Mackenzie District Council

Activity Management Plan

Transportation

2018-2028

MACKENZIE DISTRICT COUNCIL

ACTIVITY MANAGEMENT PLAN FOR TRANSPORTATION

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Mayor (on behalf of Councillors)

Document No

File No .....

UPDATE REGISTER

Number	Date	Description of Update	Updated by
Version 3	April 2009	Revision of the second AMP produced by MDC	Opus International Consultants
Version 4	30 November 2011	Full update to Version 3 Draft	Opus International Consultants
Version 5	19th January 2015	Full Review of Lifecycle management resulting in significant changes, focusing on Sealed road resurfacing and unsealed road re-metalling, partial review of the remaining document resulting in updates	Bernie Haar, Asset Manager, Mackenzie District Council
Version 6	July 2016	Full review and update of Version five to reflect ONRC measures and problem statements. Make necessary amendments to life cycle sections.	Scott McKenzie Roading Manager, Mackenzie District Council

Contents

The following terms and acronyms (in brackets) are used in this Plan.

ACCRUAL ACCOUNTING

The recognition of revenues as they are earned and expenses as they are incurred.

ANNUAL PLAN

A document produced annually by an organisation to inform stakeholders of its objectives, intended activities, performance, income and expenditure required for a period of one financial year. It may also indicate anticipated future short-term income and expenditure

ASSET

A physical component of a facility, which has value, enables services to be provided and has an economic life of greater than 12 months. Dynamic assets have some moving parts, while passive assets have none.

ASSET MANAGEMENT (AM)

The combination of management, financial, economic, engineering and other practices applied to physical assets with the objective of providing the required level of service in the most cost-effective manner.

ACTIVITY MANAGEMENT PLAN

A plan developed for the management of one or more infrastructure assets that combines multidisciplinary management techniques (including technical and financial) over the lifecycle of the asset in the most cost-effective manner to provide a specified level of service. A significant component of the plan is a long-term cash flow projection for the activities.

ASSET MANAGEMENT STRATEGY

A strategy for asset management covering the development and implementation of plans and programmes for asset creation, operation, maintenance, rehabilitation / replacement, disposal and performance monitoring to ensure that the desired levels of service and other operational objectives are achieved at optimum cost.

ASSET REGISTER

A record of asset information considered worthy of separate identification including inventory, historical, financial, condition, construction, technical and financial information about each.

BENEFIT-COST RATIO (B/C)

The sum of the present values of all benefits (including residual value, if any) over a specified period, or the lifecycle, of the asset or facility, divided by the sum of the present value of all cost.

CAPITAL EXPENDITURE (CAPEX)

Expenditure used to create new assets or to increase the capacity of existing assets beyond their original design capacity or service potential. CAPEX increases the value of asset stock.

COMPONENTS

Specific parts of an asset having independent physical or functional identity and having specific attributes such as different life expectancy, maintenance regimes, risk or criticality.

CURRENT REPLACEMENT COST

The cost of replacing the service potential of an existing asset, by reference to some measure of capacity with an appropriate modern equivalent asset.

DEFERRED APPROACH

The shortfall in rehabilitation work required to maintain the service potential of an asset.

DEPRECIATED REPLACEMENT COST (DRC)

The replacement cost of an existing asset less an allowance for wear or consumption having regard for the remaining economic life of the existing asset.

DEPRECIATION

The wearing out, consumption or other loss of value of an asset whether arising from use, passing of time or obsolescence through technological and market changes. It is accounted for by the allocation of the cost (or revalued amount) of the asset less its residual value over its useful life.

DETERIORATION RATE

The rate at which an asset approaches failure.

DISPOSAL

Activities necessary to dispose of decommissioned assets.

ECONOMIC LIFE

The period from the acquisition of the asset to the time when the asset, while physically able to provide a service, ceases to be the lowest cost alternative to satisfy a particular level of service. The economic life is at the maximum when equal to the physical life; however obsolescence will often ensure that the economic life is less than the physical life.

FACILITY

A complex comprising many assets (e.g. a hospital, water treatment plant, recreation complex, etc.) which represents a single management unit for financial, operational, maintenance or other purposes.

FINANCIAL STATEMENTS

Balance sheets, profit and loss accounts, statements of changes in financial position, notes another statements which collectively are intended to give a true and fair view of the state of affairs and profit or loss for an entity for a defined period.

GAP ANALYSIS

A method of assessing the gap between a business's current asset management practices and the future desirable asset management practices. Also called needs analysis or improvement planning.

INFRASTRUCTURE ASSETS

Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components. The network may include normally recognised ordinary assets as components.

LEVELS OF SERVICE

The defined service quality for a particular activity (i.e. roading) or service area (i.e. street lighting) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost.

LIFE

A measure of the anticipated life of an asset or component; such as time, number of cycles, distance intervals etc.

LIFECYCLE

The cycle of activities that an asset (or facility) goes through while it retains an identity as a particular asset i.e. from planning and design to decommissioning or disposal.

LIFECYCLE COST

The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, rehabilitation and disposal costs.

LIFECYCLE COST ANALYSIS

Any technique which allows assessment of a given solution, or choice from among alternative solution, on the basis of all relevant economic consequences over the service life of the asses

MAINTENANCE

All actions necessary for retaining an asset as near as practicable to its original condition, but excluding rehabilitation or renewal. Fixed interval maintenance is used to express the

maximum interval between maintenance tasks.

On-condition maintenance is where the maintenance action depends upon the item reaching some predetermined condition.

MAINTENANCE PLAN

Collated information policies and procedures for the optimum maintenance of an asset or group of assets.

MAINTENANCE STANDARDS

The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practise, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives.

ONE NETWORK ROAD CLASSIFICATION

(ONRC) is a classification system, which divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available:

- National
- Arterial
- Regional
- Primary collector
- Secondary collector
- Access

Classification of New Zealand's roads using the ONRC was completed in 2013.

The ONRC is the primary tool developed through REG to enable operational and culture change in road activity management. It facilitates a customer-focused, business case approach to budget bids for the National Land Transport Programme.

OPERATION

The active process of utilising an asset, which will consume resources such as manpower, energy, chemicals and materials. Operation costs are part of the lifecycle costs of an asset.

OPTIMISED DEPRECIATED REPLACEMENT COST (ODRC)

The optimised replacement cost after deducting an allowance for wear or consumption to reflect the remaining economic or service life of an existing asset. ODRC is the surrogate for valuing assets in use where there are no competitive markets for assets, or for their services or outputs.

PERFORMANCE MONITORING

Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.

PLANNED MAINTENANCE

Planned maintenance activities fall into three categories:

- Periodic – necessary to ensure the reliability or to sustain the design life of an asset.
- Predictive – condition-monitoring activities used to predict failure.
- Preventive – maintenance that can be initiated without routine or continuous checking (e.g. using information contained in maintenance manuals or manufacturers' recommendations) and is not condition based.

REHABILITATION

Works to rebuild or replace parts or components or an asset, to restore it to a required functional condition and extend its life, which may incorporate some modification. Generally involves repairing the asset to deliver its original level of service (i.e. heavy patching of roads, slip-lining of sewer mains, etc.) without resorting to significant upgrading or renewal, using available techniques and standards.

RENEWAL

Works to upgrade refurbish or replace existing facilities with facilities of equivalent capacity or performance capability.

REMAINING ECONOMIC LIFE

The time remaining until an asset ceases to provide the required service level or economic usefulness.

REPAIR

Action to restore an item to its previous condition after failure or damage.

REPLACEMENT

The complete replacement of an asset that has reached the end of its life, so as to provide a similar or agreed alternative, level of service.

REPLACEMENT COST

The cost of replacing an existing asset with a substantially identical new asset.

RESIDUAL VALUE

The net market or recoverable value that would be realised from disposal of an asset or facility at the end of its life.

RISK MANAGEMENT

The application of a formal process to the range of possible values relating to key factors associated with a risk in order to determine the resultant ranges of outcomes and their probability of occurrence.

ROAD ASSESSMENT MAINTENANCE MANAGEMENT SYSTEM (RAMM)

The computerised road maintenance management software system developed by Transit New Zealand for use nationally by all New Zealand road asset managers.

ROUTINE MAINTENANCE

Day-to-day operational activities to keep the asset operating (replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which form part of the annual operating budget, including preventive maintenance.

SERVICE POTENTIAL

The total future service capacity of an asset. It is normally determined by reference to the operating capacity and economic life of an asset.

STATEMENT OF FINANCIAL PERFORMANCE

A report on the net surplus/deficit, and its components, arising from activities or events during a given period, that is significant for the assessment of both past and future financial performance.

STRATEGIC PLAN

A plan containing the long-term goals and strategies of an organisation. Strategic plans have a strong external focus, cover major portions of the organisation and identify major targets, actions and resource allocations relating to the long-term survival, value and growth of the organisation.

UNPLANNED MAINTENANCE

Corrective work required in the short-term to restore an asset to working condition so it can continue to deliver the required service or to maintain its level of security and integrity.

USEFUL LIFE

May be expressed as either:

- The period over which a depreciable asset is expected to be used, or
- The number of production or similar units (i.e. intervals, cycles) that is expected to be obtained from the asset.

VALUATION

Assessed asset value, which may depend on the purpose for which the valuation is required, i.e. replacement value for determining maintenance levels, market value for lifecycle costing and optimised deprival value for tariff setting.

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This Activity Management Plan (AMP) for Roading has been developed to provide the Mackenzie District Council with a long term management tool for the road asset. It sets out the current asset condition, what issues are currently and likely to impact on the asset and the costs associated with maintaining, operating, renewing, developing and disposing of the asset. The Strategic & Programme Case Document, prepared as part of the application for NZTA funding in 2017, adds to this content as part of the Road Efficiency Group work to support NZTA funding bids.

In terms of population, the Mackenzie District is the third smallest territorial authority in New Zealand with a normally resident population of approximately 4,300, with limited growth. In contrast to its small population, the area of the District is large, comprising 745,562 hectares. Fairlie, Lake Tekapo and Twizel are the main towns and there are villages at Albury, Kimbell, Burkes Pass and Mount Cook.

The District is severed by State Highways, which form the back bone of the network. Together the State Highway network, connect the district demographics and have resulted in a relatively large lowly trafficked network.

1.2 PURPOSE OF TRANSPORTATION ACTIVITY MANAGEMENT PLAN

The purpose of this AMP is to provide a tool combining management, planning, financial, engineering and technical practices to ensure that the level of service required by customers is provided at the lowest long term cost to the community. The plan is intended to demonstrate to customers that Council is managing the assets responsibly and that they will be regularly consulted over the price/quality trade-offs resulting from alternative levels of service.

1.3 PLAN LEVEL

Council considers the required sophistication of their plan in the short to medium term need not progress beyond a “Core+” planning level, which would be classed as intermediate under IIMM as:

- the cost at this time to move to an advanced plan would provide little significant benefit to Council or its’ customers
- the size, complexity and use of the assets is consistent with a rural sparsely populated district
- the risks associated with failure are low

This AMP is one of the Council’s suite of plans that together describe the services and workload that the community sees as important for the Council to provide and sustain. They outline the basic methodologies Council will use to achieve the strategic objectives promoted in the Council LTP 2018 - 2028 and thus move towards achieving the “outcomes” and the citizens’ “vision” of the society they wish to be a part of.

1.4 SCOPE OF ACTIVITY MANAGEMENT PLAN

This revision provides a full update to Version 6 of the AMP originally produced by Mackenzie District Council's consultants, at version 1 and considerably reviewed and updated to version 6 by Council Staff. It provides a medium to long term indication of asset management requirements and specific work programmes over the planning period from 1 July 2018 to 30 June 2028.

The plan will continue to be periodically reviewed to incorporate, as appropriate new asset information and improved knowledge of customer expectations. The objective is to optimise life cycle asset management activities and provide a greater degree of confidence in financial forecasts.

1.5 TRANSPORTATION ASSET MANAGEMENT ACTIVITY

Council is responsible for the management of road assets with an optimised depreciated replacement cost of $94,070,517 (July 2016 valuation). For 2018/19 Council has budgeted to spend $3.5M on maintaining, operating and renewing these assets (including staff and overhead costs).

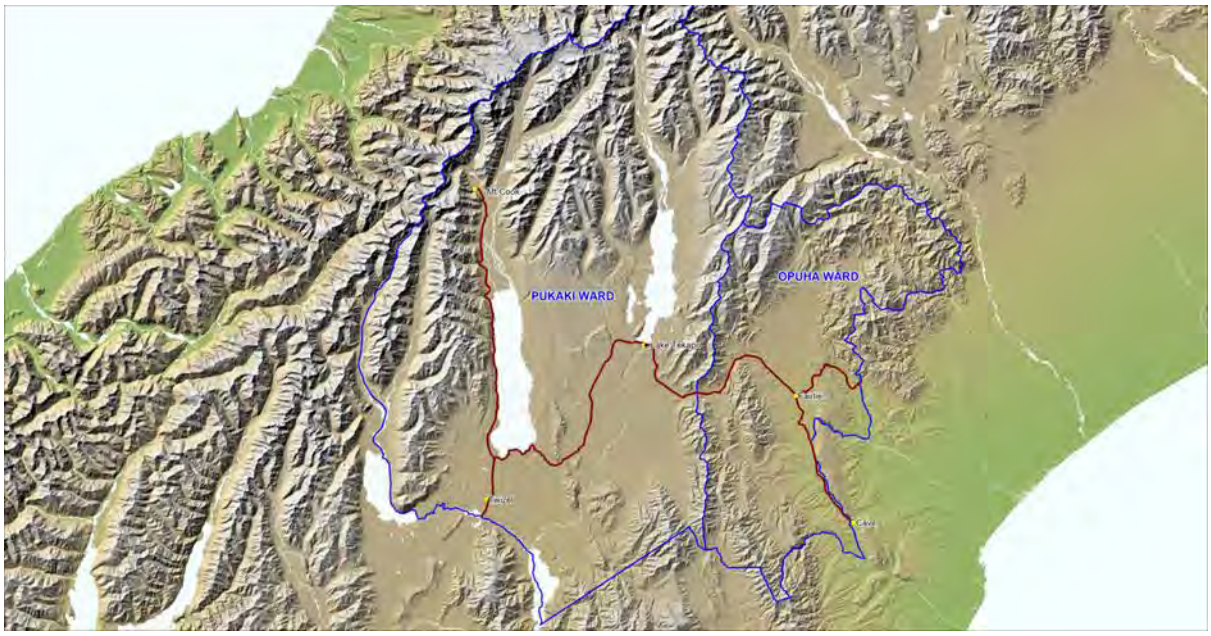
The following list summarises the Transportation Asset Management activities:

- Asset Management
- Safety Management
- Road Maintenance
- Road Data Management
- Project Management
- Environmental Management
- Network Inspections
- Legislative Compliance Management
- Network Management
- Customer Management

1.6 ASSET DESCRIPTION

1.6.1 Location

Figure 1: Map of the Mackenzie District



The Mackenzie District is bounded in the north and east by the Timaru and Waimate Districts, in the south by the Waitaki District and to the West by the Southern Alps/ Westland District boundary. There are two wards: Pukaki which in effect takes in the Mackenzie Basin and Opuha being the remaining area to the west of a line following the upper reaches of the Hakataramea River through Burkes Pass to Mt Musgrove in the Two Thumb Range.

The backbone of the roading network in the district is provided by the following State Highways which are the responsibility of the New Zealand Transport Agency (NZTA).

- State Highway 8 — Timaru - Fairlie - Lake Tekapo - Twizel - Omarama
- State Highway 79 — Fairlie - Geraldine
- State Highway 80 — Twizel - Mt Cook Village

The Mackenzie District roading consists of a network of "Principal" and "Local" roads leading from the state highways to many remote localities and providing convenient access in and around the three main urban centres of Twizel, Lake Tekapo and Fairlie (Mt Cook Village is administered by the Department of Conservation). The network is predominantly rural (93%), unsealed (72%) and with light average daily traffic volumes (less than 500 vehicles per day).

1.6.2 The Asset

The transport asset includes all Council owned road reserve, roads, streets, bridges, footpaths and related infrastructure within the District as shown in Table 1.

Table 1: Transportation assets included in this plan

Asset Description	Sub-Asset Description	Quantity
Land		1,395Ha
Roads	All roads	732.19km
	Urban - Sealed	50.07km
	Urban - Unsealed	5.12km
	Rural - Sealed	163.3km

Asset Description	Sub-Asset Description	Quantity
	Rural - Unsealed	513.65km
Footpaths		59km
Drainage	Culverts	18.07km
	Catch Pits	309
	Side Drains	16.1km
	Soak Pits	40
	Earth Surface Water Channel	739.97
	Kerb and Channel	63.8km
Bridges	Bridges - Timber	7
	Bridges – Other (Including 7 large Box Culverts)	88
	Cattle stops	58
	Concrete Fords	20
Signage	Signs	3342
	Posts	1145
Lighting	Lanterns (include brackets)	791
	Columns	696
Features (gates, Intersections, Monuments, stockpile sites)		164

Unformed roads are not included except in the land area.

1.7 KEY STAKEHOLDERS AND CUSTOMERS

1.7.1 Key Stakeholders

The Council as the ultimate owner of assets and the Crown (through Ministry of Transport financial assistance) wish to ensure that their investment is secure and that the operational capability of the network is ensured. The Crown entity established to manage Transportation activities is the NZ Transport Agency (NZTA). Other key stakeholders of the roading network include:

- Regional council
- Owners and operators of inter-connecting or co-located networks, including NZTA state highways
- Significant representative user-groups such as Road Transport Association (RTA)

1.7.2 Funding

Funding is provided by several parties and in particular the following are significant contributors:

- NZ Transport Agency – The District Transportation Programme is financially assisted by NZTA in accordance with operational requirements set out in NZTA Programme and Funding Manual.
- Ratepayers – Rates provide funding for non-subsidised activities and the Council's share of subsidised works.

Funding Assistance rates are one tool within the land transport system that the New Zealand Transport Agency uses which:

- Assists local government (and other approved organisations) and the NZ Transport Agency to work together to achieve:
- optimal national land transport outcomes within their combined financial resources, and
- an integrated and appropriately consistent land transport network throughout the country, and
- Enables the costs of the land transport network to be shared appropriately between direct land transport system users and local communities.

Funding assistance is not a subsidy, but part of a co-investment system that recognises there are both national and local benefits from investing in the land transport system.

Prior to 30 June 2014 Council received a financial assistance rate of 53% for maintenance works and 63% for capital improvements until 30 June 2015. From that time the normal FAR rate for Council will be 51%.

There will be a transition period where Council's FAR will start at 52% reducing by 1% per annum until the base is reduced to 51%. This rate will apply from the first year of the 2018 LTP period and be the same for maintenance works and capital improvements.

It also should be noted that generally the funding allocation over the last nine years has been held at a level that was not adjusted to match inflation. The Financial assistance has been falling behind the actual needs for some years.

Customer Groups

Council's customers fall into three different groups: associated service providers, users and the wider community. These are detailed in Table 2.

Table 2: Council's Roading Customer Groups

Customer Group	Description	Customers
Associated Service Providers	These are other service providers who rely on the transportation network	• Contractors • Utilities service providers – use the road corridor to access their assets • Transport operators • Emergency Services
Users	Those who directly use the service	• Private drivers • Commercial road users • Drivers of public and other transport services (e.g. tourist buses) • Pedestrians and cyclists
The Wider Community	Non-users that are affected if the service is not provided	• Citizens • Tourists • Residents who live beside the roads

Customer Group	Description	Customers
		• Local businesses – requiring access

Other Parties
Other parties with an interest in Council's AMP include Council employees, consultants and contractors who manage and work on the asset.

1.8 COUNCIL LEVEL OF SERVICE

Council's current and target levels of service as to be consulted on in the 2018-2028 LTP are summarised in Table 7Table 13 and are summarised below.

- Council provides safe, smooth, quality sealed roads in order to reduce travel times and vehicle wear.
- Council provides a safe and efficient roading network.
- Ready access is provided around the District except in extreme weather conditions.
- Footpaths are maintained in good condition and are fit for purpose.

These show how levels of service contribute to the community outcomes and provides a technical measure that enables Council to monitor current levels of service against target levels of service.

The current LOS are documented as a combination of:

- LTP LOS documentation based on real or interpreted customer feedback
- Contract processes which describe some elements of the quality of service provided, mainly travelling surfaces and intervention levels

These have been based on Levels of Service (LOS) outlined in the 2012-2022 LTP as modified during the 2014/15 Annual Plan community consultation.

Changes that may affect future LOS include:

- Changes in government requirements
- Continual drops in Funding Assistance Rate (FAR) to a base level of 51%
- Funding shortfalls caused by natural disasters, such as Canterbury Earthquakes
- One Network Road Classification.
- Change in land use and intensification associated with the roading network.
- Increased pressure from Central Government to allow heavier vehicles on the network.

1.9 NEW ZEALAND LAND TRANSPORT – ONE NETWORK ROAD CLASSIFICATION – LEVEL OF SERVICE

This AMP was written on the basis of agreed levels of service, consulted on through the LTP process since 2009, with our customers. NZTA's One Network Road Classification recently confirmed (late January 2015) indicates involves considering levels of service from a customer different perspective (measures) rather than just the traditional best for asset approach that the council has practiced level

of service from that previously confirmed by Council. The lateness of delivery of this new network confirmed classification system has be applied across the network. A gap analysis been undertaken internally as well as data quality studies carried out by the Road Efficiency Group (REG). This has identified there are a number of areas that require attention in terms of refinement or additional data collection to ensure ONRC levels of service can be measured as well as Council's levels of service. Our Transitional Plan has being worked through and provided to NZTA.

1.10 FUTURE DEMAND

The Mackenzie District Roading network predominantly carries low volume rural traffic on unsealed roads. Only 55.19km of the total 732km in the network is urban. The districts population of approximately 4,300 is low and the growth at approximately 9.3% (since the 2006 census) this is a significant change from the 2001-2006 period where the population grew by a modest 2.3%.

Predominantly the growth we are experiencing in traffic volumes is due to increasing Tourist numbers and economic development due to irrigation and changes in farm practices.

Future demand on the network will continue to be driven by tourism and land use changes and intensification brought about through changes to irrigation within the district.

1.10.1 Population

Mackenzie's population growth is expected to follow the medium projection issued by Statistics NZ in December 2016. It is anticipated that over the next ten years (2018-28) Mackenzie District will have a growth in population of around 13%, from around 4,300 at present to 4,880. Like much of New Zealand, the proportion of people aged 65 years and older will grow within the district. It is anticipated that projected population growth will not impact significantly on the operation and maintenance of our roading activity.

1.10.2 Household Growth

It is projected that over the next ten years Mackenzie District will have:

- A growth in household numbers consistent with the population growth trajectory;
- Household numbers are projected to increase to 2,200 (+16 per cent) by 2028 (Statistics New Zealand) - the higher percentage increase in households relative to population increase in 2028 reflects a projected increased in single person households;
- With a greater number of older people living alone, a reflection of structural ageing, one-person households are projected to increase by 15 percent by 2028 (Natalie Jackson Demographics Ltd, Sept 2014);
- Future demand in the Mackenzie District will be increasingly driven by one-person households and couples without children, characteristic of population ageing.

1.10.3 Development

Analysis of the future urban and rural residential subdivision over the next 4 years shows and average of 10 sections per year, long with associated infrastructure, to be vested in Tekapo and an average of 46 per year in Twizel.

During the 2015/17, 5km of sealed road and 4.8 km of unsealed road will be vested in Council. Whilst developers have to construct this to Councils standard before vesting the ongoing maintenance costs have to be allowed for.

Initially it was assumed that the level of development experienced during 2015-17 would slow down to about a third but this has proved not to be the case. We have modified our projections to allow for this growth.

1.10.4 Change in Land Use

Change in land use is ongoing throughout the district and is characterised by change of land use and intensification. Over the last decade, the Mackenzie District has seen a change from pastoral farming, to more intensive practises in particular dairy conversions, cropping and stock rearing/ finishing. This significant change in land use impacts on the road network in terms of increased heavy vehicle volumes. Each dairy conversion adds at least four heavy truck and trailer movements on the adjacent roading network a day minimum. Some of those roads are narrow gravel roads with limited structural strength.

These changes will be limited in part by planning restrictions within the Mackenzie Basin, water availability, and the state of the economy. It is important to recognise that it will happen and plan for it as early as the knowledge and effects become better understood.

1.10.5 Tourism

Mackenzie has experienced unprecedented growth in visitor numbers (both domestic and international) in recent years, as indicated by a range of data, including the Statistics New Zealand Commercial Accommodation Monitor, which for the year ended September 2016 compared with the year ended September 2015 reported:

- Guest nights rose 23.1 per cent to 705,316
- International guest nights rose 19.9 per cent to 489,769
- Domestic guest nights rose 31.1 per cent to 215,547
- The average length of stay rose from 1.32 nights to 1.33 nights
- The overall occupancy rate rose from 44.4 per cent to 50.2 per cent
- Accommodation capacity, excluding holiday parks, rose 3.1 per cent

International tourism numbers are expected to continue by 5.4 per cent per annum from 2016 until 2022. Based on this, there could be nearly 6 million tourists visiting New Zealand by 2028. Council is assuming average growth in international visitors to the district will be at least equivalent to or greater than the growth in international visitors forecast for NZ. Growth in domestic visitor numbers is also expected to occur at a similar rate.

Tourism makes up a large component of transportation demand within the district. The Mackenzie has experienced increasing numbers of free independent travellers, with fewer tourists opting for commercial tour groups. Where previously commercial tourism groups favoured the State Highway network, free independent travellers are increasingly using the local roading network.

Many international tourists are accustomed to travelling on the right-hand side of the road. On unsealed roads there is no centerline to provide visible orientation, in addition, the majority of the unsealed roading network is operated at open road speed limits.

The influx of domestic holiday-makers into the district, particularly the Mackenzie Basin, has a significant impact on roading. On some unsealed roads summer traffic volumes double or treble, at a time when the roads are extremely dry and particularly sensitive to wear. The route from State Highway 1 at Albury over the Mackenzie Pass to Lake Benmore is an example of this traffic loading.

1.11 RISK MANAGEMENT

Risk management is "the systematic application of management policies, procedures and practices to the task of identifying, analysing, evaluating, treating and monitoring those risks that could prevent a Local Authority from achieving its strategic or operational objectives or plans, or from complying with its legal obligations".

There is currently no formal Risk Management process being implemented for the roading activity within Council. A risk management strategy has been described in Section 8 of this AMP. The use of this strategy as outlined in the Improvement Plan should be completed with high priority. In particular issues surrounding emergency management and insurance require full review and inclusion in this plan.

It is planned to develop a joint risk strategy with our Aoraki Roads Collaboration as most of the transport risks are common across the four local authorities.

1.12 LIFE CYCLE MANAGEMENT PLANS

Life cycle management plans outline the work planned to keep the assets operating at the current levels of service defined in Section 4 while optimising lifecycle costs. The overall objective of the Life Cycle Management Plan is:

To provide the identified Levels of Service at the lowest lifecycle cost for present and future needs

In this AMP the lifecycle management plan has been separated into asset groups. Each section of the Lifecycle Management plan covers the following:

- • Background Data including current capacity and performance, current condition and historical data including costs.
- • Operations and Maintenance Plan covering planning for on-going day to day operation and maintenance to keep assets serviceable and prevent premature deterioration or failure.
- • Renewal/Replacement Plan covering Major work which restores an existing asset to its original capacity or its required condition (e.g. resurfacing, rehabilitation or footpath reconstruction).
- • Asset Development/Improvement Plan covering the creation of new assets (including those created through subdivision and other development) or works which upgrade or improve an existing asset beyond its existing capacity or performance in response to changes in usage or customer expectations (e.g. forestry harvesting routes).
- • Disposal Plan covering activities associated with the disposal of a decommissioned asset.

The review the AMP completed in January 2015 focused strongly on "Section 8 – Life Cycle Management" This section needs to be read in its entirety.

1.12.1 Asset Condition and Performance

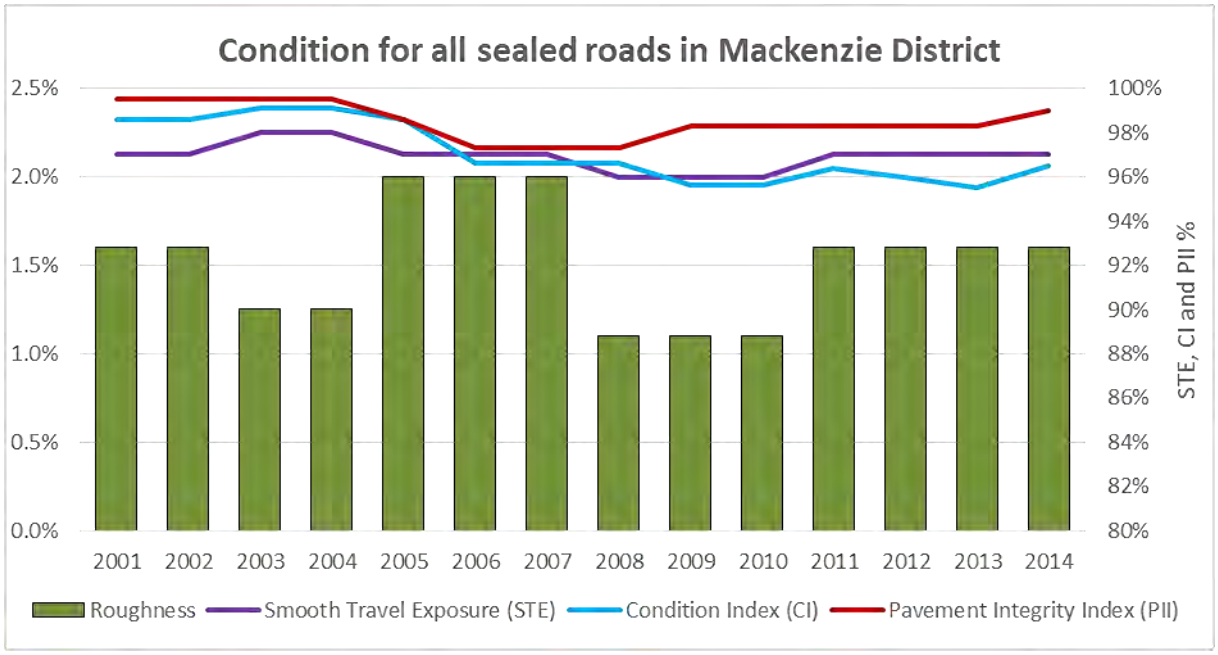
The basis of the lifecycle management plans is the current condition and performance of the asset. These allow comparison with the prescribed level of service, and from this a gap analysis can be completed to determine future work requirements.

Council has implemented RAMM Contractor and Pocket RAMM, and is utilising this, along-side their contractor, to undertake more formal condition and performance analysis of the network. Historically, Council were relying on the practical experience and knowledge of the engineering staff to provide a gauge of the networks overall performance. This knowledge is still used extensively, and is very valuable for planning purposes. Regular condition surveys of the asset components are undertaken and results recorded within RAMM. Intermediate and long term planning of asset renewal are influenced, based on the results of these surveys, the performances obtained compared to that desired, the remaining expected life of the asset component and the decision making processes outlined within this plan.

1.12.2 Asset Condition

Specific condition for each asset is not currently measured. There is reasonable condition information for sealed roads but these only make up 23% of the network. Figure 2 shows that over the last three years there has been a static or slight rise in PII and CI, albeit small at less than 2%. Roughness has also remained static corresponding to the STE stabilising on 97%.

Figure 2: Historical Condition Data for Sealed Roads



1.12.3 Safety Performance

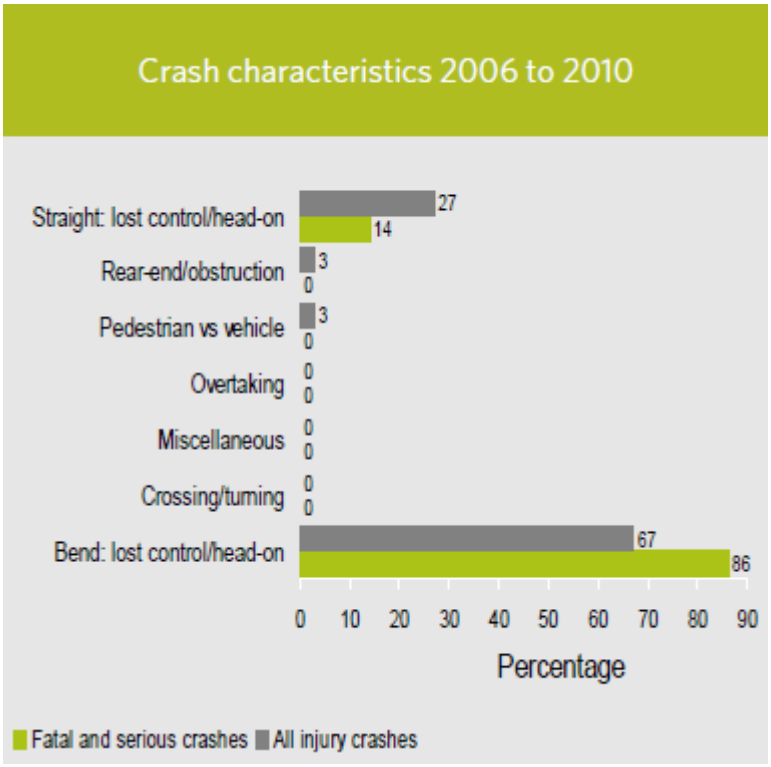
The Crash Analysis Canterbury Region 2013 to 2017 Briefing Notes, outlines crash statistics for Mackenzie District local roads. Between 2013 and 2017 in Mackenzie District, there were 12 reported injury and non-injury crashes on local roads. Table 3 shows the number of injuries resulting from these crashes by rural or urban areas. Rural is defined as an area with a speed limit of 80km/h or more. 83% of injuries were caused by crashes on rural roads.

Table 3: Injuries resulting from crashes on Mackenzie District Roads 2013 to 2017

	Fatalities	Serious Injuries	Minor Injuries	Total
Rural	2	2	28	32
Urban	0	3	10	13
Total	4	8	0	0

Figure 3 shows that loss of control crashes represent 100% of fatal and serious crashes and 94% of all injury crashes. The two most common types of crashes are: When there is a 'loss of control/head on vehicle turning' (6 crashes), followed by a 'loss of control/head on straight road' (4 crashes). It should be noted that there have been no recorded minor or no injury crashes reported on local roads in the last 5 years crashes on local roads in Mackenzie District in the last 3 years due to road conditions.

Figure 3: Crash types in Mackenzie District



21% of all injury crashes and 14% of serious and fatal crashes were related to road factors.

The most common type of crash involves loss of control on a bend which may indicate a lack of appropriate signage, poor road maintenance, vehicle related issues or driver related issues may be primary factors influencing crashes. Road widths and specifically lack of shoulders could be a concern on some of our roads.

Within the Council road safety outcomes are influenced by the following:

- community safety programmes
- road engineering improvements, - Low Cost Low Risk Project Programme, delineation, signage, etc.
- road maintenance programme (grading, re-metalling, drainage improvements, etc.)
- Regional Safety Programmes in conjunction with TDC & WDC

The outcomes that these programmes are focused on are varied but the overall aim is to reduce the number and cost of crashes on the District's roads as reported each year by NZTA. The Mackenzie District Council, Waimate District Council and Timaru District Council all belong to the South Canterbury Joint Road Safety Committee which is tasked with delivering community road safety initiatives. Each Council makes a financial contribution towards the employment of a Road Safety Coordinator for South Canterbury.

There are an ever increasing unofficial reports of near misses occur on our network. The majority of these incidents would result in a serious crash or fatality if the three factors (that influence crashes) were to align. Currently this is a large gap in our data given majority of these incidents go unreported, are discussed word of mouth once or twice removed or are received with sketchy details. Given the lower volumes of traffic using our roads and surrounding area compared to some other local authority's majority of incidents currently remain near misses and don't develop any further. Though with the increases in tourism, intensification of farming and a greater numbers of holiday makers and outdoor enthusiasts frequenting the district increases this potential of these incidents becoming more significant.

The risk of harm is made higher by the following:

- Occupancy in vehicles being at or near capacity in most.
- A high proportion of tourist using our roads.
- Fatigue being high (midpoint between Christchurch & Queenstown).
- Inexperience driving on a rural network (surfacing's, alignments, etc.
- International visitors coming from where they drive in the opposing lane.
- Driver frustration due to indecision, convoy travelling parties, reduced travel speeds due to sightseeing.

Greater number of people choosing other transport modes e.g. walking and cycling. Unfamiliar vehicle which handles differently with varying technology or functionality.

- Large proportions of long rural roads made up of a large number straight sections results in higher speeds.
- Climatic conditions snow/ ice, flooding, wind in the alpine environment.

Part of our gap analysis is to try and capture this data/ evidence from the source. It is thought at this stage the easiest way to do this is via building or use of an existing app. This would capture location and as many other details of the incident using a number of simple questions with drop downs to discover hotspots, frequencies, trends and any other relevant information.

1.12.4 Routine Maintenance Plan

Council staff manage the roading network with minimal assistance from consultants. The maintenance on the network is delivered through a competitively tendered independent: multi-year, collaboratively written contract between 4 councils. Any large renewal projects are let as competitively priced contracts on an annual basis. The resurfacing contract is a shared service agreement with Timaru District Council partnering with Waimate District Council and is tendered and let bi annually.

To ensure activities are providing the best efficiencies possible, work is generally clustered in such a way that works are carried out in localised areas. The existing maintenance contract encourages a

joint approach between Principal and Contractor through open honest conversation (within a typical maintenance contract) to solve roading issues for the lowest whole of life cost that is best for asset.

Current practice is to apply a combination of "reactive" condition driven and network lifecycle depreciation techniques to determine the work necessary to maintain the network within pre-determined financial constraints. The majority of routine maintenance is reactive so budgets have been based on historical expenditure. Increases to costs for some asset groups are projected in future due to increased asset quantity or levels of service requirements. See Lifecycle Management Section 7.

1.12.5 Renewal / Replacement Plan

This plan recommends renewal works in most asset groups, however the significant renewal expenditure requirements are in the following areas:

- Sealed road resurfacing – A full review of Mackenzie District seal histories using an average reseal life of 18 years and 5 years for 1st coats was completed in 2015. Part of this process involved creating a Forward Works Programme in RAMM to assist in the long term activity management planning of the network. The existing back log of resurfacing (i.e. where the existing seal age is older than the agreed default seal lives) has been caught up on given significant amount of unsubsidised local share invest by council and with the favourable tendered rates achieved through our combined resurfacing contract. There are still some old seals present in the network these should be deal with in the short term. This allows us to approximately flat line our maintenance costs into the future given our current network condition, funding and traffic volumes. To avoid the likelihood of a bow wave forming in our forward works programme again from year 13 we have increased the budget by an extra $100,000 to allow for the growth in our sealed network due to subdivision development and seal extension projects. The average life of the seals on the Secondary Collector is 15.30 years, with Access roads at 19.53 years and Access Low Volume are 17.45 average. There are however a number of seals much older than that, up to 34 years old. As the district develops with increased subdivision, more sealed roads are constructed and vested with Council and there is the potential to create a backlog of older seals due to funding constraints. The other impact is the ever increasing cost of bitumen against a fixed allocation from NZTA and no allowance for inflation. Council has budgeted $500,000pa for 12 years then increasing to $600,000pa for the following years (all figures are in today's dollars) to keep pavement in a reasonable waterproof condition. This will maintain the asset with an average seal lifecycle of 18 years for the foreseeable future.

- **Sealed Pavement Rehabilitation** – Normally, the average pavement renewal required based on the assumed life of 75 - 100 years. However, current funding levels dictate Council renew their pavements at a rate of approximately 800m per annum, based on a sealed network of 213.37km Current Co-investment levels from NZTA allows for a replacement lifecycle of approximately 257 years. This is clearly an unsustainable position, especially when Council must allow for the rehabilitation of areas that have suffered significant frost heave. Whilst these areas of weak pavement are identified and there is a significant investment on drainage improvements in these known areas, the nature of Mackenzie harsh winters, means that this approach is not always successful within current budgets. The nature of frost heave can be from a minor pavement failure that will self-heal to a complete breakup of the road surface, exposing unsuitable subgrades, that results in the regular access route being partially or completely impassable to all traffic. However, there have been significant changes in land use and intensification of farming practises over the last 8 years with water

rights for irrigation becoming available. This has resulted in increased heavies on a network which has not been designed for such loadings. Pavements are showing signs of increasing decay in terms of pavement deterioration due to the additional traffic. The level of funding will have to be significantly lifted as clearly they will not last 257 years.

