accordance with national standards and legislative requirements as detailed previously in conjunction with maintenance and operational activities.

Prioritising Renewals

In addition to the pavements condition and likely remaining useful life, i.e. its ability to deliver the agreed level of service, consideration is also given to the needs of other adjacent assets that may require attention soon. For example:

- If a road is getting near the end of its life and the sewer running below it is due to be replaced in two years requiring extensive works in the road, then the road renewal works would be programmed to coincide with the sewer works. Alternatively, if the road works were more urgent the sewer works would be brought forward
- During upgrading of older urban streets, the opportunity is usually taken to combine the renewal of all the urban roading asset components such as footpaths, kerb and channel, street lights and the pavement. This has proven to be an economic and practical approach, and is commonly referred to as a "street upgrade".

The District's roads and streets are important corridors for the location of non-roading services and they need to be considered when planning pavement and street renewal works, in urban areas the street take on even greater significance for these services, which can include:

- Sewers
- Water supply reticulation
- Stormwater drainage networks
- Electricity, telephone and street light poles and associated cables (overhead and underground)
- Water races.

Implementation of the "Code of Practice for Utilities Access to the Transport Corridor" should assist with more integrated planning of works in future.

For the purpose of allocation of available funds, a broad renewal priority order has been adopted. This is a guide only, and is varied as circumstances warrant. The priority order reflects the goals of safety and road efficiency.

- Resealing
- Bridge Replacement
- Area wide treatment, road rehabilitation and reconstruction
- Footpaths reconstruction and resurfacing
- Road Signs, Markings and Control Structures
- Car Park Resealing and other works.

Pavement Renewal Programme – Reseals

The process used to identify sites for annual resealing programmes is to:

- Identify the candidate sections of carriageway based on a comparison of age and expected life, suggested treatment or intervention from RAMM Treatment Selection and knowledge of the network

- Examine forward works programmes, including those of other network utilities such as water and sewer, for clashes or other factors that may influence the decision to reseal
- Confirm and prioritise sites following site inspections and inter-programme co-ordination
- In selecting the most suitable surfacing material for each category of road the impact of that material on the total pavement life and the life cycle cost are considered.

The length of sealed roads continues to increase because of seal extensions and new subdivision roads.

Pavement Renewal Program – Rehabilitation and Reconstruction

The quantity of historical and projected pavement renewals is much lower than the theoretical annual renewal length. As discussed earlier there are no condition indicators that suggest that the network is deteriorating from lack of maintenance, the current approach to selecting pavement rehabilitation sites is as follows;

Identification of carriageway sections based on RAMM Treatment Selection Analysis, which analyses average life data for treatment's option, the volume and mix of traffic using the road, pavement condition, roughness and costs.

Larger sections, and those requiring funding outside normal allocations, require justification under Waka Kotahi's project evaluation criteria, which generally require a project to obtain a BCR greater than 4 to be considered eligible. With the network's very low roughness counts, even on pavements that are at the end of their lives, it is often difficult to obtain the required "benefit" to justify the work.

Rehabilitation and reconstruction work is therefore often justified by showing that it is the least cost option for the Council and the Waka Kotahi (this approach differs from BCR in that road user benefits and costs are not considered)

The type of treatment, its need and priority identified from RAMM outputs are confirmed through a physical inspection of all candidate sites, good knowledge of overall network condition , and technical assessment by experienced staff, and where required consultants, using sound engineering principles.

Any works failing to attract Waka Kotahi financial assistance for specific funding are be considered for an alternative strategy of "heavy maintenance repairs" or other repair strategies to improve the pavement before resealing.

A rural roadside drainage programme has been established to improve drainage and reduce the risk of pavement structure failure due to moisture ingress. This involves a cycle of reshaping surface water channels/swales.

Routine Maintenance Identification of Work

The majority of maintenance work carried out by the maintenance contractor is self-identified. Roads included for reseal have all maintenance work identified and carried out prior to reseal. This is to ensure the pavement is in its best condition to receive the new surface Pre-reseal repairs are discussed further under Pre-Reseal Repairs below.

Council activity management staff and the road maintenance contractor work together to ensure that the road network is maintained to the specified standard while staying within the approved budgets.

Seasonal conditions and the need to co-ordinate routine and planned works may mean a carriageway is below the specified standard for a time. However, this is only accepted or tolerated if the road user is not unduly or adversely affected. For example, some minor patching may be held over until a full repair is done, or grading of

a metal road may be deferred due to adverse weather conditions (either wet or dry). Generally, the budgets are set at a level that permits the maintenance work necessary during the financial year.

A schedule of proposed reseals is given to the Contractor and inspections made to identify repair work necessary to prepare the carriageway for the reseal. The preliminary schedule of reseals is usually given to the contractors in August with inspections done and work approved over the following two months and the work completed prior to Christmas. Pre-reseal repairs can cost up to one third of the total value of the reseals carried out that year.

The Contractor also identifies maintenance work such as dig out repairs, edge breaks, culvert, renewals, minor bridge repairs and shoulder removal during the routine course of activities and network inspections. A schedule of work is submitted for approval to the Engineer, then once approved it is programmed and completed by the contractor.

Maintenance Programme

The nature and frequency of the work is consistent with the maintenance strategies outlined above and the age, condition and performance of the roading asset. The majority of maintenance work carried out by the Contractor is routine and can be undertaken within predefined discretionary limits without initial approval of the Engineer. There are exceptions to this general rule with some maintenance activities requiring pre-approval.

Forward work programmes are developed and maintained so the scope of up and coming work is known and quantified. The work is identified from RAMM data, the Engineer and the Contractor. These programmes are used to track progress and the costs of work in relation to the budgets available. The forward works programmes are updated regularly due to reprioritisation as other work is identified, arising from more recent network inspections or public service requests.

RAMM is used to manage the Forward Works programme for reseals and area wide pavement rehabilitation work.

Deferred Maintenance

On a network basis there is generally no significant backlog of routine maintenance at current funding levels. The exception to this is drainage work on unsealed roads, in particular the removal of high shoulders. The Council wishes to make more progress on issues surrounding this to the overall betterment of these types of pavements.

The aspect of pavement maintenance that typically has the highest levels of perceived deferred maintenance is that associated with the maintenance metalling of unsealed roads; however this is not necessary seen as deferred work, rather it is most commonly a difference in level of service expectations.

Adverse climatic conditions such as a wet winter or a storm event can create additional pressures that mean that scheduled maintenance metalling work may need to be deferred to address the more urgent problems that arise from these types of events. If an event is serious enough, and creates repair and reinstatement that cannot be sensibly met from normal funding allocations, road controlling authorities can apply additional funding from Waka Kotahi under Work Category 141 – Emergency Reinstatement.

Prioritising Work

As the contractor's general staff cover most roads in the District at far more frequent intervals than those stipulated as part of the day to day management of the contract, there is the expectation that the contractor will capitalise on this opportunity to enable work to be identified, carried out or reported for back for approval and prioritisation.

Maintenance work identified by the Contractor is either:

Prioritised as immediate, in which case it is programmed and completed by the Contractor forthwith. This includes routine work such as pothole repairs, short sections of edge break, small areas of surface levelling, and removal of surface detritus; or scheduled as part of identified work submitted to the Council's Engineer for approval monthly. Once approved by the Engineer it is included in the schedule of all approved work. A three-month forward work programme is maintained by the contractor and updated monthly. The month the work is programmed is also noted in the schedule of approved work.

Work is generally programmed in accordance with the following priorities, but may be scheduled differently if requested by the Engineer to meet non-roading priorities, e.g. utility services installation or repairs:

- The safety of road users or adjacent property owners is, or is likely to be, compromised
- The structure or integrity of the road or road component is or is likely to be compromised
- The areas of distress may expand or the method of repair change, such that the cost of any repair may increase significantly
- Other programmed work depends upon the completion of the work in question
- The order in which it was approved approval.

At times there is a greater value of work approved than budgets will allow to be done. The Engineer keeps the Contractor informed monthly on how the expenditure relates to the budget and will request certain types of maintenance work to be put on hold if expenditure is close to the budget. Generally, this applies to the work types with the larger budgets such as maintenance metalling, digout repairs and drainage.

Calls from ratepayers, road users and the Council's staff are another, less formal, form of network surveillance and a gauge on contractor performance. These calls are logged into the Council's Service Request System with relevant items passed onto the Contractor, with instructions where necessary, for assessment and/or remedy. Other defects or works required are noted as part of any additional inspections following Service Request enquiries.

Cost increases caused by inflationary pressures such as oil price increases can affect the ability to carry out all necessary work and stay within budget. Cost increases resulting from inflation cannot be economically written out of contracts and all the Council's period contracts therefore include them. Cost escalation adjustments are regularly applied to contract rates and prices.

