Rangitikei District Council

Roading

2018-21 Programme Business Case &

2018-48 Activity Management Plan

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Preface

This document is comprised of two interrelated pieces of work, the **Programme Business Case**, and the **Activity Management Plan.**

The Programme Business Case

The Programme Business Case (PBC) follows the NZ Transport Agency's Business Case Approach (BCA), which is founded on the following overarching principles:

- **Quality analysis** – the work is evidence based, thoughtful and focused.
- **Fit for purpose effort** – The effort is right sized to the risks and uncertainties.
- **No surprises** –the investment story identifies the risks and uncertainties and allows issues to be addressed earlier in the process when it is more cost effective to deal with them.
- **Aligned to management processes** – The BCA works with the methodologies, approaches and processes that are in place and is complementary to them.

The PBC identifies a range of issues and the optimal programme. The PBC presents an early opportunity for stakeholders to influence the direction of investment. It allows the Council and NZTA the opportunity to refine the programme and make trade-offs between risks and benefits. The PBC also presents an early opportunity for stakeholders to influence the direction of investment. The PBC is a living document that will be revisited as the programme is being delivered.

The PBC demonstrates a thorough understanding of the problems, opportunities and constraints developed within the Activity Management Plan and creates a clear way forward. The recommended programme will be delivered by a number of parties over a period of time, therefore the programme has been developed in a coordinated manner to produce synergies.

The Activity Management Plan

The Activity Management Plan (AMP) was developed following the Activity Management Guide for Approved Organisations Road Networks (February 2015) Local Government New Zealand EquiP – Road Transport Unit.

Council has an appreciation of the community's key transport needs for the next thirty years. For the 2018-21 period Council has established a clear understanding of how its costs and levels of service compare to our neighbours and peers. Council also understands where changes to the levels of services will require a different approach to maintenance planning and delivery.

Council is well aligned to the Regional Land Transport Plan strategic transport objectives and the GPS. Both of which have been validated at Roading Efficiency Group (REG) workshops and by the regional transport officers group.

The PBC and AMP have been audited by Jonathan Roylance, Associate Director, Specialist Audit and Assurance Services: Audit New Zealand and confirmed as being fit for purpose. Feedback has also been received from the Transport Agency and the issues raised have been addressed and incorporated in these documents.

Programme Business Case

Executive Summary

Purpose

The Programme Business Case (PBC) outlines the strategic context and case for Manawatu District Council's investment in the Roading activity. It draws on the evidence provided in the Activity Management Plan (AMP) which prioritises and addresses key transportation issues and illustrates how assets are intended to be managed.

The Problems

Maintenance: Land use changes and transport requirements are placing increasing stresses on the form and function of the network. The changing demands and needs of road users are impacting on the Customer Levels of Service (CLoS) previously provided, resulting in an increase in reactive interventions. For evidence see Section 9: Demand Changes.

Low Resilience of the Network: During periods of intense rainfall mudslides, debris flows and rock slides occur in the rural hinterland. Between 2006 and 2016, the annual average cost of Emergency Reinstatement was $3.4 million and is trending towards $3.9 million.

The problem is that the existing drainage system is unable to cope with the increasingly frequent intense rainfall events. For evidence see AMP Section 11: Resilience.

Forestry Harvest: The increase in logging traffic has commenced and there will be a peak between 2027 and 2029 with 3.5 million tonnes predicted to be extracted during that period. The increase in logging trucks will erode Network CLoS for Safety, Accessibility, Efficiency, Amenity and Travel Time Reliability (TTR). This will place 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. For evidence see Section 9: Demand Changes.

Safety: There is a high level of Serious and Fatal (S&F) crashes per vehicle Kilometre Travelled i.e. High Personal Risk. This results in high social and economic cost. For evidence see AMP Section 7: Network levels of service for safety, and Section 14: Benchmarking.

The Benefits of solving these problems

Efficient Network: A network that is efficient, supports economic activity, is fit for purpose and meets CLoS. For more detail see AMP Section 8: Levels of service, output and efficiency measures, and Section 14: Benchmarking.

Resilient Network: An increasingly consistent accessible, fit for purpose network that meets CLoS. For more detail see AMP Section 2: Strategic Environment, and Section 9: Demand Changes.

Safe Network: Minimise the risk and consequences of crashes. For more detail see AMP Section 7: Network levels of service for safety, and Section 14: Benchmarking.

The Consequences of not adopting the recommended programme

Maintenance: Road maintenance is essential in order to (1) preserve the road asset (2) protect adjacent resources and user safety, and (3) provide efficient, convenient travel along the route. If maintenance is neglected or improperly performed there will be a rapid deterioration of the road and eventual failure from both climatic and vehicle use impacts.

If the investment is reduced the result would be a more patched and rougher network, particularly on Access and Low Volume roads. There would also be a risk of occasional pavement failures if maintenance treatments fall below the base preservation levels. This would likely attract increased complaints from road users in the community, and negative media coverage.

Resilience: Between 2010 and 2017 the average annual investment in Routine Drainage maintenance and Renewals has been approximately $780,000. This has been insufficient as evidenced by the increasing expenditure on Emergency Works triggered by very high intensity rainfall and severe winds.

If the investment in Routine Drainage maintenance and Renewals is reduced and the additional investment required for Resilience Improvements is not forth coming then the annual average cost of Emergency Reinstatement is likely to be in the region of $3.9 million.

There will also be an increased likelihood of unplanned events on route availability, and the number of journeys not made due to unplanned events. As a consequences customers will be inconvenienced, and there will be an associated detrimental effect on the economy.

Forestry Harvest: Heavy vehicles are a major cause of pavement damage. The pavement damage attributable to a specific vehicle depends on a number of factors including the weight and axle configuration of the vehicle, and the design of the roadway. Heavy truck traffic results in pavement damage many times that of traffic by passenger vehicles.

- Base course will not support increased forest traffic volume.
- Base course will degrade on steep road gradient (especially on tight uphill corners)
- Harvest volumes and during wet weather events will increase pavement damage.
- Carriageway widths, visibility, passing areas, will be inadequate
- Public traffic interaction with logging traffic will increase the potential for traffic accidents.
- Road fences may limit road width.

Safety: There is a high level of Serious and Fatal (S&F) crashes per vehicle Kilometre Travelled. Traffic collisions may result in injury, death and property damage. Motor vehicle collisions lead to death and disability as well as financial costs to both society and the individuals involved.

Council's Strategic Response to the problem statements

The maintenance strategy and proposed capital projects included in the PBC and AMP are consistent with, and contribute towards achieving wider national and regional land transport priorities and objectives. These priorities and objectives are guided by the Government Policy Statement on Land Transport (GPS), NZTA's Long Term Strategic View, and the Regional Land Transport Plan (RLTP). By ensuring alignment with these high level strategic documents, the Council will not only realise its local strategic vision, but will also play its role in achieving a regional strategic integrated land transport network.

Maintenance: 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 the impact of an increased number of logging trucks. The proposed strategy is to;

- **Improve:** the reliability and cost effectiveness of the road network.
- **Deliver:** Optimised programmes that are affordable and consistent in cost within like classifications (ONRC).
- **Communicate:** to the public (via the Long Term Planning consultation phase) the proposed changes to the maintenance strategy and what the likely benefits and consequences may be.

Network Resilience: The proposed strategy is to;

- Develop operational systems and capabilities and immediate action plans.
- Identify risks and reduce magnitude of their impact and likelihood of occurring
- Increased drainage maintenance, and renewals
- Increase unsealed road metalling
- Increase in structural maintenance and component renewals

Forestry Harvest: The proposed strategy will be a combination of the strategic responses for Problems 1 & 2.

- **Communicate:** with forest owners and logging contractors to discuss non-fiscal solutions such as agreements on harvest programmes and 'fit for purpose' maintenance regimes etc.
- **Improve:** the reliability and cost effectiveness of the road network.
- **Deliver:** Optimised programmes that are affordable and consistent in cost within like classifications (ONRC).

Safety: The proposed strategy is to reduce the number and severity of crashes on the network by;

- Installing, upgrading or amending signage throughout the network.
- Removal of a number of trees that are road side hazards
- Improve visibility by sight-benching
- Traffic calming for Schools
- Minor safety improvements e.g. intersection upgrades, safety barriers, seal widening.

		3 Year Block 2018-21		
Subsidised Roading Budget		**2018/19**	**2019/20**	**2020/21**
Investment Management				
003	Investment Management Plannning	100,000	100,000	100,000
Investment Management - Totals		**100,000**	**100,000**	**100,000**
Maintenance				
111	Sealed Pavement Maintenance	1,195,000	1,195,000	1,200,000
112	Unsealed Pavement Maintenance	354,100	379,000	404,000
113	Routine Drainage Maintenance	990,000	990,000	990,000
114	Structures Maintenance	162,400	162,500	162,500
121	Environmental Maintenance	900,000	900,000	900,000
122	Traffic Services Maintenance	400,000	400,000	400,000
124	Cycle Path Maintenance	1,000	1,000	1,000
125	Footpath Maintenance	348,800	349,500	351,300
131	Level Crossing Warning Devices	15,000	15,000	15,000
140	Minor Events	370,000	370,000	370,000
151	Network & Asset Management	1,148,000	1,148,000	1,148,000
Maintenance - Totals		**5,884,300**	**5,910,000**	**5,941,800**
Renewals				
211	Unsealed Roads Metalling	410,000	435,000	460,000
212	Sealed Roads Resurfacing	1,630,700	1,445,000	1,383,000
213	Drainage Renewals	600,000	600,000	600,000
214	Sealed Road Pavement Rehabilitation	1,351,800	1,080,000	980,000
215	Structures Component Replacements	341,500	166,000	211,000
222	Traffic Services Renewal	190,000	150,000	150,000
Renewals - Totals		**4,524,000**	**3,876,000**	**3,784,000**
Road Improvements				
322	Replacement of bridges and structures	1,422,300	4,501,000	250,000
324	Road Improvements	579,600	689,100	764,500
325	Seal extension	0	0	0
341	Low Cost Low Risk Improvements	197,500	197,500	202,500
357	Resilience Improvements	171,100	136,200	102,300
451	New Footpaths	120,000	0	0
Road Improvements - Totals		**2,490,500**	**5,523,800**	**1,319,300**
Walking and Cycling				
452	Cycling facilities	1,500	2,500	2,500
Walking and Cycling - Totals		**1,500**	**2,500**	**2,500**
Public Transport				
514	Public transport facilities O & M	5,500	5,500	5,500
Walking and Cycling - Totals		**5,500**	**5,500**	**5,500**
Total Subsidised Roading Budget		**13,005,800**	**15,417,800**	**11,153,100**

Non-subsidised Roading Budget	2018/19	2019/20
Maintenance and Operations		
Street cleaning (local share)	136,600	136,600
Street Furniture repairs and maintenance	12,500	12,500
Underverhanda Lighting (power)	25,000	25,000
Festive lighting and banners	16,000	16,000
Carpark Maintenance	15,800	15,800
Access Roads	20,000	20,000
Noxious Weeds (Taihape Trust)	25,250	25,250
Professional Services	42,000	42,000
Roadside Tree Maintenance	76,000	76,000
Berm Mowing	96,000	96,000
External Contractor	5,500	5,500
Survey Costs	21,500	21,500
Sub-total Maintenance and Operations	**492,150**	**492,150**
Road Improvements		
Road Improvements - unsub portion	99,000	101,700
Sub-total Road Improvements	**99,000**	**101,700**
Total Non-subsidised Roading Budget	**591,150**	**593,850**
TOTAL TRANSPORTATION ACTIVITY	**13,596,950**	**16,011,650**

Contents

Part A - Strategic Case

1.0 Introduction

1.1 Purpose

This assessment outlines the strategic context and case for Rangitikei District Council's investment in the Roading activity. It provides the framework for the Roading Activity Management Plan (AMP), a ten year plan that prioritises and addresses key transportation issues and illustrates how assets are intended to be managed.

The strategic case:

- outlines the strategic context and fit for the proposed investment;
- identifies the key problems and rationale for investing; and
- identifies the potential benefits for investing.

1.2 Background

The transport network is a significant and essential physical resource in the District contributing to the social and economic well-being of residents, visitors and businesses. Located 2 hours north of Wellington, the Rangitikei District encompasses a trapezium-shaped block of mainly lush, rural land that covers an area of 4,479 km2 and includes the towns of Taihape, Bulls, Marton, Hunterville, and Mangaweka. The Rangitikei River largely forms the eastern boundary of the District with the Whangaehu River broadly forming the western boundary, with the northern section reaching beyond the town of Taihape and extending eastwards towards the district of Napier. The growing climate and soil lends itself to many different operations. Rangitikei boasts anything from game bird production to cut flowers, vineyards, asparagus, nuts, culinary and medicinal herbs, as well as meat productions and grain growing.

The Council delivers a fit for purpose roading network by applying life-cycle management practices to maintain and renew the existing infrastructure including:

- 1,226 km of roads you drive on
- 267 bridges and large culverts that traverse waterways
- Footpaths and cycle paths to provide multi-modal transport
- Concrete kerb and channelling to aid urban street drainage
- Stormwater sumps and chambers to manage the removal of surface water
- Small diameter culverts as part of land drainage
- Rural roadside drains as part of land drainage
- Structural retaining walls to support road pavements
- Advisory and safety signage to provide awareness to road users
- Safety lighting for night time driving

2.0 Partners and Key Stakeholders

Delivering transportation outcomes have far reaching results in terms of social, economic and environmental factors. This is supported by the overlaps the transportation activity has with other Council activities, for example, district planning, economic development and community services.

Engagement with external partners is achieved through joint planning and programmes at the national, regional, sub-regional and local level. Key groups include the Regional Efficiency Group, Regional Advisory Group, Road Controlling Authority Forum, Road Controlling Authority Special Interest Group, Horizons Road Safety Committee, Emergency Services Coordinating Committee and One Network Road Classification Group. Engagement with these groups will be important during the process of engaging on the Transport AMP.

2.1 Stakeholders involved in the development of the strategic case

In terms of setting the strategic context and direction for the AMP our key partners and stakeholders are those that we work with on a regional and sub-regional level. Refer to Activity Management Plan: Section 2; Strategic Environment (Table 2.1: Transportation Activity Stakeholders & Outcomes.

3.0 Strategic Assessment - Outlining the Need for Investment

A facilitated Investment Logic Mapping (ILM) workshop was held to gain a better understanding of current issues and business needs. The ILM process identified the following key problems:

3.1 Problem Statements

3.1.1 Problem 1: Maintenance

Council is required to meet the obligations of the Land Transport Management Act, The Government Policy Statement and NZTA's One network Road Classification. This will require ongoing investment to maintain the existing network and meet CLoS. A problem is a change from the current state to a desired state. The desired future state is to make this activity more affordable through the efficient application of resources.

3.1.2 Problem 2: Low Resilience of Network

During periods of intense rainfall mudslides, debris flows and rock slides occur in the rural hinterland. The costs of Emergency Works (EW) is averaging $ $3.4 m per annum and trending towards $3.9m. The problem is that the existing drainage system is unable to cope with the increasingly frequent intense rainfall events. For evidence see AMP Section 10: Resilience.

3.1.3 Problem 3: Forestry Harvest

The increase in logging traffic has commenced and there will be a peak between 2027 and 2029 with 3.5 million tonnes of timber predicted to be extracted during that period. The increase in logging trucks will erode Network CLoS for Safety, Accessibility, Efficiency, Amenity and Travel Time Reliability (TTR). This will place 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. Council will identify risks and reduce magnitude of their impact and likelihood of these occurring. The aim is to provide an increasingly consistent accessible, fit for purpose network.

3.1.4 Problem 4: Safety

There is a high level of Serious and Fatal (S&F) crashes per vehicle Kilometre Travelled i.e. High Personal Risk. This results in high social and economic cost. For evidence see AMP Section 7: Network levels of service for safety, and Section 14: Benchmarking.

3.2 Benefits of investment

The potential benefits of successful investment are identified as follows;

3.2.1 Benefit 1: Efficient Network

A network that is efficient, supports economic activity, is fit for purpose and meets CLoS.

3.2.2 Benefit 2: Resilient Network (Incorporating Problems 2 & 3)

An increasingly consistent accessible, fit for purpose network that meets CLoS. For more detail see AMP Section 2: Strategic Environment, and Section 9: Demand Changes.

3.2.3 Benefit 3: Safe Network

Minimise the risk and consequences of crashes. For more detail see AMP Section 7: Network levels of service for safety, and Section 14: Benchmarking.

3.3 Key performance measures

Throughout all stages of the transport planning and project delivery process, it is essential to consider how performance will be measured. In particular under the business case approach, early identification of measures for the expected benefits is a key step in planning an investment.

The ONRC has been adopted by Council to ensure national consistency around the levels of service delivered by its network. The Transport Agency and the Roading Efficiency Group (REG) developed a framework for investment performance measurement to support the next phase of implementing ONRC in the 2018-21 national land Transport Programme (NLTP).

The framework is divided into 6 ONRC Performance Measures

1. Efficiency
2. Safety
3. Resilience
4. Amenity
5. Travel Time Reliability
6. Accessibility

For a detailed commentary on the ONRC Performance Measures refer to Activity Management Plan: Section 7; Network Levels of Safety & Section 8; Levels of Service, output and efficiency measures.

Benefit	Investment KPI & Outcome Measures	Description
Efficient Network	KPI 1: Safety KPI 2: Accessibility KPI 3: Efficiency KPI 4: Amenity KPI 5: Travel Time Reliability	Maintain the current form and infrastructure in safe condition. Provide guidance so people can navigate around the Network. Deliver optimised programmes that are affordable and improves service productivity. Maintain the road environment and facilities to an appropriate CLoS. Manage the impact of activities and demand on the network.
Resilient Network	KPI 1: Reduced EW Costs KPI 2: Accessibility KPI 3: Efficiency KPI 4: Travel Time Reliability	Protect the network from damage and minimise road closures. Provide guidance so people can navigate around the Network. Deliver optimised programmes that are affordable and improves service productivity. Manage the impact of activities and demand on the network.
Safe Network	KPI 1: Reduced S&F crashes KPI 2: Reduced Collective Risk (Crash Density) KPI 3: Reduced Personal Risk (Crash Rate)	See Activity Management Plan, Section 7 Network Levels of Safety

Once the activity has been implemented, the Outcome Measures (OMs) will be used to review the performance of the investment. This will show whether the investment is a success and will help to shape future investments.

3.4 Strategic Direction

As the network is quite stable the proposed strategic direction is to submit a core programme to deliver the Customer Levels of Service (CLoS) described in Section 7; Network Levels of Safety & Section 8; Levels of Service, output and efficiency measures of the AMP. The core programme will be negotiated and agreed with the Transport Agency based on the information provided in this Business Case.

The proposed programme will deliver on all of the priority results areas in the GPS and the 6 ONRC Performance Measures.

3.5 Status of the existing evidence base

Council has access to wide range of data that can be used to provide a good initial assessment of the existing or possible future problems. Some resources and its source, is shown below.

- Traffic Monitoring System (TMS)
- Bridge Data System (BDS)
- Bridge Replacement Programme
- KiwiRap Analysis Tool
- SafetyNet
- Economic evaluation manual
- Ministry of Transport Freight Demands Study
- Ministry of Transport Household Travel Survey
- Census/ NZ demographic/ NZ business surveys
- Council’s growth and development strategies

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 the 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. Section 5: management strategy; Figure 5-1 shows the elements of the pavement Asset Management System (AMS). It is not critical that the whole AMS is not fully integrated, provided the different modules/elements are interfaced appropriately.

RAMM is used to analyse the high volume of detailed information required for a variety of asset 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.

For a detailed commentary on the status of the existing evidence base refer to Activity Management Plan: Section 4; Value, Section 5; Management Strategy, Section 6 Current condition of network, Section 9; Demand Changes, and Section 14, Benchmarking.

For Whole of Life Management see Appendices 1 through 9.

Problem Identified in ILM	Key Findings in the Evidence	Comment
Maintenance	The Smooth Travel Exposure is generally good and falls within the ONRC Output Measures. Previously, the achieved life of sealed surfaces was below that of the average obtained on neighbouring road networks. The result of an analysis conducted in 2014/15 showed that the anticipated reseal date across all classifications of road was on average 3 years earlier than actually required. 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.	See Section: 6 Current condition of network, Section 14: Benchmarking, GHD: Mangaweka Bridge Indicative Business Case, and MWH: Structural Assessment Report and FWP.
Low Resilience of Network	Between 2006 and 2016, the annual average cost of Emergency Reinstatement was \$3.4 million and is trending towards \$3.9 million. During the same period, on average 19 retaining walls were constructed per year.	See Section 11: Resilience & Section 12 Capital Projects for more detail. The mounting cost of Emergency works is a problem. The proposed measures to address this problem are described in this Programme Business Case; Part B Developing the Programme.
Forestry Harvest	Forest harvest schedules will be most intense in the period 2018-2030 with the majority of the District's forest estate reaching harvestable age.	See Moore and Associates (February 2017) Wood availability and related roading implications on Rangitikei District roads 2018-2047. A forestry study prepared for Rangitikei District Council. Section 9: Demand Changes The proposed measures to address this problem are described in this Programme Business Case; Part B Developing the Programme.
Safety	The Collective Risk on the Rangitikei District is below the Median of the peer group in all Road Categories and is classified as Low to Medium. The Personal Risk on the Rangitikei District Network is above the Median of the peer group in all Road Categories and is classified as High.	See Section 7: Network levels of service for safety & Section 14: Benchmarking

4.0 Strategic Context

Refer to Sections 2 Strategic Environment, 3 Description of Assets, 5 Management Strategy, 6 Current condition of network, 7 Network levels of service for safety, 8 Levels of service, output and efficiency measures, 9 Demand changes, 14 Benchmarking, 15 Issues and Risks)

The maintenance strategy and proposed capital projects included in this Activity Management Plan (AMP) have been developed to be consistent with, and contribute towards achieving wider national and regional land transport priorities and objectives. These priorities and objectives are guided by the Government Policy Statement on Land Transport (GPS) and the Regional Land Transport Plan (RLTP). By ensuring alignment with these high level strategic documents, the Council will not only realise its local strategic vision, but will also play its role in achieving a regional strategic integrated land transport network.

4.1 Government Policy Statement on Land Transport

The legal and policy framework for all transport activities in New Zealand is set by the Ministry of Transport which is headed by its Minister and supported by a group of Central Government organisations which have responsibility for transport in New Zealand.

Key requirements and the national direction for land transport are set out in the Land Transport Management Act (LTMA) as well as the Government Policy Statement on Land Transport Funding (GPS) which expresses the Government's objectives and priorities.

The draft GPS 2018, released for sector engagement on 22 February 2017, proposes to continue the three priorities from GPS 2015:

- economic growth and productivity
- road safety
- value for money

Furthermore new GPS strategic priorities have been defined including:

- Supporting economic growth in regions
- Enhancing resilience
- Supporting intermodal connections
- Providing clarity around expectations for treatment of environmental impacts
- Using innovation and technology to improve benefits achieve the outcomes

This Activity Management Plan (AMP) looks to identify 'problems' and justify those problems with both evidence and a link to the GPS outcomes that also solves the problem.

The AMP represents the context and case for change. It is Council's description of the current state, including the assumptions which underpin this and the outcomes targeted. The AMP explains why investment is needed.

The strategic context takes into account the assumptions of the future, Council's objectives , and underlying or umbrella strategic documents (such as the GPS, regional strategies and land development/growth strategies) to position the outcomes sought against wider national, regional and district outcomes.

The AMP strives to ensure that the problems, opportunities and consequences are well understood, clearly identified and articulated, including identification of the benefits and outcomes which can be achieved by addressing them.

The network is relatively stable so the majority of the programme is focussed on maintaining the network to the agreed customer levels of service, and performance measures.

Strategic issues arising from this assessment include the balance between changing levels of service, providing for growth and renewals to address the wearing out of assets and any significant changes associated with improvement works. Also included is the 'current state', long term investment trends, condition indicators, efficiency measures, etc.

In 2015 a Government driven Regional Growth Study was undertaken to provide an in-depth look at the economic opportunities for the Manawatu-Wanganui Region. This study and subsequent Accelerate 25 Action Plan focusses on eight key opportunities and three enablers that will unlock new levels of prosperity and growing our regional economy out to 2025. 'Distribution and Transport' has been identified as one of three key enablers in unlocking potential economic growth, and supports the Government's core priority of 'economic growth and productivity'.

Programmed works in this AMP are consistent with the One Network Road Classification, which ensures the delivery of the right infrastructure and services, to the right level, at the best cost. Consistency with the ONRC also contributes towards the Government's core priority of a land transport system that is 'value for money'.

4.2 Horizons Regional Land Transport Plan

The RLTP provides the strategic direction and policy framework for developing and investing in the region's land transport network and sets out how the region proposes to invest to achieve its objectives. The RLTP must contribute to the purpose of the LTMA which seeks 'an effective, efficient, and safe land transport system in the public interest'. The RLTP is also required to be consistent with the GPS.

The LTMA (amended in 2013) requires RLTPs to be issued every six years and reviewed every three years. The RLTP is prepared by the Regional Transport Committee (RTC), which is comprised of representatives from Horizons Regional Council, mayors from each of the local councils in the region, and New Zealand Transport Agency.

The RLTP was developed two years ago and is currently being reviewed to incorporate any significance changes since then. Particular focus has been given to being consistent with the GPS, and the key themes of the Accelerate 25 Growth agenda, being economic growth, and transport being as a key enabler. The work programme has been developed, in conjunction with other districts and the Agency, to ensure key programmes are advanced that support the RLTP and the Accelerate 25 growth agenda.

4.3 Strategic Direction of the RLTP

The RLTP is comprised of two key parts; Part One of the RLTP identifies the strategic direction and key transport issues that face our regional land transport system over the next 30 years, including objectives, strategic priorities and policies to address or solve these issues.

The second part consists of the regional programme, which sets out the specific programme of proposed land transport activities and projects in the Manawatu-Whanganui (Horizons) Region over a 10 year period.

While the vision and strategic policy direction is set at the regional level, the project of works to physically deliver improving the regional land transport network is actioned by much of the programmed works contained within the local AMPs. Therefore, by achieving the specific projects and objectives in this AMP, this will contribute towards solving the problems and realising the benefits identified in the RLTP, and ultimately achieving an effective, efficient and safe regional land transport system, while also maximising economic benefits and opportunities for the regional growth.

4.4 The New Zealand Transport Agency's view of performance

The Transport Agency expects road maintenance programmes to be well-linked to long term planning documents, particularly Activity Management Plans (AMPs), Council Long Term Plans (LTPs) and Regional Land Transport Plans (RLTPs). These documents should describe the information assumptions underlying network management. Information provided to support the maintenance programme should make reference to the relevant parts of these planning documents.

Forward work programmes and budgets for the road maintenance programme must be developed to support the delivery of greater consistency in delivery of customer levels of service as set out in the ONRC framework. The programmes should demonstrate how the proposed road operations, maintenance, and renewal activities within the maintenance programme and, where necessary, proposed improvement activities (under the improvements activity classes) optimise the life-cycle costs of their road networks in delivering the customer levels of service.

The ONRC has been adopted by the sector to ensure national consistency around the levels of service delivered by a network. The Transport Agency and the Road Efficiency Group (REG) have developed a suite of performance measures to support the next phase of implementing ONRC in the 2018-21 National Land Transport Programme (NLTP).

All Approved Organisations and the Transport Agency (state highways) are required to clearly evidence the customer levels of service that they propose to deliver and how they relate to the ONRC measures.

Maintenance programme submissions from Approved Organisations and the Transport Agency (State highways) may be supported by, and take account of, a wider set of performance measures than those currently mandated in support of ONRC. Consideration of funding allocations for maintenance programmes in the 2018-21 NLTP will be based primarily on assessment of the transport network performance to be achieved as measured against the ONRC measures.

The Transport Agency expects further development of the suite of performance measures will continue during the 2018-21 NLTP and lead to a broader set of specific performance targets for investment for the 2021-24 NLTP.

4.5 Council's Strategic goals

The identified Strategic Goals guide investment in the land transport network for the duration of the AMP. These goals link the 'strategic' element with the 'operational' aspects. Council has chosen to rank the priorities as this provides a clearer direction of where the District wishes to invest over the next ten years, see Section 10: Programme Prioritisation and Optimisation. This then should provide a clear picture of the District's wishes to the Transport Agency when it compiles the National Land Transport Programme (NLTP). The priorities address the land transport issues and contribute to the objectives already identified. A number of the identified priorities are extensions of themes running through previous iterations of the AMP.

4.5.1 Efficient road maintenance and delivery

- ensure the road network provides suitable access to business, educational, social and recreational services for the District's residents and businesses.

- ensure continuous improvement in District road safety

4.5.2 Improved connectivity of key strategic routes

- maintain and as necessary improve the strategic transport network to ensure safe, efficient intra- and inter-regional accessibility and links with national transport corridors.
- support the provision of effective connections to the District/Region's principal economic growth and productivity areas.
- support the efficient and effective movement of freight within and through the District.

4.5.3 Plan for and proactively respond to demographic change and impacts of land use change

- ensure land use planning recognises potential impact on existing transport systems.
- encourage effective integration of transport and land use planning in growth areas.

4.5.4 Increased focus on pedestrians and cycling

- encourage the uptake of walking and cycling as transport modes and for recreation.

4.5.5 An appropriate network of tourism routes

- cater for the provision of clearly defined tourism routes.

4.6 Current state assessment

4.6.1 ONRC levels of service

The ONRC Customer level of Service (CLoS) Performance Measures require an understanding of the changing context and environment. The new CLoS 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. The ONRC supports investment in a fit for purpose level of service consistently across the country. Council can still choose to invest more to get a higher CLoS if it wants but this will require a conversation with the Transport Agency about how fit for purpose is established.

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.

Where applicable condition measures are reported in terms of the One Network Roading Classification (ONRC). See Section 3 Description of Assets, Table 3-2: ONRC Functional Classifications and the corresponding lengths for the Rangitikei District, and Section 6: Current condition of network.

5.0 Key findings/Conclusions

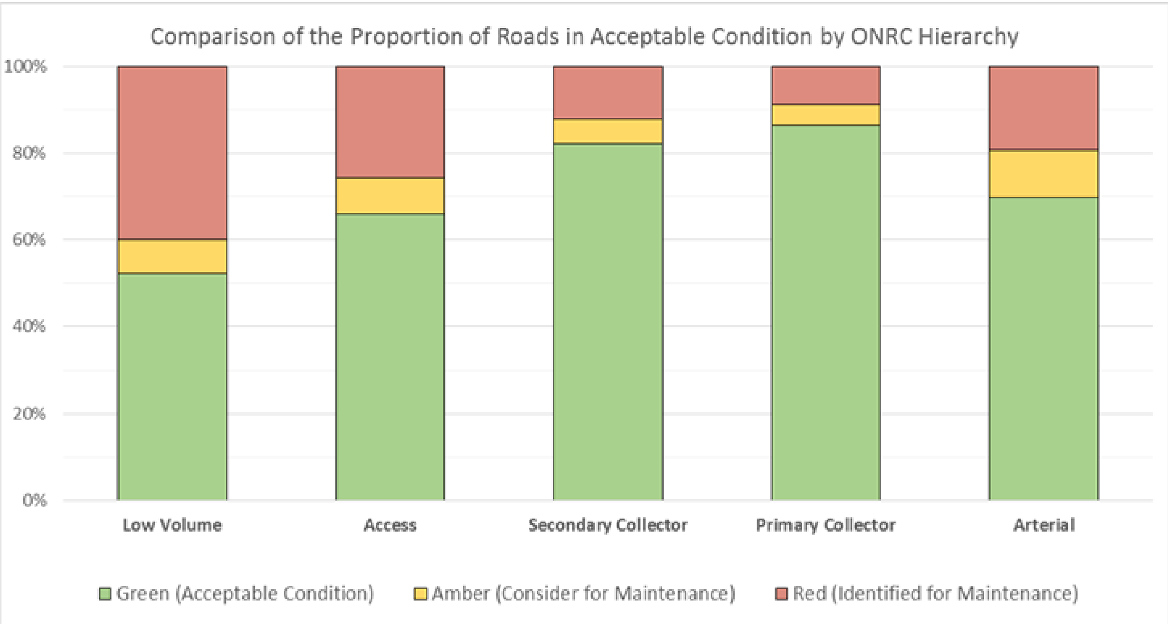
This section summarises the key findings from the review of the evidence. The evidence supports the outcomes of the ILM workshop. A Programme Business Case is required to support the Strategic Case and to realise the problems and opportunities identified.

5.1 Problem 1: Maintenance Affordability

The desired future state is to make this activity more affordable through the efficient application of resources. In order to meet its various statutory obligations, Council must develop a significant number of strategic, tactical and operational management documents related to its road maintenance activities. The Smooth Travel Exposure is generally good and falls within the ONRC Output Measures.

The Pavement Condition Index (PCI) Score is derived from Roughness, Rutting & Texture Depth data. The base Performance Indicator of the sealed road network is calculated from the data captured from the routine High Speed Data survey. The methodology is described in Section 6: Current Condition of Network; 6.9 Pavement Condition Index. Roughness data is collected for all sealed roads within the network. Rutting & Texture Depth measurements are obtained for higher classification roads, currently 98% coverage for Arterial & Primary Collector Roads and 63% coverage on Secondary Collector Roads. Some Rutting or Texture Depth measurements are also obtained for lower classification roads, currently 9% coverage for Access and 4% for Low Volume roads, this is considered acceptable given the low traffic volumes.

Acceptable Condition is shown in Green on the chart below.



5.1.1 Investment Benefits:

The District road network connects business with customers, suppliers and the workforce, helps people access places of employment and education, and helps move goods from point of production to local, national and international markets. There is no single indicator of how roads contribute to economic and social outcomes, however Council considers that the local road network delivers on the priorities defined in the draft GPS 2018.

A network that is efficient (including value for money), supports economic activity, is fit for purpose and meets the ONRC CLoS.

Providing appropriate levels of service for:
- Travel time reliability
- Safety
- Resilience
- Amenity
- Accessibility

Enable journeys that support economic growth and productivity for:
- Employment
- Access to economic opportunities and social opportunities
- Tourism, and freight.

5.1.2 Consequence of reduced investment:

The network is in a relatively stable condition. Road maintenance is essential in order to (1) preserve the road asset (2) protect adjacent resources and user safety, and (3) provide efficient, convenient travel along the route. If maintenance is neglected or improperly performed there will be a rapid deterioration of the road and eventual failure from both climatic and vehicle use impacts.

If the investment is reduced the result would be a more patched and rougher network, particularly on Access and Low Volume roads. There would also be a risk of occasional pavement failures if maintenance treatments fall below the base preservation levels. This would likely attract increased complaints from road users in the community, and negative media coverage.

5.1.3 The Strategic Response:

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. See Section: 6 Current condition of network, Section 14: Benchmarking, GHD: Mangaweka Bridge Indicative Business Case, and MWH: Structural Assessment Report and FWP.

- **Improve:** the reliability and cost effectiveness of the road network.
- **Deliver:** optimised programmes that are affordable and consistent in cost within like classifications (ONRC).
- **Communicate:** to the public (via the Long Term Planning consultation phase) the proposed changes to the maintenance strategy and what the likely benefits and consequences may be.

The proposed measures to address this problem are described in this Programme Business Case; Part B Developing the Programme.

5.2 Problem 2: Low Resilience of Network

During periods of intense rainfall mudslides, debris flows and rock slides occur in the rural hinterland. Between 2010 and 2017, the annual average cost of Emergency Reinstatement was $3.4 million and is trending towards $3.9 million. During the same period, on average 17 retaining walls were constructed per year.

5.2.1 Investment Benefits:

An increasingly consistent accessible, fit for purpose network that meets ONRC CLoS

- Reduced EW Costs
- Travel time reliability
- Safety
- Resilience
- Amenity
- Accessibility

5.2.2 Consequence of reduced investment:

Between 2010 and 2017 the average annual investment in Routine Drainage maintenance and Renewals has been approximately $755,000. This has been insufficient as evidenced by the increasing expenditure on Emergency Works triggered by very high intensity rainfall and severe winds.

Additional investment is required for Resilience Improvements i.e. non-routine work required to protect the serviceability of roads and bridges from damage, and to minimise the threat of road closure arising from natural phenomena. For example;

- new works that protect existing roads and bridges from river damage
- new drainage to drain incipient slips
- toe-weighting of unstable slopes
- protection planting designed to arrest the slumping or displacement of a road platform, and
- work to overcome changes in a river’s course or bed level that threaten roads, bridges or other road-related structures, but which is not attributable to one climatic event.

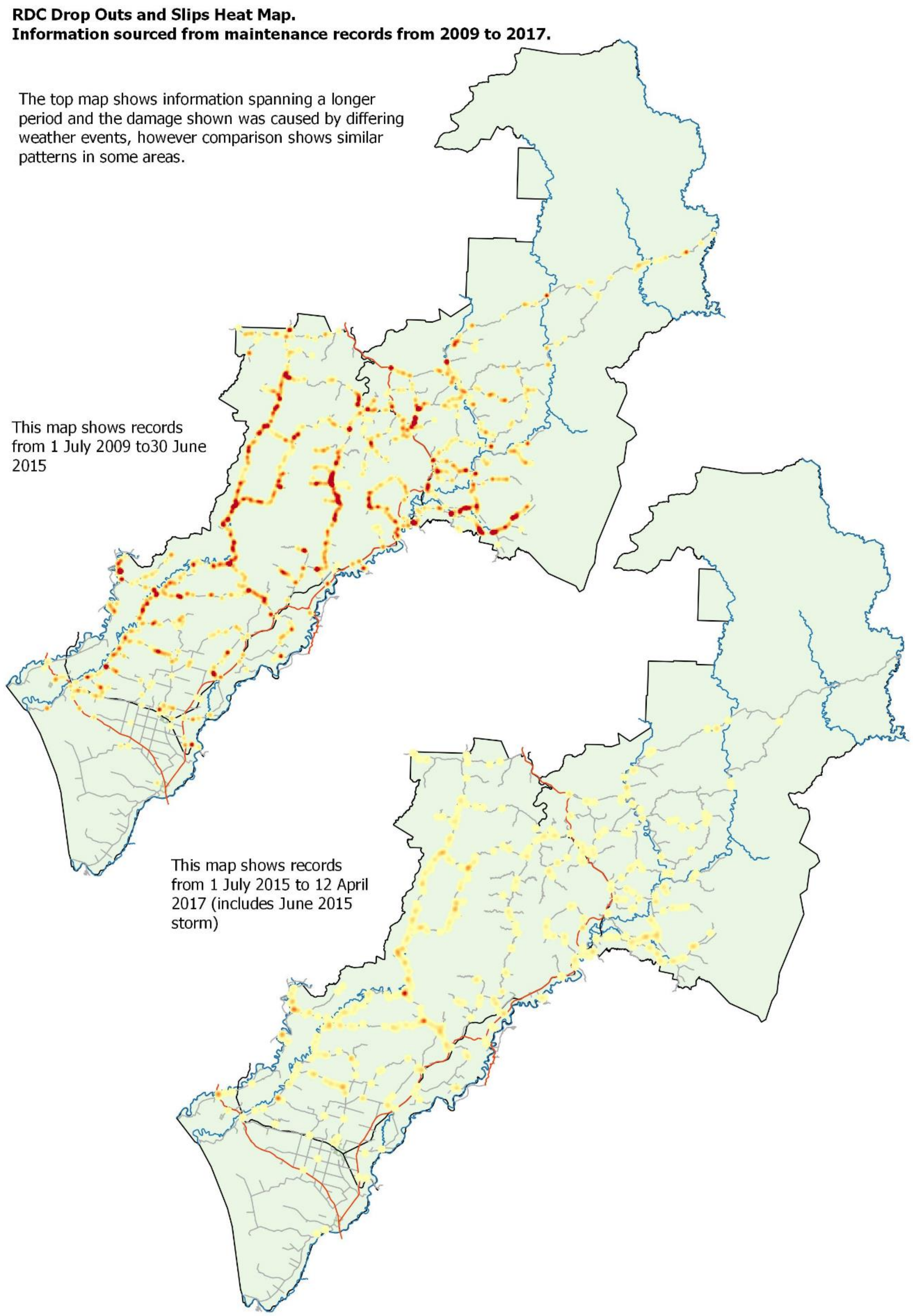
If the investment in Routine Drainage maintenance and Renewals is reduced and the additional investment required for Resilience Improvements is not forth coming then the annual average cost of Emergency Reinstatement is likely to be in the region of $3.9 million.

There will also be an increased likelihood of unplanned events on route availability, and the number of journeys not made due to unplanned events. The consequences being an inconvenience to customers and the associated detrimental effect on the economy.

This will attract increased complaints from road users in the community, and negative media coverage.

The heat map below is an historical record of the slips and dropouts in the District and highlights the venerable sections of the network.

The prioritised high level costs of intervention are detailed in Part B of the Programme Business Case: Developing the Programme.



5.2.4 The Strategic Response:

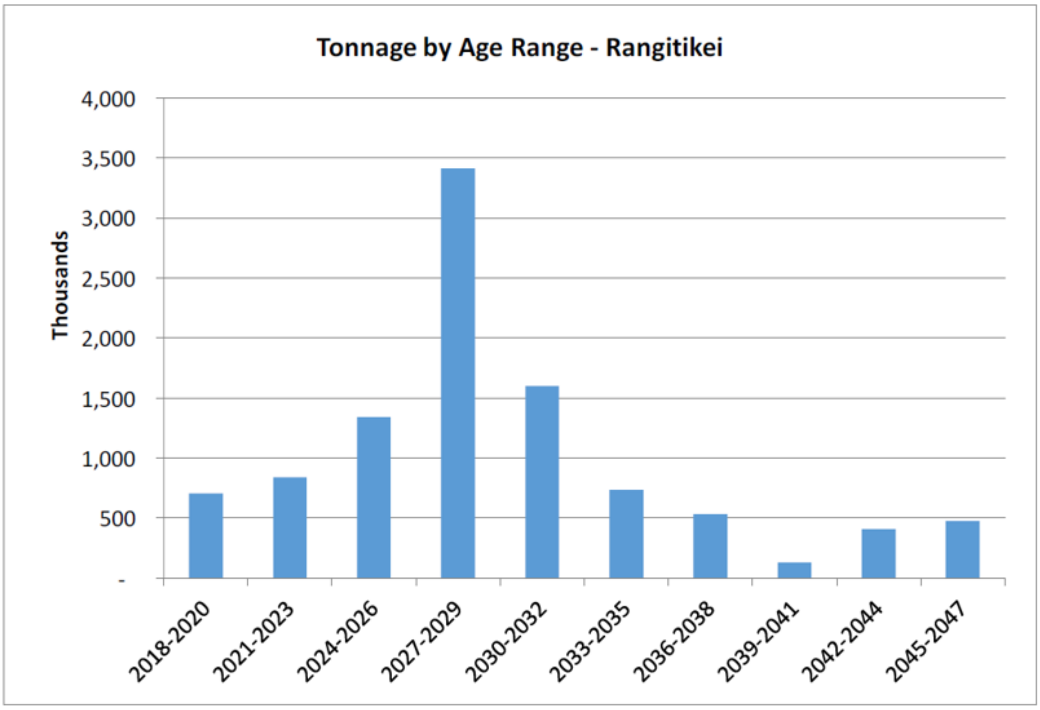
- Develop operational systems and capabilities and immediate action plans.
- Identify risks and reduce magnitude of their impact and likelihood of occurring.
- Minimise the;
    - consequence of unplanned events to customers;
    - likelihood of unplanned events on route availability;
    - the number of journeys not made due to unplanned events;

Refer to the Activity Management Plan: Section 11 Resilience & Section 12 Capital Projects for more detail.

The mounting cost of Emergency works is a problem. The proposed measures to address this problem are described in this Programme Business Case; Part B Developing the Programme.

5.3 Problem 3: Forestry Harvest Impact

Because there was large scale forest establishment during the 1990s there will be large scale forest harvests from 2018-2035. The peak will be between 2026 and 2032. This will change road usage patterns and place 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.

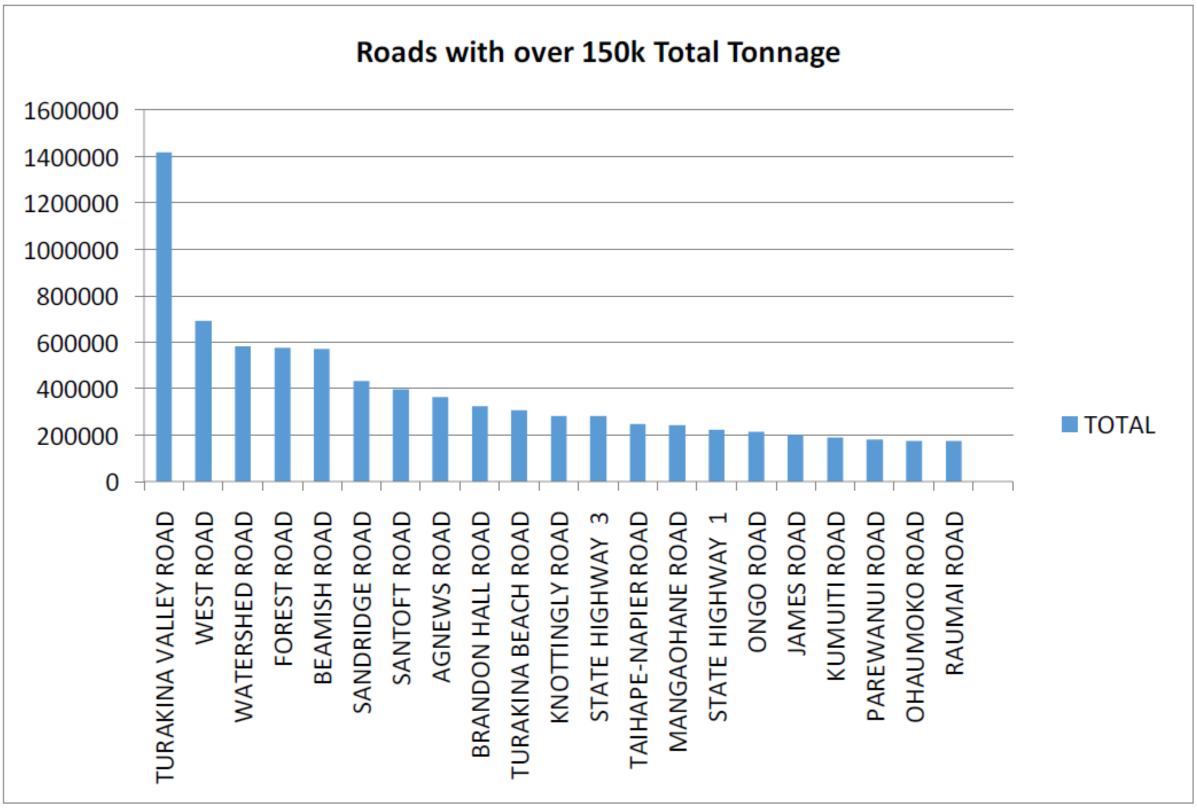


To date the impact of logging trucks has been manageable. However, as can be seen from the above graph the predicted tonnages are starting to ramp up.

The table below shows the potential haul roads.

Route 1	Route 2	Route 3	Route 4
Turakina Valley Rd	Mangahoe Rd	Onga Td	SH1
West Rd	Murimotu Rd	SH1	
Watershed Rd	Kiekie Rd	SH1	
Forest Rd	Parewanui Rd	SH3	
Beamish Rd	Santoft Rd	SH3	
Sandridge Rd	Parewanui Rd	SH3	
Santoft Rd	SH3		
Agnews Rd	Murimotu Rd	SH1	
Brandon Hall Rd	Parewanui Rd	SH3	
Turakina Beach Rd	SH3		

The graph below show the predicted tonnages these haul routes are likely to carry.



5.3.1 Investment Benefits:

An increasingly consistent accessible, fit for purpose network that meets ONRC CLoS

- Travel time reliability

- Safety
- Resilience
- Amenity
- Accessibility

5.3.2 Consequence of reduced investment:

Heavy vehicles are a major cause of pavement damage. The pavement damage attributable to a specific vehicle depends on a number of factors including the weight and axle configuration of the vehicle, and the design of the roadway. Heavy truck traffic results in pavement damage many times that of traffic by passenger vehicles.

- Base course will not support increased forest traffic volume.
- Base course will degrade on steep road gradient (especially on tight uphill corners)
- Harvest volumes and during wet weather events will increase pavement damage.
- Carriageway widths, visibility, passing areas, will be inadequate, increasing the potential for traffic accidents.
- Public traffic interaction with logging traffic will increase the potential for traffic accidents.
- Road fences may limit road width.

5.3.3 The Strategic Response:

This will be a combination of the strategic responses for Problems 1, 2 & 3.

- **Communicate:** with forest owners and logging contractors to discuss non-fiscal solutions such as agreements on harvest programmes and 'fit for purpose' maintenance regimes etc.
- **Improve:** the reliability and cost effectiveness of the road network.
- **Deliver:** Optimised programmes that are affordable and consistent in cost within like classifications (ONRC).

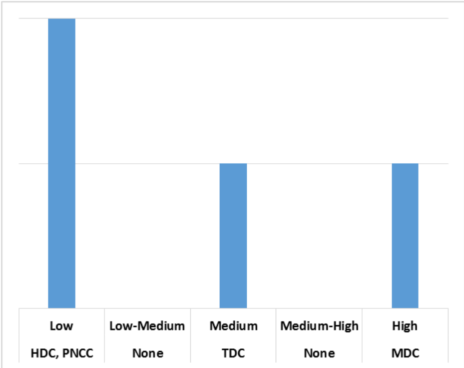
For more detail see Activity Management Plan: Section 9 Future Demand; 9.9 Roading Growth and Demand

5.4 Problem 4: Safety

There is a high level of Serious and Fatal (S&F) crashes per vehicle Kilometre Travelled. This results in high social and economic cost. The graphs below show how the high Personal Risk on the Rangitikei District Council network compares with the Central New Zealand Peer Group.

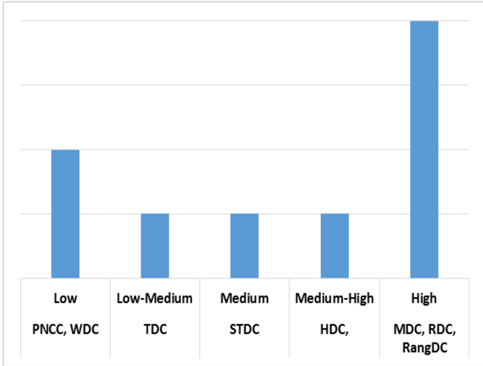
Safety OM3 Personal Risk 2006-2016

Arterial



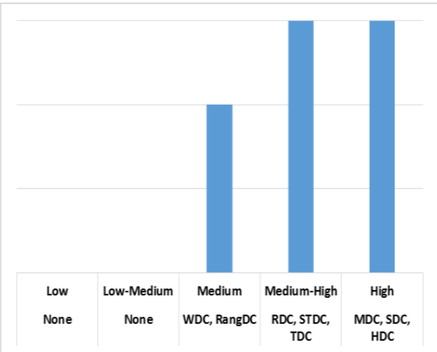
Median = 5. Rang DC = 0

Primary Collector



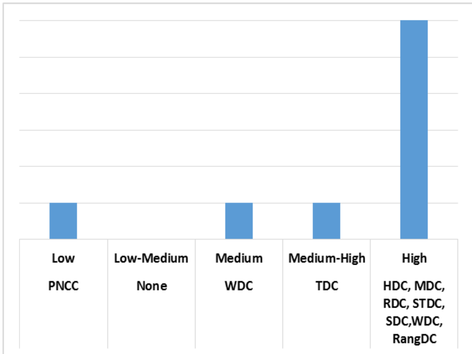
Median = 9. Rang DC = 10

Secondary Collector



Median = 9. Rang DC = 6

Access



Median = 14. Rang DC = 21

5.4.1 Investment Benefits:

Minimise the risk and consequences of crashes

- Reduced Collective Risk (Crash Density)
- Reduced Personal Risk (Crash Rate)

5.4.2 Consequence of reduced investment:

A motor vehicle collision occurs when a vehicle collides with another vehicle, pedestrian, animal, road debris, or other stationary obstruction, such as a tree or pole. Traffic collisions may result in injury, death and property damage.

A number of factors contribute to the risk of collision, including vehicle design, speed of operation, road design, road environment, and driver skill, impairment due to alcohol or drugs, and behaviour. Motor vehicle collisions lead to death and disability as well as financial costs to both society and the individuals involved.

5.4.3 The Strategic Response:

- Minimise
    - risk of crashes

- consequence of crashes
- risk of driver behaviour related crashes
- risk of crashes due to driver confusion

- Reduce
  - consequences of crashes
  - risk of crashes at night
  - risk of loss of control crashes
  - risk of crashes to active road users
  - risk of crashes due to driver confusion

For more detail see Part B of this Programme Business Case and the Asset Management Plan; Section 7: Current network levels of service for safety

5.5 Anticipated Strategic Fit and Effectiveness

When assessing proposals, the Transport Agency considers best value for money, where value for money has been defined as:

- selecting the right things to do (results alignment)
- implementing them in the right way (business case approach)
- implementing them at the right time and for the right price (cost-benefit appraisal)

The Transport Agency uses the Investment Assessment Framework (IAF) to assist it achieve value for money in its investment decisions, as it:

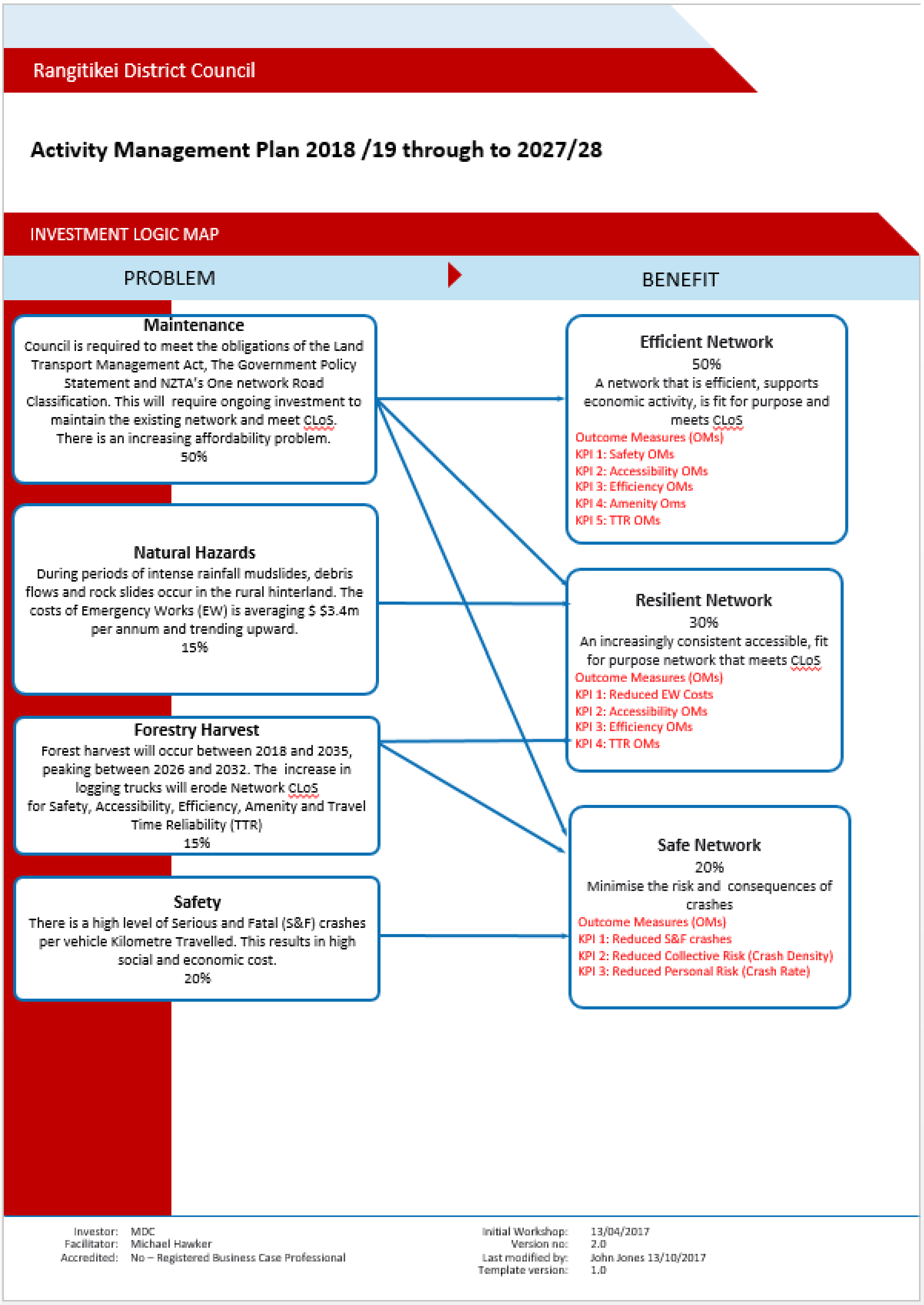
- assesses the contribution that proposed activities make against the results sought in the GPS and the purpose of the Land Transport Management Act
- provides a consistent means of comparing and prioritising proposals based on their relative contributions to the results sought in the GPS
- takes into account the results addressed by proposed activities and considers the benefits and costs of solutions in a balanced way

The framework uses two assessment factors to determine the degree to which proposed activities meet the Government's investment strategy in the GPS:

Assessment factor		Rating
Results Alignment	Assessment of how well the problem/issue/opportunity identified aligns with results identified in the GPS and the Long Term Strategic View	**Medium/High**
Cost-benefit appraisal	Assessment of the whole of life costs and benefits based on the Economic Evaluation Manual for improvement activities, and cost effectiveness and performance comparisons for road maintenance.	For improvements, benefit cost ratios range from **3 - 4.9** For programmes, cost effectiveness ranges of: **Medium/High**

5.6 Investment Logic Maps (ILM)

The Investment Logic Maps developed during the facilitated Council workshops, and subsequently refined following analysis of the available data, are included below.


Rangitikei District Council
Activity Management Plan 2018 /19 through to 2027/28
INVESTMENT LOGIC MAP
PROBLEM
BENEFIT
Maintenance
Council is required to meet the obligations of the Land Transport Management Act, The Government Policy Statement and NZTA's One network Road Classification. This will require ongoing investment to maintain the existing network and meet CLoS. There is an increasing affordability problem.
50%
Natural Hazards
During periods of intense rainfall mudslides, debris flows and rock slides occur in the rural hinterland. The costs of Emergency Works (EW) is averaging $ $3.4m per annum and trending upward.
15%
Forestry Harvest
Forest harvest will occur between 2018 and 2035, peaking between 2026 and 2032. The increase in logging trucks will erode Network CLoS for Safety, Accessibility, Efficiency, Amenity and Travel Time Reliability (TTR)
15%
Safety
There is a high level of Serious and Fatal (S&F) crashes per vehicle Kilometre Travelled. This results in high social and economic cost.
20%
Efficient Network
50%
A network that is efficient, supports economic activity, is fit for purpose and meets CLoS
Outcome Measures (OMs)
KPI 1: Safety OMs
KPI 2: Accessibility OMs
KPI 3: Efficiency OMs
KPI 4: Amenity Oms
KPI 5: TTR OMs
Resilient Network
30%
An increasingly consistent accessible, fit for purpose network that meets CLoS
Outcome Measures (OMs)
KPI 1: Reduced EW Costs
KPI 2: Accessibility OMs
KPI 3: Efficiency OMs
KPI 4: TTR OMs
Safe Network
20%
Minimise the risk and consequences of crashes
Outcome Measures (OMs)
KPI 1: Reduced S&F crashes
KPI 2: Reduced Collective Risk (Crash Density)
KPI 3: Reduced Personal Risk (Crash Rate)
Investor: MDC
Facilitator: Michael Hawker
Accredited: No – Registered Business Case Professional
Initial Workshop: 13/04/2017
Version no: 2.0
Last modified by: John Jones 13/10/2017
Template version: 1.0

Manawatu District Council

Activity Management Plan 2018 /19 through to 2027/28

INVESTMENT LOGIC MAP

BENEFIT | **STRATEGIC RESPONSE** | **SOLUTION** (CHANGES / ASSETS)

Efficient Network
50%
A network that is efficient, supports economic activity, is fit for purpose and meets CLoS

Improve:
reliability and cost effectiveness of the road network
50%

Deliver:
Optimised programmes that are affordable and consistent in cost within like classifications across NZ (ONRC)

Pavement and surfacing:
- Resurfacing
- Rehabilitation
- WOL Service Costs

Resilient Network
30%
An increasingly consistent accessible, fit for purpose network that meets CLoS

Minimise:
- consequence of unplanned events to customers
- likelihood of unplanned events on route availability
- the number of journeys not made due to unplanned events.
- the consequence of unplanned events to customers
- the number of journeys impacted by unplanned event

35%

Reduction:
Identify risks and reduce magnitude of their impact and likelihood of occurring.

Readiness:
Develop operational systems and capabilities.

Response:
Immediate actions.

Pavement
Surfacing
Drainage
Road structures
Environment

Safe Network
20%
Minimise the risk and consequences of crashes

Minimise:
- risk of crashes
- consequence of crashes
- risk of driver behaviour related crashes
- risk of crashes due to driver confusion

Reduce:
- consequences of crashes
- risk of crashes at night
- risk of loss of control crashes
- risk of crashes to active road users
- risk of crashes due to driver confusion

15%

Reduction:
Reduce annual S+F crashes per km
Reduce annual S+F per Vh km travelled and Risk Rating

Pavement and surfacing:
- Resurfacing
- Rehabilitation
- WOL Service Costs

Delineation
- Carriageway lighting
- Signs,
- Edge markers
- RRPMs
- Pavement Marking
- Level Crossing Devices
- Network controls
- Vegetation Control
- Guardrails & barriers
- Safety Management

Geometry
- Minor Improvements

Investor: MDC
Facilitator: Michael Hawker
Accredited: No – Registered Business Case Professional

Initial Workshop: 13/04/2017
Version no: 2.0
Last modified by: John Jones 13/10/17
Template version: 1.0

Part B – Developing the Programme

1.0 Overview

Funding for Rangitikei District Local Roads Network is planned and allocated within three-yearly cycles through the National Land Transport Programme, allowing medium-term certainty and avoiding costly resource reallocation.

The draft GPS 2018, released for sector engagement by the Ministry of Transport on the 22 February 2017 (http://www.transport.govt.nz / gps2018), proposes to continue the three key priorities from GPS 2015 :

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

Furthermore new GPS strategic priorities have been defined including:

- supporting economic growth in regions
- enhancing resilience
- supporting intermodal connections
- providing clarity around expectations for the treatment of environmental impacts
- using innovation and technology to improve benefits and achieve the outcomes

2.0 Overall programme Development

Through the 2018-48 AMP Council aims to maximise the benefit derived from investment in maintaining, operating and improving the local road network as part of the transport system, to grow the Regional economy in a safe and sustainable manner. The 2018-48 AMP aims to achieve the right outcomes by targeting the right treatment or activity, in the right place, at the right time, and for the right cost.

In developing the 2018-48 AMP Council ensures that the expenditure associated with the programme of work fits within its allocated budgets. To do this, Council have implemented a rigorous programme development process to extract maximum value for money from our operations, maintenance and improvements programmes.

The process has involved:

- targeting the most important issues for our customers
- identifying where we can make the greatest difference to improving journeys
- identifying the best programme of activities we can implement to close the level of service gap.

The 2018-48 AMP has been developed from maintenance, renewal, operational and infrastructure improvement activities already underway, together with new activities that have been prioritised and programmed using the business case approach.

Council prioritises activities (or groups of activities) for inclusion in the National Land Transport Programme through the application of the ONRC intervention hierarchy and the Transport Agency's Investment Assessment Framework. However, Council also consider other factors and the approaches taken to developing the respective programmes is outlined further in Section 10: Programme Prioritisation and Optimisation.

The Draft AMP 2018-21 seeks to deliver the One Network Road Classification levels of service.