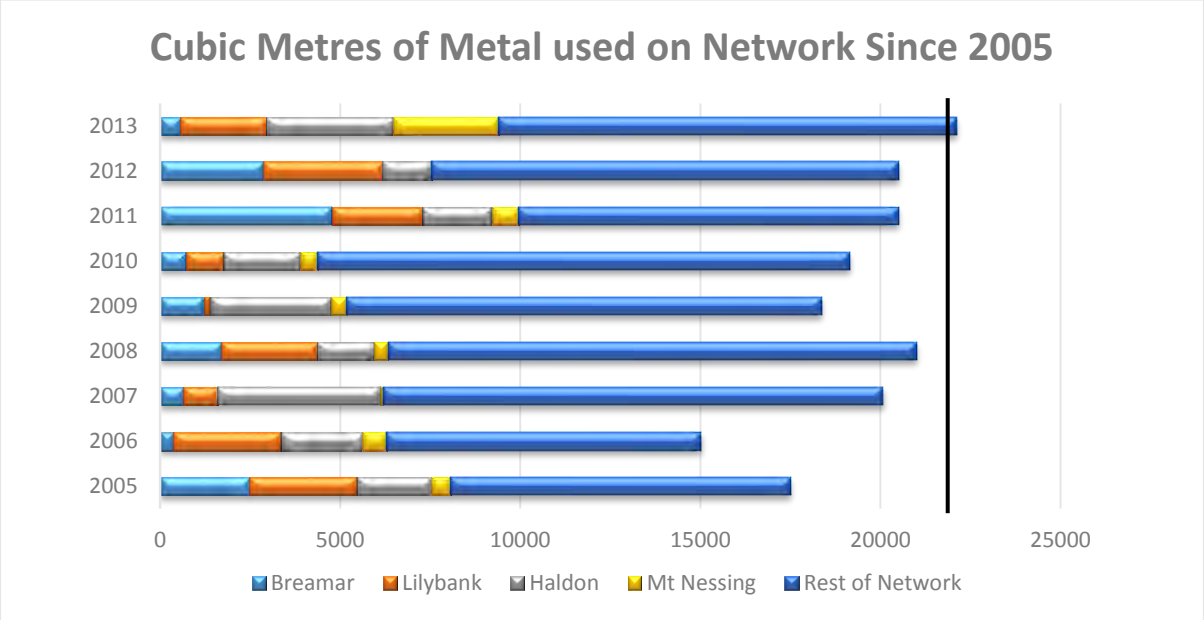
- **Unsealed road metalling** – The road user perception of unsealed roads is that they are of inferior quality to sealed roads due to issues with carriageway width, roughness, dust, mud, corrugations, potholes, soft areas and increased vehicle operating costs. These issues are being continually assessed by the maintenance contractor and Council personnel with work programmed and executed to keep the roads within the agreed LoS.

The Council recognises that some unsealed road users may never be satisfied until "their" road is sealed, but acknowledges that this is not always viable given the length of the unsealed network, seasonal/ varying use and cost involved. Therefore, maintenance is aimed at maintaining the asset to an acceptable Level of Service for the lowest whole of life cost. However, on some routes significant fluctuations in traffic volume affect both condition and the ability to maintain acceptable LoS economically. The higher priority roads, typically receive the most traffic therefore attracting a greater portion of the re-metaling budget typically applied as wearing courses due historic performance.

The Roundhill Ski area on Lilybank Road has seen increased Ski traffic of up to 600vpd on a road designed to take its normal loading of 80 vpd to the high country stations and DoC walkways which are increasing in popularity with tourism. This increased loading impacts the pavement at the worst possible time of the year. Going forward it is uneconomic to maintain Lilybank as an unsealed road therefore we have planned to begin a seal extension project from the end of the existing sealed sections to form a seal road eventually from the beginning of Lilybank Road to the ski field.

Figure 4 clearly shows Council's higher traffic volume roads receive a higher portion of wearing and running course annually.

Figure 4: Distribution of wearing and running course across the network



- **Wearing course** application is budgeted on an annual basis based on good historic records, and regular gravel loss surveys taken from 24 sites across the network. We are finding this treatment spread at 100mm is achieving the best whole of life cost given historic

maintenance spreads weren't achieving the life required laid at 40mm. Unsealed roads are prioritised yearly from Priority 1-3. Priority 1 condition is very poor and needs a full stabilisation treatment to be able to continue to function as a road safely trafficable at 70km/h. Priority 3 is in poor condition showing corrugations and bony patches and evidence of topsoil showing through. Programmes over recent years have been very reactive and it has been identified that further funding will enable completion of P1 and intervention on P2 roads and begin a gravel replacement programme to counter gravel loss/migration.

- **Bridges** - Council's Bridge Replacement Strategy lists the bridges which are to be replaced over the next 10 years. Seven bridges will realise their end of remaining useful life in this period, however, only five have been identified for replacement, with the remaining two, potentially to be handed over to the adjacent landowner or replaced with a box culvert. These have been included under the Low Cost Low Risk projects programme as detailed in "Section 8 - Lifecycle Management". Whilst these were previously funded from Bridge Renewals, NZTA have advised that these small structures are to be first call on our Minor Improvement allocation.

Other renewal type works including sign replacement, street lighting replacement and footpath resurfacing are allowed for within the maintenance programme.

1.12.6 Asset Development Plans

This plan recommends some capital improvements to the existing transport infrastructure, with work in and around Tekapo being a priority as identified through the Transportation Strategy. The works included are as follows:

- **Low Cost Low Risk** improvements projects may now be budgeted up to an expenditure amounting $1,000,000 Mackenzie's programme is between $350,000 and $1,600,000 (2018-21 approved programme). Note, there is no guarantee that we will be always funded at this level going forward. The Transportation Strategy, currently underway has identified a number of projects within Tekapo around Pioneer Drive and the village centre that would potentially qualify for this funding. Also due to changes in funding rules bridge replacements and other minor works must be funded out of our low cost low risk budget. We have approximately $1,153,800 costs forecast for bridge replacement over the period 2015-2025.
- **Seal Extensions –** Prioritised sites for seal extension to reduce life cycle costs and provide improved Levels of Service are based on strategic importance and local knowledge have been identified. Under the present NZTA funding regime and funding constraints it is unlikely that subsidy will be available in the foreseeable future. Council's current policy is to only complete seal extensions if NZTA financial assistance is available. Council has budgeted in the 2018-28 LTP, $140,000 per annum to deal with some dust issues in the Reserve and Kimbell.

1.12.7 Asset Disposal Plan

Council currently has within its asset register 20 bridges that service only one ratepayer. Further discussions and policy/legal decisions need to be made in regards to future ownership and replacement of these bridges.

At this stage, the Council has no specific plans for disposal of components of the roading asset. Asset disposal is dealt with on a case by case basis.

1.13 ASSET MANAGEMENT PRACTICES

Council employ an Asset Manager, a Roading Manager, an Engineering Technician and an Assets Administrator who are responsible for the management of the road asset. In year one allowance has been made for a Development Engineer to deal with the growing number of subdivision and vested assets coming online with the amount of growth in the district.

Management planning is generally actioned in-house based on the knowledge of the Asset Manager/ Roading Manager assisted by such planning tools as the RAMM software tools, condition modelling using graphs and excel spread sheets.

Council has in place a Multi-Party Funding Agreement (MPFA) with Timaru District Council to provide professional services to assist with the management of the road network. This provides the ability to buffer workloads, provide expertise that we may not have available and also helps with consistency of asset management practices across both Councils.

Occasionally elements of the management of the network may also be negotiated with consultancy services. For specialised works or where a specific area of expertise is required a consultant will typically be employed to aid or carry out the specific works.

Physical works are managed in accordance with the procedures documented in the flowcharts shown in Appendix VI. Routine maintenance is undertaken through a competitively tendered contract (common specification for Ashburton, Mackenzie, Timaru and Waimate District Councils) of normally 3 to 5 year duration. Other works such as resurfacing (joint two year resurfacing contract with Mackenzie, Timaru and Waimate District Councils) large pavement rehabilitation (>1000m in length), bridge renewals are let as competitively priced contracts generally on a year by year needs basis.

Council accounts for revenue and expenditure on an accrual basis. All works are identified through a job cost ledger with appropriate breakdown level to be able to monitor and report on revenues and expenditure to NZTA and Audit NZ requirements. All claims and dispatches are reported and claimed in RAMM Contractor All external reports are prepared in compliance with Generally Accepted Accounting Principles.

1.13.1 Collaboration

Mackenzie District Council is working in collaboration with other boundary Councils. The Mid-South Canterbury Roading Collaboration (ARC) comprising the Councils of Ashburton, Mackenzie, Timaru and Waimate Districts.

On the 28 October 2014, the first Memorandum of Understanding (MoU) was signed between Ashburton, Mackenzie, Timaru and Waimate District Councils. This was to actively seek to collaborate and co-operate with each other to improve effectiveness and efficiency with which they achieve the identified objectives and desired outcomes for specific aspects of roading asset management and network operations. The roading networks are the local roads within the four (4) Districts and due to the differing natures of the parties and their respective networks, the level of participation by each party varies across the numerous asset management and network operations.

The Councils will improve management and operations of their road networks by working together. In doing this the objectives of the collaboration are:

- Continually improve the performance of their asset management processes, the outcomes and consistency of service delivery in respect of their respective road networks.
- Improve investment decision-making, while recognising and accepting appropriate risk.
- Attract, develop, and retain good internal human resources and capability.
- Enhance governance through shared policy and strategy.
- Provide a sustainable market for affordable specialist resources.
- Become "smarter buyers" and recognised as leaders with best practice in asset management and road network operations.
- Enhance customer satisfaction.
- Formulate Programmes of work that will enhance the delivery of local services.
- Further embed safety in the cultures of the respective organisations.

Currently, as part of the collaboration, the following contracts have been successfully awarded:

- Road Network Operations and Maintenance Contract
- Joint procurement and documentation
- Road Resurfacing Contract
- Single South Canterbury joint contract

With the Collaboration work that is happening between the different Councils, Mackenzie District Council has been given the opportunity to look at other contract modes, work done by REG Procurement subgroup, REG Case Study, and obtaining constructive feedback from contractors involved in the collaboration work.

1.13.2 Asset Management Processes

Council uses the LTP process to identify community concerns and issues which are incorporated into levels of service that are expressed by performance measures written into the professional services and physical works contracts. The satisfactory execution of these performance measures result in levels of service compliance that ensures the Council's outcomes are achieved and the community vision of a district they wish to live in is accomplished.

Well documented standards and processes exist for an on-going inspection programme of pavements, surfacing and bridges (see appendix VI).

Maintenance and renewal costs are recorded against activities that relate to NZTA work categories in the general ledger.

There is no formal risk management process.

1.13.3 Asset Management Systems

The RAMM database is used as the asset inventory management system and is the depository for all the available asset data, including street lights. The assets are recorded in RAMM but are managed offline and routine updates uploaded into the database. Street lighting is maintained in RAMM through our MPFA with Timaru District Council.

A regular counting programme is in place to monitor traffic volumes on the network. Traffic counts are completed primarily on roads that are targeted for improvement or are showing signs of accelerated failure. We are also counting roads that have no traffic count data or current counts to

improve our data quality for and to keep ONRC classification up to date. Actual count data exists in RAMM since 2010, and then estimated for other similar roads within the network that have not been counted that year giving consideration to the number of households using the road and the nature of the adjoining land-use. There are still gaps in our traffic count data we are currently working on a programme to determine traffic through the network via a targeted traffic count programme to keep data current. Some of our estimates are still well out of context and these are being worked on by forming a traffic model to provide better more realistic, reliable, up to date information based on actual count information. The position of Engineering Technician was vacant during 2017 for some time and this created a gap a 6 month gap in our traffic counting programme.

Accident data is recorded from police reports to the CAS database by NZTA. Council obtains crash information, and other reports as required by direct request to our Road Safety Co-ordinated or NZTA.

Other systems operated by the Council are:

- ArcGIS Geographic Information System
- NCS Corporate financial management system
- Electronic document management system
- Hardcopy document filing systems
- Hardcopy plan filing systems

1.14 PLAN IMPROVEMENT AND MONITORING

This AMP has previously been reviewed and had updates incorporated into it including improvements to move towards "Core+" (Intermediate) level Asset Management. Council is committed to a continual improvement as outlined in Section 10. A key objective is to dovetail the activity management planning process with the other key planning processes particularly the 30 year infrastructure plan and the Community Long Term Plan (LTP).

The review and improvement of this AMP requires resource and budget in order to complete the selected improvement tasks. Table 38 outlines the items for improvement, relative urgency, resource, priority, budget and the authority sought to give approval to complete each item.

1.15 KEY FACTORS ASSUMED IN DEVELOPING THIS ACTIVITY MANAGEMENT PLAN

There are a number of key factors assumed in the development of this AMP as outlined below.

1.15.1 Asset Data

The level of confidence in our data has significantly increased since the last iteration of this AMP completed in 2015. Council has carried out a significant auditing and validation programme on its RAMM data, completed by OPUS Consultants Ltd. All previous assets excel spreadsheets and modelling practises have been integrated with this validated data. Subsequent to this as part of the REG data group there has been a report released rating all Local Authorities RAMM Data. There are still areas that require attention in the RAMM databases this is around Traffic Counts and Surfacing & Pavement Data

Table 15 gives the assessed data confidence quality of the Council RAMM and spread sheet data tables as described in the 2016 Roading Asset "Mackenzie District Infrastructure Revaluation" report.

1.15.2 Financial Forecasts

NZTA's 10 year National Land Transport Programme (NLTP) for Mackenzie District is based on targeted maintenance of the existing and increased roading infrastructure (via. development) paired with an escalation in renewal programmes. Over the next 10 year period there has allowance for cost increases due to inflation.

The forecast total Mackenzie District Transport Programme for 2018/21 for operations, maintenance and renewals totals $5.90M (inclusive of all administration costs and professional service fees). 73% of this is to be spent on maintenance and operation with 27% to be spent on renewals. Whilst Council realise this is an increase of nearly 8% over the approved allocation for the 2015/18 NLTP, the real cost is under $600,000 per annum and addresses the network needs, which deals with deferred maintenance, due to restricted funding for a number of years. This is not an increased level of service. The $250,000 approved in the 2015/18 NLTP, for WC 341, has been requested to continue with a small increase to $300,000 to allow for low cost low risk projects to address structures replacements and safety issues.

Funding for the management and maintenance of the road network is provided from the District roading rate and co-investment received from NZTA. Funding for improvements is provided from NZTA co-investment and the targeted roading rates.

As at 1 July 2016 the total optimised replacement cost of the Roading Infrastructure was assessed to be $141,527,652. The total optimised depreciated replacement cost was assessed to be $94,070,517. The annual depreciation or decline in service potential has been determined to be $1,840,895 per annum.

A check of the annual renewal expenditure against the Annual Depreciation (AD) for each asset component gives an indication whether the renewal expenditure is appropriate for the age and condition of the network. For asset components nearing the end of their expected lives a figure greater than the depreciated costs would be expected to be spent. For situations where the asset component is new or only partially through the expected life the budgeted expenditure would be expected to be less than the AD with the balance banked so as funding will be available when required. Table 4 shows the 2018/19 forecast renewal expenditure compared to the Annual Depreciation.

Table 4: Comparison between Forecast Expenditure and Annual Depreciation

Asset Type	2018/19 Renewals Forecast	Annual Depreciation
Pavement	$1,350,000	$1,075,000
Footpaths	$30,000	$121,000
Structures	$50,000	$315,000
Drainage	$70,000	$93,000
Traffic Services	$70,000	$149,000

From the comparison shown in Table 4, it can be seen that expenditure is probably appropriate for most assets in relation to the Annual Depreciation. However, underinvestment is indicated for Structures and Drainage assets. It has been identified that the condition and performance of the drainage and structures assets does not currently need this level of investment and staff are targeting

the areas of most need in the network, which are replacement of unsealed road metal, resurfacing and/or replacement of sealed pavements.

Key factors assumed in the financial forecasts are as follows:

- NZTA will continue to provide financial support to Council for the road network.
- The Council will continue to fund the level of service currently set out in this AMP and consulted on in the 2012-22 LTP.
- The dollar values shown in this Plan are July 2017 dollars.
- Renewal costs are best available estimates, based on current network needs, some especially very long term estimates (greater than five years), are rough order of cost estimates that need to be further researched and refined.
- The effects of known very likely or future developments are included.
- Assumptions made on Total Useful Lives and Residual Useful Lives of the assets in relation to the asset valuation.
- The asset data is considered to be reliable and fit for the purpose for developing the long term financial forecasts.
- Reduction in NZTA's Funding Assistance Rate (FAR) by 1% every year to a base co-investment rate of 51% for the first year of the LTP period (2018).
- There has been increases in the Network and asset management field to allow for increases in reporting costs, collaboration, data collection/ testing as a direct result of implementing One Network Road Classification (ONRC).
- It is thought that sufficient allowance has been made for potential change in level of service for the next 3 year funding block and resultant co-investment as a direct result of implementing One Network Road Classification.

1.16 FINANCIAL FORECAST

1.16.1 Proposed Future Capital Works Programme

ROADING	LTP Budget Yr 1 2019	LTP Budget Yr 2 2020	LTP Budget Yr 3 2021	LTP Budget Yr 4 2022	LTP Budget Yr 5 2023	LTP Budget Yr 6 2024	LTP Budget Yr 7 2025	LTP Budget Yr 8 2026	LTP Budget Yr 9 2027	LTP Budget Yr 10 2028
	(thousands)									
Roading Professional Services										
0868925. Plant and Equipment	0	0	0	0	6,105	0	0	0	0	6,941
District Roading										
2548193. Vested Assets	721	665	95	0	1,187	0	0	1,480	0	0
2548211. Unsealed Road Metalling	650	668	685	703	722	740	760	779	800	820
2548212. Sealed Road Resurfacing	500	514	527	757	555	570	585	600	615	631
2548213. Drainage Renewal	70	72	74	76	78	80	82	84	86	88
2548214. Sealed Road Pavement Rehabilitation	200	205	211	216	222	228	234	240	246	252
2548215. Structures Component replacements bridges	50	51	53	54	56	57	58	60	62	63
25482151. Structures Component replacements cattle stops	10	0	11	0	11	0	12	0	12	0
2548222. Traffic Services Renewals	60	62	63	65	67	68	70	72	74	76
2548310. Footpaths - Surfacing	30	31	32	361	370	380	58	60	62	63
2548341. Minor Improvements	300	308	316	325	333	342	351	360	369	379
2548395. Sealing Past Houses	140	144	153	162	155	159	0	0	0	0
Total Roading Capital Expenditure	**2,731**	**2,719**	**2,219**	**2,719**	**9,859**	**2,623**	**2,209**	**3,734**	**2,325**	**9,314**

1.16.2 Annual Net Cost – Funding Impact Statement

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
Targeted rates	1152	1590	1799	1517	2495	2693	2886	3202	3437	3733	4080
Subsidies and grants for operating purposes	771	851	856	878	1046	1059	1086	885	890	915	902
Internal charges and overheads recovered	0	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tac, fines, infringement fees and other receipts	26	28	29	29	30	31	32	32	33	34	35
Internal charges and overheads applied	59	163	179	220	263	292	349	441	537	644	832
Total operating funding (A)	**2008**	**2632**	**2863**	**2644**	**3834**	**4075**	**4353**	**4560**	**4897**	**5326**	**5849**
Payments to staff and suppliers	1553	1751	1793	1870	1884	1931	2014	2029	2080	2171	2191
Finance costs	69	0	0	0	0	0	0	0	0	0	0
Internal charges and overheads applied	17	17	17	20	21	29	30	31	32	33	33
Total applications of operating funding (B)	**1639**	**1768**	**1810**	**1890**	**1905**	**1960**	**2044**	**2060**	**2112**	**2204**	**2224**
Surplus (deficit) of operating funding (A-B)	**369**	**864**	**1053**	**754**	**1929**	**2115**	**2309**	**2500**	**2785**	**3122**	**3625**
Finance costs	0	0	0	0	0	0	0	0	0	0	0
Subsidies and grants for capital expenditure	1055	938	958	989	1120	1042	1063	1097	1119	1154	1178
Development and financial contributions	0	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding (C)	**1055**	**938**	**958**	**989**	**1120**	**1042**	**1063**	**1097**	**1119**	**1154**	**1178**

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
Capital expenditure											
To meet additional demand	0	0	0	0	0	0	0	0	0	0	0
To improve the level of service	0	0	0	0	0	0	0	0	0	0	0
To replace existing assets	2201	2010	2054	2124	2719	2574	2623	2209	2254	2325	2380
	2201	**2010**	**2054**	**2124**	**2719**	**2574**	**2623**	**2209**	**2254**	**2325**	**2380**

2 INTRODUCTION

This section sets out the purpose of this AMP and shows the plan framework.

2.1 PURPOSE OF THIS PLAN

The purpose of this AMP is to outline and summarise in a coordinated manner the Council's long-term asset management approach for the provision and intergenerational management of water throughout the District. This may also be considered the overall objective of Asset Management.

This AMP is intended to be read in conjunction with the Long Term Plan (LTP) and fulfils requirements of the Local Government Act 2002 (LGA), - Schedule 10.

Activity Management Planning is a management tool that provides the link between strategic planning and managerial areas of Council's business and community's desired outcomes.

The need for AMPs for Council's major infrastructure and other major assets is an implied requirement of the LGA and the Long Term Plan (LTP). Such AMPs define agreed levels of service, and the expenditure required to maintain these agreed service levels for the period of the plan.

This AMP is also to serve as the programme case for NZTA as part of the business case approach. The AMP is also to incorporate the One Network Road Classification Plan and associated measures.

Levels of service are the definitions of service quality resulting from operation of the particular asset against which the assets service performance may be measured. Levels of Service are one of the key outputs from the strategic planning process and typically comprise the following elements.

- Quantity
- Quality
- Cost
- Timescales
- Performance Measures
- Sustainability

2.2 RELATIONSHIP WITH OTHER PLANNING DOCUMENTS

The Activity Management Planning process analyses the impact of the Levels of Service on the business and should be structured to be compatible with other key planning mechanisms and documents, including:

LTP: Council's LTP sets out the broad strategic direction for the period of the plan, defining the District Vision, Outcomes, Strategic Objectives, Projects and Tasks and the Financial Framework that will be required. The outcomes are directly related to Governance, Community Well-Being, Environment Protection, Sustainability, Economic Development, and Organisation Performance.

District Plan:
Section 73 of the Resource Management Act requires the Council to have at all times a District Plan for its District.

The District Plan specifies objectives, policies and methods, in relation to resource management issues in the District, to achieve the integrated and sustainable management of the District's resources. To

achieve the objectives and policies of the Plan, rules are included which prohibit, regulate or allow activities.

The Council has adopted the principle of zoning. This technique recognises that different areas of the District will have different resources, character and levels of amenity and that the community will seek different environmental results for these areas. The zones provide opportunities for future development in keeping with the character and amenity sought for these different areas. Any particular activity must comply with the rules applicable to the zone in which it is situated, as well as general district rules covering a range of matters such as subdivision, heritage values and transportation.

30 Year Infrastructure Strategy:
The LGA requires that a local authority must prepare and adopt, as part of its LTP, an Infrastructure Strategy for a period of at least 30 consecutive financial years.

The task of building, operating and maintaining infrastructure assets in an affordable manner is becoming increasingly difficult in view of:

- Demographic changes
- Environmental impacts
- New technologies
- Continually changing legislative environment (Central & Regional Government)
- Infrastructure resilience
- Aging of infrastructure

Council considered these impacts and developed a strategy to guide decision-making for the next 30 years.

Annual Plan and Budget:
The works identified in this AMP will form the basis on which future annual plans are prepared.

Procurement Strategy:
This is required by the Land Transport Management Act and signals Council's intentions for procurement of subsidised land transport activities.

Contracts:
The levels of service, strategies and information requirements contained in AMP's are translated into contract specifications and reporting requirements.

Bylaws, standards and policies:
These tools for asset creation and subsequent management are needed to support AM tactics.

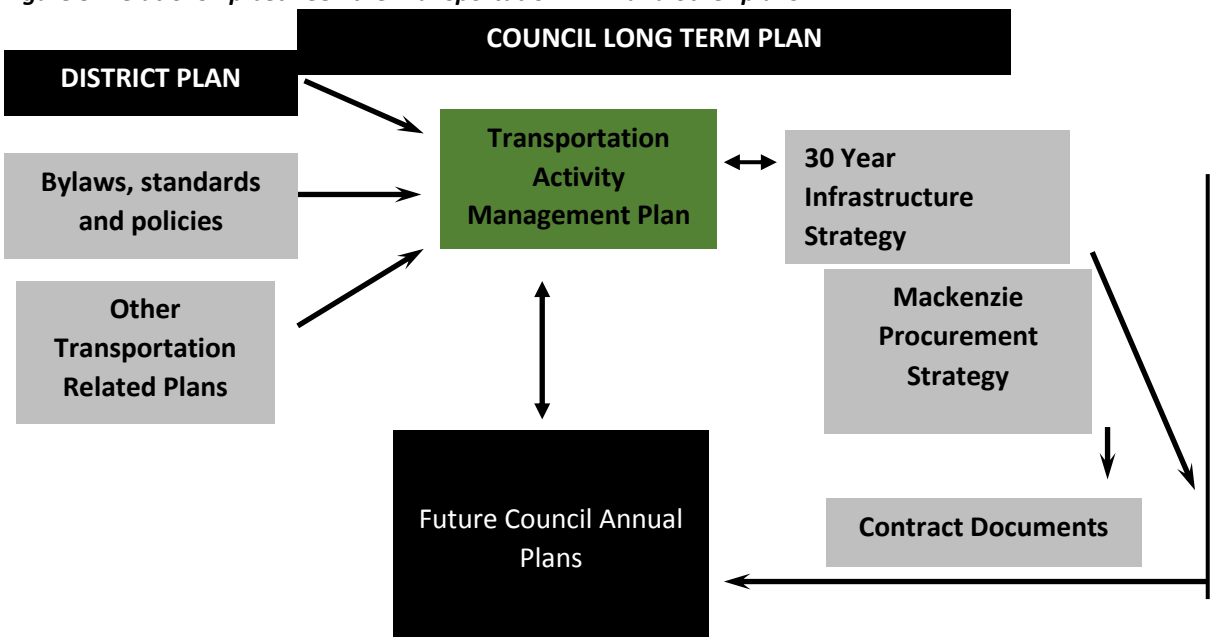
Other Transportation Related Plans:
These include:

- MDC Transportation Strategy
- Walking and Cycling Strategies
- Regional Policy Statements
- Regional Land Transport Strategy
- Regional Passenger Transport Plan
- Government Policy Statement
- New Zealand Transport Strategy

- New Zealand Walking and Cycling Strategy; Getting there on foot, by cycle.

Figure 5 illustrates the relationships between this LTAMP and other Council plans.

Figure 5: Relationship between the Transportation AMP and other plans

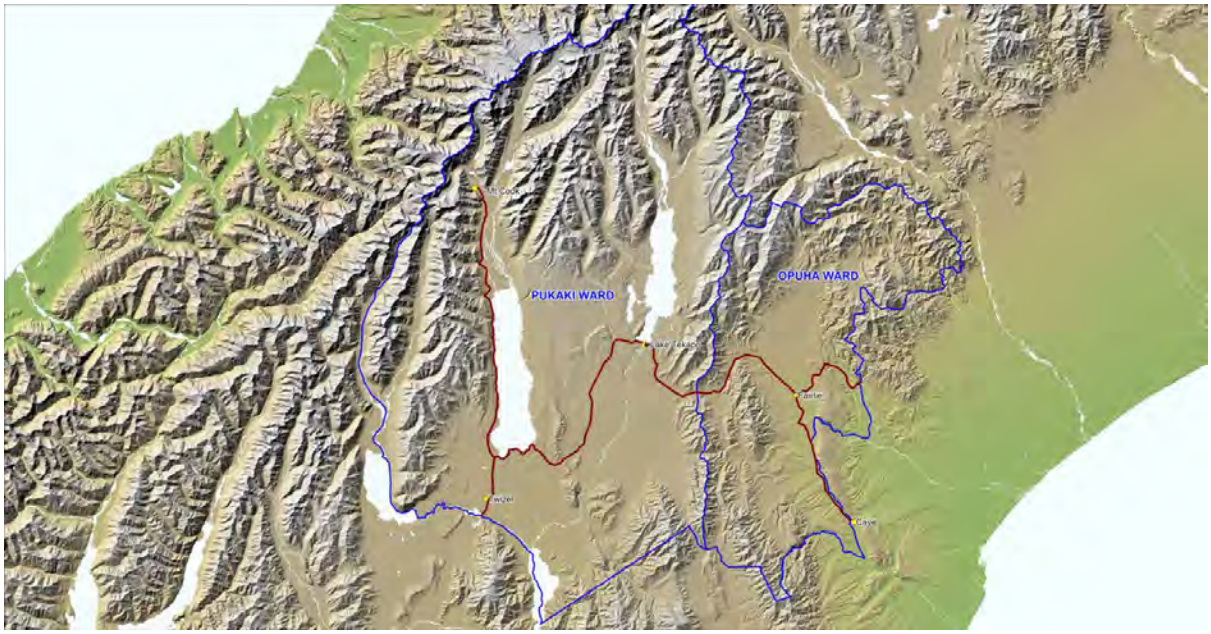


2.3 ASSETS INCLUDED IN THIS PLAN

2.3.1 Location

Figure 6 shows the location of the district within the Canterbury Region. The Mackenzie District is bounded in the north and east by the Timaru and Waimate Districts, in the south by the Waitaki District and to the West by the Southern Alps/ Westland District boundary. There are two wards: Pukaki which in effect takes in the Mackenzie Basin and Opuha being the remaining area to the east of a line following the upper reaches of the Hakataramea River through Burkes Pass to Mt Musgrove in the Two Thumb Range.

Figure 6: Map of the Mackenzie District



- State Highways 8, 79 & 80 are the responsibility of the NZTA which form the backbone of the local district roading network. The Mackenzie road network consists of "Secondary Collector " roads that lead from the State Highways into the remote areas of the District, form routes through the District or are the main through roads in the urban settlements. "Access & Low Volume Access" roads generally extend from these "Secondary Collector" roads to serve the remaining urban and rural areas and provide linkages.
- The condition of the roads is continually changing due to tourism, land intensification, climatic conditions, topography and traffic changes.
- As some inter district boundaries follow rivers, there are three boundary bridges. These have joint ownership.

2.3.2 The Asset

The transport asset includes all Council owned road reserve, roads, streets, bridges, footpaths and related infrastructure within the District as shown in Figure 6.

Table 5: Transportation assets included in this plan

Asset Description	Sub-Asset Description	Quantity
Land		1,395Ha
Roads	All roads	732.19km
	Urban - Sealed	50.07km
	Urban - Unsealed	5.12km
	Rural - Sealed	163.3km
	Rural - Unsealed	513.65km
Footpaths		59km
Drainage	Culverts	18.07km
	Catch Pits	309
	Side Drains	16.1km
	Soak Pits	40
	Earth Surface Water Channel	739.97
	Kerb and Channel	63.8km

Asset Description	Sub-Asset Description	Quantity
Bridges	Bridges - Timber	7
	Bridges – Other (Including 7 large Box Culverts)	88
	Cattle stops	58
	Concrete Fords	20
Signage	Signs	3342
	Posts	1145
Lighting	Lanterns (include brackets)	791
	Columns	696
Features (gates, Intersections, Monuments, stockpile sites)		164

Unformed roads are not included except in the land area.

2.4 KEY STAKEHOLDERS AND CUSTOMERS

2.4.1 Key Stakeholders

The Council as the ultimate owner of assets and the Crown (through Ministry of Transport financial assistance) wish to ensure that their investment is secure and that the operational capability of the network is ensured. The Crown entity established to manage Transportation activities is the NZ Transport Agency (NZTA). Other key stakeholders of the roading network include:

- Regional council
- Owners and operators of inter-connecting or co-located networks, including NZTA state highways
- Significant representative user-groups such as Road Transport Association (RTA)

2.4.2 Funding Partners

Funding is provided by several parties and in particular the following are significant contributors:

- NZ Transport Agency – The District Transportation Programme is financially assisted by NZTA in accordance with operational requirements set out in NZTA Programme and Funding Manual.
- Ratepayers – Rates provide funding for non-subsidised activities and the Councils “local share” of subsidised works.
- Both NZTA and Council are partners in delivering Transportation Activities to the community.
- Recently Central Government has set up the “Tourism Infrastructure Fund” to assist Council to support the development of public infrastructure that is used by visitors

2.4.3 Customer Groups

Council’s customers fall into three different groups: associated service providers, users and the wider community. These are shown in

Figure 7 and further detailed in Table 6.

Figure 7: Customer Groups (Ref IIMM Figure 2.1.6)

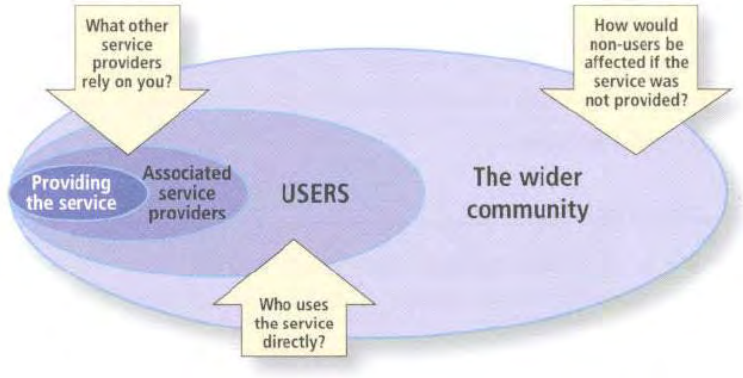


Table 6: Council's Roading Customer Groups

Customer Group	Description	Customers
Associated Service Providers	These are other service providers who rely on the transportation network	• Contractors • Utilities service providers – use the road corridor to access their assets • Transport operators • Emergency Services
Users	Those who directly use the service	• Private drivers • Commercial road users • Drivers of public and other transport services (e.g. tourist buses) • Pedestrians and cyclists
The Wider Community	Non-users that are affected if the service is not provided	• Citizens • Tourists • Residents who live beside the roads • Local businesses – requiring access

2.4.4 Other Parties

Other parties with an interest in Council's AMP include Council employees, consultants and contractors who manage and work on the asset.

2.5 ORGANISATION STRUCTURE

Mackenzie District Council's organisation structure is shown in Figure 8. This AMP covers activities included under Essential Services, led by the Council Asset Manager and Roading Manager.

Figure 8: Council Organisation Structure - as at December 2017

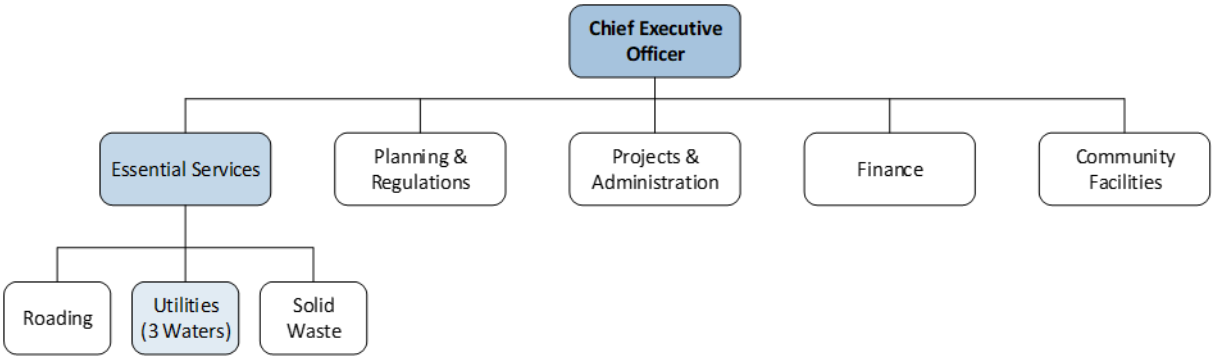
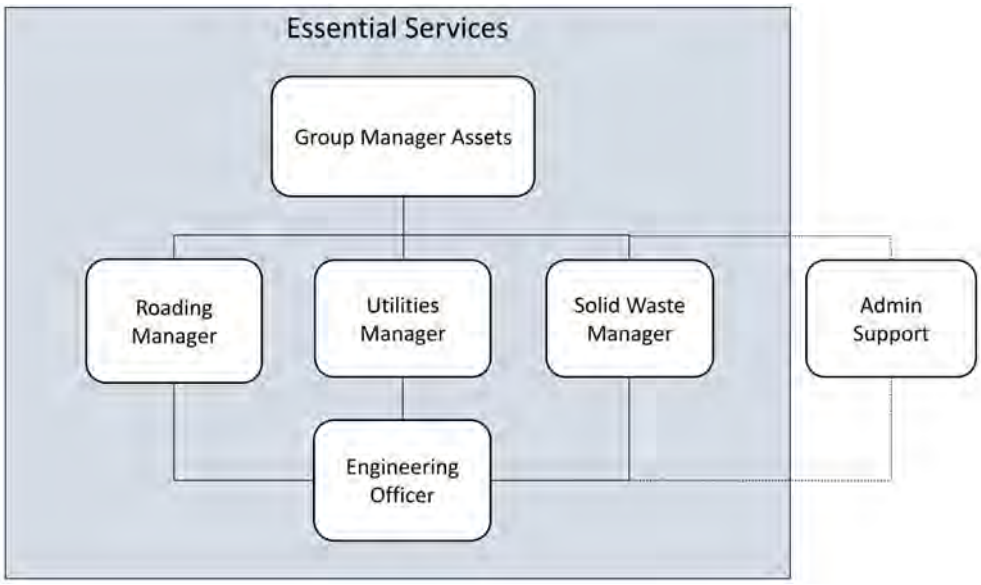


Figure 9: Essential Services Group Structure



Council has an Asset Manager, Roading Manager and an Engineering Officer responsible for the maintenance management of the Roading network. Occasionally some elements of the work are tendered to consultancy services to manage (e.g. Major Projects etc.). The Roading Manager and the Maintenance Contractors regularly inspect and monitor the network. Any work identified is directly tasked to the incumbent maintenance contractor or, if it is beyond the scope of the maintenance contract, tendered using Competitive Pricing Procedure guidelines. This may or may not need the involvement of consultants depending on the nature or extent of the work.

Council has in place a Multi-Party Funding Agreement (MPFA) with Timaru District Council to provide professional services to assist with the management of the road network. This provides the ability to buffer workloads, provide expertise that we may not have available and also helps with consistency of asset management practices across both Councils.

Council accounts for revenue and expenditure on an accrual basis. All work under the Works Programme is identified through a job cost ledger with a significant level of breakdown using analysis

codes. The costs are summarised into the general ledger where operational/maintenance costs are identified separately to capital/renewal items.

The majority of the work (physical works and professional services) carried out as part of the total management of all Roading Asset functions is actioned under either physical works or consultancy contracts.

All contract works are claimed monthly against each of the contract item numbers by the physical works and professional services contractors. Council and/or consultants confirm the payment value for all physical works and the Council confirms the payment of any professional services. The accounts job number and account codes are included on the payment certificate. These certificates are forwarded to Council for payment. The types of work that this system relates to are maintenance, renewals and capital expenditure.

There are a range of reports prepared in order to comply with the requirements of Council, and the Auditors. All external reports are prepared in compliance with Generally Accepted Accounting Principles (GAAP).

2.6 GOALS AND OBJECTIVES OF ASSET OWNERSHIP

2.6.1 Purpose of Ownership

Council provides a safe, efficient, convenient and comfortable roading network to ensure appropriate property access and freedom of travel for all road uses including pedestrians and cyclists. The provision of a roading corridor also accommodates the infrastructure of utility service providers throughout the District. The Council's overriding aim is:

To ensure all roading assets are managed to provide the desired level of service in the most cost effective and achievable manner for existing and future customers.

2.6.2 Review of Activities and Funding

The LTP identifies planned activities, defines the rationale for justifying these activities, and identifies the appropriate funding source.

2.6.3 Legal Authority for Council Action

The Local Government Act 2002 gives local authorities the full capacity, and full rights, powers and privileges, to carry on, undertake any activity or business, do any act, enter into any transaction wholly or principally for the benefit of its district.

Along with these wide powers comes the requirement to identify all reasonably practicable options before making a decision, to assess the benefits and costs of each option against the likely economic, environmental, social and cultural impacts.

Local authorities are also required to consult widely, effectively and appropriately with the community to determine the communities' wishes and to seek feedback on all potentially significant activities – not only when a particular course of action is proposed, but at the various stages of the decision-making process.

A significant aspect of this consultation process is the development of the LTP, which forms the long-term (not less than ten years) direction for all Council's activities.

2.7 LINKS TO ORGANISATION VISION, MISSION, GOALS AND OBJECTIVES

2.7.1 Vision

Mackenzie will be a district in which:

- We foster the unique attributes and strong sense of community that makes the Mackenzie District special.
- Our natural environment is protected and enhanced in balance with achieving social and commercial objectives.
- A dynamic economy that provides employment and investment opportunities consistent with the quality of life aspirations of existing and future generations.
- Democracy is respected and equal opportunities are provided, for which the rights of the individual are upheld.
- A variety of sporting, recreational, cultural, spiritual, welfare and educational resources are available to enrich the lives of our people.
- Safe, effective, sustainable water, waste, communication, energy and transport systems are in place.
- People are encouraged to use their skills and talents for the benefit of the community.

Council's outcomes and objectives for the road network are stated in the LTP 2018-2028.

These outcomes and objectives have been translated into various targets for maintenance and renewals to be achieved in each financial year. The outcomes are reported in each Annual Report.

The principal goal is to provide an effective, efficient, accountable and sustainable range of services that meet the actual needs of the residents. The road network provides access to each residence in the District and allows the free, safe and efficient movement of all types of traffic.

The over-riding management strategy is that the roading infrastructure as it presently exists will be maintained to deliver at least the current Levels of Service in perpetuity providing funding allows.

Table 7 outlines the community outcomes and transportation levels of service.

Table 7: Community Outcomes and Performance Measures

Community Outcomes		
• Safe, effective and sustainable infrastructure' • 'A thriving economy' • 'An attractive and highly valued natural environment' • 'A fit and healthy community'		
Levels of Service	**Measure of Service**	**Targets**
Council provides safe, smooth, quality sealed roads in order to reduce travel times and vehicle wear.	The average quality of ride on a sealed local road network, measured by smooth travel exposure.*	90% for rural and 75% for urban roads.