The maintenance budgets for each year are adjusted to reflect the previous year's inflation in that particular part of the industry. This is done using standard construction cost indices compiled by the Waka Kotahi. Failure to increase annual budgets to match the costs of inflation over the previous period will usually result in failure to achieve the agreed levels of service, and a loss of service potential.

Urgent work is generally completed even if this means that there is expenditure over the budget or other work has to be deferred to keep overall expenditure within budget. This is particularly relevant to safety related works and other works that are needed to restore roads affected by adverse weather events like storms that result in wind damage, flooding, slips and snow. As discussed in Emergency Works, if the extent of this becomes too severe the Council can apply for Waka Kotahi Funding for additional funding.

Sealed Pavements, General Maintenance

Sealed road pavement maintenance includes:

- Pothole repairs
- Digout repairs
- Surface levelling
- Repairs to seal edges (edge break and shoulder wear)
- Trimming of high shoulders to ensure drainage off the carriageway.

Details of the various types of defects and the method of repair are in detailed in the Road Maintenance Contract specifications. In general, small repairs such as potholes, short sections of edge break and small areas of surface levelling, are completed by patching trucks as part of their routine circulation around the District. Other routine maintenance activities are carried out as needed by the Contractor.

The maintenance of private entranceways within the road reserve is carried out as part of the carriageway maintenance. This is subject to the entranceway being previously formed and sealed to match the carriageway. Unsealed entranceways are only maintained at the seal edge, unless there is significant damage to the seal edge in which case the entranceway will be sealed to 1.5m from the carriageway edge in conjunction with the roading work, this is to ensure that the edge of the sealed carriageway is kept intact.

Pre-Reseal Repairs

Pre-reseal repair work is carried out under the road maintenance contract. The purpose of this work is to ensure that all defects are repaired prior to the reseal. It includes high-shoulder removal, which consists of the trimming of the existing shoulder and berm to remove the build-up of soil, vegetation and chip at the edge of the carriageway. The formation of shallow drainage-swales to move runoff away from the pavement formations is also done at this time.

The co-ordination of shoulder maintenance and re-seals ensures that over time the entire network will have improved drainage that is regularly attended to, as part of the reseal cycle. This work also helps to prevent or minimise damage to the carriageway that can occur from remedial shoulder maintenance works.

The majority of the shoulder removal and digout repair budget is spent on the roads being resealed. By doing this as pre-reseal work the entire network will get shoulders trimmed and the failed area of pavement dug out during the reseal cycle.

Unsealed Road Pavements

Maintenance of unsealed roads consists of the routine work such as grading, pothole patching, isolated gravelling, the removal of high shoulders, placement of Base-course to provide the normal camber of 4.5 to 6% and placement of running course. Pothole patching, removal of corrugations and rutting is carried out as needed by the Contractor.

The performance standards associated with this is detailed in Part A Section 8 Current Levels of Service, output and efficiency measures.

Grading and Pothole Repairs: Grading is done on a set frequency for each road section. Additional grading is done, outside the set grading frequencies, if the condition of the road falls below the stipulated performance standards. The grading frequency is based on that historically needed to maintain the carriageway to the required standard. This is based on information obtained from long-serving staff, observation of the roads, and from the contractor who also recommends changes to the frequency if necessary.

The grading frequencies are routinely reviewed. Without exception, the frequency of grading has only ever increased; no road section has had the frequency of grading decreased. Corrugations are cut out as part of routine grading. The specification requires corrugations greater than 25 mm high (trough to crest) to be cut out. Some corrugations shallower than this can still cause concern to road users and the contractor is usually asked to cut these out as part of the next grade.

Drainage work to reduce surface water on or at the edge of sealed and unsealed carriageways is carried out following identification and approval.

Pothole patching and isolated gravelling are done by the contractor where needed and generally to coincide with the grading cycle, repairs being done prior to the grading. This is done to maintain a carriageway that is becoming worn but does not yet need major renewal.

Maintenance Metalling: Carriageways that cannot be maintained to the required standard through regular grading and patching are scheduled for approval of the work necessary to overcome the problem. This may include trimming of high shoulders, or replacement or reformation of all or part of the Base-course and running course.

Four main types of "maintenance" works are undertaken:

- Stabilise Existing Running Courses
- Repair Sub-base and Reform Carriageway
- Reshape Existing Carriageway
- Place New Running Course.

Programmed Application: A decision process for the application of metal is based on a performance management evaluation undertaken by Council engineers and inspectors. This methodology has shown deficiencies and inconsistencies of ensuring a consistent running course layer application. Future programmed applications is to be based on the theoretical gravel loss prediction model. This provides consistent protection to the base formation of the unsealed road, manages pavement deterioration and provides a quality material suitable for ongoing grading and compaction.

Predicted gravel loss model: A 10mm theoretical gravel loss has been assessed as applicable for the Manawatū District Unsealed roads. This model makes no allowance for variable traffic volumes on the unsealed roads. Therefore a modified calculation is applied to the lower volume roads as the gravel loss is reduced due to the lower traffic volumes. Typically these lower volume roads are no-exit roads servicing two or three properties.

Unsealed Road Average Daily Traffic Volumes: Council's unsealed roads are categorised into 4 bands based on traffic volumes. Traffic counting programmes are generally not undertaken on unsealed roads so local knowledge of the network is applied to assign the category accordingly.

Unsealed 1 (U1)	<25 vpd
Unsealed 2 (U2)	25 – 50 vpd
Unsealed 3 (U3)	50 – 75 vpd
Unsealed 4 (U4)	>75 vpd

Re-metalling

Road Category	ADT	Road km/Category	Gravel Loss per Annum (mm)	Application/ annum m3
U1	<25 vpd	38.73 km	5	2336
U2	25 – 50 vpd	95.62 km	5	7450
U3	50 – 75 vpd	186.25 km	10	1912
U4	>75 vpd	58.41 km	10	774
		379.01 km		12472 m3

Maintenance aggregate grading size and quantities

GAP 20 10,000 m3

GAP 40 1,500 m3

GAP 65 1,000 m3

Grading Frequency

Road Category	ADT	Road km/Category	Grading Frequency/ year	Grading km/year
U1	<25 vpd	38.73 km	2	77.5
U2	25 – 50 vpd	95.62 km	3	286.9
U3	50 – 75 vpd	186.25 km	6	1117.5
U4	>75 vpd	58.41 km	12	700.9
		379.01 km		2,182.8 km

Isolated re-metalling is also carried out as needed. The roads in need of upgrading are identified by the Contractor and by the Engineer by observation or following complaints from ratepayers and road users. These roads are listed and prioritised by the Engineer and programmed in accordance with the most effective use of the available funds.

The re-metalling list is reviewed regularly to reflect changing circumstances. The contractor, following the identification of sections of road in need of upgrading and approval of the proposed work carries out placement of new metal courses when approved by the Engineer.

5.6 Environmental Management

5.6.1 Stock Crossing/Droving

Stock droving is permitted on roads within the District, but it must comply with the requirements of the Council's Traffic Safety and Road Use Bylaw 2015, Part Five – Stock on Roads. Alongside that bylaw sits the Road Controlling Authorities, Best Practice Guidelines for Stock Crossings 2014 and the NZ Transport Agency's Code of Practice for Temporary Traffic Management – Section I - Stock under control (crossing and droving).

Two specific consents are required for Stock Droving and Stock Crossings from the Council.

Farmers must obtain the appropriate consent in advance when the droving or crossing activity will exceed normally accepted standard conditions, practices and expectations detailed in the bylaw.

The current bylaw reflects the Councils current responsibilities towards the control of the activity. It balances the needs of farmers to use public roads for moving stock against the rights of other road users, primarily from a road safety perspective, in a fair manner. In addition this, with the increase in rural residential subdivision that has occurred in the District, the resulting new property owners are much less tolerant to rural farm practices, such as stock and effluent on rural roads, than the original farming communities. Again, Council has had to balance the needs and rights of the respective road users in a fair manner.

5.6.2 Consent Applications

Two Specific Consent approvals are required:

1. Stock Droving Permit: For regular or one-off movement of stock on arterial, collector and strategic roads as required.
2. This application is free and must be completed 10 working days before your estimated droving date accompanied with a Traffic Management Plan.
3. Stock Crossing Permit: For the movement of dairy cows (or other stock) on or across the road for milking (or for other farming requirements).

This application must be renewed five yearly or when a change of farm ownership occurs. A fee must be paid as per the current fees and charges.