The main factors that are driving increased costs are:

- **demand changes:** growth in heavy vehicle kilometres and HPMV impacts which add to wear and tear on the network.
- **input prices increases**: for example rising bitumen and aggregate costs due to market supply pressures and international currency matters.

The aim is to counterbalance these trends through:

- **improved effectiveness**: constructing and renewing assets so they are fit for purpose having regard to an appropriate level of service for the road in question
- **improved efficiency**: optimally maintaining, repairing and renewing assets to minimise whole-of-life costs
- **improved economy**: smarter procurement that reduces the costs of delivering the programme while maintaining competitive markets, and risk transfer to Council for renewal investment decisions.

3.0 Approach to Maintenance and Renewals

3.1 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 Section3: Description of Assets; Table 3-2: ONRC Functional Classifications and the corresponding lengths for the Rangitikei District.

Key areas of focus for the future are outlined below.

3.2 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. Refer Section 6: Current Condition of Network

3.3 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. Refer to Section 6: current Condition of Network

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

3.4 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 will be less frequently renewed. This will result in more patched roads and a less smooth journey for customers on Access and Low Volume Roads (See Section 3: Description of Asset; Figure 3.1: ONRC Hierarchy. Notwithstanding this, road conditions will be monitored to ensure safety is not compromised.

3.5 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.

3.6 Roading Activity Management Plan (Sections 1 through to 17 and the Appendices)

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.

The AMP contains individual lifecycle asset management plans for the different asset classes. These will be updated over 2018-21 as Council reviews each service area and whenever any other significant improvement opportunity arises. The AMPs will provide the benchmark requirements for asset management planning for the network. This will increase the consistency of approach across the network and the implementation of improved practices as these are developed.

3.7 Cost effectiveness of state highway 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. Refer to Section 14: Benchmarking.

4.0 Proposed Programme

4.2 Efficiency:

The outcome Council is seeking is "Value for Money" and the optimisation of whole of life costs in its delivery of affordable customer levels of service (CLoS). Council will deliver optimised programmes that are affordable and improves service productivity. The intention is to programme works to maximise existing asset benefits while being mindful of minimising service risk i.e. not too early and not too late.

4.2 Safety (Maintain the current form and infrastructure in safe condition)

Minimise the risk of crashes

- Permanent hazards are identified and mitigated in a consistent and fit for purpose manner so that a driver's expectation about the standard of these are a major factor in his or her ability to negotiate the road environment safely (RTS 5/MOTSAM)
- COPTTM requirements implemented at every work site and temporary hazard as soon as practical
- Rural Road Sight distance (including hazard warning devices) are not obscured by vegetation
- Sight distance (including hazard warning devices) is not obscured by unauthorised obstructions (advertising signage, etc)

Direct Influences

- ✓ Sign maintenance and renewals Level crossing warning devices (Work categories 122, 222, 131)
- ✓ Network Controls (traffic management audits) (Work category 151)
- ✓ Vegetation Control (mowing, spraying, etc) (Work category 121)
- ✓ Network Controls (Work category 151)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

Minimise the consequence of crashes

- All traffic restraining devices such as bridge side rails, guardrails, wire rope barriers and crash cushions are maintained in an effective operating condition.
- Roadside safety zones are maintained free from unauthorised obstructions and the development of new hazards.

Direct Influences

- ✓ Guardrail and Barrier maintenance and renewals (Work categories 114, 215)
- ✓ Vegetation Control (sapling removal, specific tree removal) Network Controls (Work categories 121, 151)

Indirect Influences

- ✓ Associated and Minor Improvements ((Work categories 231, 324, 341)

Minimise the risk of driver behaviour related crashes

- A targeted programme is in place to address identified needs (e.g. NZTA Communities at Risk Register)

Direct Influences

- ✓ Safety Management (Work category 151)
- ✓ Traffic Services maintenance and renewals (Signs, Edge Markers, RRPMs, Pavement Marking (Work categories 122, 222)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

Reduce the consequence of crashes

- Develop strategies to achieve appropriate KiwiRAP star rating, and identify and manage noncompliant sections and high risk sites or for lower rural classifications.
- Develop strategies to identify and manage non-compliant sections and high risk sites over time.

Direct Influences

- ✓ Safety Management (Work category 151)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

Reduce the risk of crashes at night

- Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement.

Direct Influences

- ✓ Carriageway lighting maintenance and renewals (Work categories 122,222)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

Reduce the risk of loss of control crashes

- Reducing Trend of Loss of control, wet road and night time crashes.
- Number of maintenance related faults (such as rutting / depressions, shoving, potholes, corrugated length, edge break (in lane), bleeding, detritus (in lane), ponding water) that are likely to affect driver behaviour, eg requiring a reduction in speed or evasion.
- Areas with surface friction deficiencies are identified and remedied appropriately and efficiently.

Direct Influences

- ✓ Pavement and surfacing maintenance, delineation (Work categories 111, 122)
- ✓ Sealed Pavement Pothole repairs, Digouts, Shoulder maintenance, Rehabilitation.
- ✓ Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 111, 112, 211, 214)
- ✓ Waterblasting, Scabbling, Crack sealing, Resurfacing (Work categories 111, 212)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

Minimise risk of crashes to active road users

- 95% of the district's footpaths are within acceptable defect levels, for example cracking, breaks, high lips, trip hazards.
- Minimise the number of maintenance related hazards (such as detritus, ponding water, potholes, broken glass) on cycleways requiring evasive action by rider.
- Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement, and personal security.
- Warning of hazards on the trip
- Guidance on safe use.
- Maintain the current form and infrastructure in a safe condition

Direct Influences

- ✓ Footpath maintenance (non-subsidised activity)
- ✓ Cycle path Sweeping, Pothole repairs (Work category 124)
- ✓ Carriageway lighting maintenance and renewals (Work categories 122, 222)

Indirect Influences

- ✓ Associated and Minor Improvements (Work categories 231, 324, 341)

4.3 Resilience

Prepare for Emergencies and Incidents that could disrupt travel

- An Emergency Procedures and Preparedness Plan is in place and actionable.

Direct Influences

- ✓ Incident Response, Network Management (Work categories 121, 151)

Indirect Influences

- ✓ VMS maintenance, weather monitoring (Work category 151)

Mitigation to avoid route closure where appropriate

- Network Resilience Maintenance, Monitoring and Improvement Plan in place and actionable.
- Number of journeys lost where road closure occurs due to proactive maintenance not taking place

Direct Influences

- ✓ Network Management (Work category 151)
- ✓ Network Management, Winter maintenance, Operational traffic management (Work categories 151, 121, 123)
- ✓ Resilience improvements e.g. incipient slip stabilisation, work to overcome changes in a river's course or bed level that threaten roads (Work category 357)

Indirect Influences

- ✓ Environmental maintenance and renewals (Work category 121)
- ✓ Minor events (Work category 140)
- ✓ Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures (Work categories 113, 213)

Provide Alternative Routes where appropriate

- A plan is in place that details an alternative route available or the current route is robust in case of route closure.

Direct Influences

- ✓ Network Management (Work category 151)

Inform customers of Route Availability and Travel choice

- Customers are informed prior within an hour of Council being informed of change in travel conditions and/or route choice, via appropriate prior-to-travel mediums as stated in EPPP
- Customers are informed on route within an hour of Council being informed of change in travel conditions and/or route choice, via appropriate on-route mediums as stated in EPPP*
- Passenger transport customers are informed within x minutes of a significant change in travel times, via appropriate on-route mediums.

Direct Influences

- ✓ Incident Response, Network Management (Work category 121, 151)

Indirect Influences

- ✓ VMS maintenance, weather monitoring (Work category 151)

Restore connectivity as soon as circumstances allow

- Customers will be informed of the estimated time access will be restored and when the next update will be. Customers will be informed through notified channels within an hour of Council receiving notification of an incident.

Direct Influences

- ✓ Incident Response, Network Management (Work category 121, 151)

Indirect Influences

- ✓ VMS maintenance, weather monitoring (Work category 151)

4.4 Amenity

Maintain the road environment and facilities that support an appropriate level of comfortable ride

Sealed roads

- Peak roughness: At least 95% of the sealed road network meets specified levels of ride comfort.
- Truck ride: Areas with truck ride deficiencies are identified and remedied appropriately

Direct Influences

- ✓ Sealed Pavement Pothole repairs, Digouts, Shoulder maintenance, Rehabilitation (Work categories 111, 214)

Network Management, pavement maintenance (Work category 151, 111)

Indirect Influences

- ✓ Crack Sealing, Resurfacing, Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures) (Work categories 111, 113, 213)
- ✓ Pavement rehabilitation (Work category 214)

Unsealed Road Roughness

- The average ride comfort level of the unsealed road network meets specified levels.

Direct Influences

- ✓ Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 211, 214)
- ✓ Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 211, 214)

Indirect Influences

- ✓ Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures) (Work categories 113, 213)

Maintain the road corridor compatible with the urban context of the road use experience

- Meet specified levels of service for the management of aesthetic maintenance related faults (such as litter, damaged or non-functioning equipment or furniture, graffiti, vegetation, etc.) that are likely to detract from the customer's experience.
- Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement, and personal security.

Direct Influences

- ✓ Graffiti cleaning, litter collection, vegetation control, street cleaning. Rest area maintenance (Work categories 121)
- ✓ Carriageway lighting maintenance and renewals (Work categories 122, 222)

Indirect Influences

- ✓ Minor improvements (Work category 341)

4.5 Travel Time Reliability

Manage the impact of activities and demand on the network

- Council will coordinate planned activities and events minimising customer impact, taking into account road function and any changes in priority by mode that may occur
- Delays due to planned activities shall be kept to a minimum where feasible
- Delays due to unplanned activities is covered in Resilience

Direct Influences

- ✓ Network Controls, Traffic Management Coordination (Work category 151)
- ✓ Incident Response, Network Management (Work category 121, 151)

Operate the network to maximise its effective capacity

- Council has a network/corridor operating framework in place to ensure operation of the network focusses on moving people and goods, balancing the competing demands for limited road space

Direct Influences

- ✓ Operational Traffic Management (VMS, traffic signals), Network Management (Work category 123, 151)
- ✓ Network Management (Work category 151)

4.6 Accessibility

Council will provide guidance so people can navigate around the District Network

- Council provides information on way finding in advance of intersections, at intersections and beyond intersections to reassure road users that they are travelling on the correct route.
- When a sign is provided, it will comply with MOTSAM, RTS2 and the Traffic Control Devices Manual

Direct Influences

- ✓ Sign maintenance and renewals (Work categories 122, 222)

Indirect Influences

- ✓ Minor improvements (Work category 341)

Council will provide access to adjoining land to support the role in the transport network where it does not affect others and the function of the road

- Access to adjoining land for new customers shall not be restrictive but balanced against minimising impact to the existing CLoS Outcomes.

Direct Influences

- Network Controls and Planning (Work category 151)

Council will provide infrastructure that meets an appropriate level of accessibility to users to perform their role

- Council identifies and manages (through prioritisation and mitigation) sections of the network unable to carry Class 1 traffic HPMV and/or 50 Max vehicles
- Physical state of the network, is maintained in an economically sensible manner (allowing safe travel at a sensible and appropriate speed)

Direct Influences

- Network Controls and Planning (Work category 151)

Council will manage the network to ensure it is accessible for different uses where appropriate

- Council has a strategy in place to demonstrate it is managing active road user demands and ensuring new assets are consistent with ONRC guidelines

- Council manages Corridor Access Requests, ensuring all utility access to the network complies with the NZUAG code, COPTTM, and the activity's impact on CLOS outcomes is minimised
- Council manages access to the transport corridor to minimise the impacts to the customer in line with the CLoS Outcomes.

Direct Influences

✓ Network Controls and Planning (Work category 151)

Indirect Influences

✓ Footpath and Cyclepath maintenance and renewals (Work category 124)

4.7 Asset condition and risks to service

The condition of the District network pavements and surfacing's is represented by the following measures:

Roughness	Distribution by road classification, percentage above threshold levels and smooth travel exposure (percentage of assessed network length where roughness is under the relevant threshold)
Texture	Percentage of assessed network where texture is less than 0.5mm mean profile depth
Rutting	Percentage of assessed network in each wheel path, where; rutting is between 10mm & 20mm depth and rutting is greater than 20mm depth
Skid Resistance	Percentage exceeding the skid reporting threshold and adequate skid exposure (where skid resistance exceeds the relevant threshold value by site category)
Condition Index	The average index score - utilising visual rating of surface condition defects - distributed by road classification

To date, most District Road reporting has focused on the extent of the overall network beyond a threshold limit. Such reporting ignores the performance of the major proportion of the network i.e. the condition trend(s) within individual road classifications. If these latter statistics are not reported, the potential danger is that management activity will focus on addressing only those roads in worst condition whilst the overall pavement asset is consumed. To this end, the distribution of condition within each road classification is now included.

5.0 The Programme

Refer to Sections 5 Management Strategy, Strategic Environment, 3 Description of Assets, 6 Current condition of network, 7 Network levels of service for safety, 8 Levels of service, output and efficiency measures, 9 Demand changes, 10 Programme Prioritisation and Optimisation, 11 Resilience, 12 Capital Projects, 14 Benchmarking, 15 Issues and Risks)

The 2018/21 Roading Programme was developed using the ONRC Performance Measures. To meet these new measures Council has;

- analysed the changing context and environment,
- reviewed it's the current practices and thinking,
- changed some systems that have been in place for a long time,
- revisited assumptions and set the new frameworks for the future.

The ONRC Performance Measures support investment in a fit for purpose level of service consistently across the country. The ONRC Performance Measures are described in the following six groups;

- Efficiency,
- Safety,
- Resilience,
- Amenity,
- Travel Time Reliability and,
- Accessibility.

5.1 Investment Management (Activity Class)

5.1.1 Activity management planning improvement (Work category 003)

This work category provides for the preparation and improvement of land transport Activity Management Plans, road safety action plans and procurement strategies.

5.1.2 Programme business case development (Work category 004)

This work category provides for the preparation of a Programme Business Case, including supporting evidence collection and model application.

The Transport Agency expects that proposals for funding assistance for a Programme Business Case will be justified using a fit for purpose Strategic Case which:

- outlines the case for change and the need for the potential investment
- identifies the strategic context and fit of the proposed investment
- provides stakeholders with a high degree of confidence that the investment aligns with strategic priorities.

Investment Management (Activity Class) Budgets				
WC	Work Category Name	2018/19	2019/20	2020/21
003	Investment management Planning	100,000	100,000	50,000
	Investment Management - Totals	**100,000**	**100,000**	**100,000**

5.2 Maintenance (Activity Class)

5.2.1 Sealed pavement maintenance (Work category 111)

This work category provides for the routine care of sealed pavements to maintain their structural integrity and serviceability.

This is an **enhanced** programme to cover the cost of deterioration caused by increased traffic associated with logging. The heavy maintenance will be targeted at the haul routes. Refer to Activity Management Plan; Section 9: Future Demand.

Heavy Maintenance	2018/21
Mangahoe Road (1400m) aligns with forestry	79,000
Okirae Road (1910m) aligns with forestry	60,000
Mangatipona Road (600m) aligns with forestry	19,000
Turakina Valley 3 (1720m) aligns with forestry	54,000
Mangatipona (300m) align with forestry	9,000
Mangatipona (1500m) align with forestry	47,000
Parewanui/Raumai Road intersection(500m) align with forestry	15,000
Te Moehau Road (3080m) align with forestry	89,000
Length 11,010m	**$372,000**

5.2.2 Unsealed pavement maintenance (Work category 112)

This work category provides for the routine care of unsealed pavements to maintain their structural integrity and serviceability.

This is an **enhanced** programme to cover the cost of deterioration caused by increased traffic associated with logging. The maintenance will be targeted at the haul routes. The programmed will be developed in close consultation with forestry owners and logging contractors. Refer to Activity Management Plan; Section 9: Future Demand.

5.2.3 Routine drainage maintenance (Work category 113)

This work category provides for the routine care of drainage facilities to maintain their function.

This an **enhanced** programme to address a backlog of deferred maintenance. The goal is to make the network more **resilient** to severe weather events. The estimate is based on Lump Sum activities, 110km of water channel cleaning and high shoulder removal mainly within reseal sites, and 2.5km of culvert jetting. The budget is increased by $300k over the next 3 years to address a backlog of high priority faults identified.

5.2.4 Structures maintenance (Work category 114)

This work category provides for the routine work necessary to maintain the functional, structural integrity and appearance of the following:

- road bridges
- retaining structures
- guardrails
- stock access structures
- cattle stops
- footpaths on road structures

This is an **enhanced** programme. A more rigorous inspection regime and the development of a Structures Activity Plan has revealed a back log of previously unidentified faults.

5.2.5 Environmental maintenance (Work category 121)

This work category provides for the routine care and attention of the road corridor to maintenance safety, aesthetic and environmental standards.

This a **core** programme. With climate change there is an increase in the amount of rocks and minor slips that have to be removed following severe weather events. Estimate based on Lump Sum vegetation control, debris pick up and, a high number of trees are roadside hazards need to be removed to mitigate the **'High Personal Risk'** on the rural network.

The programme also provides for improved Temporary Traffic Management for winter road closures on the Taihape Napier Road to maintain an acceptable level of public safety.

5.2.6 Traffic services maintenance (Work category 122)

This work category provides for the routine care and attention of: road furniture, markings, and carriageway and pedestrian crossing lighting.

This is the **core** programme and is <u>less</u> than the average costs for the preceding six years. The reduction in costs result from the accelerated renewal programme of LED carriageway lighting on residential streets.

5.2.7 Cycle path maintenance (Work category 124)

This work category provides for the operation, maintenance and renewal of the pavement and facilities associated with cycle paths, including the operation of associated lighting. This includes cycle and combined walk-cycle paths and facilities, provided the facilities are consistent with a relevant cycling or walking and cycling strategy or plan.

Exclusions are:

- cycle paths and facilities used for purely recreational purposes
- pedestrian only walk paths and facilities
- construction/implementation of new cycle facilities or capital work on existing facilities, such as the provision of new lighting – these are funded under Work category 452: Cycle facilities.

This a **core** programme.

5.2.8 Rail level crossing warning devices maintenance (Work category 131)

This work category provides for Council to share in the costs associated with the maintenance and renewal of rail level crossing warning devices carried out by the relevant rail track authority.

This is the **core** programme.

5.2.9 Minor Events (Work category 140)

This work category enables funding from the National Land Transport Fund (NLTF) for the response to minor, short duration, natural events that reduce service levels on part of the transport network.

This a **core** programme, with climate change there is an increase in the amount of rocks and minor slips that have to be removed following severe weather events.

5.2.9 Network and asset management (Work category 151)

This work category provides for the general management and control of the road network and management of road assets.

This is a **core** programme which provides a greater emphasis on high speed data capture, traffic counts, RAMM data collection, and bridge inspection/asset management.

5.10 Cost estimates

The proposed programme is based on the average actual quantities over the five year period from 2012/13-2016/17 with the exception of:

- Sealed Pavement Maintenance (WC 111),
- Unsealed Pavement Maintenance (WC 112)
- Network and Asset Management (WC 151).

The tendered rates in the current maintenance contract (RDC Road maintenance Contract 980) were applied to the average quantities to estimate the costs.

Increase in traffic as a result of forestry logging will increase the cost of maintenance on specific routes.

A study of the potential routes and effect on traffic has been undertaken. The results are contained in the file: *Sharepoint 1-AM-6-3-Planning Year 2018-19/Roading Activity Management Plan Forestry Anticipated Harvest Period_Network_AWG.*

Also a study of the change in maintenance costs for a typical unsealed road was undertaken using Kumuiti Rd. The features and traffic use prior to logging are typical of an unsealed road and over the last 2 years been subject to logging traffic. The results are contained in the file: *Sharepoint 1-AM-6-3-Planning Year 2018-19/Roading Activity Management Plan 2018-21 Kumuiti Road Costs.xlxs*.

Budget adjustments have been made to the following Work Categories:

The maintenance costs for the 2018-21 Council long Term Plan and the National Land Transport Plan are tabulated below.

Summary Maintenance (Activity Class) Budgets				
WC	**Work Category Name**	**2018/19**	**2019/20**	**2020/21**
111	Sealed Pavement Maintenance	1,195,000	1,195,000	1,200,000
112	Unsealed Pavement Maintenance	354,100	379,000	404,000
113	Routine Drainage Maintenance	990,000	990,000	990,000
114	Structures Maintenance	162,400	162,500	162,500
121	Environmental Maintenance	900,000	900,000	900,000
122	Traffic Services Maintenance	400,000	400,000	400,000
124	Cycle Path Maintenance	1,000	1,000	1,000
125	Footpath Maintenance	348,800	349,500	351,300
131	Level Crossing Warning Devices	15,000	15,000	15,000
140	Minor Events	370,000	370,000	370,000
151	Network & Asset Management	1,148,000	1,148,000	1,148,000
	Maintenance - Totals	**5,884,300**	**5,910,000**	**5,941,800**

5.3. Renewals (Activity Class)

5.3.1 Unsealed road metalling (Work category 211)

This work category provides for the planned periodic renewal of pavement layers, including top surface metal, on unsealed roads.

This an **enhanced** programme to address pavement damage caused by logging trucks

5.3.2 Sealed road resurfacing (Work category 212)

This work category provides for the planned periodic resurfacing of sealed roads.

A comparison with other neighbouring Local Authority Networks indicated that the achieved life of sealed surfaces in the Rangitikei District was on average 3 years less than that of the chosen peer group. A realignment of the forward works programme was undertaken to address this. The individual candidate sites are detailed in a separate report.

The proposed programme is outlined in the tables below.

This is the **core** programme and is reduction on 2015-18. A comparison with other neighbouring Local Authority Networks indicated that the achieved life of sealed surfaces in the Rangitikei District was on average 3 years less than that of the chosen peer group. A realignment of the forward works programme was undertaken to address this.

2018-19 Sealed Roads Resurfacing			
Treatment Type	**Length (m)**	**Area (sq.m)**	**Cost ($)**
2nd Coats	5,737	35,728	150,130
Reseals	40,425	251,790	1,066,310
AC	655	7,854	392,700
Roadmarking & Internal			21,560
Totals	**46,816**	**295,372**	**1,630,700**
% of Sealed Network Length	5.9%		

2019-20 Sealed Roads Resurfacing			
Treatment Type	**Length (m)**	**Area (sq.m)**	**Cost ($)**
2nd Coats	2,926	18,172	76,307
Reseals	42,119	262,570	1,116,133
AC	385	4,620	231,000
Roadmarking & Internal			21,560
Totals	**45,430**	**285,362**	**1,445,000**
% of Sealed Network Length	5.7%		

2020-21 Sealed Roads Resurfacing			
Treatment Type	**Length (m)**	**Area (sq.m)**	**Cost ($)**
2nd Coats	3,927	24,486	102,472
Reseals	40,810	254,870	1,074,168
AC	308	3,696	184,800
Roadmarking & Internal			21,560
Totals	**45,045**	**283,052**	**1,383,000**
% of Sealed Network Length	5.6%		

5.3.3 Drainage renewals (Work category 213)

This work category provides for the renewal of drainage facilities that is not routine in nature, but that will reduce future maintenance costs.

This an **enhanced** programme to address a backlog of deferred maintenance. The goal is to make the network more **resilient** to severe weather events.

The individual candidate sites are detailed in a separate report.

5.3.4 Sealed road pavement rehabilitation (Work category 214)

This work category provides for the replacement of, or restoration of strength to, sealed pavements where other forms of maintenance and renewal are no longer economic.

This is a **reduced** programme. Rather than strengthening forestry harvest routes, damage caused by logging traffic will be repaired under the Sealed pavement maintenance WC. Rehabilitation will be differed as long as possible.

Project	2018/19
Mangahoe Road (1170m)	406,800
Parewanui / Ferry Road (int) (70m)	126,000
Spooners Hill Road (500m)	175,000
Taihape Napier Road 2 (1840m)	644,000
Length 4,950m	**$1,351,800**

Project	2019/20
Bryces Line (660m)	231,000
Turakina Valley 1 (1880m)	506,000
Skerman Street (urban) (160m) In-conjunction with K&C and footpath	256,000
Taihape Napier Rd-2 (250)	87,000
Length 2,950m	**$1,080,000**

Project	2020/21
Morris St (urban) (460m) In-conjunction with K&C and footpath	644,000
Tutaenui Road (250m) Carriageway only, up to 1m from kerbs, includes Armagh Tce corner roundings.	336,000
Length 710m	**$980,000**

Reserve Project	2018/21
Pukepapa Road (1520m)	532,000
Length 1,520m	**$532,000**

5.3.6 Structures component replacements (Work category 215)

This work category provides for the renewal of components of:

- road bridges.
- retaining structures
- guardrails
- tunnels
- stock access structures
- cattle stops
- footpaths on road structures, and
- pedestrian over-bridges /underpasses

This is the **core** programme.

Structures Component Replacements (Work Category 215)					
Name of Location	**Bridge Number**	**Description**	**2018/19**	**2019/20**	**2020/21**
Te Moehau Road (RP8230-8270)	Moawhango 28 (C-H truss)	Capacity assessment (forestry & HPMV)	$10,000		
Toe Toe Road (RP570-650)	Toe Toe 12 (C-H truss)	Capacity assessment (forestry & HPMV)	$10,000		
Ongo Road	Blundells 38 (C-H truss)	Capacity assessment (forestry & HPMV)		$10,000	
Brandon Hall Road (RP500-538)	Brandon Hall 1 (C-H truss)	Capacity assessment (forestry & HPMV)			$10,000
Turakina Valley Road 3 (RP2061-2085)	Otiwhiti 102	Replace existing handrail with compliant safety barrier	$32,500		
Taihape-Napier Road 1	Whittles 29	Install concrete lining to invert.	$30,000		
Taihape-Napier Road 1	Woolshed 108	Install concrete lining to invert.	$30,000		
Taihape-Napier Road 2	109 Kakakino	Install concrete lining to invert.	$40,000		
Abattoir Road (RP620-647)	Jacobsens 115	Repair cracked bearing plinth on central pier	$16,000		
Whaka Road	Mickelson 52	Replace TL d/s gabion wing wall	$12,000		
Turakina Valley Road 3 (RP2990-3000)	Hautawa nr 44	Replace existing handrail with compliant safety barrier		$32,500	
Taihape-Napier Road 1	Springvale 75	Install compliant ends to approach safety barriers.			$78,000
Gorge Road	Knights 14	Install compliant ends to approach safety barriers.			$78,500
Turakina Valley Road 3 (RP5998-6040)	Concrete Ford 45	Install safety barrier to approaches			$32,500
Agnews Road	Agnews 90	Spot treatment of corrosion	$38,000		
Mangatipona Road	Churnsides 38	Spot treatment of corrosion	$36,000		
Christophers Road	Public Trust (Suspension) 41	Repair corrosion, renew Goldseal, repaint cable frames.	$30,000		
Omatane South Road	Totmans 20	Spot treatment of corrosion	$33,000		
Wairepu West Road	Weekes 48	Underpin TR DS walls	$12,500		
Mokai Road	Makino No 2 135	Underpin TL abutment + wingwalls	$11,500		
Gorge Road	Omatane 22	Clean and spot repair areas of truss galv		$55,000	
Torere Road	Taoroa 23	Clean + spot repair corroded areas of steel elements -approx 10%.		$30,000	
Silverhope Bush Road	Unnamed 319	Repaint steelwork		$22,000	
Silverhope Road	Silverhope 6	Spot treatment of corrosion		$16,500	
Te Kapua Road	Greens 60	Renew expansion joint seals			$12,000
Total			**$341,500**	**$166,000**	**$211,000**

5.3.7 Traffic services renewals (Work category 222)

This work category provides for the renewal of existing:

- road furniture, lighting, poles, posts, signs, lights, etc. , lighting, signs and markings, and
- traffic management equipment and facilities.

Signs renewal is a **core** programme and is on a par with the average costs for the preceding six years. The goal is to reduce the number and severity of crashes on Council's roads by installing, upgrading or amending signage throughout the network.

The Street lighting component is an **enhanced** programme to complete the replacement of streetlights with energy efficient LED lights on the busier streets.

222 - Traffic Services Renewals	2018/19	2019/20	2020/21
Signs renewals	100,000	100,000	100,000
Additional LED streetlights to achieve compliant lighting levels	50,000	50,000	50,000
Taihape Ped crossing lighting upgrade	40,000		
Totals	**190,000**	**150,000**	**150,000**

Summary of Renewals (Activity Class) Budgets				
WC	Work Category Name	2018/19	2019/20	2020/21
211	Unsealed Roads Metalling	410,000	435,000	460,000
212	Sealed Roads Resurfacing	1,630,700	1,445,000	1,383,000
213	Drainage Renewals	600,000	600,000	600,000
214	Sealed Road Pavement Rehabilitation	1,351,800	1,080,000	980,000
215	Structures Component Replacements	341,500	166,000	211,000
222	Traffic Services Renewal	190,000	150,000	150,000
	Renewals - Totals	**4,524,000**	**3,876,000**	**3,784,000**

5.4 Road Improvements (Activity Class)

An increase in budget for this activity class is being sort to address the increase in heavy traffic form logging on key routes and the high personal risk roads users are exposed to as identified in the ONRC report under Safety Outcome-3 Personal Risk.

5.4.1 Replacement of bridges and structures (Work category 322)

This work category provides for the upgrade or replacement of existing bridges and other road structures, where this is the main purpose of the work.

The individual candidate sites are detailed in a separate report

The Mangaweka Bridge on Ruahine Road at Mangaweka is at the end of its useful life. There is currently a significant weight restriction imposing a maximum weight limit of 6 tonnes. Various options have been considered for the future of the existing Mangaweka Bridge on Ruahine Road at Mangaweka including refurbishment, heavy maintenance or complete replacement.

A complete replacement is the preferred option.

Bridge Replacements (Work Category 322)				
Location	**Description**	**2018/19**	**2019/20**	**2020/21**
Mangaweka Bridge replacement (No. 69) - construction	Replace the bridge with a new bridge.	$810,000	$4,051,000	
Te Kapua Bridge replacement (No.150) - design/constr	Replace the bridge with a new bridge.	$155,000		
Kakariki Bridge strengthening (No.64) - design	Undertake the design for strengthening the half joints to allow the bridge to be rated to carry HPMV.	$40,000		
Moawhango Bridge strengthening (No. 28) - design	Undertake an assessment and design for strengthening the Callendar Hamilton trusses.	$30,000		
Kakariki Bridge strengthening (No.64) - construction	Strengthen the half joints to allow the bridge to be rated to carry HPMV.		$210,000	
Moawhango Bridge strengthening (No. 28) - construction	Strengthen the Callendar Hamilton trusses.		$210,000	
Toe Toe Bridge strengthening (No. 12) - design	Undertake an assessment and design for strengthening the Callendar Hamilton trusses.		$30,000	
Toe Toe Bridge strengthening (No. 12) - construction	Strengthening the Callendar Hamilton trusses.			$210,000
Blundell's Bridge (No.38) - design	Undertake an assessment and design for strengthening the Callendar Hamilton trusses.			$40,000
Otara Road 67 (S173C) Bdy	Strengthening	$387,300	$0	$0
Total		**$1,422,300**	**$4,501,000**	**$250,000**

5.4.2 Road improvements (Work category 324)

This work category provides for improvements to or upgrading of existing roads within the existing or widened road reserve, and deviations onto a new road reserve, where the original road is closed, including any associated new road structures.

This is an **enhanced** programme to reduce the high personal accident risk and address the increased accident risk due to increased HCV traffic associated with forestry harvesting activity. It is linked with the pavement rehabilitation and reseals programme.

Road Improvements (Work Category 324)				
Location	**Description**	**2018/19**	**2019/20**	**2020/21**
Various	Improvements in conjunction with the rural AWT programme	350,000		
Makirikiri Road RP2993-4634	Seal Widening	24,600		
Mangatipona/Kauangaroa/Okirae Road Intersection	Seal Widening	100,000		
Ruanui Road RP900-1200	Seal Widening	7,5000		
Various	Improvements in conjunction with the rural AWT programme		350,000	
Tennants Road RP29-1219	Seal Widening		35700	
Kie Kie Road RP10-3450	Seal Widening		137600	
Murimotu Road RP4450-5930	Seal Widening		48800	
Various	Improvements in conjunction with the rural AWT programme			350,000
Pukepapa Road RP2360-3193	Seal Widening			29,400
Kakariki Road RP1840-2954	Seal Widening			59,200
Murimotu Road RP4450-5930	Seal Widening			44,400
Toe Toe Road RP2390-3680	Seal widening and geometric improvements			64,500
Taihape Naiper Road RP32000-34000	Seal widening and geometric improvements			100,000
Accelerated renewal programme of LED carriageway lighting	LED carriageway lighting	30,000	117,000	117,000
Total		**579,600**	**689,100**	**764,500**

5.4.3 Minor Improvements (Work category 341)

This work category provides for the construction/implementation of low-cost/low-risk improvements to the transport system to a maximum total cost for approval per project of $300,000. This programme will be reviewed if the limit per project is increased to $1.0 million. Candidate projects will be advanced if they are affordable and economically justified.

The Collective Risk on the Rangitikei District is below the Median of the peer group in all Road Categories and is classified as Low to Medium. However, the Personal Risk is above the Median of the peer group in all Road Categories and is classified as High.

The **core** programme is on a par with safety programmes for previous years, replacing pipe rails on bridges with compliant safety rails, and safety rails at out of context curves.

The detailed programme is shown in the table below:

Minor Improvements (Work Category 341)				
Location	**Description**	**2018/19**	**2019/20**	**2020/21**
Various	Guardrail to replace timber sightrails on bridge approaches	107,500		
Various	Additional LED's to achieve compliant lighting	50,000		
Hautapu Street / Tui Street pedestrian crossings	Taihape Pedestrian Crossing Upgrade - Tui St (2)	40,000		
Toe Toe Road; TV-3 Br102 Otiwhiti RP2070; Br44 Hautawa RP 3000, and old wire rope barrier as part of AWT	Guardrail to replace timber sightrails on bridge approaches		147,500	
Various	Additional LED's to achieve compliant lighting		50,000	
Various	Guardrail to replace timber sightrails on bridge approaches			152,500
Various	Additional LED's to achieve compliant lighting			50,000
Various	Guardrail to replace timber sightrails on bridge approaches			
Total		**197,500.00**	**197,500.00**	**202,500.00**

5.4.4 Resilience improvements (Work category 357)

This work category provides for non-routine work required to protect the serviceability of the following from damage, and to minimise the threat of road closure arising from natural phenomena.

This is an **enhanced** programme that sets out to improve the reliability of the network during natural phenomena events.

The programme set out in the table below targets the highest priority roads and sites that are constantly under threat.

Resilience Improvements (Work Category 357)				
Location	**Description**	**2018/19**	**2019/20**	**2020/21**
Okirae Road Bluffs	Okirae Road Bluff stabilisation	30,000		
Various	Stream channel protection at bridges	141,100		
Okirae Road Bluffs	Okirae Road Bluff stabilisation		30,000	
Various	Stream channel protection at bridges		106,200	
Okirae Road Bluffs	Okirae Road Bluff stabilisation			30,000
Various	Stream channel protection at bridges			72,300
Total		**171,100.00**	**136,200.00**	**102,300.00**

Summary of Road Improvements (Activity Class) Budgets				
WC	**Work Category Name**	**2018/19**	**2019/20**	**2020/21**
322	Replacement of bridges and structures	1,422,300	4,501,000	250,000
324	Road Improvements	579,600	689,100	764,500
325	Seal extension	0	0	0
341	Minor Improvements	197,500	197,500	202,500
357	Resilience Improvements	171,100	136,200	102,300
451	New Footpaths	120,000	0	0
	Road Improvements - Totals	**2,490,500**	**5,523,800**	**1,319,300**

5.5 Walking and Cycling (Activity Class)

5.5.1 Cycling facilities (Work category 452)

This work category provides for the construction/implementation of new or improved cycle facilities, and shared pedestrian and cycle paths.

The construction of on road interventions required to improve the safety and amenity value of cycling, for example a wider carriageway, vehicle parking configurations, pinch points or kerb structure is eligible for funding assistance.

This is an **enhanced** programme is to provide cycle lane markings radiating from schools in Hereford St and Bredins Line. Roads to be marked include; Wellington Rd High St to the Rail underpass, Broadway from Follett St to Bond St, and High St. The objective is to provide a safe lane to encourage cycling.

Walking and Cycling (Activity Class) Budgets				
WC	**Work Category Name**	**2018/19**	**2019/20**	**2020/21**
452	Cycling facilities	1,500	2,500	2,500
	Walking and Cycling - Totals	**1,500**	**2,500**	**2,500**

5.6 Public Transport (Activity Class)

5.6.1 Public transport facilities Operations and Maintenance (Work category 514)

An allowance of $5,500 per annum has been made for the maintenance upkeep of bus shelters.

Public Transport (Activity Class) Budgets				
WC	**Work Category Name**	**2018/19**	**2019/20**	**2020/21**
514	Public transport facilities O & M	5,500	5,500	5,500
	Public Transport - Totals	**5,500**	**5,500**	**5,500**

6.0 Nonsubsidised Roading Activities

The following activities are not eligible for funding assistance from the Transport Agency.

6.1 Maintenance and Operations

6.1.1 Sealed pavement maintenance

Nonsubsidised activities include;

- Aesthetic treatments (such as flower gardens) on berms, shoulders, medians and traffic islands.
- Maintenance of the area between the kerb and the road reserve in urban areas.
- Control of noxious plants declared in terms of the Biosecurity Act 1993 within the road reserve
- The construction, maintenance or renewal of off-street parking areas is not eligible for funding assistance.

6.1.2 Street cleaning (local share)

The Transport Agency's policy is that funding assistance will be provided for 30 percent of the total cost of cleaning channels, sumps and cesspits in urban areas , as an approximation of the benefit to the road and its users.

The remaining 70 percent balance will remain Council's amenity cost with no funding assistance.

6.1.3 Traffic Services

Nonsubsidised activities include costs related to amenity lighting, which includes the lighting of:

- buildings
- property and reserves
- under-veranda lighting
- festive lighting
- any other lighting not directly related to the operation of a road.

6.1.4 Network and Asset Management

This is the cost related to the asset management of all nonsubsidised maintenance and operations.

6.2 Renewals

6.2.1 Roading Renewals

Nonsubsidised activities include costs related to:

- Improvements and renewal of roadside berm features
- Kerb and Channel Renewals
- Vehicle Crossing Renewals
- Cycle Lane/Facilities Renewals

6.2.2 Footpath Renewals

Nonsubsidised activities include costs related to the renewal of pedestrian only walk paths and facilities

6.3 Road Improvements

6.3.1 New Roads, Urban Reconstructions and New Footpaths

The construction of sub-divisional roads is not eligible for funding assistance, which includes second coat sealing.

6.3.2 Seal extension

The sealing of unsealed roads is not eligible for funding assistance, which includes second coat sealing.

Non-subsidised Roading Budget	2018/19	2019/20	2020/21
Maintenance and Operations			
Street cleaning (local share)	136,600	136,600	136,600
Street Furniture repairs and maintenance	12,500	12,500	12,500
Underverhanda Lighting (power)	25,000	25,000	25,000
Festive lighting and banners	16,000	16,000	16,000
Carpark Maintenance	15,800	15,800	15,800
Access Roads	20,000	20,000	20,000
Noxious Weeds (Taihape Trust)	25,250	25,250	25,250
Professional Services	42,000	42,000	42,000
Roadside Tree Maintenance	76,000	76,000	76,000
Berm Mowing	96,000	96,000	96,000
External Contractor	5,500	5,500	5,500
Survey Costs	21,500	21,500	21,500
Sub-total Maintenance and Operations	**492,150**	**492,150**	**492,150**
Road Improvements			
Road Improvements - unsub portion	99,000	101,700	112,200
Sub-total Road Improvements	**99,000**	**101,700**	**112,200**
Total Non-subsidised Roading Budget	**591,150**	**593,850**	**604,350**

7.0 Delivery

For a more complete commentary refer to Rangitikei District Council Roading Procurement Strategy 2018-21.

7.1 Ability to complete a programme

Professional services are integral to an activity approved under s20 of the LTMA. For Transport Agency funding purposes, these are treated as an input, and the cost is charged directly to the activity. They are services provided by a person (or persons) skilled in the particular field for which they are engaged.

Council has its own in-house professional services personnel. In addition Council is currently supplied with services from a wide range of consultants, ranging from local to international companies that provide services to the transport infrastructure sector. Apart from the core transport services that are needed many of these firms have support services to provide a more complete one stop shop service. A number of these consulting firms have established offices in the Region whilst the majority are supported from larger offices located in Wanganui, Palmerston North and Wellington.

These firms provide services to the Council, across a number of sectors, as well as to other authorities in the Region (such as Ruapehu, Wanganui, Manawatu, Tararua, and Horowhenua District Councils as well as Palmerston North City Council and NZTA) and to land developers and private clients.

Established consulting firms that provide roading and transport related services to Council and other customers in the region include: Beca; GHD; Opus International Consultants. Ancillary services such as in the fields of urban design, landscape architecture, geotechnics, surveying, modelling, three D and video imaging, GIS and asset management are frequently provided by many of the larger firms or by specialist boutique service providers.

For each procurement action, an assessment is made regarding the best value for Council and for small commissions and one off projects consideration is given to the minimising the cost of tendering.

The Council enjoys the availability of a range of contractors serving the transport infrastructure sector. Apart from the core transport services that are needed by Council many of these firms have support services to provide a one-stop-shop service. Most firms have an established office or depot in the District and Region. These firms provide services to other authorities in the Region (such as Rangitikei, Ruapehu, Wanganui, Manawatu, Tararua, and Horowhenua District Councils as well as Palmerston North City Council and NZTA),land developers and private clients as well as to Council.

The maintenance and construction activities consumes a significant amount of materials that are sourced locally or regionally however there are some manufactured items that are produced overseas. Bitumen and derivative products are imported. Concrete and base course materials are generally from local quarries and suppliers and some specialised manufactured products are constructed locally.

Contractors that provide roading related services to Rangitikei include Higgins; Downer; Fulton Hogan; and Alf Downs Street Lighting Ltd.

Council procures the bulk of the maintenance, operation and renewal work through Contract C4-1505 Road Maintenance Contract with separable portions for Manawatu, Rangitikei, and Horowhenua District Councils. This contract commenced 1st July 2015 and was for 3 years.

Contract C4-1505 Road Maintenance Contract is for the maintenance of local roads within the Council's network as specified. The Contractor provides appropriate resources to respond to all incidents that may occur within the network. Maintain the network to the standards specified, it is not to upgrade the network to an as-new condition.

The Contract may be extended for two (2) periods of three (3) years subject to acceptable performance by the Contractor and successful negotiation to standards that apply to One Network Roads Classification due to be implemented in 2018. These standards were not issued at the time of Tendering.

The Specifications set out the specific tender and contract requirements. This information includes:

- A description of the Roading Network
- Specific tendering requirements
- Specific operational requirements that apply to this Contract

7.2 Appropriate procurement

The Council will be looking to adopt a targeted procurement approach that best fits its circumstances both now and in the future. The Road Efficiency Group, in particular, has provided useful documentation and held local workshops to promote improved efficiency through procurement innovations. Top of mind is the three core requirements of the LTMA and the community levels of service as agreed through Council's Long Term Plan.

Council procures transport activities that are predominantly of a small to medium scale. However there is opportunity to transition towards a more collaborative style where risks are distributed in line with the party most appropriate to carry the risk and this is would be most useful in regard to the maintenance, operations and renewal functions. Due consideration will be given to the use of the most appropriate type and style of contract to achieve Council outcomes and best value along with continuing to address the three core LTMA outcomes as noted above.

Council has an 'open' supplier selection process as its default position. Direct appointments and 'closed contest' processes may be considered for low value contracts. Council's transportation procurement procedures will be based on a selection of the procedures as documented in the latest edition of NZTA's Procurement Manual for Activities Funded through the National Land Transport Programme: Appendix C, while following the rules as set out in Chapter 10 of the NZTA Procurement Manual.

7.3 Work Quality

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.

7.3.1 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.

7.3.2 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.

7.3.3 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.

7.4 Governance and reporting

The Rangitikei District Council (RDC) Procurement Policy was developed from the Ministry of Business Innovation and Employment – Government Rules of Sourcing and the Office of the Auditor General's Procurement Guidelines for Public Entities. RDC rules for planning procurement, approaching the market and contracting, represent the Council's standards of good practice for the procurement of goods and services.

The RDC rules for planning procurement, approaching the market and contracting, provide the foundation of best practice procurement and will demonstrate that Council is open, transparent and accountable. The rules help to design processes that are robust, and build confidence in Council procurement practices. This will build greater public trust and confidence that Council spending is well-planned and well-executed. Smart public procurement will deliver better public services and provide value for money to the ratepayers of the Rangitikei District.

Activity Management Plan

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1 Introduction

1.1 Purpose of the Activity Management Plan (AMP)

The purpose of this AMP 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 asset management throughout the organisation;
- Improving customer satisfaction and organizational 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 Intended Audience

The intended audience for AMP are the New Zealand Transport Agency (NZTA), Council Representatives, Council Staff, Consultants, Developers and those who want to find out more about the processes that Council uses to maintain the agreed level of service.

1.3 AMP Timeframe

The AMP shows that the programme has been optimised and provides evidence that a decision to invest in a programme of works represents best value for money. In taking a "Whole of Life" approach a 30 year horizon has be used 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 30 year forecasts and is also consistent with the role of the AMP. That is selecting 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 implementing them in the right way, at the right time and for the right price.

Financial details are shown for the ten year budget from 2018/19 through to 2028/29. The AMP assumes that Transport assets as a whole will have an indefinite life and the main focus of the plan is on determining the strategies required for maintaining, rehabilitating and renewing components over the next 10 years. It is intended that this plan be reviewed every year with a major update every three years prior to the LTP review process.

1.4 Business Case Approach

The AMP describes Council's Roading Network and presents a Business Case to obtain the required Transport Agency investment for the future.

It is a reasoned dialogue between investors and asset owners to enable the right levels of investment, in the right way, at the right time, and for the right price, within the new sector driven One network Roading Classification (ONRC) system, the overall aim of which is increased network and sector performance and sustainability.

The 2015-18 Activity Management Plan was prepared in accordance with Clause 2 of Schedule 10 of the Local Government Act 2002. It included a significant amount of information which contributes to the management of the asset and network, but is not required by the Transport Agency to evaluate investment decisions.

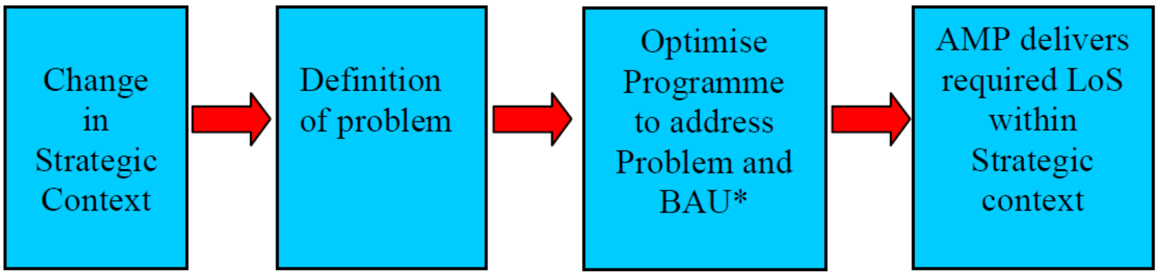
Council has therefore modified and updated the 2015-18 Activity Management Plan to be consistent with the Local Government Act and the Transport Agency's Business Case expectations.

The ONRC, performance levels and Customer Levels of Service (CLoS) are carried through the AMP. It is a living document and will be updated as best practice evolves with time.

The Business Case approach generates a clear understanding of problems, consequences and benefits at the outset by integrating best practice decision making, programme management and investment assurance tools. This approach progressively builds an investment case by:

- identifying the core problem,
- identifying the consequences of not addressing it, and
- identifying the benefits to be gained by investing in the solution.

The AMP process is shown in Figure 1 below



* BAU – Business as Usual

Figure 1-1: AMP Process

The goal of good activity management is delivering the appropriate level of service within the current strategic context and optimised programme, while sustaining the asset overall at the lowest whole of life cost.

Council's AMP 2018-2028 sets out the strategic direction for land transport in the Rangitikei District over the next 10 years. It has been developed in collaboration with key regional transport partners and stakeholders, and in accordance with statutory requirements under the Land Transport Management Act 2003 (LTMA).

The AMP incorporates the Regional Land Transport Programme which identifies the land transport activities the Region wishes to prioritise for inclusion in the National Land Transport Programme (NLTP) for subsequent funding subsidy. The AMP identifies options, benefits, consequences and potential costs, and presents the preferred programme of activities to progress.

In summary:

The programme AMP addresses the strategic priorities.

The programme AMP sustains the network i.e. the major spend items are realistic in terms of resurfacing and rehabilitation and are aligned with the RAMM data.
Investment decisions provide for an appropriate level of treatment.
The cost is reasonable compared to other District Councils with similar mixes of roads.
The programme meets the Business Case requirements.
The programme shows how it will implement the One Network Roading Classification (ONRC).

1.5 Key Planning Assumptions and Limitations

The following assumptions have been made for the growth projections:

Rangitikei is expecting minor increases in the usual resident population.
That a declining number of people per household and a modest growth in population is likely to result in an increasing numbers of households.
That the median age of Rangitikei District residents will increase significantly over the long term leading to changes in the way Council delivers services
That forecast population, household and business growth can be catered for by current and planned activities

The legal and policy framework for all transport activities in New Zealand is set by the Ministry of Transport, headed by its Minister.

The Minister works through the Ministry of Transport to head the group of Central Government organisations which have responsibility for transport in New Zealand. The Ministry manages the interface with a number of Crown entities that have varied responsibilities for sectors of the transport system.

These include:

- The New Zealand Transport Agency, which has responsibility for land transport planning; managing the state highway system; regulating access to and participation in, the land transport network; promotion of land transport safety and sustainability; and allocation of Government funding for land transport.
- Transport Accident Investigation Commission (TAIC). The principal purpose of TAIC is to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in future. TAIC investigates significant aviation, rail, and marine accidents and incidents.
- Maritime New Zealand. The responsibilities of this organisation include maritime safety, security and marine environment protection.
- Civil Aviation Authority (including the Aviation Security Service) has responsibility for regulating civil aviation in New Zealand.
- The New Zealand Railways Corporation (trading as KiwiRail Group) is a State Owned Enterprise that is responsible to the Crown but operates as a commercial entity.
- At a local level, the territorial authorities of the Region are responsible for the management of local roading networks, while the Regional Council has statutory transport planning responsibilities through the Regional Transport Committee.

1.6 Council's Asset Management Policy

1.6.1 Objective of the Roading Asset Management Policy

The objective of Council's Asset Management policy for the Roading Activity is to ensure that Council's service delivery is optimized to deliver the purpose of local government (as defined in the Local Government Act 2002), agreed community outcomes and levels of service, manage related risks, and optimise expenditure over the entire life cycle of the service delivery, using appropriate assets as required.

1.6.2 Asset Management Policy Principles

The following principles will be used by Council to guide Activity Management Planning and decision making:

- Effective consultation to determine appropriate Levels of Service
- Ensuring service delivery needs form the basis of asset management
- Integration of asset management with corporate, financial, business and budgetary planning using asset/activity management plans and Council's LTP to demonstrate this
- Integration with neighbouring authorities and other agencies including NZ Transport Strategy, National Land Transport Programme, and the Regional Land Transport Strategy, and shared services agreements
- Integration of asset management within Council's strategic, tactical and operational planning frameworks
- Informed decision making taking a lifecycle management and inter-generational approach to asset planning
- Transparent and accountable asset management decision making
- Sustainable management providing for present needs whilst sustaining resources for future generations

1.6.3 Policy Linkages to Other Plans

This AMP links to Council's LTP, and the Horizons Regional Land Transport Strategy. New Zealand Transport Agency's One Network Roading Classification (ONRC) asset management requirements and Council's Infrastructure Strategy form this Policy's minimum asset management practice requirements.

1.6.4 Implementation and Review of Policy

This Asset Management Policy has been implemented in conjunction with the 2018-21 AMP and the 2018-21 LTP.

The next full review of this Asset Management Policy shall be completed in June 2020 prior to completing Activity Management Plan updates to support the 2021-24 LTP

1.6.5 Resourcing of Asset Management Programmes

To be effective, AMP programmes must be adequately resourced, and therefore require on-going budget to deliver identified improvements and keep plans and processes current with evolving practice. For asset management to be successful in Rangitikei District there must be a commitment recognised across the organisation. This commitment must translate into budget, human resources, and management accountability.

1.6.6 Application

This AMP includes improvement and expenditure programmes that will be actioned by the Roading Asset Manager implemented by Council's Service Delivery Group and other providers with the objective of achieving community outcomes and delivering the stated levels of service for this Activity.

2 Strategic Environment

Rangitikei District Council Mission Statement

"Making our District thrive"

2.1 Strategic Overview

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.

The roading and footpaths activity enables communities to travel safely, easily and efficiently through the District while maintaining good access to properties, businesses and other areas of interest, as an essential service for the public good. Roading assets are critical infrastructure to growth of the economy and connectivity of diverse communities. Council ownership and management of these assets is the most affordable means of achieving these activity outcomes. Council staff have the experience and skills to manage consultation and contracts with service providers.

2.2 The District

The Rangitikei was one of the first Counties constituted under the Counties Act 1876 when the provincial system of Government gave place to the county system. The first meeting of Rangitikei County Council was held in 1877.

2.2.1 Geography

Located 2 hours north of Wellington, the Rangitikei District encompasses a trapezium-shaped block of mainly lush, rural land that covers an area of 4,479 km^2 and includes the towns of Taihape, Bulls, Marton, Hunterville, and Mangaweka. The Rangitikei River largely forms the eastern boundary of the District with the Whangaehu River broadly forming the western boundary, with the northern section reaching beyond the town of Taihape and extending eastwards towards the district of Napier.

The District takes its name from the Rangitikei River, one of New Zealand's longest rivers, which flows from the Central Plateau south to the South Taranaki Bight at Scott's Ferry.

Known as a marvellous place to farm, the growing climate and soil lends itself to many different operations. Rangitikei boasts anything from game bird production to cut flowers, vineyards, asparagus, nuts, culinary and medicinal herbs, as well as meat productions and grain growing.

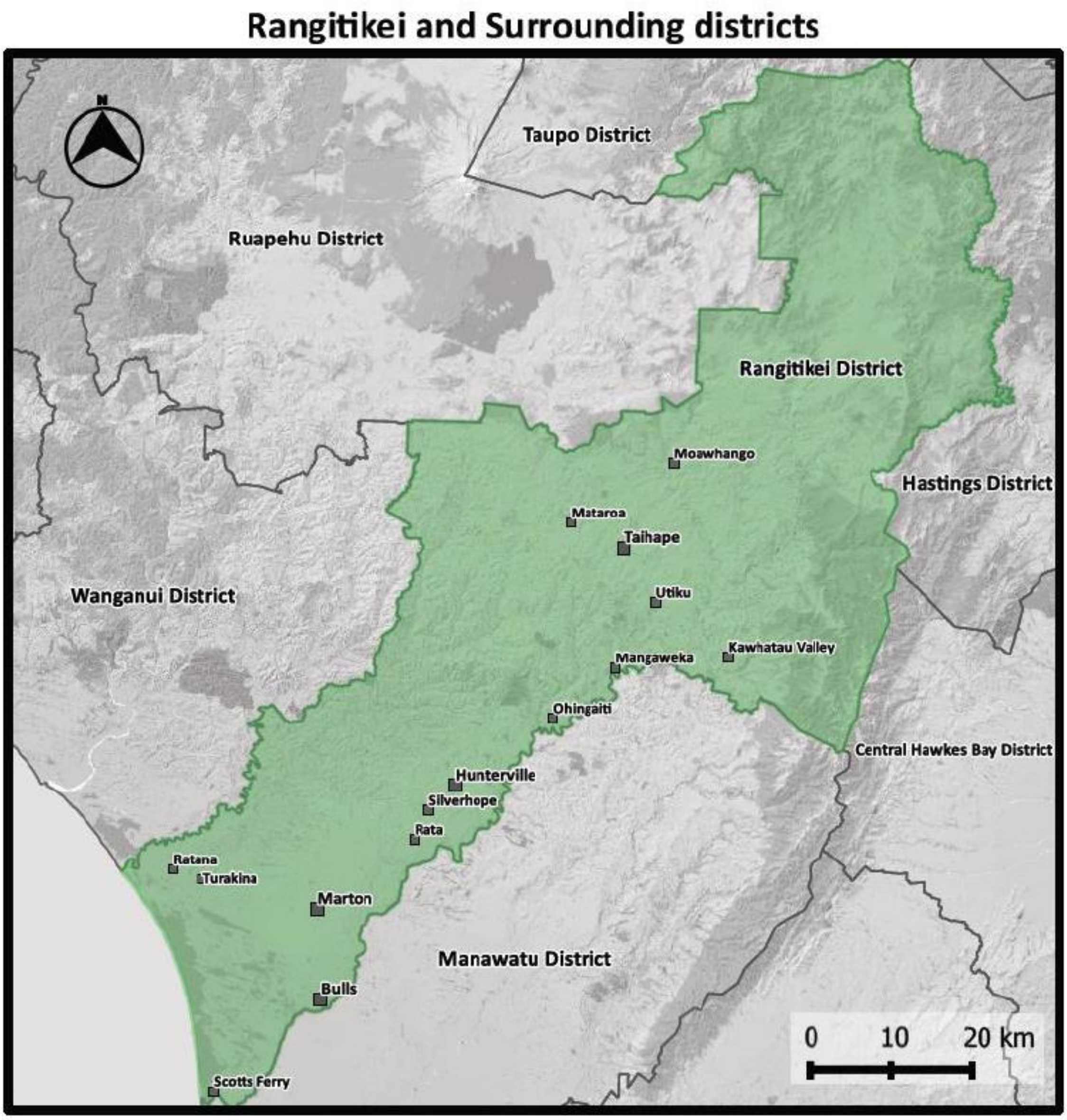
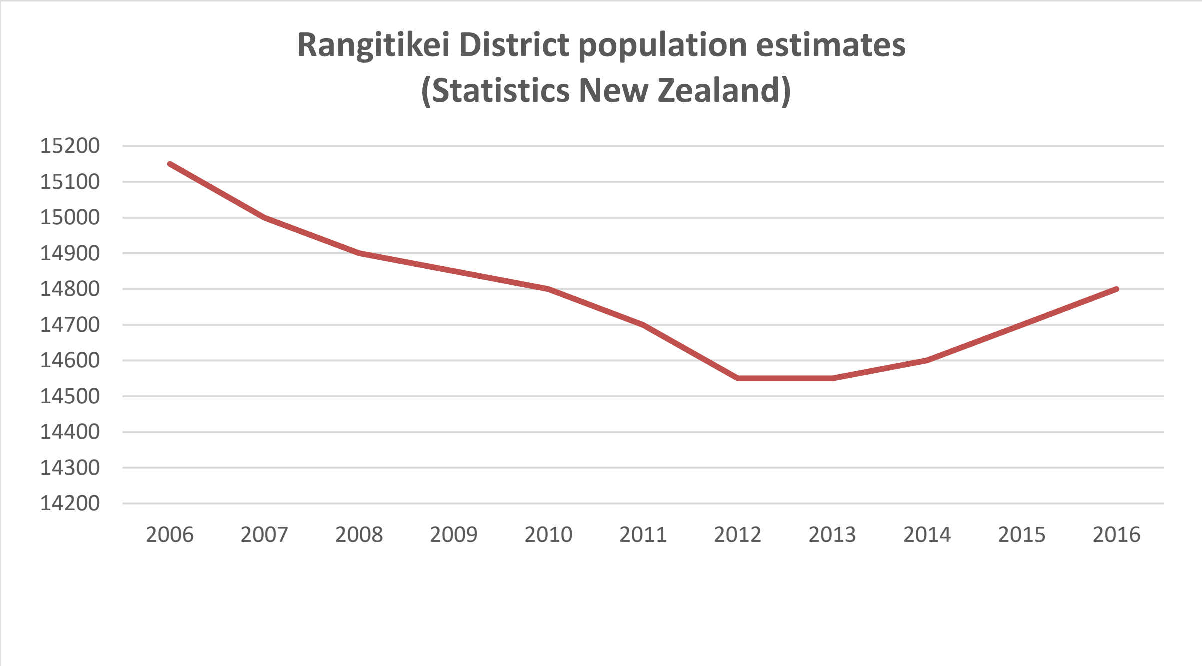


Figure 2-1: Rangitikei and Surrounding Districts

Rangitikei's climate is temperate and has few extremes compared to many parts of New Zealand. Summers are warm with average temperatures in the low 20s. The most settled weather occurs in summer and early autumn. Winters are mild near the coast and on the plains; it is colder inland and in the hill country, but often frosty, clear and calm. Snowfall occasionally settles in areas 400 m above sea level, such as Taihape. Annual hours of bright sunshine can average over 2,000.

2.2.2 Population

The total population of the Rangitikei District is 14,019 from the 2013 Census. This is a decrease of 693 people or 4.7 % since the 2006 Census. However, recent population estimates indicate that the population is seeing a small increase for the first time in more than 25 years.