Community Outcomes		
• Safe, effective and sustainable infrastructure' • 'A thriving economy' • 'An attractive and highly valued natural environment' • 'A fit and healthy community'		
Levels of Service	**Measure of Service**	**Targets**
	The percentage of the sealed local road network that is resurfaced.*	≥4%
	The percentage of the unsealed road network renewed using wearing course and stabilisation techniques.	≥2%
	The percentage of road users are satisfied with the roading network.	≥85%
Council provides a safe and efficient roading network.	The change from the previous year in number of fatalities and serious crashes on the local road network, expressed as a number.	Change from each previous financial year= 0 (Equates to a total target of ≤2 fatality and serious injury crashes)
	The percentage of customer service requests relating to roads and footpaths to which Council responds within the timeframe specified in the LTP	≥75% of service requests relating to roads and footpaths will be responded to within 10 working days.
Footpaths are maintained in good condition and are fit for purpose	The percentage of footpaths that fall within the level of service or service standard for the condition of footpaths that is set out in the LTP.*	≥75% of the total length of footpaths are at or above the 'average condition rating'. Condition rating will be undertaken at not less than 5 years frequency.

2.8 ASSET MANAGEMENT DRIVERS

The business drivers, which define the need, priority and scope for improved AM practices within Council may be summarised as follows:

2.8.1 Customer Service

Customers require that agreed levels of service be delivered reliably, efficiently and economically. The use of AM techniques provides the following benefits in satisfying these demands:

- focuses on identifying and satisfying customer requirements
- provides a basis for customer consultation when determining levels of service preferences by identifying the range and cost of service level and service delivery options
- enhances customer confidence that funding is being allocated in an equitable and cost effective manner; that assets are being well managed and improves understanding of service level options and requirements.

2.8.2 Financial Responsibility

"The Local Government Act section 101A Financial Strategy":

(1) A local authority must, as part of its long-term plan, prepare and adopt a financial strategy for all of the consecutive financial years covered by the long-term plan.

(2) The purpose of the financial strategy is to—
- *(a) facilitate prudent financial management by the local authority by providing a guide for the local authority to consider proposals for funding and expenditure against; and*
- *(b) provide a context for consultation on the local authority's proposals for funding and expenditure by making transparent the overall effects of those proposals on the local authority's services, rates, debt, and investments.*

(3) The financial strategy must—
- *(a) include a statement of the factors that are expected to have a significant impact on the local authority during the consecutive financial years covered by the strategy, including—*
  - *(i) the expected changes in population and the use of land in the district or region, and the capital and operating costs of providing for those changes; and*
  - *(ii) the expected capital expenditure on network infrastructure, flood protection, and flood control works that is required to maintain existing levels of service currently provided by the local authority; and*
  - *(iii) other significant factors affecting the local authority's ability to maintain existing levels of service and to meet additional demands for services; and*
- *(b) include a statement of the local authorities—*
  - *(i) quantified limits on rates, rate increases, and borrowing; and*
  - *(ii) assessment of its ability to provide and maintain existing levels of service and to meet additional demands for services within those limits; and*
- *(c) specify the local authority's policy on the giving of securities for its borrowing; and*
- *(d) specify the local authority's objectives for holding & managing financial investments, equity securities and its quantified targets for returns on those investments & equity securities.*

The implementation of the optimised work programmes and resulting long-term cash flow projections contained in AMPs will aid compliance with these requirements.

AMPs (supported by appropriate processes, systems and data) should provide clear justification for forward works programmes (and associated funding programmes) and provide the ability to even out peak funding demands and account for changes in asset service potential.

2.8.3 Environmental Responsibility

Activity Management Planning demonstrates how Council is addressing sustainable management of its physical resources while enhancing the protection of the environment as required under the provisions of the Resource Management Act.

2.8.4 Safety

AM planning addresses Council's safety obligations through:

- • adoption of appropriate design standards for the creation of new assets
- • development of risk management practices
- • monitoring and reacting to road safety issues

2.8.5 Economic Efficiency

The techniques incorporated into this AMP support economic efficiency by:

- providing a basis for monitoring asset performance and utilisation
- enabling asset managers to anticipate, plan and prioritise asset maintenance and renewal expenditure
- identifying under-funding of asset maintenance and renewal
- identifying opportunities to build resilience into the network and the infrastructure that supports it.
- extending the life of an asset by optimising maintenance programmes and demand management

2.8.6 Achieve Strategic Goals

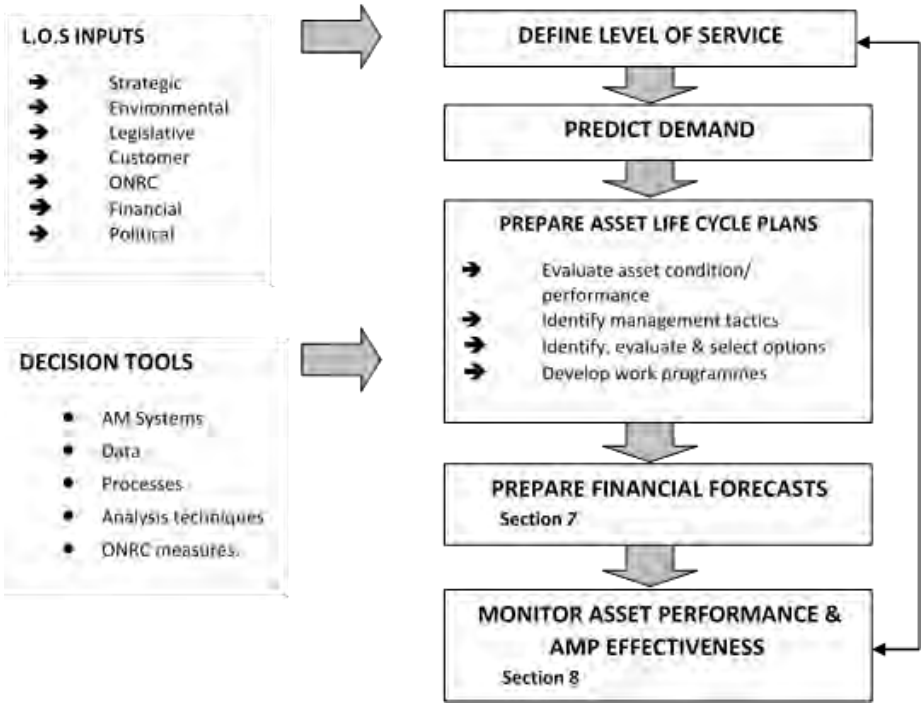
Council has a strategic intent to "achieve sustainable development" and other goals relating to growth, building communities, protecting the environment, supporting the economy and providing quality customer service. This activity plan for transportation has been developed to implement this intent.

2.9 PLAN FRAMEWORK

This AMP is structured around the current asset inventories, the existing levels of service and consequential financial management plan for at least the next ten years. It includes Maintenance requirements, Renewals, and Capital improvements in terms of NZTA and Council requirements.

This AMP generally follows the format recommended in the National Asset Management Steering Groups (NAMS) Infrastructure Asset Management Manual to a core level. Figure 10 shows the framework of this AMP.

Figure 10: Transportation AMP Framework



This AMP assumes that the current road network will be maintained in perpetuity.

2.10 APPROPRIATE LEVEL OF ASSET MANAGEMENT

The International Infrastructure Management Manual (IIMM) provides a summary of the different degree asset management complexity: Aware, Basic, Core, Intermediate and Advanced. The degree of complexity differs according to an organisation's corporate needs. The level of complexity of Asset Management is dependent on the following:

- The costs and benefits to the organisation
- Legislative and other mandated requirements
- The size, condition and complexity of the assets
- The risks associated with failures
- The skills and resources available to the organisation
- Customer expectations

A core AMP will meet minimum legislative and organisational requirements for financial planning and reporting. It provides basic technical management outputs such as statements of current levels of service, forward replacement programmes and associated financial projections and is appropriate for the needs of the network.

Council considers the required sophistication of their plan in the short to medium term need not progress beyond a "Core" planning level, as the cost at this time to move to an advanced plan would provide little significant benefit to Council or its' customers

- the size, complexity and use of the assets is consistent with a rural sparsely populated district
- the risks associated with failure are low

The current AMP generally meets "Core" requirements as outlined in the IIMM 2011. By implementing improvement planning Council can assess the asset management performance and identify gaps to drive improvement actions.

3 DESCRIPTION OF TRANSPORTATION ASSET

3.1 DESCRIPTION OF ACTIVITY

Roading is the largest Council activity with 13.5% (2016) of Council's current expenditure devoted to this activity.

The Mackenzie District Council owns and is responsible for the day-to-day operation, maintenance, renewal and improvement of the District's local roading network excluding State Highways No 8, 79 and 80 which are owned by the Crown and managed by the New Zealand Transport Agency. The Council also provides other assets such as footpaths and street lights. State Highways 8, 79 and 80 are an important part of the overall roading network in the District. The Council works with New Zealand Transport Agency and the Regional Transport Committee to meet its obligations with regard to roading and to be consistent with the Regional Land Transport Strategy.

The purpose of road assets is to provide a sustainable, safe, convenient, comfortable and cost effective road network for the free movement of people, goods and vehicles throughout the Mackenzie District.

The transportation asset is made up of the following components, which are described in more detail in the sections below.

- Land
- Road pavements - sealed and unsealed
- Bridges, fords and other structures
- Drainage
- Traffic services
- Footpaths
- Street lighting

3.1.1 Maintenance Road Groups

The Mackenzie District roading consists of a network of "Secondary Collector", "Access" and "Low Volume Access" roads as classified under ONRC leading from the State Highways to many remote localities and providing convenient access in and around the three main urban centres of Twizel, Lake Tekapo and Fairlie (Mt Cook Village is administered by the Department of Conservation). The network is predominantly rural (93%), unsealed (72%) and with light average daily traffic volumes (less than 500 vehicles per day)

The Council has adopted the ONRC classification system based on traffic volumes and the use of the roads as shown in Figure 11.

The One Network Road Classification (ONRC)
The ONRC is a new framework that categorises roads throughout the country. This is the first time in the history of New Zealand that consistent specifications will apply to all public roads from Cape Reinga to the Bluff, depending on what purpose they serve.

The ONRC considers the needs of all road users, be they motorists, cyclists or pedestrians. It will give road users more consistency and certainty about what standard and services to expect on the national road network, including the most appropriate safety features. It will also help New Zealand to plan,

invest in, maintain and operate the road network in a more strategic, consistent and affordable way throughout the country.

The below illustrations outlines ONRC the road classification hierarchy and describes how the classifications are determined. The Mackenzie District is made up of 29% secondary collector, 9% access, 60% low volume roads. These hierarchies have been recorded in RAMM.

Figure 11: One Network Road Classification System

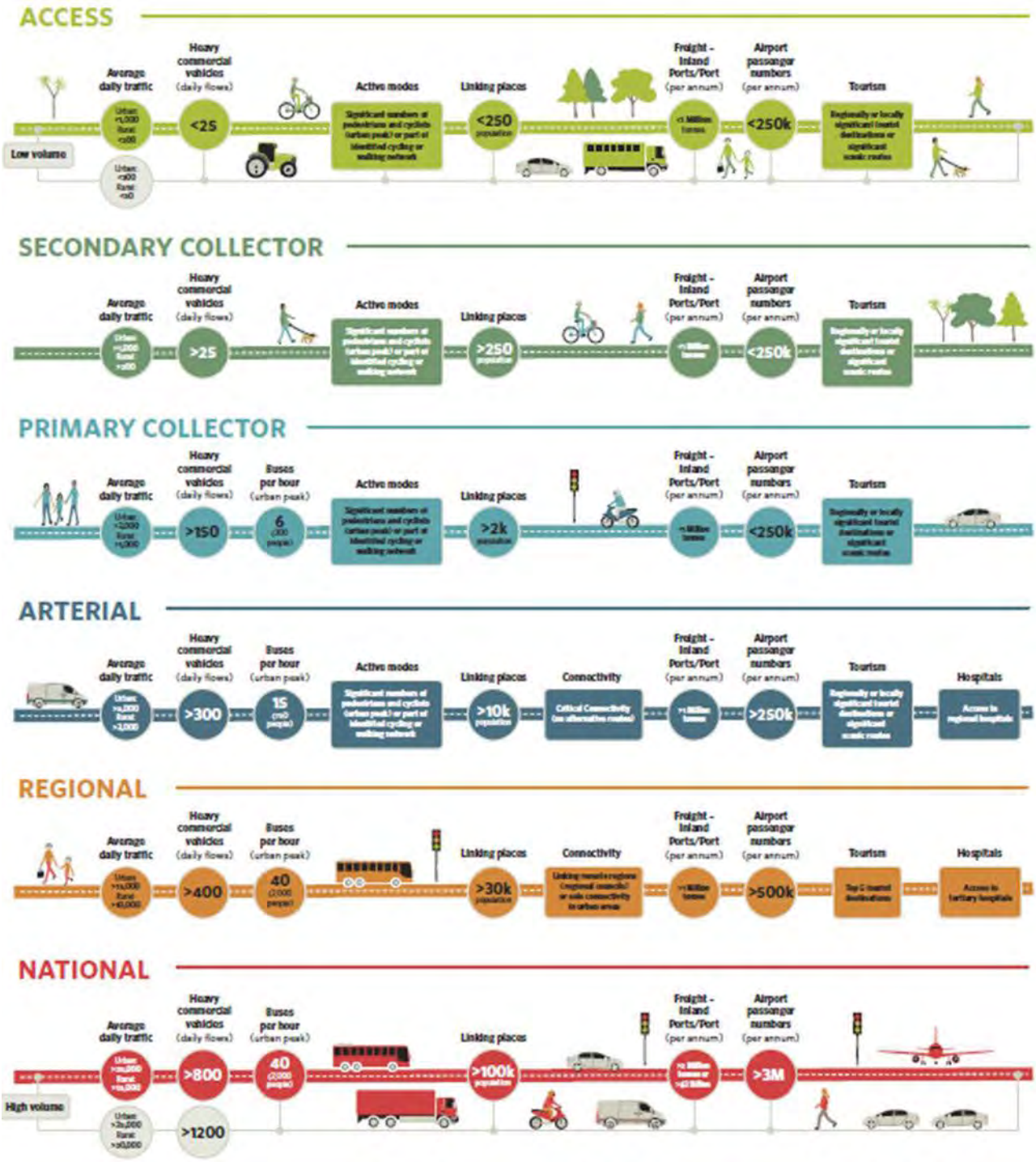
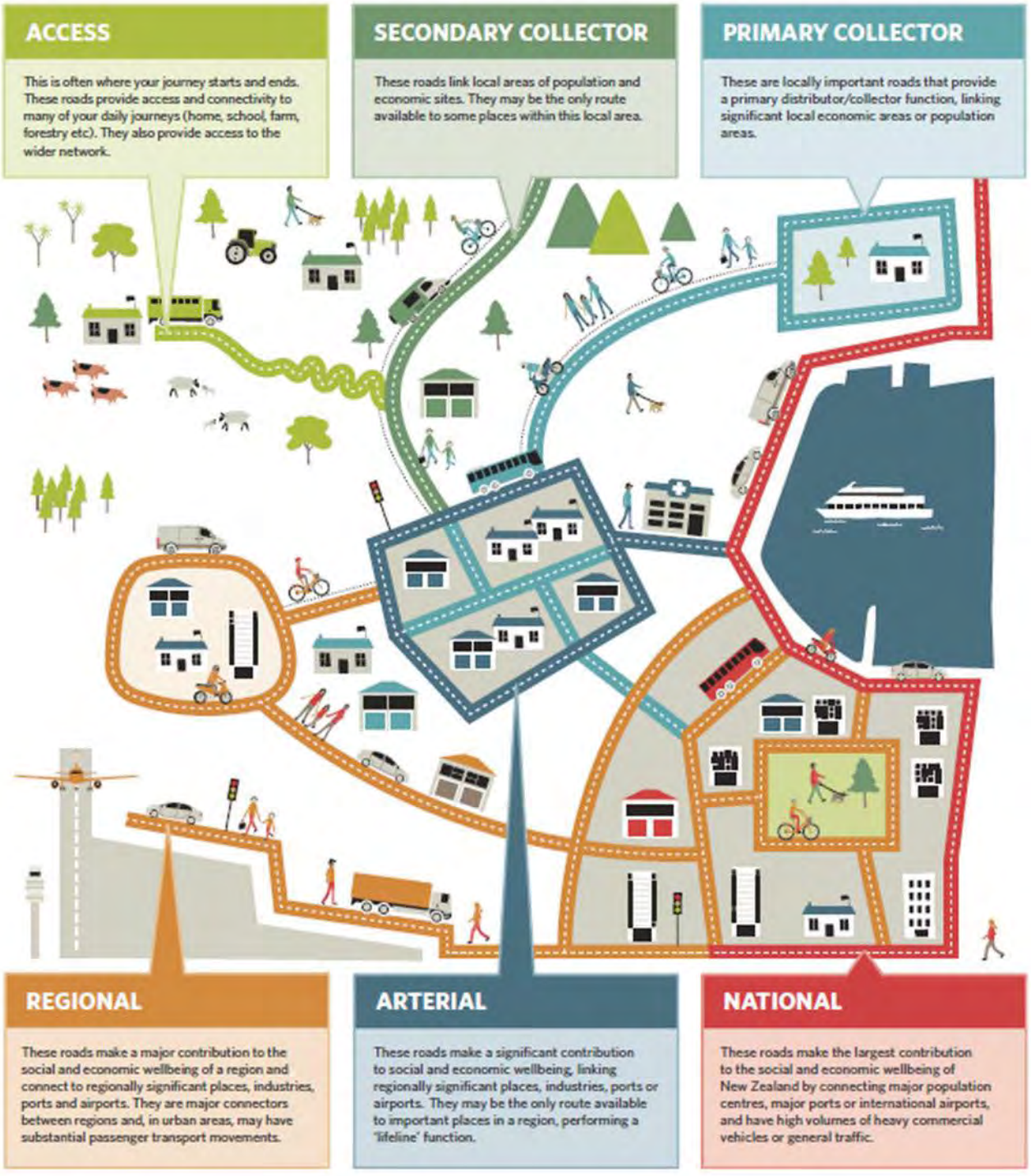


Figure 12: One Network Road Classification Network Make Up



3.2 ROAD PAVEMENTS

Mackenzie District Council owns, operates and maintains a total of 732.18km of road pavements. There are 213.4km of sealed road total, 50.07km of the sealed network being urban roads (i.e. where the legal speed limit is 70kph or less) and 163.3km of the roads being sealed rural roads.

There are 518.77km of unsealed roads within the network and only 5.12km of these in the urban area. The unsealed roads, which are spread throughout the district and are generally lower volume roads that provide access from individual properties to Secondary Collector roads and the State Highway

Network. They generally have lower speed values than sealed roads, with the aim of providing a suitable surface for the public to travel comfortably at 70 km/hr. on straight sections.

The amount of each type of road based on road hierarchy groups is detailed in Table 8.

Table 8: Sealed and unsealed pavement qualities

Class	Rural AADT	Urban AADT	HCV Daily	Additional Criteria
Secondary Collector	200-1000	1000-3000	25-150	• Buses per hour (urban peak) • Pedestrian/cyclist numbers • Linking populations • Critical connectivity • Ports / Inland Ports (tonnage) • Airport Passengers (per annum) • Tourism (significant destinations) • Hospitals (tertiary or regional)
Access	< 200	<1000	<25	
Low Volume	<50	<200	<25	

3.3 BRIDGES

Council manages a total of 95 bridges with a combined length of 1993m including 7 large culverts (considered bridges as they have a waterway area over 3.4m2). The types of bridges include:

- 86 single lane bridges (90% by length)
- 7 timber bridges (7% by length)
- 14 speed and weight restricted bridges
- 20 fords with improved access, 44 Fords in total.

3.4 DRAINAGE

Mackenzie District Council owns, operates and maintains drainage assets associated with the road pavements. The quantities of each type of drainage asset is detailed in Table 9.

Table 9: Drainage asset qualities

Drainage Type	Quantity
Kerb and channel concrete	17.4km
Dished Channel Concrete	0.8km
Mountable Kerb and Channel	2km
Mountable Kerb Concrete	0.2 km
Kerb only Concrete	3.3km
Dished Channel Sealed	39km
Kerb and Dished Channel Concrete	1.1km
Total	**63.8km**

Drainage Type	Quantity
Surface Water Channel (Deep)	378km
Surface Water Channel (Shallow)	361km
Total	**739km**
Culverts < 300mm dia.	1.6km
300 - 599mm dia.	2.2km
600 - 1,199mm dia.	13.7km
1,200 - 1,799 mm dia.	0.5km
> 1,800 mm dia.	0.05km
Total	**18km**
Catch pits	309
Soak pits	40
Side Drains	16.1km

3.5 TRAFFIC SERVICES

Council manages 3,342 signs, 289 culvert markers, 36km of road marking, 1183 road marking symbols.

Within RAMM there is an inventory for these traffic services asset components:

- signs
- culvert markers
- railings

There are currently no road markings or EMPs recorded in the RAMM database. Road marking data capture is currently being obtained by the contractor and inserted into a user defined table within RAMM.

3.6 FOOTPATHS

There are 62km of permanent footpath on the transportation network. These are principally designed for and used by pedestrians. The majority (36.7km) of the footpath is within the Twizel Township Urban area. A smaller amount (16.4km) is in Fairlie area and a further (9.2km) in Tekapo area. Footpaths on State Highways are included in this asset as they are the maintenance responsibility of the Council. These numbers are increasing as part of vesting assets with Council from development.

A summary from the current spread sheet inventory of formed footpath is included in Table 10.

Table 10: Footpath assets

Footpath Type	Length (m)	Area (m^2)
Asphalt concrete	12,900	26,500
Asphalt concrete / Grass	1,929	3,490
Asphalt concrete / Gravel	715	1,155
Chip Seal	39,986	123,950
Chip Seal / Grass	512	707
Chip Seal / Gravel	75	90
Cobbles	63	130

Footpath Type	Length (m)	Area (m^2)
Gravel	175	423
Concrete	5900	8800
Total	**62,255**	**159,803**

3.7 STREET LIGHTING

Council administers the maintenance and power consumption of street lights throughout the district including those on the state highways owned by NZTA, whose direct costs are recovered from NZTA. Street lighting asset details (excluding NZTA owned assets) are summarised in Table 11. The data contained within this table is correct as at November 2017, however Council has applied for funding to replace all these lights with LED equivalent, taking advantage of the 85% subsidy currently available for this project.

Table 11: Street Light Assets

Lights		Poles		Bulbs	
Type	**Number**	**Material**	**Number**	**Type**	**Number**
850mm Bollard	36	Concrete	170	Led 17 Watt	128
Mackenzie Park Double Style	5	Wood	5	100 Watt High Pressure Sodium	31
Mackenzie Park Style	38	Steel	521	150 Watt High Pressure Sodium	57
Market Square Style	22	Fibreglass	18	26 Watt Florescent	25
Tekapo Springs Style	19	Unknown (Alpine Owned)	449	2 x30 Watt Florescent	44
Windsor Heritage Bollard	267			35 Watt Low Pressure Sodium	432
Goughlite	630			36 Watt Low Pressure Sodium	1
				400 Watt Mercury Vapour	1
				55 Watt Low Pressure Sodium	12
				2 x 55 Watt Low Pressure Sodium	30
				70 Watt High Pressure Sodium	107
	128			LED 3000k	128
Total	1145		1145		1145

3.8 ENVIRONMENTAL ISSUES

3.8.1 Dust Nuisance

With its large proportion and length of unsealed roads, dust can be a significant nuisance, to dwellings situated near roads, to following/passing vehicles and adjacent land uses. The Council does not use dust suppression agents, as these are costly, short lived and require reapplication. Council has introduced silty/clay bound wearing course for unsealed roads, which has helped to mitigated dust to

some extent. Council has been undertaking trials with locally sourced pit weathered rock materials ("rotten rock") over the past 4 – 5 years, this is showing significant dust suppression qualities and reduction in routine maintenance cost. This material has progressed to being used as a wearing course as close proximity sources allow or there are dust nuisance or maintenance issues. It is not intended to roll this out to entire road lengths but trials are still continuing and performance of the various source materials are monitored as well as trialling and monitoring of new sources.

The Council has a current policy for sealing past houses where a house was built or relocated after 2002. Council has placed a dust nuisance warning on LIM and PIM reports since that date and is considered due diligence to warn of possible dust problems. As such the applicant will be required to fully fund the Council approved dust nuisance project. For properties that were built or relocated prior 2002 Council and landowner are carry out a cost sharing exercise going 50/50 share with the Council's contribution capped at $10,000 at a maximum length of 200m for any one request. This would likely be unsubsidised unless it meets NZTA Guidance Note (Dust Circular 16/04) where subsidy maybe available depending if it meets the set out criteria. On-going maintenance is carried out by the Council. These isolated seals that we currently have are expensive to maintain and resurface and we try to minimise these as much as possible trying other forms of treatment in the interim.

3.8.2 Physical Works Impacts

Roading maintenance activities generally do not have major adverse environmental effects. The control of dust and water pollution at work sites is carried out under the contractors' quality and environmental management plans. Work in riverbeds requires resource consent from Environment Canterbury. The only long term impact on the environment is the creation of borrow pits for the extraction of aggregate for unsealed road maintenance. Both the Council and contractors take care in how these are managed and are rehabilitated after use. We will try to limit the extend and number of borrow pits in future as they can cause reasonable road safety hazards at certain times of the year and once all of the material has been harvested leaves a large hole.

3.9 FUTURE WORKS

The current age and remaining life of all assets are reviewed regularly, as more accurate information and knowledge becomes available. As the confidence in this data grows the accuracy of the life cycle management requirements improves significantly.

4 LEVELS OF SERVICES

4.1 DEFINING THE LEVEL OF SERVICE

Activity management planning requires a clear understanding of customer needs and preferences and the minimum obligations that must be met. A key objective of this activity plan is to match the level of service provided by the asset with the expectations of the customers given legislative, financial, technical and safety constraints. Service standards, set to meet this objective, provide the basis for the life cycle management strategies and work programmes identified in Section 7.

The service standards defined in this section will be used:

- to ensure legal and legislative requirements are met
- to inform customers of the type and level of service offered
- as a focus for the asset management strategies developed to deliver the required level of service
- as a measure of the effectiveness of this Plan
- to identify costs and benefits of the services offered
- to enable customers to assess the suitability, affordability and equity of the services offered

The Council levels of service for Transportation reflect current industry standards and are based on:

- Customer Research and Expectations: Information gained from the community on their expectations of quality and price of services
- Strategic and Corporate Goals: Provide guidelines for the scope of current and future services offered, the manner of service delivery and define specific levels of service which the Council wishes to achieve
- Legislative Requirements: Environmental standards, regulations and acts that impact on the way assets are managed (i.e. resource consents, building regulations, health and safety legislation, Local Government Act)
- Demands on the Roading Network: Service demands that are placed on the network by the mix of road users and how this demand varies across the District.

4.2 CUSTOMER RESEARCH AND EXPECTATIONS

The Council utilises the following methods to determine and measure customer expectations:

- Public meetings
- Consultation via the Annual Plan and LTP process
- Feedback from customers and elected representatives
- Publicity
- Council are currently undertake Customer Surveys annually.

Road users want full time availability of safe, smooth roads and adjacent land owners/occupiers want to minimise the impact these roads have on them and their properties but retain maximum benefit from the access and convenience that the roads provide.

Customer expectations are one of the key considerations used to determine the acceptable target levels of service prescribed for the Council Road Network. The Council classifies road users as customers in the context of service provision although not all road users are ratepayers.

The community's expectations can be summarised as being:

- Roads address the needs of network continuity
- Roads serve demands for access consistent with the needs of the time
- Roads can be traversed at a level of safety, comfort and speed appropriate with their usual use
- Roads are constructed and maintained to avoid unjustified or avoidable expenditure
- Minimal interruption to use of roads

In order to achieve the above community expectations there are five specific strategies that the Council will implement:

- The maintenance of roads to provide appropriate ride quality for each road, based on the road's usual purpose and number of vehicles using the road
- The Council will maintain a road network where preferred routes are supported, where practicable, by sufficient alternative routes to minimise the impact of disruptions such as planned maintenance, storm/weather damage, accidents and other occasional hazards
- The Council will meet and coordinate operations with other Councils, agencies and the private sector (e.g. NZTA, Police, South Canterbury Road Safety Co-ordinating Committee) to improve road safety.
- The Council will employ preventative maintenance and monitoring systems to protect the District's roads, bridges, culverts and supplementary roading infrastructure to reduce avoidable damage, disruption and cost
- Roads will be maintained and improved in keeping with the demands of residential users, commerce, business and agriculture, where the level of use justifies the cost to ratepayers

Council has now been using the MagiQ service request system for a number of years. This system seems to work well for Council and provides easy access to historic records as well as to follow up on complaints and ensure performance measures are being met. This information provides a good measure of levels of service and identifies trends in issues/complaints received.

4.3 STRATEGIC AND CORPORATE GOALS

The road network must be operated to meet Council policy, objectives and various NZTA requirements where financial subsidies are involved. Council's goals and the community's expectations are stated in the LTP which provides the framework for the operation and development of the roading infrastructural assets.

4.3.1 Organisation Mission, Goals and Objectives

The Council's mission statement is: "FOSTERING OUR COMMUNITY". The particular aspects of the overall mission that relate to the roading activity are:

SERVICE
We are a service organisation. Providing efficient and cost-effective services is our prime responsibility.

SUSTAINABILITY
We are committed to the sustainable management of all the resources and infrastructure of the district.

4.3.2 Roading Activity Goal and Principal Objectives

As outlined in Council's Community Plan (LTP) Council, the roading asset contribution to achieving Council's governance goal and the community outcomes identified in Section 2 is through the Roading Activity Goal:

To ensure all roading assets are managed to provide the desired level of service and safety in the most cost effective and achievable manner for existing and future customers.

The specific Objectives of the roading activity are as follows:

- To develop an AMP for roading
- To contract cost-effective service delivery
- To ensure all roads are adequately maintained
- To identify and prioritise key areas for safety improvements and progressively correct these
- To develop and implement a planned programme of seal extension (NZTA funding is likely to be difficult to obtain)
- To meet established footpath standards and continue to implement them over time
- To be proactive in ensuring adequate funds are provided to maintain and develop the District's roading network for the best whole of life cost

4.4 LEGISLATIVE REQUIREMENTS

Legislative requirements set the framework for the minimum standards of service that Council as the Road Controlling Authority has to meet. The key legislation relating to the Council's responsibility to manage the Transportation asset is:

- Local Government Act 2002 (including amendments)
- Local Government Act 1974
- Land Transport Management Act
- Resource Management Act 1991
- Building Act 2004 and 2005 Amendment
- Health & Safety Act at Work Act 2015
- Civil Defence Emergency Management Act 2002
- Traffic Regulations Act 1976
- Public Works Act 1981
- Land Transport Rule: Setting of Speed Limits 2003
- Land Transport Rule: Traffic Control Devices 2004

The ***Local Government Act 2002*** gives local authorities the full capacity, and full rights, powers and privileges, to carry on or undertake any activity or business, do any act, or enter into any transaction wholly or principally for the benefit of its district.

Along with these wide sweeping powers comes the requirement to identify practicable options before making a decision, and to assess the benefits and costs of each option against the likely economic, environmental, social and cultural impacts.

Local authorities are also required to consult widely, effectively and appropriately with the community to determine the communities' wishes and to seek feedback on all potentially significant activities – not only when a particular course of action is proposed, but at the various stages of the decision-making process.

The Council has determined that it will consult its communities where practical, reasonable and within the resources available to it. A significant aspect of this consultation process is the development of the LTP, which forms the long-term (not less than ten years) direction for all Council's activities.

The remaining sections in the ***Local Government Act 1974***, in respect to roads, give local authorities the authority to construct, upgrade, and repair all roads with such materials and in such manner as the Council thinks fit. It also gives Council the power to name roads, set road gradients, charge betterment for any road improvement and the right to lay pipes under the roadway.

It also gives Council the power to "stop or close" a road.

The ***Land Transport Management Act (LTMA)*** requires Council to prepare a three year land transport programme (which is reviewed annually and fully redeveloped at the completion of the three year period) through a special consultative procedure, unless the local authority includes the matters that are required to be in such a programme in its LTP or Annual Plan, and provide details of those matters in a form acceptable to Land Transport New Zealand (NZTA).

When preparing its land transport programme Council must take into account how road maintenance:

- assists economic development
- assists safety and personal security
- improves access and mobility
- protects and promotes public health
- ensures environmental sustainability

Levels of service provided and maintenance practices used should be in line with the objectives of the New Zealand Transport Strategy and the requirements of the Land Transport Management Act 2003.

The ***Resource Management Act 1991*** requires Council to:

- sustain the potential of natural and physical resources to meet the reasonably foreseeable needs of current and future generations
- comply with the District and Regional Plans
- avoid, remedy or mitigate any adverse effect on the environment and structures (e.g. adverse effect of surface run-off from roads)

The ***Building Act 2004*** requires Council to:

- ensure all buildings and facilities constructed comply with the Act

- produce Project Information Memoranda (PIM's) which supply all available information relating to an individual property. For the roading network the relevant information may include details of access restrictions, approvals, leases, plans, relevant records, notices, etc.

The ***Health and Safety at Work Act 2015 (HSWA)*** was enacted on 4 April 2016. Working Safer is aimed at reducing New Zealand's workplace injury and death toll by 25 per cent by 2020.

The HSWA:

- reinforces proportionality – what a business needs to do depends on its level of risk and what it can control
- shifts from hazard spotting to managing critical risks – actions that reduce workplace harm rather than trivial hazards
- introduces the "reasonably practicable" concept – focusing attention on what's reasonable for a business to do
- changes the focus from the physical workplace to the conduct of work – what the business actually does and so what it can control
- supports more effective worker engagement and participation – promoting flexibility to suit business size and need.

A guiding principle of the HSWA is that workers and other persons should be given the highest level of protection against harm to their health, safety, and welfare from work risks as is reasonably practicable. The HSWA shifts the focus from monitoring and recording health and safety incidents to proactively identifying and managing risks so everyone is safe and healthy.

The HSWA identifies four duty holders:

persons conducting a business or undertaking (PCBUs) – these may be individuals or organisations	have the primary responsibility for the health and safety of their workers and any other workers they influence or direct. They are also responsible for the health and safety of people at risk from the work of their business
officers	(company directors, partners, board members, chief executives) must do due diligence to make sure the business understands and is meeting its health and safety responsibilities
workers	must take reasonable care for their own health and safety and that their actions don't adversely affect the health and safety of others. They must also follow any reasonable health and safety instruction given to them by the business and cooperate with any reasonable business policy or procedure relating to health and safety in the workplace.
other persons at workplaces	who come into the workplace, such as visitors or customers, also have some health and safety duties to ensure that their actions don't adversely affect the health and safety of others

Civil Defence Emergency Management Act 2002

Under the CDEM Act 2002 there is an expectation that Council's services will function at the best possible level and extent during and after an emergency, including no change from normal operation. Council has established planning and operational relationships with regional CDEM groups to deliver emergency management within Mackenzie District boundaries.

The ***Traffic Regulations Act 1976*** requires Council to:

- Comply with the rules for pedestrian crossings, traffic islands, road markings etc.
- Plan activities such that the network complies with driving rules

The ***Public Works Act 1981*** requires Council to:

- Set requirements for the acquisition of land by local authorities for roading works
- Sets requirements for stopping of roads and removal of trees on adjacent land

Land Transport Rule: Setting of Speed Limits 2003 and it's amendments requires Council to:

- Establish Speed Limits By-Law;
- Establish speed limits of 50km/hr. in urban traffic areas and 100km/hr. on rural roads and motorways;
- Authorise the setting of speed limits other than 50km/hr. on urban roads and less than 100km/hr. on rural roads, and to set temporary speed limits associated with work on or near the road and for special events.

Land Transport Rule: Traffic Control Devices 2004 and it's amendments requires Council to:

- Authorise and install traffic control devices in accordance with the rule;
- Ensure safe practice in the design and installation of traffic control devices and how they are used for traffic management.

Legislation (e.g. Resource Management Act) requires Council to consult with the Tangata Whenua and take into account the principles of the Treaty of Waitangi in the management of road infrastructural assets.

4.5 CURRENT AND TARGET LEVELS OF SERVICE

Council's community outcomes and their contributions to the roading activity are included In Table 12. Council's key levels of service and performance measures as defined in the 2018-2028 LTP are summarised in Table 13. These show how levels of service contribute to the community outcomes and provides a technical measure that enables Council to monitor current levels of service against target levels of service.

The One Network Road Classification (ONRC) was designed to standardise the performance of our roads throughout New Zealand, aiming to address historical inconsistencies, and promote economic growth. It is expected under ONRC that maintenance levels will change across the district. It is unsure under ONRC what the financial impact will be on the network as this is the first LTP the ONRC has whole heartedly been implemented. The emphasis is putting forward a strong business case supported by robust data and evidence which justifies the business case should be approved funding

but this is conditional on other districts bids and funding given the available funds continue to decrease from central government.

Table 12: Community Outcomes and how the Roading Activity Contributes

Community Outcome	How the Roading Activity Contributes
An attractive and highly valued natural environment	By providing vehicular access to areas while minimising the effect on the natural environment.
A thriving economy	By providing a safe and efficient highway/roading network for the transport of people and goods.
A fit and healthy community	By providing safe roads that provide access to sporting, recreational, social and medical amenities.
Safe, effective and sustainable infrastructure	By ensuring appropriate maintenance standards for roads and footpaths are adhered to and the network is steadily improved.

Table 13: Key Levels of Service and Performance Measures

Levels of Service	Measure of Service	Targets
Council provides safe, smooth, quality sealed roads in order to reduce travel times and vehicle wear.	The average quality of ride on a sealed local road network, measured by smooth travel exposure.*	90% for rural and 75% for urban roads.
	The percentage of the sealed local road network that is resurfaced.*	≥4%
	The percentage of the unsealed road network renewed using wearing course and stabilisation techniques.	≥2%
	The percentage of road users are satisfied with the roading network.	≥85%
Council provides a safe and efficient roading network.	The change from the previous year in number of fatalities and serious crashes on the local road network, expressed as a number.	Change from each previous financial year= 0 (Equates to a total target of ≤2 fatality and serious injury crashes)
	The percentage of customer service requests relating to roads and footpaths to which Council responds within the timeframe specified in the LTP	≥75% of service requests relating to roads and footpaths will be responded to within 10 working days.
Footpaths are maintained in good condition and are fit for purpose	The percentage of footpaths that fall within the level of service or service standard for the condition of footpaths that is set out in the LTP.*	≥75% of the total length of footpaths are at or above the 'average condition rating'. Condition rating will be undertaken at not less than 5 years frequency.

*NAASRA counts - National Association of Australian State Road Authorities counts are generated utilising a laser profilometer fitted to a vehicle travelling at speed on the Districts sealed roads, which records the road profile and converts the results into a roughness count/kilometre. The higher the

roughness count/kilometre, the rougher the road surface which may lead to reconstruction of the surface.

Currently in Mackenzie this is completed using response- type roughness measuring equipment to determine the movement form live rear axle in comparison to the body of the test vehicle.

Further to the levels of Service in Table 13 there are requirements that form part of the maintenance contract specifications. These are detailed in the following sections.

4.5.1 Road Efficiency Group and the One Network Road Classification

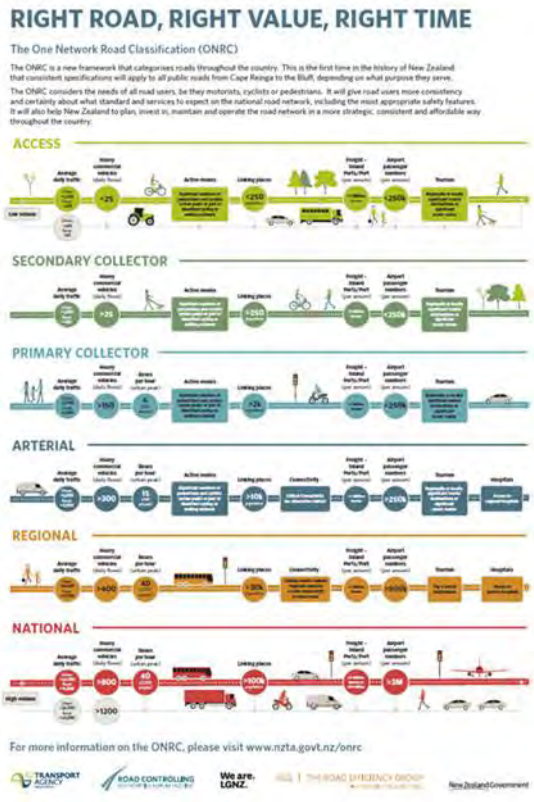
In 2011 The Minister of Transport established the Road Efficiency Task Force to examine what changes would be needed in the future funding and provision of roading. As a result, the Road Efficiency Group (REG) which included local government and NZTA, was set up to initiate a change management process. REG's purpose statement is "To Enable Efficient and Effective Transport Systems through Smart Investment"

This includes:

- The One Network Road Classification System
- The Business Case Approach
- Improvements to procurement practices
- Encouraging greater collaboration.

Mackenzie District Council has been, and will continue to be actively involved in each of these initiatives.

The One Network Road Classification (ONRC) was developed in 2013/14 and refinement of levels of service will continue through into 2018/19.