5.6.3 Maintenance

The consents for the regular droving of dairy cows directly across roads requires the farmers to take all reasonable and practicable steps to clean, scrape or sweep the road, conditions may be imposed to implement methods to minimise fouling and damage to the road surface.

5.6.4 Underpasses

There are 51 stock underpasses in the District, these are constructed to an agreed standard and each required a building consent. Upon completion of an underpass's construction, it is inspected by a Council Engineer who must approve the structure before the Code of Compliance Certificate is issued. Councils policy for stock underpasses contains specific details regarding construction and maintenance requirements of stock underpasses.

The Council offers a subsidy on the construction cost of a stock underpass to up to a maximum contribution is $5000 for each approved underpass, payable once a Code of Compliance Certificate has been obtained.

5.6.5 Surface Detritus, Litter, Street Cleaning Surface Detritus

Detritus is defined as:

- Any collection of fragments and/or material on sealed surfaces and in drainage channels, including loose sealing chip and loose pavement aggregates
- Any material that impedes the efficient operation of existing drainage
- Frettings from cuttings
- Deposits of windblown sand, grit, loose aggregates, or fallen leaves
- The results of buildup of minor droppings or spillages from passing traffic or climatic conditions

- Broken glass
- Silt and small weed growth in `lined channels.

Locations of sealed surfaces include all of the following:

- Road carriageways over their full width, including sealed shoulders, shoulder zones where cyclists ride, designated cycle zones/lanes, and intersections
- Central median islands, splitter lands, threshold islands, roundabouts, and central medians.
- Footpath surfaces
- Driveway and accessway entrance surfaces between the sealed carriageway and property boundaries
- Lined and unlined drainage channels.

Surface detritus removal is managed by the road maintenance contract.

5.6.6 Litter

Litter is defined as:

- Any single item with a dimension greater than 75 mm in any direction which is visible from a vehicle traveling at 70 km/hr
- Items such as tyre fragments, car parts, scrap steel, metal, timber, concrete, large stones, bricks, paper, cardboard packaging, refuse, rubbish, garbage, broken glass (see exclusion below), glass bottles and containers, plastic bottles, plastic bags, plastic sheeting, metal cans, plant debris including fruit fallen from trees, inorganic waste matter, or any other material of like nature weighing less than 40 kg.

Removal and disposal of litter is managed under the road maintenance contract.

5.6.7 Roadside Rubbish

Rubbish (over 40kg) deposited on road sides, referred to as fly tipping, comes under the responsibility of Council's Solid Waste Management Contract. Generally, the location of sites where rubbish has been dumped is notified to Council by contractors, council staff, ratepayers or road users.

Due to the road maintenance contractors coverage of the network it is more cost effective for the council to utilise their services to collect and dispose of roadside rubbish, rather than to send the solid waste contractor to clean up sites, which are often remote locations. At the time of the contractors payment claim, the cost of collecting and disposing of this type of rubbish is transferred to the Council's Solid Waste Management budget.

Any incriminating content in the rubbish is collected by the contractor and handed to Council's Compliance and Monitoring Team so they can pursue infringement of the person responsible if this is possible.

5.6.8 Street Cleaning

The street cleaning activity covers the inspection, reporting, programming, and cleaning of urban kerbs and channels, sump tops, property access culverts and slot crossings, and adjacent road surfaces.

Street cleaning is defined as the removal of all debris (including loose aggregate, litter, sand, grit, leaves, bottles, cans, cigarette butts, graffiti, and other unsightly or deleterious material) and detritus up to a maximum of 40 kg per individual item.

The area defined for street cleaning is the area from the kerb face to a distance of 2m into the road carriageway. Street cleaning is managed under the road maintenance contract.

Cleaning is carried out to maintain the level of service on the following schedule: CBD Areas: shall comply with the specified level of service every morning at 8.00am.

Commercial Areas: in front of commercial properties outside the CBD area shall comply with the specified level of service every Monday morning at 8.00am.

All Other Areas: other than CBD or commercial areas shall comply with the specified level of service: At 2.00pm. on the closest working day to the fifteenth day of the month, and at 2.00pm. on the last working day of the month.

Additional cleaning is also carried out on new subdivision roads to remove debris tracked out onto the carriageway from construction vehicles accessing muddy building sites. This has become more important as stormwater systems have become more complex and sensitive, to avoid them from becoming clogged or rendered ineffective and/or in breach of specific resource consent conditions relating to their operation.

Cleaning is done by mechanical sweeping where this can achieve the standard of cleaning, but hand cleaning is done in conjunction with this on dish channels, channels with non-standard shapes, or those that have berms and trees in front of the channel, and those that have channel covers or slotted channels at entranceways.

Approximately 130km of kerb and channel are cleaned.

A proportion of funding for this work is budgeted under the Waka Kotahi NZ Transport Agency (Waka Kotahi) Work Category 113 – Routine Drainage Maintenance in Council's Land Transport Programme. Current Waka Kotahi rules for the funding of street cleaning mean that only 30% of the total cost is subsidised. The remaining 70% is required to be fully funded by Council.

The details include the funding necessary for street cleaning in both the subsidised and non-subsidised portions of the financial forecasts.

The cost of street cleaning undertaken on state highways in townships is recovered from the Waka Kotahi – State Highways Group.

5.6.9 Abandoned Vehicles

Abandoned vehicles are the responsibility of Council's Environmental Services Department. Identification, removal and disposal of abandoned vehicles is undertaken by the Council's Animal Control Officers, who have the necessary dual purpose vehicles, trailers and storage areas to remove and store vehicles. The processes pertaining to abandoned vehicles are contained in Section 356 of the Local Government Act 1974, Removal of Abandoned Vehicles from Roads. This details, amongst other things, the Council's responsibility to identify the owner of the vehicle before sale or disposal.

The funding for this activity is not included in this Plan.

5.6.10 Vegetation Control

Vegetation is defined as grass, plant pests, shrubbery, exotic seedlings, trees, and any other plant growth within the legal road reserve.

Exotic seedlings are plants up to 2,500mm in height and include:

- Poplars
- Wattles
- Pinus radiata
- Macrocarpa
- Lupin
- Pinus pinaster
- Gums
- Flame Trees
- Willows
- Pampas.

All plant pests are described in the Horizons Regional Council's Regional Plant Pest Management Strategy, including Horsetail (Equisetum arvense).

Vegetation control is managed under the road maintenance contract.

The Contractor is to ensure that the work carried out on legal roads reserves is such that:

- At all times the area from boundary to boundary is free of exotic seedlings and plant pests
- At all times the area remains free of all vegetation encroaching within the 'control envelope'
- At all times the vegetation on unsealed shoulders and other nominated areas is maintained to the specified heights.

5.6.11 Sealed and Unsealed Shoulders

Vegetation height is maintained in accordance with the contract specifications for the category of road.

5.6.12 Edge Marker and Sign Posts

The area surrounding edge marker posts and sign posts, including culvert marker posts, is to be treated to provide vegetation control. Vegetation shall not exceed 150mm in height in the control area.

5.6.13 Bridge End Markers

The area surrounding bridge end markers at bridge abutments is to be treated to ensure clear driver visibility of the markers.

5.6.14 Guardrails, Sightrails and Culvert Headwalls

The area surrounding guardrails, sightrails and culvert headwalls is to be treated to provide vegetation control. Vegetation shall not exceed 150mm in height in the control area.

5.6.15 Surface Water Channels, Side Drains and Culvert Waterways

All surface water channels, side drains, cutout drains and culvert waterways is to be treated to ensure the free flow of water, with growth height not exceeding 150mm. All culvert inlet and outlet drains are to be treated to the adjacent fence line or to a minimum of five metres from the culvert, whichever is the lesser.

5.6.16 Kerb and Channel, Road Furniture, Fence lines, Footpaths and Paved Areas

Any vegetation encroaching on, over, or around the kerb face, street and road furniture, or along unmaintained fence lines, or appearing in construction and defect cracks between kerbs, pavement, footpath, edge strip, barrier walls, the pavement itself, footpath and paved surfaces, or any other concrete structure, shall be removed.

5.6.17 Visibility and Road Hazards

Roadside vegetation which encroaches into the vegetation envelope or vegetation control area, as detailed in the contract appendices, shall be within the tolerances described.

Any other vegetation which presents a safety hazard to road users or operators of all vehicle types, by restricting visibility are to be removed.

Special width cut areas may be required for safety visibility on vertical and horizontal curves, intersections, railway crossings and at private vehicle crossings, where cut areas may extend to the legal boundary.

The contract specifies the type of herbicides permitted along with restrictions and exclusions relating to their use. Control of vegetation by the use of chemicals is carried out in accordance with all relevant Acts, regulations and Bylaws.