2.2.3 Age Distribution (Census 2013)

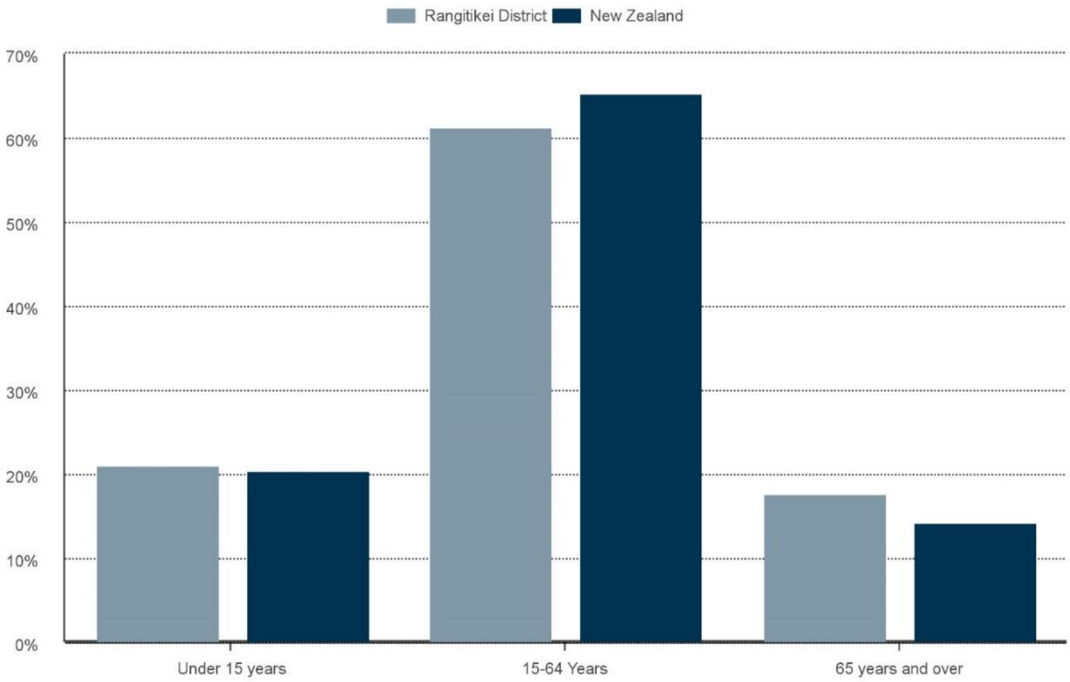
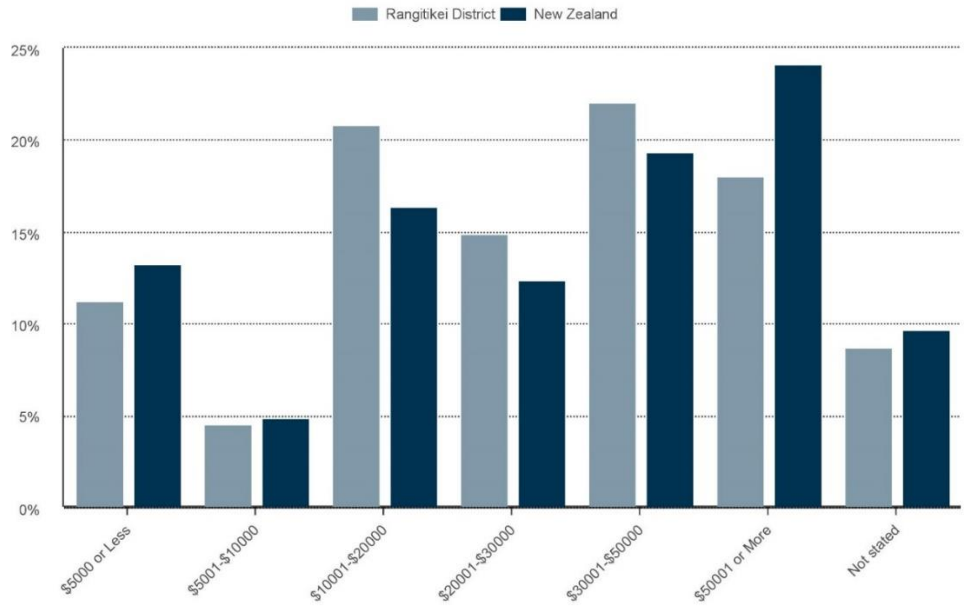


Figure 2-2: Age Distribution

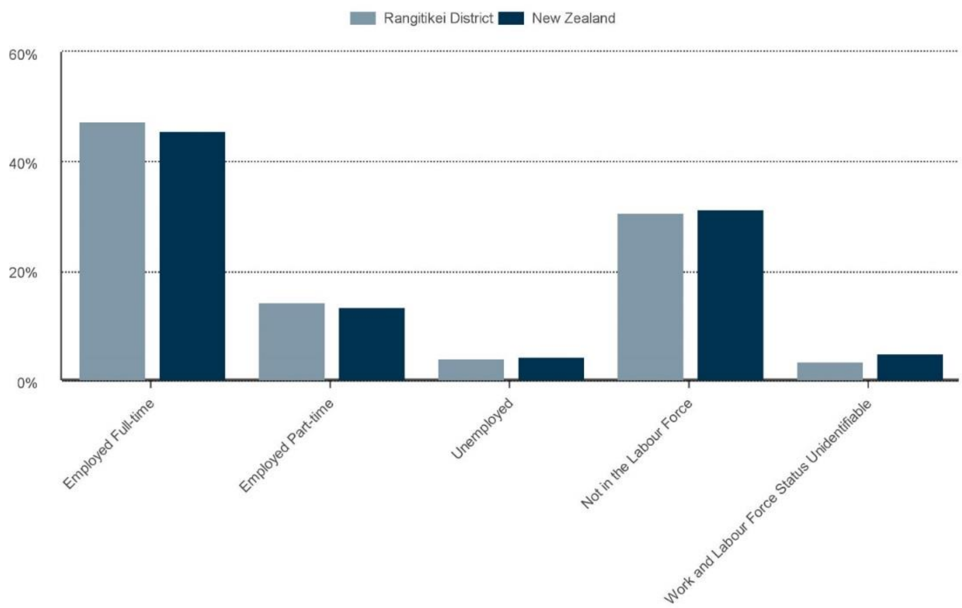
The overall ageing of the population will have a major influence. Changes in demographic structure are likely to have a significant impact on the transport needs of the population. An elderly population becomes more dependent on others for their transportation needs. This results in less need for private vehicles and a greater need for public transport such as buses or taxis.

2.2.4 Socio-economic factors - income



Income is a determinant of travel as the more people earn, the more they tend to travel. The 2013 Census suggests that the income for 50% of the population is less than $30,000 per annum.

2.2.5 Socio-economic factors – labour force participation



Historically the labour force participation rate in the District has been slightly higher than the national average. Higher employment rates tend to correlate to greater travel demand, as people generally need to travel between their place of work and residence.

2.2.6 Regional Economy

Agriculture (including: horticulture and fruit growing; sheep, beef and livestock farming; dairy farming; other farming services to agriculture; and hunting and trapping) is the Manawatu-

Whanganui (Horizons) Region's most important enterprises. Agriculture, forestry and fishing contributes almost 32% to the District GDP compared to just over 6% nationally. Approximately two thirds of this is sheep and beef cattle farming.

Councils in the Horizons region are collaborating to facilitate economic growth and prosperity for the Region. This collaboration has seen central Government invest in a Regional Growth Study for the Region which was completed in April 2015. This study identified key opportunities for growing our regional economy. Government has highlighted the importance of Councils collaborating with each other and with industry and iwi to facilitate growth.

Accelerate 25, the action plan associated with the Regional Growth Study, is investigating ways to increase the Horizon region's agribusiness exports from $1.9 billion to $3.8 billion by 2025. The Region comprises around 80% of fertile grassland including 18% of all Class 1 soils and 14% of all Class 2 soils in New Zealand. These are considered to be the most versatile soils for agriculture and horticulture and there is potential for further growth around the use of these soils.

As farmland is used more intensively than in the past (particularly potential increased dairy farming and more intensive livestock production), there will be implications for the District's transport networks, with increasing numbers of heavy vehicles servicing these industries.

2.3 Key Legislation

Legislation is established by central government and must be complied with at local government level. Significant legislation and regulations affecting the Roading activities are provided in the table below. Different legislation has differing levels of impact on the Roading activity; this is indicated under Impact Range (Broad ***, Moderate **, Limited *)

Legislation and Regulation	Roading Impacted Range
Building Act 2004	*
Civil Defence Emergency Management Act 2002	**
Climate Change (Emissions Trading and Renewable Preference) Act 2008	*
Climate Change Response Act 2002 (and amendments)	*
Electricity Act 1992.	*
Health and Safety in Employment Act 1992	***
Land Drainage Act 1908	*
Land Transport Management Act 2003	***
Land Transport Act 1989	**
Local Government Act 2002	***
Local Government Rating Act 2002	*
Local Government Rating Act 1974	**
Public Works Act 1981 (and amendments)	*
Railway and Corridor Management and Safety Act 1992.	*
Reserves Act 1977 (and amendments)	*
Resource Management Act 1991 (and amendments)	**
Summary Offences Act 1991.	*
Telecommunications Act 1987	*
Transit New Zealand Act 1989.	*
Utilities Access Act 2010	***

Table 2-1: Legislation levels of impact

2.3.1 Local Government Act 2002

The purpose of local government is to enable democratic local decision-making and action by, and on behalf of, communities; and to meet the current and future needs of communities for good-quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost-effective for households and businesses.

In this Act, good-quality, in relation to local infrastructure, local public services, and performance of regulatory functions, means infrastructure, services, and performance that are efficient, effective; and appropriate to present and anticipated future circumstances.

For these reasons, the provision of roads and footpaths is also a mandatory group of activities for local authorities under the Act. As such, the Council must include in its Long Term Plan (LTP) a statement of the amount of capital expenditure that the authority has budgeted to:

(a) meet additional demand for an activity; and

(b) improve the level of service; and

(c) replace existing assets.

The LTP must also include a statement of the intended levels of service provision including:

(a) performance measures that are prescribed by central government under section 261B of the Act,

(b) any additional performance measures that the local authority considers will enable the public to assess the level of service for major aspects of groups of activities,

(c) the mandatory target or the targets set by the local authority for each performance measure

(d) any intended changes to the level of service from the previous year and the reasons for the changes

(e) the reason for any material change to the cost of a service.

The Council uses this Activity Management Plan to inform its LTP. It is prepared to align with Council's mission statement, its infrastructure strategy and in accordance with Council's decision-making processes, including public consultation.

2.3.2 Land Transport Management Act 2003

The Land Transport Management Act (LTMA) 2003 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 Manawatu-Whanganui 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 NZTA for incorporation into the National Land Transport Programme; 10-year forecasts are also required.

2.3.3 Civil Defence Emergency Management Act 2002

The expectations under the CDEM Act 2002 are that Council's services will 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.

Roading 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.

2.3.4 Health and Safety at Work Act 2015

The Health and Safety at Work Act 2015 (HSWA) is New Zealand's workplace health and safety law. It came into effect on 4 April 2016. HSWA repeals the Health and Safety in Employment Act 1992.

2.3.5 Utilities Access Act 2010

The 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.

2.4 Relevant Strategies and Plans

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 New Zealand Transport Agency (NZTA).

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

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 these documents.

2.4.1 National Infrastructure Plan

The National Infrastructure Plan (NIP) details the Government's view of the challenges and priorities for infrastructure. The 2015 NIP describes the view to 2045.

The vision: By 2045 New Zealand's infrastructure is resilient and coordinated and contributes

to a strong economy and high living standards.

What this means...

New Zealand has a modern, integrated, and efficient infrastructure system which underpins a prosperous and inclusive society with high-quality state services and a healthy and sustainable natural environment. Economic performance is strong with infrastructure that supports international connectedness, increased productivity, movement up the global value chain, and more exports and growth. It helps enable all New Zealanders to reach their full potential and play a meaningful role in the economy and society.

- National decision-making is integrated with regional and local planning and considers the interdependencies between sectors...

- Separate national, regional, and local entities work together to create an efficient and effective infrastructure network...
- Our infrastructure investments provide clear overall social, environmental, and fiscal benefits that increase economic prosperity and living standards for all New Zealanders...
- New Zealand has stable and predictable regulatory settings, with industries clear on the expectations and requirements of them...
- We have mature asset management practices which provide a good understanding of intended levels of service and whole-of-life costs of investment, and these are effectively communicated...
- There is widespread use of shared infrastructure data standards so that our infrastructure networks can be benchmarked and network interdependencies can be better understood...
- Infrastructure providers consider both demand and supply-side solutions to infrastructure problems...
- Where supply-side solutions are necessary, appropriate funding options are always considered and advanced procurement tools are being used across the country...
- Our infrastructure is resilient.

2.4.2 New Zealand Transport Strategy and Long Term Strategic View

The New Zealand Transport Strategy (NZTS) and Long Term Strategic View (LTSV) provides the Government's over-arching strategic vision for transport as follows:

"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

The NZTS and the Government Policy Statement (GPS) on land transport funding are part of a raft of changes to the transport sector set out in the Land Transport Management Amendment

Act 2008 and are the driving force behind achieving an affordable, integrated, safe, responsive and sustainable transport system.

The Government is focused on building a more productive and competitive economy, as articulated in the 'Government's Business Growth Agenda – Future Direction 2014'. The right level of investment, infrastructure and delivery is crucial to achieving this, including a fast and efficient roading network connecting our regional economies.

2.4.3 Government Policy Statement on Land Transport 2017

The Government has a strong focus on driving improved performance from the land transport system and investing in new transport infrastructure. This is primarily articulated through the 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 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.

2.4.4 National Land Transport Programme

Under the GPS, the NLTP contains all the land transport activities, such as public transport services and road construction and maintenance, which are expected to receive funding from NZTA. The NZTA 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.

2.4.5 Horizons Regional Land Transport Strategy (RLTS)

Section 75 of the Land Transport Management Act 2003 requires a Regional Transport Committee to produce a Regional Land Transport Strategy (RLTS).

The 2018 - 2048 RLTS is closely aligned with the objectives of the NZTS and LTMA 2003, tailored for the Manawatu – Whanganui region. It includes strategies to accommodate projected growth in the region and the resulting traffic growth or demands for further transport services e.g. Regional Land Transport Strategy (RLTS).

This document 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 LTMA 2003, 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.

2.4.6 Rangitikei Land Transport Programme

This describes the general terms the Council's programme of works for which it seeks NZTA subsidy through the National Land Transport Programme in accordance with NZTA's Planning, Programming and Funding Manual 2008.

The LTMA 2003 requires Road Controlling Authorities (RCAs) to prepare programmes that contribute to three yearly Regional Land Transport Programmes for approval and incorporation into a National Land Transport Programme.

2.4.7 Horizons One Plan

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.

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 region's resources and policies for protecting them. It identifies specific management areas relating to 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.

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.

2.4.8 Rangitikei District Plan

The Rangitikei District Plan provides the land use rules for the District. The District is split up into zones, which have different land use rules. Activities may be permitted, or may require resource consent. The roading network throughout the District is designated for roading purposes. This means that roading activities can occur throughout the network without the need for resource consents.

2.4.9 Other References

The following documents influence management of the Roading activity:

- NZTA's Statement of Intent 2018-2021 – reinforce the priorities around supporting economic development
- NZTA's Rules, Policies and Guidelines (including published manuals) – provide guidance to programming planning and funding
- The Road Efficiency Group: One Network Road Classification Guidelines
- LGNZ Activity Management Plan Guide for Approved Organisations Road Networks

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Accident Compensation Commission		Limited	Correspondence
Audit NZ	Transport Sector groups	Limited	Correspondence
Automobile Association	Transport Sector groups	Limited	
Department of Conservation	Enhance conservation values	Limited	
Energy Conservation Authority	Transport Sector groups	Limited	Correspondence
Federated Farmers	Transport Sector groups	Limited	Correspondence
Local Government New Zealand	Ensure that Local Government Act is complied with	Limited	
Ministry of Education	Safety for school children	Limited	Correspondence
Ministry for the Environment		Limited	
Ministry of Health		Limited	
Ministry of Transport		Moderate	
New Zealand Police	Road Safety Partner	Limited	On-going liaison and appropriate formal contact where required
New Zealand Transport Agency	Legislative responsibilities as defined in Legislation, Funding Partner	Moderate	Continual and frequent contact where required
Central Transport Federation/Heavy Haulage Association	Transport Sector groups	Limited	Correspondence
OnTrack (NZ Railway corporation)	Transport system provider	Limited	Liaison with OnTrack on levelling crossing maintenance.

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Telecom and other telecommunications companies	Utility operator	Limited	Liaison
The Forestry Owners Association	Transport Sector groups	Limited	Correspondence
Neighbouring Authorities with road connections Wanganui District Council Central Hawkes Bay District Council Manawatu District Council Hastings District Council Taupo District Council Ruapehu District Council	Neighbouring Road Controlling Authorities are connected with a number of boundary roads and share bridges.	Moderate	On-going contact with relevant staff. Formal liaison of elected representatives at CE levels. Formal agreement has been reached, for maintenance and management of the boundary roads and bridges.
Neighbouring Authorities with no road connections.	Neighbouring Road Controlling Authorities	Limited	Regular contact with relevant staff
Mid Central Health Board	Community Health	Limited	Correspondence
Horizons Regional Council	Resource use is sustainable as directed in the RMA 1991	Moderate	
Horizons Regional Land Transport Committee	LTMA 2003 role	Moderate	Correspondence, Transport programme submission
New Zealand Transport Agency – highways division	The state highway division of the NZTA is the State Highway Authority. There are four State Highways in the District, SH1, SH3, SH54 and SH56.	Moderate	Regular communication and correspondence where required. Delegations – street lights, street sweeping on urban State Highway sections
PowerCo/Chorus	Utility Operators	Limited	Correspondence
Stakeholders – External and Local	Stakeholders Main Interest	Engagement Range	Engagement Methods
Rangitikei District Council customers and resident population	Reliable transportation services at an affordable cost	Broad	
All commercial and private road users including, Pedestrians, Cyclists, Motorists, Heavy-vehicle operators, Equestrians	Reliable transportation services at an affordable cost	Broad	

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Local Businesses/Industries	Reliable transportation services at an affordable cost	Moderate	
Local Iwi	Cultural and spiritual values	Limited	Formal liaison of elected representatives at CE levels.
Schools	Safety for school children	Limited	Correspondence
Rangitikei District Council	Maximise the purpose of local government through provision of the Transportation Activity	Broad	
Asset Managers	As above plus policy, planning and implementation of infrastructure and service management activities.	Limited	
Project Managers	Responsible for implementation of infrastructure and service management activities	Moderate	
Chief Financial Officer	Accounting for assets and for services consumed by asset management activities	Moderate	
Customer Services	Systems which minimize and resolve complaints/enquiries about service	Limited	
Elected Officials	Owner of assets, responsible for sustainable service levels under the LGA 2000	Broad	
Executive Management Team/Group Managers	Compliance with regulations, service reliability and quality	Broad	
Planners	AMP support for Long-term Plans.		

Table 2-2: Transportation Activity Stakeholders & Outcomes

2.5 Standards and Regulations

2.5.1 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 (NZTA) 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

2.5.2 Relevant Regulations Affecting this Activity

- 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)

2.5.3 Cultural Heritage

Places of particular cultural heritage value have been scheduled and identified on the District planning maps so that location is known and can be taken into account when considering development. The scheduled sites are those that are registered under the Heritage New Zealand Pouhere Taonga Act 2014, or those requested to be scheduled following consultation with iwi. Not all sites are recorded and for major developments it is important that consultation be undertaken with tangata whenua, registered archaeologists, Heritage New Zealand and the Regional Council. Protocols can be developed in the event of discovery.

The following mitigation measures may be considered when taking into account cultural heritage values or sites:

- Consultation with key stakeholders
- Development of protocols
- Due diligence prior to development

2.6 Consultation

Statutes that require Council to undertake consultation for Roading include:

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

2.6.1 Public consultation under the Local Government Act 2002

Every decision made by a local authority must be made in accordance with the provisions of the Local Government Act 2002 including section 82, the principles of consultation.

For certain decisions, the Council is required to use the Special Consultative Procedure as prescribed in the LGA 2002. Examples of decisions that can only be made following a Special Consultative Procedure are:

- adopting or amending the Long Term Plan. (The LTP is reviewed every three years with the Annual Plan giving effect to that Plan in the intervening years.)
- establishing a council-controlled organisation

- making, amending or revoking a bylaw which is of significant public interest (or likely to have a significant impact on the public)
- assessing Council's water and other sanitary services

For all other decisions, Council is required to have a Significance and Engagement Policy. This enables it to decide if a decision is significant and, if so, how it will consult with its communities before coming to a decision. A decision is considered to be significant if the consequences could be major and/or long term on:

- Council's ability to act in accordance with the statutory principles relating to local government
- The delivery of the statutory core services (including Roading)
  and/or if there is a potentially high:
- Community interest in the issue
- Financial costs/risks associated with the decision
- Non-financial costs/risks associated with the decision

The Significance and Engagement Policy also identifies all of the assets the Council considers to be strategic. The Roading assets are considered to be strategic assets: decisions that affect the whole asset group are considered to be significant.

2.6.2 Public Consultation through the LTP

Council has undertaken a range of consultation processes over the past few years to gather information on the extent of infrastructure that Council will provide or how a service is managed. Council has not undertaken consultation recently specifically on Roading Levels of Service. However Levels of Service across Council activities have been consulted through LTP consultation, which includes a special consultative procedure which is audited by Audit NZ for compliance with the LGA 2002.

The following diagram details the layers of information that underpins the summary statements in the LTP.

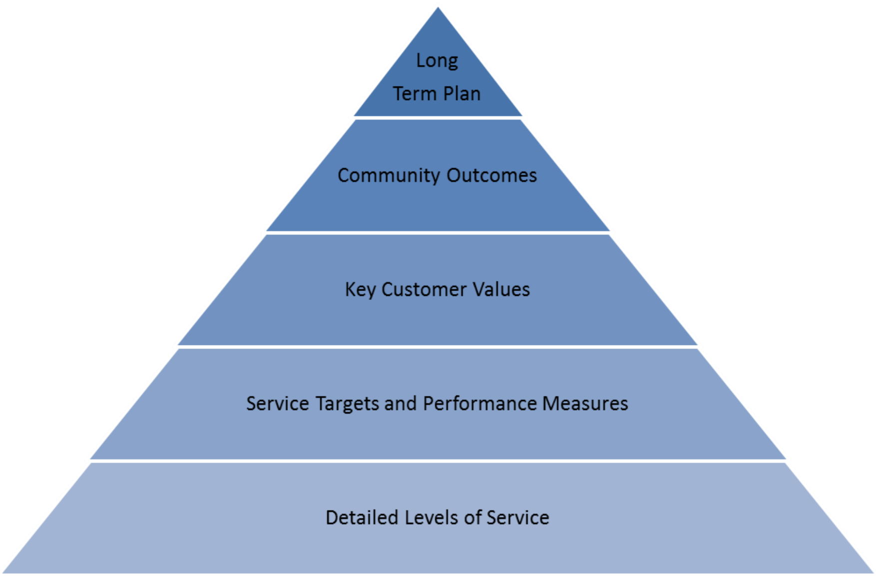


Figure 2-3: Outcomes and Levels of Service

2.6.3 Rangitikei District Council Community Outcomes

Community outcomes are defined in the LGA 2002 as "outcomes that a local authority aims to achieve". Rangitikei District Council's outcomes are:

- Good access to health services
- A buoyant District economy
- A safe and caring community
- A treasured natural environment
- Enjoying life in the Rangitikei
- Lifelong Educational Opportunities

Rangitikei District's roading network is important for meeting these outcomes. The network provides essential links around the District and to other areas, ensuring the efficient transportation of goods and services. These links also ensure the District's communities are linked via "fit for purpose" Roading.

2.6.4 Key Customer Values

The customer values that underpin the Roading group of activities are:

- Accessibility: "How easily I can get to where I want to go".
- Amenity: "My journey is a pleasant experience".
- Resilience: "I can reach my destination regardless of weather or other incidents".
- Safety: "I can get there safely".
- Travel Time Reliability: "I know how long it will take".

2.6.5 Service targets and performance measures

Performance measures and targets are established to define the standard that should be met. For the roading and footpaths group of activities there are performance measures that are mandatory and set by central government. These are:

- **Road condition:**
  The average quality of ride on a sealed local road network, measured by smooth travel exposure
- **Road maintenance:**
  The percentage of the sealed road network that is resurfaced

  The percentage if the unsealed road network which is re-metalled during the year
- **Footpaths**
  The percentage of footpaths within the District that fall within the level of service or service standard for the condition of footpaths that is set out in the Council's relevant document (such as its annual plan, activity management plan, asset management plan, annual works programme or long term plan)
- **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

Council has set targets for these performance measures in its LTP. There are additional performance measures associated with customer satisfaction and more detailed performance measures associated with the Levels of Service.

2.6.6 One Network Road Classification Customer Levels of Service and Performance

Since 2013, NZTA has been coordinating the development of the One Network Road Classification (ONRC). This aims to categorise roads based on the functions that they perform as part of the national network. The classification is intended to support local government and NZTA to plan, invest in, maintain and operate the road network in a strategic, consistent and affordable way throughout the country. It aims to give road users consistency and certainty about what standard and services to expect on the national road network.

It has three elements:

- The first is the development of the functional classification that categorises all New Zealand public roads according to their function within the national road network.
- The second is to develop Customer Levels of Service (CLoS) which define what "fit for purpose' outcomes are for each category of road in terms of mobility, safety, accessibility and amenity.
- The third is the development of performance measures and targets for each of the CLoS.

These three elements have been developed by NZTA through an extensive consultative process with all stakeholders. However, individual Councils may decide to have a higher or lower level of service for its roads than is designated through the ONRC but the matched funding available from central government is capped by the ONRC classification.

2.6.7 Detailed Levels of Service in the Rangitikei

Local Levels of Service are developed to reflect the expectations of the community and regulators. They are consulted upon through the Long Term Plan process as outlined in section 2.5.2 above.

2.6.8 Key stakeholders in the Roading Activity Management Plan

Key stakeholders are those who have significant specific involvement with the assets and/or the service facilitated by the assets and describes their particular main interest and is limited to the main issues for the key stakeholder groups. In particular 'Public Service providers' include schools, military organisations, correction facilities, hospitals, and other government organisations. 'Asset Managers' are those District Council staff (engineers and others) whose responsibility it is to manage the services made possible by the assets covered in this Activity Management Plan.

The key stakeholders and the outcomes that they require for the Roading Activity are detailed in the table below.

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Accident Compensation Commission		Limited	Correspondence
Audit NZ	Transport Sector groups	Limited	Correspondence
Automobile Association	Transport Sector groups	Limited	

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Department of Conservation	Enhance conservation values	Limited	
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Federated Farmers	Transport Sector groups	Limited	Correspondence
Local Government New Zealand	Ensure that Local Government Act is complied with	Limited	
Ministry of Education	Safety for school children	Limited	Correspondence
Ministry for the Environment		Limited	
Ministry of Health		Limited	
Ministry of Transport		Moderate	
New Zealand Police	Road Safety Partner	Limited	On-going liaison and appropriate formal contact where required
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Horizons Regional Land Transport Committee	LTMA 2003 role	Moderate	Correspondence, Transport programme submission
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Schools	Safety for school children	Limited	Correspondence
Rangitikei District Council	Maximise the purpose of local government through provision of the Roading Activity	Broad	
Asset Managers	As above plus policy, planning and implementation of infrastructure and service management activities.	Limited	
Project Managers	Responsible for implementation of infrastructure and service management activities	Moderate	
Chief Financial Officer	Accounting for assets and for services consumed by asset management activities	Moderate	

Stakeholders – External and National	Stakeholder Main Interests	Engagement Range	Engagement Methods
Customer Services	Systems which minimize and resolve complaints/enquiries about service	Limited	
Elected Officials	Owner of assets, responsible for sustainable service levels under the LGA 2000	Broad	
Executive Management Team/Group Managers	Compliance with regulations, service reliability and quality	Broad	
Planners	AMP support for Long-term Plans.		

2.7 Relationship with other Organisations

2.7.1 Ministry of Transport

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

The aim is 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. It also manages and accounts for funds invested in transport. The delivery of the transport functions is by the New Zealand Transport Agency.

2.7.2 New Zealand Transport Agency

The New Zealand Transport Agency (NZTA) is both a co-investor and manager of the state highway operations.

The Council, together with other approved Road Controlling Authorities (RCA), has a very important ongoing relationship with the NZTA, which is a funding partner to the majority of land transport activities across New Zealand. The NZTA 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 NZTA funds, through a subsidy, 50% of the cost of the Land Transport Programme for all RCAs in New Zealand.

2.7.3 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) 2018-21 contains all land transport activities of the District Councils in our Region (Wanganui, Manawatu, Rangitikei, Horowhenua, Ruapehu and Tararua) and Palmerston North City Council, the New Zealand Transport Agency (state highway division) and Horizons itself.

The RLTP 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 Horizons Regional Council also provides the natural resource management functions across the region. Horizons develops policies to guide the way we manage our Region's environmental resources – land, air, water, and coast – primarily through the One Plan (see section 2.3.8 above).

2.7.4 Road Controlling Authorities

This term describes an organization that manages and controls activities associated with roads. The term comes from the Land Transport Management Act 2003 and is used throughout the country, it includes District Councils, the NZTA state highway division, and the Department of Conservation.

Council is an RCA and has working relationships with neighbouring RCAs;

- Wanganui District Council
- Central Hawkes Bay District Council
- Manawatu District Council
- Hastings District Council
- Taupo District Council
- Ruapehu District Council

Agreements exist with these authorities which outlines who has specific responsibilities to maintain assets, on various boundary roads.

NZTA is responsible for the State Highways 1, 3 and 54 that traverse through the Rangitikei District. A Memorandum of Understanding exists between NZTA and individual RCAs over responsibilities and obligations.

2.8 Potential Issues

2.8.1 Negative environmental effects

There are a number of adverse environmental effects that can occur in the process of undertaking transport related development, particularly major construction projects. The potential effects of the Roading Activity can be generated during both the construction phase and the operational use of the network. The information provided below outlines some of these issues and associated mitigation measures that could be employed.

Dust

Dust can affect vegetation health along the edge of the earthworks area, can be a nuisance to the surrounding public, and can contribute to sediment loads by being deposited in areas without sediment control measures. Sediments deposited on sealed public roads can also result in a dust nuisance. Similarly, unsealed roads can present a dust nuisance during periods of prolonged drought.

The following mitigation measures may be considered in the control of dust emissions:

Wheel washing for trucks leaving development sites
Spraying down areas (with water) to control dust emissions
Monitoring at site boundaries

Sediment Runoff

Sediment runoff from development works is generally controlled via sediment control techniques and administered by the Regional Council. Sediment from exposed areas of land can enter waterways, streams and rivers, potentially causing adverse effects to fauna and flora.

The following mitigation measures may be considered in the control of sediment runoff:

- Effective sediment control techniques such as cut-off drains, ponds, and silt fences retain sediment and prevent it from entering water systems
- Compliance with an approved sediment and erosion control plan

Noise
Noise is a factor to be considered during construction projects. The documents that Council shall have regard to NZS 6806: 1993 Road Traffic Sound and “Guidelines for the Management of Road Traffic Noise – State Highway Improvements” by Transit New Zealand 1994.

The following mitigation measures may be considered in the control of noise emissions:
- Hours of permitted work
- Monitoring at site boundaries
- Compliance with standards
- Community consultation

Stormwater Discharges

Stormwater discharges need to be managed to prevent pollutants from entering waterways. Roads provide a number or potential contaminants such as metals (from vehicles), hydrocarbons, gross pollutants (litter) and herbicides (from vegetation control). These can cause adverse effects for flora and fauna in receiving waters. In addition, stormwater pipes/culvert outlets can cause scour during large flows.

The following mitigation measures may be considered in the control of stormwater discharges:

- Retention dams, swales, and outfall structures to dissipate flows. Any number of options can be evaluated prior to consent approvals.
- Evaluate receiving waters to determine background water quality
- Monitoring of the mixing zone

2.8.2 Resilience
Resilience is determined in terms of how well the network can withstand short and long term interruptions. The District is prone to emergency events such as floods and slips, high winds and earthquakes. There is also the very real threat of volcanic activity from the Central Plateau and Mt Taranaki, and climate change may bring sea level rise to some of our coastal communities.

Tracking legislation with respect to climate change and consistent monitoring of natural hazards and their impacts will need to be ongoing.

2.8.3 Regional Economy and its Impact on Transport Demand

Agribusiness

The National Freight Demands Study 2014 provides a snapshot of New Zealand's current freight task and a forecast of what it will look like over the next 30 years. The Study has estimated that the three most important destinations of freight in 2042 will be Taranaki with an estimated 2.59 million tonnes of freight, Wellington (1.81m/tonnes) and Hawke's Bay (1.20m/tonnes).

The most important origins of freight for our District will be Auckland (2.40m/tonnes), Hawke's Bay (1.48m/tonnes) and Wellington 1.42 (m/tonnes). Taranaki, Hawke's Bay and Wellington, therefore, are the key origin-destinations in moving freight efficiently and effectively during the lifetime of the AMP.

The District's economy is reliant on the land transport network in transporting product from its point of origin to its destination. A large proportion of the District's primary product eventually makes its way out of the region for either export overseas or to be redistributed to other parts of New Zealand. Therefore it is critical to the economy of the region that transport links are resilient.

The dairy supply chain is complex, with varying degrees of movement throughout the region to processing plants both within and outside the region. Nationally, around 50% of dairy products are moved by rail. However, this is higher in the Manawatu - Wanganui Region because milk is conveyed from the processing facilities at Oringi and Longburn to the Whareroa plant in Hawera. There is also a large counter flow from Hawera to the Port of Napier, with finished product being sent for export from Napier.

In 2015, Fonterra's Pahiatua milk processing facility was upgraded with a new milk powder dryer. All the milk produced in the eastern North Island from the Hawke's Bay to Wellington is converted to milk powder at the Pahiatua facility, therefore negating the need for it to be transported to Hawera.

There are a number of meat processing facilities in the District and region that contribute to it having the largest volume of stock movements in the country. About 44% of meat is conveyed by rail around New Zealand as many meat processing plants have railway sidings. Most meat processed within the Region that goes for export is transported to either the Ports of Tauranga or Napier.

Forestry is likely to contribute more to the economy in the years between 2020-2030 as much of the Region's forestry estate reaches its harvestable age, although when it gets harvested will generally depend on its commodity price at the time. There are large plantations of forest in the Rangitikei, Ruapehu and Whanganui Districts, accounting for more than 75% of the total land area planted with radiata pine in the Horizons region. Most of the logs will get transported via road, particularly local roads, but in some instances are transported by rail. Most logs get exported via the Ports of Napier, Taranaki and Wellington (CentrePort).

Tourism

The regional tourism industry is largely reliant on the domestic tourism market, with no international airports or seaports in the District. Most tourists will enter the District via the land transport network as free independent travellers rather than on organised tours. The Region accounts for 4.3% of tourism spend within New Zealand. The major tourist destination in the Region is Palmerston North, accounting for about 40% of all regional tourism spend. Due to its central location and ease of access, it is a major domestic conference and sporting venue which accounts for a large amount of its domestic tourism visits. International visitors are more important to the Ruapehu and Wanganui Districts, where there are major recreational attractions such as the Tongariro and Whanganui National Parks.

The Ruapehu and Wanganui Districts also have two of the 'Great Rides', that comprise the national cycleways network, Nga Haeranga: The Timber Trail and the Rivers to Sea cycle trails. The trails are the 'premier' rides on the network. In recent years the network of cycle routes has been expanded to include a number of on-road cycle touring routes, with the long-term aim of developing a nationwide cycling network, enabling locals and international visitors to explore all of New Zealand by bike.

2.9 Strategic Assessment

The Strategic Assessment defines the problems, benefits, and consequences of the issues that the District is facing over the lifetime of the AMP. The issues tend to be multi-faceted and there are generally no 'quick fixes'. They may take many years from start to finish to resolve. Progressing roading projects through the Business Case phases to Implementation can take many years.

The identified issues in the District are:

- Integrated land use and transport planning to:
    - Produce a more resilient network, and
    - Provide a more structured roading hierarchy that appropriately reflects road use;
    - Links to the south of the District and to the north of the regional border between the Desert Road Summit and Taupo;
- Anticipated economic growth in the Rangitikei District leading to:
    - Increasing pressure on the Region's rural roading network, particularly the impact of increased freight distribution; forest harvesting, agricultural use and potentially tourism traffic; and
    - an increasing role for secondary strategic links that are providing east-west links, alternative routes and for tourism/economic development purposes;
- The need for continued improvements to road safety in the District;
- Mitigating adverse environmental effects from the regional transport system.

2.9.1 Integrated land use and transport planning

The District, largely due to its central location, is well served by a strategic network of road, rail and air links, with access to ports in neighbouring regions. In order to ensure that sustainable economic and social development of the District is supported, it is vital to ensure that this network continues to function well.

In line with the Road Maintenance Taskforce's recommendations Council is taking a 'One Network' approach to asset management. Council collaborates with Manawatu and Horowhenua District Councils and engages in joint management of the network to improve efficiency.

The Road Efficiency Group (REG) formed the One Network Roading Classification (ONRC). This involves the categorising of roads based on the functions they perform as part of an integrated national roading network. This classification will help Council plan, invest in, maintain and operate the road network in a strategic, consistent and affordable way. Counsel began implementing the ONRC in the 2015-18 NLTP period.

The One Network Road Classification ensures more efficient freight movements as roads across the District, Region, and nationally, and will provide a level of service based upon the function they perform.

However, there are a number of vulnerable sections of the network, which will become subject to increasing pressure over the coming years if traffic growth occurs. Of particular importance is the role of freight and its predicted growth.

2.9.2 Anticipated economic growth

Rangitikei District Council, along with other Councils in the Region, has also invested in Accelerate 25. This is an implementation plan that takes opportunities identified from the Regional Growth Study and puts them into practice. The base strategy was completed in June 2015 and will be subject to ongoing monitoring and development. It builds on the strength the Region has in agribusiness from primary producers through to secondary processing and food-based research and development. Collectively, the Councils in the Region see significant advantages in building on the agribusiness base and aim to double the Region's agribusiness exports by 2025.

As the benefits expected from the Regional Growth Study and Accelerate 25 begin to accrue, Rangitikei and the other Councils are likely to continue to invest in the land transport network, as the distribution of product from market will be key to unlocking anticipated growth.

Increasing pressure on the Districts rural roading network

Rural roading networks are critical to the District's economic success, providing access to farming and forestry areas and service centres. Council faces increasing challenges to maintain networks that are appropriate for the heavy vehicles that use them to bring out primary products, as well as catering for residential access. Council also faces increasing costs associated with the maintenance of routes that have a more strategic inter-district role. In addition, the local roads often provide the important 'first and last' kilometre of the journey from the producer of goods to the market. The ONRC will support the prioritisation of strategic routes for the District roading network

Boundary bridges

The Council maintains 253 bridges (this total includes 96 major culverts) ranging in size from small timber bridges to the 140 m long Mangaweka Bridge over the Rangitikei River on Ruahine Road.

There are bridges that straddle the District's boundaries. Three are state highway bridges and the Council has no responsibility for them. Responsibility for the other six bridges is shared as shown in Table 3 below.

Road Name	Bridge Name	Plate Year	Responsibility
Taihape Napier Road 2	Kurapapaonga Bridge	1961	HDC / PNCC
Mangamahu Road	Whylies Bridge	2015	WDC/RDC
Kauangaroa Road	Kauangaroa	1974	WDC/RDC
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

Table 2-3: Bridges with shared responsibility

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 NZTA.

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.

2.9.3 The need for continued improvements to road safety in the District

Road crashes have a huge social and economic cost to the District. The estimated value of each life lost in a road fatality is $4.61 million.

The National Road Safety Strategy, Safer Journeys 2020, is a strategy to guide improvements in road safety over the period 2010-2020. Its aim is to create a safe road system increasingly free of death and injury. To do so, the Strategy describes using a Safe Systems approach that works across all elements of the road system: roads, speeds, vehicles and users.

The Strategy identifies 13 areas where current performance needs to be strengthened and ranks them into areas of high concern, medium concern, and continued and emerging focus. Coupled with this national focus, is the "Communities at Risk" register that identifies communities with a significantly higher than average risk of crashes involving certain causal factors. The Communities at Risk and Safer Journeys will guide investment in road safety until at least 2020.

Since *Safer Journeys* was introduced the national road toll has dropped to totals not seen since the early 1950s when the population was far smaller and there were far fewer cars on the roads. While improvements have been made, it is considered that work is still required to reach the ultimate goal of a zero road toll.

The work done in the District contributes to improving the outcomes identified in *Safer Journeys*. Since the 2015-25 Activity Management Plan was adopted, there have been some big improvements in the number of fatalities and serious injuries in the District.

It is important that all road safety partners continue to work in a coordinated manner in order to reduce the amount of fatalities and injuries on the Region's roads.

Some of the main contributing factors to road crashes in the Region are:

- Intersection crashes, occur at a higher rate regionally than the national average on both rural and urban roads.
- The Region accounts for 7.7 percent of national serious trauma from crashes involving alcohol and/or drugs. The Region accounts for just 5.2 percent of New Zealand's population.
- Motorcyclists are also more likely to be killed or injured in this Region than would be expected nationally.
- Fatigue is a particular problem on State Highway 1 two to three hours north of Wellington.

Regionally, local Road Safety Action Plans provide a means for all road safety partners across the traditional three 'E's', engineering, enforcement and education, to cooperate on achieving positive road safety outcomes.

2.9.4 Mitigating adverse environmental effects from the regional transport system

The transport system is responsible for about one-fifth of New Zealand's climate changing greenhouse emissions and, under a "business as usual" scenario, these are anticipated to increase over time. An increase in the use of alternative and energy efficient transport modes is needed to combat transport emissions. Transport emissions are the largest contributor to poor air quality in New Zealand. However the District's air quality is generally good.

There are also a number of other negative effects that the transport system produces. Contaminants such as those from vehicle tyres, brake pads, oil and grease and the wear of bitumen from road surfaces can all end up in the District's air, water and land. Large construction projects can also lead to adverse environmental effects. Runoff from earthworks can end up in waterways and dust can become airborne if not mitigated effectively.

Promoting energy efficiency, particularly via the promotion of alternative modes of transport such as walking and cycling is a key contributor to mitigating the adverse environmental effects of the land transport system.

2.9.5 Outcomes

The Strategic Assessment has identified a number of outcomes that Council will hope to achieve with its Activity Management Plan. They are:

1. Enhanced freight efficiency across the District;
2. Enhance the strategic advantage of the freight hub for the central North Island;
3. Better targeted investment for a strategic network;
4. A safe land transport system; and
5. A resilient and multi modal transport system.

These outcomes contribute to the purpose of the LTMA 2003 and are consistent with the draft Government Policy Statement on Land Transport Funding. They do not differ greatly from the outcomes of Activity Management Plan Roading 2015-2025. The AMP contributes to an effective, efficient, and safe land transport system in the public interest.

The first two outcomes capture the strategic direction carried over from the 2015-25 Activity Management Plan that focused heavily on supporting economic growth and connecting to national transport corridors. This is still a relevant issue for the District and is also consistent with the purpose of the LTMA 2003 and the current GPS.

The third objective focuses on a number of major work streams that are ongoing and will have an impact on the delivery of the road network over the lifetime of the AMP, such as the One Network Roading Classification, HPMV and 50Max implementation (heavy vehicles that do not need a permit to take up to 50 tonnes maximum loading). It focuses on the efficient delivery of the network.

The focus of the fourth objective, safety, has always been a focus of previous AMPs. Road crashes have a huge social and economic cost to the District and the use of some other modes of transport (i.e. walking and cycling) is declining because of concerns about safety and personal security, whether real or perceived.

The fifth objective recognises the varied transport needs of the District’s residents, some of whom have a high degree of choice and flexibility, while others have limited options for getting around. It acknowledges the need for increased choice of personal transport in order to reduce dependence on car travel. It also recognises the need for the transport system to be adaptable to changing circumstances and to respond to the needs of the District’s varied communities.

2.10 Key Results Areas (KRAs)

The identified KRAs will guide investment in the land transport network for the duration of the AMP. These priorities link the strategic outcomes to the roading operations. Council has ranked the KRAs to provide a clear direction to operational aspects. This in turn provides a clear direction to NZTA when it compiles the NLTP.

A number of the identified KRAs are extensions of themes running through previous iterations of the AMP.

2.10.1 KRA 1: Efficient road maintenance and delivery

The ONRC was produced to address and implement efficiencies in the delivery of road maintenance. This AMP incorporates the ONRC, which is a classification of roads based on the function they perform in the overall national picture.

As the implications of the ONRC become apparent, maintaining the existing roading asset at its current level of service may require additional ratepayer funding if this level of service is above the level identified in the ONRC.

This, along with the increasing cost of maintaining and renewing the District's roads means that the road maintenance dollar will need to spread more thinly. In addition, continuing population growth is uncertain and so it may be that the rates burden is spread across fewer ratepayers.

Safety is a key component of this priority as this forms one of the key deliverables of the land transport system. Road maintenance plays an important part in road safety as a lowering of roading standards can be a contributing factor in road crashes.

Links to outcomes:

- Better targeted investment for a strategic network
- A safe land transport system

2.10.1.1 Council will ensure the road network provides suitable access to business, educational, social and recreational services for the District's residents and businesses by;

- Maintaining and renewing roads in a manner consistent with their function as identified in the ONRC.
- Providing and maintaining local roads that cater appropriately for the needs of businesses and communities.
- Separating arterial and local road traffic where appropriate.
- Maintaining and renewing existing transport links into rural areas to facilitate economic growth.
- Collaborating with other road controlling authorities in order to maximise investment.
- Implementing the ONRC in the 2018-21 National Land Transport Programme timeframe.
- Completing renewals and maintenance programmes achieved within budget.
- Reduce costs in road maintenance activities through improved asset management practices.

2.10.1.2 Council will ensure continuous improvement in District road safety by;

- Utilising a safe systems approach involving a combined package of measures targeting safer road users, safer vehicles, safer roads and safer speeds.
- Targeting the areas of highest risk (as identified in road crash statistics) for road safety interventions.
- Promoting the development of a road safety culture
- Ensuring that safety and personal security are fully considered when implementing transport projects.
- Regularly reviewing and implementing District Road Safety Action Plans ensuring good coordination between districts on common road safety issues.
- Reducing the number of serious and fatal road crashes year on year.
- Reducing annual social cost of crashes.

2.10.2 KRA 2: Improved connectivity of key strategic routes

With the Government's and Region's current focus on economic growth, in particular through the Regional Growth Study and Accelerate 25, it is importance to the District that the arteries of the land transport network have sufficient capacity to enable economic growth. This is important for our District as it serves as the crossroads for much north-south and east-west traffic in the lower North Island. As the majority of freight is still forecast to be carried on road during the lifetime of the AMP, it is important that the key strategic routes are capable of carrying HPMVs.

Links to outcomes:

- Enhanced freight efficiency across the Region
- Enhance the strategic advantage for the freight hub for the central North Island
- Better targeted investment for a strategic network
- A safe land transport system

2.10.2.1 Council will maintain and renew the strategic transport network to ensure safe, efficient intra- and inter-regional accessibility and links with national transport corridors by;

- Protecting the current and future functions of the strategic transport network through designations and appropriate planning processes.
- Ensuring the strategic transport network is resilient to disruption from adverse weather and other hazards, and that there are available alternatives of appropriate standard for this function.
- Maximising the existing capacity of the strategic transport network by efficient network management techniques.
- Minimising the negative effects of land use intensification on the strategic roading network.
- Work with neighbouring Districts through their AMP development and implementation.
- Implement the recommendations of the Joint Transport Study, subject to scheme assessment reports and further consultation with affected communities, to ensure that the strategic transport network in the Rangitikei caters for future growth and facilitates economic development.
- Implement safety realignments on strategic routes in identified priority order through the AMP.
- Identify and advocate for maintenance and renewal of strategic routes that have inter-regional significance.
- Submit on District Plan reviews and land use proposals to ensure effects of development on existing and future networks are avoided or mitigated.

2.10.2.2 Council will support the provision of effective connections to the District/Region's principal economic growth and productivity areas by;

- Maintaining and renewing rural roads and bridges as necessary to cater for commercial, agricultural, forestry and tourism traffic.

- Encouraging the separation of arterial and local road traffic where appropriate.
- Implementing the recommendations of Accelerate 25, where appropriate to encourage further economic development in the District.

2.10.2.3 Council will support the efficient and effective movement of freight within and through the District by;

- Planning, maintaining, and developing transport corridors to support and encourage the District's role in the efficient distribution of freight throughout New Zealand.
- Supporting the integration of modes, where possible, to encourage the most efficient and effective inter- and intra-regional movement of freight.
- Considering the needs of freight distribution in planning documents, and ensure the availability of suitable land to facilitate this.
- Supporting the provision of facilities for the transfer of freight between transport modes, as appropriate.
- Establishing and protecting a safe network of routes for 'high productivity motor vehicles', where appropriate.
- Ensuring that freight corridors are resilient to disruption from adverse weather and other hazards, and that there are available alternatives of appropriate standard to minimise disruption of freight flows.
- Promoting and providing infrastructure that mitigates adverse environmental effects resulting from the transport system, such as stock truck effluent disposal sites.

2.10.3 KRA 3: Plan for and proactively respond to demographic change and impacts of land use charge

Current demographic trends are showing that households are getting smaller and the population is ageing and becoming more urban. There may also be a change in car driving habits with less vehicle ownership and fewer VKT driven per person.

It will be important during the lifetime of the AMP to ensure that access to services is secure, particularly for the District's rural communities. As the population becomes more urbanised key services, such as health, postal and banking, have been gradually reduced and centralised.

Changing demographic trends will have considerable impacts on how people use the land transport network and there are also particular conflicts on the rural-urban periphery where the urban areas in the District are experiencing, or planning, growth. Making sure that land use planning considers future transport needs is important to ensure that the District is not locked into inefficient use of transport resources that is difficult and expensive to mitigate at a later date.

Accelerate 25 will investigate ways to maximise the value of outputs from the land which may have some impacts on long-term land use change. It is important that the AMP is aligned with Accelerate 25.

Links to outcomes:

- A resilient, multi modal land transport network
- A safe land transport system

2.10.3.1 Council will ensure land use planning recognises potential impact on existing transport systems by,

- Ensuring new land use development includes provision for walking, cycling and public transport services, consistent with relevant best practice guidance.
- Promoting increased urban housing density in areas or corridors with high accessibility via several transport modes, such as along bus routes.
- Promoting the establishment of community facilities in new areas of development in order to reduce the need to travel.

2.10.3.2 Council will encourage effective integration of transport and land use planning in growth areas by,

- Ensuring that current and future transport corridors are identified and protected in planning documents.
- Developing transport projects and services which are consistent with land use plans and strategies.
- Ensuring freight and tourist flows are taken into account during planning processes.
- Ensuring alignment with the Regional Land Transport Plan.
- Collaborating with neighbouring territorial authorities on walking and cycling strategies, new developments and urban growth.

2.10.4 KRA 4: Increased focus on pedestrians and cycling

Walking and cycling has declined over the past 20 years throughout New Zealand. Lifestyle changes have played a part, and the convenience and availability of low-cost vehicles have contributed to this decline. However, the Government has recognised the important role walking and cycling can have in positive economic, social and environmental outcomes.

The GPS 2015-25 encourages progress on improving urban cycling networks, or commuter cycling. Encouraging walking and cycling in urban, and between, urban centres can support economic growth and productivity through the provision of better access to markets, employment and business areas. It also improves capacity on existing roads through mode shift and so lessens the amount of maintenance and renewal needed.

The District continues to promote walking and cycling as convenient and healthy methods for short trips, as well as trips connecting main urban centres, including an ongoing programme of infrastructure improvements in order to facilitate growth.

Links to outcomes:

- A resilient, multi modal land transport network
- A safe land transport system

2.10.4.1 Council will encourage the uptake of walking and cycling as transport modes and for recreation by,

- Providing new infrastructure that caters for safe walking and cycling, where appropriate.
- Maintaining current walking and cycling facilities to appropriate standards.

- Encouraging walking and cycling through travel behaviour change programmes, and promotional and educational activities.
- Providing facilities which enable transfer between modes, such as bike parks at bus terminals and cycle carriers on buses.
- Developing and promoting recreational walkways and cycle ways where appropriate.
- Promoting the role of cycling in tourism and recreation in the District.
- Increasing uptake of walking and cycling counts.
- Continued investment in walking and cycling facilities.

3 Description of Assets

3.1 Introduction Overview

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

3.1.1 Asset Register

The Transportation assets are managed in a RAMM (Road Assessment and Maintenance Management) Database. Over 47,500 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

Limited access is provided to the RAMM database to licensed users of the database, to manage and control data integrity.

3.1.2 Asset Data Collection

Existing Assets – The assets contained in the database, with useful life remaining are managed both in the field with electronic collection devices, and in-house with desktop application. Modifications consist of maintenance cost inputting, updating replacement information and work programme management.

Vested Assets – New assets, that are constructed by Council initiated work programmes or new land development is uploaded into the RAMM database. Pre-established default unit rates and useful lives automate and simplify the process for future data management. Specific requirements are required as part of construction projects and subdivision development to provide the data in an electronic format complying with Council's requirement to simplify and ensure quality data uploads.

Disposal of Assets – Any surplus asset that is removed from service, is deleted from the RAMM database.

3.1.3 Asset Condition Monitoring

The inspections of roads, bridges and structures, culvert inspection, traffic facilities (signs and lights), is undertaken on a regular cycle by both the road network maintenance contractor and Council's roading engineers to monitor and evaluate the asset conditions. Specific inspections are initiated after weather events to ensure road closures and damage is managed in a timely manner.

Specialist inspections of roads are conducted on roads to assess the condition rating (roughness) of pavements. Roughness and condition rating surveys of all sealed roads are undertaken every second year. Condition rating surveys of all sealed roads carrying more than 2000 vehicles per day are undertaken annually. External service providers provide the resource to complete these surveys.

The condition of the assets are linked to the levels of service specified in the LTP, this Asset plan and the road network maintenance contract.

3.2 Summary of Services (Infrastructure assets included in the Plan)

The Rangitikei District is diverse in terms of the geographic and topographic nature of the area. Land use is diverse from forestry, beef and sheep farming in the upper elevated northern portion, and widespread dairy agricultural land use in the central and southern areas. The economic productivity of the region is supported by a number of processing facilities in the District plus access to regional ports in neighbouring districts/regions. The transport network is a vital role to the ongoing economic productivity of the District.

We provide a roading network of 1226 km of roads (65% of which are sealed) and 267 bridges and including 106 large culverts. This enables transportation and access throughout the district.

3.2.1 Assets Included in this Plan

The inventory of the Transportation services and assets owned by the Rangitikei District Council is shown below. It does also include the land value associated with the assets.

3.2.2 Asset Components

Asset Type	Component	Unit	Quantity	ORC Value
Bridge	Bridge (Culvert)	m	1,276	$11,155,988
	Bridge (Deck)	m^2	18,802	$87,383,742
Crossing	Crossing	Each	4,433	$6,518,210
Drainage	Drainage	Each	1,073	$1,584,358
		m	56,413	$20,847,686
Footpath	Footpath	m	250	$28,213
		m^2	159,961	$12,177,514
Land	Rural	Ha	3,951	23,706,000
	Urban	Ha	226	16,272,000
Marking	Marking	Each	1,517	$36,101
		m	251,251	$80,638
Railing	Railing	m	17,484	$2,380,908
Retaining Wall	Retaining Wall	Each	3	$32,640
		m	121	$758,417
		m^2	11,745	$13,415,890
Shoulder	Shoulder	m^2	109,310	$138,992
Sign	Sign	Each	5,660	$1,452,666
	Sign Post	Each	3,035	$390,831

Asset Type	Component	Unit	Quantity	ORC Value
Streetlight	Street Light (Bracket)	Each	1,864	$651,989
	Street Light (Light)	Each	1,651	$536,710
	Street Light (Pole)	Each	281	$926,226
SW Channel	Surface Water Channel	m	1,326,633	$15,561,957
Treatment Length	Formation Region A	m^3	1,725,753	$41,450,346
	Formation Region B	m^3	4,284,566	$102,909,706
	Formation Region C	m^3	1,855,508	$44,566,875
	Pavement 1st Coat	m^2	4,708,438	$22,286,077
	Pavement R k-Depth	m^3	1,158,842	$79,954,834
	Pavement R u-D <2000	m^3	1,643	$113,369
	Pavement R u-D >2000	m^3	3,286	$226,737
	Pavement U k-Depth	m^3	115,490	$7,968,302
	Pavement U u-D <2000	m^3	1,901	$131,143
	Pavement U u-D >2000	m^3	3,801	$262,286
	Pavement Unseal	m^2	2,493,144	$7,181,310
	Surface Structure	m^2	6,300,002	$24,189,152

Table 3-1: Asset Components

3.3 Network Hierarchy

A One Network Roading Classification Hierarchy has been developed (see Figure 3-1 below).

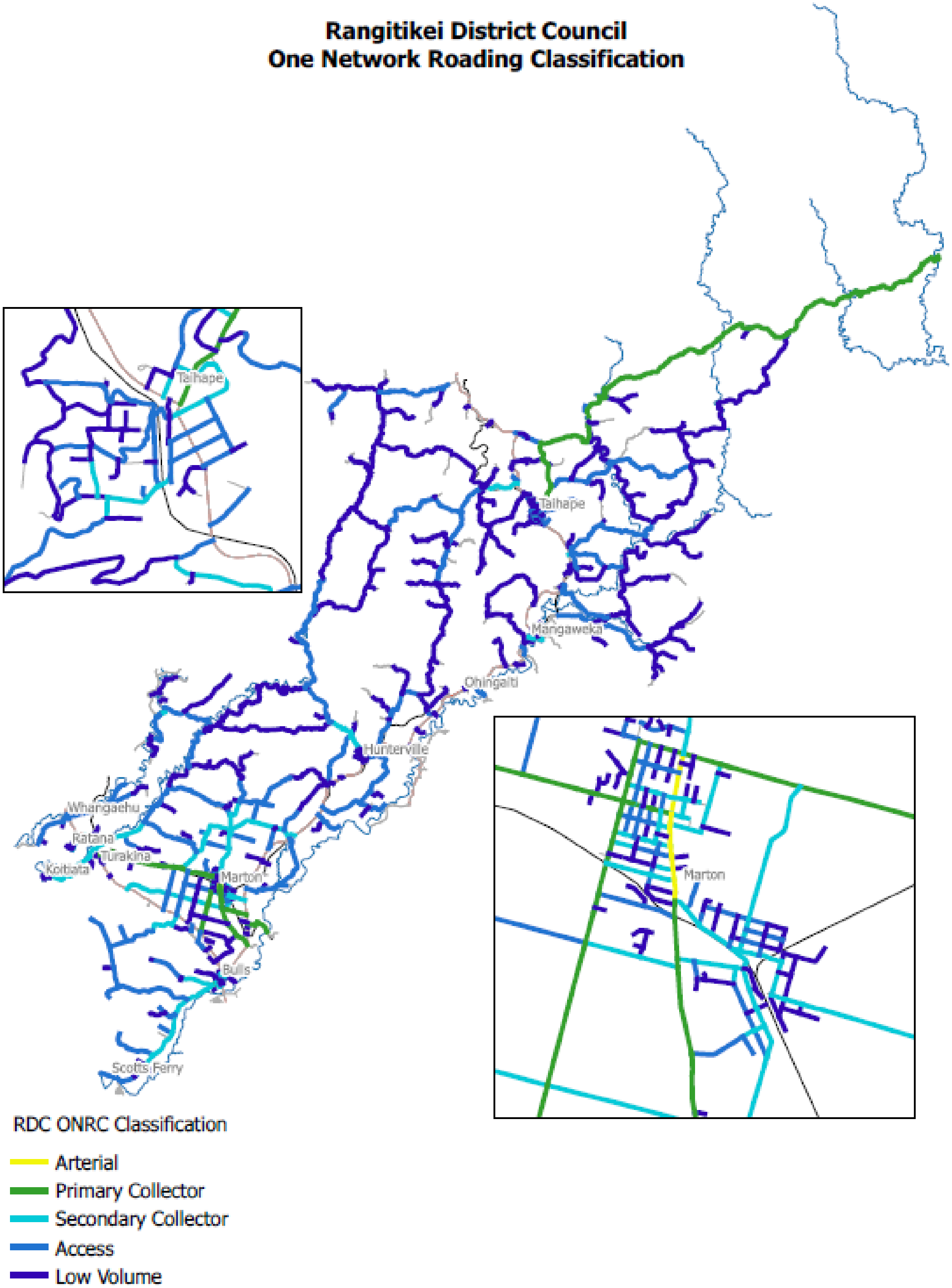


Figure 3-1: One Network Roading Classification Hierarchy

3.3.1 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.

3.3.2 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. 3 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. 2 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 1 other criteria (i.e. 2 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 theymay 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. 1 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. 1 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.

In the Primary/Secondary Collector and Access road categories we propose that the criteria other than the Typical Daily Traffic, Heavy Commercial Vehicles, Bus Urban Peak can be used to move a road up a category on the basis of local knowledge. For example, an Access road may provide critical connectivity or provide access to a regionally or locally significant tourist destination warranting it moving up a category to Secondary Collector even through it does not conform to the movement criteria for that category.

ONRC – functional classification

CATEGORIES/CRITERIA	MOVEMENT OF PEOPLE AND GOODS				
	AADT	HCV	BUSES	ACTIVE MODES	LENGTH (km)
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		1.69
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		118.034
SECONDARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic or HCV)	Urban: > 1,000 Rural: > 200	>25		Significant numbers of pedestrians and cyclists (urban peak) or part of identified cycling or walking network	113.862
ACCESS All other roads **(LOW VOLUME)** Meet low volume Typical Daily Traffic	Urban: > 1,000 Rural: > 200 Urban: < 200 Rural: < 50	<25			992.078

Table 3.2: ONRC – functional classification and the corresponding lengths for the Rangitikei District

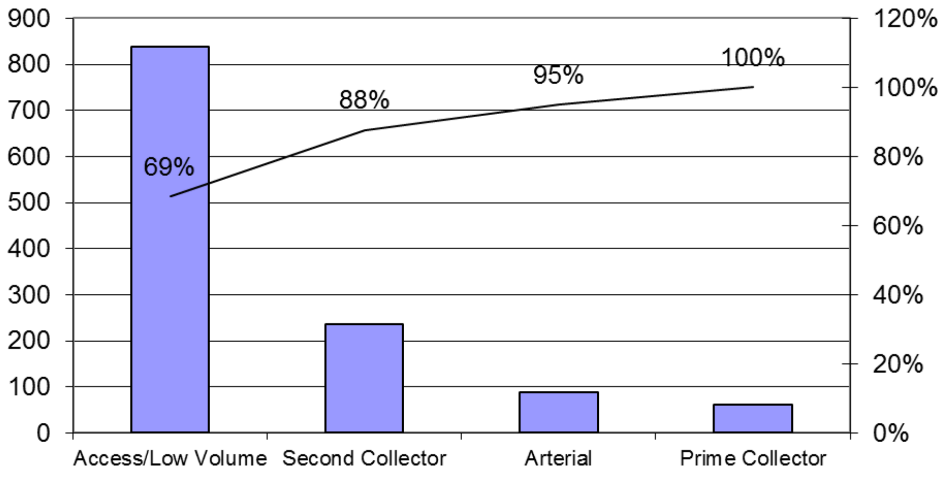


Figure 3-2: Pareto Chart: ONRC – functional classification percentage by length

3.4 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.

3.4.1 Network Summary – Length (km)

	Sealed	Unsealed	Network
Urban	82.3	3.0	85.3
Rural	714.5	425.8	1140.4
Both	796.8	428.8	1225.6

Table 3.3: Network Summary – Lengths

3.4.2 Network Summary – Proportion

	Sealed	Unsealed	Network
Urban	6.7%	0.2%	7.0%
Rural	58.3%	34.7%	93.0%
Both	65.0%	35.0%	100.0%

Table 3-4: Network Summary - Proportions

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.

3.4.3 Network summary – Use

VKT	Sealed	Unsealed	Network
Urban	23.16%	0.03%	23.18%
Rural	72.04%	4.77%	76.82%
Both	95.20%	4.80%	100.00%

Table 3-5: Network Summary – Use

The tables above show that while 35% of the network consists of unsealed roads these contribute to less than 5% of the use of the network.

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.

3.5 Other Facets of the Transportation Activity

In providing transportation services to Rangitikei District, Council manages assets and delivers programmes that support effective and safe use of the transport network.

'Non-asset' solutions focus on improving the use of existing assets and supporting behaviour change to achieve better outcomes for the community.

Council is actively involved in the following areas:

3.5.1 Road Safety

Implementing national, regional and local road safety initiatives involves the co-ordination of activities within the Transportation team. Road Safety Action Plan forums are operational and include involvement of external stakeholders such as NZ Police, Regional Road Safety coordinator, ACC and NZTA.

3.5.2 Walking and Cycling (Active Transport)

Encouraging walking and cycling provides positive benefits for health and efficient use of the transportation system.

3.5.3 Transportation Planning

The transportation sector is highly regulated and planning is required to ensure:

Long Term Planning and consultation occurs as required under the Local Government Act 2002
NZTA requirements are met in terms of funding applications and reports along with compliance with rules and guidance
Development is managed effectively within the Resource Management Act 1991 and the Regional/District Planning Framework
The asset is managed effectively and efficiently through the use of technology, information management and wise decision making

Transportation planning is undertaken by the Asset Manager –Roading with support from internal transport staff, and consultants.

4 Value

4.1 Background

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.

The Council's current policy is to revalue infrastructural assets on a yearly basis, and to annually review the extent of the change from the previous year. This helps 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. Road assets are by Council staff and specialist consultants in accordance with the following standards:

NZIAS16 The NZ Equivalent if International Accounting Standard 16, Property, Plant and Equipment
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 valuation calculates the following items are calculated for the subject year:

- Replacement Cost (RC),
- Optimised Replacement Cost (ORC),
- Depreciated Replacement cost (DRC),
- Depreciated Optimised Replacement Cost DORC) and
- 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.

4.2 Valuation Assumptions

4.2.1 Pavements

Pavements are the most valuable asset group of the network. Pavements are depreciated on a straight-line basis using relevant RAMM data and the assumptions outlined below. Unit rates are supplied by Council.

4.2.2 Footpaths

Footpath Base-course and surfaces are depreciated on a straight-line basis in relation to asset condition.