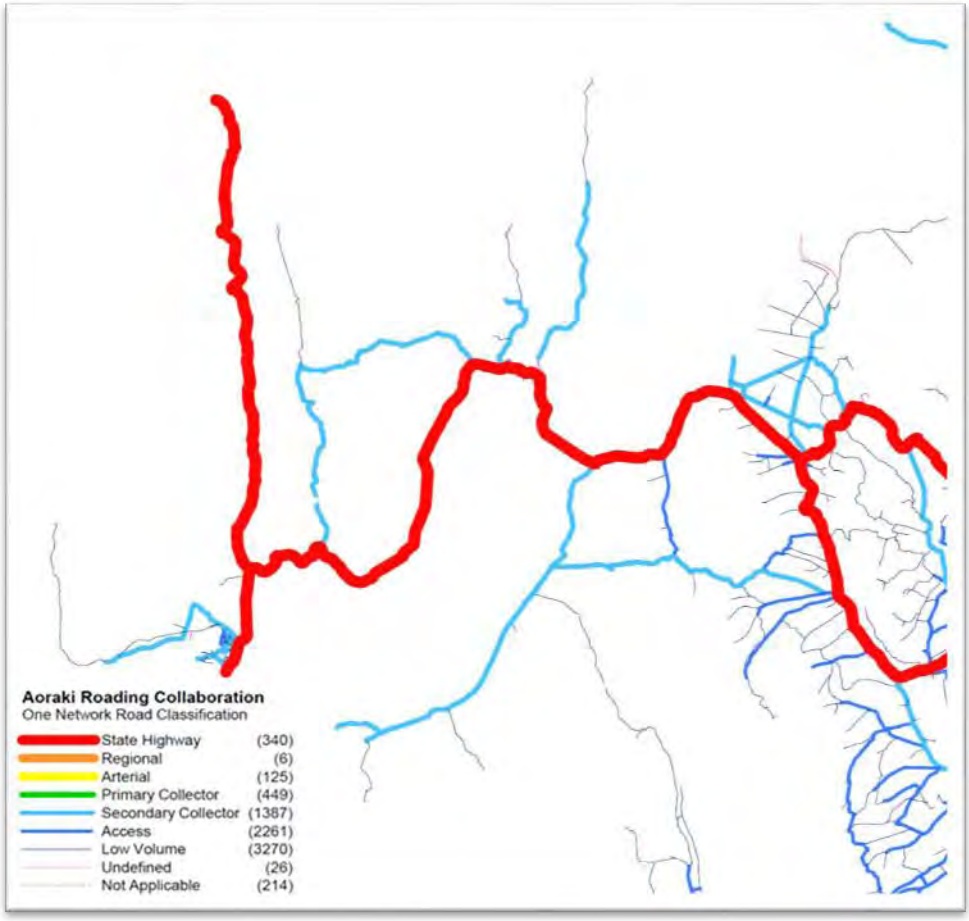


The One Network Road Classification (ONRC) is a classification system, divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available. The classifications include:

- National
- Arterial
- Regional
- Primary collector
- Secondary collector
- Access
- Access (Low Volume) was also added later

The Mackenzie roading network is characterised by many roads that 'hang' off the state highway network, and few through routes. 29% of the network roads are secondary collectors, 9% access, and the majority (60%) are low volume.

Figure 13: One Network Road Classification for Mackenzie District



The ONRC is a customer-centric model, with Customer Outcome measures including:

- Safety
- Resilience
- Amenity
- Accessibility
- Travel time reliability

Levels of service can be measured and compared nationally to identify where investment is needed to deliver a 'fit for purpose' roading network. Data is collected for these measures and used to drive prioritised investment in the issues and areas it is needed most. Safety and resilience are two of the key issues for the Mackenzie network, with a large number of visitors travelling on the network and challenging climatic conditions.

The Business Case Approach involves a different approach to network management and demonstration of the investment needed. The Roading Activity section of the LTP discussed this further.

Mackenzie has embraced new procurement and collaboration opportunities. The Aoraki Road Collaboration compromises Ashburton, Mackenzie, Timaru and Waimate District Councils. A common approach has been taken to asset management and maintenance contracts, with greater staff and

resource sharing. As a smaller authority this helps Mackenzie access a larger capability pool. Procurement is undertaken for resurfacing together to seek efficiencies and better value for money.

Each of these initiatives has benefitted Mackenzie District in the long-term provision of roading services; Council is able to demonstrate and articulate the issues clear, and work with its neighbours to deliver value for money results.

4.5.2 Safety Levels of Service

Council is focused on reducing the number and cost of crashes on the District's roads by maintaining the Operational Safety Measures as included in Table 14 and by providing the Traffic Services Levels of Service as detailed in the Table 14. Traffic services are devices used for the safe and orderly control of vehicles and people on public roads. The function of these devices is to:

- Regulate
- Warn
- Guide, and
- Inform road users

Table 14: Operational and Safety Measures

Safety Response Times	Secondary Collection	Access	Access Low Volumes
Potholes	5 days	10 days	10 days
Digouts /stabilisations	28 days	28 days	28 days
Surface Openings and Minor Surface Levelling	28 days	28 days	28 days
Surface Defects Sealed	5 days	10 days	10 days
Adjust Service Covers Urban			
Edgebreak	20 days	N/A	N/A
Weed and grass removal	7 days	3 weeks	3 weeks
Unsealed Shoulder Maintenance Rural	5 days	10 days	10 days
Localised Widening Rural	20 days	N/A	N/A
Minor Sealing	comply	comply	comply
Unsealed Road Potholes	5 days	7 days	7 days
Grading	5 days	7 days	7 days
Unsealed Road Pavement Metalling	5 days	7 days	7 days
Structures Maintenance Urban	1 day	7 days	7 days
Structures Maintenance Rural	1 day	7 days	7 days
Traffic Services - Non-regulatory signs	As Programmed	As Programmed	As Programmed
Traffic Services - Regulatory signs Urban	1 day	2 days	2 days
Traffic Services - Regulatory signs Rural	1 day	2 days	2 days
Edge Marker Posts	3 weeks	3 weeks	3 weeks
Roadmarking	1 day	5 days	5 days
Raised Pavement Markers	As Programmed	As Programmed	As Programmed
Drainage Maintenance Urban	5 day	10 days	10 days
Drainage Maintenance Rural	5 days	10 days	10 days
Surface detritus Rural	1 day	1 day	1 day
Surface detritus Urban	1 day	1 day	1 day
Surface detritus Urban CBD	1 day	1 day	1 day
Vegetation Control- Mowing and Spraying Urban	7 days	10 days	10 days
Vegetation Control- Mowing and Spraying Rural	7 days	10 days	10 days

Safety Response Times	Secondary Collection	Access	Access Low Volumes
Potholes	5 days	10 days	10 days
Footpaths, Walkways and Cycleways Maintenance Urban	1 days	7 days	7 days
Footpaths, Walkways and Cycleways Maintenance Rural	1 days	7 days	7 days
Granular Overlay	5 days	7 days	7 days
Incident Response - Winter Maintenance Urban	4 hours	4 hours	4 hours
Incident Response - Winter Maintenance Rural	24 hours	24 hours	24 hours
Unscheduled Works - Urgent Work	As programmed	As programmed	As programmed
Unscheduled Works - Emergency Work	Immediate	Immediate	Immediate

4.5.3 Asset Preservation Measures

Council is committed to maintaining and improving the network where current levels of service may not be being met. Analysis of the network condition over time provides an indication of asset behaviour and performance achievement.

4.6 GAP ANALYSIS

4.6.1 Levels of Service Development with Users and Stakeholders

The current level of service being provided has been established through Council's LTP process. Meaning there is approval with the current regime.

Options to further examine this issue in the future could include:

- Monitor and interpret customer feedback through customer feedback and complaints. This information can be analysed for any trends or common factors related to current service levels (e.g. number of complaints received from identified road sections can be compared to current conditions)
- Review agreed (with Stakeholders) Levels of Service on other local authority road networks as a means of benching these on this network as there may be opportunities to consider some reduction in service levels where any reduction would result in savings or enable some reallocation of expenditure between activities
- Engage customers in a formal process. Council is currently undertakes an independent customer survey annually.
- Engagement with key stakeholders. These include the Regional Council, NZTA, transport operator groups, Automobile Association and others. Good input information to these engagements will produce valuable feedback.

4.6.2 Levels of Service Definition

The current LoS are documented as a combination of:

- LTP LoS documentation based on real or perceived customer feedback
- Contract processes which describe some elements of the quality of service provided, mainly travelling surfaces and intervention levels

This can be improved by:

- Augmentation of existing information e.g. clearer relationships between alternative service levels for roughness, street lighting etc. and their associated costs.
- Utilisation of a level of service model defining quality, quantity, location, and timeframe. This would be based on the IIMM and define the transport service in terms of Accessibility, Health and Safety, Quality, Reliability and Responsiveness, Sustainability, Functionality.

These would form the basis for a consultative process as outlined above.

4.6.3 Performance Measures

Currently performance is measured as per contractual requirements and changes in indicators such as road roughness. This gives a good indication of the performance of the Transportation Activity and with our collaboration partners using the same specification, there is a great opportunity to benchmark each other.

Mandatory Performance Measures
Council has suite of performance measures agreed with the community and reported on annually by the Annual Reports. This performance is measured as per contractual requirements and changes in indicators such as increased flooding or maintenance. However Central Government introduced a suite of mandatory performance measures covering Transportation, Three Waters and Flood Control that came into force on 1 July 2014.

These mandatory performance measures have been adopted by Council and were included in the 2015-25 Long Term Plan and will continue to be used for the 2018- 28 Long term plan period. No other measures will be used or considered at this stage.

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, AMP, AMP, annual works program or long term plan).

Suggested Council Measure
“75% of the total length of footpaths are at or above the “average” condition rating” Condition rating to be undertaken no less than a 5 year frequency.

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. (This response time to be determined)

Suggested Council Measure

“75% of service requests relating to roads and footpaths, to which the territorial authority responds within 10 working days”

4.6.4 Affordability and Willingness to Pay

Hand in hand with the current LoS vs. Desired LoS is the issue of cost. This needs to be addressed at two levels:

- Cost for different Levels of Service options within the Transportation Activity
- Cost of the Transportation activity within the total Council programme.

The first level can be addressed using the options outlined above where fully described and costed service level options are consulted with the community.

The second level needs to be addressed as an assessment of the relative contribution the Transportation Activity makes towards the achievements of Community Outcomes at the current level vs. greater or lesser levels of service.

With increased growth in Tourism and more of the free independent travellers there is a need to consider a higher LoS. Especially in historical rural communities where it was previously accepted to have gravel footpaths, roading , minimal traffic services, curvature alignments, impassable roads due to weather event for a couple of days, four wheel drive access only roads, fords, etc. There is an increased safety risk due to the free independent traveller not being familiar with our roads and not keeping left or parking clear of the carriageway.

5 ASSET MANAGEMENT PRACTICES

5.1 INTRODUCTION

Council has a full time Roading Manager, with assistance from the Asset Manager and an Engineering Officer, who are responsible for the maintenance management of the road network. Overall responsibility lies with the Asset Manager. Occasionally design and management are negotiated to consultancy services. The Roading Manager and the Road Maintenance Contractors regularly inspect and monitor the network. Any work identified is directly tasked to the incumbent maintenance contractor or, if it is beyond the scope of the maintenance contract, tendered or negotiated using NZTA Competitive Pricing Procedure guidelines. This may or may not need the involvement of consultants depending on the nature or extent of the work.

Council accounts for revenue and expenditure on an accrual basis. All work under the Works Programme is identified through RAMM Contractor with a significant level of breakdown using analysis codes. The costs are summarised into the general ledger where operational/maintenance costs are identified separately to capital/renewal items. Specialist reports have been developed to match analysis code costs to the work categories required for NZTA reporting.

All contract works are claimed monthly against each of the contract item numbers by the physical works and professional services contractors. Council and/or consultants confirm the payment value for all physical works and the Council confirms the payment of any professional services. The accounts job number and account codes are included on the payment certificate. These certificates are forwarded to Council for payment. The types of work that this system relates to are maintenance, renewals and capital expenditure.

A variety of reports are prepared in order to comply with the requirements of Council, NZTA and Audit NZ. All external reports are prepared in compliance with Generally Accepted Accounting Principles (GAAP)

5.2 ASSET MANAGEMENT PROCESSES AND SYSTEMS

5.2.1 Processes

Levels of Service

The Council currently has a level of service that has been consulted on over several the Long Term Plan iterations. One Network Road Classification (ONRC) has been introduced and implemented as a national approach to classify roading networks around the country. There are seven road classifications under ONRC of which the lower three make up the Mackenzie District (secondary collector, access and access low volume. The aim of the ONRC is to be able to have a consistent standard of roading across the country when measured against the 27 performance measures. It is focused on the customer's perception rather than just the technical aspect aiming at performance measures and targets encouraging a different thought process targeted toward the investment story. Instead of focusing on each of the individual measure the performance measures should be considered as the entire package and also wider across network boundaries, regionally and nationally. This method enables comparative reporting between similar sized and functioning districts encouraging road controlling authorities to assess, evaluate, challenge their asset management practices against their peers to achieve the best whole of life cost and continue to consistently

improve their practices and efficiency. This has reinforced the level of service requirement for the various road classifications. The ONRC model is based on spending the money where required but weights the maintenance spend against the road classification. Therefore the maintenance works shall be greater on the higher classification (secondary collector) roads rather than the lower classification (low volume access) roads.

Knowledge of Assets

The process of capturing as-built records for the on-going enhancement of asset registers is included as a requirement of the maintenance contracts. The information is supplied to Council via RAMM contractor and assets are updated accordingly. Projects undertaken outside the maintenance contracts have a requirement within their contract and/or resource consent requirements for the relevant information to be collected and forwarded to Council for them to update RAMM. There are minimal observed gaps in the securing of data for new road infrastructural assets (e.g. subdivisions). Consultant time will be utilised to address any gaps.

Accounting/Economics

Maintenance and renewal costs are recorded against broad activities in the general ledger. Valuations are currently based on straight line depreciation and assumed effective lives. On the completion of capital projects and the acceptance of vested assets associated with new subdivisions all the asset infrastructure data is passed to the financial section of Council for updating their systems to ensure the correct amount of depreciation is allocated. The value of those vested assets are provided by the developer from the tendered contract information for the project. If the developer is unable to provide the data, the value of the vested assets is developed using rates supplied during the three yearly valuation and CPI adjusted if required.

Condition and Performance Monitoring

Well documented standards and processes exist for an on-going inspection programme of pavements, surfacing, culverts, cattle stops and bridges. Other assets are inspected on an as required basis.

Processes for regularly monitoring the performance of pavements, (e.g. roughness, gravel loss, defects, crash statistics) surfacing, culverts and bridges are well documented and the information is used for identifying and prioritising upgrading and development of projects. The monitoring of other assets is informal and mostly reactive.

Risk Management

Although processes are in place for the monitoring of some critical assets (e.g. bridges), risk management is generally practised informally based on the knowledge of experienced staff.

Operations

Operational processes are documented in service delivery contracts or specified in NZTA standards, and are subjected to regular review.

Maintenance

Competitively tendered contracts are entered into regularly for major budget items.

Optimised Life Cycle Strategy

Systems are in place for optimising pavement and surfacing renewals using a combination of inspection, RAMM Treatment Selection algorithm and assumed expected economic lives. Work optimisation for other assets is based on the judgement of experienced staff, and renewal projections are based on assumed economic lives.

Road Utilisation
Current traffic volumes are recorded within RAMM to monitor demand within the network.

Design, Project Management
NZTA project management procedures are used as a guide but no specific procedures are formally documented for Council. Fit for purpose procedures are used during the project evaluation, design phase, and contract management on all minimal expenditure low risk projects. Larger projects are designed and managed by external consultancy services. The supervision of assets constructed within sub-divisional development and subsequently taken over by Council is considered to be adequate however, it requires periodic auditing by the Asset Manager or delegated staff member during crucial construction phases to ensure a high quality subdivision, with a low lift cycle cost is vested with Council on completion.

Quality Assurance/ Continuous Improvement
Audit NZ audits performance measures reported in the annual plan annually and NZTA regularly audits financial transportation practices. Recommendations for improvements are generally adopted and implemented as resources permit. Recommendations by audit and NZTA were in relation to traffic counts which we had previously identified as an issue and are working on remediating due to the need for accurate data in reporting to NZTA.

5.2.2 Systems

Several data management systems are used to assist in the decision making process for Transportation network issues.

Road Assessment and Maintenance Management System (RAMM)
The RAMM system is the main information systems used in the management of the road network. RAMM contains a schedule of all roads in the network and information on carriageway widths, surfacing types and ages, pavement composition, bridge data, footpaths, traffic volumes and loadings and road condition data along with street lights.

The bridge asset is managed, under a professional services contract by DCL Consulting. They use a RAMM database to manage the asset.

The information held on RAMM is continually being updated and improved following the completion of roading maintenance and renewal treatments, capital improvements, traffic counts and road rating condition assessments.

The use of RAMM or an equivalent asset management system is mandatory to obtain financial assistance from NZTA.

Table 15 gives the assessed data confidence quality of the Council RAMM and spread sheet data tables as described in the 2016 Roading Asset “Mackenzie District Infrastructure Revaluation” report.

Table 15: Data Confidence Levels

Valuation Element	Pavement	Footpath	Structures	Drainage	SWC	Signs	Lights
Asset Registers or Databases	H	G	H	H	G	G	G
Attribute Details	G	G	G	H	A	H	G
Asset Categorisation	VH	H	VH	H	H	H	G
Optimisation Information	H	G	H	H	H	H	H
Useful Lives Information	A	G	A	A	A	A	A
Unit Rates	H	H	G	G		G	A

The table Data Confidence Levels are:

VH	very high confidence	H	high confidence	G	good confidence
A	average confidence	P	poor confidence		

RAMM - Condition Assessments

Data on road condition is collected through road roughness and condition rating surveys.

Roughness surveys that measure the quality of ride experienced by motorists when travelling on the road are undertaken bi-annually. The measurements are obtained using a vehicle mounted response meter which records the vertical displacement or roughness of each 100 metres of traffic lane. These measurements are then converted to NAASRA and IRI counts which are the standard measure of road roughness and stored on the RAMM database.

Condition rating surveys involve a visual assessment of pavement surface condition and are undertaken bi-annually over the sealed network. They involve a detailed walkover and identification of defects on the carriageway over an approximate 10% sample each sealed road length. The defects recorded include the number of potholes and the area or length of other defects such as rutting, shoving, flushing, scabbing, cracking, edge break. Drainage assets are not rated other than to state whether they are adequate, inadequate or non-existent.

RAMM -Treatment Selection Algorithm (TSA)

The RAMM system contains a treatment selection algorithm that utilises the condition data, roughness, traffic counts and other road inventory data to make recommendations as to preferred treatments on the network. The outputs from the treatment selection are utilised at a network level and also at an individual treatment section level.

At a network level the treatment selection summary report identifies the length of the network recommended for resealing in the current and following year and also makes recommendations as to the length of the network requiring major treatments such as smoothing or strengthening. The treatment selection algorithm undertakes an economic analysis of the maintenance options for each treatment length to identify the most cost-effective treatment option. This is based on the on-going cost of maintenance, vehicle operating costs and the unit costs of the various maintenance and renewal treatments.

The treatment selection summary report is a useful tool in assessing the effectiveness of the maintenance and renewal strategies being followed and is an indicator of the future maintenance needs of the network. The treatment selection output identifies sections of road with various faults and makes recommendations as to which specific road sections should undergo resealing or rehabilitation. These outputs are used in the preparation of the annual resealing and rehabilitation programmes. However, NZTA does not necessarily meet the co-investment required to achieve these recommended programmes.

The treatment selection algorithm is run after updating of the RAMM database to reflect completed physical work and forecasts are adjusted to exclude sections of road where renewal works are programmed in the current year or underway.

Traffic Data Collection

A regular counting programme is in place to monitor traffic volumes on the network. Traffic counts are completed primarily on roads that are targeted for improvement or are showing signs of accelerated failure. Council currently has four permanent counts stations set up on Braemar,

Lilybank, Haldon and Mount Nessing Roads. These count AADTs but cannot provide classification data. In addition seasonal trending data is gathered on a number of roads on an annual basis to provide certainty to the impacts of growth on these networks. Actual count data exists in RAMM since 2010, and then estimated for other similar roads within the network that have not been counted that year giving consideration to the number of households using the road and the nature of the adjoining land-use.

Bridge Data

Bridge data is currently held in Council's RAMM database such that the bridge valuation can be undertaken. Council has recently undertaken updating the RAMM database with DCL Consulting Dunedin who is tasked with the annual structural inspection of the bridge stock, to include all available asset data.

A bridge maintenance inspection of a third of the bridge stock is undertaken on a yearly cycle to identify and prioritise repairs. Bridge structures that require repairs or some of the high risk weight limited structures are assessed annually. A full report of these inspections is provided to Council. Superficial inspections are undertaken by the maintenance contractor on a regular basis.

Pavement and Surfacing

All road sections are monitored by the maintenance contractors to determine routine maintenance needs. This ensures the road network is kept to the minimum levels of service required by their contracts. Council staff also monitor the road network condition when undertaking their daily duties to ensure contractor compliance.

CAS Database

CAS is an online NZTA live database of official crash data and includes sophisticated spatial, analysis and reporting capability. Access to this data is available by direct enquiry to NZTA.

Other systems operated by Council include the following:

- ARC Geographic Information System developed by ESRII
- NCS Corporate financial management system
- Hardcopy plan/filing systems

5.3 INFORMATION FLOW REQUIREMENTS AND PROCESSES

General maintenance work is continuous throughout the year and responds to the needs of the network. The data from the repairs carried out is entered into RAMM Contractor daily with maintenance costs being updated monthly. Signs data, culvert replacements and traffic count data are entered into the RAMM database as they become available.

New subdivisions in the District result in additions to the roading infrastructure. In the past there have been difficulties with developers not supplying the additional asset information. A process has been established to ensure that this data is recorded in RAMM, at the cost of the developer, and is available for on-going effective Road Asset management.

5.3.1 Programming of Works and Funding

Currently the network is funded to the level at which NZTA has deemed appropriate based on historical spending. As such there is some deferred maintenance, particularly in re-metalling, as discussed in considerable detail under the "Lifecycle Management" section. Extensive modelling has

been undertaken to show that the level of funding approved previously is not meeting network demands. This shortfall in funding needs to be addressed and either met by NZTA or the ratepayer. With the greater number of visitors using the infrastructure in comparison to locals, even with growth in the towns the majority of this the private visitor accommodation rather than an increase in local residents. Therefore it would seem fair the Financial Assistance Rate (FAR) be increased for the Mackenzie to aid in the up keep and improvement of essential infrastructure given the increasing use been driven mainly by non-ratepayer. For example, our level of approved funding for pavement rehabilitation means that all sealed roads within the network must last 257 years before they are renewed.

Maintenance and renewals on the Roading network are prioritised on the following categories;

- Situation in the network
- Increasing signs of failure

Current traffic loadings and demand

Budgets are expended in the work category that is required at the right time to ensure the lowest lifecycle cost is realised. This practise of "just in time" and "sweating the asset" is unsustainable and considered poor asset management leaving the road network, in particular the sealed roads and unsealed roads, at risk of significant failure that will be expensive to rehabilitate when in reality all they require is a waterproofing seal coat or wearing course.

The budget figures defined in this AMP reflect network requirements based on current contract rates and agreed levels of service. Items that are likely to impact on this are;

- Level of Service Changes from ONRC
- Contract Rate Changes as a result of retendering
- Failure by NZTA to recognise the level of co-investment required

During the NLTP period there is an ability to reallocate funds between work categories depending on network requirements. This reallocation endeavours to provide the best final outcome for the long term benefit of the network.

Low Cost Low Risk projects are carried out to improve the network where funding is not available through other means. Programed bridge replacements are first call on this work category, which in some years eats into this allocation and thus there is limited ability to complete other improvements in those years.

Bridge replacement/renewals are based on benefit cost analysis, and funded under the "Low Cost Low Risk" improvements programme, where replacement is expected to be under $1,000,000. All bridge projects are ranked on their merit, taking in to account;

- Situation in the network
- Increasing signs of failure
- Current traffic loadings and demand

When a bridge reaches the end of its economic life, Council reviews the need for replacement and looks at the full range of options such as removal, replacement, wash over ford culverts etc.

Validation

Each year when the annual programme is developed unit rates are checked and amended to reflect the current seasons contract prices.

The RAMM database system is the main management tool used to ensure the annual works programme is providing the correct balance of maintenance and renewal work to keep the network operating at the appropriate levels of service. Condition and performance reports from RAMM are analysed and trends produced that provide measures of the appropriateness of the work practices.

Lifecycle costs are analysed at a projects design phase using criteria laid out by NZTA. This assists in the selection and ranking of projects. Project design is standardised by use of the Austroads and NZ Supplement Pavement Design Manual, Road Geometric Design Manual (recognised nationally and internationally) and local knowledge.

5.3.2 Standards and Guidelines

The management of the road asset is constrained by the funding available to maintain the network as a viable entity. The requirements of NZTA which channels Government funding that provides a substantial portion of the roading funds available, are detailed in their “Programme and Funding Manual” and the “Project Evaluation Manual”.

Another key manual is the International Infrastructure Management Manual which provides guidelines on the structure and format for AMPs and practice.

6 FUTURE DEMAND

6.1 DEMAND DRIVERS

The significant future demands affecting roading in Mackenzie District to be considered are:

- Growth Trends – Trends in population growth or decline give a good indication of future growth and in turn demand on the network.
- Economic Changes – Changes in land use, farming intensification, freight movements and tourism can all affect the demand on the roading asset.
- Vehicle Mix and Use Changes – The available modes of transport, vehicle ownership, heavy vehicle trends and the increasing width of agricultural equipment using the road can all impact on future demand on the network.
- Improvements to Levels of Service - Continual demand for improvements in the levels of service. This can result from:
- Advances in available technology
- A greater understanding of customers' use, perceptions and expectations – using survey currently being completed.
- A higher level of road safety consciousness – Joint TDC Road Safety
- Changing legislative requirements
- One Network Road Classification (ONRC)

Table 16 indicates how these factors are expected to be reflected in changes in use of the roading network.

Table 16: Transportation Demand Drivers

Transport Demand Drivers	Urban - Sealed	Urban - Unsealed	Rural – Sealed	Rural - Unsealed
Growth	Population changes	Not significant (only 5km)	Not significant	Not significant
Economic	Tourism, parking, walking and cycling	Not significant (only 5km)	Changes in land use & Tourism increased due to self-driving	Changes in land use and commercial operations due to farm intensification (irrigation) Tourists driving on unsuitable roads.
Vehicle Mix and Use	Changes in vehicle ownership	Not significant (only 5km)	Increased heavy vehicle usage	Increased heavy vehicle usage and heavier vehicles, HPMV, 50 Max
Improvements to Levels of service	Increased parking, signage and walking and cycling requirements	Increased pressure to seal these 5km due to dust nuisance and safety	Adequate depth of pavement to allow for large vehicles, lane width perception, passing opportunities, direction of road user	Changes of farm operations, more contractors coming in, deliveries, station owners/managers travelling to town centres daily for school etc.

6.2 DEMAND FORECASTS

6.2.1 GROWTH TRENDS

Population Projections

Mackenzie's population growth is expected to follow the medium projection issued by Statistics NZ in December 2016. It is anticipated that over the next ten years (2018-28) Mackenzie District will have a growth in population of around 13%, from around 4,300 at present to 4,880. Like much of New Zealand, the proportion of people aged 65 years and older will grow within the district. It is anticipated that projected population growth will not impact significantly on the operation and maintenance of our roading activity.

Household Growth

It is projected that over the next ten years Mackenzie District will have:

- A growth in household numbers consistent with the population growth trajectory;
- Household numbers are projected to increase to 2,200 (+16 per cent) by 2028 (Statistics New Zealand) - the higher percentage increase in households relative to population increase in 2028 reflects a projected increased in single person households;
- With a greater number of older people living alone, a reflection of structural ageing, one-person households are projected to increase by 15 percent by 2028 (Natalie Jackson Demographics Ltd, Sept 2014);
- Future demand in the Mackenzie District will be increasingly driven by one-person households and couples without children, characteristic of population ageing.

Residential Development

Analysis of the future urban and rural residential subdivision over the next 4 years shows and average of 10 sections per year, long with associated infrastructure, to be vested in Tekapo and an average of 46 per year in Twizel.

During the 2015/17, 5km of sealed road and 4.8 km of unsealed road was vested in Council. Whilst developers have to construct this to Councils standard before vesting the ongoing maintenance costs have to be allowed for.

Initially it was assumed that the level of development experienced during 2015-17 would slow down to about a third but this has proved not to be the case. We have modified our projections to allow for this growth.

6.2.2 Economic Changes

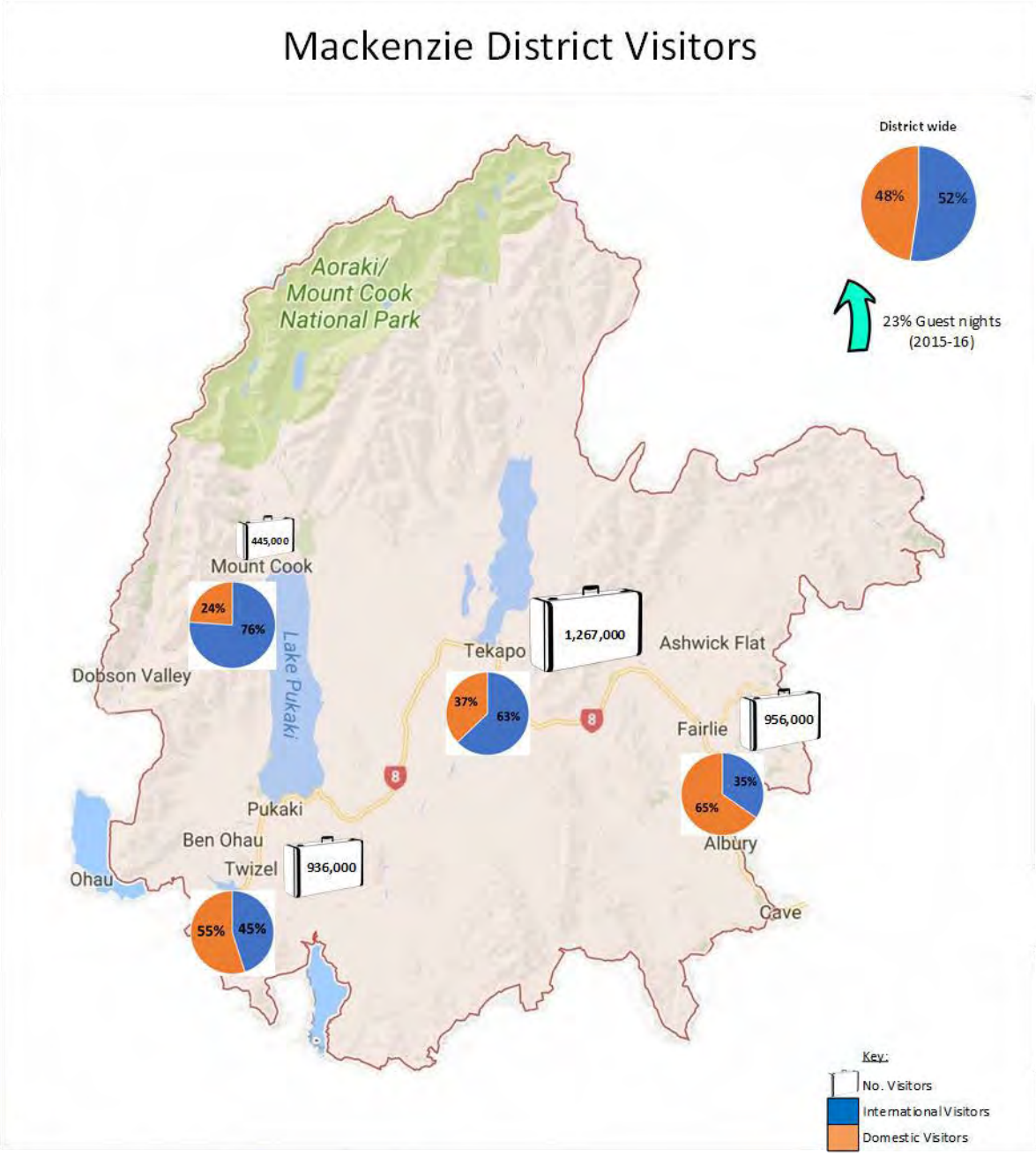
Tourism

Mackenzie has experienced unprecedented growth in visitor numbers (both domestic and international) in recent years, as indicated by a range of data, including the Statistics New Zealand Commercial Accommodation Monitor, which for the year ended September 2016 compared with the year ended September 2015 reported:

- Guest nights rose 23.1 per cent to 705,316
- International guest nights rose 19.9 per cent to 489,769
- Domestic guest nights rose 31.1 per cent to 215,547
- The average length of stay rose from 1.32 nights to 1.33 nights

- The overall occupancy rate rose from 44.4 per cent to 50.2 per cent
- Accommodation capacity, excluding holiday parks, rose 3.1 per cent

International tourism numbers are expected to continue by 5.4 per cent per annum from 2016 until 2022. Based on this, there could be nearly 6 million tourists visiting New Zealand by 2028. Council is assuming average growth in international visitors to the district will be at least equivalent to or greater than the growth in international visitors forecast for NZ. Growth in domestic visitor numbers is also expected to occur at a similar rate.



Tourism makes up a large component of transportation demand within the district. The Mackenzie has experienced increasing numbers of free independent travellers, with fewer tourists opting for commercial tour groups. Where previously commercial tourism groups favoured the State Highway network, free independent travellers are increasingly using the local roading network.

Many international tourists are accustomed to travelling on the right-hand side of the road. On unsealed roads there is no centerline to provide visible orientation, in addition, the majority of the unsealed roading network is operated at open road speed limits.

The influx of domestic holiday-makers into the district, particularly the Mackenzie Basin, has a significant impact on roading. On some unsealed roads summer traffic volumes double or treble, at a time when the roads are extremely dry and particularly sensitive to wear. The route from State Highway 1 at Albury over the Mackenzie Pass to Lake Benmore is an example of this traffic loading.

The following provides an overview of specific areas of demand on roading activities resulting from tourism growth:

- The Church of the Good Shepard: vehicle and pedestrian pressure on Pioneer Drive and surrounding walkways.
- Dark Sky Reserve: within the Tekapo township and surrounding rural landscapes.
- Mt John: increasing pressure on Godley Peaks Rd for day and night visitors.
- Lake Alexandrina: pressure on sealed and unsealed roading on Godley Peaks, Lake Alexandrina and Lake Alexandrina South Roads.
- Haldon Camp: high summer traffic volumes on Haldon Road.
- Ski Fields: open the traffic on the feeder roads can increase by 1200%. An example of the effect of increased tourism traffic on the Mackenzie network is the Roundhill Ski area on Lilybank Road. The Ski traffic of up to 600vpd on a road designed to take its normal loading of 80 vpd to farms. This increased loading impacts the pavement at the worst possible time of the year. Whilst this road is classified as a secondary collector under the ONRC, it is actually a predominantly unsealed road that operates at 100km/hr so increased traffic results in accelerated wear through loss of fines. This road attracts a disproportionate amount of costs to maintain it at a safe level of service for the customer compared to what is collected from the properties it serves.
- Alps2Ocean cycle trail: increased demands on Mt Cook Station Road and Hayman Road. Safety concerns arising from user conflicts on Hayman Road will be mitigated by the off-roading of the trail on Hayman Road to be completed in Years 1-2 of the LTP.
- Te Araroa Trail: general traffic increases on sealed and unsealed roads within the district.

Changes in Land Use, Practices and Resource Use

Development is likely to have some impact on Council's roading activities

Key developments within the rural area of the district, as affecting our roading network are identified below:

- Tenure Review: there are a number of High Country Stations involved in tenure review. Historically this process has resulting in part of the reviewed station being passed into the public estate and becoming open for public access. This has resulting in increasing expectation from the Department of Conservation and other road users for improved access to areas of public land. However, there is no additional funding from either NZTA or DoC for these improvements. Council staff continue to work with DoC in an attempt to minimise this.
- Meridian Energy shoreline protection: erosion of the Lake Pukaki shoreline continues, risking the erosion of Hayman and Mt Cook Station Roads. There is an existing agreement with Meridian Energy whereby they are responsible for that erosion and will undertake work to rectify and minimise erosion at their cost. It is anticipated that this work will continue to be undertaken by Meridian Energy over the term of the LTP.

- Rural Land Change: changes to land use and intensification within the district include dairy conversions; increasing primary produce as a result of irrigation, and Mt Cook Station 50yr forestry programme. Land use conversions can impact the road network in terms of increased heavy vehicle volumes.

6.2.3 Vehicle Mix and Use Changes

Traffic Counts

Mackenzie District Council has been actively completing traffic counts over the last 10 years. Traffic counts are completed primarily on roads that are targeted for improvement or are showing signs of accelerated failure. The count data in RAMM is based on actual count data for roads surveyed and then estimated for other similar roads within the network that have not been counted that year giving consideration to the number of households using the road and the nature of the adjoining land-use.

It is difficult to draw conclusions from this data as different lengths of road have been counted each year. Average Annual Daily Traffic (AADT) for each road type is shown in Table 17.

Table 17: Average ADT

Road Group	1		2		3	
	Length (km)	ADT	Length (km)	ADT	Length (km)	ADT
Rural	75.5	180	584.0	45		
Urban	4.4	919	9.1	227	36.7	48

Council are reviewing their traffic counting programme and have developed a strategy for Traffic Counting that allows for regular annual traffic counts to be completed on all of council roads, particularly highly trafficked roads. This will allow historic comparisons and from this predictions on future growth. It will also assist with ensure the correct ONRC classification is applied to each of the roads in our district. Council also have 5 permanent counting sites in strategic locations that continuously count the number of vehicles.

High Productivity Motor Vehicles (HPMVs)

The Land Transport Rule: Vehicle Dimensions and Mass Amendment 2010 (VDM Rule Amendment) implemented on 1 May 2010, allows for High Productivity Motor Vehicles (HPMVs) to travel on approved roads within New Zealand.

The VDM Rule Amendment makes changes to the 2002 rule for some heavy vehicles requirements and allows for long-term permits to be issued for HPMVs to operate (with divisible loads) on approved roads. The main changes affecting the road network are:

- HPMVs can operate by permit at a gross mass above 44 tonnes up to a maximum of 62 tonnes.
- HPMVs can operate by permit at lengths greater than 20m.

The mass limits allowed as-of-right (i.e. without a permit) are not changed by the VDM Rule Amendment.

Because specific HPMV routes have to be approved with input from road controlling authorities, Council has some control over the impacts of this rule change on the district's roading network. However, in 2011, 2012 and 2013 when the NZTA made a blanket dispensation to the rule for Fonterra, Council had no control or consultation on the dispensation which is of concern. Council has no

approved HPMV routes, of significance, and treats every request for access as an overweight permit situation.

6.2.4 Changes to Levels of Service

Changes in Technology

Changes in technology can effect road construction and the vehicle fleet. The following are considered the most likely technology advancements affecting future demand and performance on the network:

- Stabilising and recycling for road construction and maintenance. Where there is sufficient pavement depth this will reduce the need for heavy vehicles to carry aggregate and waste material over the network. Unfortunately many of Mackenzie's pavements lack adequate depth to successfully complete this repair method.
- In recent years the vehicle fleet in New Zealand has changed markedly. Some of the changes that will continue to have an effect on driver expectation or road performance have included:
    - Increased power and changes to drive train configuration in trucks leads to greater potential damage on steep hills and intersections as trucks change gear, accelerate and decelerate.
    - The improvements to power steering lead to greater damage with turning vehicles, including cars, entering and leaving the roadway and at intersections.
    - Larger Trucks require wider intersections and corners to accommodate increased turning circles.
    - Cars with thinner metal on the body that are more prone to damage from loose metal and lower chassis requiring unsealed roads to be graded more frequently. With these changes road users expect a higher standard of road with fewer changes in standards across a network.
    - Computers in vehicles, various sensors, traction control, ABS or equivalent braking, etc. means cars can travel faster on gravel or icy roads without the drivers requiring the knowledge or experience. This creates higher wear and safety risks for other uses especially if the technology aids can't cope or evasive action is taken due to the feeling of loss of control.
    - The increased availability and use of light weight SUV type vehicles with 4WD is the cause of the increased "short" corrugations on a number of unsealed roads and this being most prevalent on Lilybank Road leading to the ski field.
    - The increased use of in car Traveller Information Systems (GPS), especially tourists, that direct them on in-appropriate and less safe for their driving ability

Changes in Customer Expectations

In recent years there has been an increasing awareness on the part of drivers with respect to safety issues. It is anticipated that the following safety issues will become an increasing priority for Council in determining design and operational standards.

- Increased carriageway and shoulder widths
- Improved surface condition of unsealed roads
- Upgraded Intersection controls
- Bridge end protection
- Destination signage for tourists

- Reduction in the number of loss of control crashes

Changing Level of Service Demands

The intended Levels of Service defined in Section 3 are considered to be representative of the service demands of the current and the future community. However, if Council is not successful in obtaining sufficient funds from New Zealand Transport Agency to fund the operations, maintenance and renewals of the Mackenzie District roading network then Council may have consider the following;

- A reduction in maintenance and renewal of low trafficked roads
- Review its Policy in maintaining access to the last house which may result in - Disposal of asset components (e.g. bridges, cattle stops, sections of roads)
- Fund the shortfall via ratepayer contributions

Policy or Management Changes

Changes to transportation practises, driven by NZTA, will have an effect on Councils' current levels of services as defined in Section 3. The One Network Road Classification (ONRC) was designed to standardise the performance of our roads throughout New Zealand, aiming to address historical inconsistencies, and promote economic growth. It is expected under ONRC that maintenance levels will change across the district. It is unsure under ONRC what the financial impact will be on the network as this is the first LTP the ONRC has whole heartedly been implemented. The emphasis is putting forward a strong business case supported by robust data and evidence which justifies the business case should be approved funding but this is conditional on other districts bids and funding given the available funds continue to decrease from central government. The ONRC has been developed by subject experts from the Road Efficiency Group (REG) – a collaboration between Local Government New Zealand and the New Zealand Transport Agency. When used with the ONRC Performance Measures online reporting tool, they are a significant resource to help asset managers better understand their network and tell their investment story. This can only be achieved if all Road Controlling Authorities (RCAs) are monitoring and measuring their roads with the same performance measures, standards and data capture being consistently captured and assessed against over time.