5.6.18 Berm Mowing

The mowing and trimming of berm areas, embankments and amenity areas is to conform to the standards for amenity mowing detailed in the contract specifications. Maximum vegetation heights vary from 200mm to 400mm depending on road hierarchy.

It is expected that property owners will mow berms in urban areas (70 and 50 kph) so these are a specific exclusion noted in the maintenance contract.

5.6.19 Vegetation Hazards

The Council's Request for Service (RFS) records sites where there are observed problems on the road network, such as fallen tree blocking the road. If clearance is more of a major undertaking, the road is practicable then permanent repairs or reinstatement is prioritised in the Councils forward works or rolling maintenance programmes.

Vegetation control is budgeted under Waka Kotahi Work Category 121 – Environmental Maintenance in the Council's Land Transport Programme.

Trees planted in the berm areas of urban streets are covered under the Parks and Reserves Maintenance Contract, administered by Council's Community Facilities Group. The removal of trees for safety is considered on a case by case basis based upon input from:

- The road maintenance contractor
- Council staff
- Community committees.

5.6.20 Roadside Berms

Inventory details on berms are collected and stored in Council's RAMM database.

There are no formal maintenance or renewal programmes associated berm assets. Berms are renewed as a component of urban reconstruction projects but are not generally subject to renewal in isolation.

Berm maintenance occurs on an as needed basis and is carried out under the road maintenance contract. It is generally accepted that residents will mow and keep berms in a tidy condition, most residents are happy with this approach.

5.7 Disposal Plan

This section describes how to identify and actively manage assets, which are no longer fit for purpose, and then to programme the most cost effective disposal or removal of those assets.

Disposal activities are associated with the removal from service of a redundant or surplus asset. Assets may become surplus to requirements for any of the following reasons:

- Under utilisation
- Obsolescence
- Provision exceeds required level of service
- Uneconomic to upgrade or operate
- Policy change
- Service provided by other means (e.g. private sector involvement)
- Potential risk of ownership (financial, environmental, legal, social, vandalism, etc)
- Advancements in technology which provide more cost effective options.

To date the only significant disposals that have occurred have been associated with bridges and pavements bypassed where road realignments have occurred. There has also been a small-scale trial of LED street lights involving removal of existing luminaires before the end of their expected life.

5.7.1 Disposal of Roads

Pavement assets are considered for disposal when they become uneconomic to own or operate, they become surplus to current and excepted needs, or through rationalisation of the asset group.

The most common reason for disposing of part of the pavement asset is when part of a road or an intersection has been realigned or closed, and the disused road becomes surplus to requirements.

The Council is not free to dispose of roading assets as it wishes. The principal controls on its ability to do so are:

- Section 342 of the Local Government Act 1974. This gives The Council authority to remove a road from the network and for title to it to be granted to the Council. The Council may then retain or dispose of the title to an adjoining landowner (but see "The Public Works Act" below). The procedure is legally described as "stopping". The Council's ability to stop a road is tightly circumscribed by statute and common law. In summary they require: The intention to stop the road to be advertised for public submission in accordance with Schedule 10 of the Act
- If there are any public objections that cannot be resolved, the matter must be decided by the Environment Court
- The Minister of Lands must give prior consent to the stopping of any rural road
- Part 6 (Sect 75 ff) of the Local Government Act 2002. This stipulates how the Council must make decisions. To meet its requirements The Council must have a "Significance" policy and consult the public, using the "Special Consultative Procedure" on significant matters
- The Public Works Act 1981 contains provision relating to the sale of land and offering surplus land back to the original owners, which also affect these processes
- Every land parcel held in a separate title must have a legal access to it. This is usually provided by a road, whether formed or unformed, but it may be by a legal right of way. The access does not have to be practical, merely legal
- Council Policy Road Stopping – Disposal of Surplus, which outlines the Council's minimum requirements for consideration of a request to stop a road
- If a road is diverted or realigned, rather than being removed from the network, the particular provisions around road stopping may not apply.

For smaller realignments in rural areas, the administrative and legal costs to stop a small, disused, portion of road reserve are usually uneconomic when compared to any perceived benefit obtained by the stopping. In these cases, the Council may allow the adjoining farm property to be re-fenced to include the surplus land. This benefits the Council, as it does not need to maintain the area in perpetuity (especially around intersections relating to vegetation control and maintaining sight lines), and the adjoining landowner who benefits from the additional grazing or pastoral area obtained.

In other situations, where significant private land is needed for new roading realignment works, any resulting disused portion is offered as part compensation for the new land if it benefits the landowner, and it can thus offset the direct cost of the work.

In most situations road stopping occurs after landowners request to have unformed and unmaintained legal roads stopped. The resulting titles are usually amalgamated legally with the title of the adjoining property.

These processes apply, whether there is a specific pavement asset associated with the land or not, as such it applies to the very base layer of the pavement, the land upon which it sits.

5.7.2 Uneconomic Roads

Waka Kotahi has made a formal policy determination on provision of financial support for "uneconomic roading facilities".

This is detailed in its Planning, Programme and Funding Manual. The determination defines an uneconomic roading facility as one where the total cost of the proposed works per AADT is greater than or equal to $8,000.

The determination also states Waka Kotahi will not normally provide financial assistance (subsidy) for uneconomic works but that it will continue to provide financial assistance for cost effective maintenance.

The Council has no expressed intentions or programme to dispose of low traffic volume roads or unformed and unmaintained legal roads (also called "paper roads") unless requested to do so. However, it may decide not to maintain them or only to provide limited maintenance – there are currently no plans do to either of these things on any road.

Unformed legal roads are not maintained by the Council for roading purposes. Some roads have been classified as limited maintenance roads, and therefore receive only sufficient maintenance to provide a minimal level of service.

The Council's practice is that it will generally not carry out any upgrading of a paper road or uneconomic road. It may be prepared to carry out specific uneconomic projects if it reaches agreement with potential users over cost sharing. The Council may agree on a case-by-case basis to maintain a road if it has been upgraded to a suitable standard by others at their cost, with its prior permission.

5.7.3 Surplus Land

Land is usually declared surplus when:

- Land designated as legal road is not required for roading purposes now or in future, this usually affects paper roads. The Council will facilitate a road's closure and disposal, where requested by an adjacent property owner who wishes to incorporate the road into their adjacent land title in the following circumstances
- When this process is requested, the Council undertakes an evaluation on a case-by-case basis to determine if there is any strategic value in keeping the land for another transport purpose, for example as a pedestrian walkway, an off-road cycleway or as part of more extensive future route. If this there is no benefit evident in retaining the road for a future roading purpose, the disposal process is initiated, but because of the legal process required (see the preceding discussion) the result cannot be predicted or guaranteed
- It has been purchased under the Public Works Act for future road development and is no longer required.

In some places there is land parcels that were intended to be roads when originally surveyed in the early days of European settlement, but were never formally declared to be roads or vested in the Council or the Crown as roads. In these situations, the Council may hold titles to these parcels as ordinary freehold (fee simple) land.

5.7.4 Disposal of Bridges Disposal Strategy

A bridge may be disposed of if it is uneconomic, unsafe or becoming so, and it is not in the public interest to maintain it in an appropriate safe condition. Disposal of bridges can be carried out in the following ways:

- Sale; or
- Demolition without replacement.

Sale usually involves realigning the section of road served by the bridge, stopping the existing alignment, and selling the stopped road, together with the bridge to the adjacent landowner. The circumstances when all factors for a sale are possible, let alone achieved, are rare. These sale processes must comply with the Council's legal obligations under the Local

Government Act 1974, which covers:

- Public notification required prior to sale
- Restrictions on the minimum value recovered
- Use of revenue received from asset disposal.

Bridge demolition is much simpler than sale. The process may require resource consents from Horizons Regional Council and the Manawatū District Council, this need can only be satisfactorily determined on a case-by-case basis.

When a bridge is demolished any worthwhile materials such as hardwood beams are retained where possible and stockpiled for reuse as repair and maintenance stock for other bridges or for other purposes such as landscaping. Other materials are salvaged by the contractors – the value of this salvage is reflected in the cost to the Council of the bridge demolition tenders or quotations.

No decisions have been made on disposal of any bridges. These will be considered when the need arises for substantial renewal works or replacement, considering all which are defined as "uneconomic" bridges as discussed earlier.

5.7.5 Disposal of Footpath Disposal Plan Disposal Strategy

Before committing to the removal of any of path the Council will:

- Consult the people in the affected street or streets
- Consult the relevant communities
- Consider the recommendations of the relevant township committees.