The expected useful lives vary for materials including 30 years for asphalt and 80 years for concrete (refer report for details).

4.2.3 Kerbs and Channels

Kerbs and channels are depreciated on a straight-line basis in relation to asset condition.

The expected useful lives vary for materials and design, 50-80 years is typical (refer report for details).

4.2.4 Bridges

Bridges are depreciated on a straight-line basis. Assets have been allocated base life of ranging between 150 years for a concrete structure constructed after 1972 to 50 years for an Armco culvert, i.e. dependant on the type of construction. The expected life of each structure has been calculated based on the known construction date and the current condition (used to calculate the remaining life).

4.2.5 Street lighting

Poles and brackets are depreciated on a straight-line basis with asset age based on known or assumed installation dates.

Lamps have been depreciated on a straight-line basis based on an assessment provided by the Contractor.

The age of the street light asset varies considerably.

4.2.6 Traffic Services

Signs are depreciated on a straight-line basis assuming the asset is half way through its expected life of 10 years on average.

Road markings are not valued or depreciated as these are considered a maintenance activity.

4.3 Valuation Report

Asset Description	Replacement Cost	Total Accumulated Depreciation	Depreciated Replacement Cost	Annual Depreciation
Land	$39,978,000	$0	$39,978,000	$0
Formation	$190,087,915	$0	$190,087,915	$0
Pavement Layers	$112,426,522	$78,205,080	$34,221,442	$1,686,647
Pavement Surface	$30,368,665	$18,869,013	$11,499,652	$2,908,160
Shoulders	$138,992	$17,310	$121,683	$689
Bridges and Major Culverts	$88,320,059	$44,932,704	$43,387,355	$797,602
Drainage	$21,510,865	$11,727,558	$9,783,307	$260,267
Surface Water Channels	$15,107,259	$11,774,774	$3,332,485	$184,516
Retaining Walls	$15,672,163	$3,991,402	$11,680,761	$195,902
Footpath	$12,431,740	$7,191,568	$5,240,171	$189,632
Markings	$106,564	$0	$106,564	$0
Signs & Posts	$1,991,682	$784,488	$1,207,194	$132,732
Railings	$2,393,252	$1,805,837	$587,415	$60,465
Street Lights	$2,181,917	$882,863	$1,299,054	$37,799
Crossings	$6,536,482	$3,224,039	$3,312,443	$88,071
Berm	$6,478,252	$4,221,009	$2,257,243	$82,598
Islands	$136,842	$68,421	$68,421	$1,711
Total	**$544,473,965**	**$187,832,421**	**$356,641,543**	**$6,612,428**

Table 4-1: Valuation Report

5 Management Strategy

5.1 Overview

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

5.2 Organisational Structure

5.2.1 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.

5.2.2 Staff Competencies

An important measure of the quality of Council's asset 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 asset 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 asset management when new positions are being filled or replacement staff sought.

5.2.3 LTP Planning

To ensure that staff were thinking and working towards a common LTP goal, Council management instigated a LTP planning process early in 2016 for the 2018-21 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

5.2.4 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 Township and Hall and Reserve committees is:

- Ratana Community Board.
- Taihape Community Board.
- Bulls Community Board.
- Hunterville Community Committee.
- Marton Community Committee.
- Turakina Community Committee.
- Turakina Reserve Management Committee.

5.3 Quality Assurance

5.3.1 Audits

To establish and ensure the on-going improvement of the quality of Council's systems, audits of financial, technical and performance systems need to be routinely implemented.

5.3.2 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.

5.3.3 Information System Audits

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

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

5.3.4 Technical Audits

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

5.3.5 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 NZTA national role in monitoring performance of transportation agencies.

5.4 The Asset Management Processes

The asset 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.

The approach is described in Figure 4.1 The Asset Management Process, Section 10 Programme Prioritisation and Optimisation and Section 12 Capital Projects.

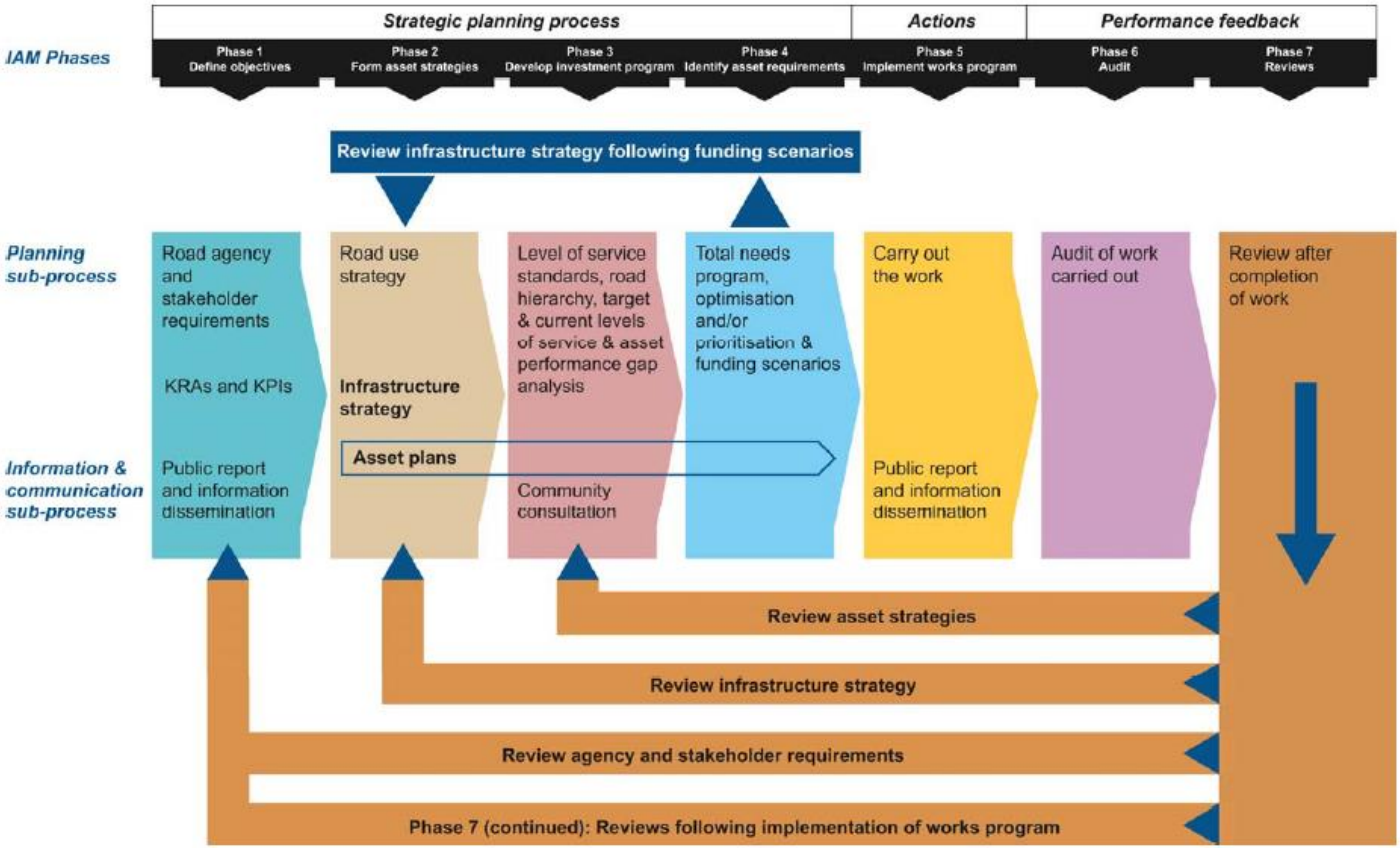


Figure 5-1: The Asset Management Process

5.5 Asset Management Objective

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 asset management practices and service delivery to the customers.
Comply with Statutory Requirements.

5.6 Asset Groups

The asset groups and their principal components are:

5.6.1 Road Pavements

- Formation - the existing/modified material supporting the sub-base and base-course layers
- Sub-base – the lower structural layer between the formation and base-course
- Base-course – 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

5.6.2 Drainage

- Culverts – pipe system under roads to convey storm-water 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

5.6.3 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

5.6.4 Bridges

- Abutments – fixed platform to support deck ends
- Piers – midpoint columns to support decking
- Deck spans – the trafficable platform atop the abutment and piers
- Large Culverts – pipe area greater than 3.4m^2 of cross sectional area

5.6.5 Retaining Walls

- Carriageway formation and support and protection structures

5.6.6 Street Lighting

- Luminaire – light fitting including control gear and lamp
- Poles – concrete or steel column to support the lamp
- Brackets – supporting the luminaire atop the pole

5.6.7 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)

5.6.8 Footpaths

Concrete, Paved, Asphaltic and unsealed pedestrian pathways

5.6.9 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

5.6.10 Operation and Asset Management

Asset 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

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; and
- 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 asset management strategies.

5.7 Service Delivery and Rationale

This section describes how Council will manage and maintain the identified levels of service for the Transportation Assets, identifying and maintaining the service capacity, the operating regime, and assess the estimated costs of providing them.

A key element of Activity Management Planning is determining the most cost effective blend of planned and unplanned maintenance.

5.7.1 Funding Strategy

The Council sets its funding for land transport operations, maintenance and renewals three yearly, through the Long Term Plan (LTP) process. Since 2009, the Land Transport Management Act 2003 requires road controlling authorities such as the Council to prepare and submit their three year Land Transport Programs for approval as part of a Regional Land Transport Program, which is then incorporated into the National Land Transport Program (NLTP).

The incorporation into the NLTP is part of the Governments co-investment into the National Land Transport Program. The co-investment rate, known as the Financial Assistance Rate (FAR) is 53% of the total cost of the providing the Land Transport Activities throughout the country. The Government provides its guidance on investment of the Land Transport activity via the Government Policy Statement (GPS) for Land Transport which is issued by the Ministry of Transport.

The subsidised Land Transport Program is a summary of a range of individual activity classes. Each category covers a specific quantum of works and approved funding is dedicated for the delivery of that activity.

The activity classes are as follows:

Activity Class - Maintenance	Work component
111 – Sealed Pavement Maintenance	Pavement Repairs, Potholes, unsealed shoulder maintenance, pre-reseal repairs
112 – Unsealed pavement maintenance	Grading and maintenance of running course material
113 – Routine drainage maintenance	Cleaning of kerb and channel, sumps, water table clearing, culvert maintenance culverts <3.4m2
114 – Structures maintenance	Maintenance of bridges, retaining structures, guard rails, large culverts >3.4m2
121 – Environmental maintenance	Snow clearing, vegetation control, litter collection on rural roads
122 – Traffic Services maintenance	Maintenance of signs, marker pegs, pavement marking, sight rails, street lighting and power costs
124 – Cycle path maintenance	Maintenance of dedicated cycle paths
131 – Level crossing warning devices	Maintenance of level crossing warning devices
141 – Emergency works	Response to and restoration of assets following natural events
151 – Network and asset management	Management of the road network and asset database

Activity Class - Maintenance	Work component
Activity Class - Renewals	Work component
211 – Unsealed road metalling	Replacing wearing course material, pavement strengthening
212 – Sealed road surfacing	Maintenance reseals, 2nd coat seals
213 – Drainage renewals	Renewal of culverts <3.4m2
214 – Sealed road rehabilitation	Pavement overlays and strengthening
215 – Structures component replacement	Renewal of components of bridges, retaining walls, guardrails
222 – Traffic services renewals	Renewal of traffic signs, street lighting, pavement markings
231 – Associated improvements	Minor drainage and seal width improvements
341 – Minor improvements	Small geometric road and intersection improvements, sight benching, guard railing, safety lighting

Footpath maintenance and renewal is not an activity subsidised by the NZTA, and therefore funded by Council as a non-subsidised activity.

In general, funding of maintenance is set to match the long-term needs established by the maintenance programs set out in this Activity Management Plan.

5.7.2 Road Maintenance Contract

All physical maintenance activities are carried out under contract and Council believes that the current arrangement provides the best solution for maintaining its roads.

The Council does not directly employ any physical works maintenance staff to carry out road maintenance activities.

The key issues relating to pavement management are:

- Maintenance of an accurate inventory of all pavements.
- Keeping routine maintenance to a level that maintains the integrity of the pavement and overall networks.
- Identifying and investigating sections of pavement in need of rehabilitation.
- Ensuring that all necessary rehabilitation is programmed for funding and physical works.

In 2015 the Road Maintenance Contract was rewritten and following an open tender process was let to Higgins Contractors Ltd. The contract commenced 1st July 2015 and is for a 3 + 3 + 3 year duration. Depending on performance the contract would finally expire in 2024.

Pavement works are included in the Council's Road Maintenance Contract, others are subject to separate project orientated contracts for the delivery of specific physical works such as area wide pavement treatments, minor improvements, other unsubsidised works and for the delivery of specific professional services as needed.

The contracts generally include:

- Procedures, standards and performance measures. These are defined, but there is flexibility for the contractor to determine the most appropriate materials and methods.

- Requirements for compliance with legislation, e.g. Health and Safety in Employment Act and the Resource Management Act.
- Response times for routine and emergency work occurrences. Response times are defined for notified defects, there are standards by activity type and road type.
- Inspection, programming and reporting requirements.
- Timing and approvals for work programmes.
- Schedules of quantities, except where lump sum based.
- Reporting, claiming, payment and liaison requirements.

5.8 Operations

This section of the Life Cycle Plan covers asset operational activities associated with:

- Professional Services
- Asset Management Systems

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 asset 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.

5.8.1 Professional Services Overview

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 stormwater were also incorporated. The Strategic Asset 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 asset management and professional services provided for the Rangitikei District Council.

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

5.8.2 Professional Services Costs

The New Zealand 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; and
- Manage preventative maintenance

NZTA Work Category 151 – Network and Asset Management under the Council's subsidized Land Transport Programme is where funding is sourced for professional services for Activity Class 8 – 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 10 – Renewal of Local Roads, and 12 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 Asset Management team, and any external consultants the Council engaged. These activities are all subsidisable provided the works themselves are subsidisable. The exception is footpaths which are non-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.

5.8.3 Asset Management Systems

The primary asset 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.

5.8.4 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 systems in place for the major asset groups.

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

Asset Category		Monitoring
		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 (<3.4m^2)	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 (>3.4m^2), 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	Monthly night time inspection and annual daytime inspection by street light maintenance contractor

Table 5-1: Asset & Condition monitoring Systems for Major Asset Groups

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.

5.9 Programme Development

5.9.1 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.

5.9.1.1 Emergency

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.

5.9.1.2 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.

5.9.1.3 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.

5.9.1.4 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

5.9.1.5 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 $300,000.

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.

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.

5.9.2 Outline of Program Development Process

The flow chart in Figure 9 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.

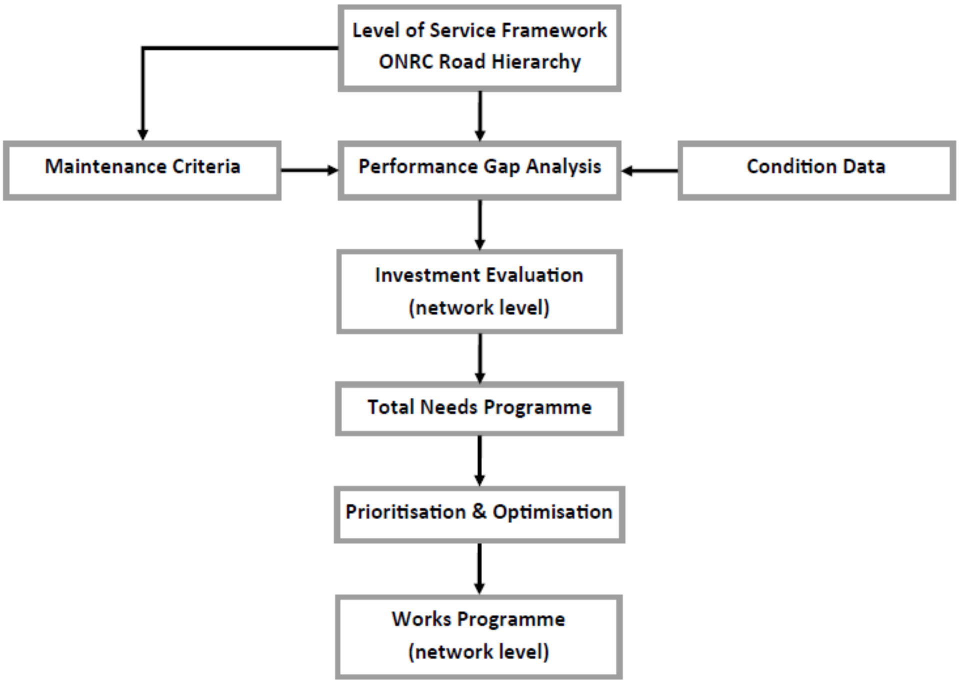


Figure 5-2: Process of works program development at the network level

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.

5.9.3 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.

5.9.4 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 $300,000), 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.

5.9.5 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 NZTA) 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 NZTA.

Following budget submission, the next annual cycle commences.
The actual funding allocation process typically spreads over a few months.

5.9.6 Program Development

The decision-making process for road asset 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 NZTA'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 NZTA. NZTA 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.

5.9.7 Asset 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 shows the elements of the pavement Asset Management System (AMS). It is not critical that the whole AMS is not 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 asset 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.

5.9.8 Information Management Systems

Current Rangitikei District Council information systems used in the roading and street services function are outlined below.

Other Asset Management systems are used by other asset managers within the Council. Linking and integration of systems is a corporate function.

System	Current Business Practice
Asset Registers	RAMM Reliable asset registers available for most assets except berms and markings,
Financial System	Origen Job costing system available, via general ledger system Costs allocated at activity level only Inflation adjustment application

System	Current Business Practice
	Current valuation generated from downloaded information inventory from databases
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

Table 5-2: Current Information Systems

5.9.9 Accounting/Financial Systems

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

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

5.9.10 Financial Management System (Origen)

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. This is currently in accordance with International Accounting Standards – IAS16. The International Accounting Standards are determined by the Institute of Chartered Accountants of New Zealand. The Finance Activity 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:

Origen accounts payable, fixed assets, inventory, time entry, work orders, and general ledger Accounts receivable, cash receipting, bank management and rates, plus inputs from other Local Government regulatory systems such as Person/Property, Infringements, Licensing, Consents

5.9.11 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 Origen 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.

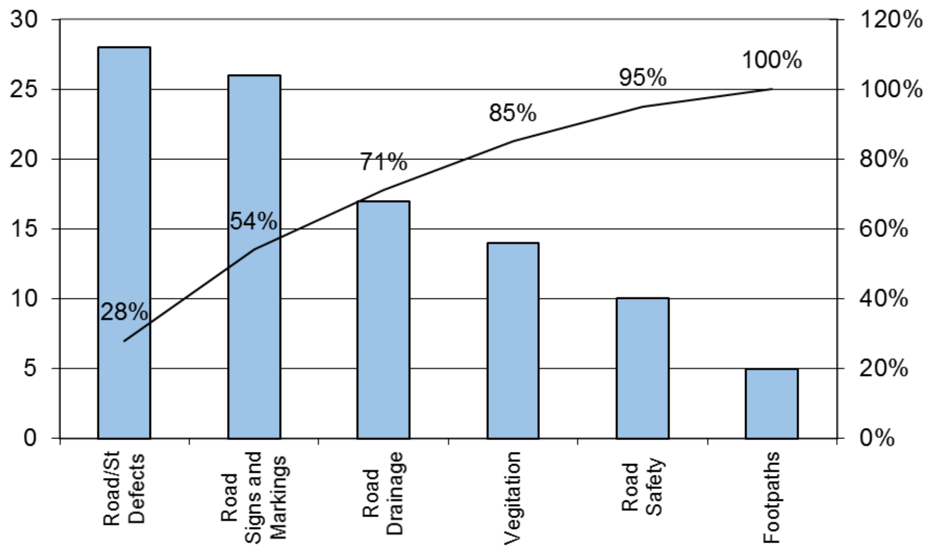


Figure 5-3: Annual Service Requests

The Pareto Chart above shows the percentage of annual Service Requests for each asset group since records began in 2000

Unsurprisingly the highest category shown is "Road/Street Maintenance" which contain a broad number of specific areas within this, ranging from pothole repairs to unsealed road grading.

Next, following closely behind, is "Road Signs and Markings" where, like road/street maintenance, issues of concern are perhaps more immediate and identifiable.

The performance ratings of footpaths has increased in recent years and that reflects the number of service requests being relatively low.

5.9.12 Asset Management Systems

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 stored on a server at RAMM Software Ltd (RSL) in Auckland. 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 annually updated to enable forward work programmes to be developed, both short term via the Treatment Selection process. 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 asset management and contract management purposes.

The Council also uses the RAMM system to undertake valuation of the asset, using the Asset Valuation Module. The street light portion of RAMM is managed by the Street light Maintenance and Management contractor.

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 expected life RUL Effect of condition on life Replacement asset type How asset element is measured (volume, area etc) Predicted depreciation

Heading	Inventory Item
User-defined items	In addition RAMM can cater for an unlimited number of user defined items

Table 5-3: Inventory Items

RAMM includes a software module (previous called SLIM — Street Lighting Inventory Module) that holds all key information on street lights. Information held includes type, ownership and location details for poles, brackets, luminaires and lamps (“bulbs”).

As part of the Street Light Maintenance contract, the contractor is required to use and maintain this database, updating it with details of any new lights installed and recording all other asset changes that have occurred.

All street lights are linked to RAMM via RAMM Road ID. The Contractor module of the software allows the contractor to maintain the street light inventory and recording maintenance history. It also provides call logging, dispatch information for repairs and detail to manage contract claims.

The call logging module allows production of work instructions to repair crews. Details of dispatches can be tracked from their initial entry through to completion with current status always available.

The contractor is able to enter the agreed contract schedule along with rates, internal costs and crew payment rates. All claims for work performed are entered against dispatches, in addition to claims for other activities such as bulk lamp changes.

Data Assessment and Analysis: The Street Lighting module includes “decision cube technology” which allows choice on how and what data is displayed. This allows data to be manipulated in order to perform asset management functions over the whole range of data held. For example comparisons can be made against electricity usage and cost, component performance, contact claims, lamp failures etc.

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.

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.

Table 5-4: RAMM Treatment Selection

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 was surveyed and inspected at least once every 6 years. All inventory information is captured and a full inspection performed in accordance with NZTA bridge assessment criteria. This provides the base information necessary to manage repairs and maintenance of the bridges.

Repairs are prioritised based on the following classifications:

Classification	Meaning
1	Urgent
2	Priority
3	Routine

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 asset 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 roading assets in 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 ~95% 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
Life Cycle Costs	Renewal and new improvement costs for common items known from recent experience

Table 5-5: The assessed current completeness of asset management data

Geographical Information Systems (GIS - MapInfo): Council has used MapInfo as its GIS system. GIS has some basic linkages with the RAMM system, and RAMM has GIS type functionality included. The GIS system is available to all Council Staff (at all Service Centres) 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: Contracts are managed using RAMM as well as paper-based records and systems. 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

Figure 5-4 shows the typical elements of an information system for pavements

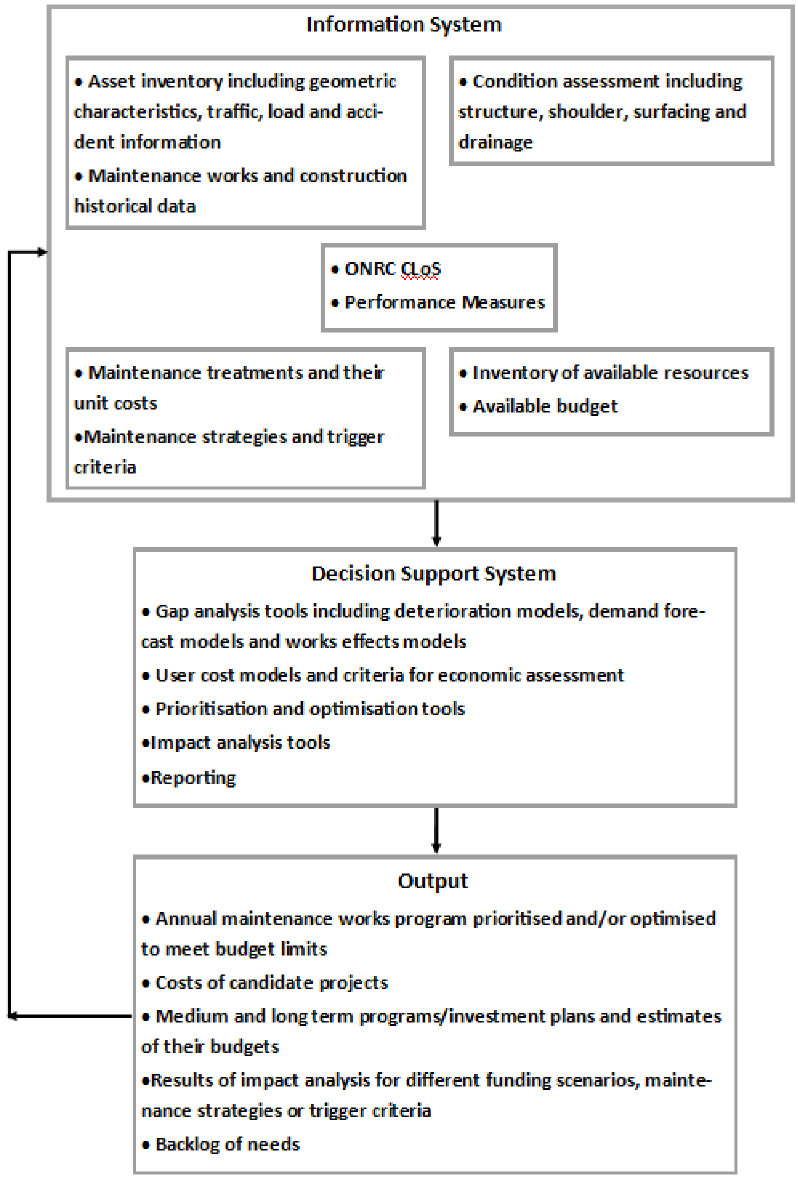


Figure 5-4: Elements of the pavement Asset Management System (AMS)

5.9.13 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.

5.9.14 Decision Support Levels

DSS support decision making at a number of levels of the asset 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 and their linkages are shown in Figure 5-5.

Strategic level (NZTA)

- 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.

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 NZTA
- 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.

Project level (Council)

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

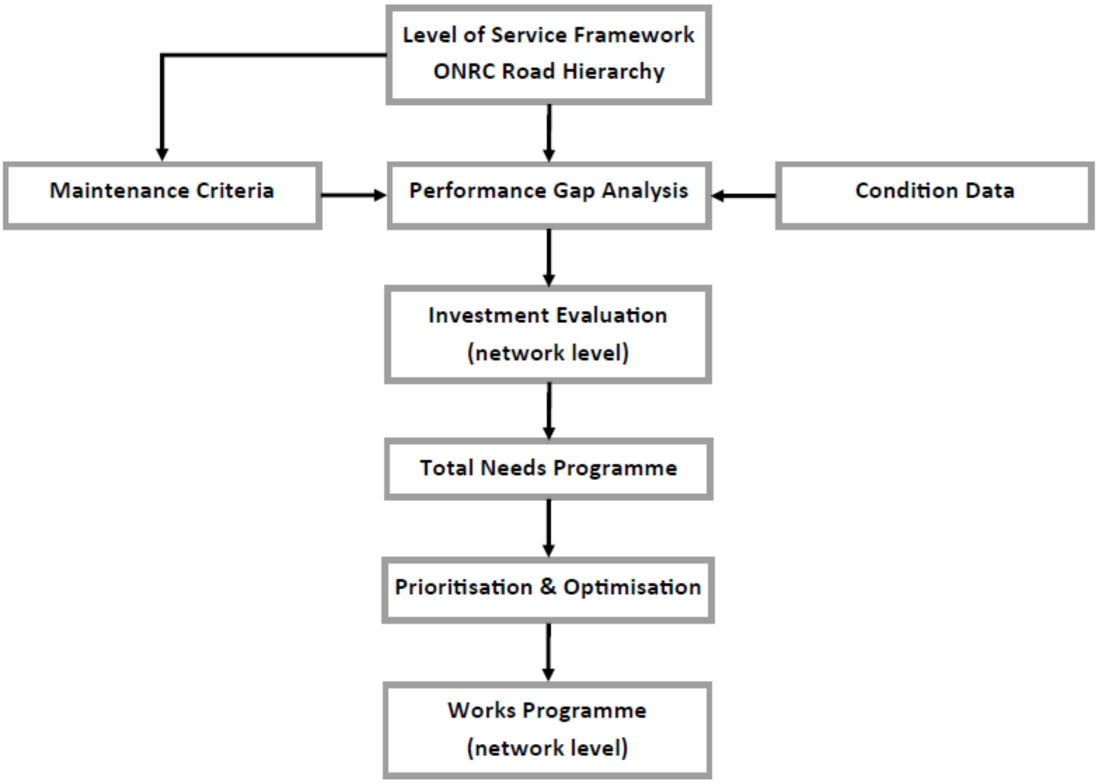


Figure 5-5: Decision levels and their linkages

5.10 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.

5.10.1 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.

5.10.2 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.

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.

5.10.3 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 parameters such as those presented in Table 3. The configuration parameters are 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 asset management practices. For example, Efficiency, Safety, Resilience, Amenity, Travel time reliability, and Accessibility.

5.10.4 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

Asset 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.

5.10.5 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.

Maintenance Intervention Criteria: 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.

5.10.6 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 NZTA 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.

5.10.7 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).

5.10.8 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
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.

5.10.9 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.

5.11 Investment Planning and Evaluation

5.11.1 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.

5.11.2 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 asset 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 programme.

5.11.3 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, unpaved 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 NZTA 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 NZTA are used to select appropriate treatments to meet Performance Measures.

5.11.4 Unit Costing

The unit cost of work is the typical overall cost of separately performing capital and maintenance work on an asset over a set unit dimension, such as one cubic metre or one square metre. Standard costs are applied to the whole range of works necessary to arrive at an estimate of costs to complete the capital and maintenance works program and evaluation. It is an analysis tool that establishes the starting point for cost projection, as well as setting benchmarks.

Development of the Unit Costing Framework: A unit cost framework was developed using the following steps:

Types of work typically performed on the road network were identified.
Relevant unit of measurement for each type of work were set (e.g., km, m^2, etc.).
The unit cost for each type of work were determined from available records.
Geographical differences were considered as they may result in variations in the standard costs.

Recorded historical costs were broken down into categories/groups. The minimum cost data needed to estimate the unit costs is as follows:

capital costs that include material and equipment supply costs, construction costs, overhead and supervision costs, investigation, design and survey costs and quality control costs
maintenance costs include much the same costs as above
additional specific contingency costs within the network for capital and maintenance works due to particular circumstances such as unexpected adverse weather conditions, delays due to industrial action, critical supply and relocation items and physical remoteness.

5.11.5 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.

5.11.6 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.

6 Current condition of network

6.1 Condition Measures

The condition of the District network pavements and surfacings is represented by the following measures:

Roughness	Distribution by road classification, percentage above threshold levels and smooth travel exposure (percentage of assessed network length where roughness is under the relevant threshold)
Texture	Percentage of assessed network where texture is less than 0.5mm mean profile depth
Rutting	Percentage of assessed network in each wheel path, where; rutting is between 10mm & 20mm depth and rutting is greater than 20mm depth
Skid Resistance	Percentage exceeding the skid reporting threshold and adequate skid exposure (where skid resistance exceeds the relevant threshold value by site category)
Condition Index	The average index score - utilising visual rating of surface condition defects - distributed by road classification

To date, most District Road reporting has focused on the extent of the overall network beyond a threshold limit. Such reporting ignores the performance of the major proportion of the network i.e. the condition trend(s) within individual road classifications. If these latter statistics are not reported, the potential danger is that management activity will focus on addressing only those roads in worst condition whilst the overall pavement asset is consumed. To this end, the distribution of condition within each road classification is now included.

See Section 8 Levels of service, output and efficiency measures for targets.

6.2 Issues to consider when interpreting reports

In drawing conclusions on any condition measure, it is important to take account of several key factors:

Variability of foundation and pavement materials in highway construction
The district experiences varying climatic conditions, such as different temperature ranges and rates of rainfall
Improvements to technology and measuring techniques mean that a measured parameter may be reported differently over time even though the underlying condition might be constant
Reliability of the associated data inputs, for example surfacing and traffic volumes
Varying network condition targets or standards

Conditions vary over the year and reported results represent only a snapshot of network condition at any one time
Data collection techniques may only be conducted over a limited extent of the network due to cost and/or time restraints; fuller extents might only be achieved over multiple years.

In addition to such technical issues above, broader external factors also have an impact. For example, the road network is a dynamic entity that may experience:

Changes in traffic volumes and loadings over short, medium or long term duration;
New roads being vested and/or constructed by Council
Seal extensions within the existing network

6.3 Reporting by hierarchy

Where applicable condition measures are reported in terms of the One Network Roading Classification (ONRC).

6.4 Roughness and Smooth Travel Exposure

A key performance indicator for road user comfort is road roughness. A surface with higher roughness is uncomfortable, increases vehicle operating costs and may also affect safety.

Smooth Travel Exposure: An indication of the percentage of network length with roughness better than an upper threshold level (limits shown below)

Traffic Volume	Urban NAASRA	Rural NAASRA
< 500	<= 180	<= 150
500 - 999	<= 150	<= 150
1000 - 3999	<= 150	<= 130
4000 - 9999	<= 120	<= 130
>= 10000	<= 110	<= 130

Table 6-1: Roughness & Smooth Travel Exposure

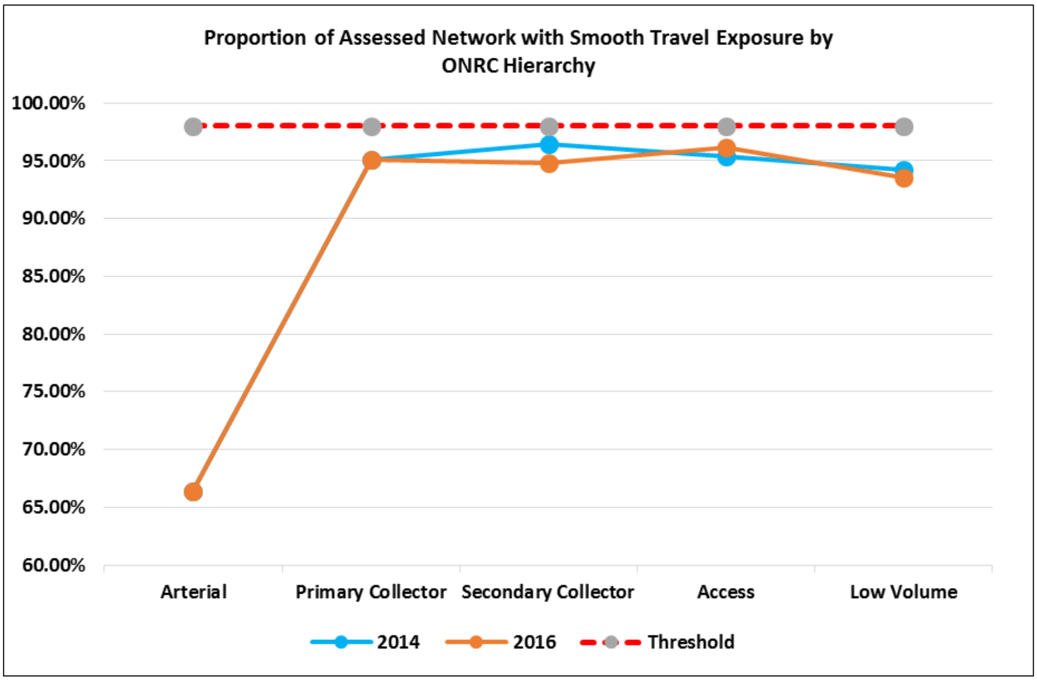


Figure 6-1: Proportion of Assessed Network with Smooth Travel Exposure

Smooth Travel Exposure has generally remained relatively constant over the last 2 years.

It should be recognised that a significant proportion of the available data used in the compilation of the above charts is at the outer bounds of data validity (age of information) and new data will be required for meaningful trend analysis in future years.

Notwithstanding the above observation, Council have concluded that it is managing the network sufficiently with the current level of investment. Given that the majority of Council's network lies in the Access and Low Volume classification roads, it is prudent to redirect some attention from the higher classification roads (redirection is not expected to impact investment level).

6.5 Texture

A key performance indicator of road safety for road users is texture depth (Mean Profile Depth) of the road surface, which is of primary concern in high-speed environments. If a surface has a coarse texture, then surface drainage is sufficient to reduce the risk of aquaplaning and to mobilise the surface skid resistance. One measure is reported:

Texture depth below 0.5mm (MPD): An indication of percentage of network length where the texture depth is below the acceptable minimum.

In urban (low) speed environments Council reports the measure for chip seal surfaces only, as many of the asphaltic concrete surfaces have (acceptably) low texture, which is fit for purpose.

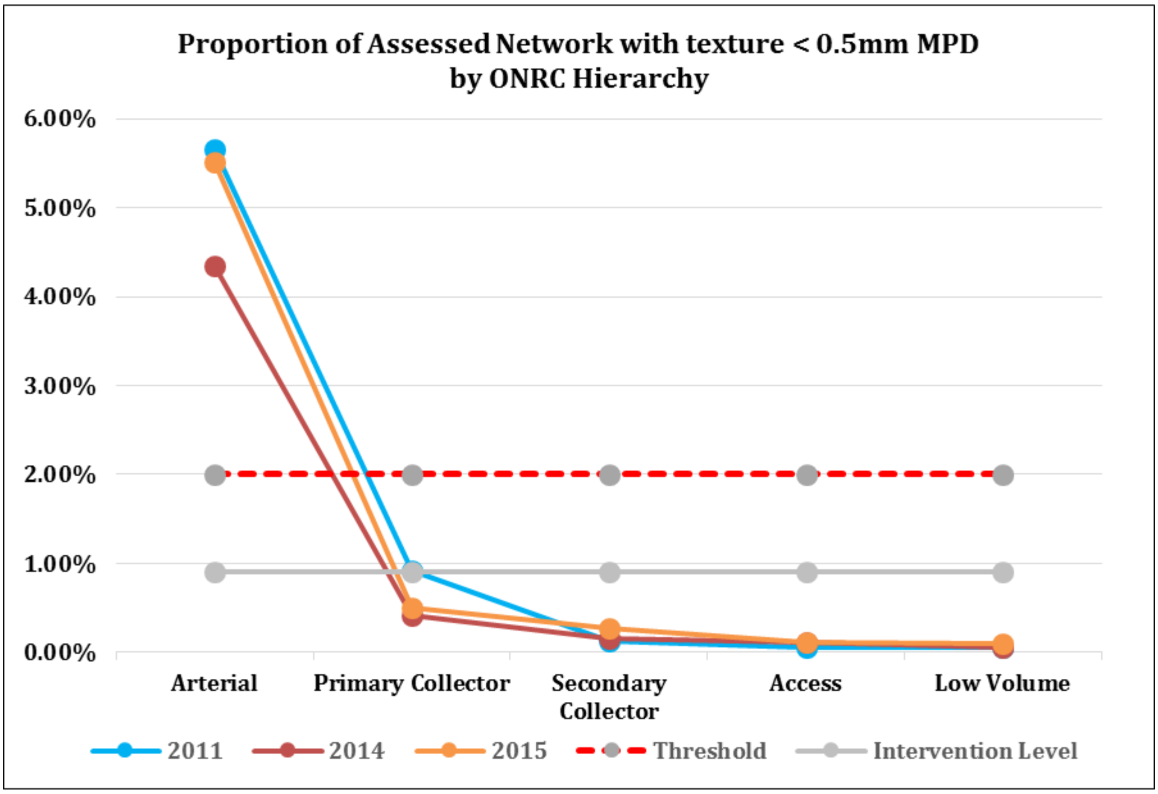


Figure 6-2: Proportion of Assessed Network with Texture

The extent of texture below the acceptable minimum continues to improve and is well within the 0.9% Intervention Level and the 2% Maximum Allowable threshold.

Currently, 35% of the network is assessed using High Speed Data (HSD), which provides the above measure and is concentrated primarily on higher classification roads. The low readings indicate that Council manages Collector roads in an acceptable manner.

Lower classification roads rely mainly on identification of flushing using the Visual Rating Assessment (VRA). Where HSD and VRA methods overlap, there is a reasonable correlation when identifying flushing with VRA exhibiting a tendency to over-estimate extent; this leads Council to conclude that identification of flushed locations on the network is conducted and addressed in an adequate manner.

6.6 Rutting

Pavement rutting is a key performance indicator for road safety, road user comfort, and as an indicator of pavement deterioration. The measures reported are:

Rutting greater than 20mm depth: an indication of percentage of pavement length exhibiting rutting more than the acceptable maximum, which has implications for safety.

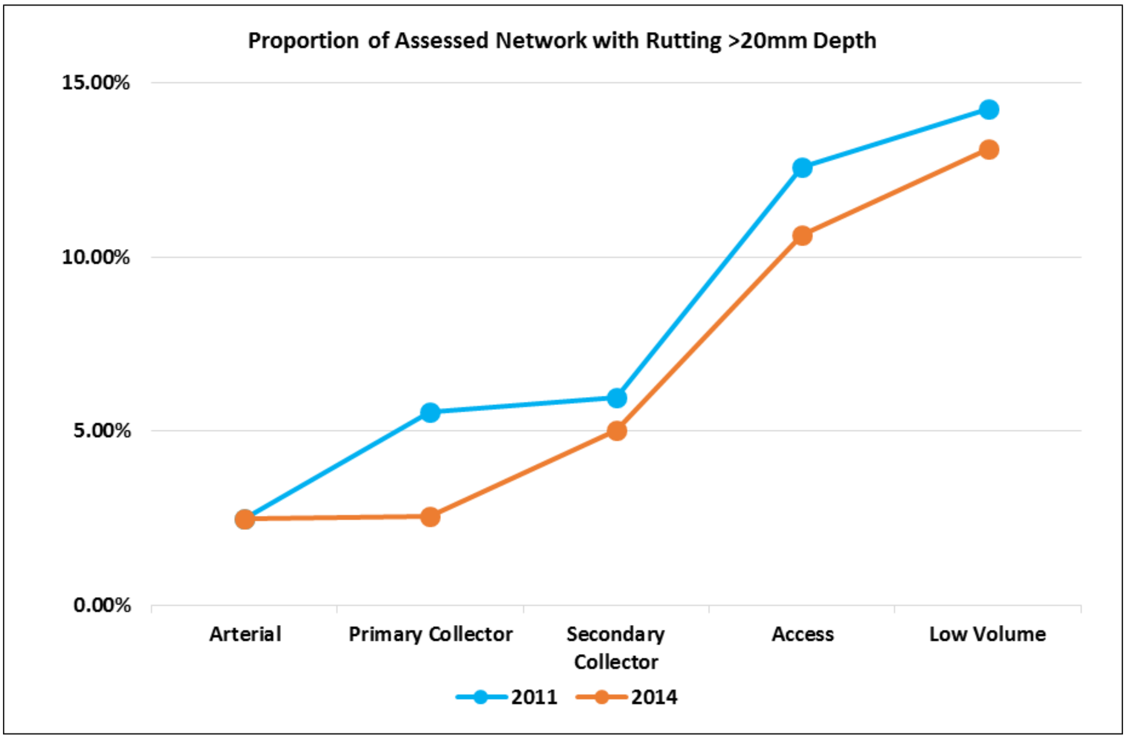


Figure 6-3: Proportion of Assessed Network with Rutting > 20mm Depth

Rutting greater than 10mm depth: an indication of percentage of pavement length exhibiting rutting approaching the acceptable maximum.

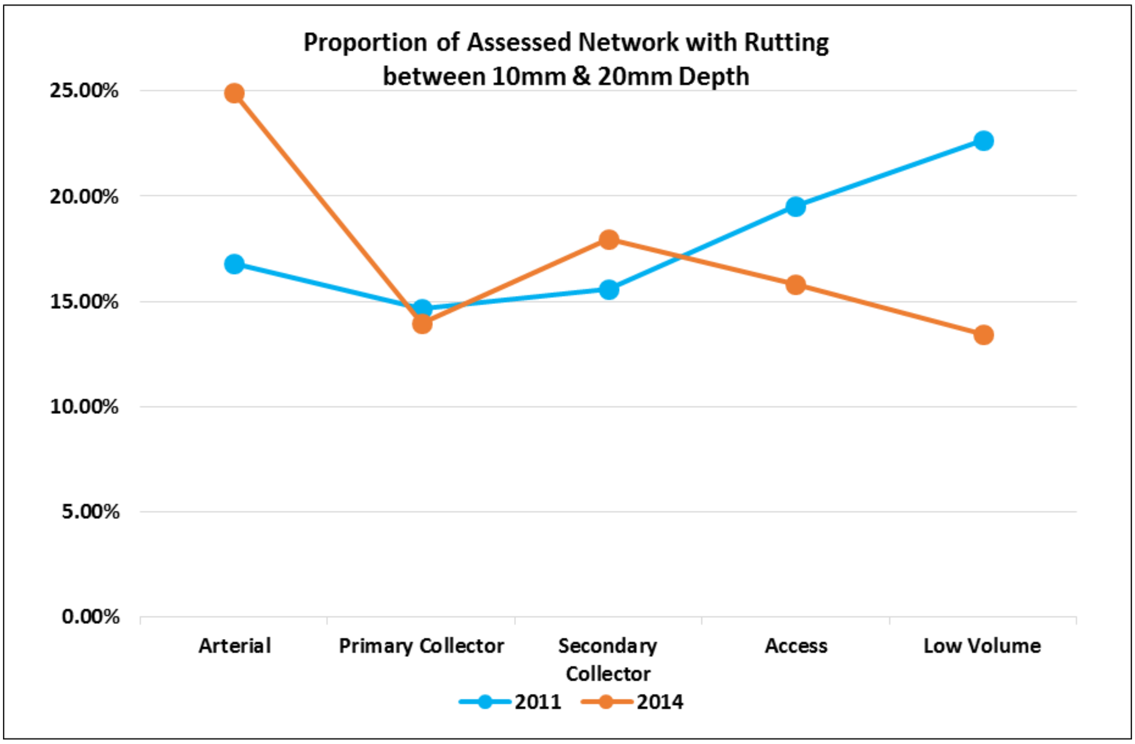


Figure 6-4: Proportion of Assessed Network with Rutting between 10-20mm Depth

The network shows a slight trend for improvement across the assessed network. Although the distribution of rutting performance across the road classifications shows a greater exceedance on Arterial roads in particular.

Where rutting between 10mm & 20mm occurs there is a general trend showing improvement across the network, implying a consistent application of maintenance and/or renewals to address this defect.

Rutting data is obtained using High Speed Data Collection and, as such, only covers 9.2% of the Low Volume and 36.6% of the Access classification roads respectively. There is still a reasonably high volume of rutting indicated on the assessed portion of the network.

The lower classification roads in particular should be monitored over the next few seasons to better analyse rutting performance.

Notwithstanding any data reliability issues noted above, the rut depth measure is possibly Council's most robust predictor of maintenance and renewal investment.

6.7 Skid Resistance and Good Skid Exposure

Another key performance indicator of road safety is skid resistance. The measures reported are:

Skid Resistance: Percentage of network length where skid resistance is below the defined level of service threshold for differing Site Categories (shown below).

Adequate Skid Exposure: Percentage of the assessed network currently above the threshold value for providing good skid resistant road surfaces.

Table 16

Category	Demand	Carriageway Environment
1	Highest	Junctions with Give way or Stop lines Roundabouts Railway Level or Pedestrian crossings
2	High	Curves with Radii less than 250m Gradients steeper than 10%
3	Medium	Minor Road Junctions Gradients Between 5% and 10%
4	Low	Carriageways with Large Radii Curves Gradients shallower than 5% Long Bridges
5	Lowest	Divided Carriageways

Table 6-2: Skid Resistance

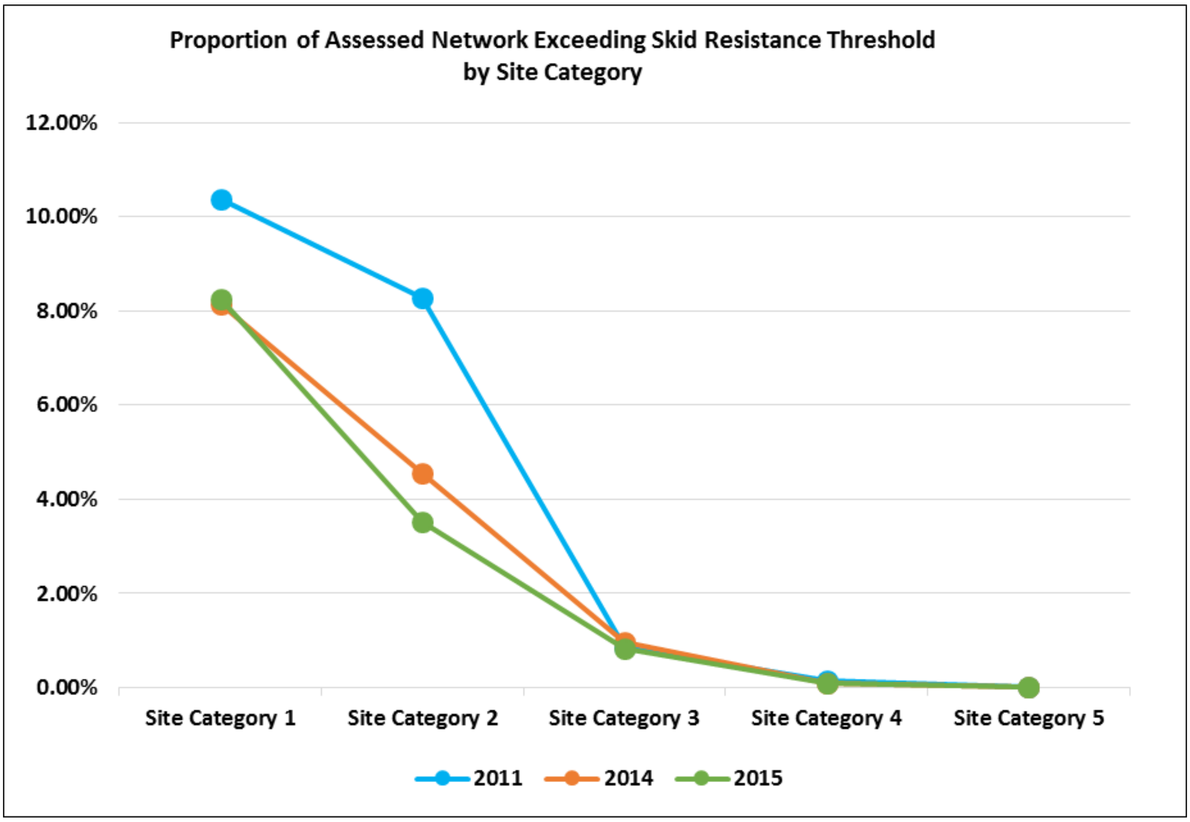


Figure 6-5: Proportion of Assessed Network Exceeding Skid Resistance

There has been a slight deterioration in the overall performance of skid resistance across the assessed network. This reduction is primarily due to the increase in exceedance of skid resistance in Site Categories 2 to 5 (high to lowest demand). In particular, the increase in exceedance occurs on either small radii curvature or steep gradients. However, there has been an improvement in Site Category 1 and 2 (highest demand).

Council has instigated a programme to identify locations where skid resistance is reported as substandard. Council will then investigate each location and programme a cost effective maintenance or renewal activity, integrated with or amending the existing forward works programme as necessary.

For the last two years more than 98% of the network is above the Adequate Skid Resistance Exposure threshold. All but the Low Volume road classification show slight improvements.

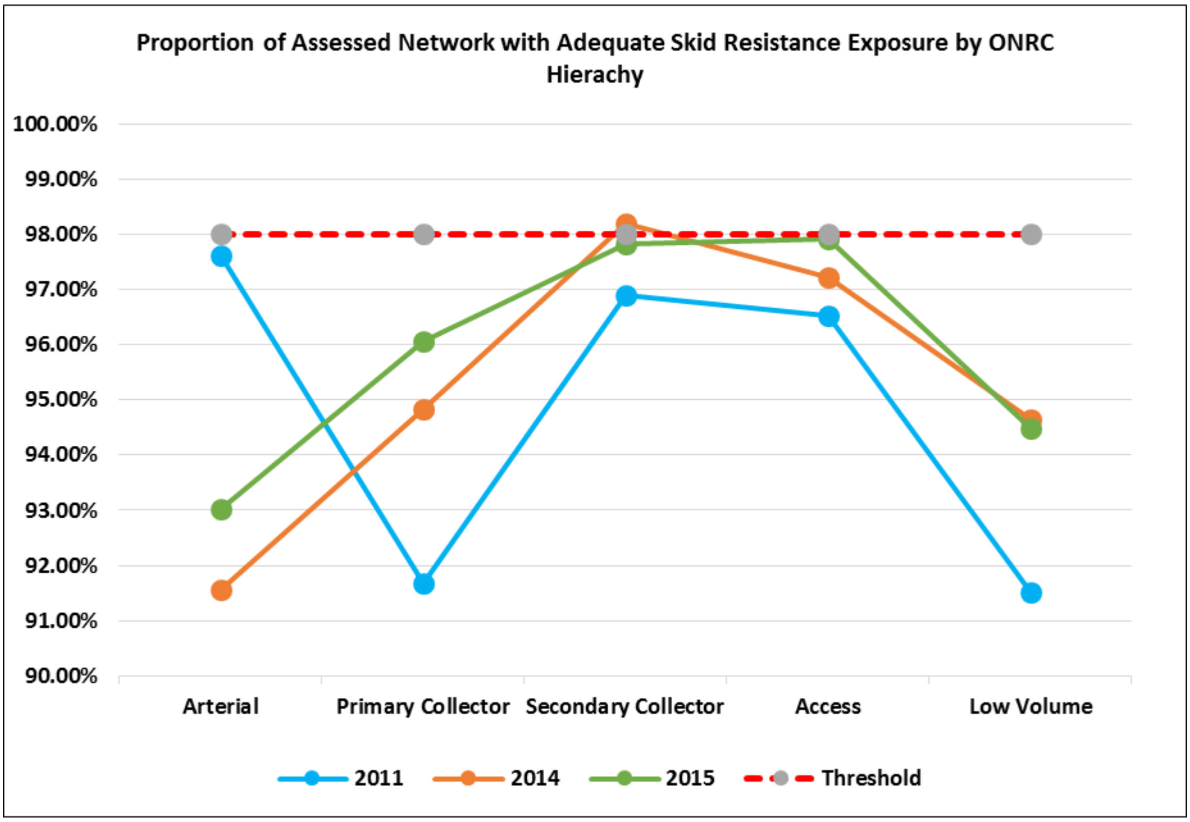


Figure 6-6: Proportion of Assessed Network with Adequate Skid Resistance

Skid resistance is very sensitive to a range of parameters and is also the most challenging to monitor with high speed automated surveys. This is because the results vary depending on the time of year the survey was carried out. The two main reasons for this variation are:

- Rainfall, which washes away the contaminants that reduce the skid resistance
- High temperature, which softens the bitumen and increases risk of bitumen contamination.

Council 'seasonally corrects' the data to remove the effect of normal contaminants dealt with by rainfall and therefore to allow comparison.

Council also focuses on appropriate surfacing strategies which minimise the risk of skid events across the network. Council monitor 'skid resistance' to identify actions that should be taken to deliver the best outcome possible within the budget allocation.

Skid Resistance: SCRIM data is presently collected to higher classification roads on a two yearly basis. This data is analysed to determine timely treatments to sealed surfaces in order to maintain sufficient skid resistance and macrotexture. The Reporting Value for skid resistance is measured against the Investigatory Level (IL) and Threshold Level (TL) as per specification T/10; the percentage of lane length below each measure is recorded. Where the percentage exceeds either 60% for IL or 25% for TL within a treatment length, this is flagged for further review and/or action.

Similarly, macrotexture is assessed against the IL and TL (varied by urban/rural & surface material as per specification T/10); the percentage of lane length below each measure is recorded. Where the percentage exceeds either 75% for IL or 25% for TL within a treatment length, this too is flagged for further review and/or action.

As an enhanced analysis within each treatment length, an additional check is made to locations identified with an increased skid resistance demand (i.e. junctions, gradients, curves, rail crossings, etc). Again, where the percentage exceeds the TL by 25% or more, this is flagged for further review and/or action.

As of the latest SCRIM Survey obtained in March-17, 1,452.870 lane km of the network was assessed, exhibiting the following Threshold Level exceedances:

Measure	Applicable Lane Length (km)	Percentage where TL Exceeded
Macrotexture > 0.5mm Skid Reporting Value < -0.1	1,452.870	1.35%
Macrotexture < 0.5mm Skid Reporting Value < -0.1	1,452.870	0.01%
High Demand	16.390	17.63%
Medium-High Demand	260.250	5.68%
Medium Demand	53.350	1.01%
Medium-Low Demand	484.650	0.33%
Low Demand	0.000	-

Table 6-3: SCRIM Survey

It should be noted that although 17.6% of High Demand lane length is reported as exceeding the Threshold Level, only 12No locations on the network show a continuous exceedance of 50+m. The remainder comprise either lengths less than 50m or are singular, isolated instances.

Crashes with skid resistance as a potential factor: Injury crashes on a wet road within the preceding 2.5 years of a SCRIM survey are identified where the average Skid Resistance Reporting Value on a 50m approach to a crash location is below the Investigatory Level.

For the Rangitikei District, 3 No crashes in total were identified where Skid Resistance or Macrotexture has since been reported below the Investigatory Level and may have contributed to the crash. Upon investigation of the crash reports, the following was observed:

Crash location	Driver observations	Police report observations	Skid resistance contributed?
Kakariki Road	None	Lost control and skidded into SWC on opposite side of road wen accelerating around uphill curve – Driver overreaction, impairment due to old age.	Possibly, although impairment may have exacerbated loss of control
Matai Street	None	Lost control whilst joyriding, (14 yr old TWOC), not on road but lime depot yard off Matai St	No
Parewanui Road	None	Driver lost control on curve – wet road listed as cause	Quite likely
Spooners Hill Road	None	Driver travelling too fast, cut corner, struck vehicle in travelling in opposite direction	Unlikely
Toe Toe Road	None	Driving at high speed whilst evading police, braked hard at curve and skidded off road.	Unlikely
Wanganui Road	None	Travelling on cruise control around curve, auto dropped gear in curve causing vehicle to lose control	Likely

Table 6-4: Crashes with skid resistance as a potential factor

(It is worth noting that reassessment of injury crashes against Threshold Levels rather than Investigatory Levels resulted in 2 No crashes returned – the Kakariki and Wanganui Road incidents).

6.8 Condition Index

The condition index (CI) is a single index summarising surface condition based on visually measured condition defects (from RAMM rating). The index score ranges from 0 (perfect) to 100 (very bad).

The CI aims to reflect engineering practice in so far as the weightings of the various condition defects are based on an intuitive view as to their impact on pavement deterioration.

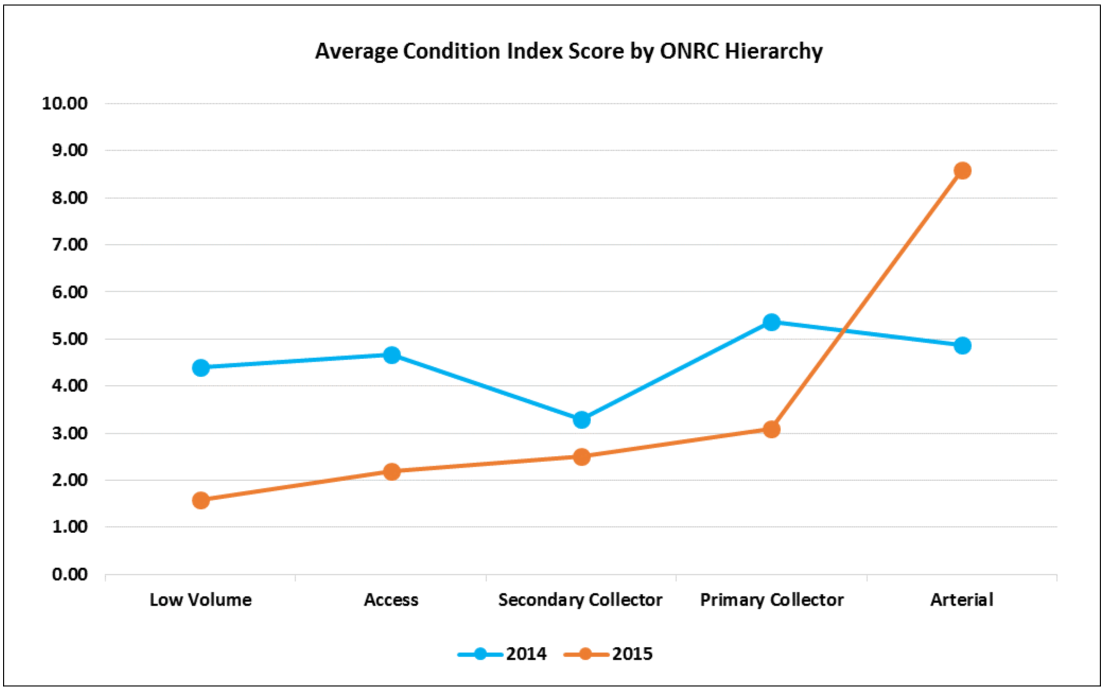


Figure 6-7: Average Condition Index

The average Condition Index across the network indicates a very slight improvement. However, with the margins of error, Council considers that this is not significant.

Arterial classification roads indicate a poorer average surface condition than other classifications.

Generalizing condition scores across each classification is a relatively broad analysis tool, which may lead to masking any real underlying trend. Council therefore focuses on the underlying defects that drive individual condition scores to inform any management action.

6.9 Pavement Condition Index

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 (see Figure 6-8.)