Land Transport Management Amendment Act 2008 (LTMA)

The introduction of the LTMA saw the establishment of the NZTA with greater flexibility in determining funding alternatives to Transportation and methods of improving the efficiency of the Transport Sector in New Zealand.

The Act has changed NZTA's objective from allocating resources to achieve a "safe and efficient Transportation system" to allocating resources "in a way that contributes to an integrated, safe, responsive and sustainable land transport system."

Specific targets have been set for the whole transport sector which are detailed in two key documents that are part of a raft of changes contained in the LTMA and are to be the driving force behind achieving an affordable, integrated, safe, responsive and sustainable transport system throughout New Zealand. The two documents are:

- New Zealand Transport Strategy 2013 (NZTS)
- Government Policy Statement on Land Transport Funding (GPS 2014)

Under the Act, all land transport programmes (including those prepared by local authorities) must take into account all the NZTS objectives and the purpose of the Act, which includes ensuring funding is allocated in an efficient and effective manner.

When preparing the NLTP, NZTA must also take into account relevant regional land transport strategies and the National Energy Efficiency and Conservation Strategy (NEECS).

NZTA expects all activities proposed for inclusion in the NLTP will come from processes which exhibit the principles of integration, sustainability, responsiveness and safety, and have the attributes of being forward-looking, collaborative, accountable and evidence-based.

NZTA has undertaken to work with organisations during planning and strategy processes to assist with these requirements.

Connecting New Zealand

The objectives are to provide;

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

The implementation of Connecting New Zealand included the setting up of "Safer journeys" which has priorities around;

- Increasing the safety of young drivers
- Reducing alcohol/drug impaired driving
- Safe Roads and Road sides – Classification system on network and improvements on High risk rural roads.
- Increasing the safety of motorcycling

Government Policy Statement on Land Transport Funding (GPS)

The Government Policy Statement on Land Transport Funding (GPS) sets out what the Government expects to be achieved from its investment in land transport through the National Land Transport Fund. It states how large the investment will be, broadly how it will be spent and how the revenue for it will be raised.

The GPS is issued by the Minister of Transport every three years and with the recent change in Government, there is uncertainty on the direction the next review may take.

Essentially the GPS currently directs funding to high trafficked areas of the country (including state highways), rebuilding Canterbury land transport system, Auckland transport and public transport. This suggests that rural local roads, especially in low trafficked areas are less likely to be high priority for subsidised funding.

Financial Contributions

Financial Contributions are another means of funding network infrastructure, reserves or community infrastructure. Mackenzie District Council does not have a 'Financial Contribution Policy' for transportation funding. A contribution policy should be developed and include a methodology for calculating the cost of the effects a development will have on existing community infrastructure including roads. This should ensure that the negative effects of development are in part funded by the developer rather than the ratepayer.

6.3 EFFECTS OF DEMAND ON ASSETS

Overall implications for the network of continual demand for improvement in levels of service tied to a relatively static population and with increasing tourist traffic generated vehicles and changes in land use and farming intensification practises on the road are:

- A possible increased rate of deterioration on road pavements, as maintenance cannot keep up with road user use
- An increasing focus on road user safety
- An increased level of expenditure to attain current consulted levels of service
- A relatively static ratepayer base to fund Mackenzie District Council's contribution to the roading budget

Projections must be based on an understanding of the composition of the district's roading network. The network has 213km of sealed and 519km of unsealed road. Given that increases in demand are expected mainly from heavy vehicles servicing agricultural industries and that only 7% of the network is in an urban environment, the analysis will focus on demand aspects for the rural portion of the network.

The majority of the district's roads were originally constructed with thin pavements, these pavements were not expected to carry either the numbers or weights of the heavy vehicles they presently do, let alone any projected increases. Most of the districts roads and bridges were built to carry single axle trucks and trailers, with occasional dual axle trucks. The gross mass of these trucks was around 16 tonne, current HCV classified vehicles can be up to 50 tonne or greater. There is little understanding of the rate of failure of these pavements under heavy loading, as most analyses are based on the assumption of strong pavements constructed to best practice. Many rural roads only carry a small volume of heavy traffic but this changes significantly when land use intensification, including dairy conversions occurs. Small changes can result in rapid deterioration, this may make it necessary to monitor the effects of specific industries on individual roads. In the case of on-farm development projects, in particular dairy conversions and farm intensification as a result of irrigation, it will be necessary to closely monitor individual developments. Funding for road improvements as a direct result of these changes has to be funded within existing constrained budgets.

Traffic volumes are low within the District. Current demand focuses on the standard of roading and in particular the sealing of unsealed roads to reduce the maintenance cost of metalling/ grading on our high volume roads, remove dust nuisance and to provide a better level of roading surface. Satisfying this demand through seal extensions is being carried out to the greatest extent that Council can manage this is ideally to enhance the network and make it more efficient. It is limited by the availability of NZTA financial assistance. The Council is committed to continue with seal extension projects where NZTA co-investment can be achieved and the need is justified. There must overall benefit to the network given current budget constraints, currently it is very difficult to obtain NZTA approval. Council acknowledges for the majority of roads in the district there currently isn't the need to carry out seal extensions as they can be maintained as unsealed roads cost effectively but there are a proportion of urban and high volume sections of rural roads that require sealing due to unsustainable maintenance costs, safety and amenity factors.

Significant urban and rural land subdivision has occurred in the District. When each subdivision is completed its roading network is vested in the Council, which then takes over responsibility for on-going maintenance. Whilst there should be no major repairs or maintenance required for several

years, street cleaning and street lighting costs do impact immediately. New subdivisions can also increase traffic volumes on existing roads which, in turn, can increase maintenance requirements. Council require developers to complete a second seal coat prior to vesting of the asset in Council. Council has acknowledged that two coat seal on cul-de-sac heads carries risk of failure, therefore policy has been implemented requiring all cul-de-sacs to now be surfaced with 30mm of hot mix.

6.4 DEMAND MANAGEMENT PLAN

There are three recognised components to a demand management strategy:

- ***Transport demand management*** – a transport system approach which seeks to achieve modal shift (i.e. to low impact modes such as cycling and walking)
- ***Traffic demand management*** – a single network approach which seeks to optimise or reduce traffic flows
- ***Travel demand management*** – focuses on the individual travelers and seeks to change travel behavior through various initiatives (such as education and marketing).

The ***Canterbury Land Transport Strategy 2015-2025*** – Is the vision that remains the over-arching goal for the Regional Land Transport Committee and guides future relationships across the sector, as well as future planning and investment. To help achieve this vision, the RLTP sets the direction for the Canterbury transport system for the next 30 years.

Accordingly, the plan:

- outlines the economic, social and spatial context in which the transport system operates;
- identifies regional transport issues and challenges anticipated over time;
- describes how these challenges will be met; achieving the vision and objectives through policies, measures and investment priorities over time;
- includes a regional programme of proposed land transport activities for the next 6 years (2015/16 – 2020/21) and prioritises significant new improvement activities; and
- provides a ten year financial forecast of anticipated investment and revenue for the region's land transport activities.

The RLTP enables a more comprehensive and integrated approach to meeting regional transport challenges by laying the foundations for a more collaborative planning and investment environment that involves all transport providers. It also supports moves to advocate for legislative and policy change where the Committee feel it is needed, as well as secure investment for the region's transport system to ensure Canterbury maximises its potential and contribution to national wellbeing.

The strategy also outlines that the forecast for the future in rural areas is the continued use of private motor vehicles as the primary mode of travel, or between rural areas and urban areas as the distances to be travelled are often too far and the population too dispersed to provide realistic alternatives. Maintenance of the rural road network is essential to maintain high levels of access and mobility in rural Canterbury. Other modes of transport would have been limited in rural areas historically, but walking and cycling are beginning to become more popular as more a regular travel choices with greater numbers of locals and tourists choosing these modes of transport. These alternative modes of transport are made more popular via advertising and technology.

In terms of freight movement, again roads will continue to serve most local freight transport needs such as the movement of goods to and from farms or from processing plants to export terminals.

6.4.1 Asset Based Demand Management

Asset Based demand management encompasses traffic demand management. For this network it is best managed through "Pavement Use" Hierarchy. The adoption of a roading hierarchy, which identifies a tiered roading system based on road function and planned levels of service, is important to enable the effective management of traffic. The hierarchy of Council roads is defined and classified in Figure 11.

In essence, given the nature of the Mackenzie District network, the hierarchy reflects use rather than traffic volumes.

There are minimal asset based demand options that do not have a significant cost attached. However, provision of differing standards of pavement, surfacing, traffic services etc. dependent on the Council Maintenance Groups as detailed in Section 4.

6.4.2 Non-Asset Based Demand Management

Non-asset based solutions for managing demand are available as alternatives to asset based solutions and generally fall into the transport and travel demand management categories. Possible non-asset based solutions are:

- Traffic Bylaws on heavy commercial vehicles on preventing use on lightly constructed roads within the district
- Threshold and speed hump installation
- Education communication programmes targeted at stakeholder expectation
- Speed restrictions
- Subdivision rules restricting development from existing roads that are of sub-standard width and safety
- The use of development impact fees (DIF)
- Closure of public road serving only one property and lying entirely within that property

National non-asset based demand management solutions include alternative transport modes. Although vehicle ownership and usage is high in Mackenzie District due to the rural nature of the district, it is important to consider the use of other modes of transport as ways to manage demand on the network where possible. Public transport systems, car-pooling or alternative transportation (including cycling and walking) are sustainable and environmentally friendly transportation modes as convenient pedestrian, bicycle, and public transport networks can reduce reliance on vehicle transport. However, low volumes of population, combined with dispersed communities, means that public transportation is not a cost effective option at present and is unlikely to be so in future given the relatively small static population in the district. It is more likely that there will be private transportation company's setup in the district to ferry tourists about town with their bags in the short term.

6.5 ASSETS PROGRAMMES TO MEET DEMAND

The Canterbury Land Transport Strategy 2015-2025 outlines that in rural Canterbury the focus of implementation of the strategy will be on improving safety and the efficient use of motor vehicles as there are limited opportunities to use other modes. Given the highly dispersed population and low volumes of traffic on most rural roads there is little need for large scale improvements to

infrastructure or services. Because of the relatively small numbers of people living in the Mackenzie District there are significant challenges surrounding the funding of transport initiatives. The focus of implementation in rural Canterbury will be on maintaining and renewing road networks to retain community connectedness and reliable travel times. Low cost measures that help remote communities maintain affordable access to key services are also considered.

The capital works programme includes works that will assist with meeting the current and future demands on the network.

The significant capital works improvements for the next 10 years include:

- ***Bridge renewals and component replacements*** – this will ensure that accessibility to all parts of the network is maintained.
- ***Associated improvements*** – a limited budget has been allowed for associated improvements.
- ***Seal Extensions*** – With recent NZTA requirements to put forward a better business case model it is highly unlikely any seal extensions will be completed in the foreseeable future
- ***Low Cost Low Risk*** –Under new NZTA guidelines (General Circular investment – 11/04) Council is required to fund Council's Bridge replacements, and then fund worthwhile minor improvement projects that cannot be funded through another work category. Low Cost Low Risk have maximum individual project cost of $1M.

The issue of under width pavements could possibly be considered as a capital improvement item and would go some way to contributing to the economic and safety outcomes of the network, although Council's ability to obtain funding for such a programme of works is currently severely limited. The process of seal widening is catered for through the pavement renewal process where the widening of the seal is justified. Details of the costs associated with these works are outlined in Section 8.

6.6 FUTURE DEMAND IMPROVEMENTS

In order to have a more accurate idea of the impacts of demand on the network and managing any growth, Council should consider the following:

Traffic Count Data
Direct measurement of current demand through annual traffic counting should be completed through a targeted approach ensuring that traffic counts are completed on an annual cycle for high use/high wear roads to give information on past traffic trends. This data can then be used to extrapolate future traffic trends, based on this and other demand data.

Development contributions policy
In years 1 and 2 of the LTP the Council will investigate options and initiate work on a Development Contributions policy. This will be required to ensure that the negative impact of development is in part funded by the developer rather than the ratepayer.

Land Use Research Study
Further research should be conducted to review changes to land use which may impact on demand. This should include a review of the impact of District Plan changes and future predictions of development and asset creation within the Council area, which potentially could impact on the roading asset.

Customer Demand Changes

Council undertakes Customer Surveys annually, and this helps to establish any changes in customer expectations as they relate to demand on the network.

7 RISK MANAGEMENT

7.1 INTRODUCTION

The following outlines a suggested risk management procedure for the Council road network. The procedure establishes the basic parameters within which risks must be managed and sets the scope for the risk management process.

The risk management process proposed is based on the Guidelines in AS/NZS 4360:2004, "Risk Management" and SNZ HB 4360:2000 New Zealand Handbook "Risk Management for Local Government" that defines the risk management process as:

> ***"The systematic application of management policies, procedures and practices to the task of identifying, analysing, evaluating, treating and monitoring those risks that could prevent a Local Authority from achieving its strategic or operational objectives or Plans or from complying with its legal obligations".***

These plans may include the 30 Year Infrastructure Strategy, Long Term Plan, AMP, Annual Plan, Financial Strategies, corporate plans and policy documents.

It is important for Council and its stakeholders to understand and appreciate that the risk management structure for the road asset management system will inevitably be different from that which is appropriate for capital works projects, and will be greatly influenced by the structure of existing asset management systems. With capital projects, risk management systems are very much focussed on the early identification of live or emerging risks and then developing treatments or strategies to minimize or mitigate their negative effects.

Because the capital project has a beginning and an end, the identification of these risks is a dynamic process that must focus on actively managing known risks, and also expending resources on identifying those risks that were unanticipated. In the capital project, one would expect a significant number of unanticipated events that may affect the completion date or the financial performance of the project, but the majority of these risks then decline to zero as the project nears completion.

In contrast, asset management and network operations are on-going activities that have been functionally providing expected results to Council for many years. Within this environment, the risk management practitioner is likely to find fewer emerging risks, particularly because existing systems have been established to minimize their occurrence.

Road asset management and network operations as a management activity has evolved as it has matured as an industry and the modus operandi has been structured over time to minimize the risk of unexpected events. In many cases these existing controls were likely implemented with risk being one of several motivators for the control. In most cases, these controls will materialise as a set of policies, procedures, and detailed systems that manage some of the network risks in more detail. One tenet within "Risk Management" is "once the risk actually occurs, it ceases to be risk management, and becomes incident management". While incidents continue to occur, in the asset management case, many of these incidents will have occurred early in the industry's history. Policy, procedure and micromanagement have therefore already been developed to minimize their frequency and consequences.

From the asset manager's perspective, the existing system for managing risk to a standard level will be reliant on a defined level of funding, and further investment and effort will be required to allow for an increase in the level of control of existing risk exposure.

The risk management system requires a reporting function that informs management personnel, who are likely to be outside the day-to-day activities of asset management, of the impact their existing decisions have on their risk exposure, along with the effective communication of emerging risks that may be exceptional. This reporting function should be composed of both a standardised format at a defined frequency in addition to an exceptional reporting mechanism that will occur at a higher frequency as the need arises. It is through this reporting mechanism that Council can be:

- Informed of current risk levels given the existing funding regime
- Appraised of emerging risks that may require immediate or exceptional attention and resources

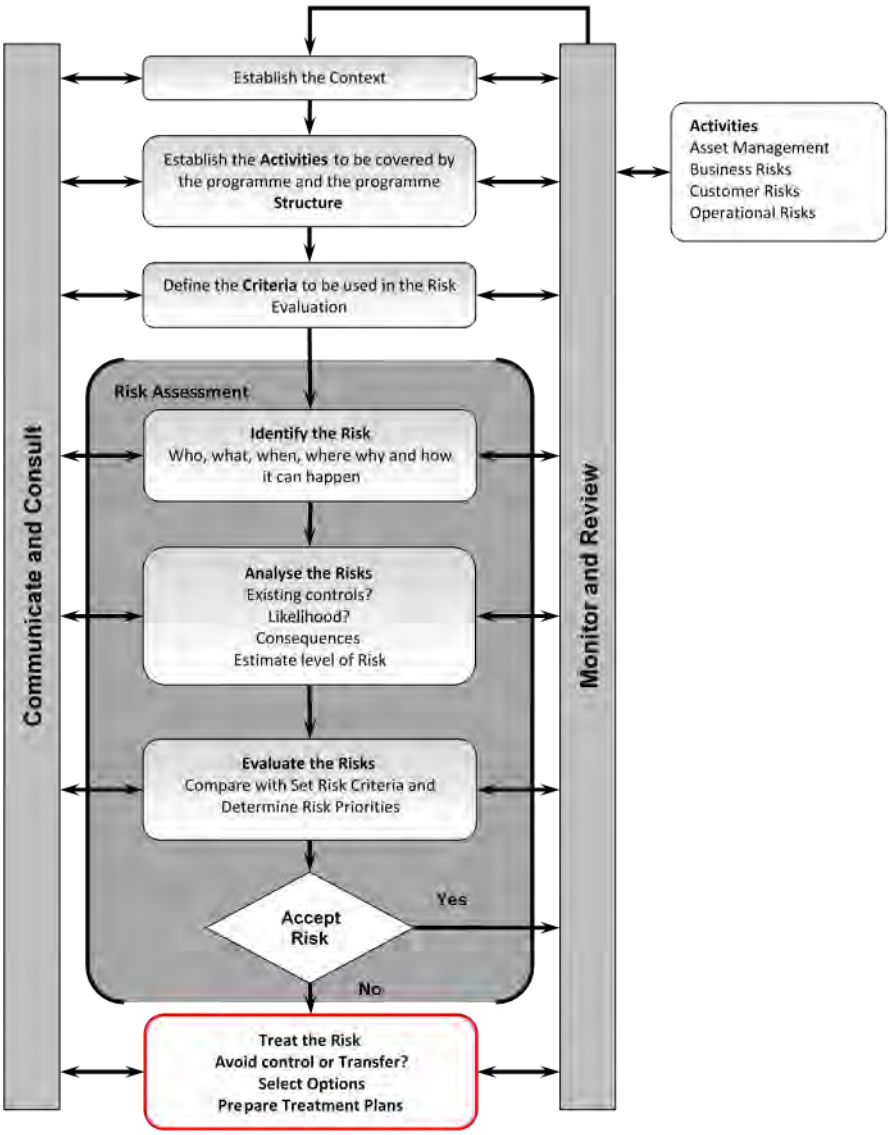
This information will assist Council personnel to assess where risk reduction efforts should be focussed based on their corporate accepted risk level. The reporting mechanism will also allow the asset management teams the opportunity to provide alternatives to decrease the current risk levels based on Council's priorities and assist with the development of preferred strategies which can be effectively implemented at the functional level.

Assessment of risks is initially based on a qualitative analysis. More sophisticated analysis or quantitative risk analysis may be carried out as part of the risk treatment plan for specific high risk events.

The overall risk management process is illustrated in

Figure 14. Some of the concepts and criteria may be applied to other Council activities or assets but this risk management framework has been developed for planning and operation of the Council's road transportation corridor.

Figure 14: Risk Management Process



7.2 THE RISK MANAGEMENT PROCESS

7.2.1 Understanding the Context

As for the levels of service, the context for the application and development of risk must be set to ensure that risk development is not completed in isolation, as the identification analysis and treatment of risk will impact at all levels in the management of the asset; from community outcomes through to service level delivery, strategic goals and operational delivery.

Context refers to strategic context, organisational context and risk management context.

Strategic Context

This AMP for Roading sets out the strategic context as it relates to risk management. It outlines the relationship to identified community outcomes, activity goals, strategic result and strategic action. Further the plan sets out the relationship to other plans, legal requirements, financial strategies, regulatory and policy obligations of the roading activity.

Organisational Context

The organisational context is approached through the identified activities of managing the roading asset, as the activity identifies the risk associated with staffing, the elected representatives and work areas, location and IT systems.

Risk Management Context

The risk management context refers to the risk-related activities undertaken within the roading activity. The remainder of this section sets out the risk management context in terms of risk management activities, likelihood scale, and consequence scale. A risk assessment matrix and risk register are introduced, as are the required analysis and format for a risk treatment plan.

7.2.2 Establishing the Activities

Table 18 sets the areas of activity associated with the Council roading activity. Under each heading is a process that might occur within these activities (not an exhaustive list). These processes have associated with them a number of risks. By setting the activity and their associated processes the development of the risk register and all associated risks can be considered and analysed and related to the AMP for Roading.

Table 18: Risk Management Activities

Road Transportation Risk Management Activities				
	Asset Management	**Business**	**Customer Service**	**Operational**
Processes	Forward Planning	Funding Provision	Public Request Management	Routine Maintenance - Sealed
	District Roading Programme	Governance	Managing Response Times	Planned Maintenance - Sealed
	Information Management	Legislation Compliance	Customer Expectation - Raise/Reduce	Routine Maintenance - Unsealed
	Standards and Guidelines	Policy Development	Level of Service change	Planned Maintenance - Unsealed
	Demand Change	Service Provision Purchasing	Customer not understanding service levels	Routine Corridor and Safety Maintenance
	Data Storage	Employment	Customer Consultation	Capital/Renewal Physical Works (QA, Management, Timeliness)
	Information Systems	Financial Reporting /Management		Routine Inspections - (Contractor/Consultant/
	Consultant	Political – Elected Representative		Contract Administration
	Contractor	Council Staff		Footpath Maintenance
	Safety Management			Drainage Maintenance

Relationship of Risk

The relation of risk in the AMP is achieved through the risk management activities. The activities relate to the plan in the following way:

Table 19: Relating Risk to Land Transport Management Activity Plan Sections

Risk Management Activity	Plan Sections
Activity Management	Life Cycle Management, Future Demand, Level of Services, Asset Management Practice
Business	Financial Summary, Level of Service, Asset Management Practice, Plan Improvement and Monitoring
Customer Services	Levels of Service, Life Cycle Management, Plan Improvement and Monitoring
Operational	Life Cycle Management, Asset Management Practice

Risks apply across all processes in the management of the asset. The risk register holds the identified risk and which activity the risk impacts on.

The outcome of the process, illustrated in Figure 14, will be development and on-going maintenance of a Road Transportation Risk Register. This register will contain a prioritised list of all of the identified risk within each of the above four Risk Management Activity areas.

7.2.3 Risk Criteria

Criteria are used to evaluate the level of risk. They may be measured by key performance indicators. Risk is a function of consequence and probability/likelihood of an adverse event. Risk management procedures set out in AS/NZS 4360:2004 provide a general frame work for different organisations and activities. The following tables suggest criteria for the Council road network.

Likelihood (L) Scale

Likelihood Scale applicable for road transport activities are based on frequency or return period, rather than an absolute probability. These are set out in Table 20 below.

Frequency and probability of occurrence in 10 years are indicative only. Values are rounded off where appropriate to avoid giving a greater impression of accuracy than is justified by the qualitative analysis that is undertaken. The prime objective of this process is to determine a set of applicable likelihood criteria which are also reasonable within the context of road transport corridor management activities.

Table 20: Likelihood Scale

Likelihood Scale				
Level	**Descriptor**	**Description**	**Indicative Frequency**	**Probability of at least one occurrence in 10 years**
A	**Probable**	The threat is expected to occur frequently	> 1 year	>99.9%
B	**Common**	The threat will occur commonly	1 to 5 years	90% to 99.9%
C	**Possible**	The threat occurs occasionally	5 to 10 years	65% to 90%
D	**Unlikely**	The threat could occur infrequently	10 to 50 years	20% to 65%
E	**Rare**	The threat may occur in exceptional circumstances	>50 years	<20%

Consequence (C) Scale

The scale of consequence is focused around a quantitative approach and includes categories of health and safety, image/reputation, annual costs, obligations, network condition and serviceability.

The following provides explanatory notes for each consequence type:

- Health and Safety: Self explanatory
- Image Reputation: Self explanatory
- Environment: The possible impact on the environment from an event taking place
- Annual cost: The risk assessment for annual cost is the whole cost of negative events, without considering the potential subsidies from Central Government for reducing the risk or dealing with the potential consequences. This is something that maybe taken into account at 'Treatment Plan' stage.
- Obligation: Relates to those issues of sound governance and includes the ability of the Council to meet identified Community Outcomes as stated in the LTP in relation to the LGA2002's four well beings
- Network Condition: Is the net reduction of the asset value in the case of an event occurring. This is a subjective measure and is used to indicate the unexpected loss of service potential in the asset.
- Serviceability: Relates to accessibility and the impact on accessibility from an event.

Where an event may impact upon more than one outcome area, then the one scored as having the highest level should be used for the risk rating calculation.

Table 21: Consequence Scale

Level	Descriptor	Consequence Scale (C)						
		Health and Safety	**Image /Reputation**	**Environments**	**Annual Cost**	**Obligations**	**Network Conditions**	**Serviceability**
I	**Severe**	Multiple fatalities	International media cover	Permanent widespread ecological damage	>$10M	Central government takeover	Net reduction to asset value > $10 million	Prolonged (> 1 Month) disruption to major facility or large area
II	**Major**	At least one fatality	Sustained national media cover	Heavy ecological damage	$1M to $10M	Government or independent commission of Inquiry	Net reduction to asset value $2 to $10 million	Temporary (5 Days – 1 Month) disruption to large area or prolonged disruption to smaller area
III	**Moderate**	Serious injury	Regional media cover or short term national cover	Significant, but recoverable, ecological damage	$100k to $1M	Abatement Notice, RMA prosecution, Audit tags	Net reduction to asset value $0.5 to $2 million	Temporary disruption to small area and significant reduction in Levels of Service. Detour > 10 km
IV	**Minor**	Minor Injury	Local media cover	Limited, medium term, ecological damage	$10k to $100k	Minor claims, excessive rate payer complaints.	Net reduction to asset value $100 to $500 thousand	
V	**Negligible**	Slight Injury	Brief local media cover	Short term damage	< $10k	Occasional rate payer complaints	Net reduction to asset value < $100,000	Moderate reduction in Levels of Service. Significant traffic delay or short detour in place for < 1 day.

Risk Rating

The risk ratings have been assigned 4 categories, based upon the actions required to mitigate the risk set out in Table 22. These actions are:

- For risks in the Very High category are considered intolerable and immediate action is required to reduce the likelihood or consequence to reduce the risk to a lower category. Risk treatment options may be required that are not justifiable on strictly economic grounds. Safety, legal and social responsibility requirements may override financial considerations. As a minimum there must be a specific risk treatment plan for each entry in the "very high risk" category.
- High Risks are undesirable, but may be accepted if they cannot be reduced or avoided. All reasonable measures should be undertaken to reduce these risks to as low a level as possible, regardless of cost, inconvenience or other factors. As a minimum there must be a specific risk treatment plan for each entry in the "high risk" category.
- Items in the Medium Risk category should be evaluated on a case by case basis. Action to reduce these risks will be undertaken only when the potential benefits of the risk treatment outweigh the expected costs. Normal project evaluation criteria can be used to asses potential risk treatment measures for medium risks.
- No action required for Low Risks, other that monitoring to ensure they do not progress into higher risks.

Table 22: Risk Rating Categories

Rating	Description
Very High	**Intolerable. Urgent action required. Mitigation plan required for each risk**
High	**Take actions to reduce risk to as low as reasonable possible. Mitigation plan required for each risk.**
Medium	**Tolerable. Consider mitigation measures on case by case basis. Measures to reduce risk if justified.**
Low	Business as usual.

Table 23 summarises the outcome of the various likelihood x consequence (L x C) combinations producing a risk rating matrix. When the analysis of the risk is undertaken any item on the register that receives a rating of high or very high will require further work according to the rating outcome.

Table 23: Risk Rating Matrix

Likelihood (L)		Consequence (C)				
		I	II	III	IV	V
		Severe	Major	Moderate	Minor	Negligible
A	Probable	Very High	Very High	High	High	Medium
B	Common	Very High	High	High	Medium	Medium
C	Possible	High	High	Medium	Medium	Low
D	Unlikely	High	Medium	Medium	Low	Low
E	Rare	Medium	Medium	Low	Low	Low

7.2.4 Risk Analysis

The next steps in the risk management process are to develop a comprehensive list of risks (Identify the Risks), analyse the risks and to evaluate each one against the criteria defined above. The risks will be entered in a risk register, Appendix V, in the form shown on example Table 24. Ideally, a risk should be identified in the following terms:

Table 24: Example Risk Register

Ref	Name	Description	Existing controls	Likelihood (L)	Consequence (C)	Risk Rating (L x C)	Treatment option	Treatment cost

(Something happens) leading to a (negative outcome). The description should include additional information, such as:

- the source of the risk
- what are the existing controls or influences on the risk
- what (specifically) are the consequences
- is it dependent on other risks or conditions

The risk may trigger several categories of consequence, or if it has a range of probability/likelihood and consequence, it should be rated according to the combination that gives the highest risk rating.

Risks fall under the general headings of the Activities as outlined in Table 18 “Risk Management Activities”:

- Asset Management (Ref A for example placed under “Management Activity” in the Risk register)
- Operational (Ref; O)
- Customer Services (Ref; C)
- Business (Ref; B)

The reference is then used to relate the identified risk to the AMP for Roading.

An event leading to a negative outcome to Council’s objectives is regarded as a threat. However the process of risk analysis can also occasionally identify positive outcomes or Opportunities, and it is quite appropriate to use this register as a means of recording these in addition to the more common approach of only just considering the threats.

The description should include additional information, such as: the source of the risk, what are the existing controls or influences on the risk, what (specifically) are the consequences, is it dependent on other risks or conditions.

Residual Risk

The Consequence and Likelihood values applied to derive Risk Rating on the register need to reflect the level of residual risk remaining after the Risk Treatment Plans have been developed and implemented and their effectiveness in mitigating or eliminating the initial level of risk has been assessed.

7.2.5 Treat Risks

A risk treatment plan should be created for all risks rated high or very high in the form shown in Figure 15, to document how the risk treatment options will be implemented.

Risk treatment options generally fall into the following categories:

- Avoid the risk by deciding not to start or continue with the activity that gives rise to the risk. This includes considering the possible risks within a project when a project is being considered
- Reduce the likelihood of the negative outcomes
- Reduce the consequences
- Sharing or transferring the risk with other organisations
- Retaining the risk, after all reasonable treatment measures have been considered.

Some risks may be rated high initially due to uncertainty in the likelihood or effects and the risk treatment plan may consist of further investigations or assessments to better define the level of risk. Other risk treatment options may consist of financial controls (e.g. insurance), operational improvements, contingency planning or physical works to reduce risks.

Figure 15: Risk Treatment Plan

Risk Treatment Plan

Risk:			**Ref:**
Summary			
Proposed actions			
Resource Requirements			
Responsibility			
Timing			
Reporting and Monitoring			
Compiled By:	Date:	Reviewed By:	Date:

7.2.6 Risk Transfer

A fundamental concept in Risk Management is that the Risk Treatment activities should be the responsibility of, and carried out by, the party who is in the best position to manage them; which may be Council staff, Consultant(s), the Maintenance Contractor(s) or other third parties. To assist with this understanding, Council is encouraged to seek and evaluate as much information as possible on the spectrum of risk associated with all practical alternatives along with their associated costs.

Through this process of risk/cost trade off they will be able to then determine an appropriate balance of accepted risk and associated cost. In some situations the Council may feel that it is appropriate for them to carry a higher level of risk rather than bare a much higher level of expenditure that would otherwise be necessary to see the risk transferred to another party.

7.3 IDENTIFIED RISKS

Critical Risks

The most critical risks are:

- Identifying and agreeing the risk management context, i.e. consequence/likelihood frame work. Without this agreement the risk rating process may lead to an extensive number of high to very high risks requiring funding to mitigate or fix
- The changing legislative environment requirements
- Incomplete management and supervision of this activity due to limited staff resources

7.3.1 Considered Risks

Council Contract Procedures Manual

- The various contracts for the operation and maintenance of this activity require the contractors to provide Quality Plans for the execution of the contract requirements. The Quality Plans include procedures for work to be carried out. The risk is that the Council and contractors procedures are not followed.

Health and Safety

- Council has a comprehensive Health and Safety Programme for its operations.
- The various contractors involved in this activity have Health and Safety Programmes in operation. Reports are received from the contractors about any incidents relating to health and safety.

The various contractors involved in this activity have Health and Safety Programmes in operation. Reports are received from the contractors about any incidents relating to health and safety.

General Management Issues

- ***Contract Observation*** - The various contractors are not being observed sufficiently to ensure that all aspects of the contracts are being carried out or met.
- ***Legislative Compliance*** - Council staff practitioners supported by their experience and training, believe that all legislative requirements that impact on this activity are being complied with.
- ***Resources*** - The financial provisions shown in this Plan should be sufficient to provide the service required for this activity.
- ***Service Agreements*** - There are no specific service agreements in place between each department to ensure everyone is aware of their roles in this activity. However being a small Council with a small staffing level, interdepartmental discussion in relation to any facet of this activity is normal practice.
- ***Council Policies Clear*** - Council's policies are held in the Policy Manual. Updated road activity policies are currently under review and will be put to Council for approval as they are completed.

Financial

- Cost 'Overruns' - Council staff manage expenditure by:
  - ordering work only if finance is available and approved
  - reviewing expenditure monthly
  - reporting exceptions

True Costs – Costs Not 'Manipulated' - The financial forecasts that have been made in this Plan portray the true cost of this activity, given the assumptions made in making those forecasts.

Financial Assistance – for this Activity is received from NZTA in accordance with their policies. The 2018/2021 financial assistance rates are to be a base rate of 51% for maintenance, renewals and construction, and calculated as per NZTA formula for emergency works (max Base +20%)

Insurance

There is no current insurance cover for roads within the Mackenzie District.

In general Council has reserves to cover any additional funding required resulting from road asset damage.

Emergency Management – Operational Emergency Management

Operational Risks are those associated with the day to day operation of the District. The most prevalent of these are snow events followed by flooding and serious wind events. Initial response to all these events is managed through the Network Maintenance management Contract, and is covered in our specifications "Council C9 Emergency Work (Storm Damage, debris, slips, and snow clearance)". This specification covers response times, liaison, notifications, plant and personnel requirements. We also have a detailed snow clearance policy which ensures emergency services and high risk/use areas are cleared initially with the lower priority areas then being cleared.

Life Lines Emergency Management

Council has held discussions on the "Life Lines" philosophy with the various groups that provide services within the district and is reviewing its "Disaster Resilience Summary". Council has participated in an Engineering Lifelines project, Earthquake Hazard Assessment, and the summary of the assessment is outlined below.

Earthquake Damage Assessment

Table 25 Damage Assessment Chart has been compiled for use in conjunction with the Waimate, Mackenzie and North Waitaki Districts Engineering Lifelines Project, Earthquake Hazard Assessment, Report to Environment Canterbury, May 2008, (ECan Report no. U/08/18) prepared by Geotech Consulting Ltd. It should be read in conjunction with Sections 6, 7 and 8 of that report. Section 9 outlines three earthquake scenarios, and it is recommended that these also be read to provide a perspective on the contents of Table 25.

Chart Zones

Table 25 has been set out for each of the three Ground Shaking Zones as shown in Figure 6.13 of the above Environment Canterbury report. Because of the large area of the Districts, and the range of expected earthquake shaking intensities for any single earthquake event, or on a probabilistic basis, indicative damage is shown for a range of shaking intensities for each zone. The damage is indicative only and a wide variation can be expected within each zone due to variations in sub¬surface conditions, geology, terrain and orientation of the site with respect to the earthquake source.

Chart Limitation

The Damage Assessment Chart is an indicative guide only. This table is derived from a similar chart originally prepared for the Christchurch Engineering Lifelines Study (Risks and Realities, 1997). It is based on damage reports from historical earthquakes in New Zealand and overseas. There is little information on damage ratios for structures or infrastructure other than buildings, (this particularly applies to in ground pipework) and the relative damage is necessarily somewhat subjective. The damage to structures should be read in conjunction with the description of damage in the Modified Mercalli Intensity Scale, Appendix C of the Report. It may be used for coarse screening of effects, but must not be used as the basis for any design. Any decision involving expenditure or engineering design requires a more detailed evaluation of the conditions pertaining at that particular site.

Liquefaction

The Damage Assessment Chart does not include reference to liquefaction. Areas of significant liquefaction hazard in the Districts are limited. The majority of the areas are underlain with alluvium are older Pleistocene surfaces. Both the relatively old age and the predominantly coarse grading of this gravel make widespread liquefaction very unlikely. Liquefaction is more likely to occur within the ground shaking Zone 3 areas. If liquefaction occurs, the damage outlined in the chart could be significantly greater. For an indication of the effect of liquefaction, refer to Table 2.2, page 28 of Risks and Realities, report of the Christchurch Engineering Lifelines Group, CAE,, 1997.

Table 25: Damage Assessment Chart

Zone	Shaking Intensity	Roading	Railway	Bridge Structure	Bridge Abutments
1	MM VI	Little to no damage	Little to no damage	Refer section A - Structures	Little to no damage
	MM VII	Minor damage to kerbs and cracking of seal	Minor damage to alignment		Minor slumping
	MM VIII	Some damage to kerbs. Some distortion and cracking of seal.	Distortion of rail lines, some fissuring and spreading of embankments		Some slumping of abutment fill common
	MM IX	Widespread damage to kerbs, Distortion and cracking of seal, some ground fissuring. Permanent ground distortion and settlement.	Marked distortion of rail lines, both horizontal and vertical, significant embankment damage		Slumping of abutment fill at nearly all bridges, many of significant magnitude. Translational or rotational movement at some abutments.
2	MM VI	Little to no damage	Little to no damage		Little to no damage
	MM VII	Minor damage to kerbs and cracking of seal. Small slips on steep batters.	Minor damage to alignment		Minor slumping
	MM VIII	Some damage to kerbs. Some distortion and cracking of seal. Slips in batters	Distortion of rail lines, some spreading of embankments		Some slumping of abutment fill common
	MM IX	Damage to kerbs, distortion and cracking of seal, Land sliding in steep slopes and batters, cracking of ground	Distortion of rail lines, both horizontal and vertical, significant embankment damage		Slumping of abutment fill at most bridges, many of significant magnitude. Translational or rotational movement at some abutments.
3	MM VI	Little to no damage	Little to no damage		Little to no damage
	MM VII	Rockfall and small slips on steep batters.	Minor damage to alignment		Minor slumping
	MM VIII	Rockfall and slips in steep batters	Distortion of rail lines, some spreading of embankments		Some slumping of abutment fill common
	MM IX	Land sliding in steep slopes and batters, cracking of ground, large volume rockfall possible	Distortion of rail lines, both horizontal and vertical, significant embankment damage		Significant slumping of abutment fill at most bridges. Translational or rotational movement at some abutments.

7.4 FUTURE IMPROVEMENTS

7.4.1 Development of Risk Management

It is important to have input from a broad range of people and organisations so that the risk register is as comprehensive as possible. Often the greatest risks arise from events that were not anticipated or considered beforehand. Initially the risk register and assessment should be created in a workshop environment from a number of stake holders including Council staff and input from other stakeholders (e.g. contractors). Once the risks have been identified these should then be analysed in the consequence / likelihood frame work to assess the validity of the scales. If the risk outcome for all identified areas of risk is too great then the consequence and likelihood scales may need to be adjusted. At this stage a second review of the scales and reassessment of the identified risk can be completed.

After rating the risks and creating the risk register, Council will need to determine which parties are in the best position to carry out risk treatment planning for each of the high and very high risks, so that the appropriate actions may be taken.

7.4.2 Cross-Asset Risk Management Process

Risk Management procedures set out in AS/NZS 4360:2004 and SNZ HB 4360:2000 are generic for a wide range of activities and organisations. The Risk Management system proposed in this AMP is based on the assessment of Council values and goals for its road transportation network. Council will need to review the risk management process and provide feedback on the proposed risk rating criteria.

To ensure a robust and fair approach is taken with all of these assets, it is recommended that Council consider the development of a Cross-Asset Risk Management process in the future. This would then provide a greater level of assurance to Council that the prioritisation of the risks associated with its entire asset base, along the allocation of Council funds required to manage them, has been based upon an approach that is both rational and equitable.

7.4.3 On-Going Review

To ensure that emerging risks are identified and captured and that the Risk Treatment Plans are monitored for effectiveness over time, both the register and treatment plans must be reviewed on a regular basis by Council and other stake holders. The frequency for these reviews should be agreed and included in the Councils Operating Procedures.

Any significant additions or changes to the risk register will be noted as they occur through regular reporting procedures. It is recommended that the risk register should have a comprehensive update at each AMP review.

8 LIFECYCLE MANAGEMENT PLANS

8.1 LIFECYCLE MANAGEMENT – AN OVERVIEW

This section of the AMP outlines the work planned to keep the assets operating at the current levels of service, defined in Section 4 at the lowest lifecycle costs. The overall objective of the Life Cycle Management Plan is:

To maintain performance measures to ensure that the current strategies do not consume the asset leading to an unexpected increase in maintenance/renewal expenditure in the future.