The costs of disposing of a footpath are essentially the costs of removing the foundation and surface, replacing them with suitable soil, and sub-soil if appropriate, and sowing new grass in the reconstructed berm. This could, be done in conjunction with renewal of the footpath on the other side of the road or part of a street upgrade project.

There are no current plans to dispose of any footpaths.

6. RISK MANAGEMENT PLAN

6.1 Introduction

The Council is exposed to a number of risks arising from the operation of the road network. A Risk Register and Treatment Plan have been developed in alignment with AS/NZS ISO 31000:2009 Risk Management, Council's Corporate Risk Policy, and the RIMS Best Practise Guideline for Risk Management on Road Networks. The framework for Transportation risk management considers the risk topics shown below.

6.1.1 Planning Risks

- Strategic planning risks
- Activity management planning risks
- Levels of service risks
- Natural event and environmental risks.

6.1.2 Management Risks

- Systems/information risks
- People risks
- Financial risks.

6.1.3 Delivery Risks

- Procurement risks
- Project management risks
- Contract management risks
- Communication risks.

6.1.4 Physical Asset Risks

- Risks common to all assets
- Risks associated with specific asset types.

6.2 The Risk Management Context

Establishing the context for risk management is fundamental to effective risk management. The context against which risks may be identified is likely to exist in the following:

- Political, economic, social, technological, legal and environmental change
- Client/contract objectives
- Client or supplier initiated contract change
- Delivery programme
- Potential for failure to achieve performance Indicators (PIs)

- Estimating assumptions or uncertainties
- Business, process, design or construction change
- Design outputs and assumptions
- Construction working methods
- Outputs from review/audit.

6.3 Identifying Risks

The following risk identification techniques are utilised:

- Checklists: Review of generic and/or activity specific risk themes
- Workshops/reviews: formal multi-disciplinary forums that take the form of either 'blue sky' thinking or focused review of existing data. Participants are selected based on attendance requirements relative to maximising outcomes from the degree of involvement and time spent
- Interviews: used on a selective basis to elicit information from specialist personnel
- Experience based reviews: Review of previous projects and/or contracts undertaken
- Ad-hoc: Delivery team identification of risks during contract execution.

6.4 Identifying Critical Assets

Risk management provides the foundation for critical infrastructure protection. The ability to effectively identify critical assets is a crucial first step to any risk management process. Ensuring that a critical infrastructure asset identification methodology is complete, reproducible, documented and defensible is essential to enabling cross-sector comparisons. The scope, approach and evaluation method are variables that can contribute to meeting these requirements. While several methodologies have been proposed in the literature, no current methodology meets all the requirements. A multi-criteria decision making model that combines the strengths of existing methodologies is a promising approach as it can provide systematic solutions that address the gaps and challenges associated with critical infrastructure asset identification efforts.

6.5 Evaluating the Risks

6.5.1 Prioritisation

Risk evaluation of analysed risks will be used to determine which risks are to be treated and to define the prioritisation for treatment.

Each risk will be allocated a risk score for both current and target exposure and ranked within the risk register by its current exposure risk score. To facilitate ranking of risks the scoring system provided in NZ Transport Agency Minimum standard Z/44 – Risk management will be utilised.

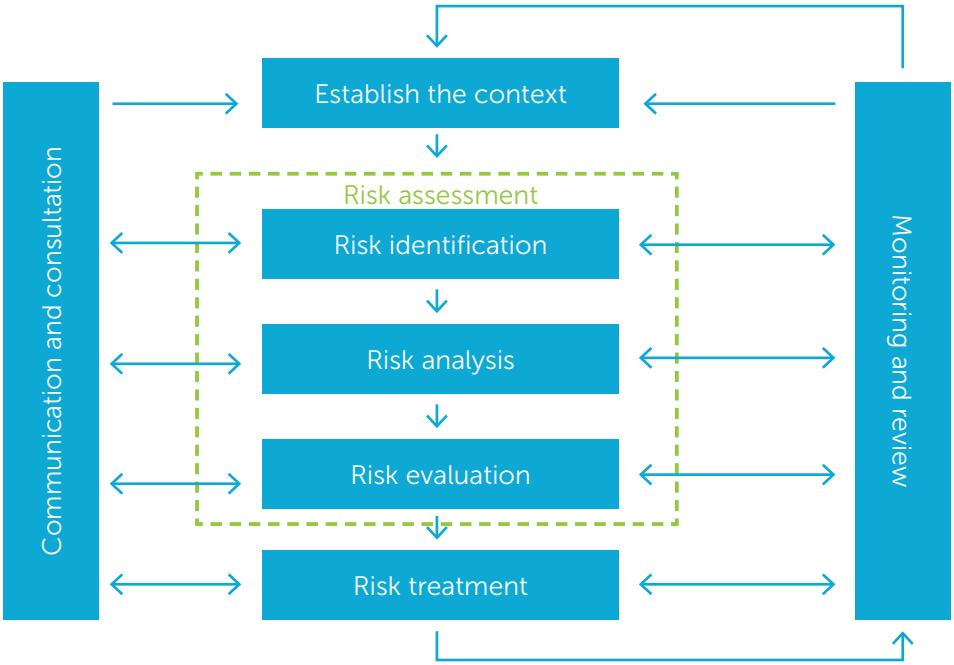
6.5.2 Risk Tolerance Threshold

To aid in risk treatment prioritisation a risk tolerance threshold(RTT) has been established, and agreed, as being risk score 10. Risks with an exposure below the established RTT will be given a 'live – parked' status. These risks will be monitored but will not be treated, when a change in exposure occurs the need for treatment will be re-evaluated.

The establishment of an RTT will aid the delivery team to focus resource effort on those risks likely to have the greatest negative impact on the contract (and positive impact with respect to opportunities).

6.6 Managing the Risks

The figure below summarises the key steps of the risk management process specified in AS/NZS ISO 31000:2009 and as applied within this contract. This process is a systematic approach applicable to all aspects of Council's Roading Activity delivery; from governance to task level activity.



6.7 Monitoring and Review

The activity management team will monitor contract delivery raising identified risks on to the risk register for review and notification to Council (in accordance with NZ Transport Agency Minimum standard Z/44 – Risk management, Table 3.2). Risk owners will be responsible for ongoing monitoring and review of owned risks, the conduct and effectiveness of associated treatments and currency of related data. Council will be responsible for monitoring the content of the risk register to ensure currency of data and the identification and notification of risk owners requiring to update owned data. Contract risk reviews will be conducted to ensure the ongoing validity of risks identified, exposure levels, and progress and effect of associated treatment actions. Risk reviews will be attended by such members of the delivery team as deemed appropriate by the activity management team so as to maximise outcomes.

6.8 Assessing Infrastructure Resilience

6.8.1 Impacts on the Roading Network

The Region is a major corridor for road and rail transportation networks. There is an extensive network of both state highways and local roads throughout the area, and the road network has been identified as being the most critical of the transportation networks.

The main causes of large-scale failure are earthquake and river flooding, with severe storms and landslides causing most site specific failures. The consequences are primarily social and economic, with isolation and restricted access being the main issues. Despite this, there is arguably more redundancy within the road network than any of the other lifeline utilities.

Plans to deal with a large scale failure are detailed in the CDEM Plans.

Bridges, culverts and structures are at risk from natural hazard events such as earthquakes, floods and the failure of attached and adjacent services e.g. water mains. It is only in recent times that adequate earthquake resistance has been incorporated into bridge designs.

6.9 Lifeline Services – Risks of Natural Hazards

This report undertaken by the Manawatū-Wanganui Lifelines Advisory Group examined the effects of direct damage by known major natural hazards to lifeline services. It:

- assesses the vulnerability of lifeline services to damage from hazards
- identifies interdependencies amongst the lifeline services
- identifies practical strategies for reducing risk
- helps project participants identify and implement mitigation and response strategies for their own networks and co-ordinate these with the plans of other lifelines.

Assessed risk scores were determined and a summary of the key risks for the Manawatū District Transportation Infrastructure is summarized below. High score indicate high risk and dependency of other utilities.