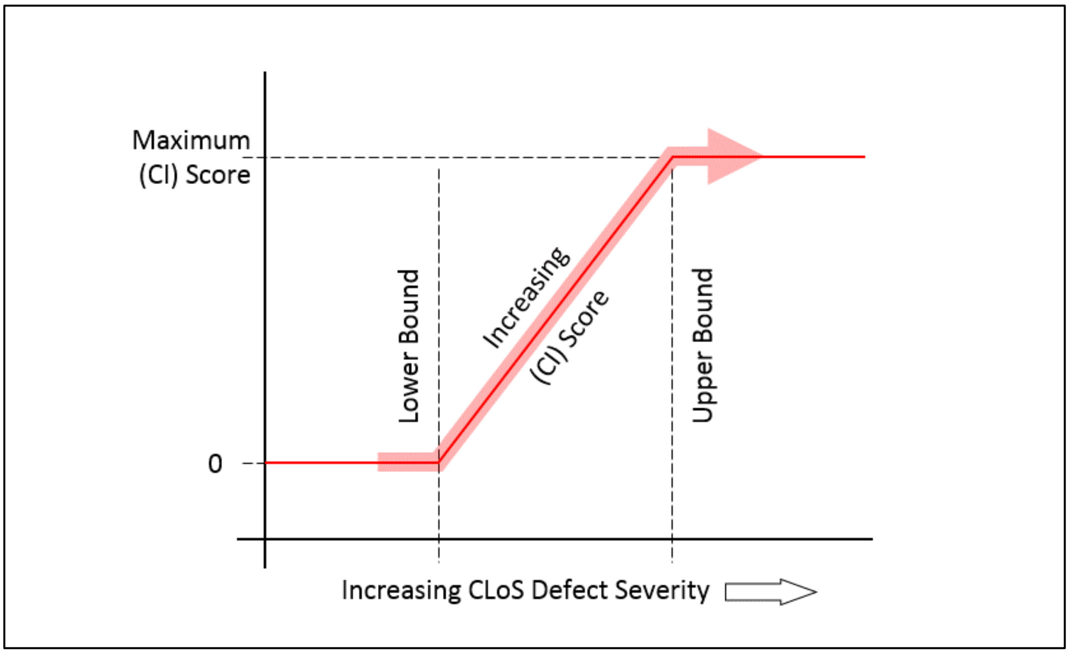


Figure 6-8: Individual CLoS (CI) Scoring System

CLoS	Lower Bound	Upper Bound	(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

Table 6-3: CloS Store

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

Table 6-4: PCI Store

This ‘traffic light’ grading system can be plotted by road length (see Figure 6-9 below) 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

Roadname	DUNCAN ROAD	RANK	235 of 312

Survey Date Range : 16/01/2011 to 9/06/2016

Length Assessed : 1162 m No of Data Points : 59

	Mean PCI	Counts where 50 > PCI > 75	%'age where 50 > PCI > 75	Counts where PCI > 75	%'age where PCI > 75
Overall Combined	17.23	5	8.5%	3	5.1%

Combined Scores, assessed against overall PCI Thresholds

	Mean Element Score	Counts	% Btn Lower & Upper T'hold	Counts	% Exc Upper Threshold
Roughness	1.38	2	3.4%	0	0.0%
Rutting	15.85	25	42.4%	1	1.7%
Texture	0.00	0	0.0%	0	0.0%

Individual Defect Scores, assessed against Element Score Range Thresholds

Figure 6-9: Pavement Condition Index Store

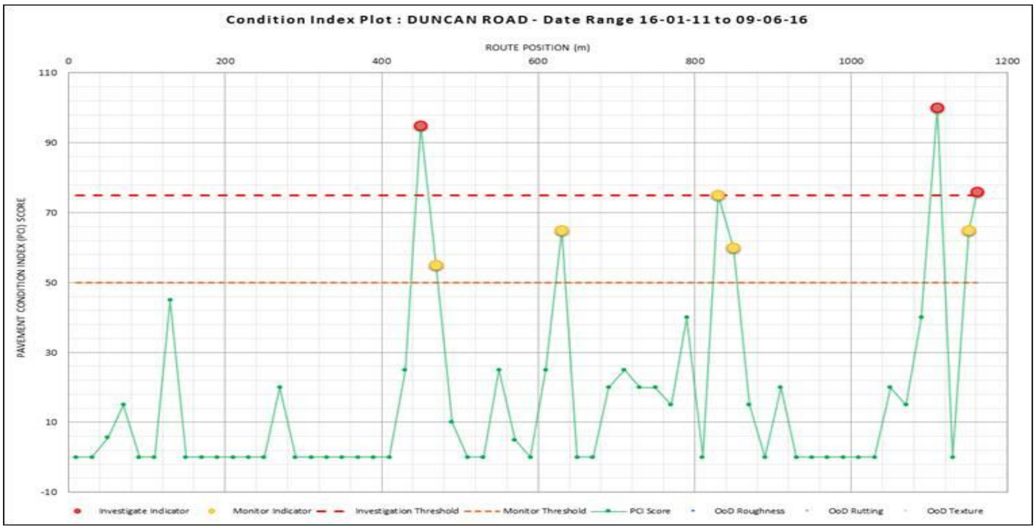


Figure 6-10: Example of (PCI) Score Plot Along Length of Road

6.10 Conclusions

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.

7 Current network levels of service for safety

7.1 Safety

How road users experience the safety of the road. Over time all roads in a particular One Network Road Classification (ONRC) category should offer an increasingly consistent, fit for purpose Customer Level of Service (CLoS) for road users.

7.1.1 Purpose

Minimise the risk of crashes
Minimise the consequence of crashes
Minimise the risk of driver behaviour related crashes
Minimise the risk of crashes due to driver confusion
Reduce the consequences of crashes
Reduce the risk of crashes at night
Reduced risk of loss of control crashes
Minimise risk of crashes to active road users

7.1.2 Outcome

Outcome measures are the primary means of quantifying performance of the network. All performance measures below this contribute to the delivery of this outcome measure.

7.1.3 Injury Counts – Fatal & Serious

Safety OM1: Number of serious and fatal crashes on network each year as part of a 5 year trend.

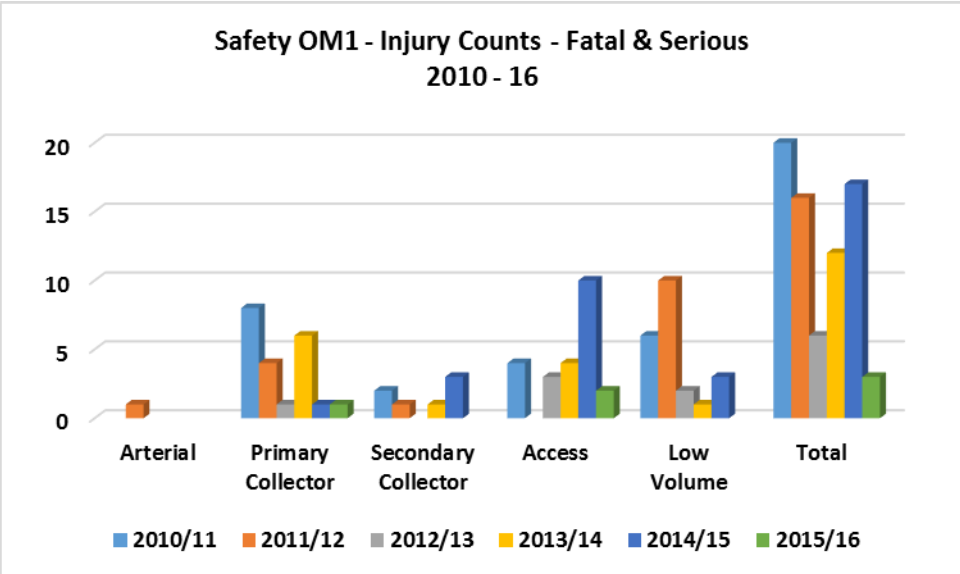


Figure 7-1: Injury Counts Fatal & Serious 2010 - 2016

Comment: Apart from spikes in 2010/11 and 2014/15 there is a downward trend of serious and fatal crashes.

Safety OM2 - Collective Risk (Crash Density) - Annualised S+F crashes per km by classification and Risk rating.

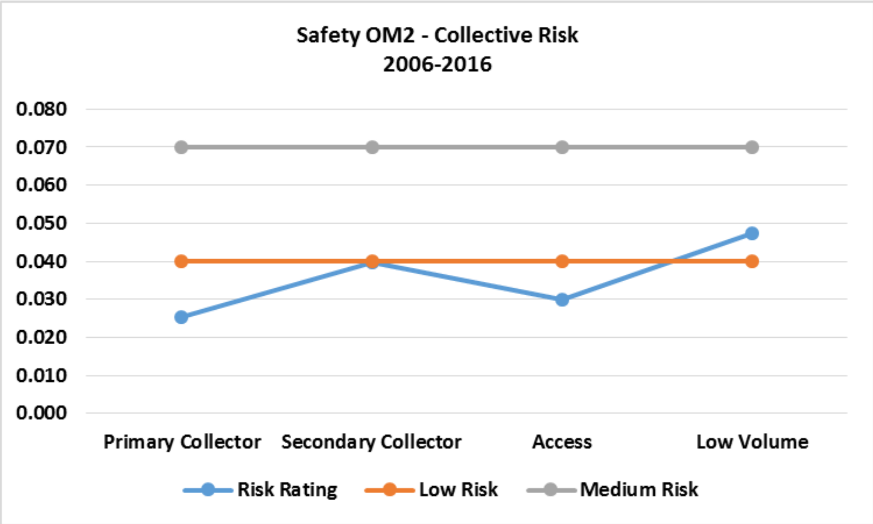


Figure 7-2: Safety OM3 Collective Risk

Comment: The Collective Risk for the District is Low - Medium

Safety OM3 - Personal Risk (Crash Rate) Annualised S+F crashes per veh k travelled (See KiwiRAP) and Risk rating.

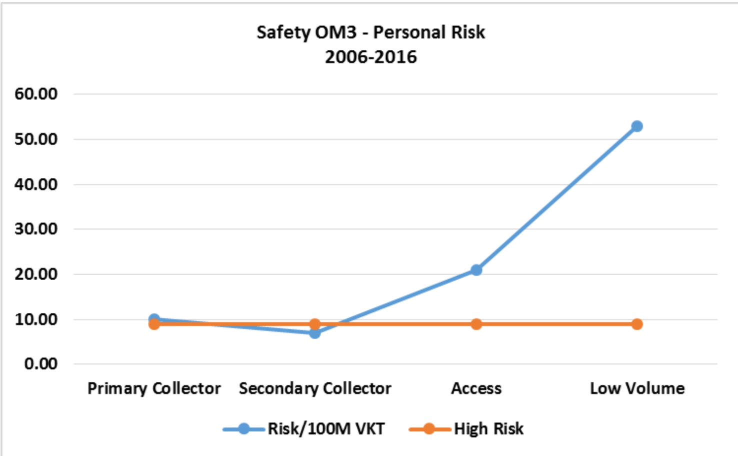


Figure 7-3: Safety QMS Personal Risk

Comment: The Personal Risk for the District is High

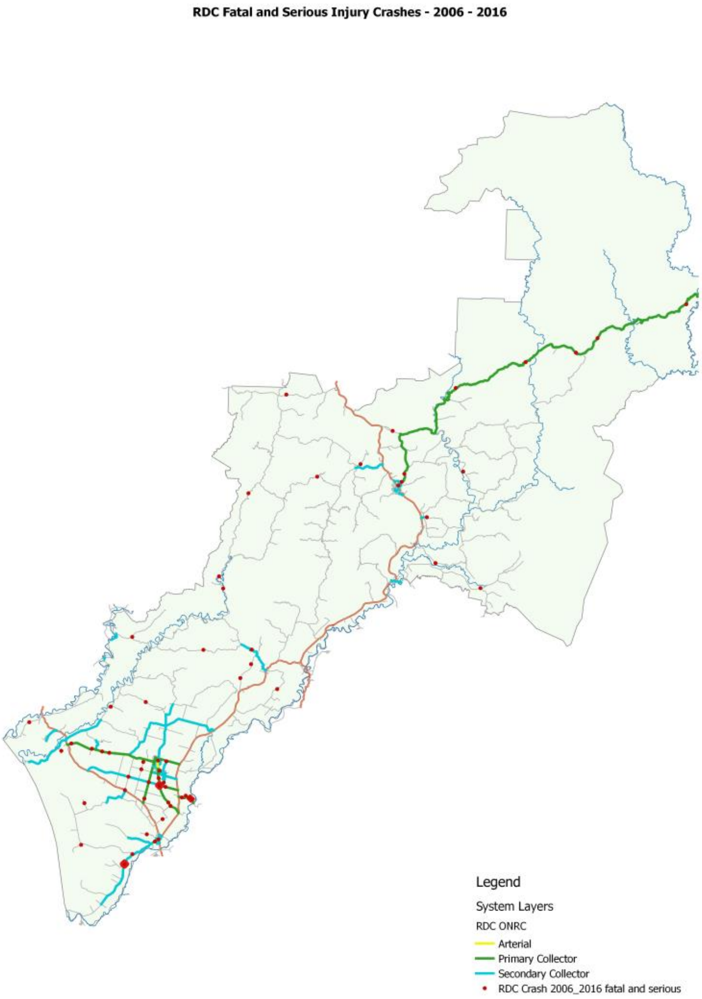


Figure 7-4: RDC Fatal and Serious Crashes 2006-16

7.1.3 Council's promise to the customer

Warning of hazards on the trip
Guidance on safe use.
Maintain the current form and infrastructure in a safe condition

7.1.4 Customer Level of Service Outcome

Over time all roads in a particular category should offer an increasingly consistent, fit for purpose customer level of service for road users.

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.

Primary and 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.

Access (Including Low Volume Roads): 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.

7.2 Hazards are identified and mitigated

7.2.1 Rural Road Permanent Hazards

Performance Measure: Permanent hazards are identified and mitigated in a consistent and fit for purpose manner so that a drivers expectation about the standard of these are a major factor in his or her ability to negotiate the road environment safely (RTS 5/MOTSAM).

Rural Road Permanent Hazards; Targets by Classification:

Arterial: Specific warning provided for all out of context and critical hazards.
0 faults per section
Primary and Secondary collector: Specific warning signs and out of context hazards. 0 faults per section.
Access: Generic warning signs and out of context hazards. Max. 3 faults per section.
Access (Low Volume): Generic warning signs and out of context hazards. No specified faults per section.

7.2.2 Temporary Hazards Identified

Performance Measure: COPTTM requirements implemented at every work site and temporary hazard as soon as practical.

Temporary Hazards; Targets by Classification:

All Categories: No site reported as "Dangerous" from audit criteria

7.3 Sight Lines are maintained

7.3.1 Vegetation

Performance Measure: Rural Road Sight distance (including hazard warning devices) are not obscured by vegetation.

Vegetation; Targets by Classification:

Arterial: 10% annual sample. Always complies
All Categories: 5% annual sample. Always complies

7.3.2 Objects

Performance Measure: Sight distance (including hazard warning devices) is not obscured by unauthorised obstructions (advertising signage, etc.)

Objects; Targets by Classification:

Arterial: 10% annual sample. Always complies
All other Categories: 5% annual sample. Always complies

7.4 Functional traffic restraining devices

7.4.1 Guardrails and Barriers

Performance **Measure:** All traffic restraining devices such as bridge side rails, guardrails, wire rope barriers and crash cushions are maintained in an effective operating condition.

Guardrails and Barriers; Targets by Classification:

Arterial: 10% annual sample. Always complies
All other Categories: 5% annual sample. Always complies

7.5 A forgiving roadside corridor

7.5.1 Roadside Obstructions

Performance Measures:

Roadside safety zones are maintained free from unauthorised obstructions and the development of new hazards.
Council has strategies in place to identify and manage non-compliant sections and high risk sites over time. For example Safety Risk Assessment (or Safety Performance Index for local roads) or for lower rural (less than primary collector) classifications a strategy in place to manage non-compliant sections.

Guardrails and Barriers; Targets by Classification:

Arterial: 10% quarterly sample. No unauthorised roadside obstructions while maintaining the current standard of roadside safety zone.
All other Categories: 5% annual sample. Usually no unauthorised roadside obstructions while maintaining the current standard of roadside safety zone.

Work category:

Safety Management (Work category 151)
Associated and Minor Improvements

7.6 Road User Education

7.6.1 Road Safety Improvements

Performance Measure: A targeted programme is in place to address identified needs (e.g. NZTA Communities at Risk Register)

7.7 Road provides adequate traffic facilities for safe way finding

7.7.1 Delineation

Performance Measure: Adequate provision of delineation for safe driving at night and lane and directional information during the day.

Delineation; Targets by Classification:

Arterial and Primary Collector: Centrelines and edge lines total route, edge markers total route to Spacing B (new SH Standard), RRPM total route 20m centres.

Secondary Collector: Centrelines total route where seal width >5.0m, edge lines isolated sections, edge markers to Spacing A (old SH Standard), RRPM isolated sections only 20m centres.
Access: Centrelines isolated sections where seal width >5.0m, no edge lines, edge markers isolated sections to Spacing A (old SH Standard), no RRPM.
Access (Low Volume): Generally no road marking or delineation devices except in special circumstances as defined in RTS 5.

7.8 Visibility of the carriageway and hazards at night

7.8.1 Carriageway lighting

Performance Measures:

Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement.
Procedure as to identification, investigation and assignment of appropriate lighting is in place and operational.

Work category:

Carriageway lighting maintenance and renewals (Work categories 122,222)
Minor Improvements

7.9 Road provides confidence to drive safely without unexpected surface hazards

7.9.1 Crashes

Performance Measures:

Reducing Trend of Loss of control, wet road and night time crashes.

Work category:

Pavement and surfacing maintenance, delineation (Work categories 111, 122)
Associated and Minor Improvements

7.9.2 Surface Faults

Performance Measure: Number of maintenance related faults (such as rutting / depressions, shoving, potholes, corrugated length, edge break (in lane), bleeding, detritus (in lane), ponding water) that are likely to affect driver behaviour, e.g. requiring a reduction in speed or evasion.

Crashes; Targets by Classification:

Arterial: 10% annual sample, Urban - 2 deficient locations per 1km, Rural - 3 deficient locations per 10km
Primary collector: 5% annual sample, Urban - 3 deficient locations per 1km, Rural - 4 deficient locations per 10km
Secondary collector: 5% annual sample, Urban - 3 deficient locations per 1km, Rural - 6 deficient locations per 10km
Access: 5% annual sample, Urban - 3 deficient locations per 1km, Rural - 8 deficient locations per 10km

Access (Low Volume): 5% annual sample, Urban - 4 deficient locations per 1km, Rural - 10 deficient locations per 10km

Work category:

Sealed Pavement Pothole repairs, Digouts, Shoulder maintenance, Rehabilitation, Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 111, 112, 211, 214)
Crack Sealing, Drainage maintenance and renewals.

7.9.3 Surface Friction

Performance Measure: Areas with surface friction deficiencies are identified and remedied appropriately and efficiently.

Work category:

Waterblasting, Scabbling, Crack sealing, Resurfacing (Work categories 111, 212)
Pavement Maintenance and renewals

7.10 Footpaths and Cycle-paths are available and maintained

7.10.1 Footpath Faults

Performance Measures:

Percentage of network falling within the level of service or service standard set by the Council's relevant document. (DIA Measure).
Percentage target set by Council as per DIA guidelines.

Work category:

Footpath maintenance (non-subsidised activity)

7.10.2 Cyclepath Faults

Performance Measures:

Number of maintenance related hazards (such as detritus, ponding water, potholes, broken glass) on cycleways requiring evasive action by rider.
Sampling as per Council Policy. 4 deficient locations per 1kms

Work category:

Cycle path Sweeping, Pothole repairs (Work category 124)

7.11 Visibility at Night of the User and the carriageway/footpath

7.11.1 Lighting

Performance Measures:

- Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement, and personal security.
- Procedure as to identification, investigation and assignment of appropriate lighting is in place and operational. Procedure should give effect to lighting that facilitates movement of people but acknowledges greater vigilance is required on some sections.

Work category:

- Carriageway lighting maintenance and renewals (Work categories 122, 222)
- Minor Improvements

Conclusions:

- Apart from spikes in 2012/13 and 2014/15 there is a downward trend of serious and fatal crashes.
- The Collective Risk for the District is Low - Medium
- The Personal Risk for the District is High

Deficiencies

- The number of permanent hazards
- The network length of inadequate sight distances
- The number of locations with inadequate lighting
- The network length of chip seals with polished unsafe aggregate.
- Sections of substandard seal width

8 Current Levels of service, output and efficiency measures

The Levels of Service for the Transportation Activity are defined in this section and the performance measures by which the service levels will be assessed. The service levels are aimed at supporting the community outcomes and meeting the strategic goals.

The One Network Road Classification System provide a series of consistent measurable targets, that measure the performance across the District and also comparisons across the country.

8.1 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.

8.1.1 Outcome Measures

Outcome measures are the primary means of quantifying performance of the network. The performance measures below this contribute to the delivery of this outcome measure.

OM1 - Land Use Planning: Council has a transition plan in place so that access requirements documented in the District Plan are implemented and aligned to the ONRC customer levels of service for Accessibility.
OM2 - **Access to adjoining land:** for new customers should not be restrictive but balanced against minimising impact to existing users
OM3 - Access to Bus Stops: The proportion of the metropolitan / urban network within 800 metres of a bus route and reflective of the CLoS Outcome.
OM4 - Truck Travel Exposure: Proportion of the network not transversable to -Class 1 Heavy Vehicles and to 50 Max vehicles
OM5 - Lane Occupancy: - where applicable, an appropriate system is in place to enable measuring lane occupancy

8.1.2 Delivery of Outcomes

Signage and Guidance: To minimise the risk of delays and or driver confusion Council provides guidance so people can navigate their way around the network. This will be done by providing adequate traffic facilities for way finding.

Council has a strategy and/or policy in place to provide information on way finding in advance of intersections, at intersections and beyond intersections to reassure road users that they are travelling on the correct route. And; when a sign is provided, it should be compliant with MOTSAM, RTS2 and the Traffic Control Devices Manual.

Access to Adjoining Land: To ease of access to key destinations Council will provide access to adjoining land to support the role in the transport network where it does not affect others and the function of the road. Provide road access to people's properties and their destination.

Access to adjoining land for new customers shall not be restrictive but balanced against minimising impact to the existing CLoS Outcomes.

Network/Corridor Operating Plan: To ease of access to and through the network Council will provide infrastructure that meets an appropriate level of accessibility to users to perform their role. This will be achieved by minimising conflicting and changing priorities to access the network by mode, place and time of day.

Road User Priority at Intersections: Assurance that people can make the journey without difficulty.

Heavy Commercial Vehicles: To ensure freight and goods can make the journey productively, Council has a strategy in place to identify and manage (through prioritisation and mitigation) sections of the network unable to carry Class 1 traffic HPMV and/or 50 Max vehicles.

All Modes: To ensure the condition of the network enables access to and through the network, Council maintains the physical state of the network in an economically sensible manner (allowing safe travel at a sensible and appropriate speed).

Council manages the network to ensure it is accessible for different uses where appropriate.

Network Access and journey continuity for Active Road Users: Council has a strategy in place to demonstrate it is managing active road user demands and ensuring new assets are consistent with ONRC guidelines.

Utilities Access: Council has a process that demonstrates it is managing Corridor Access Requests, ensuring all utility access to the network complies with the NZUAG code, COPTTM, and the activity's impact on CLOS outcomes (such as Safety and TTR) is minimised.

Community Access to the Network: Council manages access to the transport corridor to minimises the impacts to the customer in line with the CLoS Outcomes. (Where not already covered by legislation such as the NZUAG code or Council's District Plan).

8.1.3 Customer Level of Service Outcome

Over time all roads in a particular category should offer an increasingly consistent, fit for purpose customer level of service for road users.

Arterial: Some land use 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. Numerous bus stops with high frequency services to key destinations and interchanges. Some separation of road space for active road users in urban areas to provide network access and journey continuity. Parking for all modes and facilities for mobility impaired at activity centres, and some shared spaces. 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: 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. Regular bus services to key destinations and interchanges. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Parking for all modes and facilities for mobility impaired at activity centres. Provision of quality information relevant to collector road user needs.

Secondary Collector: Land use 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. Regular bus services to key destinations and interchanges. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Parking for all modes and facilities for mobility impaired at activity centres. Provision of quality information relevant to collector road user needs.

Access and Access (Low Volume): 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 via 'share the road' philosophy (active road users, mobility impaired and drivers), journey connectivity to key destinations via all modes, and provision of quality information.

8.2 Efficiency

8.2.1 Purpose

Right Time - What we do is timed to maximise existing asset benefits and to minimise service risk i.e. not too early and not too late.

The Right Price - Affordable and consistent service cost within like classifications across New Zealand

8.2.2 Outcome

Value for Money and whole of life costs will be optimised in the delivery of affordable customer levels of service. The Measures of Efficiency in delivering the CLoS Outcomes.

8.2.3 Council's promise to the customer

An optimised programme will be delivered that is affordable and at a cost that improves service productivity.

8.2.4 Council meets the customer need by reporting

Quantities of Work undertaken for the financial year by Road classification.

The average life achieved for pavements and surfacing assets.

Pavement Rehabilitation

Pavement Resurfacing

Percentage of Work Completed to that Planned

8.2.5 Foundation Principles

Data: Council will have sufficient robust traffic, asset and expenditure data to apply or give effect to the ONRC classification, CLoS and performance measures.

Productivity: The productivity of the network will improve over time. As measured by the cost of service provision without the same decline in CLoS.

One Network Road Classification Performance Measures -Efficiency 1								
How Council meets the customer need	**Quantities of Work undertaken for the financial year by Road classification**					**The average life achieved for pavements and surfacing assets**		**% of Work Completed to that Planned**
Performance measure (Output from Network)	**Pavement Rehabilitation length (km)**	**Pavement Resurfacing length (km)**	**Pavement Resurfacing area (m^2)**	**Unsealed Road Metalling length (km)**	**Unsealed Road Metalling quantity (m^3)**	**Pavement Rehabilitation**	**Pavement Resurfacing**	
Road Classification	**Targets by Classification** These are reporting measures only at this stage. Once established, they will be used to benchmark the cost of service provision within like classifications							
Arterial								
Primary Collector								
Secondary Collector								
Access								
Access (Low Volume)								

Table 8-1: One Network Road Classification Performance Measures Efficiency 1

One Network Road Classification Performance Measures - Efficiency 2								
How Council meets the customer need	**Report the Total Cost each Financial Year divided by total lane.km within each road classification**				**Report the Total Cost each Financial Year divided by total vehicle kilometres travelled (vkt) within each road classification**			
Performance measure (Output from Network)	**Pavement Rehabilitation**	**Pavement Resurfacing**	**Pavement Maintenance**	**Unsealed Road Metalling**	**Pavement Rehab**	**Pavement Resurfacing**	**Pavement Maintenance**	**Unsealed Road Metalling**
Road Classificatio n	**Targets by Classification** These are reporting measures only at this stage. Once established, they will be used to benchmark the cost of service provision within like classifications							
Arterial								
Primary Collector								
Secondary Collector								
Access								
Access (Low Volume)								

Table 8-2: One Network Road Classification Performance Measures Efficiency 2

One Network Road Classification Performance Measures - Efficiency 3								
How Council meets the customer need	For the previous Financial Year's sealed road resurfacing				For the previous Financial Year's sealed road pavement rehabilitation			
Performance measure (Output from Network)	Percentage of the sealed road network that is resurfaced	Average age of the seals resurfaced	Total cost of completed resurfacing	$/km for completed resurfacing	Percentage of the sealed road network that is rehabilitated	Average age of the pavements rehabilitated	Total cost of completed pavement rehabilitation	$/km for completed pavement rehabilitation
Road Classification	Targets by Classification These are reporting measures only at this stage. Once established, they will be used to benchmark the cost of service provision within like classifications							
Arterial								
Primary Collector								
Secondary Collector								
Access								
Access (Low Volume)								

Table 8-3: One Network Road Classification Performance Measures Efficiency 3

8.3 Amenity

8.3.1 Travel Quality

The level of travel comfort experienced by the road user.

8.3.2 Travel Aesthetics

The aesthetic aspects of the road environment (e.g. cleanliness, comfort, convenience, security) that impact on the travel experience of the road users in the road corridor.

8.3.3 Purpose

Customers receive an appropriate level of comfortable ride
Improve customers travelling experience
Active road users are confident to travel at night

8.3.4 Outcome

Outcome measures are the primary means of quantifying performance of the network. All performance measures below this contribute to the delivery of this outcome.

Amenity OM1: Smooth Travel Exposure (STE) Index
Amenity OM2: Avg Roughness - The average ride comfort level of the sealed road network meets specified levels

8.3.5 Council's promise to the customer

The road environment and facilities will be maintained to support an appropriate level of comfortable ride.

The road corridor will be maintained compatible with the urban/rural context and the road use experience.

One Network Road Classification Performance Measures - Amenity					
Road roughness will be maintained				The aesthetic value of the road environment is maintained	**Lighting is provided**
Peak Roughness	Truck Ride	Unsealed Road Roughness	Unsealed Road Average Roughness	Aesthetic Faults	Lighting
At least 95% of the sealed road network meets specified levels of ride comfort. Measured in NAASRA Counts	Areas with truck ride deficiencies are identified and remedied appropriately	At least 95% of the unsealed road network meets specified levels of ride comfort.	The average ride comfort level of the unsealed road network meets specified levels.	No more than X defects per 5 kilometre sample length of aesthetic maintenance related faults (such as litter, damaged or non-functioning equipment or furniture, graffitti, vegetation, etc.) that are likely to detract from the customer's experience.	Provide and maintain lighting in a consistent and fit for purpose manner to support the facilitation of safe movement, and personal security.

Table 8-4: One Network Road Classification Performance Measures Amenity

Road Classification	Amenity Targets by Classification Provisional targets attempt to give effect to the CLoS Outcome at left. Fit for purpose will be established once Council has applied the measures and reported the gap in their current service levels.					
	Sealed Pavement NAASRA		Unsealed Pavement NAASRA			
Arterial	U <= 130 R < = 110	Comply	N/A		Complying with a maximum of 15 defects as per the visual guidelines per 5 km sample length	Reported under Safety Measures
Primary Collector	U <= 140 R < = 120	N/A				
Secondary Collector	U <= 140 R < = 120	N/A	180 Max			
Access	U <= 150 R < = 130	N/A			Complying with a maximum of 20 defects as per the visual guidelines per 5 km sample length	
Access Low-Volume	U <= 150 R < = 150	N/A				
	Direct Influence					
	Sealed Pavement Pothole repairs, Digouts, Shoulder maintenance, Rehabilitation (Work categories 111, 214)	Network Management, pavement maintenance (Work category 151, 111)	Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 211, 214)	Unsealed Pavement Grading, Metalling, Spot Metalling (Work categories 211, 214)	Graffiti cleaning, litter collection, vegetation control, street cleaning. Rest area maintenance (Work categories 121)	Carriageway lighting maintenance and renewals (Work categories 122, 222)
	Indirect Influence					
	Crack Sealing, Resurfacing, Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures)	Pavement rehabilitation	Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures)	Drainage maintenance and renewals, (as influenced by Value for Money and optimum whole of life cost measures)	N/A	Minor Improvements

Table 8-5: Amenity Targets by Classification

8.4 Travel Time Reliability

8.4.1 Travel Time Reliability

The consistency of travel times that road users can expect

8.4.2 Purpose

Minimise the impact of planned activities and events
Minimise the impact of travel time variability on journeys
Maximise effective capacity

8.4.3 Outcome

Outcome measures are the primary means of quantifying performance of the network. All performance measures below this contribute to the delivery of this outcome measure. **We will manage the impact of activities and demand on the network.**

TTR OM1 - Predictability of travel time - Measures the variability of travel times for agreed time periods on a representative sample of high classification roads and key journeys

8.4.4 Council's promise to the customer

The impact of activities and demand on the network will be managed.
Information on travel time will be provided to customers so they can choose when and where to travel.
Council will operate the network to maximise its effective capacity

9 Future Demand

The purpose of this section is to examine the key drivers of the future demand for the Districts Roading assets and explore the impact these drivers may have on the provision of these assets.

9.1 Demand Drivers

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. In certain circumstances an asset may become surplus to requirements.

The present road network was set up many decades ago and has been gradually upgraded to the present standard in line with increasing demands driven by the factors outlined above. Generally, the network copes with the current demand.

Exploring the future demand of the District's Roading assets is important as it enables Council to plan for potential changes and identify the most practical response to changing demands. It also ensures risks associated with changes in demand are adequately managed.

The roading asset is facing some major changes at present, which will place additional stresses on the physical assets and budgets. The major factors driving future demand are:

- Population and demographic change.
- Central government funding policy.
- Changes to rural economy.
- Rising costs of oil based products.
- Land use change.
- Changing technologies.
- Changing legislative requirements.
- Changing regional and District planning requirements.
- Climate and climate change.

Each of these drivers requires some prediction/estimates about future conditions which may or may not be accurate. Whilst Council plans on the basis of the most likely future conditions, it also considers appropriate "What if…" scenarios which take account of less likely futures.

9.2 Population and demographic change

Generally an increase or decrease in population will result in an increase or decrease in traffic on the roads which will increase or decrease congestion and reduce/improve the level of service provided by the road, as well as varying wear on the roads. An increase in population/traffic may result in an increase in maintenance costs, whereas a decrease in population/traffic could mean that maintenance to the current level of service is less affordable.

Population Projections

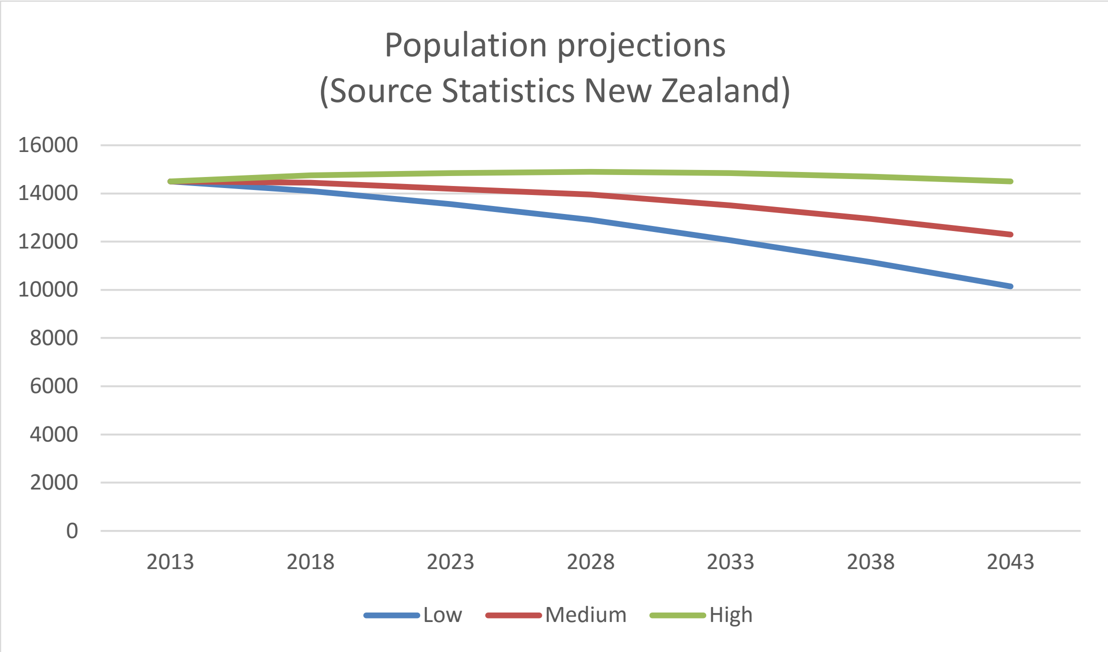


Figure 9-1: Population projections

Current population estimates indicate that the trend is tracking slightly above the high projections. This means that the population of the District is likely to be stable for the next thirty years or so.

Ageing population

The median age of residents in Rangitikei District as at census 2013 was 41.1 years and this is set to rise to between 45.8 (high population projections) and 48.8 (low population projections) in 2043. The number of residents aged 65+ is set to double with a fourfold increase in the number of residents aged 85+.

This means that an increasing number of the District's ratepayers are likely to be on low and/or fixed income. In addition, an increasing number of the District's population are likely to experience decreased mobility, both in terms of the need for the footpath network to be able to accommodate greater use of mobility scooters and in increasing numbers of residents being unable or unwilling to drive.

Ethnicity

The District is predicted to become increasingly diverse; this increase is largely responsible for the slowing down/reversal of population decline. To maintain this growth it is important that the District supports the successful settlement of these new communities.

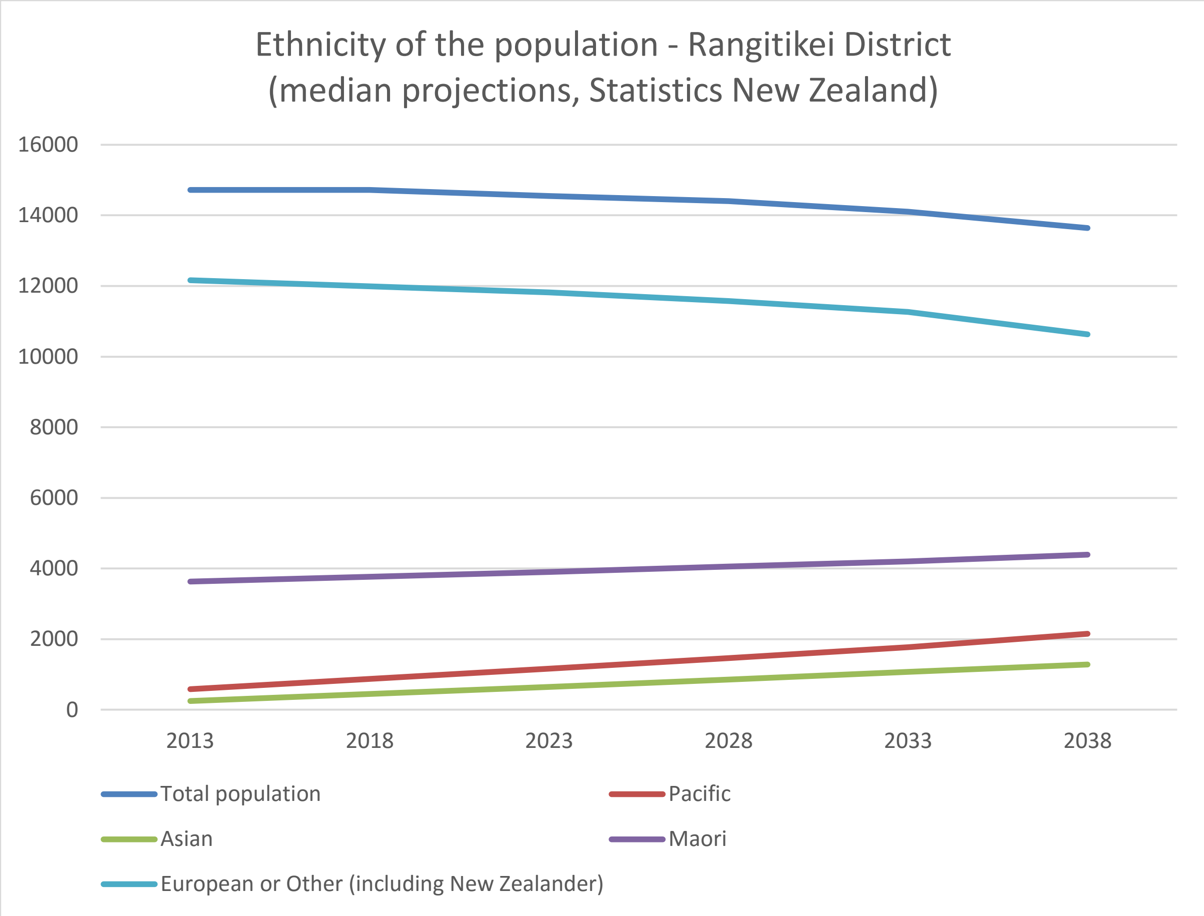


Figure 9-2: Ethnicity of the population

Number of households

There were 6,000 households according to the 2013 Census. This is predicted to decrease to 5,000 if population projections follow the low scenario but to increase by 500 to 6,500 under the high population projection scenario.

30 year assumption

That the District population and number of households will stay the same over the next thirty years, and that the average age will continue to rise with increasing numbers of residents aged 65+ and 85+.

Level of uncertainty – Moderate. Statistics NZ acknowledge that the important unknown in the calculations is the figure assumed for net migration from the District to elsewhere. If this differs significantly from the figure assumed, then the impact on the population predictions will also be significant.

However, the road network is relatively independent of the resident population since it is still required in its current length if it is to continue to provide "a safe roading network which allows people to travel from A to B" and particularly to meet the needs of the rural economy.

9.3 Economic development and the structure of the local economy

The main industry groups in the District are:

- Primary production – particularly beef and sheep farming (18.4% local GDP in 2015), dairying (6.4% local GDP in 2015) and forestry (2.5% local GDP in 2015)
- Secondary production – particularly meat processing in the southern Rangitikei (7.1% local GDP in 2015)

Dairying, sheep/beef farming and meat processing generally require regular use of heavy vehicles. A key driver of the roading programme is to maintain the network to a standard that is fit for purpose for these economic activities.

9.3.1 Dairying

Farm conversions and on-going development of the dairy industry in Rangitikei (and to some extent the wider region) would cause a localised increase in heavy traffic movements on routes to and from processing and distribution hubs. This loading particularly affects 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.

9.3.2 Forestry

The increase in rural land set aside for forestry, particularly driven through government incentives in the 1980s, is likely to have an increasing impact on the roading network.

Forestry activities provide the Rangitikei with both an environmental and an economic benefit. They usually occur on land which has low productive value for other types of rural activity. Forestry intensification/land retirement improves silt management, erosion control and nitrogen retention in the soils.

Problems occur when heavy vehicles used during forestry harvesting are required to use low volume, rural roads which were not designed for such use. Forestry blocks tend to be on isolated and relatively inaccessible land and activity is generally confined to short but intense periods of logging once every 20-30 years. The issue is exacerbated by logging activity in cold, wet winter conditions. However, forestry typically undertakes logging when commodity prices are high, irrespective of season/weather. If Council were to extend its level of service for roading to provide roads that were fit for forestry/logging purposes, then that would come at a significant cost.

Therefore it is necessary to understand, over a 20-30 year period, firstly, what is the relative impact on the roading network of rural activities compared to each other and, secondly, what is the relative contribution from rural activities to the roading rate compared to each other. This is important in order to be able to develop solutions which do not penalise or favour one rural activity over another. In other words, the principles of fairness and user/exacerbator pays need to be transparent in Council's deliberations to address the issue of who pays, and how, for wear and tear caused by heavy vehicle use on its roads.

9.3.3 Tourism

The provision of recreational and tourist opportunities within the District may increase visitor numbers. This in turn will increase the use of particular roads, thus increasing the wear and increase maintenance requirements. However, tourism is not currently expected to increase significantly in the District and therefore this is unlikely to be a key driver of the roading programme.

30 year assumption

Many of the roads servicing the land blocks were not constructed to handle the high level of loading they are currently facing. Consequently, the movements of heavy vehicles are likely to be the key driver of the rehabilitation forward work programme.

That the Council will introduce a system of user/exacerbator pays for the use of the roading network by heavy vehicles.

Level of uncertainty – Low. In late 2014 a working group was established by the Road Controlling Authorities Forum. The purpose of the working group is to identify a robust process for quantifying the life cycle cost impact of heavy vehicles on low volume roads, determine equitable mechanisms for addressing the cost impact, and develop national guidelines for best practice. Council will reconsider this option once the Heavy Vehicles on Low Volume Roads Working Group has reported with national guidance. This is anticipated to be in 2017 so would potentially be an issue for the 2018-28 LTP.

9.4 Peak Oil and Climate Change

9.4.1 Rising costs of oil based products

The Roading and footpaths activity relies upon materials and goods that are derived from oil-based commodities. The costs of the activity are therefore very sensitive to changes in the price of these commodities. Trends indicate that these price rises are greater than the average CPI and therefore Roading costs are increasing at a faster rate than the costs of other Council services. Global oil prices have been reasonably stable over the past few years (i.e. increasing at a steady rate rather than fluctuating wildly).

Oil, as the basis for fossil fuels, is a limited commodity and there is active debate as to when global peak oil will occur, how to measure peak oil, and whether peak oil production will be supply or demand driven. Reducing the reliance of the Roading activity on oil-based commodities will result in the need for alternative methods to be used: this may increase or decrease the cost of providing these services, and the impact may be different in the short-term and the long-term.

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.

9.4.2 Climate change

The Resource Management Act 2004 Amendment Act defined climate change as:

A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to the natural climate variability.

Changes in weather patterns associated with climate change, such as the increased frequency of storm events, will cause increasingly frequent damage to the roading network. This will either be addressed through the necessity for more emergency works or through changes to the processes for road rehabilitation and renewal which result in a resilient roading network.

30 year assumption

That the cost of oil-based commodities in the Roading activity will continue to increase at a higher rate than the CPI and that as substitutes for fossil fuel based products are developed, the cost will be at least equivalent to current oil-based products.

That there will be an increasing costs associated with emergency works and/or ensuring a resilient network as a result of changing weather patterns.

Level of uncertainty – Medium. There is uncertainty around when and how peak oil will occur and if suitable substitute products can be developed, how soon this can happen and what the likely costs will be. There is also no certainty about future levels of government funding for roading (rehabilitation, renewal or emergency works). However, these problems will not strike the District in isolation, they will be national issues and the solutions are likely to be driven nationally with regard to local affordability.

9.5 Central Government funding policy

Central government assistance towards the maintenance of the local roading network is set by the Financial Assistance Rate (FAR) provided by NZTA. Currently the Council receives a FAR subsidy for a number of the roading assets of 63%. Given the size of Council's local roading network it is a vital source of income. There has been significant investment in the roading assets by both the Council and NZTA.

Maximising the FAR will become even more crucial as fewer rate payers will be available to fund the maintenance of the network. However, currently NZTA is reviewing the FAR. A decrease in the FAR provided by NZTA may significantly reduce the levels of service able to be provided for this asset.

9.6 Changing Central Government policies

Changes to legislation may introduce changes to the demand for transport services, typically such changes will affect the characteristics of the traffic (e.g. truck weight limits) or the management of the roading activity (e.g. Government Policy Statement on Transport Funding).

It is accepted that legislative change can occur at any time and that the impacts of such changes can be broad or quite specific. Council's assumptions for strategic planning accept the legislative framework that is in place at the time of planning.

9.7 Other issues affecting demand

9.7.1 Land use change

In addition to the contribution from the local roading network to economic productivity, road use is directly related to residential development with each household estimated to produce between six and eight vehicle movements/day. The potential changes to land use in the future of the Rangitikei District and the subsequent effects on the Roading network are difficult to determine with accuracy.

The local population is expected to be stable for the next 30 years or so. In addition, decreasing household size and increasing household numbers is a phenomena that has played out over the last 25 years and it is likely that the number of households (rating units) is also stabilising.

In line with the current Development Contributions Policy, Council does not collect any development contributions. During the recent period of static or negative growth, Council took the view that its existing infrastructure was sufficient for rehabilitation and renewal and that it was unlikely to require new infrastructure. Recently, it ceased the sealing of unsealed roads and is currently reviewing the Roading level of service in line with the ONRC (see section 2).

30 year assumptions

Land use change is unlikely to lead to any major review of the roading network since new subdivisions are likely to be on the edges of existing settlements. Where a large subdivision is planned, income from additional rates is likely to offset any increase in expenditure.

Level of uncertainty – Low. The assumption allows for no growth or minor additional growth. There is uncertainty over the stabilisation of the population but investment is only made as new demand is identified.

9.7.2 Changing technologies

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.

30 year assumptions

That technology will continue to develop and bring efficiencies in traffic management but that this is unlikely to make a material difference to the overall cost of this activity.

Level of uncertainty – Low. Technological innovation is almost certain to happen and to be driven by cost and affordability issues.

9.8 Demand Changes

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 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.

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.

9.8.1 High Productivity Motor Vehicles

In 2010, amendments were made to the Land Transport Rule for Vehicle dimensions and Mass. This included:

High-productivity vehicles would be allowed long-term permits to operate on approved routes at weights up to 53 t and lengths up to 22 m.
Vehicles below 44 t would be able to operate at higher axle limits without permits.
Operation over 53 t and 22 m would require overweight and over dimension permits.
Overweight permits may be issued to divisible loads.

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 t.

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

9.9 Roading Growth and Demand

9.9.1 Major Influences

Particular trends that have a significant impact on the road asset include:

Forestry - Within the Rangitikei 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 Rangitikei District large scale 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.

High volumes of harvestable timber will reach maturity in the period 2020-2030 with over 50 % of the regions 20,100ha becoming available for logging. On average the region produces around 530 tonne/ha harvested yield.

The regions two key forest epicentres Santoft and Hunterville are different by nature. While producing less tonnage per ha due to its poorer soils types Santoft is predominantly a 'mixed age class' forest resource, with established road access, road egress points, low relief land and with close proximity to State highways.

In comparison the Hunterville area is remote, has large areas of even age class forest, egress points for harvested timber are not yet established for the majority of large forest blocks, timber yield (tonnes/ha) is higher and land is higher relief (steeper).

Most importantly roads servicing the Hunterville forest area and linking them to State Highways are often unsealed low volume rural roads.

Consultation with major forest owners is required to determine key egress points prior to harvest operations. This information will feed into road maintenance schedules, engineering and design.

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 data has shown some clear trends in harvestable age timber.

34% of total district harvestable tonnage occurs in the 2027-2029 period.

50% of total district harvestable tonnage occurs in the 2027-2032 period.

A number of large even age woodlots will mature in the 2024-2032 period in the Hunterville forest epicentre.

As an example, in the 2027-2029 period 50% of district tonnage occurs on 3 roads within the Hunterville forest area. These include:

- Turakina Valley Road
- West Road
- Watershed Road.

The Santoft forest epicentre shows a more mixed spread of age classes and smaller lot size.

These results show a clear trend towards peak harvesting periods, age classes, forest locations and potential road usage scenarios.

The District does not have an equal spread of forest areas. Certain land types have suited the establishment of larger forest areas and in doing so have established two major district forest epicentres at Hunterville and Santoft.

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 New Zealand Transport Agency (NZTA) financially assists the road maintenance budget (currently 63%), 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.

Consultation with major forest owners (>100ha) should be undertaken to determine forest harvest egress points onto rural roads more accurately. This data should be mapped using suitable GIS methods to locate areas that represent harvest 'hot-spots' and infrastructure bottlenecks e.g. bridge weight loadings, passing width and turning radius issues.

Meetings should be held with major forest owners to discuss suitable methods of cooperative harvest schedules and infrastructure e.g. shared egress points, harvest plans.

The feasibility of establishing facilitate new railheads should be discussed with Kiwirail, the forestry industry, and NZTA.

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 2020 and 2032, these include harvest groups in the 2024-2026, 2027-2029 and 2030-2032 periods when over 50 percent of the region's forests reach harvestable age.

High volume areas which impact on low-volume roads are located on central and western roads and carry a large percentage of regional volume. A relationship exists on these roads between distance from State Highway, large average lot size and even-age plantations. This relationship has implications for road maintenance schedules.

Variable log grade and wood product demand, carbon trading, 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 and drainage.

Railheads are becoming an integral part of the forestry transport network, particularly as a means of easing congestion on State Highways. Opportunity exists at places like Hunterville to create hubs which may result in some realignment of feeder networks.

Reference: Moore and Associates (February 2017) Wood availability and related roading implications on Rangitikei District roads 2018-2047. A forestry study prepared for Rangitikei District Council.

Dairy conversion - Conversion of land use to dairying has a direct effect on the road network, specifically with pavement widths, pavement loadings and safety under all pressures. Conversion to other intensive land uses not currently known or anticipated may have similar effects, which is potentially one of the risks to the Council from climate change problems.

Inadequate seal widths on sealed roads used by dairy tankers become apparent 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, grading and generating more dust than most other vehicles.

High Productivity Motor Vehicles - In 2010, amendments were made to the Land Transport Rule for Vehicle dimensions and Mass. This included:

High-productivity vehicles would be allowed long-term permits to operate on approved routes at weights up to 53 t and lengths up to 22 m.
Vehicles below 44 t would be able to operate at higher axle limits without permits.
Operation over 53 t and 22 m would require overweight and over dimension permits.
Overweight permits may be issued to divisible loads.
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 t.

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

9.9.2 Central Government Funding Policy

Central government assistance towards the maintenance of the local Roading network is set by the Financial Assistance Rate (FAR) provided by NZTA. Currently the Council receives a FAR subsidy for a number of the Roading assets of 63 %. Given the size of Council's local Roading network and its importance in the rural economy, it is a vital source of income. There has been significant investment in the Roading assets by both the Council and NZTA.

Maximising the FAR will become even more crucial as fewer rate payers will be available to fund the maintenance of the network. However, currently NZTA is reviewing the FAR. A decrease in the FAR provided by NZTA may significantly reduce the levels of service able to be provided for this asset.

9.9.3 Rural Economy

Current trends indicate that there will be increasing dairying conversions and forestry activities in the District. These are outlined in the District Overview section of the LTP. This will lead to a greater use of the Roading network requiring additional maintenance costs. In the case of dairying conversions, the change is a daily increase in heavy vehicle movements to take milk from the dairying unit. In the case of forestry activity, there is little or no use for many years within a particular area then during the logging period, a concentrated number of heavy vehicle movements will occur in a short space of time.

Many of the roads servicing these land blocks were not constructed to handle the high level of loading they are currently facing. Consequently, the dairying and logging truck routes are likely to be a key driver of the rehabilitation forward work programme.

The provision of recreational and tourist opportunities within the District may increase visitor numbers. This in turn will increase the use of particular roads, thus increasing the wear and increase maintenance requirements.

9.9.4 Oil-Based Products

The Roading and footpaths activity relies upon materials and goods that are derived from oil-based commodities. The costs of the activity are therefore very sensitive to changes in the price of these commodities. Trends indicate that these price rises are greater than the average CPI and therefore Roading costs are increasing at a faster rate than the costs of other Council services. Global oil prices have been reasonably stable over the past few years (i.e. increasing at a steady rate rather than fluctuating wildly).

Oil is also a limited commodity and there is active debate as to when global peak oil will occur, how to measure peak oil, and whether peak oil production will be supply or demand driven. Reducing the reliance of this activity on oil-based commodities will result in the need for alternative methods to be used and this may increase the cost of providing these services, at least in the short-term.

9.9.5 Economic Trends

The main industry groups in the District are:

Dairy
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 in the District that provide a varied source of employment in the District include:

Meat processing e.g. CMP.
Small to Medium industry e.g. Wrightson Grain Silo.
Commercial and Industrial Opportunities.
Golf Courses e.g. Rangitane 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 Rangitikei. The Council is looking to attract new commercial and industry ventures to the District.

9.9.6 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.

The potential changes to land use in the future of the Rangitikei District and the subsequent effects on the Roading network are difficult to determine with accuracy. However, 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 lifestyle of the population. 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. streetlights or footpaths.

The Council intends to maintain its awareness of these issues and plans to provide a Roading network which meets the communities' expectations.

As discussed, farm conversions and on-going development of the dairy industry in Rangitikei, Manawatu, Taranaki and the Tararua are to a lesser extent, increasing gravel extraction and processing. This is subsequently increasing localised heavy traffic movements on routes to and from processing and distribution hubs. This loading particularly affects 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.

9.9.7 Rail Transport

The District is served by two railway lines, being the North Island Main Truck Railway and the Marton to New Plymouth with 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.

9.9.8 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.

9.10 Other Drivers

9.10.1 Climate Change

The Resource Management Act 2004 Amendment Act defined climate change as:

A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to the natural climate variability.

It is necessary to consider climate change issues in relation to the Roading activity to ensure the sustainability of this activity and maintain the agreed levels of service.

9.11 Demand Planning

9.11.1 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 system. Classified Counts (number and type of traffic) are used for this information.

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.

9.11.2 Asset Capacity

Generally the District's roads and intersections are far from their ultimate capacities and many are unlikely to reach those points in the near future. Under the conditions that prevail on most of the rural principal road network, two lane roads can be expected to carry up to 4,800 vpd, without a significant decrease in the level of service. However, there are some points where there is difficulty meeting the demand and where future growth may create strain on the network and possible delays at peak times.

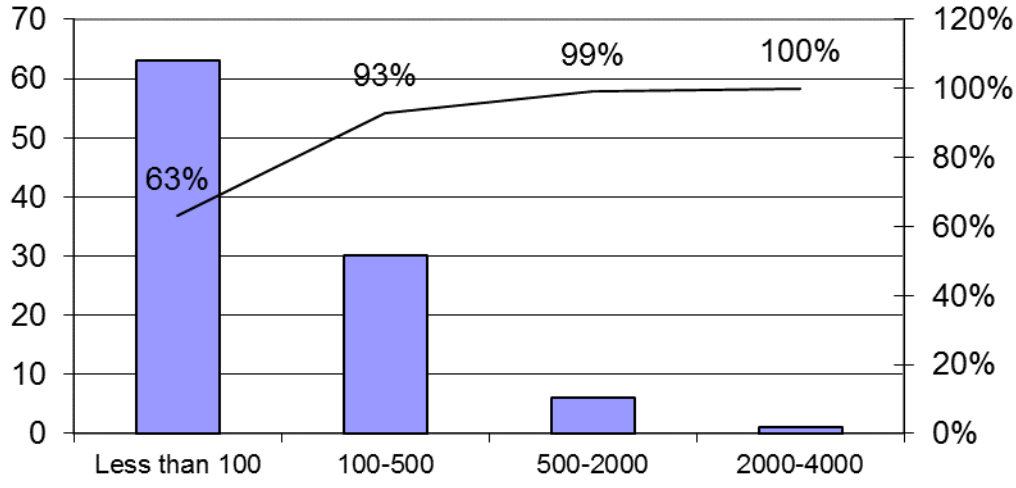


Figure 29 -Roads by Average Daily Traffic Volume

Figure 29 illustrates the proportions of Daily Traffic across the network; most notable is that 63 % of the length of the network (771 km) carries less than 100 vpd. In terms of the expected capacity of a two lane road, less than one percent of the length of the network currently carries more than 5,000 vpd. This comprises 1.2 km of urban road.

In the more rural areas, the District's roads and intersections are far from their ultimate capacities and many are unlikely to reach those limits in the near future. There is significant redundancy in the network that reflects the historic development of most roads that came about from the simple metalling of partially formed tracks as the District was colonised.

Under the conditions that typically prevail on rural Roading networks, two-lane roads can be expected to carry up to 4,800 vpd total without a significant decrease in the level of service. However, there are some points where it can benefit from specific minor improvements for example intersection realignments and other safety works, being carried out.

9.11.3 Achievements

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 Manawatu-Whanganui 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. The more rural environment that the District offers attracts these people; however, they expect higher levels of service more akin to those in metropolitan areas. 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. 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 discussed in the following paragraphs:

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 is used. This may mean roads will need to be modified or 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 feel safe whilst doing so, 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: This 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. However, there are disconnections between what can be realistically provided in the District's urban and rural areas.

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.

9.11.4 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 NZTA 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 NZTA'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 $250,000 per project can be funded from this category. This is taken from a bulk allocation that is equivalent to 8 % of the value of the Council's Land Transport Maintenance and Renewal Programmes. This equates to approximately $507,000 per annum. Previously this work was referred to as "minor safety improvements" and was limited to a cost of up to $150,000 per project.

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

Wherever possible the Council utilises subsidised funding sources to carry out major works. If major roading projects are not eligible for subsidised funding, the Council then considers fully funding these as projects in order to achieve them.

Approved projects are bulk funded by The NZTA through Work Category 341 – Minor Improvements of the Land Transport Programme. The total value of this fund for each road controlling authority is limited to 5 % of the value of its total maintenance and renewal budgets in the Land Transport Programme.

A Hazard and Deficiency Database has been developed 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.

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.

9.11.5 New Improvement 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 LTPs, Council 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 coordinated 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.

9.11.6 Options

The Local Government Act 2002 requires that:

77. (1) A local authority must, in the course of the decision making process,—

Seek to identify all reasonably practicable options for the achievement of the

objective of a decision; and

Assess those options by considering; Asset Management Plan – Roading – 2015-2016 112

The benefits and costs of each option in terms of the present and future social, economic, environmental, and cultural well-being of the District or region; and

The extent to which community outcomes would be promoted or achieved in an integrated and efficient manner by each option; and

The impact of each option on the local authority's capacity to meet present and future needs in relation to any statutory responsibility of the local authority; and

Any other matters that, in the opinion of the local authority, are relevant; and

c)If any of the options identified under paragraph (a) involves a significant decision in relation to land or a body of water, take into account the relationship of Maori and their culture and traditions with their ancestral land, water, sites, waahi tapu, valued flora, fauna and other taonga. The Council does however have discretion as to:

(i) The extent to which different options are to be identified and assessed; and

(ii) The degree to which benefits and costs are to be quantified; and

(iii) The extent and detail of the information to be considered; and

(iv) The extent and nature of any written record to be kept of the manner in which it has complied with those sections.

The principles set out in section 14; and

The extent of the local authority's resources; and

The extent to which the nature of a decision, or the circumstances in which a decision is taken, allow the local authority scope and opportunity to consider a range of options or the views and preferences of other persons.

This plan considers available options such as:

The social, economic, environmental, and cultural wellbeing of the District, by taking appropriate cognisance of the Council's Goals and objectives.

The extent to which community outcomes would be promoted or achieved by having regard to the Council's published community outcomes.

In considering these matters there is a need to coordinate projects within the Roading activity and between this and other activities of the Council. This integration has occurred where possible with the continual development of the Council's systems and Asset Management Plans.

Analysis of the benefits and costs of options is not appropriate at these early stages of project and plan development covered by this plan. Rather, these factors should be considered in the decision making process that is followed before any specific project is built.

Most improvement projects listed in this plan should therefore generally be regarded as 'likely solutions to the problem' rather than firm indications as to the exact option that will be built. However, some projects only explore options and consider benefits, costs and wider community issues in the process of making more strategic recommendations.

9.11.7 Local Priorities

As part of the development of LTP, the District's communities, via their respective Township Committees and Community Boards, are provided the opportunity to rank proposed improvement projects in order of their preferences. The Council will then consider these preferences 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 NZTA.

Until 2008, the LTP was submitted annually to the NZTA for funding approval. The Land Transport Management Amendment Act 2008 introduced a three year National Land Transport Programme to coincide with local authorities' three yearly LTP budgeting processes. The requirement to submit a local LTP for approval is now indirect; a Regional Land Transport Programme has to be compiled and this cannot be done without the relevant information from all the road controlling authorities' individual Land Transport Programmes.

9.12 Proposed Improvements

9.12.1 Pavements

Proposed improvements to road pavements can be split into several different categories:

9.12.1.1 Seal Extensions

Previously, if a benefit-cost ratio (BCR) of over 4 could be obtained, then a seal extension was programmed as subsidised work through the Council's Land Transport Programme. This however became rarer as the busier roads were sealed and seal extensions were carried out as non-subsidised Roading works.

The main factor affecting the BCR is the traffic volume. Previously a long-standing "rule of thumb" was a road could be considered viable to seal if the traffic volume was over 90 vpd. Increases in sealing costs and other changes in economic criteria suggest that an on a comparative basis today this has increased to 150-200 vpd.

The roads included in the early seal extension programmes were readily identified high use unsealed roads, and those that were the subject of ratepayer submissions. However, since the early 1990s, when the Council started to obtain traffic counts for all unsealed road sections, each section was ranked on a consistent and objective basis to determine a prioritised annual forward programme for consideration by the Council. As part of this, the traffic counts of the top ranked 25 seal extension candidates were validated to ensure an accurate ranking relativity.

In recent years the number of seal extension obtaining a BCR over 2 has been rare. This is why no rural seal extensions were carried out in 2007-2008. Previously the Council was open to funding 50 % of the cost of a seal extension if this was matched by other funding, for example by property owners who were strongly advocating having their road sealed. In 2007 the Council decided that they could no longer support this type of commitment.

Recently the original seal extension forward programme has been updated and improved, to correct inaccuracies and miscalculations that have crept into the original spreadsheet-based prioritisation process over time. The updated Seal Extension Forward Programme has been repopulated with RAMM inventory information and traffic counts and this can now be repeated easily and consistently before each review.

While the original forward programme was updated annually to enable the Council to consider potential seal extension candidates in conjunction with its Annual Budget process, the revised Forward Programme will only be updated and reprioritised on three yearly cycles in conjunction with updating this Plan. This will provide greater certainty to ratepayers and the Council and fit more closely with the LTP and Land Transport Programme cycles. It also reflects the continuing objective of having no traffic counts over three years old.

9.12.1.2 Seal Widening

Deficient seal widths in the District are driven by identified maintenance and safety issues. A seal widening forward programme identifies candidates based on sections where there is insufficient road width when compared to adjacent sections. This may include those with significant maintenance liabilities from edge break and rutting. It also considers when the road is due for resealing so that widening can occur in advance of this allowing the completed full pavement to be re-sealed to provide a homogeneous surfacing, in terms of life and appearance.

9.12.2 Kerb and Channel

On occasion, Council has used an external consultant to carry out a sealed road pavement assessment, which includes an examination of all damaged or broken kerb throughout the District. The results of this survey are submitted and stored via the RAMM system for future use .Council uses this data to assist in the creation of forward works programmes for repairing and renewing kerb and channel.

Furthermore, this information can also be used to support the construction of new kerb and channel within urban areas requiring improvements in pavement drainage.

Much of the older data stored in RAMM is heavily influenced by the assumptions made about construction dates of older kerb and channel and is therefore subject to more scrutiny. New improvements will be balanced with the forward works programme in combination with renewal works and new projects are expected to be limited in scale and undertaken under minor improvements.

9.12.3 Other Improvements

There is no improvement or development work planned for other asset groups at this stage.

9.12.4 Town Upgrades

Township improvement works are carried out mainly at the request of the local township committees. 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 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.