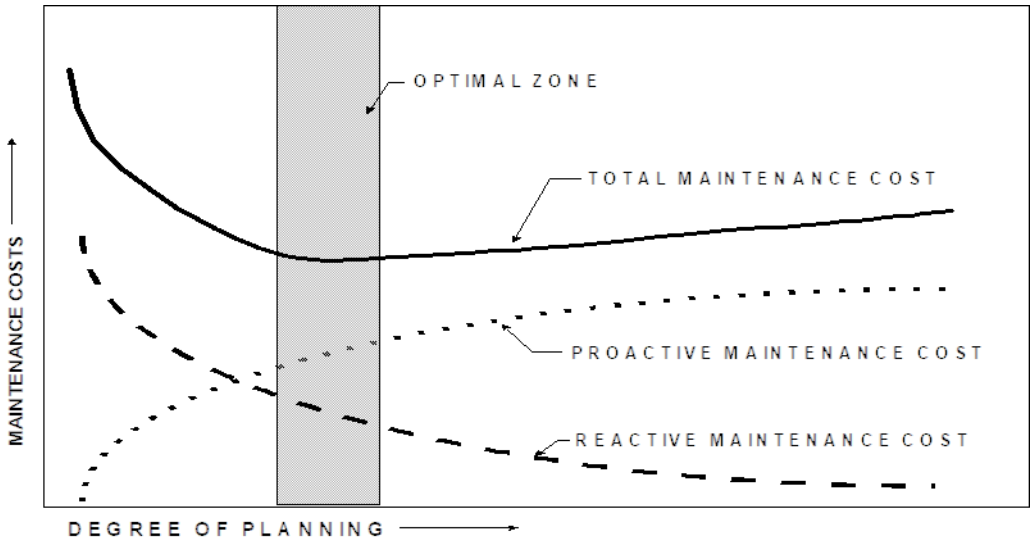
This lifecycle management plan covers the following:

- ***Background Data*** identifying where possible:
  - Physical parameters of the assets as outlined in the description of the transportation asset included in Section 3
  - Current capacity and performance of the asset relative to the levels of service defined in Section 4 and demand projections of Section 5
  - Current condition of assets
  - Asset valuations
  - Historical data
- ***Operations and Maintenance Plan***: This covers planning for on-going day to day operation and maintenance to keep assets serviceable and prevent premature deterioration or failure. This plan includes:
  - Current trends and issues, including results from growth analyses, LoS shortfalls, etc.
  - Any deferred work and associated risks
  - Maintenance decision making process
  - Strategies required to meet levels of service
  - How tasks are prioritised
  - Future Costs, current and future works in detail for the first three years and in summary form for the balance.
- Two categories of maintenance are carried out:
  - Unplanned Maintenance: Reactive work carried out in response to reported problems or defects (e.g. pothole repair, dig-outs)
  - Planned Maintenance: Proactive work carried out to a predetermined schedule (e.g. metalling, grading, bridge inspections).

A key element of activity management planning is determining the most cost effective blend of planned and planned and unplanned maintenance as illustrated in

Figure 16.

Figure 16: Balancing Proactive and reactive Maintenance



- ***Renewal/Replacement Plan:*** This covers Major work which restores existing assets to their original capacity or their required condition (e.g. resurfacing, rehabilitation or footpath reconstruction). This plan includes:
  - End of life projections, including results from growth analyses, LoS shortfalls, etc.
  - Future Costs, current and future works in detail for the first three years and in summary form for the balance
- ***Asset Development Plan:*** This section of the plan covers the creation of new assets (including those created through subdivision and other development) or works which upgrade or improve an existing asset beyond its existing capacity or performance in response to changes in usage or customer expectations (e.g. forestry harvesting routes). This plan includes:
  - End of life projections, including results from growth analyses, LoS shortfalls, etc.
  - Renewal decision making process
  - Renewals strategies and methods to meet required LoS
  - How renewals are identified, prioritised and to what standard they are replaced
  - Future Costs, current and future works in detail for the first three years and in summary form for the balance
- ***Disposal Plan:*** This covers activities associated with the disposal of a decommissioned asset. Assets may become surplus to requirements for any of the following reasons:
  - Under utilisation
  - Obsolescence
  - Provision exceeds required level of service
  - 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).

The lifecycle plans are developed separately for the following assets:

- Sealed roads
- Unsealed roads

- Bridges, fords and other structures
- Drainage control facilities
- Traffic services
- Footpaths
- Street lighting

The maintenance and construction standards and response times for these components vary according to road user demands that are reflected in the Road Maintenance Categories (see Figure 11).

8.1.1 NZ Transport Agency Work Categories

NZTA's Work Categories (WCs) were reviewed and new categories established in 2008 and outlined in their Planning, Programming and Funding Manual[1] shown in Table 26. These are the WCs used for all financial reporting. This Life Cycle Management Plan reports on work within these WCs. For clarity we have identified the WC numbers for the work within each section of the Life Cycle Management Plan.

Table 26: NZ Transport Agency Work Category Structure

Activity Class 1 – Transport Planning		
Activity	**Work category No.**	**Work category name**
Transport Planning	001	Regional land transport planning management
	002	Studies and strategies
	003	AMPs
	004	Programme business case development

Activity Class 8 – Maintenance and Operation of Local Roads		
Activity	**Work category No.**	**Work category name**
Structural maintenance	111	Sealed pavement maintenance
	112	Unsealed pavement maintenance
	113	Routine drainage maintenance
	114	Structures maintenance
Corridor maintenance and operations	121	Environmental maintenance
	122	Traffic services maintenance
	123	Operational traffic management
	124	Cycle path maintenance
Level crossing warning devices	131	Level crossing warning devices
Minor events	140	Minor events
Emergency reinstatement	141	Emergency works

[1] The NZTA Planning, programming and funding manual, First Edition, 2008

Activity Class 8 – Maintenance and Operation of Local Roads		
Activity	**Work category No.**	**Work category name**
Network and asset management	151	Network and asset management
Property management	161	Property management (state highways)
Financial grants	171	Financial grants

Activity Class 10 – Renewal of Local Roads - Maintenance and Operation of Roads		
Activity	**Work category No.**	**Work category name**
Structural renewals	211	Unsealed road metalling
	212	Sealed road resurfacing
	213	Drainage renewals
	214	Sealed and Unsealed Pavement rehabilitation
	215	Structures component replacements
Corridor renewals	221	Environmental renewals
	222	Traffic services renewals
Associated improvements	231	Associated improvements
Preventative maintenance	241	Preventive works

Activity Class 12 – Improvement of Local Roads		
Activity	**Work category No.**	**Work category name**
New road infrastructure	321	New traffic management facilities
	322	Replacement bridges and other structures
	323	New roads
	324	Road Improvements (reconstruction)
	325	Seal extension
Property	331	Property purchase (State highways)
	332	Property purchase (local roads)
	333	Advance property purchase
Low Cost Low Risk Projects	341	Low Cost Low Risk Projects
Resilience Improvements	357	Resilience Improvements
Road Safety Promotion	432	Promotion, education and advertising
	451	Walking facilities

Activity Class 12 – Improvement of Local Roads		
Activity	**Work category No.**	**Work category name**
Walking and Cycling	452	Cycling facilities

8.2 MANAGEMENT PROGRAMME

8.2.1 Method of Service Delivery

Council staff manage the roading network with some assistance from consultants. Maintenance of the network is through a competitively tendered multi-year contract with a common document written and compiled by our collaboration (with aid of a consultant) between the four councils (Ashburton, Timaru, Waimate & Mackenzie). Our collaboration is known as the Aoraki Roading Collaboration (ARC). Other works such as resealing (currently we have a combined 2 year contract with Timaru & Waimate District Council) and large renewal projects are let as competitively priced contracts on an annual basis.

The current contracts let are included in Table 27.

To ensure activities are providing the best efficiencies possible, work is generally clustered in such a way that works are carried out within set corridors. The maintenance contract encourages a joint approach to solve roading issues for the lowest whole of life cost.

The current road maintenance contracts (5 year flat contract) place considerable onus on the contractors to self-manage all road maintenance activities; this involves regular inspection of roads, locating maintenance requirements and carrying them out under a performance based specification.

Table 27: 2011 Physical Works Contracts

Contract No.	Contract Name	Length (Years)	Responsibilities	Contractor
1222	Road Maintenance (November 2015 – November 2020)	5	Sealed pavement maintenance Pre-seal repairs Unsealed pavement maintenance Vegetation control Tree Removal Traffic services maintenance Drainage maintenance Footpath maintenance Minor bridge maintenance Sealed/Unsealed AWPT Culvert replacements Slip removal Flood damage repairs Pavement Marking	Whitestone
1234	Sealing District Roads	Bi-annual	All resurfacing (chip seals). Combined contract with Timaru District Council	Fulton Hogan
	Street Lighting Maintenance	Annual	All lighting maintenance	Negotiated annually (Netcon sole supplier)
1222	Bridge Maintenance	Annual	Routine and structural bridge repairs	Tendered or maintenance contractor depending on scale

Contract No.	Contract Name	Length (Years)	Responsibilities	Contractor
1222	Sealed Pavement Rehabilitation	Annual	Rehabilitation and Area Wide Pavement Treatments for sealed roads where quantity warrants a standalone contract	Tendered or maintenance contractor depending on scale
Priced Work	Improvement Works	Annual	Seal Extensions Major Safety Improvements	Tendered or maintenance contractor depending on scale
Priced Work	Minor Safety Works	Annual	Safety Footpath Guardrail Installation Sight Benching	Tendered or maintenance contractor depending on scale

Council's Subsidised Roading Activity Procurement Strategy provides full details of how all subsidised work will be procured. Regular tendering of contract activities helps to ensure reasonable marketplace price is accomplished for all phases of the work.

Council is also currently investigating combining specific operations (e.g. renewal activities) with other Local District councils (as part of the Aoraki Roads Collaboration) to improve value for money by achieving best market rates available and optimising the efficient and effective use of the existing infrastructure and resources.

8.2.2 Forward Works Programme

Historically the sealed roads in the Mackenzie have been in good condition and there has not been enough approved funding available to embark on a significant renewal programme. Over the past three year funding block a bow wave in the resurfacing FWP has been dealt with and reduced to a manageable level going forward. This spike in the programme was identified forming during the preparation of the 2015- 2018 LTP period. Local share funding was injected into this work category over the last three year period to get on top of this due to it been not approved in initial funding request. Subsequently cost scope adjustments were applied for to limit the aspects of this investment. The methodology is still to continue to work within the available funds are spent on the areas of greatest need on the network incorporating ONRC classifications into this decision making process.

However, a forward works programme has been developed to protect the assets in the condition they are in, to avoid consuming the asset and improve the resilience of the network. It is difficult to predict fully the areas requiring sealed road rehabilitation due to the harsh winters in the Mackenzie and the effect of frost heave on the network.

A 30 year resurfacing FWP has been developed based solely on RAMM data. In any one year, the age and condition of the oldest or at risk seals are assessed to determine the remaining useful life and thus formulate that years reseal programme. This still requires some in the field testing to verify the programme is reflective of the condition of the road. This is part of the councils improvement plan over the next three years aiming to begin this project in year one.

This programme has been used as a basis for works included in this AMP.

8.2.3 Asset Valuation

A valuation is undertaken every three years in order to assess the value of the network, the depreciated value and the annual depreciation. Details on Asset Valuation and Depreciation are held in Section 8 Financial Summary.

8.2.4 Historical Data

Historical data is used to make an assessment of past performance and to see if future trends can be applied. At a network level, these trends can indicate if the condition of the network is deteriorating or improving. The different forms of historical data and their location are outlined in Table 28.

Table 28: Historical Data

Type	Location	Comment
Roughness	RAMM	Current and historic testing has been completed using an axle response metre to measure roughness with technological advances in is likely this may be measured with a laser profiler in future given constant data across the network and improved accuracy.
Sealed Rating Data	RAMM	Faults are manually rated. Some interpretation discrepancy may exist between rating teams.
Carriageway surfacing data	RAMM	Holds surfacing history. Surfacing data must be maintained to obtain confident surfacing history.
Past Unsealed Pavement Maintenance	Spread sheet	Provides a full summary of grading and metalling completed over the last 10 years
Past Maintenance Costs	RAMM	Provides summary of maintenance costs and works completed.
As Built Drawings	RAMM from As Built Plans each year	Collected at end of construction verified and entered into RAMM.
Pavement Structure	RAMM	All new pavement construction records include pavement composition details

Historic expenditure summaries have been produced in the past from the NZTA website. The information that produced the following graphs is no longer available and as a consequence the graphs could not be updated. The most useful comparisons are made with other areas or authorities with similar characteristics, rather than with the whole country. The data for Council is compared with a peer group of similar council authorities. The peer group used for comparison with Mackenzie District is Group E which consists of largely rural areas with small provincial towns with low traffic volumes. 24 local authorities are included in Peer Group E, with approximately half in each of the North and South islands. NZTA has different sets of comparison data available on their website. http://www.nzta.govt.nz/planning-and-investment/transport-data/data-and-tools.

Figure 17 shows the total maintenance based on Lane Kilometre, compared to average costs for Peer group E. These figures show that overall costs have increased over the last 10 years. The costs in $/lane-km for the district are slightly higher than the average for the peer group.

Figure 17: Total Maintenance and Renewal Costs and $/land.km for Mackenzie DC and Peer Group E ONRC graph

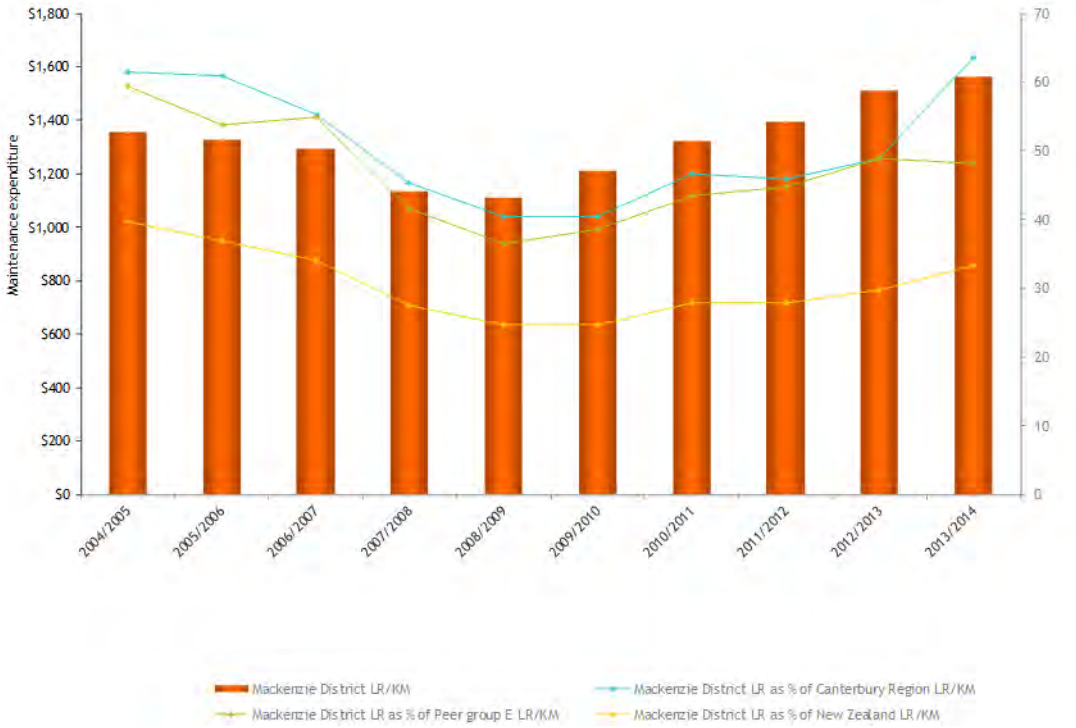
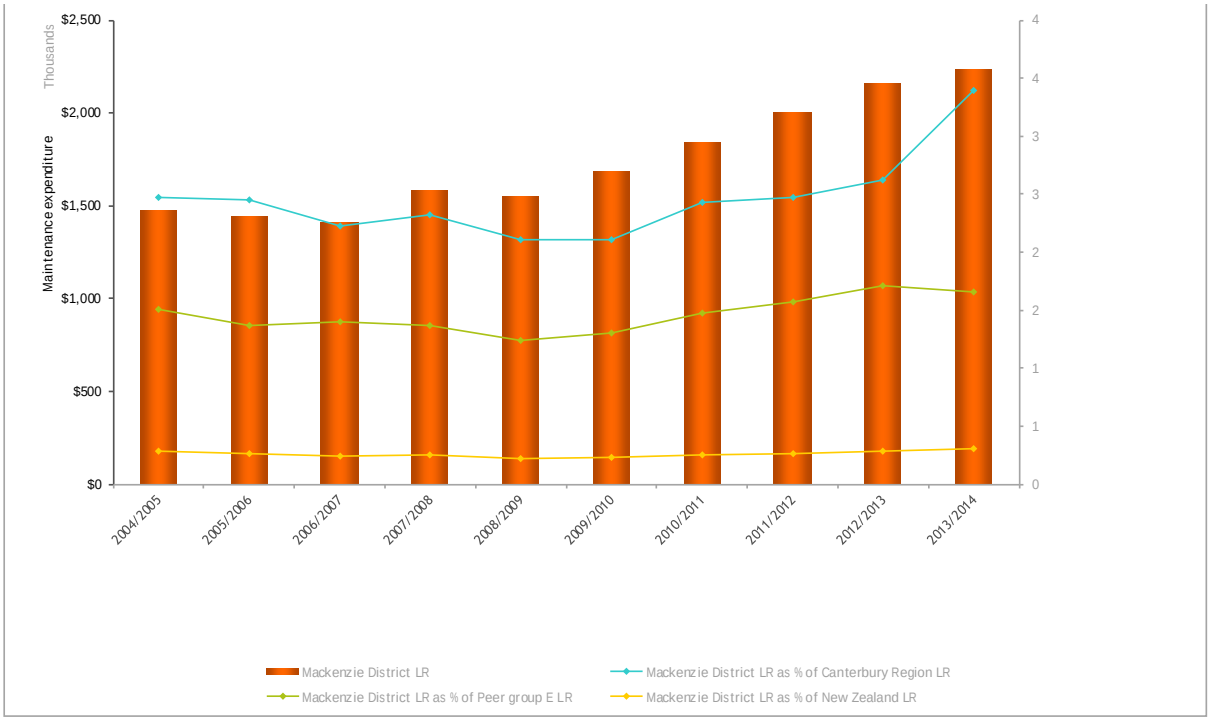


Figure 18: Expenditure comparisons (10 years expenditure totals only, compared to peers, region, NZ)



Safety Standards

The Crash Analysis Canterbury Region 2013 to 2017 Briefing Notes, outlines crash statistics for Mackenzie District local roads. Between 2013 and 2017 in Mackenzie District, there were 12 reported

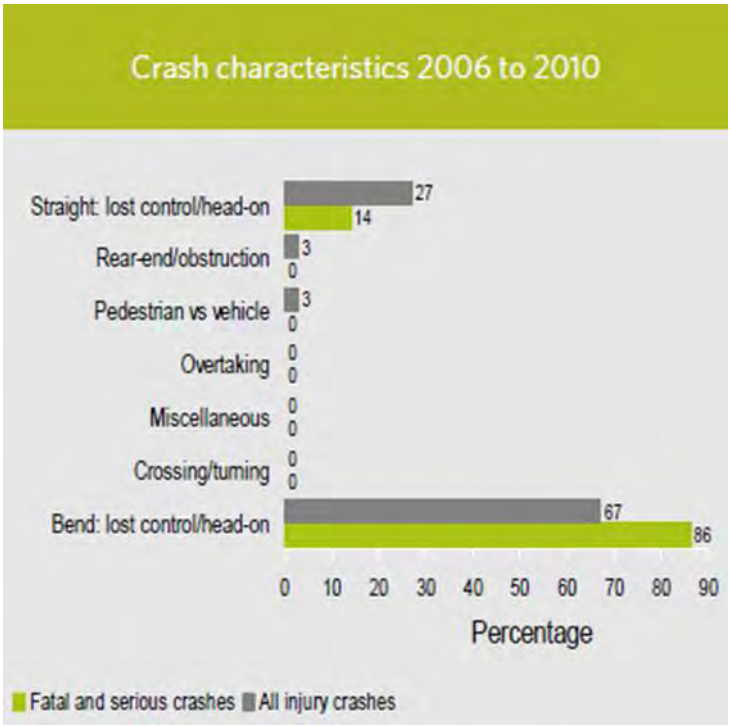
injury and non-injury crashes on local roads. Table 29 shows the number of injuries resulting from these crashes by rural or urban areas. Rural is defined as an area with a speed limit of 80km/h or more. 83% of injuries were caused by crashes on rural roads.

Table 29: Injuries resulting from crashes on Mackenzie District Roads 2013 to 2017

	Fatalities	Serious Injuries	Minor Injuries	Total
Rural	2	2	28	32
Urban	0	3	10	13
Total	4	8	0	0

Figure 19 shows that loss of control crashes represent 100% of fatal and serious crashes and 94% of all injury crashes. The two most common types of crashes are: When there is a 'loss of control/head on vehicle turning' (6 crashes), followed by a 'loss of control/head on straight road' (4 crashes). It should be noted that there have been no recorded minor or no injury crashes reported on local roads in the last 5 years crashes on local roads in Mackenzie District in the last 3 years due to road conditions.

Figure 19: Crash types in Mackenzie District



17% of all of the crashes were related to road factors.

The most common type of crash involves loss of control on a bend which may indicate a lack of appropriate signage, poor gravel maintenance on unsealed roads or driver related issues may be primary factors influencing crashes. Road width and specifically lack of shoulders could be a concern on sealed roads.

Within the Council road safety outcomes are influenced by the following:

- community safety programmes
- road engineering improvements, - Low Cost Low Risk Programme, delineation, signage

- road maintenance programme (grading, re-metalling, drainage improvements)

The outcomes that these programmes are focused on are varied but the overall aim is to reduce the number and cost of crashes on the District's roads as reported each year by NZTA. The Mackenzie District Council, Waimate District Council and Timaru District Council all belong to the South Canterbury Joint Road Safety Committee which is tasked with delivering community road safety initiatives. Each Council makes a financial contribution towards the employment of a Road Safety Coordinator for South Canterbury.

There are an ever increasing unofficial reports of near misses occur on our network. The majority of these incidents would result in a serious crash or fatality if the three factors (that influence crashes) were to align. Currently this is a large gap in our data given majority of these incidents go unreported, are discussed word of mouth once or twice removed or are received with sketchy details. Given the lower volumes of traffic using our roads and surrounding area compared to some other local authority's majority of incidents currently remain near misses and don't develop any further. Though with the increases in tourism, intensification of farming and a greater numbers of holiday makers and outdoor enthusiasts frequenting the district increases this potential of these incidents becoming more significant.

The risk of harm is made higher by the following:

- Occupancy in vehicles being at or near capacity in most.
- A high proportion of tourist using our roads.
- Fatigue being high (midpoint between Christchurch & Queenstown).
- Inexperience driving on a rural network (surfacing's, alignments, etc.
- International visitors coming from where they drive in the opposing lane.
- Driver frustration due to indecision, convoy travelling parties, reduced travel speeds due to sightseeing.
- Greater number of people choosing other transport modes e.g. walking and cycling. Unfamiliar vehicle which handles differently with varying technology or functionality.
- Large proportions of long rural roads made up of a large number straight sections results in higher speeds.
- Climatic conditions snow/ ice, flooding, wind in the alpine environment.

Part of our gap analysis is to try and capture this data/ evidence from the source. It is thought at this stage the easiest way to do this is via building or use of an existing app. This would capture location and as many other details of the incident using a number of simple questions with drop downs to discover hotspots, frequencies, trends and any other relevant information.

8.3 SEALED ROADS

8.3.1 Sealed Roads Background Data

Sealed Roads Scope and Nature of Asset

The purpose of a sealed road is:

- To provide a paved network suitable for the efficient movement of vehicles and people, with an all-weather surface appropriate to its location and function in terms of skid resistance,

noise reduction and smoothness, and that has a structure suitable for legal traffic loading requirements.

Only 213.4km or 29.1% of the districts roads are sealed – 50.07km of urban roads and 163.3 km of rural roads.

The key issues relating to the sealed pavements are:

- Optimising the use of limited funds to maintain the condition of the asset
- Tourism growth and the increased numbers of free independent travellers is causing greater damage and higher level of service
- Setting levels of service that align road user expectation and lifecycle costs
- Keeping Pavements Water proof
- Providing adequate seal width to cater for capacity on higher trafficked roads (if funding is available)
- Land Use intensification, water consents increasing productivity, Forestry and dairy conversions.
- Development, creating and vesting new roads with Council and no guaranteed increase in funding from NZTA

Sealed Roads Current Condition

Many of the District's roads evolved from tracks to unsealed roads that were constructed to absolute minimum standards in terms of pavement strength, width and drainage facilities. As traffic volumes increased individual roads were widened, extra metal added as considered appropriate and surfaces sealed. Construction consisted of river run or pit sourced gravel sub base on some individual roads with the majority consisting of a thin layer of crushed aggregate base course and a single coat chip seal surface. The metal courses were often laid over silty clay subgrade of unknown bearing capacity with little or no consideration given to whole of life strength requirements needed to satisfactorily carry the expected traffic loads over the roads expected life. Only since the 1970's have pavements been designed to carry expected traffic loading over a projected 25 year design life, and the 1970's design loads were significantly less than the current design loads given recent increases in heavy commercial vehicles (HCV).

Maintenance work includes the following activities:

- repairing minor defects: pot holes, depressions, heaving, shear failures, cracking, edge breaks, chip loss, shoulder damage and bleeding bitumen

The condition of the sealed road network is monitored as follows:

- Regular routine inspections by Council and Contractor personnel. Defects found are included in the programme of works to be undertaken by the Maintenance Contractor. The number, size, location and date of defects are logged in RAMM Contractor to provide a measure of conformance with the key performance measures required within the contract
- A formal biennial road condition roughness and rating survey. The information from this survey is recorded in RAMM and used to:
  - Assist with the development of a forward reseal and reconstruction work programme
  - Provide surface and pavement condition data and enables the possibility of the "Treatment Selection Algorithm" to be undertaken in RAMM

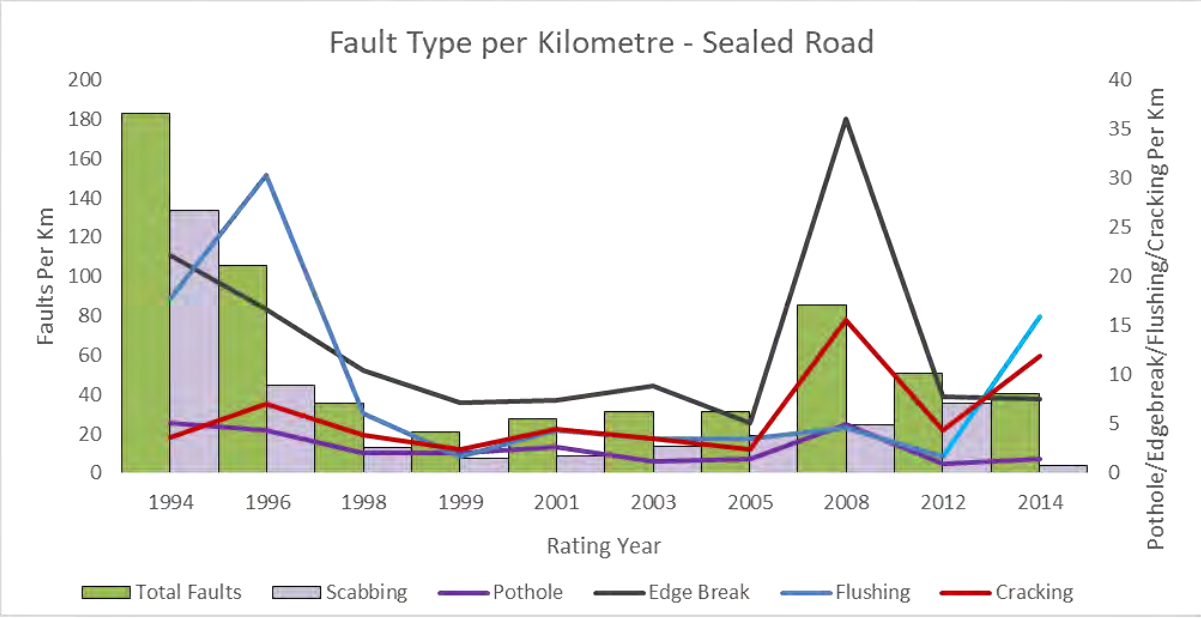
  - Calculate surface condition indices that provide a measure of the performance of the sealed surface
  - Report to NZTA
- Biennial roughness surveys of the sealed network to ascertain the current condition and provide a measure of performance against the required levels of service
- Annual maintenance costs per kilometre for work types are calculated from the costs recorded within the maintenance contract and the trends used to establish relative network surface condition
- The safety of the network is gauged by recording accident information (including near misses where reported currently there is a gap in data), analysing accident trends and the statistical data produced in the NZTA "Road Safety Issues" and "briefing notes" reports. All serious crashes on local roads are assessed by the Roading Team to investigate if road conditions were a factor in the crash.

RAMM Rating Historic Trends Graph

The biennial visual road condition rating survey is used to measure and record defects shown by each road element in a standard and objective manner. This provides a measure of the condition of each road element, which can be used to assess routine maintenance and rehabilitation needs. The historic trends are dependent in our network given the climatic conditions that occur in our district. The amount of cracking for example is a lot greater in winter than it is in summer as in winter given pavements contract it opens up allowing water into the pavement causing greater damage and in summer (given the hot dry weather) the binder softens sealing up the cracks therefore providing a possible false representation of historic trends and network condition depending on when the survey is carried out.

Figure 20 shows the historical results from visual condition rating. The latest condition rating data in RAMM is from 2016.

Figure 20: Historical Visual Condition Rating Data for Sealed Roads



The historical data shows that condition significantly improved in 1998 and since then has remained relatively stable, with the exception of potholes which have increased in the 2008 survey. This survey also shows very low percentages of alligator cracking, rutting, shoving and slightly increased

percentage of flushing to just over 1%. The data shows that although the general condition of the pavement and surfacing remains stable, there is an increase in isolated pothole pavement failures. This indicates that maintenance intervention levels for sealed roads are appropriate to maintain the condition of the pavements at an acceptable level (given current infrastructure), but a greater focus may be required on completing pavement repairs to a good standard in isolated areas.

Even though there has been a significant amount of pavement drainage improvements on the seal road network, the number of heaving and shoving failures appears to be increasing. This is most likely to an increase in HCVs across the network. Traffic classification data is showing a range of 10% to 27% HCVs with an average of 16% across the network. Which is higher than the industry standard of approximately 10%.

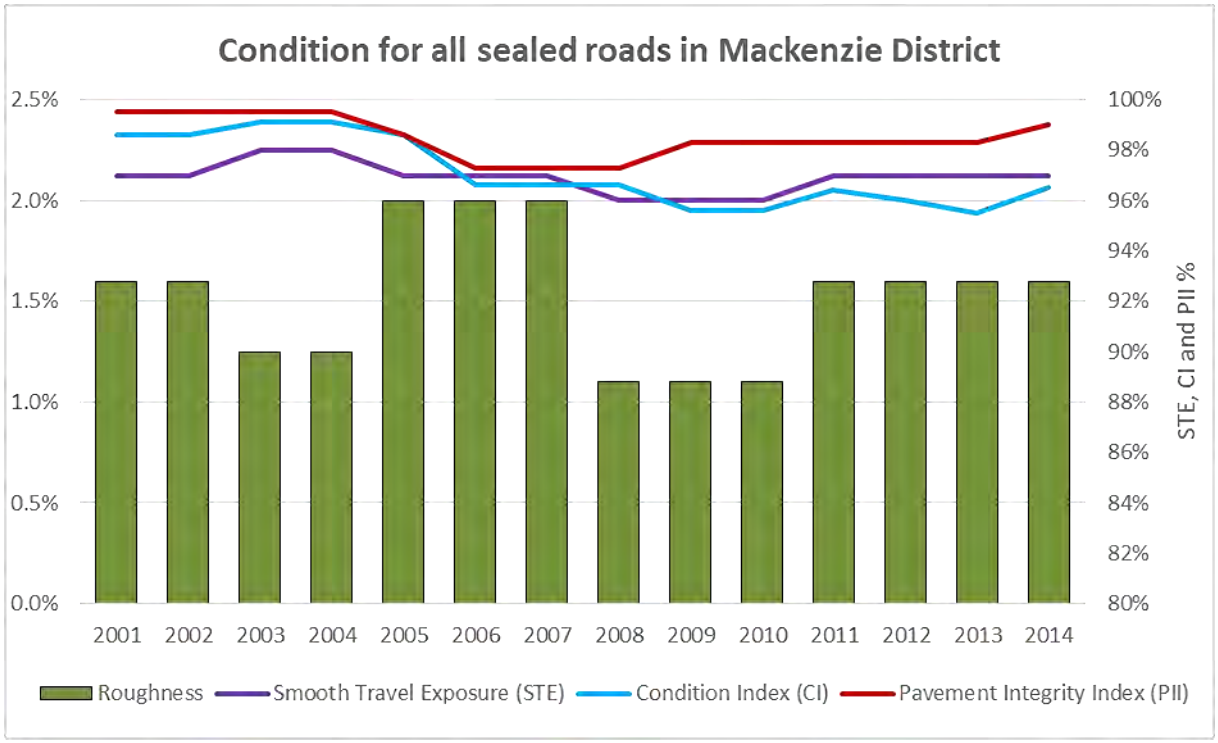
Roughness, Pavement Integrity Index and Condition index

Pavement Integrity Index (PII) is a combined index of the pavement faults in sealed road surfaces. It is a 'weighted sum' of the pavement defects divided by total lane length. PII combines surface faults (CI) with rutting and shoving. A high PII corresponds to high pavement integrity.

Surface Condition Index (CI) is an overall condition value that reports an aggregation of a number of surface defects over a specified length of road pavement.

Figure 21 shows that over the last three years there has been a static or slight rise in PII and CI, albeit small at less than 2%. Roughness has also remained static corresponding to the STE stabilising on 97%.

Figure 21: Historical Condition Data for Sealed Roads



Sealed Roads Current Capacity and Performance

The capacity and performance of the sealed carriageway is directly related to its condition. The intention of this plan is to maintain condition at an optimal level that maximises road user benefits whilst optimising lifecycle costs. However this objective could be compromised if there is a lack of NZTA financial support. The result of which would be a minimisation of life cycle costs and appropriate Levels of Service had to be compromised. This could result in trying to maintain the asset to a similar

condition for less funds effectively consuming the asset which a number of other road controlling authorities have allowed to happen and are now requiring greater investment to try and catch up. This goes against all sound asset management and engineering principals that the Mackenzie District has prided itself on over the years on the philosophy that maintenance is the key. Mackenzie District Council has historically injected local share funds to limit the asset deteriorating given we have other funding stakeholders being our rate payers. The majority of our ratepayers are intergenerational therefore have a large investment in the infrastructure assets in the Mackenzie District and don't want to see the assets that have been built and maintained over time to what they are today lost. Our AMP is based on maintaining the asset and prolonging the requirement for large scale renewals and intervening with heavy maintenance, renewal works or a project where basic maintenance isn't best for the whole of life cost. Given we sit within the middle of our peer group for maintenance cost and given the current condition of our network we believe that our asset management practices are optimised.

Arriving at an optimum level of maintenance is a complex process that has to be based on an accurate and detailed asset inventory, actual condition data and a sound working knowledge of the asset component and its mode of deterioration. The maintenance level also relies heavily on climatic conditions that occur within the network annually as it can severely affect the amount required depending on the scale of the weather events. Maintenance in the District is increasing with the tourism growth especially with the number of free independent travellers exploring our network, farming/ land intensification and development.

The asset's capacity is a measure of its ability to meet its design standard, agreed levels of service and any perceived future demand that may be placed on the asset. The future demand that was predicted five years ago has been exceeded with the current growth we are experiencing which is putting increased pressure on all infrastructure assets across the district. The current capacity and performance of the sealed carriageway component of the Council road network is shown in Levels of Service Table 13. If maintenance funding isn't approved as per our application it is likely that performance measures won't be able to be met forming another bow wave of works. With traffic increases and the amount of growth there is a possibly that the maintenance if not funded at an appropriate level that the asset may get to a point of large scale renewal which won't be able to be caught up on.

8.3.2 Sealed Roads Operations and Maintenance Plan (WC-111)

Current practice is to apply a combination of "reactive" condition driven and network lifecycle techniques to determine the work necessary to maintain the network within financial constraints (see chart Appendix VI). These methods rely heavily on:

- an Asset & Roading Manager's knowledge of the network
- annual or biennial inspections to obtain the condition data used in the RAMM Treatment Selection Algorithm (TSA)
- accurate base inventory
- life and cost information of each asset component
- historical maintenance cost of each road (From 2016 this data will be recorded by carriageway section in RAMM)
- ONRC Classification

Over the last three years, due to inflation the maintenance costs have increased annually (CPI being applied to 5 year maintenance contract) with the resulting condition generally remaining static but with an increase in shoving/ heaving failures and ever increasing amount of edge break and low shoulder. It indicates that in order to keep the network maintained at the similar condition level, future maintenance cost increases will be required. If the network was still a rural network predominantly and tourism wasn't a factor then it would be likely with a slight increase in maintenance costs for inflation and increased farm production but the network would be fit for purpose.

Advanced asset management techniques that model asset performance under varying maintenance and financial conditions could be used to further optimise and prioritise road maintenance effort and expenditure. It is considered however that the low limited traffic loading and limited maintenance requirements, coupled with detailed knowledge held, on the majority of our network, doesn't warrant this sophistication of approach.

Maintenance Standards

The technical LoS required are detailed in the maintenance standards that implement these technical LoS is set out in Council specifications contained in the road maintenance contracts.

Maintenance Programme

The majority of the pavement maintenance is reactive so budgets are based on historical expenditure, particularly that of the last three years. As noted above with the increase in heaving and shoving failure being identified, at risk areas have had or are programmed for extensive drainage improvements. With the ever increasing amount of low shoulder and edge break as well increases the need for costly maintenance repairs due to traffic increases due to tourism or seal widening improvements. The financial forecasts are presented in Appendix III. However, adjustments are included for new roads and to reflect significant improvements. There is a need to increase maintenance to reflect lack of timely renewal works being able to be funded, which are also influenced by NZTA funding decisions.

8.3.3 Sealed Road Resurfacing and Sealed Pavement Rehabilitation (WC 212 and 214)

Renewals include resurfacing, smoothing and pavement rehabilitation. The identification of sealed pavement requiring renewals is brought about in a number of ways:

- Regular drive-over inspections
- RAMM rating surveys
- Ratepayer service requests
- Contractor inspections/reports
- Annual maintenance costs

The required level of renewal varies depending on:

- The age profile of carriageway surfacing and structure
- The condition profile of the carriageways
- The deterioration of the top surface
- The level of on-going maintenance demand
- The likely future demand on the road
- One Network Road Classification (ONRC)
- Other improvement works being required.

This information is used as base data in the generation of road condition forecasts, forward works programmes and road renewal programmes. NZTA project evaluation methods are used to determine Benefit/Cost ratio. Road rehabilitation is carried out only if NZTA co-investment can be met or if winter conditions render a section(s) of the network impassable where funds are typically diverted.

Renewals Treatments

Sealed Road Resurfacing

Sealed Road Resurfacings are pavement resurfacing where the reseal is to be applied to an established sealed road. Examples of these activities include:

- Conventional chip reseals, including second coat seals (generally two coat)
- Void filling seal coats
- Texturising seals
- Other special purpose surfacing (polymer modified seals) that fall into the maintenance chip seal NZTA category
- AC/ Slurry will be required in future due to higher traffic volumes and intern greater stresses occurring. Levels of service have also been increased in subdivision developments in high stress areas only typically which we eventually require replacement.

Sealed Road Pavement Rehabilitations

Rehabilitation is pavement renewal, generally of a limited area in which there are no geometric improvements to be actioned. These may include:

- Thin asphaltic overlays
- Unbound granular overlays
- Treatments involving ripping and/or reshaping
- Chemical stabilisation treatments.

Initially the first call on the budget set aside for this work in any one year is to repair frost heave damage caused winter freeze/thaw conditions. At these sites the drainage is improved if required and then generally a 150mm overlay is constructed. The amount of frost heave is generally dependent on scale of the climatic conditions over the winter months, traffic volumes on the road and is typically variant of where the damage occurs, but generally it is more than often in the high country.

Basic rehabilitation works are not to increase the existing seal width or provide a seal width greater than the standard for the traffic use of the road. On some of our secondary collector roads the use is changing significantly with the increases in tourism and farm intensification. The final widths of these roads are currently being considered to reduce long term maintenance costs as regular large scale damage is currently occurring to the edge of the road indicating that the existing seal surface isn't quite wide enough. In this situation seal widening improvements would be considered at the same time as rehabilitation works were carried out. Formation widening may also be undertaken where it is required for support or structural integrity.

Historically, in any one year, sealed road pavement rehabilitation has been as a result of damage caused by winter freeze/thaw conditions. Godley Peaks Road, Lilybank Road, Braemar Road and Haldon Road have been the most at risk roads in the District. This has not completely used the available budget and any surplus has been used for sealed road resurfacing to reduce the overdue list and to balance the unsealed metaling costs on our rural roads.