Manawatū DC Roads			Siesmic Risk Score	Flood Risk Score	Volcanic Risk Score
Manawatū District	Regional Arterials				
Saddle Road	Pōhangina River (Bridge)	Manawatū/Tararua Bdy	230	1798	43
Ashhurst Road	Stoney Creek Road at Bunnythorpe	Harrisons Line at Ashhurst	14	1	1
Campbell Road	Waughs Road at Kung Foo Corner	Stoney Creek Road at Bunnythorpe	58	14	1
Waughs Road	SH54 at Camerons Line	Campbell Road at Kung foo Corner	1	1	1
Halcombe Road	West Street, Feilding	Rangitīkei River Bridge at Kakariki	173	58	1
Highway 56	SH57 at Opiki	SH1 at Hīmatangi	161	361	1
Manawatū District	District Arterials				
Ruahine Road	Te Parapara Road at Rangiwāhia	Rangitīkei River Bridge at Mangaweka	991	991	50
Rangiwāhia Road	Hagerty Street Kimbolton	Te Parapara Road at Mangaweka	446	446	1
Kimbolton Road	SH54 at Cheltenham	Hagerty Street Kimbolton	13	54	1
Awahuri Road	South Street West, Feilding	SH3 at Awahuri	388	230	1
Kawakawa Road	South Street, Feilding	Awahuri Road	13	482	1
Stewart Road	Awahuri Road	SH3 at Mt Stewart	13	1	1
Rongotea Road	SH1 near Sanson	SH57 near Longburn	361	482	1
Manawatū District	District Arterials				
Pōhangina Road	North Street, Ashhurst	Pōhangina Township	361	361	1
Valley Road	Taonui Road	Pōhangina Road	50	334	1
Taonui Road	Campbell Road	Valley Road	12	50	1
Colyton Road	SH54	Grove Road, Ashhurst	12	50	1
Kairanga-Bunnythorpe Road	Campbell Road at Bunnythorpe	Rongotea Road at Kairanga	12	149	1
Gillespies Line	Aranui Road	Bdy with PNCC	1	12	1
Pōhangina Valley East Road	Pōhangina Road at Raumai	Ōroua Valley Road near Āpiti	482	361	1
Āpiti Road	Rangiwāhia Road near Kimbolton	Ōroua River Bridge	991	334	1
Ōroua Valley Road	Ōroua River Bridge	Table Flat Road near Āpiti	991	594	1
Main South Road	Table Flat Road near Āpiti	Te Parapara Road near Rangiwāhia	991	594	1
Te Parapara Road	Main South Road	Rangiwāhia Road	991	594	1
Hīmatangi Beach Road	SH1 at Hīmatangi	Hīmatangi Beach Township	54	120	1
Tangimoana Road	SH1 at Ōhakea	Tangimoana Township	54	120	1

While roads in the district affected by floods and snow, there are seldom long delays before they are opened. The upper eastern rural roads have frequent snowfall and rainfall events with subsequent longer delays, but they serve fewer people who generally have a lesser expectations. The portions of the roading network above the 500m contour line are those usually the worse effected with heavier snowfall volumes and higher intensity rainfall durations.

Washouts occur frequently on the eastern portion of the district roads. Soil and moisture conditions in the area from the Manawatū Gorge to a line near Mangaweka are such that frequent slips and washouts occur. It is a characteristic of the silty clay material in the area. They seldom close the roads for long periods and are simply removed or repaired in a short time.

7. FINANCIAL SUMMARY

7.1 Introduction

The Local Government Act 2002 requires Council to prepare a Financial Strategy as part of its Long Term Plan. This Strategy outlines how the Council intends to manage it finances prudently. This means the Council will act with careful deliberation and will always consider the financial implications of decisions on the community. Council must make adequate and effective provision to meet expenditure needs identified in Annual and Long Term Plans.

The Financial Strategy provides a financial framework for making decisions. Simply, it enables Council to assess proposed spending against rates and borrowing requirements over the whole ten years of the Long Term Plan 2018-28 (LTP). It draws together all of the issues in the LTP along with the financial consequences and presents these along with the Council's response.

This will:

- Enable the community to readily identify what the financial issues are
- Provide the community with certainty about how expenditure will be met
- The impacts of proposals on levels of services, rates, debts and investment
- Enable the community to predict how the Council intends to manage the financial issues in the future
- Provide guidance to decision makers when considering implications of financial issues on communities now and in the future.

Council's vision is for a "connected, vibrant, thriving Manawatū - best rural lifestyle in New Zealand". The services and projects outlined in the Long Term Plan will ensure this vision becomes a reality.

The provision of services and projects comes at a cost. Council aims to spend within its means, achieving a balance between meeting the needs of the community with its ability to pay.

7.2 Identifying and Categorising Lifecycle Costs

Council makes decisions on the acquisition and ongoing use of many different assets. The initial capital outlay cost is usually clearly defined and is often a key factor influencing the choice of asset given a number of alternatives from which to select.

The initial capital outlay cost is, however, only a portion of the costs over an asset's life cycle that needs to be considered in making the right choice for asset investment. The process of identifying and documenting all the costs involved over the life of an asset is known as Life Cycle Costing (LCC).

The total cost of ownership of an asset is often far greater than the initial capital outlay cost and can vary significantly between different alternative solutions to a given operational need. Consideration of the costs over the whole life of an asset provides a sound basis for decision-making. With this information, it is possible to:

- Assess future resource requirements (through projection of projected itemised line item costs for relevant assets)
- Assess comparative costs of potential acquisitions (investment evaluation or appraisal)
- Decide between sources of supply (source selection)
- Account for resources used now or in the past (reporting and auditing)
- Improve system design (through improved understanding of input trends such as manpower and utilities over the expected life cycle)
- Optimise operational and maintenance support; through more detailed understanding of input requirements over the expected life cycle)
- Assess when assets reach the end of their economic life and if renewal is required.

The Life Cycle Costing process can be as simple as a table of expected annual costs or it can be a complex (computerised) model that allows for the creation of scenarios based on assumptions about future cost drivers. The scope and complexity of the life cycle cost analysis generally reflects the complexity of the assets under investigation, the ability to predict future costs and the significance of the future costs to the decision being made by Council.

A life cycle cost analysis involves the analysis of the costs of a system or a component over its entire life span. Typical costs for a system may include:

Acquisition Costs (or design and development costs)

Operating costs:

- Cost of failures
- Cost of repairs
- Cost for replacement.

Maintenance costs:

- Cost of corrective maintenance
- Cost of preventive maintenance
- Cost for predictive maintenance.

7.3 Valuation Approaches

Road assets are infrastructure assets, defined as infrastructural systems that provide a continuing service to the community and are generally not regarded as tradable.

The valuations are based on accurate and substantially complete asset registers (see improvement plan) and appropriate replacement costs and effective lives. The prime asset register is the RAMM database. The asset registers record data to a sufficient component level to allow assets of different base lives to be valued separately.

Statutory financial reporting standards require MDC to revalue its plant, property and equipment where there has been a significant change in values, or at a maximum interval of three years. However, MDC chooses to value its assets on an annual basis regardless of the significance of changing values. This allows the council to better forecast increases in annual depreciation.andhelps to ensure there is an understanding of any significant changes resulting from changes to the asset stock or contractor rates. Significant changes in input parameters, that may have a material effect, may result in an earlier revaluation of assets.

Asset valuation reports are extrenally peer reviewed on a three yearly cycle.

Road assets are valuedby Council staff and specialist consultants in accordance with the following standards:

PBE IPSAS 17 Property Plant and Equipment International Accounting Standards.

NAMS Infrastructure Asset Valuation and Depreciation Guidelines, Edition 2, 2006. In addition the guidelines provided in the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines Edition 2.0 2006 are followed.

The valuation is subject to Audit. Asset quantities used for the valuations are those detailed in the Council's asset registers and databases.

The annual valuations calculate the following financial information at component level which is summarised by asset type in the reports;

- Optimised Replacement Cost (ORC)
- Optimised Depreciated Replacement cost (ODRC),Annual Depreciation.

The Council has adopted the depreciation method of calculating the change of service potential; where:

- Change service potential = Renewal expenditure - Annual depreciation
- Cumulative change in service potential 03/04 = change SP 02/03 + change SP03/04.

NOTE: The value of new improvements is not added into the equations in the years in which they are built, rather, their depreciation and ultimate renewal are considered in all subsequent years.

7.4 Valuation Assumptions

MDC has valued its transportation assets at component level as they are populated in the RAMM database. The database includes assets owned by other entities, these are identified by an Asset Owner field and are excluded from the valuation calculations.

In total there are 52,656 individual assets or asset components recorded in the database, the following sections describe the different asset types.

The different asset types are discussed in more detail in section, the following table summarises the assets and their value at 1 July 2019.