Street upgrades are essentially renewal works as they mostly consist of the renewal of old footpaths, kerb and channel, street lights and pavements. However, they also can incorporate new improvements that relate more to the aesthetics of the street e.g. the use of aesthetically pleasing surfacing such as cobblestones, decorative light poles, traffic calming devices, landscaping and the undergrounding of existing overhead services. On this basis, the common view is that street upgrade projects are treated more as an overall improvement project than a number of separate renewal projects in terms of prioritisation.

In advance of each LTP process the Council consults with the respective township committees to determine a preferred priority for the works to be carried out over the next three-year period. This is because even in ‘LTP years’ The Council is unlikely to be able to unable to fund all these improvements, for budgetary reasons, so the most desired projects are proposed.

The Council balances the demands for these new improvements over the District in a fair and impartial manner within the global funding constraints for this type of work.

9.12.5 Funding

All of these works are currently identified in NZTA Work Category 324 – Road Reconstruction in the Council's proposed Land Transport Programmes on the basis they are assumed to qualify for subsidy at the Council's current financial assistance rate of 63%. If this proves not to be the case, the Council will need to reconsider its options, which include meeting the additional costs, including fully funding the works, deferring the projects or abandoning them.

9.12.6 Level of Service Improvements

With one exception the current customer levels detailed in the Levels of Service section of this Plan reflect current service levels delivered by the Council. This can be described as substantially "business as usual".

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 $250,000 can be funded through a block allocation in the Council's subsidised Land Transport Programme.

9.12.7 Level of Service Backlogs

The backlog of new improvement works required to address shortfalls in current levels of service is assessed by comparing the lists of required works with the rates at which they are being completed. While the completion rates can be determined relatively easily lists of required works are more difficult to generate.

For example, it could be argued that the sealing of approximately 454 km of unsealed roads in the District is a backlog of work as all these roads are listed in the schedule. However, this would be incorrect as it is seldom that any of these roads meet the Council's and the NZTA's criteria for sealing. The establishment of these criteria and polices by the Council in this situation is an example how the perceived backlogs, or unrealistic levels of service expectations, can be managed. Similar principles are applied to other Roading assets both on a formal and informal basis using sound engineering judgment and expertise.

9.12.8 Programming 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 intuitively 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 NZTA for approval. However, the NZTA usually requires any such requests to be "evidence based" before approving any additional funding.

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.

HPMV impact on structures---bridges

Whisper pavements (asphalt) due to increased noise

Residential and industrial growth nodes and networks

Multi---modal demand changes.

10 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.

10.1 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.

10.2 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, this Programme Business Case 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 programme. 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 NZTA , 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 (agency) of various maintenance and rehabilitation treatments for the asset. In addition to engineering solutions, other solutions not involving physical works are also considered.
NZTA'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.

10.3 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.

10.3.1 Safety

Safer Journeys: is a strategy to guide improvements in road safety over the period 2010–2020.

The long-term goal for road safety in New Zealand is set out in its vision:

"A safe road system increasingly free of death and serious injury"

To support the vision, Safer Journeys takes a Safe System approach to road safety. This approach means working across all elements of the road system (roads, speeds, vehicles and road use) and recognises that everybody has responsibility for road safety. Council has also identified the issues that are of most concern. Safer Journeys describes the actions Council will take to address these issues, using a Safe System approach that works across all elements of the road system.

High-Risk Rural Roads Guide: provides guidance on the government's Safer Journeys 2020 Strategy initiative to focus efforts on high-risk rural roads. The objective of the guide is to provide practitioners with best practice guidance to identify, target and address key road safety issues on high-risk rural roads. The guide provides links to a number of road safety resources and guidance for planning, funding and evaluating safety projects and programmes. The guide focuses on the Safer Journeys actions. However, roads that have crash problems but do not meet the criteria for a high-risk rural road may still warrant investigation and the use of suggested countermeasures but may not be prioritised in terms of funding.

To be classified as a high-risk rural road, the road will need a history of three or more fatal and serious crashes within five years, or five or more within 10 years. An equivalent number of potential crashes can also be used. Potential crashes are estimated using a risk assessment procedure such as the Road Infrastructure Safety Assessment (RISA). The minimum crash criteria will exclude sections of road with only one or two maybe random crashes from being classed as high risk.

NZTA Investment and Revenue Strategy (IRS): now recognises 'high risk rural roads' as a high priority for funding. The IRS 'high strategic fit' assessment now includes "potential to significantly reduce the number of crashes involving death and serious injuries in line with Safer Journeys on a high risk rural road". However, for a 'high strategic fit' the IRS requires us to address high risk roads identified from actual crash records only. A potential crash rate, based on risk assessment only, will be assigned a 'medium strategic fit'.

10.3.2 High-Risk Intersection Guide

Improving urban intersections will benefit pedestrians and cyclists. Planning will commence for improvements during the 2018–21 National Land Transport Programme, using the Safe System interventions from the guide. The guide has been developed by NZTA and will assist Council to target and rank safety improvements to the highest risk intersections, and provide a nationally consistent application of proven countermeasures.

Council will use the guide to identify their high-risk intersections and then to prioritise them by examining the crash histories and site characteristics to identify risk factors for which there are effective countermeasures. The results may be useful when developing the safety activities in the National Land Transport Programme.

10.4 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 Asset 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.

10.4.1 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 NZTA 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.

10.5 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.

10.6 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.

10.7 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.

10.8 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.

10.8.1 Renewal Forecasts

Staff 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.

10.8.2 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

10.8.3 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.

10.9 Summary

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 provided 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.

Any deficiencies in the AMP (such as evidence base, knowledge gaps) can be corrected either through the articulation of this stage, or as an application to the NLTP.

The Economic Network Plan tool is also a useful tool to understand the value of roads across the network in terms of economic and social value.

The combination of tools can support a robust decision making model that considers both the engineering criteria as well as the economic and social value of a road when making investment decisions for maintenance or renewals.

The preferred programme is not the maintenance and operations submission; which is developed as a result of these high level decisions and developed for more detail at the later (indicative and detailed) stages of the Business Case.

The essence of a programme business case is to show that the programme has been optimised by providing robust evidence that a decision to invest in a programme of works represents best value for money.

This is the role of the AMP.

Getting the reactive proactive maintenance balance right
Making use of advanced deterioration modelling (dTIMs)
Maintenance
Renewals
Resurfacing strategy
Resurfacing options/scenarios to meet strategy
Integration with other assets/utilities
Safety strategy and options to address the current deficiencies, as above, for the network levels of service for safety, prioritised based on severity.

11 Resilience

11.1 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

11.2 Hazards

11.2.1 Natural Hazard Management

The Rangitikei 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 Rangitikei 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 Rangitikei 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

11.2.2 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 Rangitikei 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 Rangitikei 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 stopbanks 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.

11.2.3 Natural Hazards in the Rangitikei District

The hazards most relevant to the Rangitikei 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.

11.3 Flooding

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

11.4 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.

11.5 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

11.5.1 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 Manawatu-Whanganui 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 Manawatu-Whanganui Lifelines project and included in the table following. The assessment considered major lifeline services and the effects of Natural Hazards on them.

11.6 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.

11.6.1 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 Rangitikei 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 falls: 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 h-Wanganui Lifelines project and included in the table following. The assessment considered major lifeline services and the effects of Natural Hazards on them.

11.7 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. watermains. It is only in recent times that adequate earthquake resistance has been incorporated into bridge designs.

11.7.1 Lifelines Services – Risks of Natural Hazards

This report undertaken by the Manawatu-Whanganui 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

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 Manawatu Gorge to a line near Mangaweka are such that frequent slips and washouts occur. It is a characteristic is 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.

11.8 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 Rangitikei 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

11.8.1 Emergency Management and Lifelines

Rangitikei district is subject to a wide range of natural hazards. Several significant natural events have been recorded in the last 15 years. Some of these are as follows:

Mt Ruapehu Eruption 1995 and 1996
Snow storm in 2003
Rangitikei Floods of 2004
High Wind Storms of 2011 (x2)

Through responses to and rebuilding after these events Council has gained considerable experience. It is important that the knowledge gained is captured, integrated and shared for future response and recovery operations, should they likely occur again. Lifeline exercises provide an opportunity for such experience to be shared.

11.8.2 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).

11.9 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 NZTA 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.

Refer to:

Higgins 2018-21 Incident and Emergency Plan
Manawatu-Whanganui Lifelines Project: A Vulnerability Assessment of Lifelines Infrastructure in Manawatu Whanganui

11.10 Resilience Performance Measures

11.10.1 Resilience

The availability and restoration of each road when there is a weather or emergency event (unplanned), whether there is an alternative route available and the road user information provided

11.10.2 Purpose

Minimise the consequence of unplanned events to customers
Minimise the likelihood of unplanned events on route availability
Minimise the number of journeys not made due to unplanned events.
Minimise the consequence of unplanned events to customers
Minimise the number of journeys impacted by unplanned event

11.10.3 Outcome

Outcome measures are the primary means of quantifying performance of the network. All performance measures below this contribute to the delivery of this outcome measure. Resilience OM1 - Number of journeys impacted by an unplanned event(s).

Resilience OM2 - Number of journeys not made due to unplanned event where there is no viable alternative.

11.10.4 Customer Level of Service Outcome

Over time all roads in a particular category should offer an increasingly consistent, fit for purpose customer level of service for road users.

Arterial: 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
Primary & Secondary Collector: 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.
Access: 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 low priority.
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.

11.10.5 Council's promise to the customer

Be Prepared for Emergencies and Incidents that could disrupt travel.
Carry out Mitigation to avoid route closure where appropriate.
Provide Alternative Routes where appropriate
Provide information on Route Availability and Travel Choice.
Restore connectivity as soon as circumstances allow.

11.10.6 Customer Assurance

Prepared for Response: An Emergency Procedures and Preparedness Plan is in place and actionable. (EPPP)

11.10.7 Confidence to make the journey (Robust Routes)

Resilience Plan: Network Resilience Maintenance, Monitoring and Improvement Plan in place and actionable.

Proactive Maintenance: Number of journeys lost where road closure occurs due to proactive maintenance not taking place

11.10.8 Confidence to make the journey (Route alternatives)

Plan for Alternative Routes: A plan is in place that details an alternative route available or the current route is robust in case of route closure.

11.10.9 Consistent and up to date information

Informed Prior: Customers are informed prior to making journey within x minutes of RCA being informed of change in travel conditions and/or route choice, via appropriate prior-to-travel mediums as stated in EPPP.

Informed On Route: Customers are informed on route within x minutes of RCA being informed of change in travel conditions and/or route choice, via appropriate on-route mediums as stated in EPPP.

Passenger Transport Customers Informed: Passenger transport customers are informed within x minutes of a significant change in travel times, via appropriate on-route mediums.

11.10.10 Customers informed when connectivity will be restored

Restoration Time: Customers will be informed of the estimated time access will be restored and when the next update will be. Customers will be informed through notified channels within x minutes the RCA receiving notification of an incident.

11.11 Resilience Targets by Classification

Provisional targets attempt to give effect to the CLoS Outcome. These targets will be monitored during the 2018-21 LTP period to determine if they are fit for purpose. If so Council will apply these measures in 2021-24 LTP period and report on those service levels.

11.11.1 Prepared for Response

Arterial, Primary Collector, and Secondary Collector: Plan is in place and operational. The plan reflective of breadth and scale of event, details plans for prioritisation of restoration of passage and access depending on classification and route criticality. It includes for continuity of essential needs until access is restored.

Access including low Volume: Plan is in place and operational. Plan reflects lower classification and is reflective of breadthand scale of event. It details plans for continuity of essential needs and for people to be prepared until access is restored.

Work Category: Incident Response, Network Management (Work category 121, 151)
VMS maintenance, weather monitoring

11.11.2 Resilience Plan

Arterial, Primary Collector, and Secondary Collector: Plan is in place and operational, including implementing preventative actions, to mitigate against moderate scale events and above that will interrupt customer journeys. Improvement plan identifies areas of significant vulnerability and criticality, combined with monitoring regime. Improvement plan should also include proactive intervention procedures for regular events (snowfall, ice, heavy rain etc.) as well as capital improvement programme.

Access including low Volume: Plan is in place and operational, including implementing preventative actions, to mitigate against significant scale events that will interrupt customer journeys. Improvement plan identifies areas of significant vulnerability and criticality and/or procedures for responding to any incidents and keeping customers informed.

11.11.3 Plan for Alternative Routes

Arterial, and Primary Collector: Rural Roads: Route nearly always available through either robust current route or viable alternative. Urban: N/A

All Other Categories: Not applicable

11.11.4 Provision of Information

Arterial, Primary Collector, and Secondary Collector: Within 60minutes of the event (or as appropriate)

All Other Categories: As appropriate.

Passenger Transport Customers Informed: (All Categories) Within 15 minutes

11.11.5 Restoration Time

As appropriate

Work Category:

Incident Response, Network Management (Work category 121, 151)

VMS maintenance, weather monitoring

See also Appendix 8; Non-Financial Performance Measures Rules 2013

12 Capital projects

12.1 Overview

The factors driving the development of the transportation network are outlined in this AMP.

Pavement new improvement projects include the following activities:

Seal extensions, rural and urban
Seal widening
Minor work and safety improvements
New works to meet the needs of expected development and growth
Road realignments
Intersection improvements

Development projects are derived from the following sources:

Formal studies of network needs, such as Feilding Urban Growth Framework Plan, MDC/PNCC/NZTA Joint Transport Study, the recommendations of which were adopted by the Council. Major new works arising are included in the forward programmes and financial forecasts. The costs represented are those expected to be funded by the Council and Private Developers However, joint works associated with the state highway are expected to cost shared. Agreements between the respective road controlling authorities in these and other similar situations have yet to be considered by the parties involved.
Review of the Council's obligations to carry out specific works committed by the payment of financial and development contributions by developers. Financial contributions originate from resource consent approvals issued by The Council under the Resource Management Act 1991; these are often called "subdivision commitments". Development contributions are levied under the Local Government Act 2002. (Schedule of development works included in appendices)

Consideration of other network needs based on:

Agreed Customer Levels of Service
Crash records
Network performance
Network deficiencies
Network use
Concerns expressed by councillors and communities.

12.2 Pavements

12.2.1 Pavement Expenditure History

The graph below profiles the expenditure in the pavements activity for 2006 - 2016. The "dip" in rehabilitation expenditure in 2015/16 corresponds a period when all available resources were diverted to restore the network after a major storm event. The increase in rehabilitation expenditure in the subsequent year reflects the catch up of deferred rehabilitations.

Maintenance funding previously focused on historical programme of funding to meet levels of service. Levels of service have been reviewed in light of the One Network Road Classification, outcomes. This AMP has re-focused the Forward Works Programme.

The Figure below shows historical expenditure for renewal, maintenance and emergency reinstatement work.

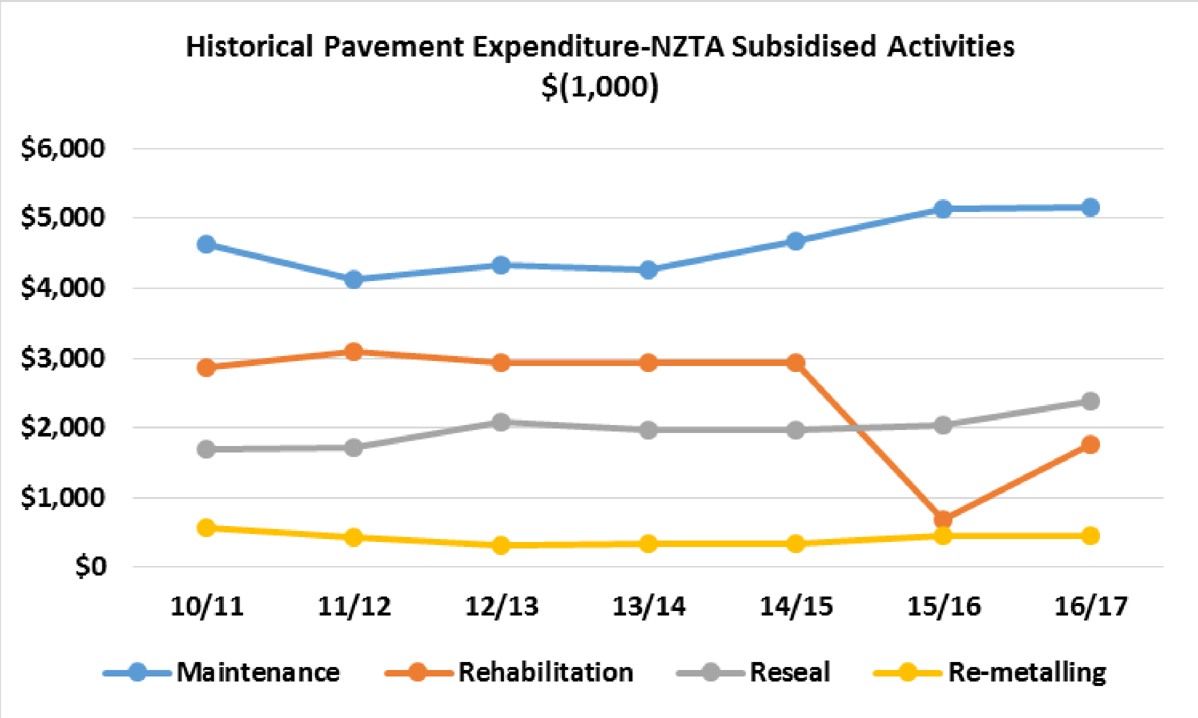


Figure 12-1: Historical Pavement Expenditure

12.3 Rehabilitation on Sealed Roads

12.3.1 Historical Pavement Rehabilitation on Sealed Roads

The following theoretical expected life cycle and average annual long-term renewal requirements for the network were established from analysis of the Council's 2013 Transportation Asset Valuation.

Pavement Structure	Length (km)	Average Width (m)	Expected Life	Length/year (km)	Area/year (m2)
Sealed Rural roads	712	5.6	75	9.5	53,163
Sealed Urban Principal roads	84	8.7	75	1.1	9,744
Sealed Urban Local Roads	426	3.7	100	4.3	15,762
Unsealed Rural Roads	3	3.5	100	0.03	105
Totals				14.9	78,774

Table 12-1: Pavement Structures

Figure 12-2 shows the length and Expenditure of pavement rehabilitation work that has been carried out on the road network between 2006 -2016. The average length of rehabilitation was 6.4 kilometres per annum. The average cost was $2,666 per annum.

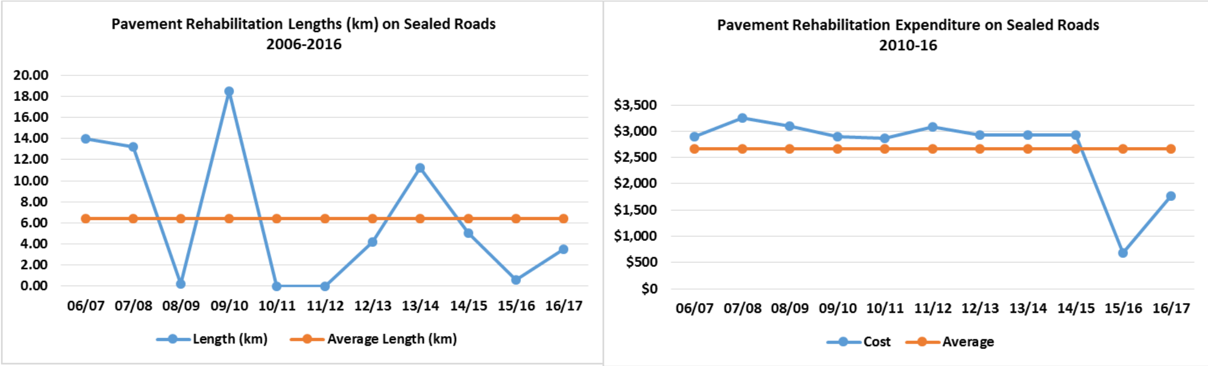


Figure 12-2: Length and Expenditure of pavement rehabilitation

12.3.2 Sealing and Resealing

Historically, the target was to complete an overall length (or proportion) of the sealed network on an annual basis. For further detail see Section 14.4.3 Average Life Achieved of Sealed Surfaces Renewed.

Moving forward, the actual length of network programmed will be a function of the following criteria:

Treatment Selection Algorithm recommendation
General Surface Condition
Skid Resistance
Texture Depth
Anticipated / recommended surface design
The area of selected treatment lengths to be resealed
2nd Coat requirements of rehabilitated sections of the network in previous years

Selection of roads to be renewed is then prioritised against budget.

As a result, the length of seal selected becomes more variable across multiple years, but the cost effectiveness of managing the network improves.

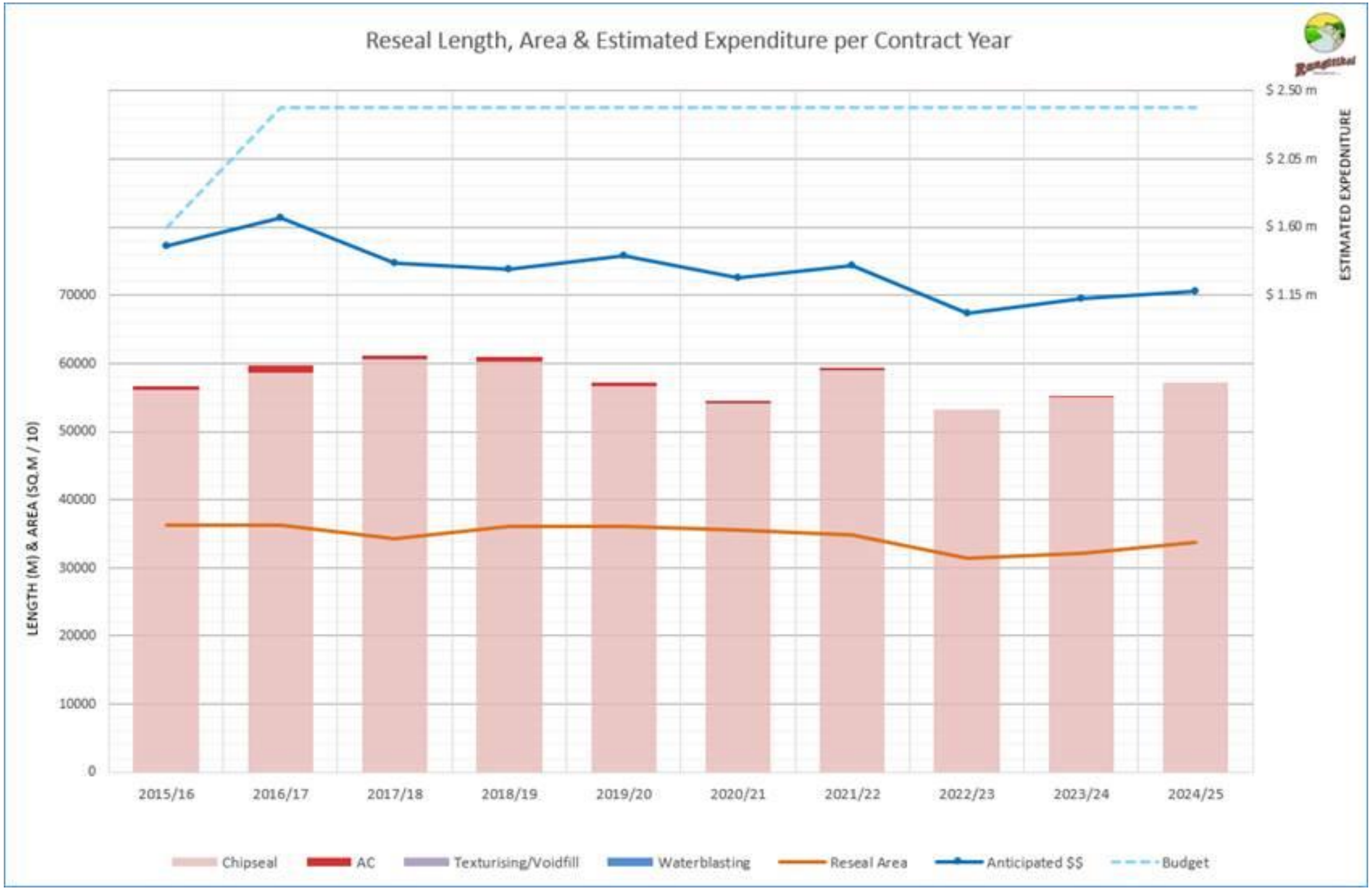


Figure 12-3: Reseal Length, Area & Estimated Expenditure per contract year

12.3.3 Seal Widening

The assessment of seal widening or pavement rehabilitation sites is done in accordance with NZTA's Geometric Design Manual (Draft). This generally applies to roads carrying more than 500 vehicles per day.

The table below correlates the widths, traffic volumes and network lengths on sealed roads.

CATEGORIES/CRITERIA	Traffic Volume	Sealed Rural Road Length (km)				
		Carriageway Width				
	AADT	Very Narrow (<6m)	Narrow (6.0 to 6.7m)	Adequate (6.7 to 7.5m)	Adequate (7.5 to 9m)	Adequate (>9m)
ARTERIAL Meet 2 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 5,000 Rural: > 3,000	-	-	-	-	1.649
PRIMARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic, HCV or Buses)	Urban: > 3,000 Rural: > 1,000	32.958	46.139	12.424	17.815	8.698
SECONDARY COLLECTOR Meet 1 criteria (incl. at least 1 of Typical Daily Traffic or HCV)	Urban: > 1,000 Rural: > 200	28.289	54.316	8.202	10.420	12.635
ACCESS All other roads	Urban: > 1,000 Rural: > 200	273.806	89.270	3.778	6.070	6.926
(LOW VOLUME) Meet low volume Typical Daily Traffic	Urban: < 200 Rural: < 50	568.767	25.041	5.483	8.014	4.923

Table 12-2: Widths, Traffic Volumes and Network Lengths on rural sealed roads

The table shows there is up to 335.053 km of carriageway that are well below target widths (pink cells) and up to a further 783.543km (yellow cells) that are potentially too narrow for the traffic volumes they carry. The 23.8km that are less than 6m wide and carry over 500 vehicles per day are of particular concern.

12.3.4 Seal Extensions

Traffic Volume	Unsealed Rural Road Length (km)		
	Carriageway Width		
ADT	Very Narrow (<5.5m)	Narrow (5.5 - 6.7m)	Adequate (6.7 to 7.5m)
0 - 100	424.496	4.308	0.0

Table 12-3: Unsealed Rural Road Length Traffic Volume

NZTA financial support for seal extension under Work Category 325 cannot generally be obtained unless traffic volumes are over 150 to 200 vehicles per day. As shown in the above table there are no unsealed roads which carry over 100 vehicles per day.

Based on current analysis there is little to suggest that it is economically viable to seal any unsealed roads, seal extension sites are assessed on a case by case basis and are normally initiated from ratepayer requests.

12.4 Structures

12.4.1 Management Review and Approval Process

The Management Review and Approval Process looks critically at the works program to ensure that it is consistent with the Integrated Asset Management (IAM) process. The IAM requires a review of the infrastructure strategy to follow the development of funding scenarios before the works program is approved for implementation. These three phases are briefly described as:

Form asset strategies:

road use strategy
infrastructure strategy

Develop investment program:

CLoS standards, ONRC hierarchy, target and current levels of service and asset performance gap analysis.

Identify asset requirements:

total needs program, optimisation and/or prioritisation and funding scenarios.

The strategic **outputs** address the following issues:

bridge sufficiency, bridge condition indices and their reporting and forecasting
adequacy of funding levels to maintain the long-term required CLoS for the network
risk management procedures recognise that inadequate maintenance funding over a long period can lead to premature network failure therefore the impact of various funding scenarios may need to be investigated as part of the optimisation process
harmonisation of the bridge works program with the works programs for other asset types budget for in the overall works program.

The management review ensures satisfaction of basic criteria for:

Routine maintenance:

rates of deterioration are higher in the absence of effective routine maintenance.

Preventative periodic maintenance:

Designed to reduce future deterioration by timely interventions to limit the need for expensive rehabilitation and ensure general safety levels are maintained. Such works can be relatively modest in unit cost terms, but highly effective when based on whole of life considerations and by not adopting a 'worst-first' approach.

Rehabilitation:

Which targets bridges which display inadequate structural capacity for the current or future traffic loading. The choice of appropriate rehabilitation treatments is huge.
By their nature, such works are very costly and might be expected to be of the order of five to ten times more costly than a preventative treatment program.
Where a large program of rehabilitation exists, involving say greater than 3 to 4% per annum of the total in-service bridge stock, it is likely that this reflects a lack of investment in periodic interventions, neglect, poor implementation or a discrete increase in traffic loading patterns. Timely intervention of appropriate quality is best.
Conversely, where the replacement program is very small, involving say less than 1% per annum of the total in-service bridge stock, and programmed maintenance costs are increasing and condition is falling, it is likely that expenditure on rehabilitation is too low. Again, timely rehabilitation is required to ensure whole of life costs are minimised. Appropriate solutions should be developed based on best practice.

The management review takes due cognisance of the following:

Life cycle cost analysis relative to bridges:

To date, there is not a standardised and generally accepted methodology in place for this highly important aspect of the optimisation process.
The use of lifecycle cost analysis, though desirable, has limitations. Using a discount rate of between 6-7%, the value of any maintenance actions beyond 25 years is so small as to have no impact on the overall value of any planned action. Also, within that timeframe there exist uncertainties concerning traffic growth, introduction of new materials, technological improvements, material deterioration rates, etc which may make lifecycle cost analysis a highly theoretical exercise.
A thorough review of the procedures and the principles behind lifecycle cost analysis is needed in order to find rational solutions from the process. Because of the diminishing value of money, the process has the tendency for analysts not to consider long-life options. However, whilst ever maintenance programs continue at approximately 1% of the bridge replacement value, there is a need to provide long-life stock and long-life solutions.
The application of lifecycle cost analysis to the process of bridge management may sound appropriate but it must be used with care and in the full knowledge of the reservations and the implied shortcomings of any time related process.

12.4.2 Current Condition

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.

The Pareto Chart below shows that 92% of the bridge stock is in a good to average condition.

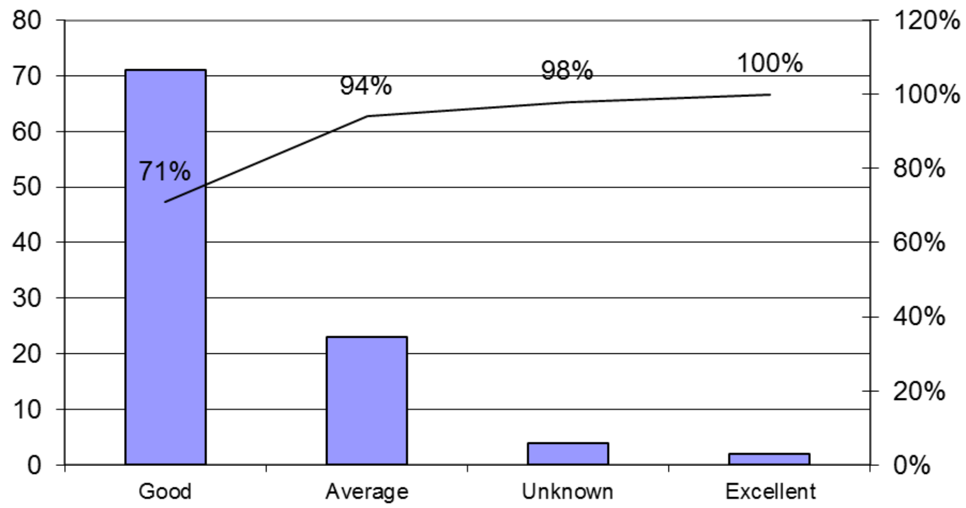


Figure 12-4: Pareto Chart

Further work is required to produce a more accurate correlation between condition rating data and remaining useful life. The following table lists the structures that are nearing the end of their useful life.

12.4.3 Resilience

Value and Depreciation of Structural Assets					
Component	Length/Area	Unit	ORC $	ODRC $	Annual Depreciation $
Large Culvert	1,276	m	11,155,988	8,042,040	112,641
Bridges	18,802	m^2	87,383,742	42,946	800,063
Retaining wall	11,.745	m^2	13,415,890	10,724,551	117,587
Total			98,553,145	18,809,537	1,030,291

Table 12-4: Value and Depreciation of Structural Assets

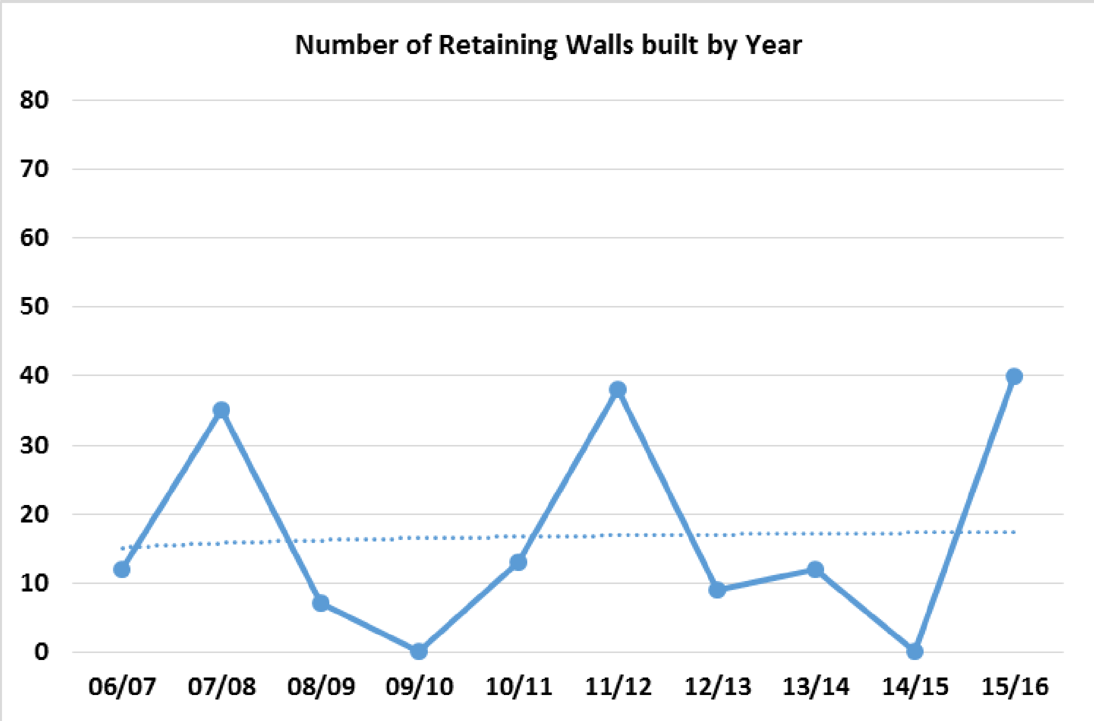


Figure 12-5: No of retaining walls built by year

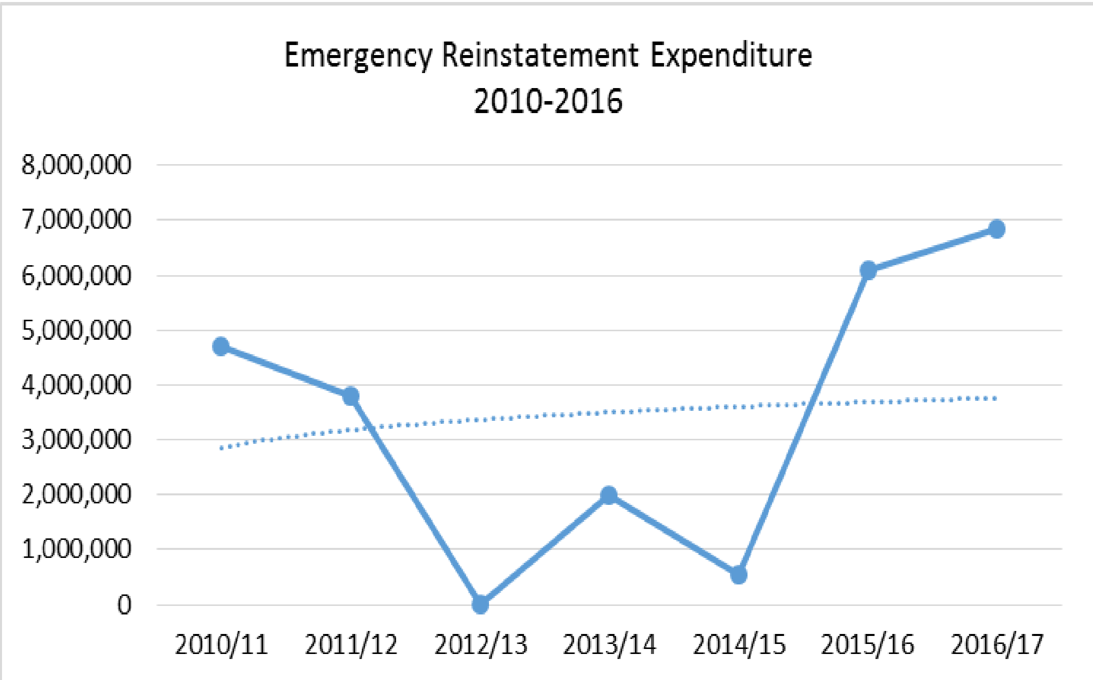


Figure 12-6: Emergency Reinstatement Expenditure 2010-2016

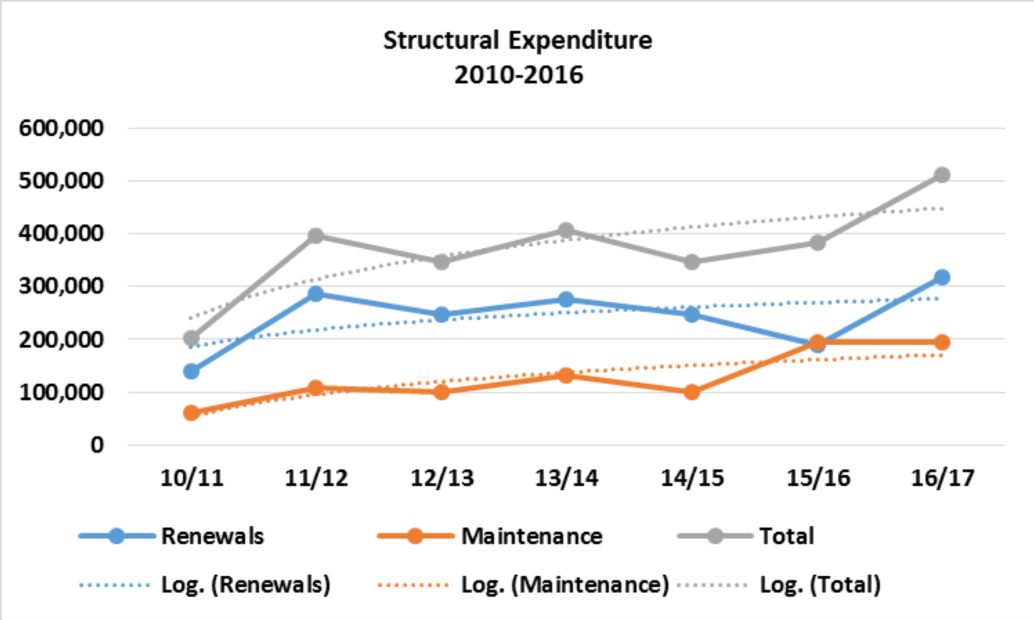


Figure 12-7: Structural Expenditure

12.4.4 Conclusion

The annual number of retaining walls constructed is trending at 18.
The annual amount of depreciation set aside for structural renewals is $1,030,291.
The annual cost of Emergency Reinstatement is trending toward $3,900,000
The annual total cost of bridge Renewals and Maintenance is trending toward $450,000

The current maintenance regime is unsustainable. Climate change is causing more frequent and intense storm events. Rather than repair dropouts with an ever increasing number of expensive retaining walls, the annual spend on drainage improvements should be increased. High risk sites can then be identified and suitable drainage improvements implemented.

The annual spend on large culvert and bridge maintenance and renewals should also be increased. River aggradation/degradation and meander should be closely monitored on the approaches to large culvert and bridge. High risk structures can then be identified and suitable river training and abutment protection implemented.

13 Financial Summary

13.1 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 "Making our District Thrive-Together". 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.

Some of the future financial issues Council faces in the future and how it proposes to manage these are:

13.2 Key Issues

The District is not growing. A number of changes are accounted for during our future financial planning period.

13.2.1 Population decreases

The population of the Rangitikei District has declined over the last 10 years at around 8-9% a year. If this decline continues by 2046 the population will be down to 8,820.

One of the major changes in the forecasted population is the increase in older people. This is a similar trend nationally. This will have an impact on the type of services delivered by the Council and the way services are delivered.

13.3 Funding Mechanisms

Council has a number of funding mechanisms available. Council's Revenue and Financing Policy details the funding mechanisms used for each activity. In summary, how an activity is funded is determined by:

- contributions to community outcomes
- who causes the costs to be incurred
- who receives the benefit
- when the benefit is likely to be enjoyed.

13.4 Depreciation

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 New Zealand Transport Agency (NZTA) subsidy is also removed from the rating calculation. Currently Council receives 63% of the maintenance and renewal expenses on the majority of roading assets.

13.5 Maintaining Levels of Service

Throughout the life of the AMP Council expects to maintain existing levels of service and meet additional demand as a result of growth. Council considers it has adequate planned income to fund these expected levels of service. There are some significant factors that may affect our ability to maintain the existing levels of service including:

Rising standards for water, wastewater and stormwater quality and management (set by central government and Horizons Regional Council)
Legislation changes requiring new levels of service
Costs increasing faster than CPI for a number of our key activities due to rising commodity prices
Compliance costs in the environmental and regulatory group of activities (set by central government)
Retaining and attracting skilled staff

Continuing to deliver savings through efficiencies, partnerships and collaboration.

13.6 Balancing our 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.

13.6.1 Unfunded depreciation

Council uses depreciation to fund the renewal or replacement of assets. Council funds 37% 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.

13.6.2 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 NZTA for roading capital expenditure, development contributions received to cover growth related capital expenditure and contributions from ratepayer to fund the connection to Council infrastructures.

13.6.3 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.

13.6.4 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.

13.7 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.

13.8 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.

13.8.1 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).

13.9 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.

13.10 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.

Table 13-1: Expenditure Classifications

13.11 Asset Management

Roading is funded through a partnership with Central Government through the New Zealand Transport Authority (NZTA). Historically most standards were set by the Council within broad NZTA 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.

13.12 Funding of Capital Expenditure

Capital works expenditure can be funded from NZTA, targeted rates, subsidies, reserves (for example depreciation reserve), borrowing and development contribution. Where possible the first source of funding for capital expenditure that will be considered is third party sources i.e development contributions.

13.13 Financial Forecast

		3 Year Block 2018-21			3 Year Block	3 Year Block	3 Year Block	3 Year Block	3 Year Block	3 Year Block	3 Year Block	3 Year Block	3 Year Block
Subsidised Roading Budget		2018/19	2019/20	2020/21	2021-24	2024-27	2027-2030	2030-33	2033-36	2036-39	2039-42	2042-45	2045-48
Investment Management													
003	Investment Management Plannning	100,000	100,000	100,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Investment Management - Totals		**100,000**	**100,000**	**100,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**	**300,000**
Maintenance													
111	Sealed Pavement Maintenance	1,195,000	1,195,000	1,200,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000	3,600,000
112	Unsealed Pavement Maintenance	354,100	379,000	404,000	1,212,000	1,212,000	1,212,000	1,212,000	1,212,000	1,212,000	1,212,000	1,212,000	1,212,000
113	Routine Drainage Maintenance	990,000	990,000	990,000	2,970,000	2,970,000	2,970,000	2,970,000	2,970,000	2,970,000	2,970,000	2,970,000	2,970,000
114	Structures Maintenance	162,400	162,500	162,500	487,500	487,500	487,500	487,500	487,500	487,500	487,500	487,500	487,500
121	Environmental Maintenance	900,000	900,000	900,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
122	Traffic Services Maintenance	400,000	400,000	400,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000	1,200,000
124	Cycle Path Maintenance	1,000	1,000	1,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
125	Footpath Maintenance	348,800	349,500	351,300									
131	Level Crossing Warning Devices	15,000	15,000	15,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000
140	Minor Events	370,000	370,000	370,000	1,110,000	1,110,000	1,110,000	1,110,000	1,110,000	1,110,000	1,110,000	1,110,000	1,110,000
151	Network & Asset Management	1,148,000	1,148,000	1,148,000	3,444,000	3,444,000	3,444,000	3,444,000	3,444,000	3,444,000	3,444,000	3,444,000	3,444,000
Maintenance - Totals		**5,884,300**	**5,910,000**	**5,941,800**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**	**16,771,500**
Renewals													
211	Unsealed Roads Metalling	410,000	435,000	460,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000	1,380,000
212	Sealed Roads Resurfacing	1,630,700	1,445,000	1,383,000	4,149,000	4,149,000	4,149,000	4,149,000	4,149,000	4,149,000	4,149,000	4,149,000	4,149,000
213	Drainage Renewals	600,000	600,000	600,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000
214	Sealed Road Pavement Rehabilitation	1,351,800	1,080,000	980,000	2,940,000	2,940,000	2,940,000	2,940,000	2,940,000	2,940,000	2,940,000	2,940,000	2,940,000
215	Structures Component Replacements	341,500	166,000	211,000	633,000	633,000	633,000	633,000	633,000	633,000	633,000	633,000	633,000
222	Traffic Services Renewal	190,000	150,000	150,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Renewals - Totals		**4,524,000**	**3,876,000**	**3,784,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**	**11,202,000**
Road Improvements													
322	Replacement of bridges and structures	1,422,300	4,501,000	250,000	3,895,000	2,785,000	3,500,000	1,970,000	2,530,000	2,640,000	1,432,165	1,860,000	4,925,000
324	Road Improvements	579,600	689,100	764,500	1,800,000	2,350,000	1,850,000	1,900,000	900,000	900,000	900,000	900,000	900,000
325	Seal extension	0	0	0	0	0	0	0	0	0	0	0	0
341	Low Cost Low Risk Improvements	197,500	197,500	202,500	607,500	607,500	607,500	607,500	607,500	607,500	607,500	607,500	607,500
357	Resilience Improvements	171,100	136,200	102,300	306,900	306,900	306,900	306,900	306,900	306,900	306,900	306,900	306,900
451	New Footpaths	120,000	0	0									
Road Improvements - Totals		**2,490,500**	**5,523,800**	**1,319,300**	**6,609,400**	**6,049,400**	**6,264,400**	**4,784,400**	**4,344,400**	**4,454,400**	**3,246,565**	**3,674,400**	**6,739,400**
Walking and Cycling													
452	Cycling facilities	1,500	2,500	2,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500
Walking and Cycling - Totals		**1,500**	**2,500**	**2,500**	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**	**7,500**
Public Transport													
514	Public transport facilities O & M	5,500	5,500	5,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500
Walking and Cycling - Totals		**5,500**	**5,500**	**5,500**	**16,500**	**16,500**	**16,500**	**16,500**	**16,500**	**16,500**	**16,500**	**16,500**	**16,500**
Total Subsidised Roading Budget		**13,005,800**	**15,417,800**	**11,153,100**	**34,906,900**	**34,346,900**	**34,561,900**	**33,081,900**	**32,641,900**	**32,751,900**	**31,544,065**	**31,971,900**	**35,036,900**

Non-subsidised Roading Budget	2018/19	2019/20	2020/21	2021-24	2024-27	2027-2030	2030-2033	2033-2036	2036-2039	2039-2042	2042-2045	2045-2048
Maintenance and Operations												
Street cleaning (local share)	136,600	136,600	136,600	409,800	409,800	409,800	409,800	409,800	409,800	409,800	409,800	409,800
Street Furniture repairs and maintenance	12,500	12,500	12,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500	37,500
Underverhanda Lighting (power)	25,000	25,000	25,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Festive lighting and banners	16,000	16,000	16,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000
Carpark Maintenance	15,800	15,800	15,800	47,400	47,400	47,400	47,400	47,400	47,400	47,400	47,400	47,400
Access Roads	20,000	20,000	20,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
Noxious Weeds (Taihape Trust)	25,250	25,250	25,250	75,750	75,750	75,750	75,750	75,750	75,750	75,750	75,750	75,750
Professional Services	42,000	42,000	42,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000
Roadside Tree Maintenance	76,000	76,000	76,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000
Berm Mowing	96,000	96,000	96,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000
External Contractor	5,500	5,500	5,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500	16,500
Survey Costs	21,500	21,500	21,500	64,500	64,500	64,500	64,500	64,500	64,500	64,500	64,500	64,500
Sub-total Maintenance and Operations	**492,150**	**492,150**	**492,150**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**	**1,476,450**
Road Improvements												
Road Improvements - unsub portion	99,000	101,700	112,200	336,600	336,600	336,600	336,600	336,600	336,600	336,600	336,600	336,600
Sub-total Road Improvements	**99,000**	**101,700**	**112,200**	**336,600**	**336,600**	**336,600**	**336,600**	**336,600**	**336,600**	**336,600**	**336,600**	**336,600**
Total Non-subsidised Roading Budget	**591,150**	**593,850**	**604,350**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**	**1,813,050**
TOTAL TRANSPORTATION ACTIVITY	**13,596,950**	**16,011,650**	**11,757,450**	**36,719,950**	**36,159,950**	**36,374,950**	**34,894,950**	**34,454,950**	**34,564,950**	**33,357,115**	**33,784,950**	**36,849,950**

14 Benchmarking

14.1 Overview

Rangitikei District Council's performance compared with other similar Road Controlling Authorities (RCA) and any differences are explained.

The following RCAs were chosen as a peer group:

- Horowhenua District Council (HDC)
- Manawatu District Council (MDC)
- New Plymouth District Council (NPDC)
- Palmerston North City Council (PNCC)
- Ruapehu District Council (RDC)
- Rangitikei District Council (RangDC)
- South Taranaki District Council (STDC)
- Stratford District Council (SDC)
- Tararua District Council (TDC)
- Wanganui District Council (WDC)

The RCA peer group may not appear in some comparisons if they have no data for the selections in this section.

14.2 Safety Outcomes

Outcome Measures (OM) are the primary means of quantifying performance of the network. All performance measures below this contribute to the delivery of this outcome measure.

14.2.1 Injury Counts – Fatal & Serious

Safety OM1: Number of serious and fatal crashes on network each year as part of a 5 year trend.

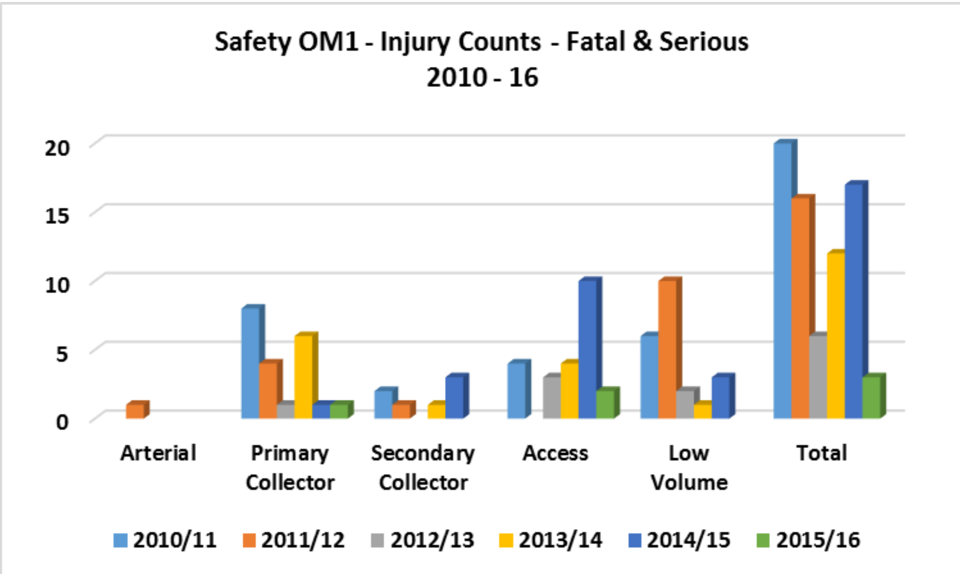


Figure 14-1: Safety OM1 – Injury Counts

Comment: Apart from a spike in 2014/15 there is a downward trend of serious and fatal crashes.

14.2.2 Comparative Collective Risk (Crash Density)

Safety OM1: Collective Risk (Crash Density) - Annualised S+F crashes per km by classification and Risk rating.

This measure is checking that the road and roadsides are being maintained in such a way as to ensure that people feel safe driving them.

The report determines the number of Fatal and Severe Injury crashes from the Crash data for the last 10 years of crash data.

Crashes are allocated to carriage ways based on the location of the crash. If a crash is located at the start of one carriageway and the end of another carriageway, it will be allocated to the section of carriageway which starts where the crash is located.

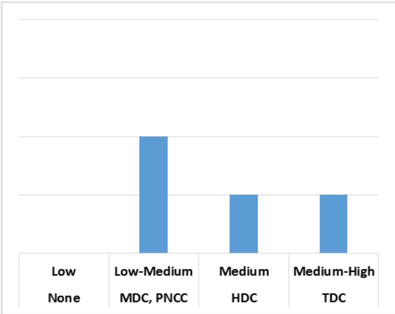
The number of rural crashes occurring on network within the Classification is divided by the number of years of data (the difference between the first crash in the classification and the last up to a maximum of 10 years) to get a number of crashes per year. This is then divided by the length of network within the classification to calculate the Collective Risk.

The Collective Risk ranges are:

Low is <= 0.039
0.04 <= Low-Medium <=0.069
0.07 <= Medium <=0.10
0.11 <= Medium-High <= 0.189
High > 0.19

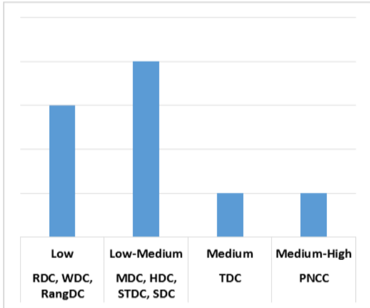
Safety OM2 Comparative Collective Risk 2006-2016

Arterial



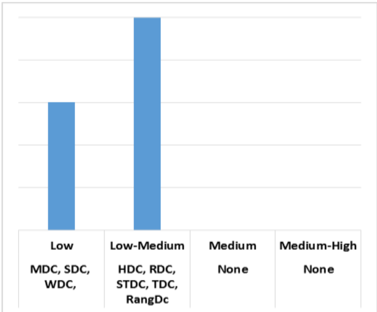
Median = 0.067. Rang DC = 0

Primary Collector



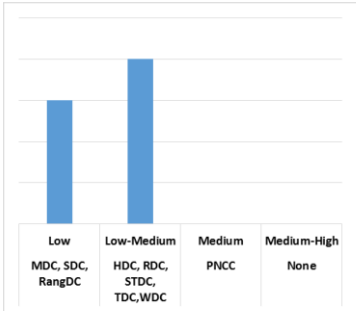
Median = 0.058. Rang DC =0.025

Secondary Collector



Median = 0.044. Rang DC =0.040

Access



Median = 0.051. Rang DC =0.030

Figure 14-2: Safety OM2 Comparative Collective Risk 2006-2016

Comment: The Collective Risk on the Rangitikei District is below the Median of the peer group in all Road Categories and is classified as Low to Medium.

14.2.3 Personal Risk (Crash Rate)

Safety OM3: Personal Risk (Crash Rate) Annualised S+F crashes per veh km travelled (See KiwiRAP) and Risk rating.

This measure is checking that the road and roadsides are being maintained in such a way as to ensure that people feel safe driving them.

The report determines the number of Fatal and Severe Injury crashes from the Crash data for the last 10 years of crash data.

Crashes are allocated to carriage ways based on the location of the crash. If a crash is located at the start of one carriageway and the end of another carriageway, it will be allocated to the section of carriageway which starts where the crash is located.

The number of rural crashes occurring on the network within the Classification is divided by the number of years of data (the difference between the date of the first crash in the classification and the last up to a maximum of 10 years) to get the number of crashes per year. This is then divided by the VKT and multiplied by 100,000,000 to get the numbers within range.

This measure is limited to Rural Sections only.

The Personal Risk ranges are:

Low is <= 4
4 < Low-Medium <=4.9
5 <= Medium <=6.9
7 <= Medium-High <= 8.9

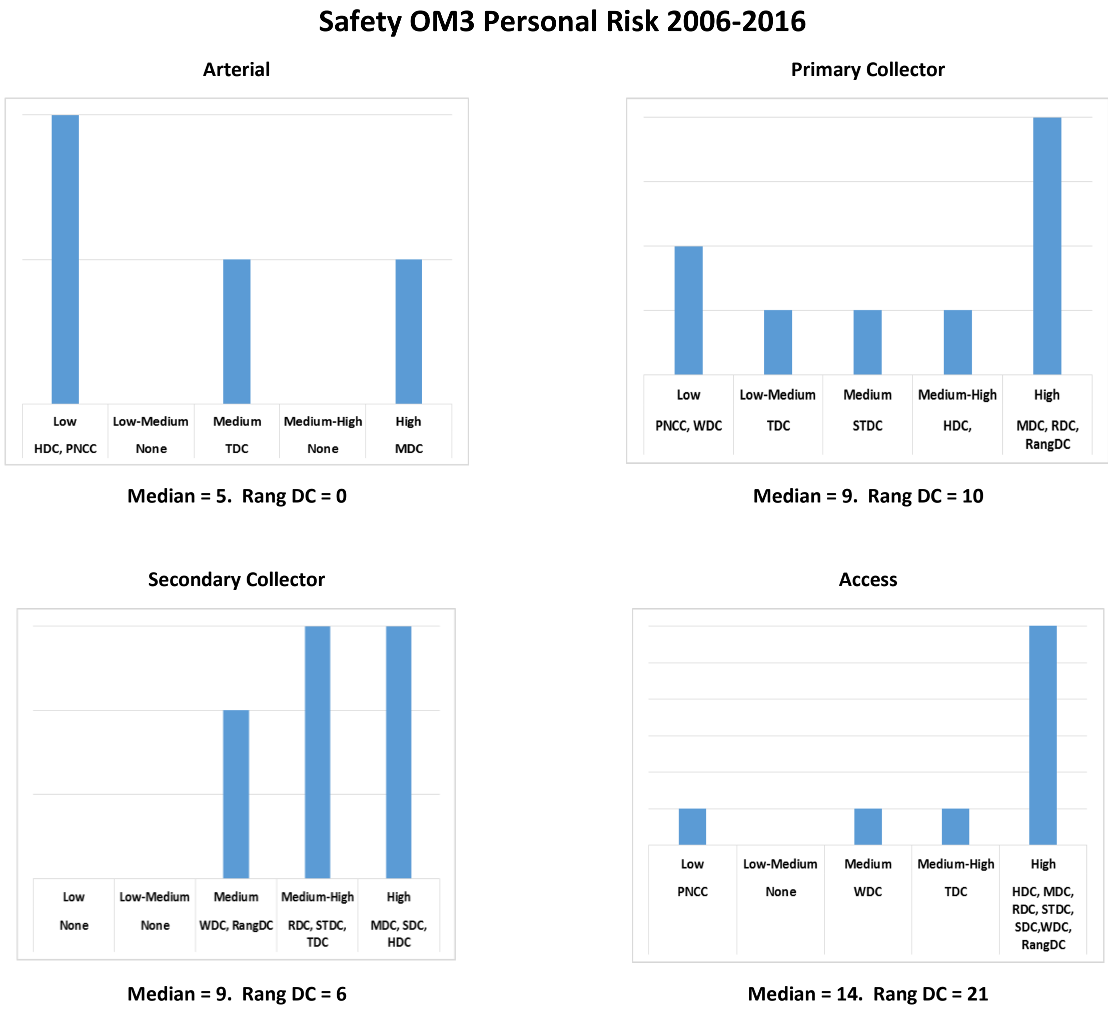


Figure 14-3: Safety OM3 Personal Risk 2006-2016

Comment: The Personal Risk on the Rangitikei District Network is above the Median of the peer group in all Road Categories and is classified as High.

14.2.4 Sight and Control

Safety PM5 - Sight and Control: This measure is looking for a reducing trend in the number of serious and fatal injuries due to loss of control in the wet, in snow/ice, or at night.

Injuries are recorded in the Crash table and the report groups the data for the last 5 financial years. In addition, this report provides a 5 year rolling average for the last two financial years.

Crashes are allocated to carriage ways based on the location of the crash. If a crash is located at the start of one carriageway and the end of another carriageway, it will be allocated to the section of carriageway which starts where the crash is located.

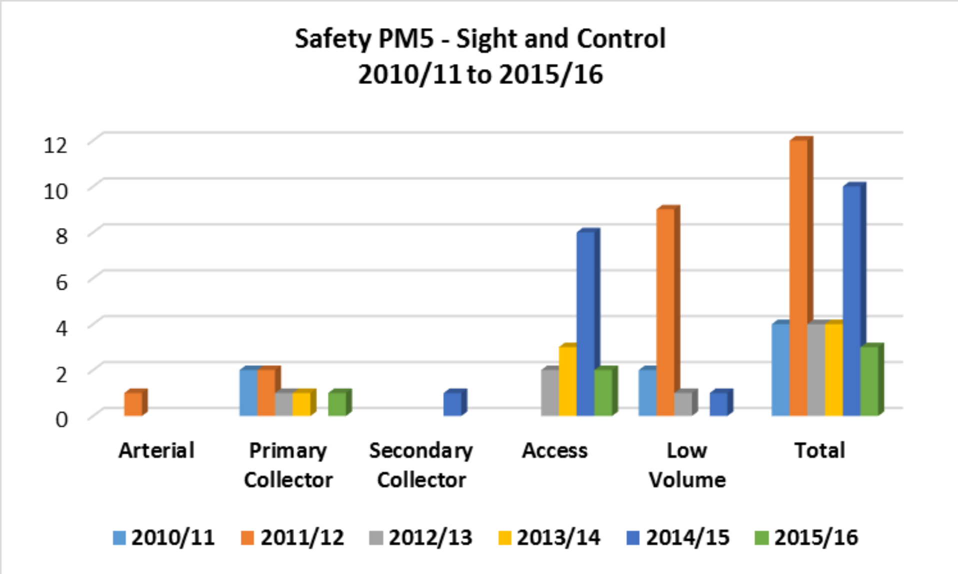


Figure 14-4: Safety PMS – Sight & Control 2010/11 to 2015/16

Comment: Apart from spikes in 2011/12 and 2014/15 there is a downward trend in the number of serious and fatal injuries due to loss of control in the wet, in snow/ice, or at night.

14.2.5 Intersections - Fatal & Severe

Safety PM6 - Intersections - Fatal & Severe

The injuries data comes from the Crash table which is being filtered by Intersections. The classifications come from the Carriageway Section table and ONRC Category table.

Crashes are allocated to carriage ways based on the location of the crash. If a crash is located at the start of one carriageway and the end of another carriageway, it will be allocated to the section of carriageway which starts where the crash is located.

The data is grouped by financial years beginning 1 July.