Council have made substantial improvements to drainage in sections that are known to cause issues, this has abated the need somewhat, but there is still a generally requirement to carry rehabilitation on sections of Haldon Road, Godley Peaks Road, Lilybank Road.

Future needs are Godley Peaks due to tourism numbers increasing, farm intensification, changes in land use with a corresponding increase in HCVs, requiring seal widening and alignment improvements. Also Lilybank where realignment and widening improvements are also required for similar reasons. Records show that the Average Annual Daily Traffic on Clayton Road has almost doubled in the last 12 years from 289 to 419 with 24% HCVs remaining constant. Thus the number of HCVs has also almost doubled.

Sealed Road Improvements

Seal Widening

Seal widening allows for the widening of existing surfacing where this is the least-cost maintenance treatment necessary to overcome edge break or to reduce shoulder maintenance. Work may include shoulder strengthening and/or formation widening where this is necessary to maintain the structural integrity of the pavement. This work may also be carried out to improve safety. Due to lower traffic volumes on a number of our roads that should be widened it is difficult to get a qualifying B/C to get the projects approved saying this there is a greater need on our secondary collector roads now as mentioned above and some of these others are now lower priority than in the past. Previously deserving roads were widened using the old Minor Safety allocation, but due to a change in funding categories these are now funded out of Low Cost Low Risk work category or form part of road improvements. .

Low Cost Low Risk

Improvements are described by NZTA as low-cost/low-risk improvements. The Low Cost Low Risk budget is set at a maximum of $1,000,000 for each project, with a co-investment rate equal to our base rate. The maximum annual amount is generally capped at 5% of the combined expenditure on:

- Pavement maintenance
- Bridge maintenance
- Corridor maintenance
- Structural maintenance (renewals)

Council still needs to fund almost half of all work costs and so this restricts the quantum of work actioned each year. A higher FAR would significantly reduce the impact funding has on improvement projects. As majority of improvements are required due to tourism coming into the area which takes priority given it causes the accelerated damage. At the same time other than bring money into the district infrastructure benefits very little from this leaving rate payers to pick up the bill via rates. Rates are difficult to increase as wages are relatively low in the area to keep locals and families in the area which keep the town running over the quieter periods that manage or work in majority of the businesses in the towns. Tourism keeps this wage low with travellers working for their accommodation/ food (WWOOFers) while on holiday or here on holiday with a working visa saving for their next adventure with a lot choosing to camp their way around the country also causing other issues and infrastructure requirements

With tourism and development occurring in rural New Zealand it puts large strain on small towns infrastructure to cater for the increased traffic volumes e.g. higher levels of service required, greater maintenance costs, more car parking, footpaths to be surfaced/ formed, increased traffic services, etc.

of which a number of these items aren't currently subsidised. For the remainder of items there is subsidy but approximately half of cost is still required to come from the rate payers to upgrade main town roadways to asphaltic concrete from chip seal, where as if tourism wasn't present chip seal would be satisfactory as would footpaths, signage, alignments etc. Additional maintenance and required improvements could be carried out with local share funds if these other factors weren't present but because of these, there has to be a trade-off currently between improvements and maintenance given our reducing FAR rate to 51% for year 1 of the 2018- 21 LTP. Majority of the community would rather for go improvement for tourism (unless mutual benefit) rather than sweating the asset and reducing level of service to what they have currently. This is due to the key infrastructure for the community and requires resilience as majority of the districts rural properties are serviced by a no exit road. The improvement requirement is acknowledged by the ratepayer but given it is for the greater New Zealand economy it is thought additional funding shall be subsidised to support this whether there is a targeted accelerated F.A.R or the F.A.R is increased overall given it typically isn't just improvements that tourism or the increases in HCV loadings effect's. This would also take some of the heat off due to farm intensification and growth in tourism. Selection criteria in this category are based on improved safety and optimising lifecycle costs including road user costs.

Low Cost Low Risk Projects typically include:

- small, isolated geometric road and intersection improvements
- traffic calming measures
- lighting improvements for safety
- installation of new traffic signs and pavement markings, or upgrading these to the current standard, where the cost is in excess of $10,000
- provision of guard railing
- sight benching to improve visibility
- construction/implementation of new or improved pedestrian facilities
- construction/implementation of new or improved cycle facilities, and shared pedestrian and cycle paths
- stock access structures
- formation of new access or 'trailer parks'
- minor engineering works associated with community programmes

NZTA have determined that all projects with a value less than $1,000,000 will be funded from Councils Low Cost Low Risk Project allocation. This means that Council's bridge replacement programme is funded from this. There are only two bridges with an estimated construction cost greater than $1,000,000 and these will have to be applied for separately due the ruling on bridge replacements, NZTA approved an allocation of $1,000,000 per annum for the 2018-21 NLTP. As we have two bridges programmed for replacement during the next NLTP, application has been made for a slight increase in level of funding $300,000 per annum.

Sealed Road Resurfacing

Figure 22 shows the amount of renewal activity achieved for each of the last 10 years. The average annual resealing achieved over the 10 year timeframe is 8.6km per year. The average annual first coat sealing achieved over the previous 10 years is 5.6km per year. It is unlikely for this level to be maintained in the future given the increases invested assets due to the developments as well as the increases in traffic volumes with higher stresses put on existing chip seals.

Figure 22: Historic Surfacing from RAMM

The expected life of a seal is dependent on whether it is a first coat or reseal, what type of seal (e.g. single coat or two coat, large or small grade chip), and the amount of traffic using the section of road. Based on a Councils sealed pavement length a target average annual reseal length of approximately 8% could be regarded as the average annual need. Actual resurfacing over the last 10 years has been less than this amount to fit in within approved budgets.

A full review of our seal histories using an average reseal life of 18 years for 2coat seals and 3-8 years for 1st coats was completed in 2015. As part of the FWP exercise, the existing back log of resurfacing (i.e. where the existing seal age is older than the agreed default seal lives) has been calculated. This showed there was theoretically 154,000 m2 (approx. 26km) of deferred maintenance. These seals were between 22 and 34 years old. The backlog has been partially caused because over the last ten years 16km of sealed roads have been added to the asset register either though development or LINZ handing over Hayman Road (5.2km) to Mackenzie District. The other impact is the ever increasing cost of bitumen against a fixed allocation from NZTA and no allowance for inflation historically.

As seen in the

Figure 23, the bow wave of overdue sealing has been reduced to a manageable amount this was able to occur in an accelerated timeframe to originally thought, due to favourable tendered rates from our collaborative contract. There are still a number of these older seals but these will be dealt with going forward as well as a number of assets been vested in the district due to growth and development. The is a high likelihood in having to increase levels of service to get the life out of the surfacing in future for the best whole of life cost of the asset (e.g. asphaltic concrete instead of chip seal) especially in high stress areas and where large scale development is occurring as proven in existing situations. For this reason it is deemed that $500,000 to clear the back log and maintain an average seal age of 18 years going forward to incorporate the second coating of seal extension projects for the foreseeable future in our towns and on Lilybank Road. In year 10 of this LTP there is a programmed increase of $100,000 (to $600,000) this is to cater for the first reseal of the developments that are currently been vested with council after their second coat. This smoothed programme allows for various seal sections to be brought forward or extended out, based on local knowledge and is yet to be fully verified in the field.

Figure 23: 20+ Year Resurfacing Forward Works Programme

It should be noted that this is an ideal situation that does not allow for early failure of any seal or inflation. It is also modelled on extensive work completed when preparing the Roading AMP for 2013/14.

Single Coat or Two Coat Seals

Historically single coat reseals, completed in 2006-2011, were used to extend the available budget as far as possible to make inroads into an increasing list of overdue seals. This has not generally been successful, so a move to two coat seals was implemented in 2012 to reduce the risk of premature failure and hopefully get the full life expectancy of at least 18 years from those seals. It is thought going forward a combination of these two types of reseal treatments will be considered as to balance out the binder to stone ratio as well as treat course or variant texture.

8.3.4 Sealed Roads Asset Development Plan (WC 323 and 324)

This plan includes for sealed pavement created through subdivision development, road reconstruction, Low Cost Low Risk projects, seal extensions and seal widening. Seal Extensions and New/Upgraded Roads is covered under the Unsealed Roads Asset Development Plan.

Only those projects that either meet NZTA criteria and attract subsidy or meet Council Policy are carried out.

New/Upgraded Roads for Development

Within the last 10 years significant urban and rural land subdivision has occurred in the District. When each subdivision is completed, any internal roading network is vested in the Council, which then takes over responsibility for on-going maintenance. While there should be no major repairs or maintenance required for several years, operating costs such as street cleaning and street lighting costs do occur immediately. New subdivisions can also increase traffic volumes on existing roads which, in turn, can increase maintenance requirements. To reduce costs and minimise risk to Council and NZTA, Council requires that all sealed roads have a two coat second coat seal applied before they are vested with Council.

The construction of roads within new subdivisions is generally funded by the developers and must be constructed in accordance with The Mackenzie District Plan and the Council's Engineering Standards. On completion, provided the roads and associated assets comply with the Engineering Standards, they

are vested in the Council (i.e. Council takes over ownership). There are few capital expenditure implications with this type of asset creation; the more significant implications are maintenance and renewal related. During the period 2004-2014, 16 km of new roading assets with associated drainage, lighting and footpaths were vested with Council.

The costs of upgrading of roads external to new sub divisional development is a significant issue in the Mackenzie District Council, especially with development involving clusters of life style units. It is recognised that development within the District adds to the demands on the infrastructure of the District. The provision of major capital works ahead of developments, presents difficulties in who should provide the funding. Council, in communication with the community, needs to formulate a policy to provide a guiding framework for road improvement decisions and funding within the Mackenzie District.

The urban and land subdivision in Council has increased over the last three years in a large way. We are now expecting for at least 30 section a year to be constructed as a minimum for the next 10yurs and subsequent infrastructure to be vested. This is off the back of growth in tourism and investors choosing to buy into the district (holiday homes), retire to the district, or setup a commercial investment property (air BnB, Rental accommodation)

Council is still working with a developer to construct two new hotel complexes in Tekapo. There is a second developer in the process of constructing a third new hotel development. A third developer is exploring extending an existing hotel complex. There are also quite a number of other small scale holiday accommodation provides appearing and these are ever increasing with the commercial accommodation providers of private holiday homes/ rentals These all will/do have an effect on transportation activities in the wider area and will have to be considered as part of the resource consent process.

We are currently in the process of working on a transportation strategy to address the traffic and transportation issues now and into the future looking out 25yrs how the three towns will function. Firstly consultation and plans been formed for Tekapo given it was assess to be the greatest need upfront given the growth and development. Then the planning and development of Twizel and Fairlie will be worked through, consulted on and a plan formed. The three minor towns won't be considered in the meantime unless significant development occurs or is planned. Small improvements are like to occur at this time if this results.

8.4 UNSEALED ROADS

8.4.1 Unsealed Roads Background Data

Unsealed Roads Scope and Nature of Asset

The unsealed road network in Mackenzie District comprises 70.9% of the districts road asset and carries approximately half of the total vehicles travelling on the network. Pavement design standards have not been specifically set for the unsealed road network.

The roads are surfaced with a modified M/4 AP20 aggregate and constructed to achieve a 4 to 6% cross fall along straights with a maximum 10% super elevation on corners, however many have adverse camber due to the effects of traffic wear and past maintenance.

Details of the unsealed road network are held in the RAMM system. This mainly involves inventory data such as the length, width and start and end points of a section of road.

The network is divided into two portions: the roads in the Pukaki Ward and in the Opuha Ward.

Roads in the Pukaki Ward consist of six long no-exit roads that provide access to farming areas. Due to the extreme climate in the Mackenzie Basin, the unsealed roads are very dry during the summer months. Little maintenance can be done except grading the loose stone back over the road surface to remove windrows and to protect the bound pavement beneath. Dust nuisance can be a significant problem. Metalling of unsealed roads is normally carried out in spring and autumn when the roads are sufficiently damp for the new metal to adhere to the existing road surface. However drought conditions can exist at any time of the year and limit what maintenance works can be carried out.

The Opuha Ward roads have less demanding maintenance needs and level of service issues. The climate does not present the extremes encountered in the Mackenzie Basin. As a result, road maintenance activities are able to be planned and executed in a more programmed and controlled manner. During periods of extreme dryness a high number of complaints are received regarding dust. It is not Council policy to apply dust suppression to any of unsealed in response to those complaints even though we are having good response to our "rotten rock" trials in relation to reduced dust generation. In extreme case signage may be erected to aid in limiting the dust nuisance but this is only in cases where there are no other existing mitigating factors.

Unsealed Roads Current Condition

The unsealed road asset is in a constantly changing condition depending on traffic use, weather, position in its maintenance cycle etc. This condition is monitored through Contractor and Roading Engineer inspections. Complaints and queries from users are an additional source of information on potential issues.

No formal condition rating information is collected and it is not intended to do so in the future as condition changes very frequently on these roads (up to daily on some roads) and such formal surveys would provide no meaningful data. Technology is becoming available to efficiently capture meaningful data on the unsealed network that could provide valuable insight into the performance and levels of service on the network. Staff are currently investigating costs v benefits of obtaining such equipment. Some of the existing methods have been tested for instance 'roadroid' app but due to the equilibrium of unsealed roads it is very hard to draw a conclusion currently it is more just trends.

Maintenance is aimed at maintaining the asset to an acceptable Level of Service. However, on some routes significant fluctuations in traffic volume affect both condition and the ability to maintain acceptable LoS economically. The Roundhill Ski area on Lilybank Road has seen increased Ski traffic of up to 600vpd on a road designed to take its normal loading of 80 vpd to the high country stations. This increased loading impacts the pavement at the worst possible time of the year. As well as the ski field there are4 station on the road, one of which (Lilybank Station) is located on the north side of the McCauley River with only river crossing access (by land) On Lilybank Road with the growth in tourism there are a number of people wanting to experience back country New Zealand and walk the DoC trails as well as sight see which occurs on a regular basis. There are also a number of hunters, 4x4 groups, fisherman, trampers etc. that use this access for recreational activities.

Braemar Road is another road that is subjected to military exercises out of the Balmoral Military Camp for training which typically happens for a 2-4week period per training exercise with larger operations lasting a one to two month(s). In winter currently there are weight restrictions placed on Braemar Road to limit frost heave during winter conditions as it often becomes impassable. The 2 stations on the road are worked with during this times as well as servicing the back of Tasman Downs and Braemar Station as well. There are also a number of forests/logging operations that occur on the adjoining

Mount Cook Station Road as well as on Braemar Road which are a significant consideration. This road is also the scenic alternative to the State Highway (S.H.8).

Godley Peaks Road is becoming busier as earth and sky increase their operation with the tourism growth for astronomy tours run from the top of Mount John as well as a café. They have currently placed a toll on their private road of $8 per vehicle toward the maintenance of their road which has been increasing annual over the past couple of years. There is also a significant number of free independent travellers using the road to access Lake Alexandrina campsite to stay the night rather than freedom camping as council has a bylaw prohibiting this as well as sightseeing given views of the lake and grassing animals in the natural landscape. In addition to the tourism there are to working stations at the end of the road who are intensifying there operations and have water rights allowing them to irrigate which is increasing productivity. There is also a number of pastoral supplement required as part of these operations with one of the farms having 400 HCV movements last year on and off the property.

Haldon Road services one of the 4 campsites on Lake Benmore being 'Haldon Arm' this see a large amount of traffic over summer from campers, boaties or recreation. It also accesses the Tekapo River, Albury via the Mackenzie Pass and Kurow via the Hakataramea Pass. There are also 7 working stations on the Haldon Road with permanent resident of which a number travel to town on a daily basis.

Mount Cook Station and Hayman Road adjoining, currently form part of the Alps to Ocean cycle trail as well as been a logging route for Mount Cook Station and the access to Tekapo B Power Station belonging to Genesis as well as the canals for fishing now the old roads have been closed. These adjoining roads also service 3 working stations. Off-roading of the cycle trail will be completed on Hayman Road by Year 2 of the LTP.

Glen Lyon Road runs up the right hand side of Lake Ohau and is the western boundary of our network. The road is used to access a DoC hut & trails as well as provides access to the headwaters of Lake Ohau for fisherman, jet boats and other recreational activities. There is also a working station at the top end of the road being Glen Lyon station which recently has logged approximately 30,000t of timber.

Unsealed Roads Current Performance and Capacity

Performance

The road user perception of unsealed roads is that they are of inferior quality to sealed roads due to issues with carriageway width, roughness, dust, mud, corrugations, potholes, soft areas and increased vehicle operating costs. These issues are being continually assessed by the maintenance contractor with work programmed and executed to keep the roads within agreed LoS.

The Council recognises that some unsealed road users may never be satisfied until "their" road is sealed, but acknowledges that this is not always viable given the length of the unsealed network, low use and cost involved. Life cycle costs of all but the shortest sealed roads (< 200m or so) are significantly greater than those of unsealed roads. That is why the District has so many of the latter. The change-over point in terms of total life cycle costs, including road user costs, is between 120 and 200 vehicles per day, depending on the road characteristics. However as NZTA requires a benefit cost ratio in excess of 4 before it will consider co investing in such work and as the Council is generally not prepared to carry the full costs of such work it is only programmed when there is very strong justification.

Despite this there is on-going pressure for seal extensions, mainly for dust mitigation.

Capacity

Where traffic volumes are low and the terrain is open a single lane carriageway of approximately 3.5 to 4.0m in width can suffice as long as there are sufficient passing opportunities. Council's normal operating width is 5.6m. When there are more than about 80vpd and the road is longer than 1 to 2km it must be wider to allow opposing vehicles to pass at slow speeds if necessary.

A carriageway width of 3.5m is acceptable where:

- the road is in a low speed environment
- there is good visibility
- the environment places stringent controls preventing a wider carriageway
- adequate passing opportunities are available
- safety records are satisfactory

Before proceeding to rebuild any unsealed carriageway the Roading Team assess whether:

- The data currently held in RAMM is accurate (road inventory, traffic estimates, etc.)
- Land use or any proposed change in land use
- Any crash statistics
- the change to carriageway width warrants the level of expenditure anticipated
- Local knowledge
- One Network Road Classification

Unsealed Roads Historical Data

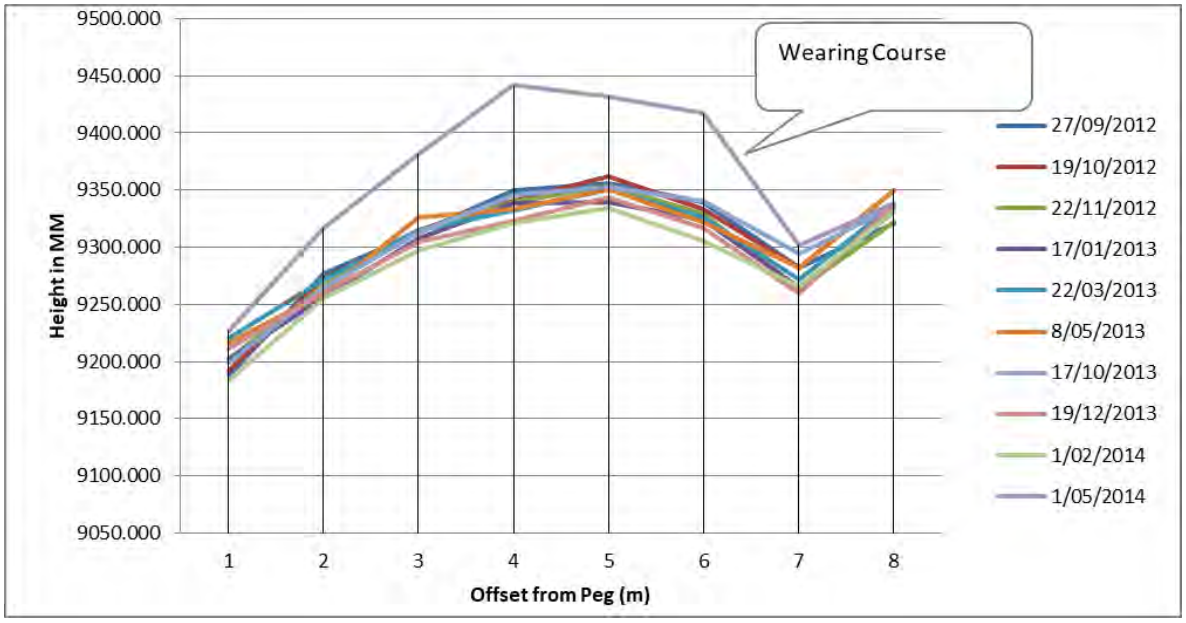
Little historic data is formally held in RAMM on the physical construction and maintenance cost of the unsealed roads. However, Council has built up significant maintenance data over the past decade including grading frequencies, quantity of maintenance metalling applied etc. and their respective costs. These records are held and updated regularly on spread sheets. This data is being loaded into RAMM per road. From October 2014 the maintenance data will be recorded in RAMM by carriageway section.

Cross Section Surveys and Gravel Loss

Council has 24 Sites where the road surface is levelled to a datum to analyse the gravel loss over time. The sites are surveyed every two to three months and the information compared over time. The five most highly trafficked roads, being Haldon Road, Lilybank Road, Godley Road, Hayman Road and Braemar Road are most closely reviewed due to their high traffic counts and fragile nature. Information gathering at some of these sites has been going on for a number of years but the programme has been ramped up considerably in the last three years. This is due to a number of material trials been carried out from varying sources on which monitoring sites have been established to measure these materials performances.

The graph below shows one of the sites on Haldon Road as a typical example.

Figure 24: Haldon Road Gravel Loss - Site 2



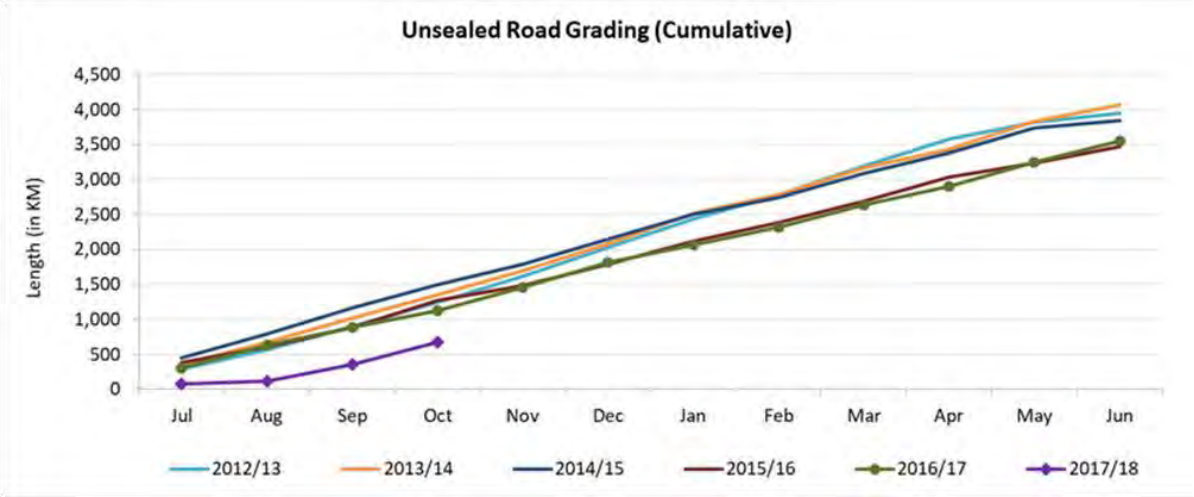
Analysis of this data shows that, for the big three roads (Haldon, Lilybank, Braemar) we lose 17mm off the crown on average annually, equating to 6,000m3. For the balance of the unsealed network the loss is on average 7mm of the crown, equating to 15,500m3.

To avoid consuming the asset this metal loss needs to be replaced on a regular cycle. At current contract rates the cost to replace 21,600 m3 across the network is $650,000.00.

Annual Grading Lengths

Figure 25 shows the length of grading completed each year over the last 10 years. The cumulative length of grading completed each year has decreased over the last 10 years. This drop is in part due to the addition of fine material (silty clay) to our maintenance metal. Therefore more funding has been made available for Unsealed Road Metalling, which could further decrease in maintenance costs in future.

Figure 25: Historic Grading Lengths



Annual Metalling Quantities

Figure 26 shows the historic quantities of aggregate applied to unsealed pavements as running course and wearing course within the District. Running course is surfacing material, whereas wearing course

is a thicker application of metal compacted with a roller to build up the pavement structure and improve the cross fall resulting in a stronger roadway with improved drainage characteristics.

The current maintenance strategy is to minimise the amount of running course applied to the unsealed road network. The available funds are generally being used to apply wearing course to provide a stronger pavement and reduce whole of life costs.

Haldon Road, Lilybank Road, Braemar Road, Godley Peaks Road, Hayman Road and Mt Nessing Road (the big four) have significantly more traffic than the balance of the unsealed network and therefore the greatest gravel loss in any one year.

As can be seen in Figure 26 total metalling has not been able to achieve the required amount of 21,600m3 of metal to avoid consuming the asset. This is due to insufficient funds being provided by NZTA as part of its co-investment of the maintenance of the network. Council does not fund non-subsidised any road maintenance. An increase in funding is required to enable Council to maintain the current level of service on those roads already upgraded and improve the strength of the balance of the network and ensure resilience is maintained given the majority of the network has only one access point. The current funding levels are insufficient to avoid consuming the asset.

Figure 26: Annual Metalling Quantities

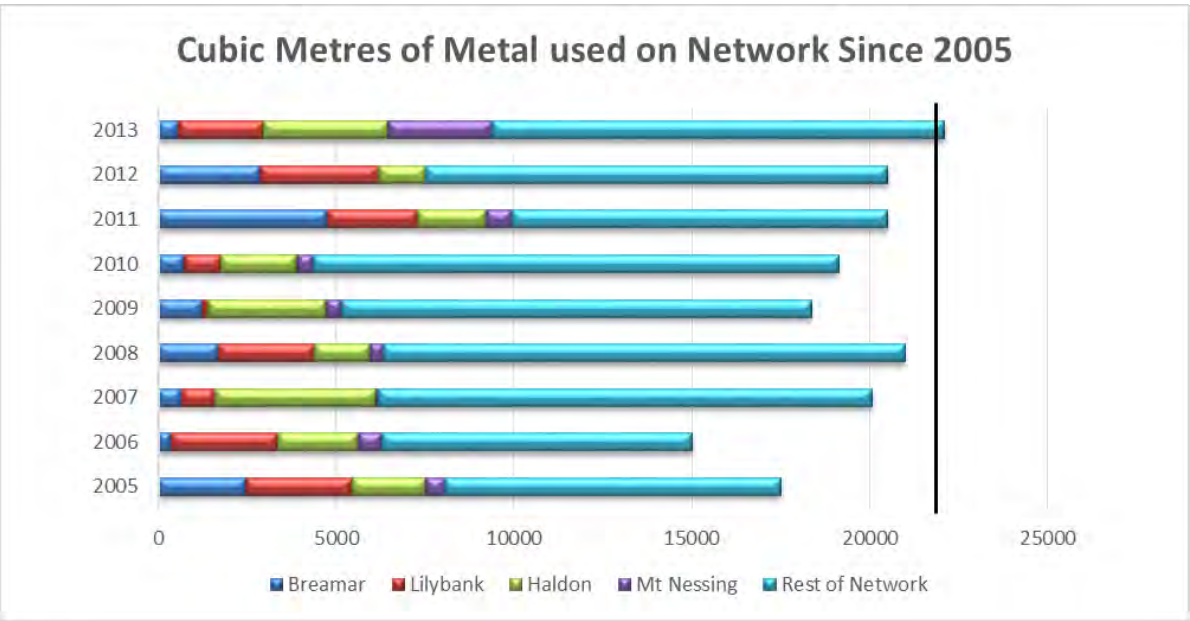
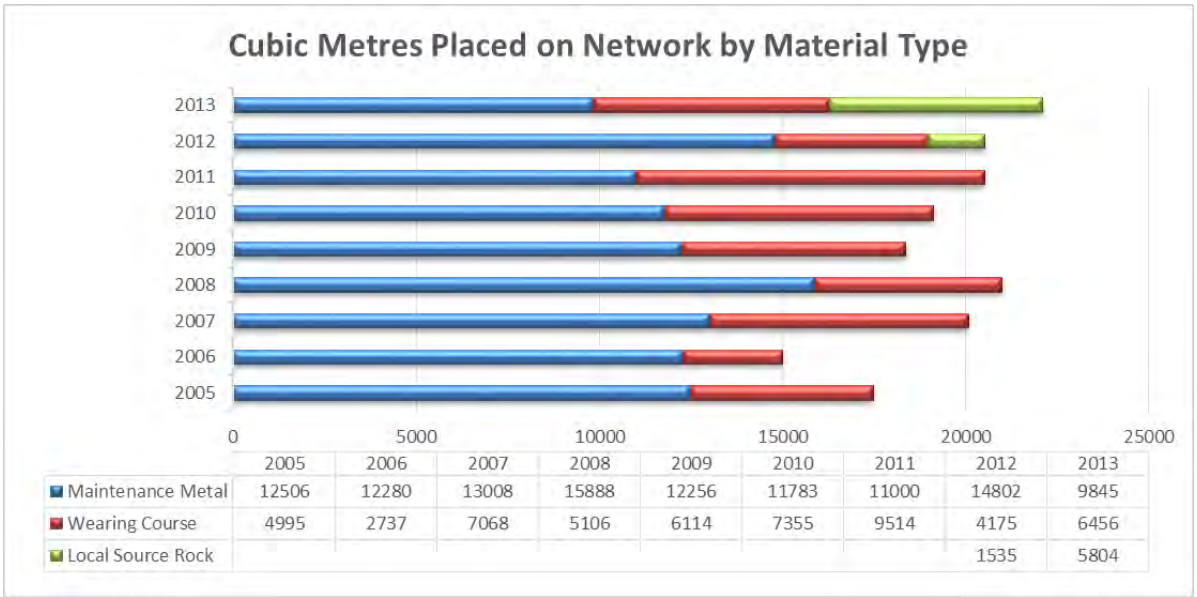


Figure 27: Historic Running and Wearing Course Application



	2005	2006	2007	2008	2009	2010	2011	2012	2013
Maintenance Metal	12506	12280	13008	15888	12256	11783	11000	14802	9845
Wearing Course	4995	2737	7068	5106	6114	7355	9514	4175	6456
Local Source Rock								1535	5804

8.4.2 Unsealed Roads Maintenance and Renewals (WC 112 and 211)

Maintenance Standard

Maintenance is delivered through competitively tendered contracts. The Contractor is paid at scheduled rates to maintain the network of unsealed roads to the required standard. The rates cover all work including:

- pothole repairs
- surface and shape restoration (grading)
- laying additional maintenance aggregate
- vegetation control (spraying)
- maintenance of surface water channels
- traffic services maintenance

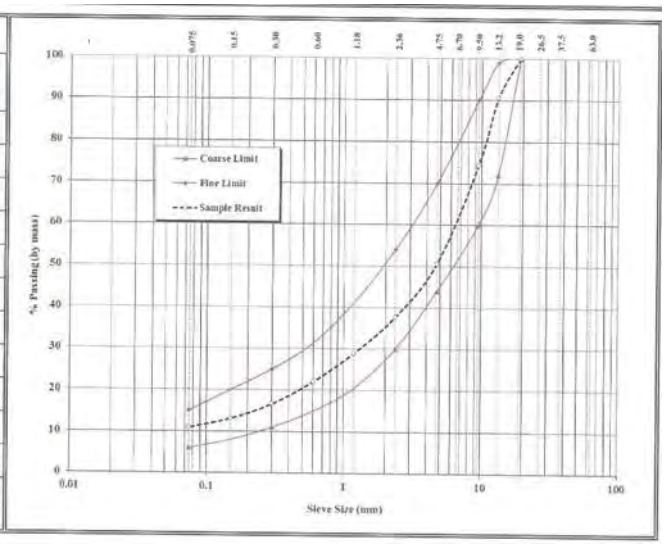
Resources are applied to unsealed roads on a needs basis. Unsealed roads are prioritised yearly from Priority 1-3. Priority 1 roads are in very poor condition and need a full stabilisation or reconstruction treatment to be able to continue to function as a road safely trafficable at 70km/h. Priority 3 are in average to poor condition showing corrugations and bony patches. Programmes over recent years have been very reactive and it has been identified that further funding is required to complete P1 and intervention on P2 roads and begin a gravel replacement programme to counter gravel loss/migration. Council is working towards having a 3-5 yearly forward works programme instead of completely reactive maintenance.

Maintenance Metal Supply

Currently, most materials are sourced from local rivers and streams within the Pukaki and Opuha areas. As these are alluvial materials there is a large number of round rock in the mix, even when passed through the crusher many round stones are retained whole even though the crushing sources are selected at the largest stone source available. This means that the mechanical interlock of river won materials is of a lesser quality, with a resulting roading surface that is friable and hard to retain a good cross fall due it ravelling and becoming unbound. As extraction of suitable materials from rivers becomes increasingly difficult, with constant delays as a result of increasing consenting requirements,

Council is moving towards more pit materials, which contain more broken faces and provide a better mechanical interlock. This in turn provides a safer, more durable driving surface. Sources are being sought off private land to limit the number of pits around the district this also benefits the land owner where they may want land or rocky outcrops levelled out.

PARTICLE SIZE ANALYSIS (NZS 4407:1991, Test 3.8.1)		
Sieve Size (mm)	% Passing (by mass)	Contract Specification
26.5		
19.0	100	100
13.2	91	72 - 99
9.50	74	60 - 90
4.75	51	44 - 70
2.36	38	30 - 54
1.18	29	
0.60	22	
0.30	17	11 - 25
0.15	13	
0.075	11	6 - 15
Note: The percentage passing the 75μm test sieve was obtained by difference.		



Currently there are three pits used today with a further three- four pits/ sources to trial/ investigate. We also are looking for other new sources throughout the district to limit cartage costs and maintenance as well as being an alternative to alluvial gravels.

The first pit is privately owned, on Mount Nessing Road, Aorangi Downs. This pit provides good “rotten rock” material. But, as this material is high in clay content we are high in fines the material has now gone through a couple of harsh winter periods and performed extremely well in freeze thaw cycles. The use of this material has now been extended to fill scour damage caused by flooding due to its good interlock. The material has also been crushed and blended with crushed alluvial maintenance metal as an alternative binding agent to silty clay. Due to such a good mechanical interlock and the weakness of the parent stone the material continues to create additional fines keeping the surface tightly bound meaning dust is severely limited with the use of this material. Given the strength of the parent rock and the weak veins hold it together the material breaks down very easily which for goes the cost as it can also be laid as straight pit run without the need for the crushing also it is easy to win given the softness.

The second pit is a slip face in the Mackenzie Pass, which frequently spills and causes large rock slips and build up over Mackenzie Pass Road. This material is durable, but lower in clay content. There is a section laid on Haldon Road and Braemar Road, the performance of this material has been monitored and is performing well. The shape is maintained but the source did require crushing due to the size of the parent material when initially laid. The material has required a modified AP20 light running course to be over the completed construction to provide additional suitable fines as the material began to ravel when originally laid.

The third is on private land also, on Clayton Station this is the newest of the three sources. The pit provides a “rotten rock” material. The material currently is still in the trial stages as it doesn’t have the same properties as Aorangi Downs as it has a greater proportion of fines and the parent stone is harder therefore requires crushing. Due to the additional of fines it doesn’t have the same dust suppressant properties but is good for blending with gap graded alluvial aggregate which has lost its fines and needs new fines reintroduced to bind. The material also was also affected after heavy rain

where it became very slippery/ greasy but once dry is like concrete. The material was crushed at the time at an AP40 and AP20 size. The AP40 was a little bit too big there for it is thought going forward it will be better in crush as an AP32 going forward.

The three to four trial sources being investigated on other private properties in the district. One of these sources is in the Opuha Area, a couple on the Haldon Road, the other is in the Pukaki area which could provide a suitable source for Hayman, Mount Cook station and Braemar Roads.

Care is taken to ensure no metal is carried from one basin to another to limit noxious weed seed spread where practicable. As such this means that clay and metal sources must be found in both basins. This also has the added benefit of shorter cart times resulting in lower whole of life costs. Rock sources also continue to be explored in the Pukaki area toward Twizel and there are various trials to complete on the Haldon road using other source materials that haven't currently been used.

Clay Maintenance Metal Initiative

A major initiative commenced in 2010/11 was the introduction of silty clay to maintenance metal and wearing course aggregate. Historically, maintenance metal available in the area has been deficient in fines and has had poor cohesion. This resulted in roads having to be graded more frequently and replacement metal applied more often to maintain roads to the required standards. Research has shown that material loss can be minimised by the addition of clay to the aggregate and this results in cost savings through reduced maintenance grading and material application frequency.

Beginning with the spring metalling programme in October, 2010, several silty clay sources were identified within the Mackenzie District and stockpiles established in strategic crushing locations. This proved to be quite an exercise in logistics since silty clay deposits are not abundant, particularly in the Pukaki Ward. However most of the clay for the Pukaki Ward was eventually found there and did not have to be carted on a long haul from Fairlie. It also avoids any concerns of weed distribution between the Mackenzie Basin (Pukaki Ward) and Fairlie Basin (Opuha Ward). The crushing subcontractor then thoroughly mixed the silty clay in the desired proportion with the river or pit run material using a loader. This mixture was then fed into the crusher resulting in a homogeneous stockpile of clay-infused aggregate.

Sixty one unsealed roads then received maintenance metal. Wearing courses were constructed on four roads: Godley Peaks, Haldon (part), Hamilton, and Middle roads. Similar to wearing course, stabilisation using silty clay binder was applied to Lilybank, Lochaber, and Godley Peaks roads.

The results of the silty clay initiative have, so far been very encouraging. Figure 15 shows grading has reduced in 2010/11, while the overall standard of surface shape (lack of potholes, corrugations etc.) and pavement drainage (surface water channels clean etc.) has remained acceptable. The savings formerly used for grading have been made available for other improvements.

The exceptions to the above are roads with minimal aggregate thickness or flat surface shape which receive occasional heavy traffic loadings such as logging activities, carting in winter feed, pastoral supplements and feeding out using large tractors and silage wagons. Examples of roads effected in this way are the top end of Lilybank Road and Godley Peaks Road. These will always need additional grading following such activities to restore surface shape.

Tourism is also becoming a large factor with the majority wanting to explore back country New Zealand as well as farm intensification with water rights being made available.

The silty clay material is performing well through the worst of the winter period, but the condition of the network where this material has been used continues to be monitored for performance and if necessary changes to the blend may be made as a result of field observations.

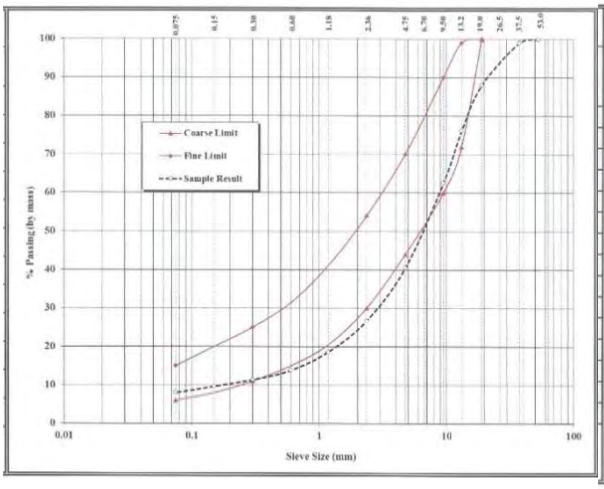
The only downside so far, is that cars have been observed travelling faster on the hard surface of these unsealed roads. Obviously this is not completely desirable since it is still an unsealed road with loose material on the surface and the potential for loss of control crashes exists. Due to the increase in fines the pavement is kept well bound with the dust created remains similar with no marketed difference. The binding achieved by the addition of the silty clay has provide cost savings via reducing maintenance costs. Additional signage has had to be erected at the change in road surface to warn motorists.

Maintenance Metal Trials and Unsealed Road Network Resilience

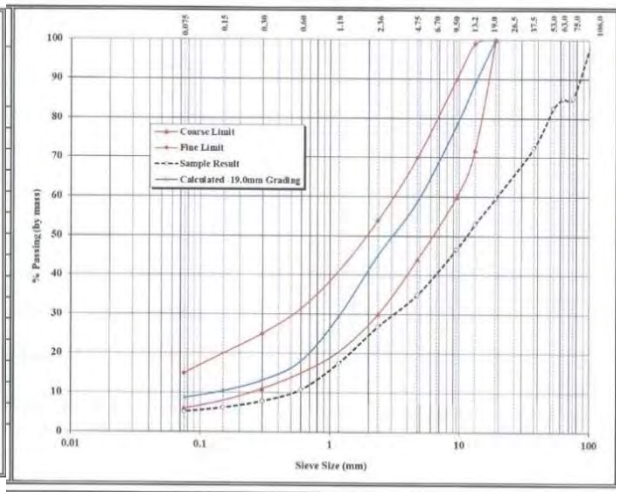
During 2012/13, a number of roads were significantly scoured out by heavy rain and these areas were rebuilt using local sourced materials, namely 'rotten rock', as a quick and economical fix to reopen the road. The material performed well having a high number of broken faces that provide a great mechanical interlock thus resisting any future scour.

Observations showed this material had a lower dust generation and required less grading to maintain the required level of service. These observations encouraged staff to use more of this product across various locations to test the viability of the range of sources as a replacement for conventional AP 40 with a high silty clay content. Some material was won directly from the pit and laid on the road where the rock size was small but in other cases it was crushed and screened to a maximum size of 32mm.