July 1 2019 Valuation Report

Asset Data			2019		
Asset Type	Component	Unit	ORC Value	ODRC Value	Annual Depreciation
Berm	Berm	m²	$4,369,724	$4,369,724	$0
Bridge	Bridge (Deck)	m	$95,026,352	$41,412,779	$992,721
	Bridge (Culvert)	m²	$10,833,439	$4,756,749	$110,216
Crossing	Crossing	Each	$7,891,898	$3,959,948	$105,425
Drainage	Drainage	m	$70,254,544	$26,912,611	$868,850
	Drainage Wall	Each	$279,802	$235,777	$7,687
Feature	Feature	Each	$58,268	$52,981	$799
Footpath	Footpath	m²	$21,110,857	$12,223,010	$345,108
Island	Island	m²	$1,455,797	$308,418	$21,695
Marking	Marking (RRPM)	Each	$262,592	$91,404	$58,688
	Marking (Remark Costs)	LS	$165,074	$165,074	$0
Railing	Railing	m	$3,240,818	$1,498,005	$74,093
Retaining Wall	Retaining Wall	m²	$31,668,989	$27,132,454	$396,307
Shoulder	Shoulder	m²	$4,187,901	$821,108	$62,507
Sign	Sign	Each	$2,581,625	$965,429	$170,787
Streetlight	Streetlight (Bracket)	Each	$1,165,379	$404,727	$23,298
	Streetlight (Light)	Each	$1,202,338	$905,042	$45,879
	Streetlight (Pole)	Each	$3,747,630	$1,756,015	$77,915
SW Channel	SW Channel	m	$23,103,246	$5,400,203	$345,102
Traffic Facility	Traffic Facility	Each	$185,994	$87,390	$12,400
Treatment Length	Formation Rural O L	m³	$124,921,069	$124,921,069	$0
	Formation Rural O P	m³	$38,368,728	$38,368,728	$0
	Formation Rural S L	m³	$32,547,173	$32,547,173	$0
	Formation Rural S P	m³	$11,454,017	$11,454,017	$0
	Formation Urban	m³	$5,304,391	$5,304,391	$0
	Pavement 1st Coat	m³	$38,725,520	$12,311,503	$578,011
	Pavement R k-Depth	m³	$22,631,131	$19,035,485	$337,778
	Pavement R u-D <2000	m³	$72,140,299	$8,696,160	$1,076,721
	Pavement R u-D >2000	m³	$7,251,582	$865,861	$108,233
	Pavement U k-Depth	m³	$4,500,575	$3,860,072	$67,173
	Pavement U u-D <2000	m³	$8,257,505	$984,044	$123,279
	Pavement U u-D >2000	m³	$2,762,454	$329,845	$41,231
	Pavement Unseal	m³	$7,701,677	$7,701,677	$0
	Surface Structure	m³	$41,031,450	$18,382,398	$2,805,023
Total			$700,389,840	$418,221,270	$8,856,924

7.5 Calculating Depreciated Replacement Cost

Most assets lose their value over time (in other words, they depreciate), and must be replaced once the end of their useful life is reached. Depreciation is a method of allocating the cost of an asset over its useful life. For example as a bridge ages and comes to the end of its useful life it is worth less than when new.

Depreciation represents the charge to the current ratepayers for the use of the asset during each year. If operating costs, including depreciation, are not covered by operating revenues, it can be argued the current users of the service are not paying for the benefits they are receiving. Depreciation will be charged on all assets by allocating the cost/or valuation of the asset over the estimated remaining useful life of the asset.

Assets are regularly revalued (operational assets at least every three years and infrastructural assets annually) with the depreciation expense based on the revalued amount. This ensures the amount of depreciation reflects current market values.

As depreciation is a charge for the use of the asset by current users, Council has elected not to create individual depreciation reserves.

There are some assets depreciated in the balance sheet, but their depreciation is not included in the calculation of rates.

The proportion of depreciation on roading assets funded by the Waka Kotahi NZ Transport Agency (Waka Kotahi) subsidy is also removed from the rating calculation. Currently Council receives 53% of the maintenance and renewal expenses on the majority of roading assets. Including this in our rating calculation would be funding the expense twice.

7.6 Developing Long Term Financial Forecasts

Long-term financial planning combines financial forecasting with strategizing. It is a highly collaborative process that considers future scenarios and helps governments navigate challenges. Long-term financial planning works best as part of an overall strategic plan.

Financial forecasting is the process of projecting revenues and expenditures over a long-term period, using assumptions about economic conditions, future spending scenarios, and other salient variables.

Long-term financial planning is the process of aligning financial capacity with long-term service objectives.

Financial planning uses forecasts to provide insight into future financial capacity so that strategies can be developed to achieve long-term sustainability in light of the government's service objectives and financial challenges.

Council has a comprehensive long-term financial planning process because it stimulates discussion and engenders a long-range perspective for decision makers. It can be used as a tool to prevent financial challenges; it stimulates long-term and strategic thinking; it can give consensus on long-term financial direction; and it is useful for communications with internal and external stakeholders.

Council's long-term financial plan includes these elements.

Time Horizon: The plan looks at thirty years into the future.

Scope: The plan considers all appropriated funds, but especially those funds that are used to account for the issues of top concern to elected officials and the community.

Frequency: Council updates long-term planning activities as needed in order to provide direction to the budget process, though not every element of the long-range plan is repeated.

Content: The plan includes an analysis of the financial environment, revenue and expenditure forecasts, debt position and affordability analysis, strategies for achieving and maintaining financial balance, and plan monitoring mechanisms, such as scorecard of key indicators of financial health.

The public and elected officials are able to easily learn about the long-term financial prospects of Council and strategies for financial balance. Hence, Council has an effective means for communicating this information, through separate plan documents and by integrating it with existing communication devices.

Disposal costs: A complete life cycle cost projection (LCCP) analysis may also include other costs, as well as other accounting/financial elements (such as, interest rates, depreciation, present value of money/discount rates, etc).

7.7 Developing Funding Plans

7.7.1 Balancing the Budget

Council is required by legislation and for prudent financial management to balance its budget. This means that operating expenses must be covered by operating revenues unless specific exemptions are detailed in this Financial Strategy. During the preparation of the Long Term Plan the balancing of the budget is done at an activity level. In the Financial Strategy Council has identified a number of circumstances where it is appropriate not to balance the budget.

7.7.2 Unfunded depreciation

Council uses depreciation to fund the renewal or replacement of assets. Council funds 47% of the depreciation on roading because the renewal or replacement of the majority of our roading assets are funded through subsidy from the New Zealand Transport Agency. Roading is a strategic asset of Council and results in a significant depreciation charge.

7.7.3 Revenue for capital purposes

The operating surplus in the Statement of Comprehensive Revenue and Expense includes revenue to fund capital expenditure. Through the life of the plan this type of revenue includes subsidy from Waka Kotahi for roading capital expenditure, development contributions received to cover growth related capital expenditure and contributions from ratepayer to fund the connection to Council infrastructures.

Funding from future development contributions for growth related capital expenditure.

In determining our development contributions a fifty year programme has been developed and development contributions were calculated over this time. Often Council is required to put the infrastructure in place to ensure we have the capacity to accommodate growth in advance of the development. In these instances loans are taken out to fund this expenditure. The servicing of these loans (both interest and principal repayments) is to be funded by future development contributions.

7.7.4 Funding From Prior or Future Years Surpluses

There are a small number of circumstances where it is considered prudent to fund operational expenditure from prior or future years' surplus.

7.7.5 Intergenerational Issues

Council manages many different assets. Roads, footpaths, pipes, drains, parks and reserves all require careful management to provide services to the community now and in the future.

Some assets are useful for a long time and provide service to more than one generation. For example, pipes and bridges often have an estimated life of 60 to 100 years.

When making financial decisions about how to fund assets, Council takes into account how today's decision will impact on current and future generations. Council considers that it is fair to expect those people who benefit from the service should pay for it. This principle assists Council to decide how to fund the costs of replacing existing assets and to build new assets. For example, long life assets may be partly funded by a loan. Loans spread the cost of the asset across current and future generations.

7.7.6 Funding Sources

Rates are a property tax set annually by Council. Rates are one source of income the Council uses to fund projects and operating services.

Council considers the affordability of the proposed rate requirements both for the Council and ratepayers. When setting rates Council considers:

- the levels of service provided
- intergenerational issues
- other sources of funds
- legislative requirements
- external factors
- what our ratepayers can afford.

A minimal amount of investment income is generated by Council's investment in forestry assets, and this is used to offset general rates.

7.7.7 Borrowing

Council utilises external borrowing to fund the acquisition of assets. Council's Liability Management Policy governs the borrowing mechanisms and current limits.

Internal Borrowing: This is a mechanism available to manage both the level of funds available and external debt. This facility enables an activity to borrow from the Council treasury function as opposed to borrowing externally, with an appropriate interest rate charged.

Utilising internal borrowing enables Council to manage its cash/investment portfolio to take advantage of the moving margins between interest rate receivable and interest rates payable. Internal borrowing is used when external borrowing costs are higher than allowed investment returns.