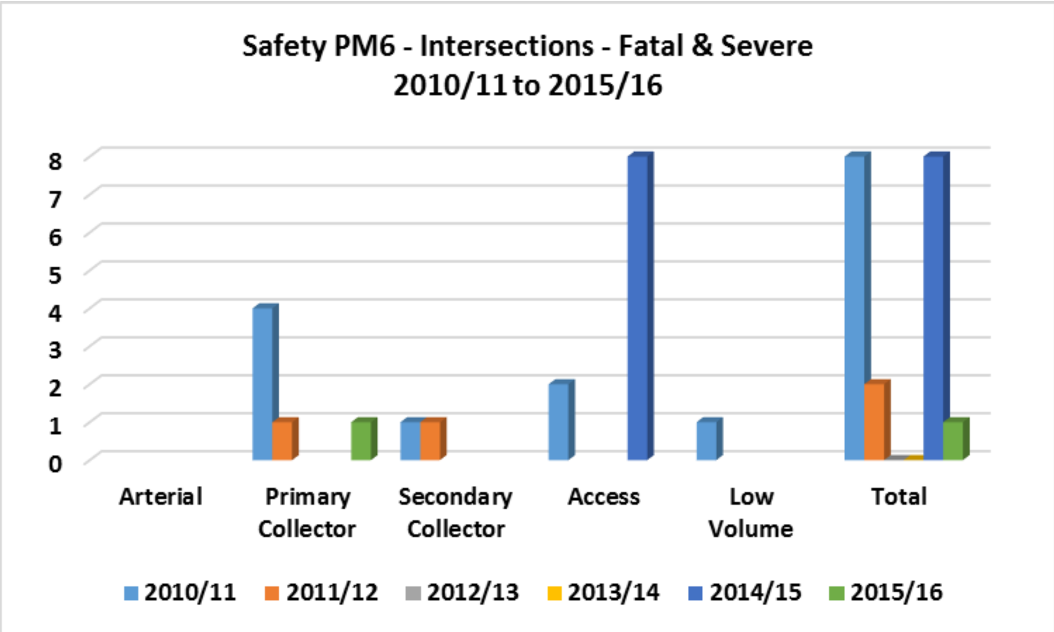


Figure 14-5: Safety PM6 Intersections – Fatal & Severe

Safety PM13 - Vulnerable Users

This measure is looking for a reducing trend in the number of serious and fatal injuries to vulnerable road users (pedestrians, cyclists, and motorcyclists)

Crashes are recorded in the Crash table and the report groups the data for the last 5 financial years.

Crashes are allocated to carriage ways based on the location of the crash. If a crash is located at the start of one carriageway and the end of another carriageway, it will be allocated to the section of carriageway which starts where the crash is located.

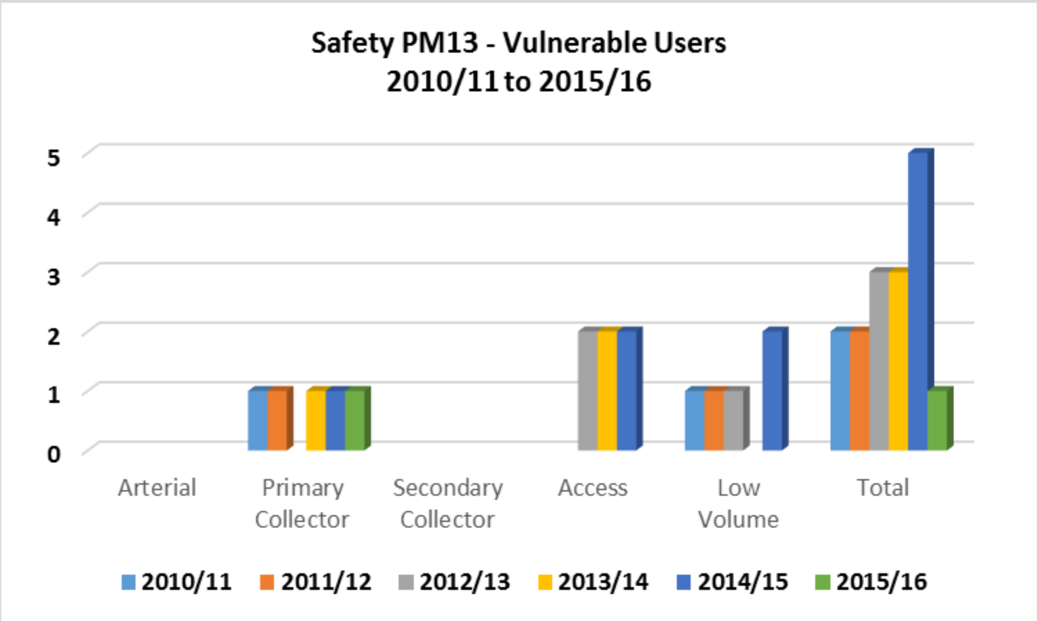


Figure 14-6: Safety PM13 – Vulnerable Users

Comment: There were 16 accidents involving motor cycles.

14.3 Amenity Outcomes

14.3.1 Smooth Travel Exposure

Amenity OM1 - Smooth Travel Exposure

This section shows Percent of travel on smooth roads by ONRC classification.

Smooth Travel Exposure is calculated from data in the RAMM treatment length table indicating the length of smooth road per treatment length. If you want detail of how STE is calculated in RAMM, then run the RAMM STE report and the methodology used is clearly displayed on the last page of the report.

For this report treatment lengths are first filtered for only Enabled treatment lengths, Sealed roads and treatment lengths that have a value for ste_length.

The length of smooth road is then apportioned to underlying carriageways.

For example if ste_length is 500m and the treatment length is 1km spanning two carriageways of 600m and 400m the ste_length would be assigned to the carriageways as 300m and 200m respectively.

- Smooth Travel per carriageway is calculated as apportioned ste_length/1000*traffic_adt_est*365
- Smooth Travel per classification is the sum for all carriageways in the ONRC Classification
- VKT per Classification is calculated from Carriageway View and is calculated as sum for carriageways in the Classification
- STE in the report is calculated as Smooth Travel per Classification / VKT per Classification

STE - Rural

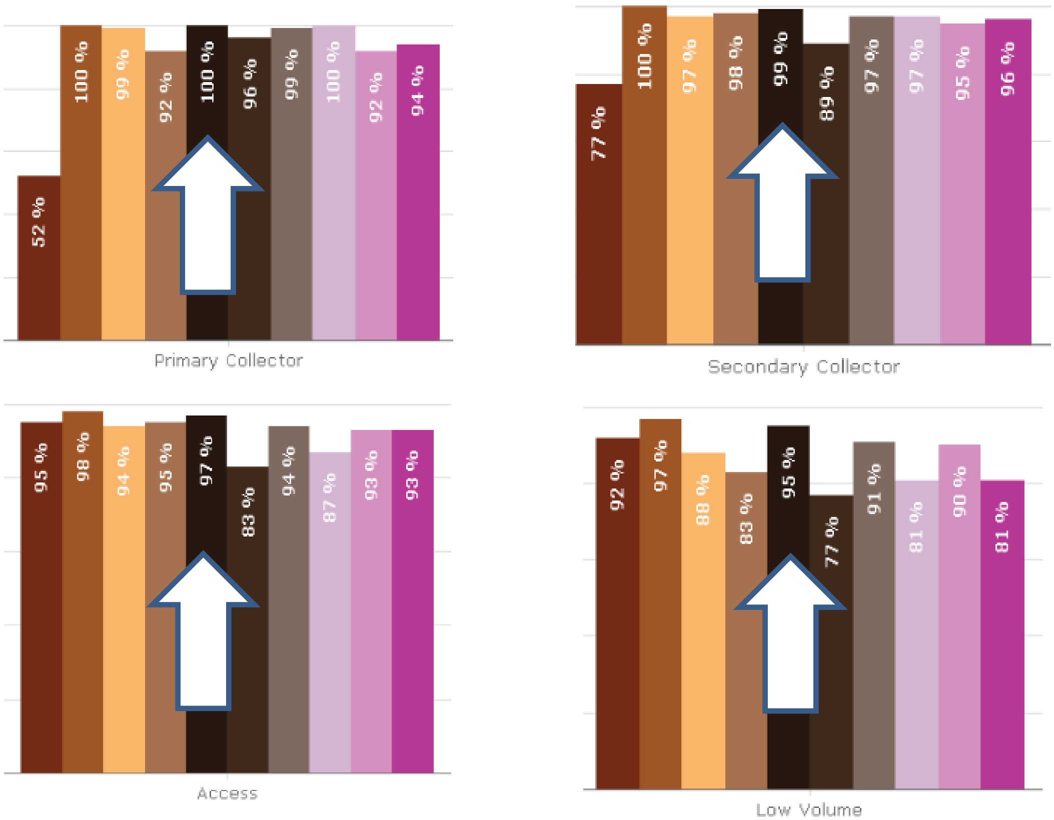


Figure 14-7.1: Amenity OM1 – Rural Smooth Travel Exposure

Peer Group STE Key

STE - Urban

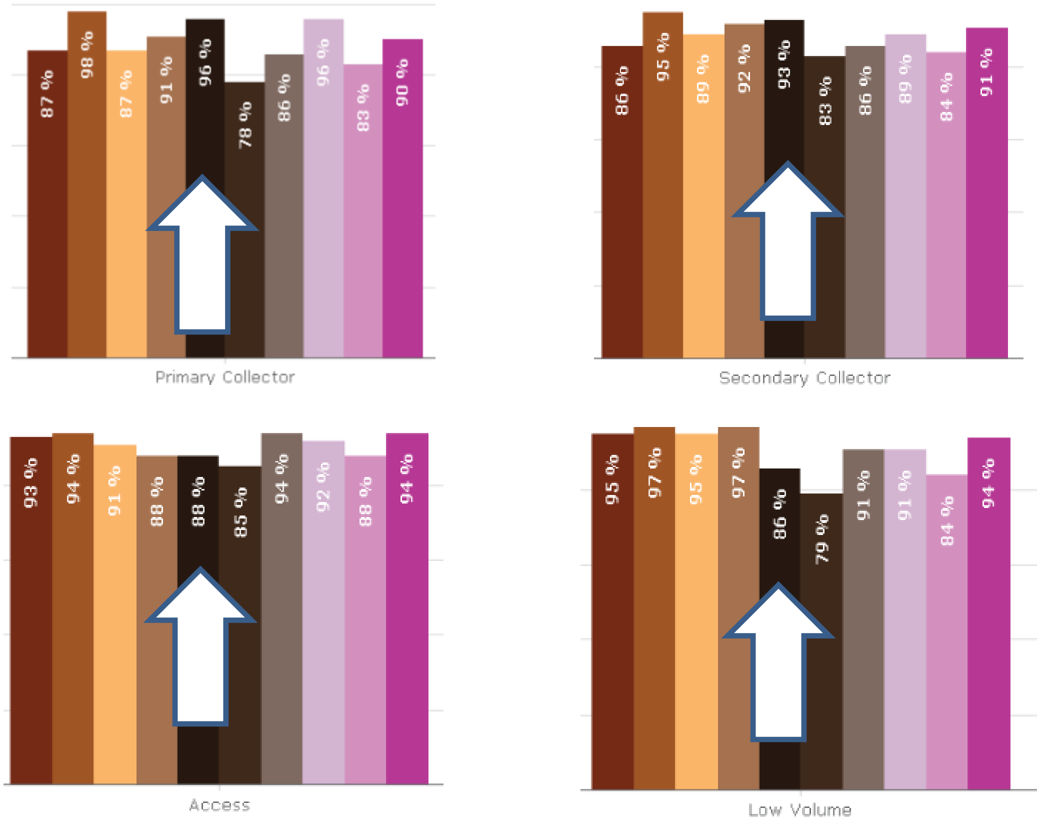


Figure 14-7.2: Amenity OM1 – Urban Smooth Travel Exposure

14.3.2 Average Roughness (NAASRA)

Amenity OM2 - Average Roughness (NAASRA)

- The rough data reports on sealed roads and comes from the Rough table with event codes excluded. The table is filtered by latest.
- The classifications come from the Carriageway Section table and ONRC Category table.
- The threshold values come from the ONRC Framework and One pagers. These values may change once the initial data is reviewed and thresholds re-evaluated.

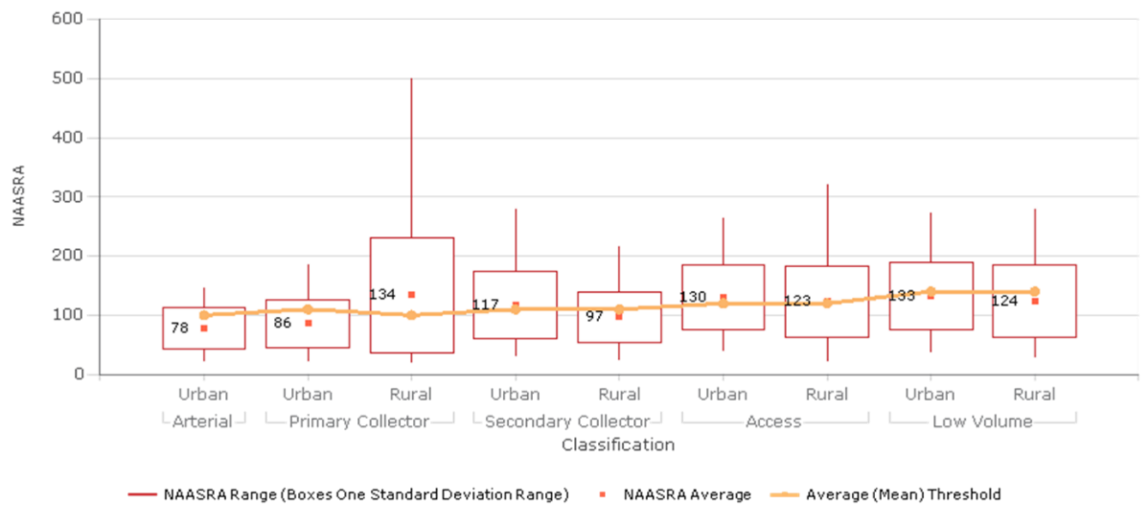


Figure 14-8: Amenity OM2 – Average Roughness (NAASRA)

14.3.3 Median Roughness (NAASRA)

Amenity OM2 - Median Roughness (NAASRA)

- The rough data reports on sealed roads and comes from the Rough table with event codes excluded. The table is filtered by latest.
- The classifications come from the Carriageway Section table and ONRC Category table.
- The threshold values come from the ONRC Framework and One pagers. These values may change once the initial data is reviewed and thresholds re-evaluated.

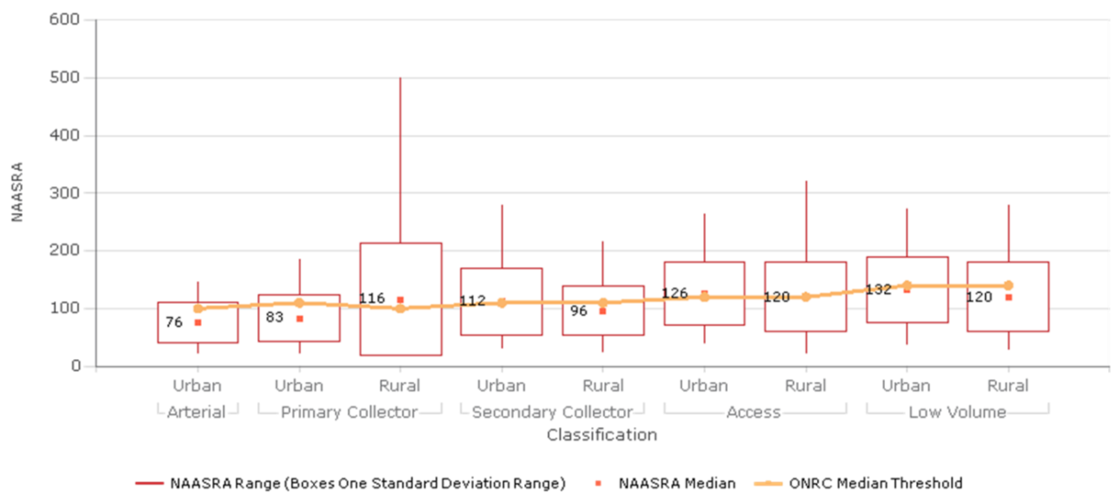


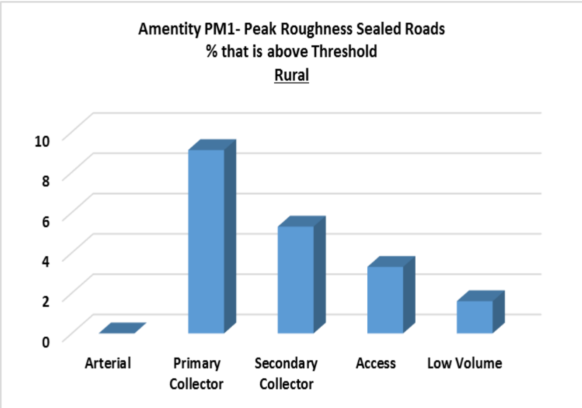
Figure 14-9: Amenity OM2 - Median Roughness (NAASRA)

14.3.4 Peak Roughness

Amenity PM1 - Peak Roughness

- This measure is checking that at least 95% of the sealed road meets specified levels of ride comfort.

- The report returns the the percentage of the network where the peak roughness is greater than the defined level for the ONRC Classification and whether it is Urban or Rural. The data comes from the Roughness table.
- The percentage length is calculated from the length of network > service level / lane kms.
- The threshold values come from the ONRC Framework and One pagers.



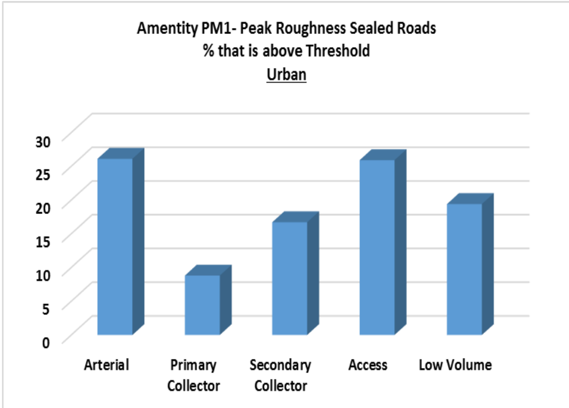


Figure 14-10: Amenity PM1 – Peak Roughness

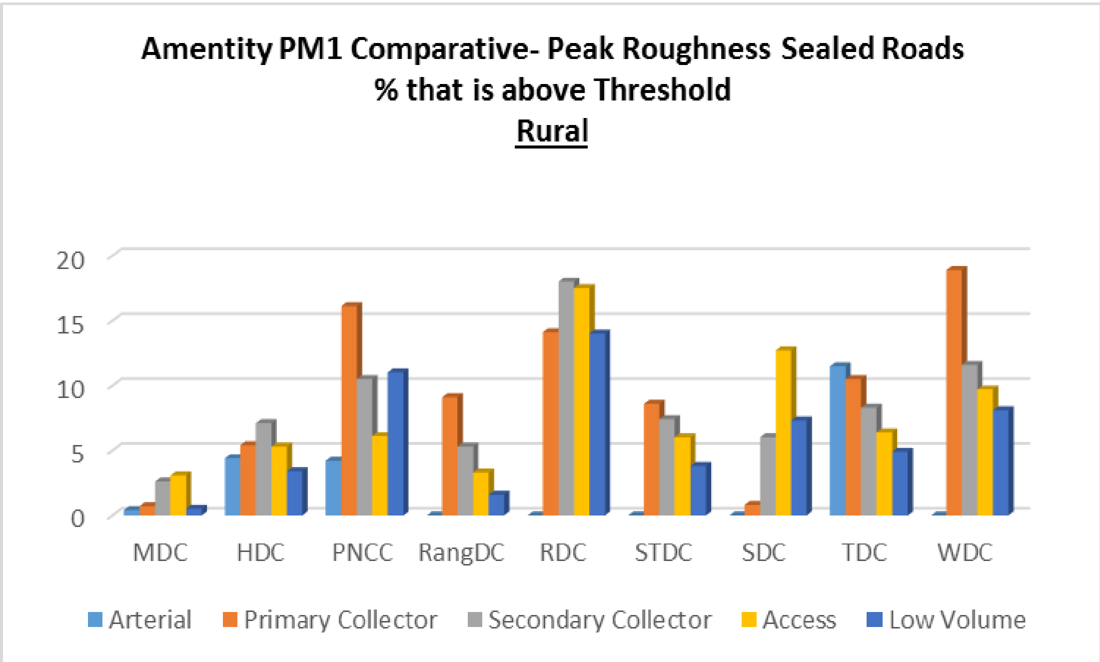


Figure 14-11: Amenity PM1 Comparative – Peak Roughness Sealed Roads Rural

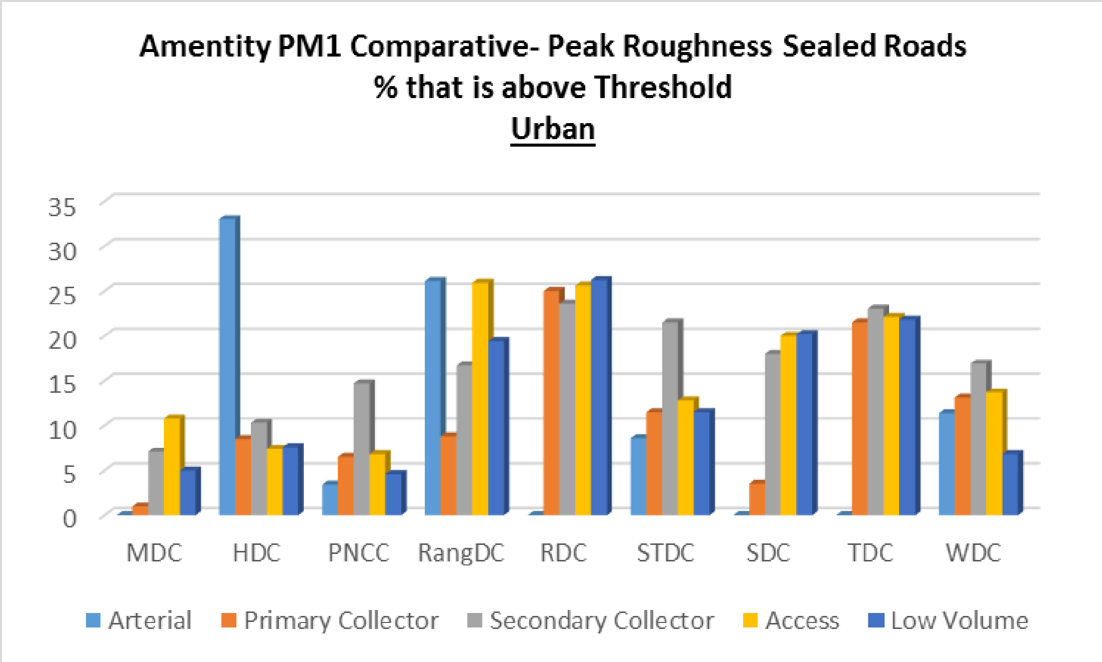


Figure 14-12: Figure 14-11: Amenity PM1 Comparative – Peak Roughness Sealed Roads Urban

14.4 Efficiency Outcomes

14.4.1 Chipseal Resurfacing Quantity

Efficiency EM2 – Chipseal Resurfacing Quantity

The surface data comes from the Carriageway Surface table which is being filtered by:

- materials – Chipseal
- functions - Reseal and 2nd Coat.

The lanes kms are being assumed to be length x number of lanes.
For surfaces which don't have a sealed area defined, the area length x cway width is being used.
The classifications come from the Carriageway Section table and ONRC Category table.
The data is grouped by financial years beginning 1 July.

Reseal 2015/16			
Classification		Lane kms	Area m^2
Arterial	Reseal	1.300	25782.00
	2^{nd} Coat	0.000	0.00
Primary Collector	Reseal	8.407	46086.00
	2^{nd} Coat	0.000	0.00
Secondary Collector	Reseal	6.139	49731.00
	2^{nd} Coat	0.000	0.00
Access	Reseal	24.489	136075.00

	2nd Coat	0.000	32351.00
Low Volume	Reseal	10.497	63055.00
	2nd Coat	0.164	8375.00
Total		56.067	361455.00

Table 14-1: Reseal 15/16

14.4.2 Asphalt Resurfacing Quantity

Efficiency EM3 - Asphalt Resurfacing Quantity

The surface data comes from the Carriageway Surface table which is being filtered by:

- materials – Asphalt
- functions - Reseal and 2nd Coat

The lanes kms are being assumed to be length x number of lanes.

For surfaces which don't have a sealed area defined, the area length x cway width is being used.

The classifications come from the Carriageway Section table and ONRC Category table.

The data is grouped by financial years beginning 1 July.

Asphalt Resurfacing 2015/16			
Classification		Lane kms	Area m^2
Arterial	AC	0.160	2998.00
Primary Collector	AC	0.087	632.00
Secondary Collector	AC	0.176	3098.00
Access	AC	0.113	2187.00
Low Volume	AC	0.000	0.00
Total		0.536	8915.00

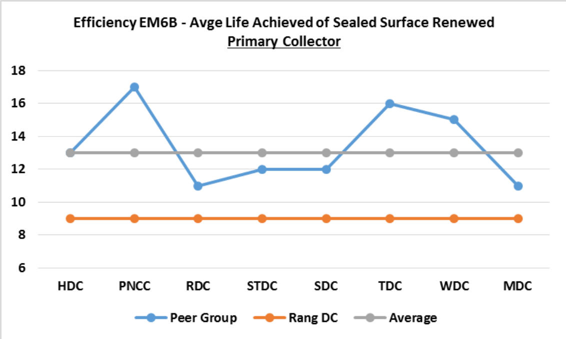
Table 14-2: Asphalt Resurfacing 15/16

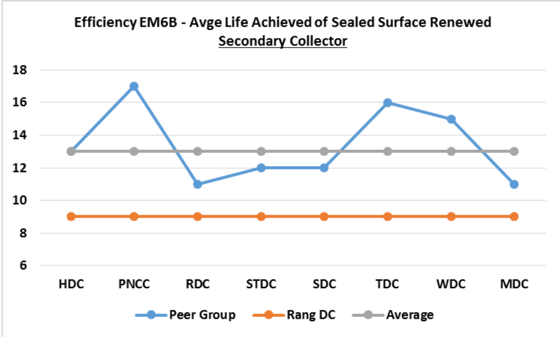
14.4.3 Average Life Achieved of Sealed Surfaces Renewed

Efficiency EM6B - Average Life Achieved of Sealed Surfaces Renewed

For each ONRC Classification this measure is determining statistics on the life being achieved from the Sealed Surfaces.

The report determines the average life achieved. Data is taken from the Carriageway Detailed view of surfacing from Surface Structure table with an additional extract of removed surfaces from the Carriageway Surface table. The length of service for a Surface comes by comparing the Reseal Date or Removed Date with the Surface Date. The data excludes 1st coat.





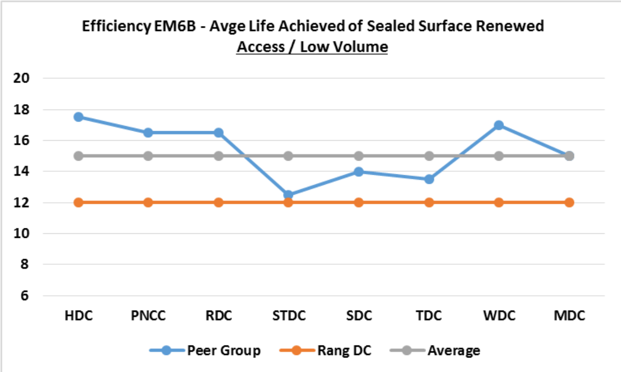


Figure 14-13: Efficiency EM6B - Average Life Achieved of Sealed Surfaces Renewed

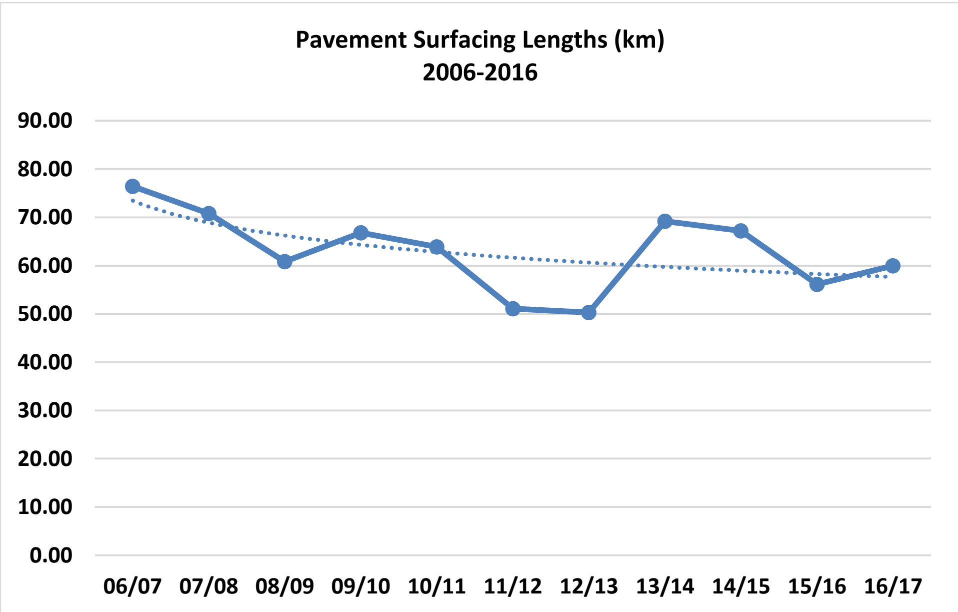


Figure 14-14: Pavement Surfacing Lengths (km)

While the length of Pavement Surfacing has been trending down since 2006 , see Figure 49 above, the achieved life of sealed surfaces has been below the average obtained on neighbouring road networks. The result of an analysis conducted in 2016/17 showed that the anticipated reseal date across all classifications of road was on average 3 years earlier than actually required.

Council has recognised that, historically, the achieved life of sealed surfaces is below that of the average obtained on neighbouring road networks. Significant – ongoing – work has been instigated to address this observation. Initially, the programme was adapted to reflect a more accurate expected seal life in 2013/14. The table below shows the results of the 2013/14 analysis/realignment:

Classification	Length (km)	Expected Average Design Life	Variation Against Expected Life
Low Volume & Access	499.981	15.60 Years	+1.30 Years
Secondary Collector	111.910	14.46 Years	+1.42 Years
Primary Collector	104.471	14.77 Years	+1.95 Years
All	716.362	15.32 Years	+1.39 Years

Table 14-3: Previous Variation Against Expected Life

The above analysis highlighted a number of gaps in the programme (i.e. a number of road sections did not have an estimated design life and expected treatment listed). As a result further work was undertaken in 2015/16, updating the life expectancies of previously omitted seals. The results are shown below:

Classification	Length (km)	Expected Average Design Life	Variation Against Expected Life
Low Volume & Access	534.676	16.03 Years	+1.56 Years
Secondary Collector	117.680	14.76 Years	+1.47 Years
Primary Collector	115.832	15.31 Years	+2.48 Years
All	768.188	15.74 Years	+1.65 Years

Table 14-4: Current Variation Against Expected Life

As can be seen, the predicted age of seal at which treatment is expected has remained relatively stable since the 2013/14 realignment analysis; variation of the seal length within each classification is primarily as a result of improvements in treatment length data accuracy and database completeness.

Historically, the primary target in relation to renewals was to complete an overall length (or proportion) of the sealed network on an annual basis, leading to excessive and/or variable costs.

Moving forward, the actual length of network programmed is less a simple length target, but becomes a function of the following criteria:

a) Treatment Selection Algorithm recommendation

b) General Surface Condition

c) Skid Resistance

d) Texture Depth

e) Anticipated / recommended surface design

f) The area of selected treatment lengths to be resealed

g) 2nd Coat requirements of rehabilitated sections of the network in previous years

Selection of roads to be renewed is then prioritised against budget (in tandem, the anticipated future demand for renewals - as determined by the above criteria - assists in projecting expenditure into future years).

As a result, there is improved visibility of anticipated renewals and subsequent cost effectiveness of managing the network:

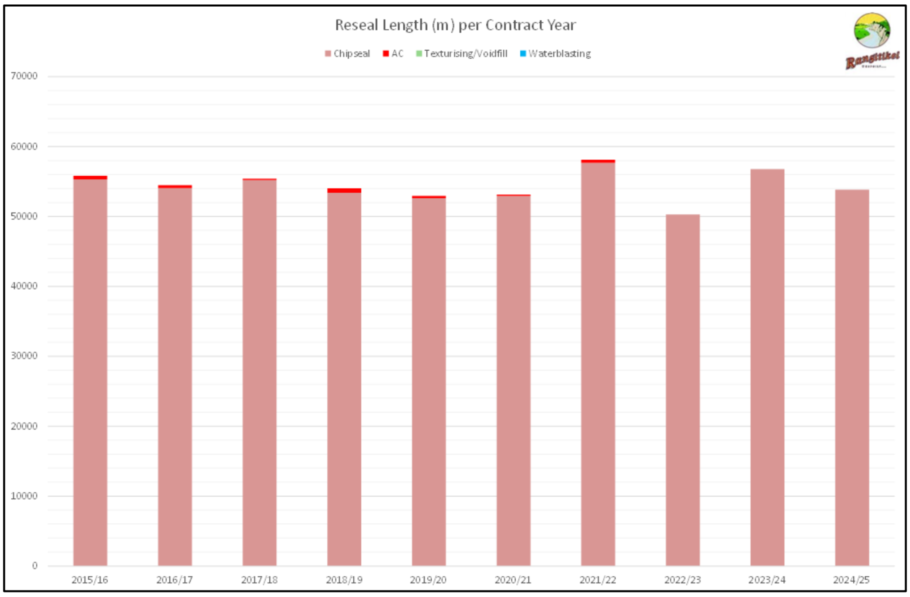


Figure 14-15: Reseal Length per Contract Year

2014 Forward Work Programme, Detailing Length per Contract Year

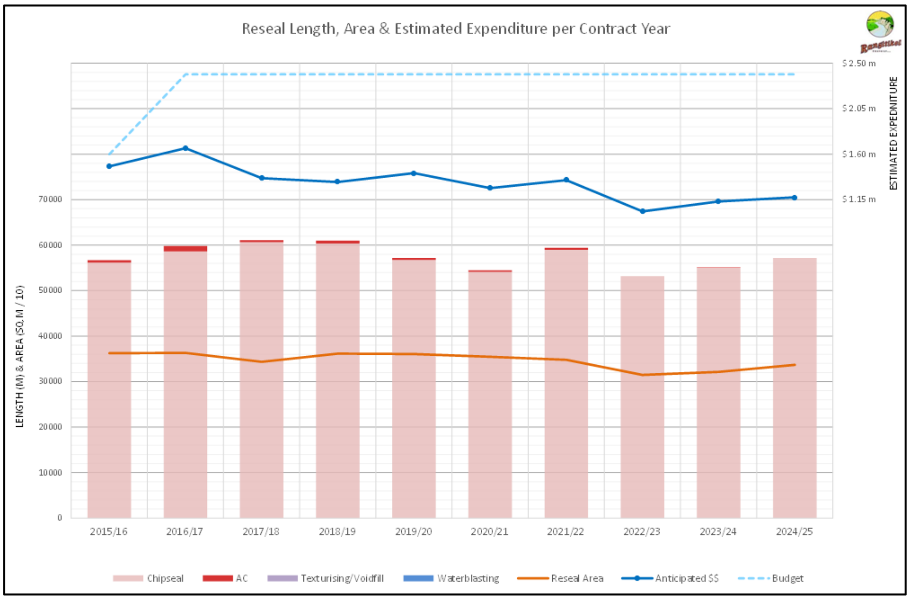


Figure 14-16: Current Forward Works Programme, Detailing Length/Area & Cost per Contract Year

Efficiency EM9 - Pavement Resurfacing

This is a summation of the Costs recorded in the Carriageway Surfacing data by ONRC Classification.

This report gathers the sum of Resurfacing Costs, Lane kms and VKT and reports on the Cost by Lane km and by VKT.

Efficiency EM10 - Routine Pavement Maintenance

Maintenance Costs are in the Maintenance Costs table. The report sums the costs by pavement

Lane kms comes from the Carriageway Section table and is calculated from length_m/1000*lanes.

VKT (Vehicle Kilometres Travelled) is calculated from Carriageway View and is calculated as length_m/1000*traffic_adt_est*365

Maintenance Cost records are associated with Carriageway Sections when the Start Displacement of the Cost falls within the Section

The data is grouped by financial years beginning 1 July.

This measure looks for Maintenance Costs associated with the Pavement Cost Group.

Efficiency EM10 Routine Pavement Maintenance			
Classification	**Cost Group**	**Cost per Lane km ($)**	**Cost per 1000 VKT ($)**
Arterial	Pavement	1899.4	7.3
Primary Collector	Pavement	23.5	4.9
Secondary Collector	Pavement	116.3	8.7
Access	Pavement	37.9	14.5
Low Volume	Pavement	196.3	89.7
Total		**2273.4**	**125.2**

Table 14-5: Efficiency EM10 Routine Pavement Maintenance

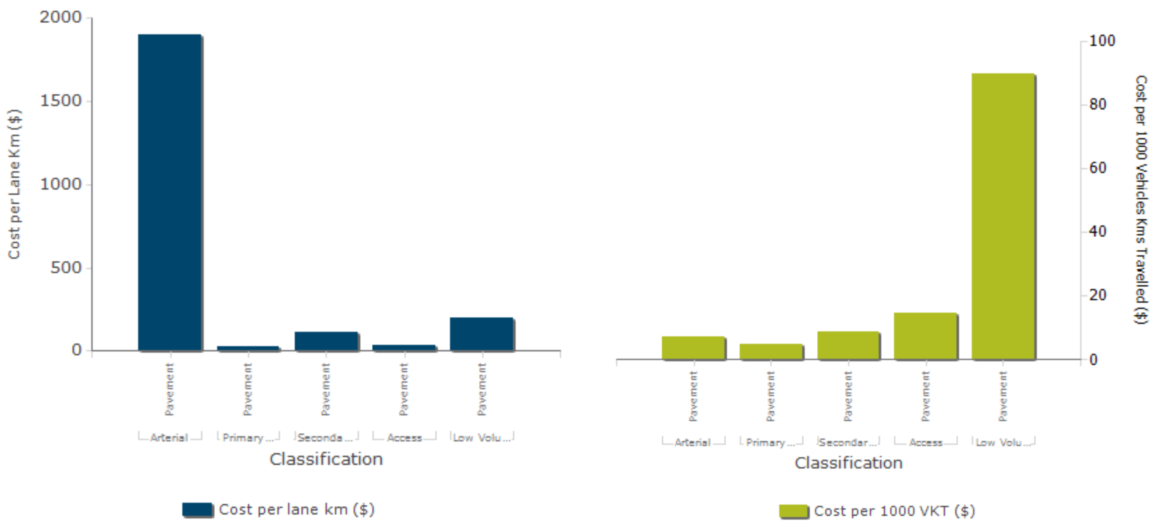


Figure 14-17: Efficiency EM10 Routine Pavement Maintenance

15 Issues and Risks

15.1 Transportation Network Risk

The Council is exposed to a number of risks arising from the operation of the road network. These risks arise from any number of sources, but can generally be grouped into two main areas:

Management – those risks that are largely concerned with the way the roading network is managed. These include funding, resourcing, programming of work and interaction with the public.
Environmental – those risks that are concerned with the impact of the environment on the physical assets, including natural and man-made disasters.

15.2 Network Events

15.2.1 Network Event Risk Management

The nature and use of the District's road network are such that the detailed network knowledge gained from continual observations and monitoring of the network is the appropriate means of managing most of the events described in this sub-section. This said, the associated risks are further reduced by the management measures described under each heading.

15.2.2 Horizons' modelled wet extents flood plain mapping

Horizons require Council to apply for a resource consent under the RMA to carry out maintenance on roads in flood prone areas that involve raising the level of the road.

15.2.3 Traffic Loading

The numbers and sizes of vehicles using a road are the two major influences on its condition and the costs of maintaining the desired level of service. Most Council roads carry significantly less than the theoretical limit of around 2,500 – 3,000 veh/day for rural roads in rolling terrain; the figures for flat terrain are significantly higher.

The Council has a traffic-counting programme that allows them to keep this matter under review.

15.2.4 Structural Loading

The traffic-counting programme also monitors the proportion of heavy vehicles on representative roads. This monitoring supplements the detailed network knowledge gained from continual observation and monitoring of the network.

Bridges are protected through regular inspection by appropriately trained and experienced external consultants. Any bridges with reduced capacity have legally enforceable load and/or speed restrictions placed on them under Land Transport Rule 41001 – Vehicle Dimensions and Mass 2002, and its subsequent amendments. These limits are displayed at each bridge, and where appropriate in advance of the bridge at a location where heavy-vehicles can turn or have the opportunity to use an alternative route.

Permits for over mass (over weight) vehicles to use Rangitikei District Bridges are issued by the Council, where appropriate, after consideration of the effects of the load on each bridge the over mass load will pass. A new prototype over mass permit system has recently being introduced by the New Zealand Transport Agency (NZTA), “50 Max” which permits loads up to 50 ton operating on permitted routes. The permits for these are issued by the NZTA under a Memorandum of Understanding with the Council. The effects of the increase loading is being monitored although with the provision of extra axles, the effects are considered marginal.

15.2.5 Material Failure

Material failures include deterioration through normal wear and tear. The Council carries out regular condition-ratings of all its sealed roads using industry-standard procedures and at frequencies appropriate for the road hierarchies.

The bridge inspections outlined in the Lifecycle Management Plans also assists in monitoring the condition of the bridge materials and components.

Unsealed metal roads are inspected regularly both a combination of network supervisors, and Council engineering resources. Grader operators, who are among the most skilled road maintenance workers, provide information on deterioration and non-recurring maintenance needs.

15.2.6 Mechanical and Electronic Equipment Failure

The only mechanical and electronic equipment on the road network relevant to this plan is railway crossing barrier arms and signalling bells/lights. These are the property of the NZ Railways (OnTrack) and are maintained and inspected by them. All railway-crossing installations have back-up power supplies capable of operating for at least 24 hours.

15.2.7 Electrical Failure

On the road network electrical failures only affects urban street-lighting and rural intersections. Failure of individual lights is managed through the Street Light Maintenance Contract that specifies response times for individual street lights and groups of failed lights. It also requires periodic electrical inspections of each light fitting, post and mounting mechanism.

Emergency incidents, vehicle accidents and weather related issues are initially responded to by PowerCo's network maintenance contractor, Tenix, whose on-call technicians make the scene safe. Formal communications links are in place with the Street Light Contractor to repair or re-instate the damaged pole or fitting.

15.2.8 Vandalism

The most significant risk posed by vandalism is removal or damage of warning or regulatory signs, to the extent that their messages are lost. The Council's maintenance contracts cover reinstatement of signs damaged by vandals or vehicle incidents.

15.2.9 Failure of Other Utilities

The installation or maintenance of utilities such as power, telecommunications, water supplies or wastewater in the road reserve can have significant adverse effects on both the road formation and its users. The applicable acts exist depending on the utility in question, and are as follows:

Telecommunications Act 2001
Gas Act 1992
Electricity Act 1992
The Local Government Act 1974
The Utilities access Act 2010

15.2.10 Health and Safety

Council is responsible for providing a safe work environment for its staff and public. A Health and Safety committee meets regularly, and provides information to all council staff on their obligations in this matter.

Council staff, by the nature of their work, are exposed to risks outside the office environment that are associated with the Transportation activity. Council provides training in general and specific safety areas as required, Temporary Traffic Management being a key area.

15.2.11 Temporary Traffic Management

All work within the road reserve requires the contractor/property owner/utility owner to inform the Council of the proposed work. A Corridor Access Request (CAR) form is used to obtain the details of the work, notifications to other utility owners, and the requirements for reinstatement, traffic management etc.

All requests are entered into a database, which also keeps information on traffic management plans. Having the information in a database allows the contractor/property owner/utility owner to be contacted if there are problems with the reinstatement. A minimum 12 month defects liability period is applied to all excavation activities via the CAR process.

The database:

Records all relevant details of each Traffic Management Plan (TMP). The majority of the contractors that carry out work for the utility companies have generic sign layouts submitted. Includes information on service plans

The Council uses the NZTA Code of Practice for Temporary Traffic Management (CoPTTM), including the RCA Forum Local roads Supplement, as the basis for management of traffic at and around worksites. All worksites, whether for Council contracts or for third parties, such as Telecom or adjacent property owners, are required to be controlled by appropriately qualified site traffic management supervisors (STMS).

15.2.12 Climate Change

The Resource Management Act 2004 Amendment Act defined climate change as "a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to the natural climate variability."

It is necessary to consider climate change issues in relation to the Transportation Activity to ensure the sustainability of this activity and maintain the agreed levels of service.

15.2.13 Legislative Change

Changes to legislation may introduce changes to the demand for transport services, typically such changes will affect the characteristics of the traffic (e.g. truck weight limits) or the management of the transportation activity (e.g. Government Policy Statement on Transport Funding).

It is accepted that legislative change can occur at any time and that the impacts of such changes can be broad or quite specific. Council's assumptions for strategic planning accepts the legislative framework that is in place at the time of planning.

15.2.14 Utilities Access to the Transport Corridor

The transport corridor provides an essential conduit for a range of utilities including Council's 3 Waters, Telecommunications, Natural Gas and Electricity.

Broadband rollout will involve considerable excavation throughout the district over the 2015-25 period. Delaying works such as footpath resurfacing is favoured to avoid rework and inferior assets.

15.3 Risk Management Process

15.3.1 Overview

Figure 50 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.

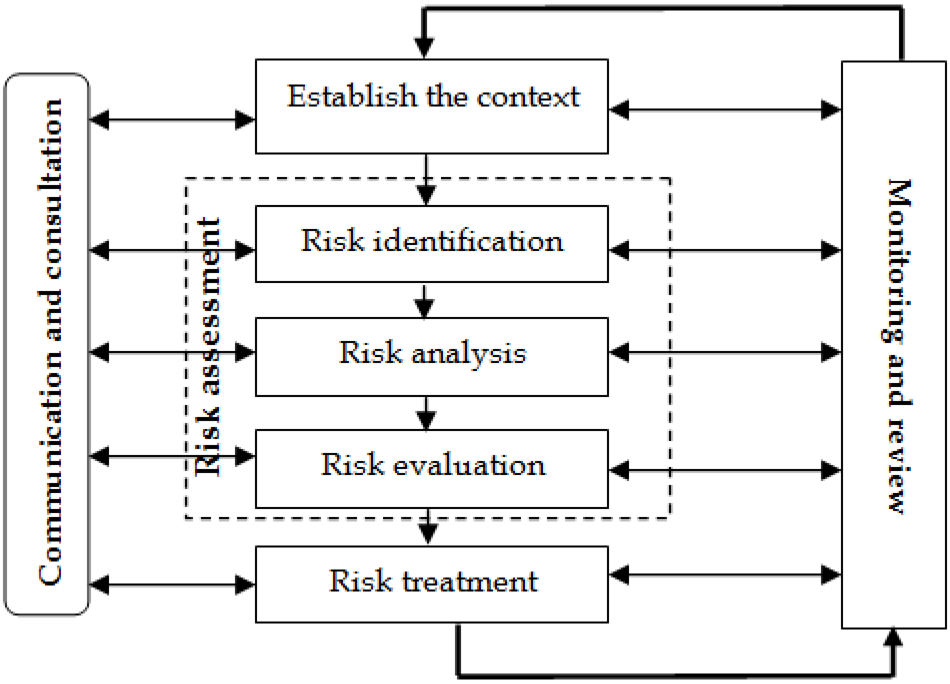


Figure 15-1: AS/NZS ISO 31000:2009 Risk management process

15.3.2 Establishing the 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.

The criteria against which risk is to be assessed are as defined within the NZ Transport Agency *Minimum standard Z/44 – Risk management.*

15.3.3 Risk Identification

The following risk identification techniques may be 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.

15.3.4 Risk Analysis

General Approach: Risk analysis will conform to the General approach as defined in NZ Transport Agency Minimum standard Z/44 – Risk management. The General Approach is based on specialist interpretation of semi-quantitative data.

15.3.5 Risk Evaluation

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 and is reproduced in Figure 51 for reference.

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).

		Threat & Opportunity Risk Matrix											
		Threat					Opportunity						
		Very Low	Low	Medium	High	Very High	Very High	High	Medium	Low	Very Low		
Likelihood	Very High	9	14	18	22	25	25	22	18	14	9	Very High	Likelihood
	High	7	12	17	21	24	24	21	17	12	7	High	
	Medium	5	10	15	19	23	23	19	15	10	5	Medium	
	Low	3	6	11	16	20	20	16	11	6	3	Low	
	Very Low	1	2	4	8	13	13	8	4	2	1	Very Low	
		Very Low	Low	Medium	High	Very High	Very High	High	Medium	Low	Very Low		
		Consequence											

Figure 15-2: Risk Matrix

15.3.6 Risk Treatment

The type of treatment to be applied to a risk will be selected from the following:

- Avoidance – not starting or not continuing the activity that gives rise to the risk.
- Share – sharing of risk, eg contractual change or through insurance.
- Treat - addressing the cause(s) of the risk, or changing the likelihood and/or consequence of occurrence of the risk.
- Tolerate – retaining the risk without treatment.
- Pursue – actively chasing the benefits of an identified opportunity.

Where treatments involve cost, a cost/benefit analysis will be conducted to ensure treatments are financially viable.

Risk owners will be responsible for the management of treatment actions against owned risks, including the allocation of resource, conduct of cost/benefit trade off and integration within the programme of work.

Fallback: For each risk with a 'live' status, the risk owner will evaluate the requirements for Fallback action, both proactive and reactive, ensuring incorporation of same in resourcing and programming. Proactive Fallback activity against identified risks will be recorded in the risk register as treatment action.

Process monitoring and review: Monitoring of the application of risk processes, good practice and compliance to contractual requirements for risk management will be carried out by Council. Where deviations are identified (from within the delivery team or the client) the asset management team will instigate corrective actions.

Additionally, the asset management team will conduct a review of risk management at six monthly intervals throughout the course of the contract. The review is intended to identify and confirm:

- Contractual compliance.
- Compliance with this RMP.
- Delivery of good practice.

Outcomes from the review will be made available to the delivery team and notified to the client in the regular report following conduct of the review.

Risk Monitoring and Review: The asset 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 asset management team so as to maximise outcomes.

Communication and Consultation: Key to effective risk management is proactive communication and consultation. The asset management team will ensure that a collaborative approach is taken by the delivery team regarding liaison with both internal and external stakeholders. By maintaining timely and open communications the delivery team will ensure a value adding flow of risk related information occurs between all parties with a vested interest in successful delivery of the AMP.

Superior stakeholder consultation will enable the establishment of context, identification of risks and changes to these, and aid in identifying and evaluating options for the treatment of risk whilst demonstrating a customer first ethos.

16 Disposal Plans

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.

16.1 Disposal of Roads

16.1.1 Overview

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.

16.1.2 Uneconomic Roads

NZTA 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 NZTA 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.

16.1.3 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.

16.2 Disposal of Bridges

16.2.1 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; and
- 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 Rangitikei 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.

16.3 Disposal of Footpath Disposal Plan

16.3.1 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; and
- 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.

17 Improvement Plan

17.1 Overview

The NZ Transport Agency carried out an Investment Audit between 9-12 October 2017.

The objective of this audit was to provide assurance that the NZ Transport Agency's investment in Rangitikei District Council's land transport programme is being well managed and delivering value for money. NZTA provide this assurance on the basis of field visits and by answering the following questions:

- What issues, if any, remain unresolved from the previous audit?
- Is Council following good practice in network management?
- Do the Activity Management Plan (AMP) and Council's Land Transport Programme reflect the network needs?
- Does Council understand its databases and are the databases accurate and robust?
- Is safety performance understood and being well managed?

In answering the above questions, NZTA assess whether Council is appropriately managing risk associated with the Transport Agency's investment. NZTA's rating assessment is based on the audit rating classification definitions summarised in the following table. As part of NZTA's assessment they made recommendations and suggestions where appropriate.

Audit Rating	Definition
Effective	**Investment management** – effective systems, processes and management practices used. **Compliance** – Transport Agency and legislative requirements met. **Findings/deficiencies** – opportunities for improvement may be identified for consideration.
Some improvement needed	**Investment management** – acceptable systems, processes and management practices but opportunities for improvement. **Compliance** – some omissions with Transport Agency requirements. No known breaches of legislative requirements. **Findings/deficiencies** - error and omission issues identified which need to be addressed
Major improvement needed	**Investment management** – systems, processes and management practices require improvement. **Compliance** – significant breaches of Transport Agency and/or legislative requirements. **Findings/deficiencies** – issues and/or breaches must be addressed or on-going Transport Agency funding may be at risk.
Unsatisfactory	**Investment management** – inadequate systems, processes and management practices. **Compliance** – multiple and/or serious breaches of Transport Agency or legislative requirements. **Findings/deficiencies** – systemic and/or serious issues must be urgently addressed or on-going Transport Agency funding will be at risk.

Overall Rangitikei District Council's network is in good condition and well managed. The network compares very well to its peers with regard to smooth travel exposure; to some extent, this will reflect Council's relatively high surfacing and rehabilitation rates. Council acknowledges greater surface life is possible and is focused on such improvement.

Council's increased focus on drainage in the last two years is timely. NZTA support Council's continued focus in this area as it helps to prevent more expensive pavement repairs.

Crash rates in the district appear comparable to other networks but we identified a number of focus areas that could deliver safety benefits. Focus areas include: active monitoring of sites with temporary traffic management; improving safety at bridges; and, ensuring consistency of delineation across the network.

Asset databases contain data that is largely complete, timely and accurate; providing confidence in the view network data provides.

Council staff are knowledgeable and have fostered good working relationships with contractors and work effectively with Manawatu District Council.

17.2 Summary Audit Rating Assessment

Question Number	Subject	Rating Assessment*
1	Previous Audit Issues	Effective
2	Network Management	Effective
3	Activity Management Plan and Land Transport Programme	Effective
4	Databases	Effective
5	Safety Performance	Some Improvement Needed

17.3 Audit Findings

The following tables present the overall findings, rating assessment and recommendations and/or suggestions for each of the respective audit questions.

Question 1:	**What issues, if any, remain unresolved from the previous audit?**	
Findings	The 2012 Technical Audit made eight recommendations to Council, and identified six opportunities for improvement. These items have been suitably implemented.	

Question 2:	Is Rangitikei District Council following good practice in network management?
Findings	Council follows good practice in the management of the road network, and the road network is generally fit for purpose. Compared to its peer group and based on percentage of sealed network, the Rangitikei District does however have a high average sealing rate (19th out of 25), and a moderately high rehabilitation rate (16th out of 25). Council's draft activity management plan acknowledges that additional surface life could be achieved; the intent to develop the surfacing programme based on network need rather than simple target lengths should help achieve this. The supporting business case should be amended as it currently envisages resurfacing rates at or above existing levels until at least 2020/21. Use of Council's high speed data to support dTIMS modelling may provide RDC with an improved long-term indicative funding model for future surfacing activity. We observed a number of locations where poor road side drainage and/or high shoulder coincided with localised pavement failures, Ongo Road was a good example of this. At a number of isolated locations where culverts were blocked, such as those seen on Erewhon Road. Culvert inspection and maintenance standards are consistent across the network. However as localised conditions and network criticality vary; it may be appropriate to have varying culvert inspection and maintenance standards based on network location. Council's increased focus on drainage, particularly roadside drains and high shoulder in the last two years is timely and can assist with reducing more expensive pavement failure repairs. Council's focus in this area has also resulted in some good network outcomes (such as the removal of surface ponding at the intersection of Wanganui Road and Johnston Road). We encourage Council's continued focus on drainage, particularly in the northern part of the network where drainage issues appeared more prevalent. While we visited only a small sample of unsealed roads in the district, those we saw were in good condition; and are typically subjected to three to four grading cycles per year. The combination of grading frequency and observed condition is considered reflective of good grading technique and a suitable intervention frequency. Council has good systems in place to verify contractor claims, and ensure that work activity data is entered into RAMM. These processes reflect well in the completeness, timeliness and accuracy of RAMM data. The continued focus on RAMM data is good, though it was not clear why condition rating should occur annually for roads carrying more than 500 vehicles per day. Current best practice suggests that condition rating is only undertaken annually for roads carrying more than 2,000 vehicles per day.

	Net present value (NPV) analysis is undertaken for rehabilitation projects meeting the Transport Agency's funding eligibility requirements for Work Category 214 (Sealed Road Pavement Rehabilitation). There is confidence in the scale, timing, and costs used in the analysis. In keeping with good practice road safety audits were completed as part of rehabilitation project scope. Council staff work collaboratively with Manawatu District Council through the sharing of staff. This approach enables a greater level of expertise (or specialisation) to both districts; and allows for more regionally consistent network outcomes. Council and contractor staff have good working relationships and are highly engaged in the management of the network.
Recommendations to Council	Amend business case resurfacing expectations to better align with the AMPs intent to reduce the rate of resurfacing occurring on the network.
Suggestion to Council	Adjust condition rating survey frequency to match current Transport Agency requirements as per Planning and Investment Knowledge Base. Review culvert inspection and maintenance standards in light of network need and confirm whether a more tailored approach is appropriate. Continue focus on drainage, particularly the removal of high shoulder and road side drain improvements.
Council Comment	The Business Case (Final bid 16/12/17) has been amended so that resurfacing expectations are better aligned with the AMPs intent to reduce the rate of resurfacing occurring on the network. The 2018-AMP has adjust condition rating survey frequencies to match current 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. Culvert inspection and maintenance standards will be reviewed in light of network need to determine whether a more tailored approach is appropriate. There will be a continued focus on drainage, particularly the removal of high shoulder and road side drain improvements.

Question 3:	**Does the Council's Activity Management Plan (AMP) and Land Transport Programme (LTP) reflect network needs?**	
Findings	Council's AMP is up to date and demonstrates a very good understanding of the challenges and opportunities facing the district.	

	The AMP follows the business case approach and reflects the ONRC framework. Network challenges are clearly defined in the AMP and supported by robust evidence in the business case. Council understands areas of the network that will be subjected to increasing pressure over the coming years. Continued awareness of local forestry activity (especially harvesting cycles, timing expectations and transport routes) will be required to ensure appropriate network management planning. Such awareness will also assist in reducing risks associated with unexpected network requirements.
Council Comment	Council concurs with the above comments.

Question 4:	**Does Rangitikei District Council understand its databases and are the databases accurate and robust?**	
Findings	Good asset management decisions rely on complete, timely and accurate asset data; we therefore commend Council's strong focus on the quality network data. Council's road asset database (RAMM) contains maintenance, condition and network use data that is largely complete, accurate and timely. The Road Efficiency Group's data quality report supports this view. The quality of data ensures confidence in Council's network analysis and the basis of its AMP, and the ability to largely rely on Road Efficiency Group comparative reporting outputs. Network surface and pavement condition indices appear stable over time. Smooth travel exposure compares very well to peers. However, there was a sudden and unexplained reduction in smooth travel exposure (STE) for the network in 2013 and 2016. There was also a poor correlation between road roughness data and actual road roughness at a localised level such as that at Beamish Road (the only site we sought to validate). This site was ranked second worst in the district for STE, yet the road provided a very smooth ride. Condition rating information recorded in RAMM complies with requirements set out in the Agency's Knowledge Base. Council has typically undertaken network rating surveys based on a 10% sample from a 500m long segment length, with the exception in 2015 when Council undertook a 100% sample. NZ Transport Agency Research Report 528 found that a change in segment length, from 500 metres to 200 metres and the sample size, from 10% to 20% can provide a better indication of actual network condition. It is our advice that Council modify current condition rating practice to 200 metre segments and a 20% sample for each segment.	
Recommendations to Council	Consider undertaking 20% sealed road rating surveys at 200m intervals to improve network condition data representation.	

	Resolve data anomalies relating to smooth travel exposure.
Council Comment	Council will consider undertaking a 20% sealed road rating surveys at 200m intervals to improve network condition data representation. Council will investigate and resolve data anomalies relating to smooth travel exposure. Council is currently in negotiations with suppliers of high speed data capture providers. Council understands that some systems can capture all the required pavement condition data in one pass.

Question 5:	**Is safety performance understood and being well managed?**
Findings	Rangitikei District Council understands the importance of a safe road network. Council is aware that a proportion of crashes (especially non-injury crashes) are likely to go unreported given the remoteness of the network. We passed a number of network utility work sites in Taihape and were concerned with the effectiveness of temporary traffic management in place. For example an effective lane closure on Kokako Street was not covered by any advance warning; and, utility operators working on Robin Street were not protected by a lateral safety zone and were outside of the speed restricted area. While the work does not relate to Council activity, Council is ultimately responsible for those travelling and working on its road network. Bridge end markers (width delineators) were in very good condition and present on all bridge approaches. We were however concerned that a number of remote rural road bridges did not protect errant vehicles from the risk posed by watercourses. Well-placed guardrail could help to provide a better level of safety in such locations. Edge marker posts and line markings were in very good condition. Despite Council having a delineation strategy, delineation was inconsistently applied along some routes in the district, such as Kaurangaroa Road (edge marker posts) and Makiriki Road (road markings). According to RTS5 (Transit NZ, 2002) delineation devices aid journey predictability and can address loss of control accidents, particularly at night. They have been shown to reduce crashes on curves by 32-67%. We note that 'loss of control and head-on crashes' remains a high strategic priority (NZTA Communities at Risk Register, 2017). Council noted that they generally only undertook 'post-construction' road safety audits. While Council can choose not to follow the complete road safety audit process, we note that in not undertaking a design-phase road safety audit, Council risks incorporating design features that could be costly to rectify if identified in the latter stages of a project. We

	remind Council that a road safety audit waiver form should be completed where road safety audits are not completed for the various phases of a project. We reviewed Council's night time network inspections policy and found the policy suggested an inspection frequency of up to three years depending on road classification. It is considered that a three yearly inspection cycle is too long given that low volume roads typically have a lower level of redundancy in hazard warning signs (for example there may only be one sign indicating an out of context curve). Night time inspections were undertaken by contract and council staff, having 'fresh eyes' on this inspection could help identify safety risks not immediately obvious to people familiar with the network. Surface hazards (such as potholes, poor pothole repairs and loose gravel) were uncommon on the network. Council has managed vegetation adjacent to the road network very well thereby ensuring that forward visibility is maintained.
Recommendations to Council	Actively monitor temporary traffic management on the road network to ensure the safety of road users and workers alike. Review bridge approaches and develop a strategy to ensure sufficient safety is afforded to road users from risks posed by steep valleys and watercourses. Ensure edge marker post and line marking application is consistent along routes and over the network, and provided in accordance with Council's delineation strategy. Ensure compliance with the Road Safety Audit Procedures for Projects (NZTA, 2013).
Suggestion to Council	Review the suitability of the night time network inspection regime.
Council comment	Council has a dedicated member of staff who manages Corridor Access Requests, approves TPMs and actively monitors temporary traffic management on the road network to ensure the safety of road users and workers alike. Bridge approaches have been reviewed and a strategy has been developed to ensure sufficient safety is afforded to road users from risks posed by steep valleys and watercourses. This work has been programmed in the 2018/21 AMP of mitigating roadside hazards. There is an enhanced programme for Traffic Service Renewals (WC222) in the 2018/21 AMP. The goal is to reduce the number and severity of crashes on Council's roads by installing, upgrading or amending signage throughout the network. Also Council will ensure edge marker post and line marking application is consistent along routes and over the network.

	Council will ensure compliance with the Road Safety Audit Procedures for Projects (NZTA, 2013). Council will include personnel unfamiliar with the rural network to assist with night audits.

17.4 Recommendations and suggestions

The tables below capture the audit recommendations and suggestions respectively. Agreed dates are provided for the implementation of recommendations by the approved authority.

NZTA recommend that Rangitikei District Council:		Implementation Date
Q2	Amend business case resurfacing expectations to better align with the AMPs intent to reduce the rate of resurfacing occurring on the network.	Included in 2018-21 AMP 16th December 2017
Q4	Consider undertaking 20% sealed road rating surveys at 200m intervals to improve network condition data representation.	Included in 2018-21 AMP 16th December 2017
	Resolve data anomalies relating to smooth travel exposure.	In Progress
Q5	Actively monitor temporary traffic management on the road network to ensure the safety of road users and workers alike.	On going
	Review bridge approaches and develop a strategy to ensure sufficient safety is afforded to road users from risks posed by steep valleys and watercourses.	Included in 2018-21 AMP 16th December 2017
	Ensure edge marker post and line marking application is consistent along routes and over the network, and provided in accordance with Council's delineation strategy.	Has commenced and will be on going.
	Ensure compliance with the Road Safety Audit Procedures for Projects (NZTA, 2013).	Will be adopted for all new capital projects in 2018/21

NZTA suggest that Rangitikei District Council:	
Q2	Adjust condition rating survey frequency to match current Transport Agency requirements as per Planning and Investment Knowledge Base.
	Review culvert inspection and maintenance standards in light of network need and confirm whether a more tailored approach is appropriate.
	Continue focus on drainage, particularly the removal of high shoulder and road side drain improvements.
Q5	Review the suitability of the night time network inspection regime.
Council concurs with all the suggestions and will implement the necessary actions. See Council's comments at the end of each Audit Findings Questions.	

* * *

Appendices

Appendix 1 Road Pavements

1.1 Lifecycle Management – An Overview

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.

The purpose of each road pavement is to provide an element of the network that is:

- Appropriate and suitable for the effective and efficient movement 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; and
- Has a structure suitable to carry legal weight, and most cases over weight, traffic.

Pavements consist of four principal components, the sub-grade, sub-base, base-course and top surface. The composition of these layers differs based on the type, function and locality of the road or street.

The pavement asset is valued in three groups;

1 Formation Layer - the lower structural component consisting of levelled, compacted heavy material.

2 Pavement Layers - compacted layers of graded finer material.

3 Pavement Surface - this could be a thin surface flexible coating such as chip seal or if the pavement is not sealed, the surface will be metal running course.

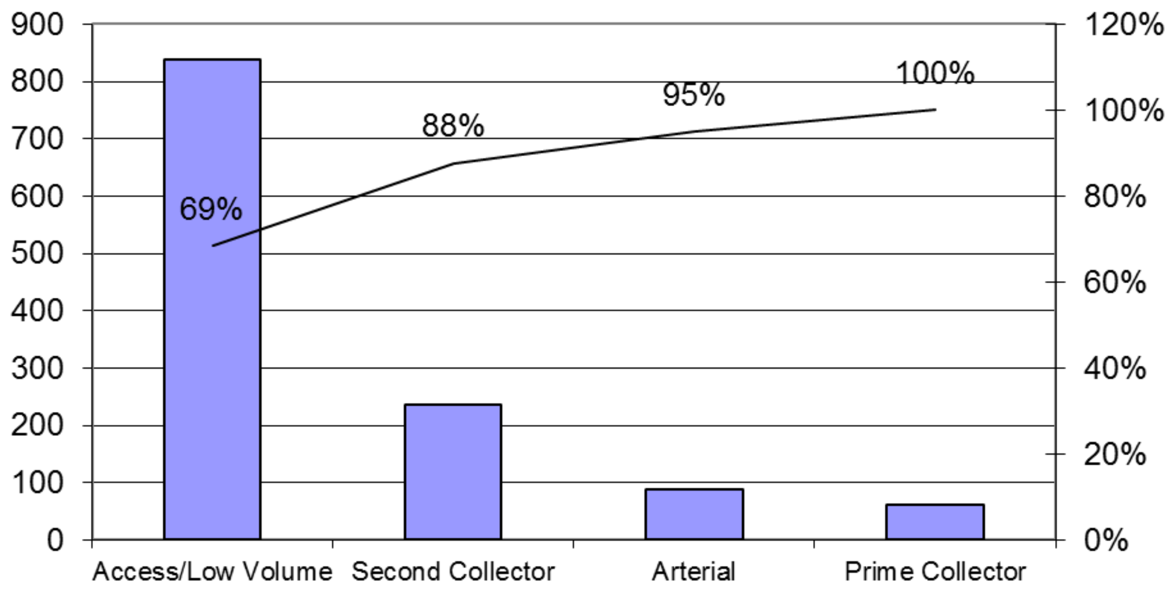


Figure 1: Distribution of vehicles on network vs total volume per road

The above Pareto Chart illustrates the distribution of vehicles on the network in terms of total volume per road hierarchy. For the Rangitikei network, 88% of the roads carry less than 500 vehicles per day.

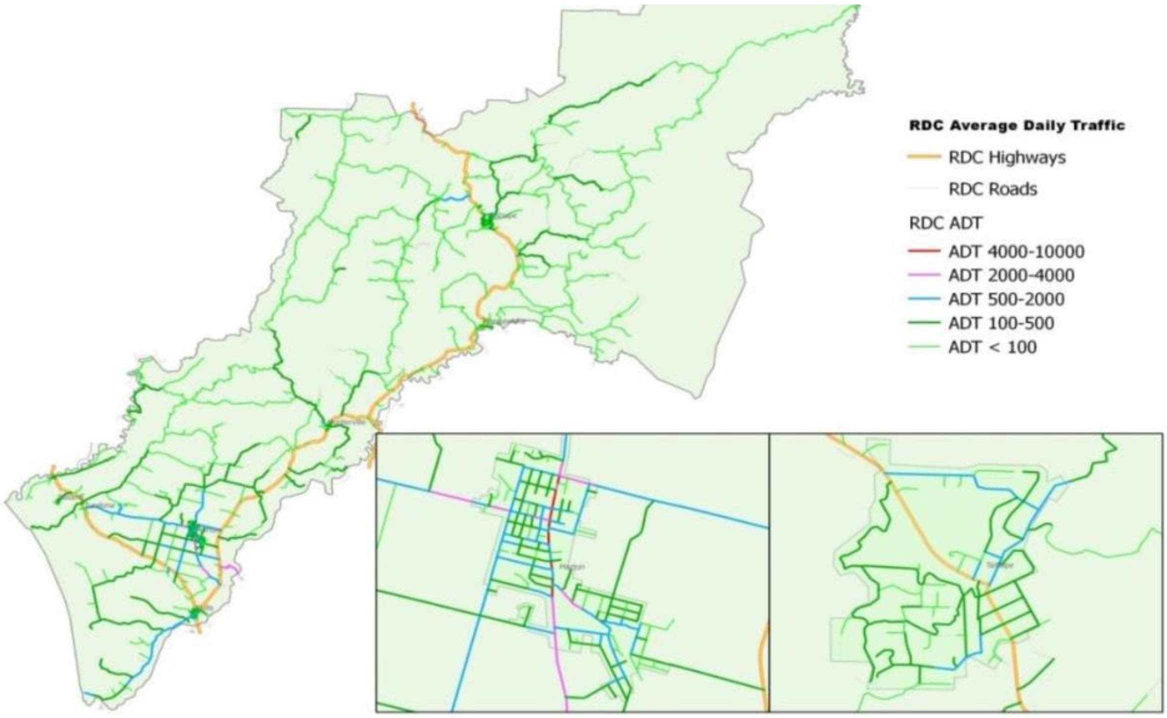


Figure 2: RDC Average Daily Traffic

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 adjacent road network.

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.

Nearly all new pavements that have been added to the network in recent times have come about from new roads and streets vested in the Council by private developers undertaking new urban subdivisions.

1.2 Pavement Layers

Pavements in the Rangitikei District consist of the following elements:

1.2.1 Subgrade

The sub-grade 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.

1.2.2 Sub Base

Sub-base 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.

1.2.3 Base-course

Base-course 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 NZTA 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

1.2.4 Top Surface

The top surface is the most frequently used means of differentiating between roads and their carriageways.

The prime purpose of the pavement 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).

The top surface is identified in the asset valuation table by Surfacing.

1.3 Sealed Roads

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.

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.

1.4 Unsealed Roads

In comparison, unsealed roads are quite dynamic in their performance and can have higher maintenance costs. 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.

1.5 Operations and Maintenance Plan Strategy

1.5.1 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; and
- 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.

1.5.2 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 NZTA.

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 NZTA 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.

1.5.3 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.

1.6 Renewal/Replacement Plan

1.6.1 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

1.6.2 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.

1.7 Identification of Work

1.7.1 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; and
- 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.

1.7.2 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; and
- 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.

1.8 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.

1.8.1 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.

1.8.2 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.

1.8.3 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.

1.8.4 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.

1.8.5 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).

NZTA 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.

1.9 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.

1.9.1 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

1.9.2 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.

1.9.3 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 NZTA'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 NZTA (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 NZTA 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.

1.10 Routine Maintenance

1.10.1 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 asset 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 digout 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.

1.10.2 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.

1.10.3 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 NZTA under Work Category 141 – Emergency Reinstatement.

1.10.4 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 NZTA. 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 NZTA Funding for additional funding.

1.10.5 Sealed Pavements, General Maintenance

Sealed road pavement maintenance includes:

- Pothole repairs;
- Digout repairs;
- Surface levelling;
- Repairs to seal edges (edge break and shoulder wear); and
- 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.

1.10.6 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.

1.10.7 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 Rangitikei 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	44.04 km	5	1873
U2	25 – 50 vpd	108.74 km	5	5973
U3	50 – 75 vpd	211.79 km	10	1533
U4	>75 vpd	66.42 km	10	621
		431.0 km		10,000 m^3

Table 1: Re-metalling

Maintenance aggregate grading size and quantities

- GAP 20 10,000m^3
- GAP 40 1,500 m^3
- GAP 65 1,000 m^3

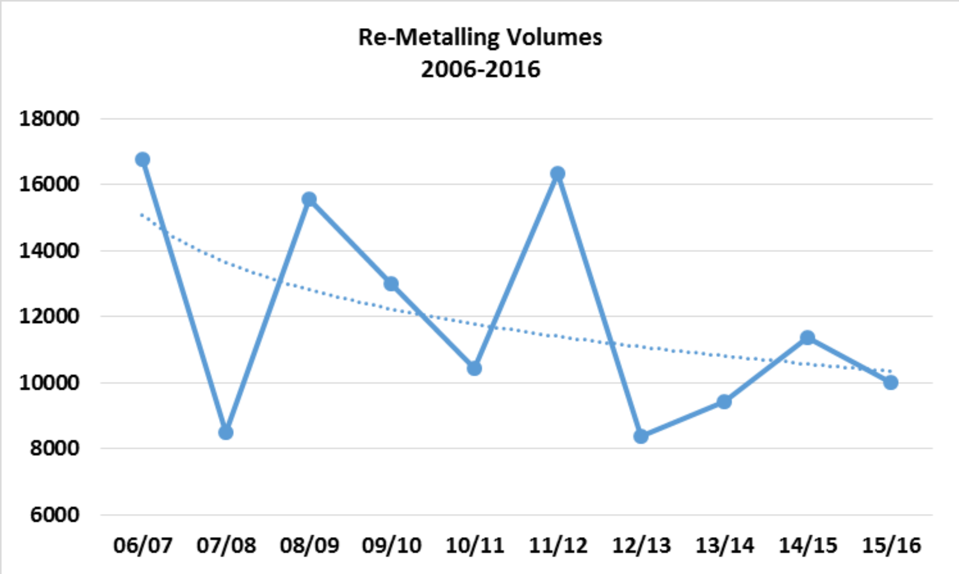


Figure 3: Re-Metalling Volumes

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.

Appendix 2 Drainage

2.1 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.

2.2 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.

2.3 Overview of Assets Involved

Drainage asset details are stored in RAMM under the following component definitions:

Drainage Type	Quantity
Catchpit 1	956
Catchpit 2	9
Sump	101
Total Drainage Assets	1,066

Table 2: Drainage Asset Details

2.4 Distinction between Roading and Utilities

2.4.1 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.

This is explained as follows:

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.

2.4.1 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.

2.5 Operations and Maintenance Plan

2.5.1 Service Delivery and Rationale

Routine Works shall 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 and catchpits which are sub asset groups of the drainage asset base.

2.6 Drainage – Culverts

2.6.1 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 3.41m^2 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.

2.6.2 Overview of Assets Involved

Culvert asset details are recorded in the Council's RAMM database and are stored in the same table as other drainage assets.

There is approximately 51 Kilometres of drainage pipe, 93% Concrete, 4% Armco, 2% Earthen ware and 1% other various.

The Pareto Chart below shows the distribution of pipe diameters by length (m), 90% of which are less than 600mm in diameter.

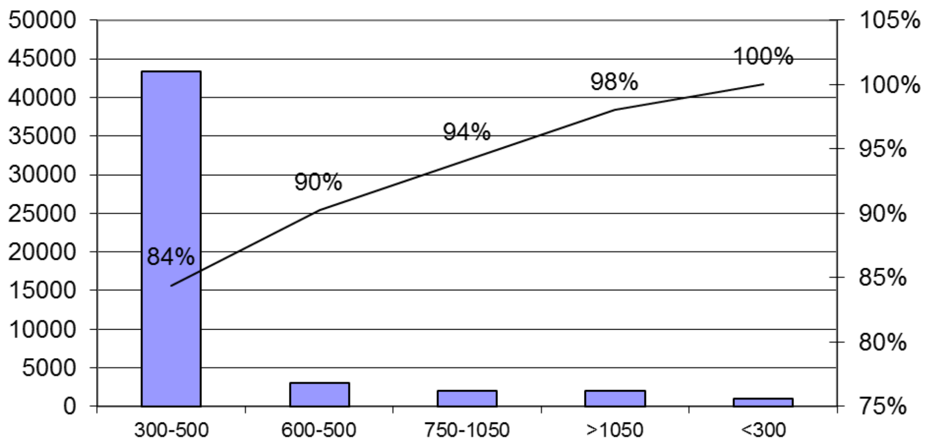


Figure 4: Distribution of pipe diameters by length(m)

2.6.3 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.

2.6.4 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.

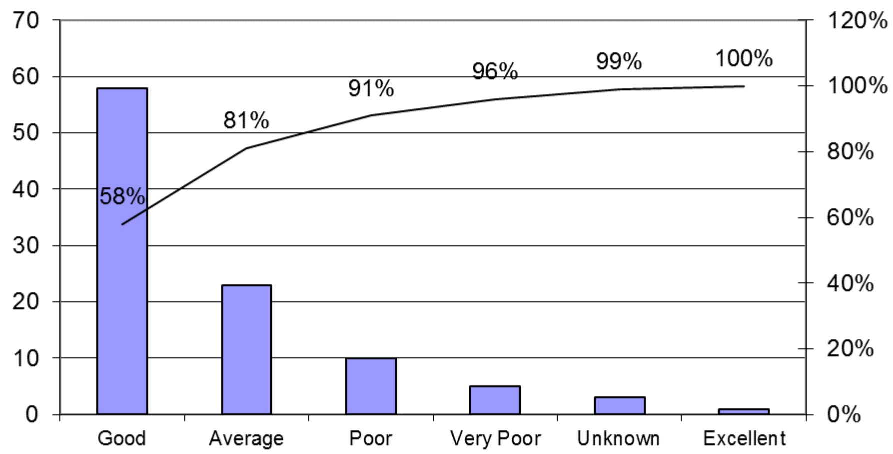


Figure 5: Condition Rating Inspection

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; and
- 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.

2.7 Drainage –Sumps and Catch-pits

2.7.1 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.

2.7.2 Overview of Assets Involved

Sumps and Catchpits are recorded in the Drainage Table of the Council's RAMM database. 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.

2.7.3 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 NZTA 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.

2.7.4 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.

2.7.5 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.

2.8 Kerb and Channel

2.8.1 Introduction

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; and
- 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; and
- 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)

2.8.2 Overview of Assets Involved

The following types of kerb and channel are utilised in the District, asset details are recorded in RAMM in the Surface Water Channel table:

Type	Length (m)
SW Channel (Shallow)	31,640
SW Channel (Deep)	1,162,760
Dished Channel (Concrete)	934
Kerb and Channel (Concrete)	125,871
Kerb Only (Concrete)	120
Kerb Only (Concrete)	1,974
Mountable Kerb and Channel (Concrete)	3,422
Mountable Kerb Only (Concrete)	578
Other Type	632
Other Type	4,862

Table 3: Surface Water Channel

2.8.3 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 NZTA 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 NZTA 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.

2.8.4 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

Table 4: Surface water channel rating

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.

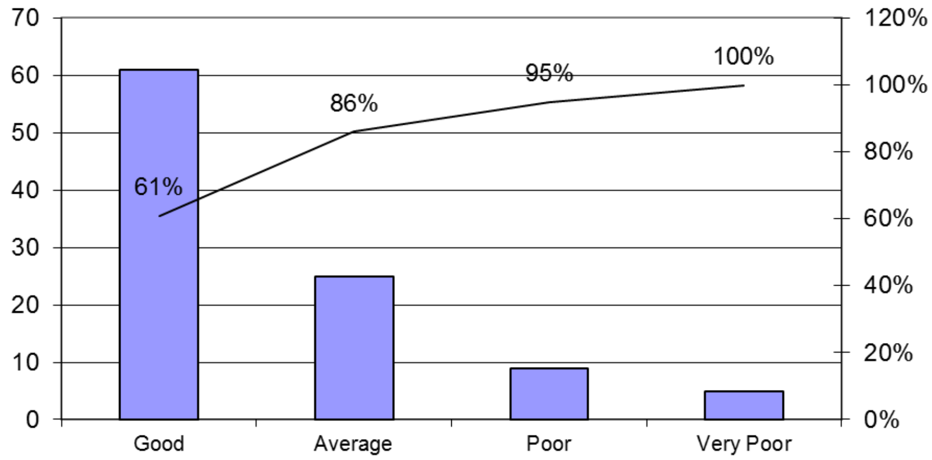


Figure 6: Defects on a recent sealed road condition rating survey

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; and
- 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.

2.8.5 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.

2.9 Deep and Shallow Surface Water Channels

2.9.1 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.

2.9.2 Overview of Assets Involved

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:

Type	Length (m)
SWC (Deep, >200 Below Seal Edge)	31,640
SWC (Shallow, <200 Below Seal Edge)	1,162,760

Table 5: Types of Deep and Shallow surface water channels

2.9.3 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 Contract No. 1005 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 Rangitikei 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.

2.9.4 Operational and Maintenance Processes

Maintenance Forecast: The maintenance of unlined surface water channels is budgeted under NZTA 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.

2.9.5 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; and
- The adequacy of the receiving stormwater collection and disposal systems, e.g. soakholes, culverts, drains and streams.

2.9.6 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.

2.9.7 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

Appendix 3 Structures

3.1 Lifecycle Management

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.

NZTA'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.

Council maintains 267 bridges (this total includes 106 major culverts) ranging in size from small timber bridges to the 140m long Mangaweka Bridge over the Rangitikei River on Ruahine Road.

There are eight bridges that straddle the District's boundaries. Three are state highway bridges and the Council has no responsibility for them. Responsibility for the other six bridges is shared as follows:

Road Name	Bridge Name	Plate Year	Management Responsibility
Taihape Napier Road 2	Kurapaponga Bridge	1961	HDC
Mangamahu Road	Whylies Bridge	1955	WDC
Kauangaroa Road	Kauangaroa Road Bridge	1974	RDC
Otara Road	Otara Bridge	1962	MDC
Mangarere Road	Mangarere Bridge	1966	MDC
Kawhatau Valley Road	Powerhouse Bridge	1975	RDC
Ruahine Road	Mangaweka Bridge	1899	MDC
Halcombe Road	Kakariki Bridge	1968	RDC

Table 6: District boundaries bridges

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 NZTA.

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.

3.2 Overview of Assets Involved

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. There are some data integrity issues with the current waterway area information, which distinguishes large culverts from smaller culverts. Overall confidence levels in large culvert attribute data is low with missing data for large culverts effecting asset valuation information. This information will be reviewed and corrected as per Section 17; Improvement Plan.

3.3 Operational and Maintenance Processes

3.3.1 Asset Performance Data

Targets and Deficiencies: RAMM contains unreliable data relating to culvert inlet area which identifies large culverts and dictates their inspection and maintenance requirements. Correction of this issue will require on site validation of data, it is intended that this will be a requirement of future bridge inspection contracts.

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.

Currently boundary bridges are valued independently of neighbouring local authorities, this could result in distorted valuation figures if both authorities are valuing the entire asset rather than their respective portion. An item to align valuation figures between the authorities has been added to the improvement plan.

3.3.2 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 asset 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 program 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 asset 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 58 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.

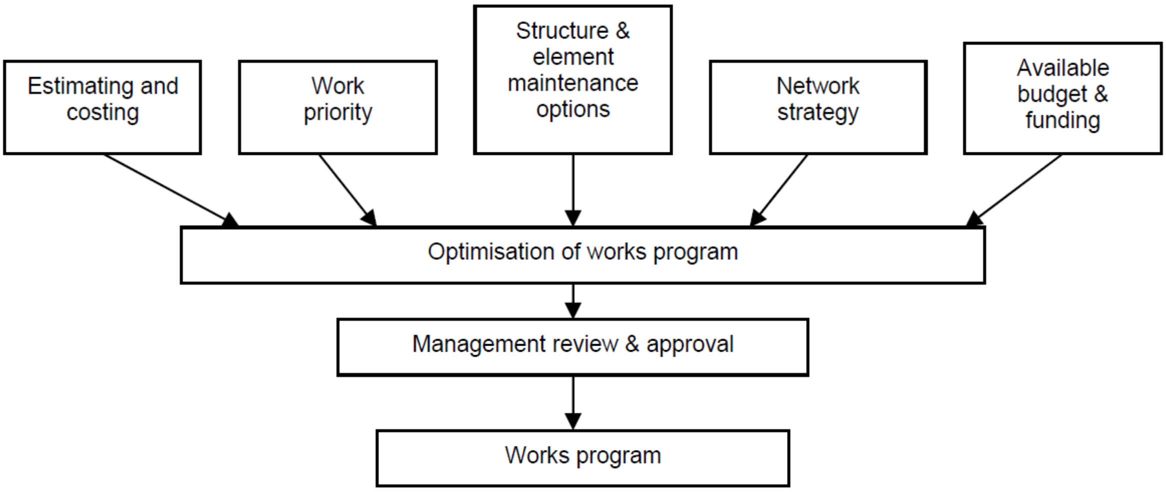


Figure 7: Elements associated with optimisation of the works program

3.3.3 Factors to be Considered in the Optimisation Process

Factors considered for the bridge works program 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 depicted in Figure 59 below showing components and main linkages in a comprehensive approach to bridge management.

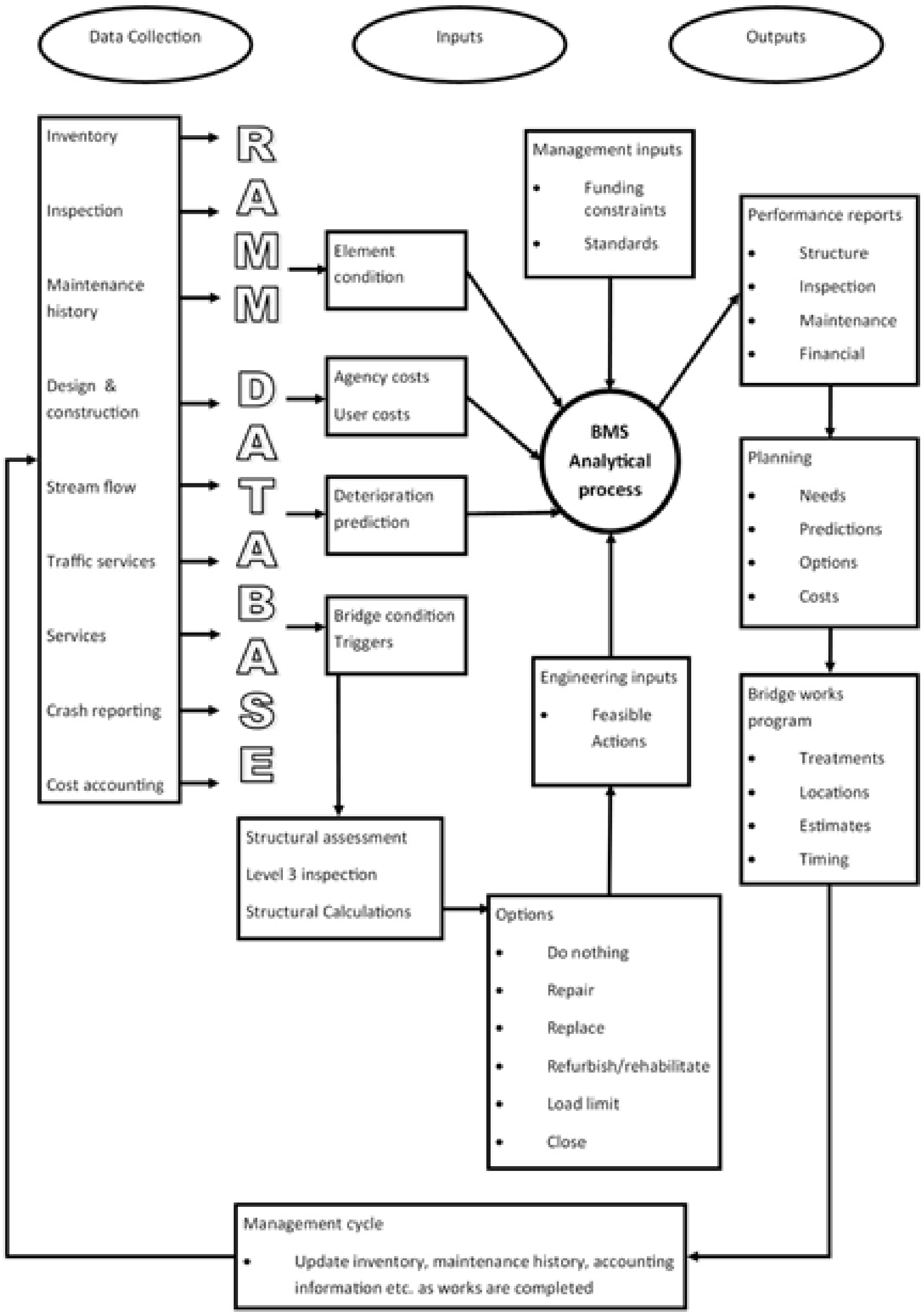


Figure 8: Framework showing components and main linkages of Council's Bridge Management System

3.3.4 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). See Figure 59 above.

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.

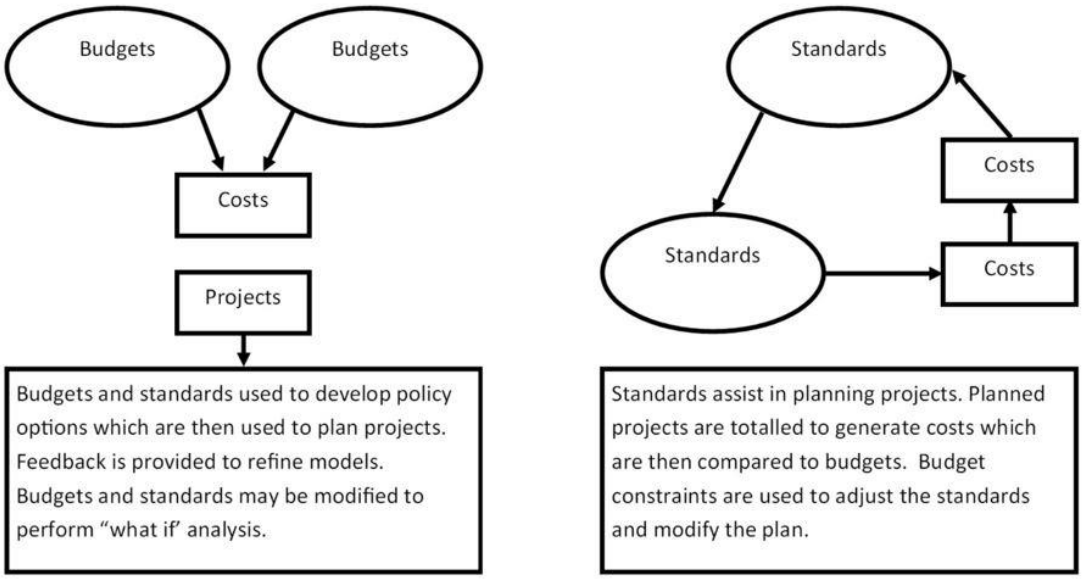


Figure 9: BMS

3.3.5 Maintenance Strategy

Scheduled bridge inspections are undertaken in accordance with NZTA 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; and
- 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 asset 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

3.3.6 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.

3.3.7 Maintenance Standards

- NZTA Bridge Inspection and Maintenance Manual
- Relevant New Zealand and other standards for design, construction and workmanship

3.3.8 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 NZTA 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.

The Pareto Chart below shows that 92% of the bridge stock is in a good to average condition.

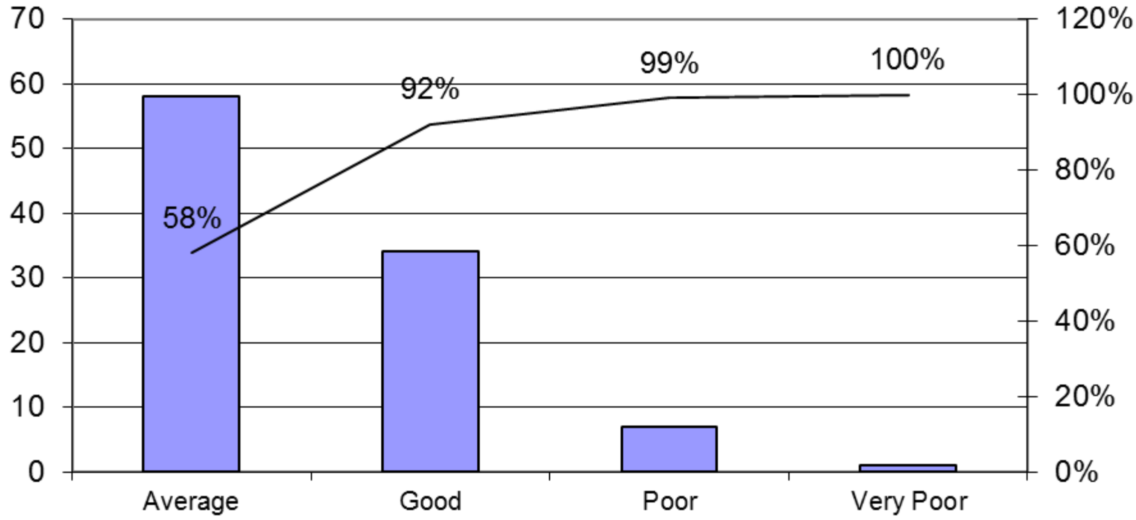


Figure 10: % Of Bridge Stock in Good to Average Condition

3.3.9 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.

3.3.10 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.

3.3.11 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.

In 2013, Rangitikei District Council undertook a review of all bridge structures to ensure they complied with the revised heavy vehicle weight limits. The table below summarises the restricted bridges located within the Rangitikei District. The nine Posted bridges were already identified and have pre-existing Class 1 restrictions, which remain in place.

Restricted Bridges				
Road Name	**Bridge Name**	**Construction Date**	**Length (m)**	**Acceptance of 50MAX**
Brandon Hall Rd	Brandon Hall	1958	38	No
Christopher's Rd	Public Trust (Suspension)	1963	43	Posted bridge
Colenso (Makino)	Colenso	1966	19	Posted bridge
Gorge Rd	Knights	1963	51	No
Mangamahu Rd	Whylies (BDY)	1955	80	No
Mangaohane Rd	Mangaohane	1979	90	No
Mangarere Rd	Mangarere (BDY)	1964	98	Posted bridge
Ongo Rd	Blundell's	1960	42	No
Otara Rd	Otara (BDY)	1962	108	No
Porewa Rd	Maungaraupi No. 2	1937	15	Posted bridge
Porewa Rd	Maungaraupi	1937	23	Posted bridge
Pungatawa Rd	Pungatawa	1959	31	No
Ruahine Rd	Mangaweka (BDY)	1898	139	Posted bridge
Scott's Rd	Scott's	1911	10	Posted bridge
Taihape-Napier Rd 2	Springvale	1970	88	No
Taihape-Napier Rd 2	Kurapapnga (BDY)	1961	59	No
Te Kapua Rd	Greens	1978	24	No
Te Moehau Rd	Moawhango	1955	42	No
Toe Toe Rd	Toe Toe	1962	81	No
Torere Rd	Taoroa	1956	32	No
Turakina Beach Rd	Cameron's	1961	35	No
Turakina Valley Rd 2	Mcleay's	1972	59	Posted bridge
	Mangara	1958	35	No
	Whareroa ½ Bridge	1975	34	No
Turakina Valley Rd 3	Concrete Ford	1959	42	No

Waikakahi Rd	Pokaka	1912	32	Posted bridge

Table 7: Restricted bridges located within the District

With a combined length of 1350 m these bridges comprise 34%of the total length of the bridge asset. Based on replacement cost they comprise 22% of the current valuation of bridge assets.

3.3.12 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.

In total there are 113 single lane bridges and large culverts owned by MDC. Thirteen of these are located on roads classified as distributors with the remainder on local Roads. The majority of these structures are located in the northern parts of the district and are predominantly on roads with very low traffic volumes. Notable exceptions are bridges S250B on Ruahine Road,S142A on Mangarere Road, S173 on Otara Road, S113 on Main South Road and S34 on Colyton Road, three of these single lane bridges have weight restrictions and all are listed as critical structures due to their locations.

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.

3.3.13 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.

3.3.14 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.

NZTA 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 NZTA 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.

NZTA have indicated that from 2012 bridge works of less than $250,000 are to be funded from the Minor Improvements budget. This will require a review of the priority of items to be funded from that budget.

Bridge renewal costs include the cost of the consents required for the bridge's construction.

3.3.15 Uneconomic Bridges

The NZTA, 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 NZTA "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 NZTA policy goes on to state: "On application, the [NZTA] 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.

3.3.16 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.

3.3.17 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 NZTA Work Category 322 –Replacement of Bridges and other structures and major components. Council's bridge renewal strategy prioritised 49 bridge renewals. There are no finalised replacement plans for any of these bridges, however, all 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.

3.3.18 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.

3.3.19 Development Strategy

Council will only consider constructing a significant new bridge if the project is subsidised by the NZTA.

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 NZTA's Economic Evaluation Manual. If prioritisation is required it will normally be by ranking projects in terms of the NZTA'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.

3.4 Retaining Walls

3.4.1 Lifecycle Management – An Overview

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 asset 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.

3.4.2 Overview of Assets Involved

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.

3.4.3 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.

3.4.4 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.

3.4.5 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 Oroua 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.

3.5 Renewal/Replacement Plan

No replacements are anticipated based on current knowledge.

3.5.1 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.

The Pareto Chart below shows that 95% of Retaining walls are in average or better condition.

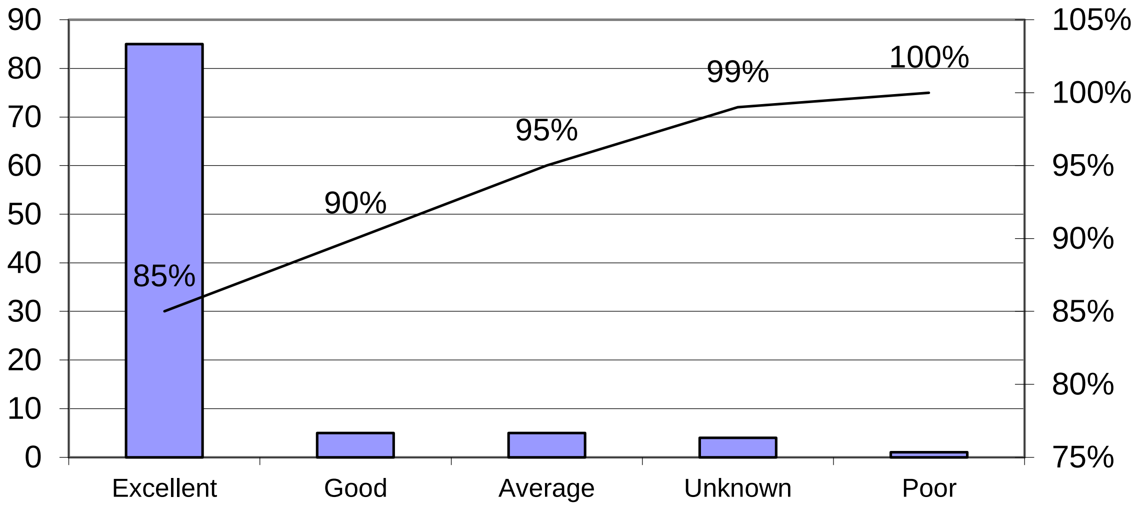


Figure 11: % of retaining walls in average or better condition

3.5.2 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.

3.5.3 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.

3.5.4 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.

3.5.5 Renewal Plans

There are currently no renewal plans in place.

3.6 Asset Improvement and Development Plan

3.6.1 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.

Appendix 4 Street Lighting

4.1 Lifecycle Management – An Overview

1 1 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.

2 2 Street lighting assets account for 0.5% of the total transportation asset group based on replacement cost.

3 3. 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.

4. Rangitikei District 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 NZTA.

2. The key issues relating to the management of street lighting are:

3. Specialist industry, most local authorities have limited in house knowledge forcing reliance on consultants and contractors.

4. Rampant technology means identifying opportunities for optimising street lighting power consumption and maintenance requirements can have benefits, which are quickly superseded. For example, the evolution of street lighting in New Zealand started with gas powered lanterns, moving to incandescent lamps, fluorescent tubes, mercury vapour lamps, high pressure sodium lamps (HPS) and currently LED technology – all these improvements were developed in the space of 60 years.

5. Reliance on the electricity network owner to maintain the street lighting power supply cables, network outages impact on council levels of service.

6. Lighting standards that reflect the intended use and road hierarchy;

7. The need for a development of a street lighting upgrade and renewal programme;

8. The impacts of any future overhead wiring undergrounding programmes; and

9. The effect of decorative urban street lights vested in the Council, by urban subdivision developers, on renewals and maintenance budgets.

10. 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. There is a significant increase in perceived personal safety occur when lighting is upgraded, particularly in high-risk areas.

11. NZTA's M30 "Specification and Guidelines for Road Lighting Design" and AS/NZS 1158 are the standards for managing the lighting network. AS/NZS 1158 Street Lighting series of standards 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.

12. The street light maintenance contract includes a scheduled lamp replacement programme where lamps are replaced at defined intervals based on lamp manufacturer's specifications, keeping the incidence of outages to a low level. Maintained in this way, the street lighting system has a high degree of reliability. Once LED's are implemented this program will be limited to any remaining HPS luminaries and under veranda lighting.

13. 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.

14. The majority of current lighting is HPS luminaires.

4.2 Overview of Assets Involved

The broad use of the term "street light" when referring to the asset includes the following three main components:

- Pole, this can be a utility network owned pole or a standalone street light pole
- 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.
- Luminaire, lighting unit which comprises of control gear and lamp

4.2.1 Ownership

Council owns the majority of the dedicated stand-alone street light poles, others are owned by NZTA 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 NZTA 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 NZTA 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 NZTA street lights can be separated, and so owners of other assets which are not maintained by Council, are easily identified.

4.3 Service Delivery and Rationale

4.3.1 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; and
    - 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.

4.3.2 Operational and Maintenance Processes

Maintenance Intervention Adjustments: The background to Maintenance Intervention Adjustments are detailed in the street light management contract.

4.4 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.

Scheduled replacement of lamps is carried out by the contractor based on the lamp manufacturers specification of expected lamp life. Manufacturers advise an expected failure rate of between 5% and 10% if lamps are left to run to 20,000 hours, which is approximately 5 years in service. It is considered that the policy of scheduled lamp replacement is more cost effective than responding to individual failures as they occur. This practice produces a more reliable and predictable level of service.

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; and
- The availability of replacement parts and fittings.

A forecast for street light renewals is not currently available, this is due to a lack of reliable construction date data for poles and luminaires. This problem is to be addressed as part of the MDC improvement plan.

4.4.1 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

Table 8: Asset condition grading

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 a satisfactory to excellent condition.

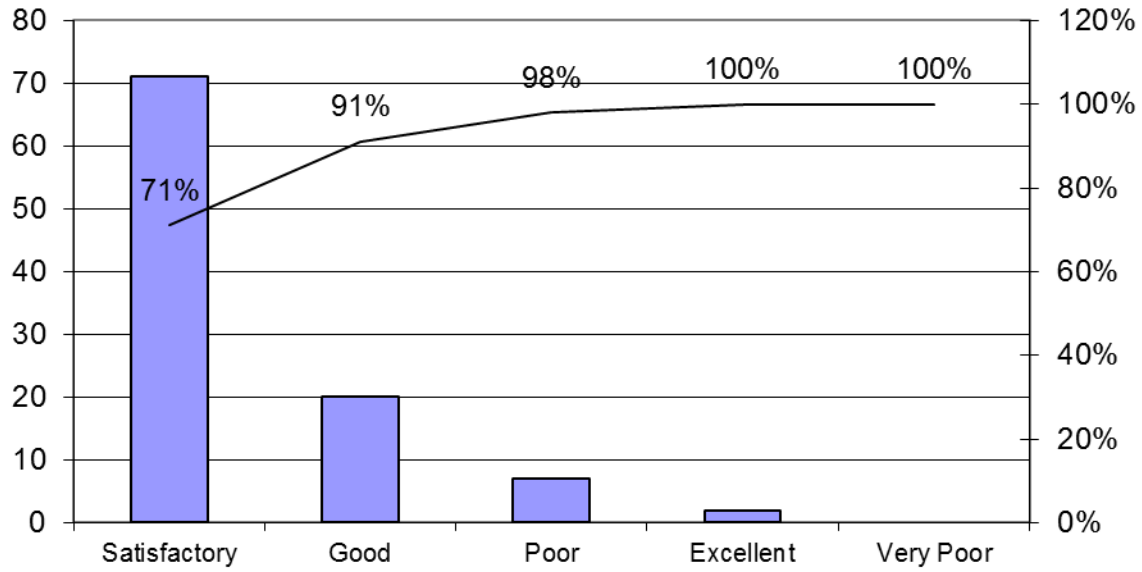


Figure 12: Condition of Poles, Luminaries and Brackets

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 UV light affects polycarbonate lenses reducing light output of luminaires, moisture causes the breakdown of electrical connections and components and acidic or wet ground conditions can accelerate corrosion of steel poles.

Light output of high pressure sodium 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.

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.

4.4.2 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 luminaires are maintained under Council's scheduled lamp replacement program, 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, however, rapidly emerging LED technology is likely to impact on future decisions.

The table below lists expected minimum expected life of the lamps that are used on the network.

Lamp Model	Quantity	Lamp Life to 5% Failure (Hrs)	Lamp Life (Approx Years)
100W High Pressure Sodium	231	17,000	4
100W Incandescent BC	5	1,000***	0
150W High Pressure Sodium	91	20,500	5
150W Metal Halide	4	5,000	1
20 LED at 525Ma	8	88,000*	20
250W High Pressure Sodium	8	20,500	5
250W Mercury Vapour ML	7	6,000	1
50W High Pressure Sodium	204	14,000**	3
65W Traffic Light	12	1,000***	0
70W High Pressure Sodium	1,080	17,000	4
Solar-powered LED	1	88000*	20

Table 9: Expected minimum life

* LED module, manufacturers specify 20 years minimum life expectancy with no reference to and percentage of expected failures within this timeframe.

** Lamps are included in the standard 4-year replacement program.

4.4.3 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 (e.g. CSP Oclyte) 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.

4.4.4 Expected Lives

Renewal of street lights is budgeted under NZTA Work Category 222 – Traffic Services in the Council's Land Transport Programme.

The expected lives of components are as follows:

- Luminaire – 20 years
- Lamp – 4 – 5 years
- Standard galvanised pole and bracket – 30 years
- Tough Coat galvanised pole – 50 years
- Concrete pole – 70 years

Revision of the default lives which are applied by RAMM is needed.. This is an item included in the improvement plan.

4.4.5 Deferred Renewals

There are currently no deferred renewals for street lighting assets.

4.5 Asset Improvement and Development Plan

4.5.1 Upgrade Process

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, and
    - 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.

4.5.2 Emerging Technology

The use of Light Emitting Diodes (LEDs) is becoming more prevalent 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.

The use of LED luminaires can reduce wattage consumed by equivalent HPS luminaries by at least two thirds in most cases. There is 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 following graph compares estimated lifecycle costs between a standard 70w HPS luminaire and a standard 22w LED luminaire. The initial capital cost is recovered in year six of an estimated 20 year lifecycle. Manufacturers normally advise conservative figures when specifying life expectancy, so savings may well extend past the 20-year mark if the luminaires are still performing adequately. Approximate lifecycle savings of $1500 per luminaire can be achieved.

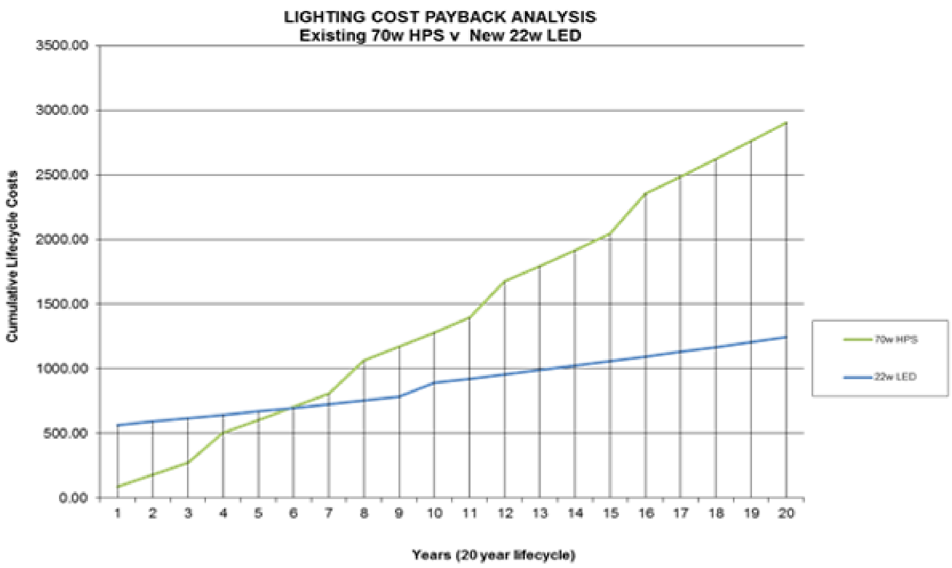


Figure 13: Lighting cost payback analysis

4.5.3 Development Strategy

The street lighting development strategy is to:

- Install lighting to improve road safety where a lighting problem is identified.
- Investigate bulk 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.

4.5.4 Development Standards

Light colour is an important consideration in selecting light fittings. Most luminaires in the district have HPS lamps installed. HPS lights emit light in narrow spectrum bands and, although they have enhancements to broaden their spectrum these are not entirely effective. Consequently, they do not render colours well, making recognition of objects harder or slower. Consideration is given to lights that produce white light in situations where colour perception is important, pedestrian crossings and access ways are an example of this situation.

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)
- 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 considered as an option in 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.

4.5.5 Management Programme

All lights, brackets and poles are maintained under Contract 1005 Street Light Maintenance by Alf Downs Street Lighting Limited. For economy and efficiency reasons, the contract includes the lights on urban state highways administered by NZTA and lights under stewardship by other council departments. The NZTA 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.

Lamps are changed at regular intervals under the scheduled lamp replacement as detailed previously. Council considers that this proactive approach is more effective and efficient than a reactive maintenance in which non-functioning lamps are replaced on an ad hoc basis when they fail.

Power for street lighting is based on the rated consumption of each light and the hours the lights are operating for, most streetlight circuits in the Rangitikei are metered so billing is accurate. This information is supplied under an agreement with the Energy provider and paid directly by the Council.

4.5.6 Proposed LED streetlight replacement program

The proposed LED streetlight replacement program was initially target areas in Marton as there were several large streetlight circuits which intermittently suffered from outages due to overloading. Installation of LED's have reduced the connected load and alleviated these issues.

The program continued through to 2018 in other areas of the district as the current renewal budget allowed. In 2018 progress will be re-assessed and specific funding may be sought through the 2018 – 2021 NZTA funding cycle.

Payback to replace the current 70w HPS luminaires with the selected 22w LED's is expected to be in year 6 of an estimated 20 year life.

Appendix 5 Traffic Services

5.1 Lifecycle Management – An Overview

Traffic Services assets consist of road signs, site rails, pavement markings, traffic islands and road edge markers, which all aid the safe and orderly movement of traffic and indicate road use restrictions or other information. A good standard of combined signage markings and delineation can contribute significantly to a safer road network.

The use and design of many traffic services assets 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.

5.2 Overview of Assets Involved

Due to the differing characteristics and maintenance requirements asset information is stored in different tables in the RAMM database.

The key issues relating to traffic services 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;
- 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.

5.2.1 Asset Description

Road Signs: 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; and
- Indicating other information of general interest to road users.

Sight and Guard Rail Systems: Two different types of sight and guard rails are in use with differing purpose.

- 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.

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.

There are approximately 8 kilometres of sight rail used throughout the District road network, with an average length of 10 metres. These are maintained by the road maintenance contractor on a regular basis. Details of all maintenance work carried out by the contractor on sight rails can be found in the asset condition section.

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.

There are approximately 1.4 kilometres of guard rail used throughout the District road network, with an average length of 25 metres. 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.

Pavement 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).
- Miscellaneous markings.

Basic detail on Road Markings is held in the RAMM database. However, as the annual road marking is work is tendered separately from other maintenance work it is easier 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 is captured.

Traffic Islands, Raised concrete and/or flush painted delineation: areas generally at intersection or in the centre of wide carriageways.

A traffic island is a solid or painted object in a road that clearly defines the separation of lanes to road users. It can also be a narrow strip of raised concrete island or road marking between lanes that intersect at an acute angle. They are also used to reduce the speed of vehicles crossing lanes through a junction.

If the island uses 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.

Traffic islands are often used at partially blind intersections on back-streets to prevent cars from cutting a corner with potentially dangerous results, or to prevent some movements totally, for traffic safety or traffic calming reasons.

5.3 Service Delivery and Rationale

5.3.1 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; and
- Response times to correct defects.

Painted pavement markings are remarked annually with this task being treated as a renewal item and managed under a separate Road Marking Contract. The use of a separate contract reflects this asset's more specialised needs in terms of plant, materials and required operator skills.

5.3.2 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.

5.3.3 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.

Pavement Marking: 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.

5.3.4 Asset Performance Data

Performance issues for signs and road markings 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 Rangitikei 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 and markings are installed or painted in accordance with MoTSAM, which in turn, complies with the requirements of the Traffic Control Devices Rule.

5.4 Renewal/Replacement Plans

Obsolete, damaged, sub-standard and non-conforming traffic service 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.

Repainting of all marking is carried out on a cyclic basis over a 12 month period using the NZTA 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.

5.4.1 Asset Condition

The condition of sight rails, traffic islands and road markings is assessed during routine inspections undertaken by the Contractor, with the results reported to Council. There is no formal condition rating system for these traffic services assets; condition is assessed both visually, and in accordance with the appropriate key performance indicators.

The extent of deterioration of road markings depends on age, traffic volumes, the materials used, the condition of the road when the markings were applied (oil and grit reduce adhesion) and the extent of bitumen bleeding in summer.

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.

Markings and 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.

The Pareto Chart below shows that 95% of sight rails, traffic islands and road markings are in a Satisfactory to excellent condition.

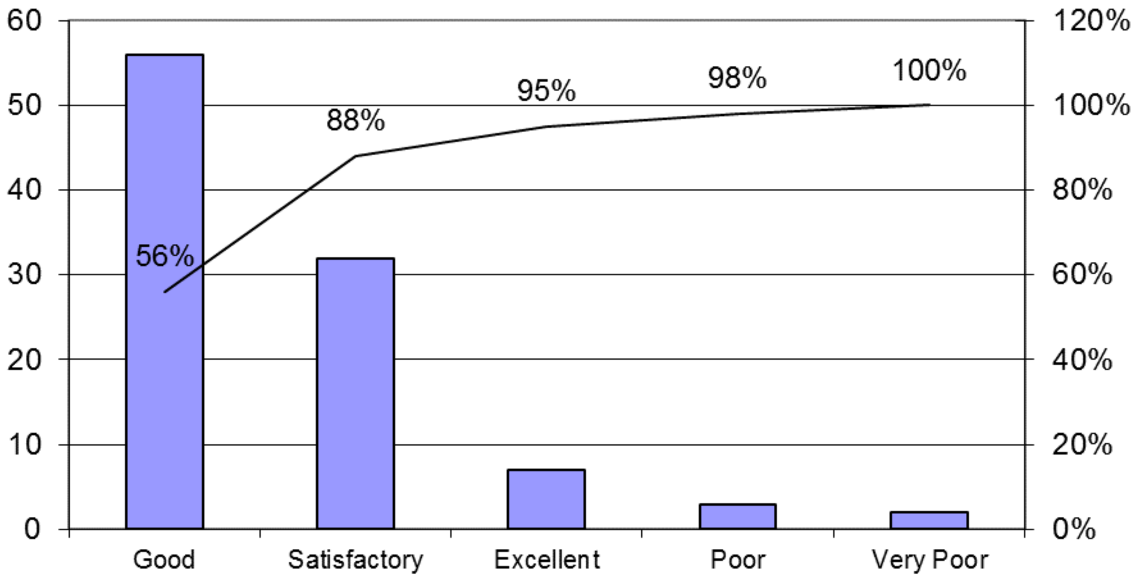


Figure 14: Condition % of sight rails, traffic islands and road markings

5.4.2 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.

5.4.3 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.

Appendix 6 Footpaths

6.1 Asset Description

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.

Locality	Length (m)	Proportion (%)
Bulls	12,850	14
Hunterville	3,569	4
Koitiata	60	< 1
Mangaweka	1,028	1
Marton	44,585	50
Ratana	2,473	3
Rural Hunterville	253	< 1
Taihape	15,038	17
Turakina	5,227	6
Whangaehu	1,047	1
Other Rural Areas	1,864	2

Table 10: Asset Locations

6.2 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; and
- 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

6.3 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; and
- Aesthetics (e.g. minor water ponding/untidy appearance).

6.3.1 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.

6.3.2 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; or
- 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; or
- Resealing with bitumen and chip or slurry on existing chip seal; or
- Resurfacing with asphaltic concrete on existing chip seal; or
- 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; and
- Likelihood of accelerated deterioration

6.3.3 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.

6.3.4 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.

6.3.5 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.

6.3.6 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

6.3.7 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.

6.3.8 Forecast Footpath Surface Condition

The data collected for RAMM on footpaths can indicate 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.

6.4 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.

6.4.1 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.

6.4.2 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 NZTA 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.

6.5 Management Programme

6.5.1 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.

6.5.2 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.

Appendix 7 Environmental Management

7.1 Stock Crossing/Droving

Stock droving is permitted on roads within the Rangitikei District but it must comply with the requirements of the Rangitikei District Council Bylaw 2013. 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 law was created to:

- Improve road safety.
- Reduce damage caused to the road, road reserve and vehicles due to stock droving, excrement and mud.

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, the Council has had to balance the needs and rights of the respective road users in a fair manner.

7.1.1 Consents

Consents are required for regular or one-off movement of stock on arterial, collector and strategic roads. The movement of dairy cows on or across any road for milking requires the written consent of the Council.

There are numerous consents granted for droving of stock across or along roads within the District. The majority of these consents are for droving dairy cows directly across roads for milking purposes. Several of those consents are for regular droving of cattle/sheep on significant roads within the District. These consents were all issued in accordance with the Rangitikei District Council Bylaw 2013.

7.1.2 Maintenance

Stock droving consent holders are required to maintain all stock crossing points, vehicle crossings, road verges and gateways to the satisfaction of the Council. The consent states:

Consents for the regular droving of dairy cows directly across roads require the farmers to take all reasonable and practicable steps to clean, scrape or sweep the road. It is also recommended in the Council Bylaw that protective matting is used to protect the road surface from stock damage.

7.1.3 Underpasses

There are a number of stock underpasses in the District, these are constructed to an agreed standard and each required a building consent before construction commenced. Upon completion of an underpass's construction, it is inspected by a Council Engineer who must approve the structure before the Code Compliance Certificate is issued. Council Policy also 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 dairying operations that were in existence prior to 1 August 2002. Specific details regarding stock underpasses and other subsidies are also detailed in Council Policy.

A stock underpass is generally considered for construction if:

- It is technically possible.
- Average traffic volume of the road is greater than 1,000 vpd.
- Council considers it beneficial to other road users.

To date, the Council has not relied on any funding assistance that may have been available from the NZTA through the Subsidised Land Transport Programme. By fully funding its contribution to underpasses, the Council avoids the funding and other constraints required by the NZTA. This makes negotiations with farmers easier and allows encouragement of the timely installation of an underpass with the minimum of “strings attached”, which may otherwise jeopardise an agreement.

An Improvement Plan task has been included to examine how subsidised funding maybe utilised by the Council for the maintenance and cost sharing of stock crossing facilities in accordance with the NZ Transport Agency’s policy detailed at clause F10.6 – Stock Crossings in its Planning, Programming and Funding Manual.

7.1.4 Programme

There is no forward works programme for stock crossings in the District. The funding of contributions towards stock crossing facilities is included in the Non Subsidised Forecasts in this plan’s financial summaries detailed in section 11 – Financial Summary of this Plan.

7.2 Cattle Stops

There are several cattle stops within the Rangitikei road network used to maintain stock within boundaries. They are classified as structures lying under a right to occupy the road reserve, but they are not Council assets. The farmer or landowner carries the cost of construction, maintenance and disposal of these structures.

7.3 Fords

There is one Ford within the Rangitikei District on Mangaohane Road, north east of Taihape. It is constructed from a reinforced concrete deck, sitting only 200–300 mm above the water level, cast on top of four small culvert pipes.

It is considered a Council asset and maintained to the same standards as a bridge or large culvert crossing. The road maintenance contractor regularly inspects the surface deck of the ford and will occasionally close this unsealed road, which joins directly off Taihape-Napier Road, when heavy rainfall causes the river level to rise above the level of the deck.

7.4 Litter, Detritus and Street Cleaning

7.4.1 Street Cleaning

The street cleaning activity covers the inspection, reporting, programming and cleaning of all urban kerb and channel (including State Highways through townships), sump tops, property access culverts and slot crossings. It involves the removal of all unsightly items including, litter, leaves, detritus, waste, road kill etc. up to a limit of 40 kg.

The Road Maintenance specification for street cleaning. The performance measures pertaining to this work are specified as follows:

- Kerb and Channel (flat, dish and shallow dish) – There shall be no litter/debris left in the channel immediately after the cleaning operation.
- Sumps (all channel types) – There shall be no litter/debris blocking sump gratings immediately after the cleaning operation.
- Covered Channel (all types) – There shall be no litter/debris remaining under portions of covered channel as to create blockages that would otherwise impede drainage, immediately after cleaning operation.
- Mountable Kerb in Carriageway – There shall be no loose material left on the carriageway within 300 mm of the edge of the kerb immediately after the cleaning operation.
- If litter/debris in the channels cannot be removed by normal cleaning methods, the Contractor shall loosen the matter by other means, without damage to the channel, prior to removal and disposal.
- The works are to be completed in accordance with the specified frequencies and as scheduled by the Contractor's programme.

Cleaning is done on a cyclic basis with the frequency based on the historic needs, which are regularly reviewed, to reflect demands and the need to keep the channels clear. These frequencies vary from weekly in townships to six monthly on rural roads. Extra cleaning is done on an as needed basis during heavy rain events, leaf fall, outside shops that require extra rubbish removal and areas that get a regular build-up of debris.

Cleaning is carried out 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, areas with berms and trees in front of the channel and those that have channel covers or slotted channels at entranceways.

A proportion of funding for this work is budgeted under the New Zealand Transport Agency (NZTA) Work Category – Street Cleaning in the Council's Land Transport Programme. The forecast costs of street cleaning is summarised in Section 13 – Financial Summary. The details include the funding necessary for street cleaning in both the subsidised and non-subsidised portions of the financial forecasts.

7.4.2 Detritus

The road maintenance contactor routinely removes surface detritus during monthly inspections of the District. It can be defined as a collection of fragments or material on a sealed surface or water channel including loose chip and aggregate. This can also include:

- Material that impedes the efficient operation of existing drainage.
- Vegetation cuttings.
- Dead animals.
- Loose aggregate or leaves.
- Broken glass.
- Silt and small weed growth in channels.

Locations of sealed surfaces include the following:

- Road carriageways and sealed shoulder areas.
- Cyclist zones and lanes.
- Footpaths.
- Drainage channels (lined or unlined).

7.4.3 Abandoned Vehicles

The road maintenance contractor is responsible for notifying the Council of any abandoned vehicles and having them removed by a suitable means. This work is subsided under the NZTA work category - environmental maintenance.

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.

7.5 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.

Sealed and Unsealed Shoulders

Vegetation height is maintained in accordance with the contract specifications for the category of road.

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.

Bridge End Markers

The area surrounding bridge end markers at bridge abutments is to be treated to ensure clear driver visibility of the markers.

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.

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.

Kerb and Channel, Road Furniture, Fencelines, Footpaths and Paved Areas

Any vegetation encroaching on, over, or around the kerb face, street and road furniture, or along unmaintained fencelines, 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.

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.

7.5.1 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.

7.5.2 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 NZTA 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

7.6 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.

Appendix 8 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

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

d) 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.

Appendix 9 Frequency Of Inspections And Response Times For Works

9.1 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.

9.2 Network Inspections

9.2.1 Contractor's Regular inspections

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

9.2.2 Culvert and stormwater structures inspections

Road Classification	Frequency
All roads	Annually

9.2.3 Bridge Inspections

Road Classification	Frequency
All roads	Annually

9.2.4 Night Time Inspections

Road Classification	Frequency
Arterial	Annually
Primary Collector	Annually
Secondary Collector	2 Yearly
Access	3 Yearly
Low Volume	4 Yearly

9.2.5 Final Inspection

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

9.3 Response Times

9.3.1 Crash Reports

Road Classification	Response Time
All roads – initial report	24 Hours
All roads – detailed report	14 Days

9.3.2 Incident Response

Road Classification	Response Time
All roads – Initial/single response	2 hours
All roads – commence work	As agreed with the Engineer

9.3.3 Surface Defects – Sealed Roads

Road Classification	Response Time
All roads – Bleeding bitumen	Refer MS4
All roads – Other defects	As per the approved programme

9.3.4 Digouts – Sealed Roads

Road Classification	Response Time
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

9.3.5 Deformation – Sealed Roads

Road Classification	Response Time
All roads	As per approved programme

9.3.6 Edge Break – Sealed Roads

Road Classification	Response Time
All roads	As per approved programme

9.3.7 Service Covers – Sealed Roads

Road Classification	Response Time
All roads	As per approved programme

9.3.8 Unsealed Shoulders – Sealed Roads

Road Classification	Response Time
All roads	As per approved programme

9.3.9 Barrier Repairs – All Roads

Road Classification	Response Time
All roads – Removal of offensive graffiti	1 Hour
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	As per approved programme
All roads – other defects	As per approved programme
All roads – new installations	As per approved programme

9.3.10 Vegetation Control – All Roads

Road Classification	Response Time
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

9.3.11 Potholes – Sealed Roads

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

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

Road Classification	Response Time
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)

9.3.13 Street Cleaning, Litter, Graffiti and Detritus Removal – All Roads (continued)

Road Classification	Response Time
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

9.3.14 Drainage Systems – All Roads

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

9.3.15 Roadmarking – Sealed Roads

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

9.3.16 Maintenance – Unsealed Roads

Road Classification		Response Time
	Pothole Repairs:	
All roads – areas with multiple potholes		2 Days

All roads – isolated potholes		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
	Or for all roads – 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

9.3.17 Footpaths – All Roads

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

9.3.18 Kerb and Channel – All Roads

Road Classification	Response Time
All roads	As per approved programme

9.3.19 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

9.3.20 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 Pohangina and Cheltenham, as agreed with the Engineer) – 28 February Southern Area (all other roads)– 31 March
Completion Report	30 April

9.4 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

Fault	Level of Service	Response Time
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 1 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 1 Pavement defects with the potential to deteriorate rapidly under traffic loading and/or adverse weather – within 5 working days of identification 1 Pavement defects with the potential to deteriorate over the next 30 days – within 30 working days of identification.
Surface 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: 1 Edge rutting exceeding 30 mm in depth 2 Potholes exceeding 200mm in diameter or 35mm in depth 3 Deviation from the widths and crossfalls of the shoulders, feather edges, and tapers 4 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	The Contractor shall inspect all sites and programme the necessary work to

Fault	Level of Service	Response Time
	200mm in diameter on an unsealed road.	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.