Security for Borrowing: Many of Council's assets are not readily saleable so are less attractive as security items. Council will secure borrowings by a charge over our rating revenue either directly or through a debenture trust deed. Council will not secure other assets unless circumstances show it to be appropriate (e.g. leased assets).

7.7.8 Investments

Council is a risk-averse entity. Council will not undertake transactions where the level of return or benefit is dependent on an unacceptable level of risk. The Investment Policy expressly forbids any form of purely speculative activity.

Adequate liquid funds are to be kept to allow all expected payments to be made on the due date. Investment levels should ensure adequate funds are maintained so special funds and reserves are backed by suitable investments.

7.7.9 Expenditure Classifications

To assist in identifying the reason for expenditure and finding the most appropriate funding source, Council has four expenditure classifications. Classification reflects good practice and new legislative requirements for financial reporting.

Type of Expenditure	Description
Operational expenditure	Operating expenditure is the day-to-day costs associated with providing a service. It includes expenditure not linked to an asset. It includes work required to keep an asset operating at the required level
Capital – renewal expenditure	Renewal work is expenditure required to replace or refurbish an existing asset that will bring the asset back to the original service potential
Capital - new works to improve the service level	In meeting desired Council outcomes and working to achieve its vision, Council may invest in additional facilities and/or upgrade existing assets. There will be changing service level requirements because of new technology, changing legislative requirements and resource consent requirements
Capital - new works to accommodate growth	Capital expenditure to accommodate growth in resident population and business activity

7.8 Asset Management

Roading is funded through a partnership with Central Government through the New Zealand Transport Authority (Waka Kotahi). Historically most standards were set by the Council within broad Waka Kotahi guidelines. A new system now sets national standards (One Network Road Classification) for each type of road. This may impact on the affordability of maintaining existing levels of service.

This strategy is not a completely new process for Council. Previous LTP processes and adopted LTPs have included infrastructure programmes that were forecast out 10 years. These were based on the Activity Management Plans (AMPs) that Council continually revised and improved in response to Council decisions, imposed standards and resource consent conditions, technology and demand changes, and condition assessments / maintenance work.

7.9 Funding of Capital Expenditure

Capital works expenditure can be funded from Waka Kotahi, targeted rates, subsidies, reserves (for example depreciation reserve), borrowing and development contribution. Where possible the first source of funding for non-subsidised capital expenditure that will be third party sources i.e. development contributions.

8. PLAN IMPROVEMENT AND MONITORING

8.1 Improvement Plan

Improvement items are identified as general deficiencies arise during the course of Asset Management and Contract Management activities and also through attendance at REG workshops which identify regional and national improvement opportunities.

8.1.1 The Road Efficiency Group

REG provides framework around Activity Management Improvement Planning, this is discussed in more detail in Section 8.5 of the Roading 2021-24 Programme Business Case document where a table of the current REG related Improvement Actions is shown.

8.1.2 RAMM

MDC collates data related improvement items which are prioritised and actioned accordingly. As at 1 January 2021 there were 55 open items in the Improvement Plan tracking spreadsheet, these items range from single asset issues to issues affecting entire asset groups.

8.2 Monitoring Performance

The One Network Road Classification (ONRC) was designed to standardise the performance of our roads throughout New Zealand, aiming to address historical inconsistencies, and promote economic growth.

This can only be achieved if all Road Controlling Authorities (RCAs) are monitoring and measuring their roads with the same tools and standards consistently over time.

The One Network Road Classification (ONRC) Performance Measures can be found by following the link below;

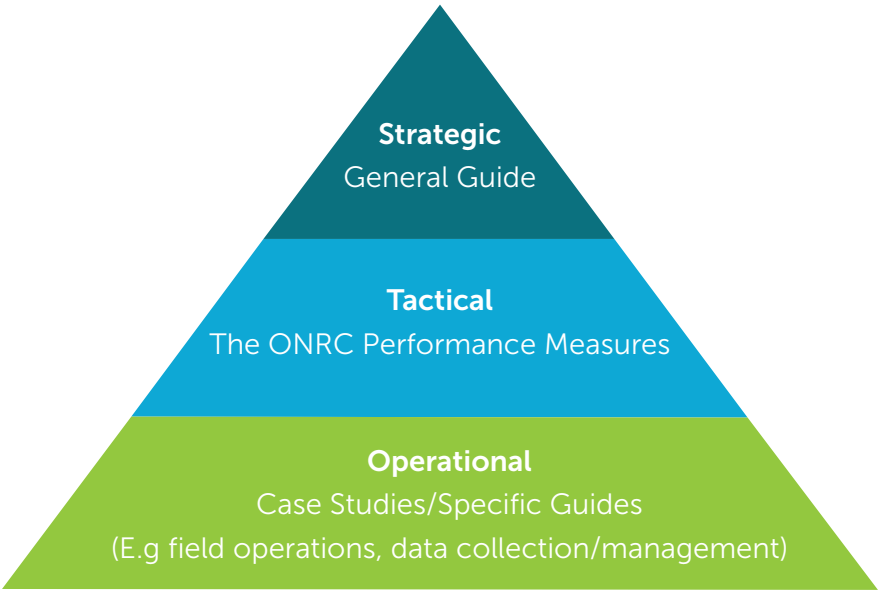
http://www.nzta.govt.nz/assets/Road-Efficiency-Group-2/docs/NZTA160801-The-ONRC-Performance-Measures-Final-Published.pdf

These performance measures support that consistency. They have been developed by subject experts from the Road Efficiency Group (REG) – a collaboration between Local Government New Zealand and the New Zealand Transport Agency. When used with the ONRC Performance Measures online reporting tool, they are a significant resource to help asset managers better understand their network and tell their investment story.

Council uses the performance measures when developing its business cases for the Regional Land Transport Plan. The ONRC Performance Measures described above provides the strategic overview and context.

When using the performance measures, it is important to remember that while there is an element of compliance, they are intended to form the backbone of a thinking process. The measures complement and interact with each other. Council's investment story is derived by considering the data across the network and in the national context, rather than focusing on individual performance measures in isolation.

- Ensure CAS data is up-to-date in the RAMM database
- Results are compared nationally and against the peer group to determine trends within different classifications
- If the sample does not provide a true reflection of the wider network, then a larger sample area is audited
- Identify any actions to address contributing factors.



8.2.1 Developing Effective Performance Measures

Council addresses their Customer Levels of Service using the ONRC Performance Measures.

The focus shifts from technical solutions to customer outcomes, and because of this the performance measures do not prescribe specific operational tasks. There are three types of ONRC performance measures:

- Customer Outcome
- Technical Output
- Cost Efficiency.

Together, they measure Council's efficiency and effectiveness at meeting the Customer Levels of Service. The Performance Measures are a key tool for Council when building its business cases for national funding.

The Road Efficiency Group Performance Measures Reporting Tool is specifically reporting the One Network Road Classification measures and is useful by Council to view its performance and compare performance with other Approved Organisations. The tool is developed specifically for this purpose.

The NZ Transport Agency's transport data website publishes a range of financial and non-financial information related to the performance of its transport investments. This data is collected as part of a statutory annual achievement return process and is published as part of the agency's commitment to open government data. These tools were developed several years ago and are currently maintained with data updates only. The Transport Agency keeps them under review and will remove any tools if they are no longer required. Most of the metrics reported are not the same as the ONRC measures.

The Waka Kotahi information is not specific to the ONRC measures but has proven to be a useful information source over many years for roading engineers in particular.

The team responsible for transport data are heavily involved in the PMRT decision making and its future management and governance through the REG. As a result the agency is well placed to understand if or when opportunities will arise for reducing the apparent duplication in systems and tools referred to.

To fully replace the transport data tools would require a significant expansion of the scope of the current PMRT. It is likely that the tools will be viewed as complimentary to each other for the foreseeable future.

8.2.2 Evaluating Options and Setting Performance Targets

As the evidence base grows, the ONRC and its performance measures will enable us to benchmark the performance of each RCA's network. Council will be able to easily identify varying levels of customer outcome across the country, and inconsistency of costs.

8.2.3 Communicating with Customers

Implementing the ONRC, associated CloS and Performance Measures as the basis for identifying asset requirements incorporates the informed view of the stakeholders and the rest of the community.

Council consultation with stakeholders and the community is a requirement of the Local Government Act 2002 and is an essential part of the planning and policy development of the whole road system. Community consultation continues throughout the whole Integrated activity management process. Formal community consultation is conducted in accordance with Sections 82 and 83 of the Local Government Act 2002.

When conducting community consultation to determine acceptable intervention criteria for condition parameters, it is important to consider the distinction between the perceived condition of the asset as 'seen' by the users and the condition of the asset as determined by measurement and the analysis of condition data, particularly the structural condition of the asset.

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