The results of these trials are being closely monitored for required maintenance and gravel loss with encouraging results being recorded to date. Maintenance grading has been significantly reduced as have the recorded gravel loss results. The surface has good skid resistance in all conditions and reduced dust generation making it a safer alternative to conventional materials.



Aorangi Downs Weathered Rock



Mackenzie Pass Weathered Rock

Staff used this material straight out of the pit on a 1km section of Blainslie Road and a similar length on Stoney River Road. We observed the improved strength of the subgrade and after the passage of traffic has setup and the road settled a smooth mosaic with good skid resistance and a good ride quality is typically present. It also has some dust suppressant properties lessoning the impacts of the dust nuisance, in some cases being so effective to almost supress the dust completely.

Following the success of these sites it was decided to apply 100mm of weathered rock from the Aorangi Downs pit on a 300m section of Hamilton Road following a complaint of serious dust nuisance.

This section of road was laid down and compacted in place and has required no grading for 9 months. After that time maintenance required was five passes with a grader that had sandvik bits attached to redistribute the fines. It had no further grading for a further 14 months and today typically only receives one maintenance grade a year. Traffic count on this section is 201vpd and during the dairy season has 4 tanker movements per day along with associated farm traffic. Not only is the regular maintenance significantly reduced there has been no dust complaints either. The dust particles are quite a lot larger and heavier than normal and do not travel as far. Subsequent to these works there have been a number of other small sites that have been carried out in the Opuha Ward typically between the end of seal and the beginning of the unsealed road e.g. School Road, Nixons Road, etc.

Gravel loss is severely reduced compared to the amount typically lost off the crown annually. This coupled with reduction in maintenance and reduction in dust nuisance has proven the success of these trials has encouraged further trials to continue using other local sourced materials.

The Aorangi Downs pit is on private property and Council is continuing to try and obtain long term access to it to ensure its availability in the future if the farm is ever sold as it has been on the market on and off in recent times.

Braemar Road

The next trial site was a 1km section on Braemar Road. Braemar Road has a high number of HCVs (15 – 35% depending on the time of year) using the road, from Meridian Energy carting rock, logging operations from Mt Cook Station Road, Station servicing traffic (stock cartage, supplement supply, etc.) and the NZ Defence Force with their large personnel carriers using the road regularly.

The initial costs to construct this were higher than maintenance metal due to the long cart from Mackenzie Pass source even though there was no cost to acquire the material. Just had to load out from a face. A significant improvement in the strength of the sub grade has been obtained with no frost heave through winter and only 1mm material loss off the crown in 12 months.

Mt Nessing Road

Mt Nessing Road in the Albury area was the next road to be added to the trial. This was chosen as it is a key route to high country properties in the area that also passes close to the Mt Nessing Golf Course. In the past Council has had to apply a significant of maintenance metal to maintain an acceptable level of service but still received a number of complaints half way through the grading cycle due to surface deterioration and dust generation.

Six kilometres of locally sourced material ‘rotten rock’ was constructed from the end of seal in a 100mm wearing course overlay from the Aorangi Pit, with no further processing. The cost complete this was $14,600 per kilometre. If we had completed this with our normal clay enhanced wearing course it would have been $18,000 per kilometre.

Haldon Road

Haldon Road in the Mackenzie Basin is one of our “Big Three” that has an average traffic count of 110 and peaks between 300 and 350 vpd. This road has high number of holiday traffic heading to Haldon Camp during the summer period as well as the normal traffic associated with servicing a number of high country stations. This is also a road where in the past Council has had to apply a significant of maintenance metal to maintain an acceptable level of service due to the high number of holiday traffic.

Four kilometres from RP 23050 - 27290 was constructed with 100mm overlay of locally sourced material from the Mackenzie Pass slip. This material had been further processed by screening out the material larger than 32mm. The cost complete this was $22,000 per kilometre. If we had completed this with our normal clay enhanced wearing course it would have been $17,700 per kilometre.

Lochaber Road

Lochaber Road is one of the largest unsealed roads in the Opuha Ward which services a number of stations and is a continuation of Clayton Road which services the Ashwick and Sherwood areas. Due to its sub alpine location it is subject to a range of climatic conditions throughout the year requiring a higher level of resilience to maintain access. Lochaber Road and an average annual daily traffic count of 49 with 10% of this been heavies. A 100mm overlay was completed using a local source a new local source rotten rock material was available from an adjacent property we completed a large wear course trial. The source appears to be slightly higher in fines compared to our other sources but goes very hard once laid and compacted. Monitoring sites have been established but it is still too early to draw any conclusions given the material hasn't yet gone through a full season. The material did take in and hold water after extremely heavy rain as the material was graded to remove surface imperfections but there was a lot of free moisture still present and was put down to works being completed at the wrong time.

Results to Date

The first rotten rock trials with the materials from the Aorangi Pit and the Mackenzie Pass Slip given the performance from the metal loss surveys and on road performance the trials are deemed to have been highly successful. The material isn't planned to be rolled out right across the network but will continue to be used where these sources are in close proximity to the site or there is a specific situation where the properties of this material is deemed necessary to issue.

With the recent source trials it is too early to draw a full conclusion even though larger trials have been completed, this is off the back of prior findings from the other successful source trials. With this locally sourced weathered rock ' rotten rock' material future sources suitability will be determined the same way as previous, by laying down small trial sites and assessing the performance of the source. These/future trials of weathered rock material require testing/ trial to ensure perform through the worst of the winter period and the other environment conditions experienced in our diverse network. The condition of these trial sites are closely monitored for material loss, performance and maintenance costs as part of the overall trial. If deemed suitable and comparative to other sources large trial sites with then be constructed and monitored once performance is reliable will become an approved source material going forward. Confidence in this 'rotten rock' will be furthered as more source are explored and trialled.

The aim is to have a ranges of this source material across the district to be used as maintenance material in future, act as blending material as an alternative to the silty clay to modify the maintenance gravel properties or to reintroduce fines to fine deficient (gap graded) material from the shoulders of the road and blend the two products to reuse this material (that would otherwise be cut to waste, by product that won't rebind) and improve efficiency by limiting maintenance costs. We believe this material allows for innovation and is another tool in our tool when maintaining our unsealed roads aiding in our asset management of our unsealed network.

Maintenance Programme

Changes in land use (farm intensification), development and increased tourist traffic have significantly increased traffic volumes on some areas of the unsealed road network so that the current quantum of road maintenance work is barely adequate to maintain the roading network to current standards

and performance measures. Although the clay maintenance metal and the rotten rock trial initiatives has helped with preserving the unsealed maintenance condition, an increase in unsealed maintenance expenditure is still required to maintain the road condition in a fit for purpose resilient condition. Improvements are also required on a number of our roads with the increases in traffic and tourism to improve alignments, road widths, visibility (sight distance) and maintain metal depth (wearing course/pavement) given metal losses, increases in HCV weights and limited weak pavements especially during winter.

The current budget for 2017/18 is $350,000 for maintenance and $700,000 for metalling. Metalling costs are forecast to remain relatively consistent with escalation for the next three years given the maintenance contract still has this period still left to run and will increase slightly given imposed cost fluctuations. The main increases for the next three years will be the maintenance cost due to the wear caused by tourism, land use changes and farm intensification generating the ever increasing traffic volumes and metal loss.

8.4.3 Unsealed Roads Improvements

On our unsealed roads renewals include area wide pavement treatment (generally stabilisation) and replacement of wearing course metal. The Council emphasis is on wearing course material replacement and this is budgeted for on an annual basis. Rehabilitation projects are included on an as needed basis and are identified from regular network inspections. The reason for this methodology is to maintain the network in perpetuity as we would struggle to fund the local share of a large scale rehabilitation going forward given the falling funding and our reducing financial assistance rate to a flat line of 51% going forward. Therefore it is best to maintain what we have putting on a 100mm wearing course as a light pavement top up/ running course on typically our secondary collector/ access roads and typically maintenance metal on our low volume access roads. This methodology obviously depends on the network/ road inspections and some sections of these roads may require a different treatment dependant on their condition and activities on those roads going forward (e.g. change in land use). Rehabilitation is generally based on complete failure of the subgrade i.e. Ski field traffic on Lilybank Road, which creates soft spots in the road surface after traversing areas which have experienced frost heave conditions. These sites, under normal traffic loadings (under 50vpd) would not cause an issue. Council has rebuilt a sections of Lilybank Road up toward the ski field turnoff on a regular basis over the last few winters, this has tied up a large portion of our current available budgets reducing the works that can be carried out on other lower need but bony/failing roads. The same issues arise on Braemar Road due to NZ Army winter exercises and transporting heavy goods off high country stations this is typically limited due to a HCV weight restriction being placed on these roads over this time. Damage also occurs on Haldon Road due to the camp reserve traffic and other regular high country station traffic.

Although Lilybank Road has been rebuilt with a minimum of 60mm wearing course from the end of seal, 2km from SH8, to the ski field turnoff it requires a large amount of running/wearing course in any one year to hold the surface at an acceptable level of service for the 600vpd the frequent the Roundhill Ski Area. Monitoring sites have shown an average loss of material off the crown of 17mm. Over the 25km to the ski field turn off a minimum of 2100m3 is required annually to hold the road and avoid consuming the asset.

8.4.4 Seal Extensions

Since 2001 the Council has embarked on an ambitious road improvement programme. Over 40 kilometres of seal extension, spread throughout the District, has been achieved. Over the last three year funding block this was removed. Going forward with this LTP this has been reintroduced as there are some roads that are no longer satisfactory as gravel roads given development or increases in traffic volumes.

There is however areas of the District where residents are required to travel over relatively long lengths of unsealed road before encountering a sealed road. Farming families are becoming more mobile and are travelling these unsealed routes far more frequently than in the past. This is on the back of modern vehicles becoming cheaper, all-wheel drive/4x4 vehicles more available, technology/convenience making it more viable to travel and self-sufficiency slowly declining on some farms due to the intensification of their land and operations. The lower travelling speed, greater ride discomfort and dust nuisance is becoming unacceptable and considerable pressure is being applied to the Council to seal these roads. It is beyond the Council's financial means to fully fund the sealing and NZTA funding assistance criteria allows funding only for seal extensions where there is particularly high traffic volumes coupled with high unsealed road maintenance costs (neither of which are prevalent in the majority of Mackenzie District). The one exception to this is Lilybank road from the 2km mark to the ski field where the majority of the road remains unsealed and over the last three years has become uneconomic to continue to maintain it as an unsealed road going forward therefore we are proposing a staged seal extension project for this LTP period. It is hoped this will begin over the next three years and may span two LTP periods to limit the unsealed maintenance cost going in favour of funding a treatment for the best whole of life cost.

The influx of domestic holiday-makers into the District, particularly the Mackenzie Basin, has a significant impact on roading. Unsealed roads summer traffic volumes double or treble, at a time when the roads are extremely dry and particularly sensitive to wear. Also tourist traffic across our network nearing all year round now has a large effect on our rural roads this effect is typically greater in the Pukaki ward being across all of the roads where in the Opuha ward only affecting half but this is likely to grow with growth and development i.e. using Lilybank Rd to access the Round Hill Ski Area over the winter months causes considerable pavement damage and there will be continual pressure applied to have this road improved.

Subsidised Seal Extensions

Subsidised seal extensions included as part of the District Land Transport Programme are subject to NZTA benefit/cost procedures that must show benefit to the road user. Benefits include safety, travel time cost savings, reduced roughness, reduced vehicle operating costs and maintenance cost savings. Roads which may meet the benefit conditions usually have high heavy traffic volumes such as the major routes to production forests or roads which have high maintenance costs (e.g. due to steep grades).

Council will consider written applications for seal extending a maximum of 200 metres to suppress dust in front of dwellings (prior to 2002 or where there has been a significant change in land use). Applicants will be prioritised by the severity of the nuisance and preference will be given to cases where the use of the road has markedly changed. To gain approval for the work the following must be met:

- applicant to fund 50% of the cost up to $10,000 total cost then any costs over and above are to be covered by the applicant

- Council must have funds available (total $10,000 per year)

MDC undertakes seal extensions when NZTA co-investment funding can be secured and the local share of the funding is available.

NZTA dust nuisance funding as per General Circular 16/04 will be considered/ applied for where the project meets the criteria of medium to high dust risk category as laid out in this circular.

Non-Subsidised Seal Extensions

Seal extensions which do not qualify for NZTA financial assistance require 100% Council funding. Sealing can provide tangible (for which a monetary value can be assessed) and intangible (cannot usually be easily quantified in monetary terms e.g. improvements to air and water quality, reduction in carbon dioxide emissions etc.) benefits. Tangible benefits generally fit into four main categories:

- productivity gains for properties alongside the road to be sealed
- improvements to ride for driver and passengers
- vehicle operating cost savings
- travel time savings

Council has adopted a ranking system to determine the relative priority for seal extension options. The advantages of a ranking system are:

- it can take into account many factors with a weighting solely applicable to the Mackenzie District
- provides relativity to assist in deciding the seal extension priorities

Manuka Terrace Financial Contributions

The reserve fund generated by financial contributions towards the sealing of Manuka Terrace from the various subdivisions since 2004 has been extinguished by the sealing of the first 2.4km of the road from the south end. Council no longer collects financial contributions from those developers subdividing in Manuka Terrace.

8.5 BRIDGES

8.5.1 Bridges Background Data

Bridges Scope and Nature of Asset

The purpose of road bridges is to provide convenient continuous all weather access over rivers, streams and similar obstacles. Other structures included in this lifecycle management plan are culverts with a waterway area greater than or equal to 3.4m2, cattle stops and fords.

The key issues relating to the management of road bridges are:

- Funding to replace bridges
- Replacement of/or disposal of uneconomic bridges e.g. Cass River Bridge.
- Ensuring the bridge foundations are protected against scour, degradation and aggradations
- Maintaining the structural integrity of bridges

There are 97 bridges (includes 7 large culverts) in the District with a combined length of 1,842m. They range from small, simple timber structures to multi-bay modern steel and concrete structures. Generally the District's bridges are in good order.

Figure 28:Ages of MDC Bridges

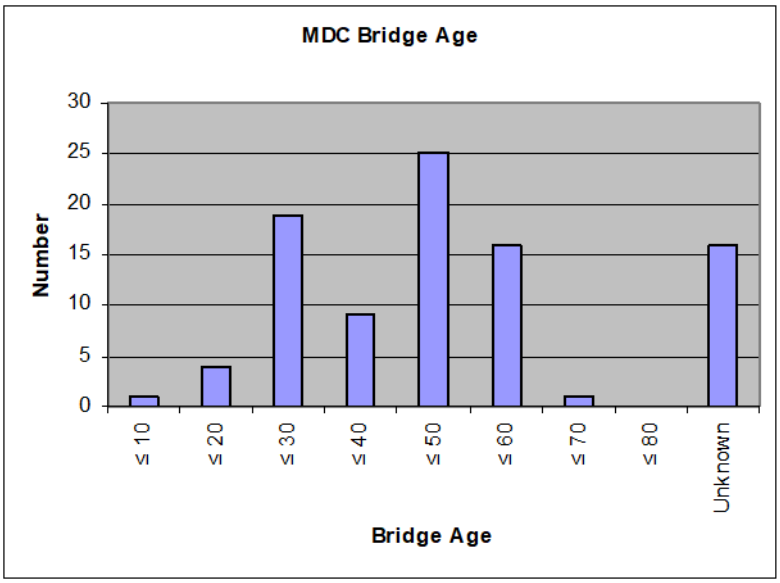


Figure 28 shows the distribution of all bridge ages. Given the large percentage of unknown age, work needs to be undertaken to provide an estimate of the remaining lives of these structures.

Eleven timber bridges have no construction date recorded but the age of timber bridges is not as important as their condition. We're unlikely to be able to establish construction dates, but these do get checked annually and our consultant's report gives updated estimates of remaining useful life so this is covered by procedure. Seven of the fourteen bridges have adjacent fords; 20 provide access to single properties.

Table 30: Bridges that provide access to one ratepayer

Name	Bridge Number	Road Number	Displacement	Span
Harris Stream Bridge	88	124	38070	18.5
Black Birch Stream Bridge	87	124	34630	6
Darcy's Bridge	86	124	30240	8.2
Jollie River Bridge	84	154	45520	78
Cass River Bridge	78	126	16560	124
Rhoboro Rd				
Grampians Bridge	70	128	1375	5.6
Aires Station Bridge	77	0	200	29.4
Cloudy Peaks Bridge	62	0	40	36
Tiffens bridge	64	186	3540	18.2
Single Hill bridge	58	181	200	12
Goodmans Bridge	26	159	5200	17
Trotters Road Bridge	29	195	430	6
Otama Road Bridge	1	166	296	6
Deepdale Bridge	11	115	6380	24
Watts Bridge	17	199	131	16
Hewson River Bridge	50	143	20870	42
Otama Road Bridge	1	166	296	6
Deepdale Bridge	11	115	6380	24

Bridges Current Condition

Condition inspections are undertaken by both the maintenance contractor and the bridge maintenance professional services contractor. RAMM used to store inventory information, results of inspections undertaken and any other relevant data.

The main reason for the deterioration of concrete structures is carbonation (loss of ability of concrete to prevent corrosion of reinforcement) but in the arid atmosphere prevailing in the Mackenzie District, carbonation is not a problem. Timber is a less durable material suffering from decay and insect attack

(which can be controlled by chemical treatment), natural defects such as cracking and splitting and, in the case of timber decks, surface abrasion from traffic.

Bridges Current Capacity and Performance

Load Capacity – Design loadings have increased as vehicle sizes and carrying capacity have been increased. Appendix IV provides details of the 18 bridges that do not meet current standard Class 1 loads and are weight and/or speed restricted. Three of these bridges are currently under contract for replacement

Traffic Capacity – All bridges except one are single lane bridges, however given the low traffic volumes on the roads they serve this is considered appropriate for capacity purposes.

Natural Hazards – Bridges are at risk from natural hazard events such as floods, earthquakes and slips. It is only in recent times that earthquake standards have been incorporated into bridge design. Most bridges were designed to have sufficient waterway area capacity to handle design flood flows. Erosion and scour of piers is a concern for some bridges.

Council has a number of bridges that are at risk from natural flood disasters and earthquakes. Some of these are being replaced and others have had work completed to improve their resilience.

8.5.2 Bridges Operations and Maintenance Plan (WC 114)

The routine maintenance contract is tendered every three to five years and includes the routine inspection, maintenance and repair of bridges. Works are carried out in accordance with NZTA specifications and manuals.

Maintenance works are undertaken to:

- ensure safety to the public
- protect the investment in assets by extending the life of the structure
- minimise repair costs

The type of maintenance work activity undertaken includes:

- planned maintenance inspections
- repairing structural defects (e.g. concrete spalling, corroded fastenings, rotten timber, undermining of foundations)
- repairing/replacing damaged components (e.g. handrails and guard-rails)
- restoring protective coatings (e.g. painting)
- maintaining drainage
- waterway area clearing (debris removal from piers and waterway)
- Seismic retrofitting to increase the earthquake resistance of strategic bridges

Maintenance Strategy

Maintenance programmes are arranged from inspection reports. Steel superstructures are generally painted at regular intervals as required.

Council's inspection and programming regime:

- on-going superficial inspections co-ordinated with other routine maintenance work

- general inspections and a full structural inspection of all timber bridges and a third of the remaining bridges undertaken each year on a three year cycle by a Bridge Engineer, taking into account such factors as structural integrity, defects, safety and appearance
- special inspections after specific events such as earthquakes, severe floods or instances of overloading

Maintenance programmes are developed from the schedules of defects identified during the inspections. Repair treatments and priorities are determined by considering the effects on:

- public safety (top priority)
- traffic movement
- future costs if the work is not done

Each item of the bridge maintenance programme is the most cost effective response to the defect identified, except where a bridge is programmed for replacement but urgent works are necessary, shorter term but lower cost remedy is selected.

Standard NZTA economic evaluation criteria are used to evaluate treatment options.

Maintenance Standards
The technical LoS required are detailed in the maintenance standards that implement these technical LoS is set out in Council specifications contained in the road maintenance contracts.

Maintenance Programme
The bridge consultant has prepared a bridge replacement plan that provides the Council with increased certainty on the cost of maintenance and renewals over the next ten years. From this it has been forecasted that a budget of $130,000 will be required for on-going routine and structural maintenance in 2015/16. The increased Structures component replacements budget allows for significant replacement of the bridge components (Running boards, wheel guards, side rails etc.) and will extend the life of the structure, which may mean that total replacement can be avoided. It also allows for the clearance of gravel and debris build-up under the bridge to reinstate the design flow carrying capacity.

Appendix III details the current expected annual expenditure on Bridge Maintenance for the next 10 years.

8.5.3 Bridge Renewal/Replacement Plan (WC 341)

Asset renewal is undertaken when a structure, or significant components of a structure, has reached the end of its economic life. Renewal provides for the following work:

- replacing a structurally inadequate bridge
- replacing a bridge for non-structural reasons such as inadequate width or waterway area
- structurally modifying an existing bridge to increase its standard capacity to a level higher than originally provided

Replacement of Fox Peak Road Bridge will be funded from the Minor Improvements programme but Fraser Road #2 is a structure component replacement because only the super structure needs replacing utilising the existing abutments.

Renewal Strategy

Council has a robust Bridge Replacement Strategy (2010-2050) which details bridges due for replacement or complete removal. This should be read in conjunction with this section.

The Council's general policies on river crossings (bridges) are:

- River crossing projects are economically evaluated in accordance with NZTA project evaluation methods for possible inclusion within the subsidised District Land Transport Programme.
- River crossing projects which cannot be economically justified in terms of NZTA project evaluation methods are recommended on a case-by-case basis to Council.

The NZTA Bridge Manual is adopted for the design of new structures and for the evaluation of existing structures.

Renewal needs are identified from the planned inspection programme and are largely condition/over-weight restriction (performance) based. Prioritisation of works and the selection of renewal options are made on the basis of an economic evaluation using NZTA criteria. Cost/benefit calculations include an assessment of risks associated with earthquakes and floods. The lowest cost option, considering all life cycle costs over a 25 year period, is selected except where funding limitations necessitate shorter term (lower cost) options for works that cannot be deferred.

Renewal Standards
The applied standard is the NZTA Bridge Manual.

Renewal Programme
Council's Bridge Replacement Strategy lists the bridges in Table 31 which are to be replaced over the next 20+ years.

Table 31: 20+ Year Bridge Renewal Programme

Bridge No	Bridge Name	Replacement Timeframe	RUL (Years)	Costing Parameters			Replacement		Notes
				Length	Width	Rate/m^2	Cost	Year	
1	Otama Road	3 - 10	8	6	2.7	5,403.00	$77,400	2023	Replace (possibly with a box culvert)
13	Coal Pit Rd No 2	10 - 15	10	12	4	$3,910.00	$208,000	2025	Replace (new bridge)
26	Goodmans	3 - 10	5	17	2.1	$3,910.00	$169,500	2020	Don't Replace (leave structure for emergency access)
41	Clayton Settlement	20+	35	66	2.8	$3,910.00	$838,700	2050	Replace (new bridge)
58	Single Hill	3 - 10	5	12	2.6	$3,910.00	$143,100	2020	Replace (new bridge) or divest*
78	Cass River	10 - 15	15	124	2.8	$3,910.00	$1,600,000	2030	Replace (new bridge)
87	Black Birch Stream	10 - 15	15	6	3.2	$4,030.00	$89,500	2030	Replace (new bridge)
89	Mowbray Road	20+	25	8	3.2	$4,030.00	$119,300	2040	Replace (box culvert)

*Note: Single Hill Bridge is not on Council road reserve but is on private land. Any discussions about its future will be held directly with the landowner.

8.5.4 Bridges Asset Development Plan

Council has no plans for bridge asset development.

8.6 DRAINAGE CONTROL FACILITIES

8.6.1 Drainage Control Background Data

Drainage Control Scope and Nature of Asset
Drainage control assets consist of kerb and channel, surface water channels, catch pits and their connection to the nearest reticulation, soak pits, side drains, and culverts of less than 3.4 m2 cross sectional area. The purpose of these assets is to provide a storm water carrying capacity for runoff from the carriageway, footpaths, berms and adjacent properties to:

- allow the convenient and safe movement of pedestrians and traffic
- protect paved areas from water ingress and resulting structural deterioration

The use of concrete kerb and channels, as opposed to open drains, is a recognised and accepted sign of urban development. Urban design is now moving to swale drains with associated vegetation and plantings to assist in the removal of hydrocarbons and heavy metal deposits prior to storm water discharge to waterways or water table or otherwise treatment via other means from the typical concrete type kerb and channels or swales. With the flat profile of the majority of the districts urban areas, ponding and stagnant water can easily eventuate if well-formed channels are not used.

The key issues relating to drainage control are:

- poor inlet detail to catch pits and culverts minimising hydraulic capacity
- blockages
- ensuring regular cleaning programmes take place

Drainage Control Current Condition

Council does not formally rate the condition of surface water channels, culverts, catch pits or drains. There is an on-going inspection and maintenance regime under the routine maintenance contract and this data is recorded in RAMM Contractor.

Drainage Control Current Performance and Capacity
Performance issues for drainage control assets relate to:

- coverage (i.e. are there open water channels or areas where water accumulates that should be serviced by pipe drains or formed channels?)
- pavement damage due to drainage problems
- improving drainage where storm events cause recurring scour problems
- entrance capacity of culverts
- a large quantity of wash over culverts/fords
- river fords may require closing four to five times per year
- conformity with standards (kerb and channel in all urban streets)

Overall the performance of drainage assets is generally adequate as there has been replacement and up sizing of culverts in recent years. The major concern is coverage, with a number of urban streets without any kerb and channel. Twizel and Tekapo are were built to have relatively short life during the construction of the adjacent hydro works. As such most streets were constructed with a sealed swale drain instead of kerb and channel. These are often quite flat and pond water that freezes in the winter. Without very extensive drainage works it is not possible to correct this problem. The issue is worsening in these towns with the development we are experiencing with a greater number of impermeable surfaces being installed i.e. concrete/ asphaltic concrete driveway. Large new homes or large alteration/ garages. Most existing drainage assets are performing well and have been adequately designed. The lack of an extensive stormwater network in Twizel means that water flows in sealed swales on the edge of the roadway using bubble up sumps to convey road run-off to the nearest reticulation. This has two problems associated with it:

- Water ponding in the swale causing icing and pavement deterioration
- Poor definition of the separation between the carriageway and the pedestrian areas.

Neither of these two problems can be economically resolved as the cost is prohibitive to construct kerb and channel in every street in Twizel and Tekapo that does not have it as well as all the additional associated pipework.

8.6.2 Drainage Control Operations and Maintenance Plan (WC 113)

Drainage maintenance work is included under the main road maintenance contract and covers:

- minimum maintenance standards
- frequency of routine inspections
- response times to correct defects

Drainage continues to be an area of focus for road maintenance activities. A wet pavement is at least three times weaker than a dry pavement of the same material. Therefore quickly diverting rain water away from the pavement so that it does not have an opportunity to penetrate and weaken the pavement structure is of paramount importance in reducing costs of repairing base course and sub base failures. On hilly sections water travelling down the Surface Water Channel (SWC) must be diverted off the road pavements and shoulders before it accumulates enough velocity to scour out the side of the road.

Apart from roadway surface considerations, maintaining good drainage is achieved by keeping the SWC, cut-outs and side drains clean, keeping culverts clear and in good condition, providing headwalls at the culvert inlets and outlets, and soak pits where side drains or ditches cannot provide an outlet for the flow.

Drainage maintenance is achieved by undertaking the following activities annually:

- Chemical weed control in the surface water channels and side drains of both unsealed and sealed roads in the entire network to remove large vegetation obstructions forming
- Surface Water Table Rehabilitation
- Side Drain (Ditch) cleaning
- Culvert inspections - All culverts in the network are inspected on a regular basis. Following significant rain events, culverts are cleared of any flood debris.
- Culvert replacement when they are failed or under sized.

- Culvert extension projects where unsealed roads are widening due to traffic volumes increasing in turn cover inlets and outlets
- Headwalls maintenance and construction to maximise culvert efficiency, preventing scour around the ends of the culvert and preventing water entering the roadway sub base by migrating along the outside wall
- Soak pit cleaning/ reinstatement

Maintenance Strategy

Condition inspections: The maintenance contractors are required to report any defects observed during day to day road maintenance activity.

Unplanned condition assessments of critical drainage assets are required after each heavy downpour to assess the number of culverts, drains and sumps affected by blockages. This is completed by the contractor and the Roading Team immediately after the event. The Contractors are required to maintain an effective communication system and level of preparedness to ensure these and other emergency works are undertaken within the specified response timeframes.

Planned maintenance: Damaged and malfunctioning drainage assets identified by Council inspections or contractor reports are programmed for repair according to the following priority:

- public safety
- network resilience
- accelerated deterioration of pavement likely to occur
- inconvenience occurring to road users, pedestrians and/ or property owners
- untidy appearance

Maintenance Standards

The technical LoS required are detailed in the maintenance standards that implement these technical LoS is set out in Council specifications contained in the road maintenance contracts.

All critical drainage assets e.g. bridges, culverts, side and back drains etc., are required to be inspected and cleaned following major storm events.

Maintenance Programme

The majority of the drainage maintenance is reactive so budgets are based on historical expenditure. However, in an effort to reduce future pavement maintenance costs for repairing soft spots and other types of premature pavement failure in both sealed and unsealed roads, the Council has adopted a strategy to improve substandard drainage along specific roads. In 2018/19the total maintenance cost budgeted is $100,000, as there has been a lot of large scale maintenance been completed in previous years. We propose an increase from previous years for this LTP due to more regular large scale storm events occurring and greater loadings on older infrastructure. It is expected that this maintenance cost requirement will carry on into the future.

The financial forecasts are presented in Appendix III.

8.6.3 Drainage Control Renewal/Replacement Plan (WC 213)

The renewal programme is prioritised on the basis of overall condition, hierarchy and extent of adjacent carriageway failure. Full renewal of kerb and dish channel is economical when more than 30% of the length of the channel is broken.

Drainage Renewals
WC 213 provides for drainage work which is not routine in nature but clearly demonstrated to reduce future maintenance costs to the roading agency.

Examples of qualifying work include:

- Renewal or installation of culverts with a diameter greater than 600mm, but having a waterway less than or equal to 3.4m2 (approx. 2.1m dia.).
- Repair and replacement of kerb and channel, provided that the deterioration is likely to adversely affect the performance of the pavement
- Installation of water channels, sub-soil drainage, or kerb and channel, where this is shown to be necessary to protect adjacent property from run-off from the road surface and the most cost-effective form of drainage control for the purpose of protecting the pavement

Preventive Maintenance
Preventative maintenance includes non-routine work required to protect the serviceability of the network and minimise the threat of road closure.

Rule: These works must be economically justified. They must be the long-term, least cost option for the road controlling authority, calculated in terms of PV.

Standards
The Council preference is for a minimum diameter of 300mm concrete culverts under roads. Steel or aluminium culverts are not used where there is a likelihood of corrosion. Preference is now to use Polyethylene (providing there is sufficient cover) now for these smaller sizes going forward given there is no risk of corrosion.

Renewal Programme
In 2018/19 the total renewal cost budgeted is $62,200. The financial forecasts are presented in Appendix III.

8.6.4 Drainage Control Asset Development Plan

Most new assets are created as part of subdivisions and subsequently taken over by the Council.

The construction of new kerb and channel is driven by property development and, to a lesser extent, in response to customer/resident requests. The criteria used for justifying new construction includes evidence of ponding/flooding, incompatibility with urban standards, higher maintenance cost of existing storm water control and reduction/minimisation of life cycle costs for all affected assets and the network.

Prioritisation is evaluated on the basis of road hierarchy, location, safety issues, storm water control needs, the number of residential properties to be served and beneficial effects to adjacent assets.

Development Standards
Council has adopted the Land Subdivision Standard NZS4404: 2004

Development Programme
The cost of drainage development works is included in the Council Structural Renewal Programme.

Stormwater Management Plan

The way we manage stormwater has, and continues to change. Traditionally, the stormwater system were built to collect and convey. The mind set was to get it out quickly and this approach is now changing to be more integrated and with a focus of slow it down, spread it out, and soak it in.

This new approach to stormwater management includes quantity and quality considerations, multiple use facilities, riparian corridors, recreation, wetland preservation and groundwater recharge.

This new approach has introduced a whole new array of issues that has resulted in basic changes in stormwater planning, design, operation and maintenance, construction, and financing. Now we have to find the resources to effectively satisfy the changes as well as the regulatory requirements.

As the move into the new stormwater approach occurs, it is also important to remember that the focus also needs to be on minimising costs and maximising the results achieved through the investments made.

Analysis of alternatives should include life cycle cost estimates and consideration for the four well beings (social, economic, cultural and environmental considerations).

Canterbury Land and Water Regional Plan

The Canterbury Land and Water Regional Plan (LWRP) became operative in January 2014 and will be a key driver for the stormwater activity, as its provisions impose increased environmental requirements for stormwater discharges.

Rule 5.93 sets out the regime for lodgement of catchment/network applications. The presumption is that either there is a consent in place or an application is currently being worked on and will be lodged before 30 June 2018.

Compliance with the LWRP will be a major focus for the stormwater activity. Investigations into the specific application of the LWRP to each stormwater system within the Mackenzie District and potential issues, options and recommended solutions (including development of Stormwater Management Plans) is required. This is included as an Improvement item. The Stormwater Management Plans programmed for completion during the 2017/18 year will determine what treatment upgrades, if any, are required and the associated timeframes in conjunction with the Utilities team.

8.7 TRAFFIC SERVICES

8.7.1 Traffic Services Background Data

Traffic Services Scope and Nature of Asset

Traffic services are devices used for the orderly management and control of vehicles and people on public roads. They consist of road signage, road markings, edge marker posts (EMPs), culvert markers, traffic islands, roundabouts and railings. Their function is to:

- regulate
- warn
- guide
- inform

The key issues relating to traffic services are:

- Ensuring signs and markings comply with NZTA guidelines and amendments to them.
- Repairing sign damage due to vandalism and/or traffic accidents

Traffic Services Current Condition, Performance and Capacity
The condition of signs and road markings is assessed in routine inspections undertaken by the maintenance contractors with the results reported to the Engineer. These inspections include day and night time inspections for both legibility, reflectivity, vandalism and graffiti.

There is no formal condition rating system used for traffic services. Condition is assessed visually against the relevant NZTA standards.

The extent of deterioration of road markings depends on age, traffic volume, the materials used and the condition of the road (oil and grit reduce adhesion). Road markings are remarked each year depending on the condition this may not be a full remark which is completed under the current road maintenance contract. However some centre line markings on rural roads have not been remarked. This not only reduces the remarking costs but also has had the effect, where traffic flow is light and good sight distances available, of reducing edge break as the vehicles are travelling more towards the centre of the road.

Most signs are replaced as a result of damage resulting from vandalism and vehicle accidents before they reach the end of their "natural" life. A number of signs in the rural area of our district are vandalised by being shot at with a firearm, the management strategy to deal with this is to leave the sign and monitor their condition. Once the legibility has been significantly compromised then the sign is replaced at this time by the maintenance contractor Loss of reflectivity through weathering is however the factor that determines the life of many signs in the district due to the harsh sun exposure.

Performance issues for signs and road marking relate to legibility, ease of comprehension, absence of too many signs, accuracy of placement, visibility and conformity with standards.

Overall the condition of traffic services assets is considered to be good.

8.7.2 Traffic Services Operations and Maintenance Plan (WC122)

All traffic services maintenance is competitively tendered through inclusion in the maintenance contract. NZTA specifications and standards have been adopted for maintenance work.

Maintenance Strategy
Planned inspections: The maintenance contractor is required to routinely inspect all assets and repair any defects. The contractors are required to respond to directed faults and have the necessary repairs completed within agreed timeframes:

Unplanned Maintenance: The Contractor is required to maintain an effective communication system, level of preparedness and stocks to ensure emergency works are undertaken within the specified response timeframes.

Planned Maintenance: Obsolete, damaged, sub-standard and non-conforming assets identified during routine inspections are programmed for replacement according to the following priority:

- public safety
- traffic volumes

- convenience of road users

Maintenance Standards

The technical LoS required are detailed in the maintenance standards that implement these technical LoS is set out in Council specifications contained in the road maintenance contracts.

Traffic Signs

- RSMA "Standard for the Manufacture and Maintenance of Traffic Signs, Posts and Fittings".
- NZTA "Manual of Traffic Signs and Markings" Traffic Control Devices Manual Part 1.
- NZTA Specification M/14: Marker Posts
- NZS 5414: 1977 “Specification for Construction of Traffic Signs”
- NZTA Specification P/12: Paint Application - Signs.

Road Markings

- NZTA "Manual of Traffic Signs and Markings" Part 2.
- NZTA Specification P/22: Road Markings

Maintenance Programme

The maintenance and budget is primarily based on historical levels of expenditure. However, in 2018/19 the total maintenance cost budgeted is $175,000, which is a significant increase from previous years. This is due to the growth in tourism and more traffic using our roads whether that be for recreation, business, etc. demanding a higher level of service for traffic services which wouldn’t have previously been required on our predominantly rural network. It is expected that this maintenance cost requirement will carry on into the future given growth in our district with tourism and costs to install/ upgrade traffic service to be consistent with our neighbouring networks as part of the One Network Road Classification (ONRC). The increase in forecast budget into the future is due to increased street lighting costs, predominantly increased electricity costs from new lighting installations being vested to Council from subdivision development. The financial forecasts are presented in Appendix III.

8.7.3 Traffic Services Renewal/Replacement Plan (WC 222)

There is no separate Renewals Plan for Traffic Services. All renewals are funded under ‘Traffic Services Maintenance’ $80,000 included in 2018/19– for new signs and street lights.

Traffic Services Asset Development Plan

There is ongoing development work currently being undertaken as part of the transportation strategy for our towns which includes wayfinding, changes of markings, increasing levels of service in regards to crossing points etc. All renewals and improvements are funded under ‘Traffic Services Maintenance’ unless directly related to a large package of works incorporating other items as a low cost low risk project.

8.8 FOOTPATHS

8.8.1 Footpaths Background Data

Footpaths Scope and Nature of Asset

The purpose of footpaths is to provide a safe and efficient network of access ways catering for the movement of pedestrians. The need to provide formed and defined footpaths is based on a combination of the traffic volume, road/seal width and pedestrian demand. Footpaths also fulfil a social function providing areas with a sense of community. The need for footpaths is increasing with tourism and development as overseas tourists want to explore our district on their overnight stay. This hasn't previously been that popular in our rural towns with driving the selected form of travel. It is the same with cycling and exercise craze encouraging more people to get out there and do it which requires the infrastructure to cater for everyone this typically now has a sealed surface in the urban environment.

The key issues relating to footpath management are:

- condition of existing asset
- adequacy of pedestrian facilities near schools, shopping centres, residential and recreational areas
- adequate provision of safety footpaths
- accuracy of the footpath age profile
- amenity (fit for purpose surfacing)
- Shared pathways

Footpath asset data is now held in RAMM. Council which holds all current asset data including location, type, quantity, age, and condition rating.

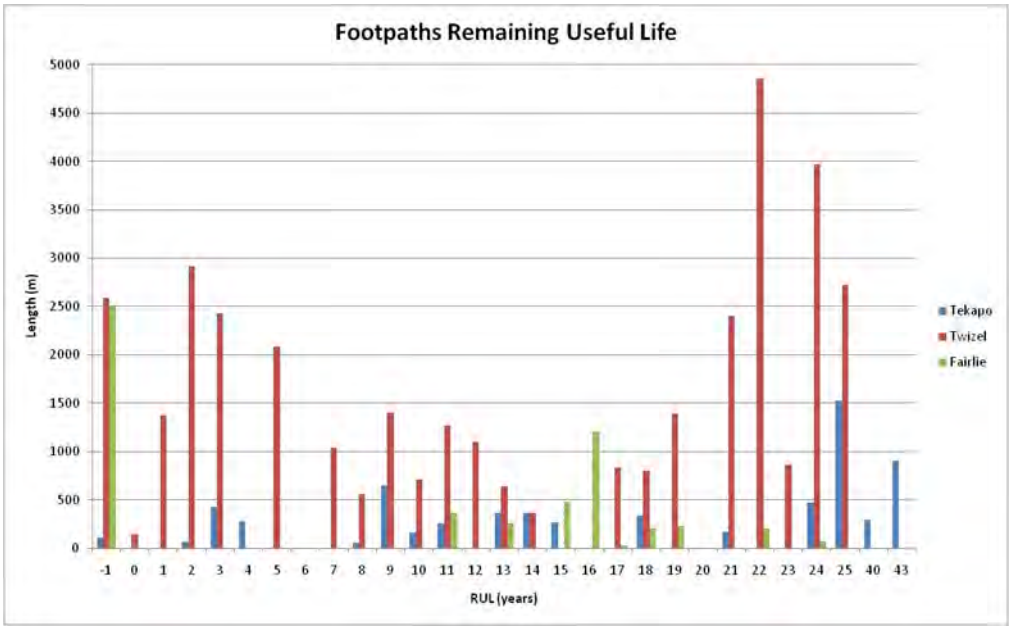
Sealed footpath construction dates have been recorded since 1985 but gravel footpath construction dates have not been recorded. However an age profile for the majority of footpaths can be determined from the resurfacing records held in the spread sheet database. An analysis of this surface record shows only one section on Aorangi Crescent (Tekapo) that has exceeded its expected life and should be inspected with a view to surface renewal.

Footpaths Current Condition

Figure 29 shows the Remaining Useful Life (RUL) of the footpath asset as currently recorded based on a useful life of 25 years for AC and Chip Seal surfaces and 50 years for concrete or cobblestone (grass and gravel surfaces have not been considered).

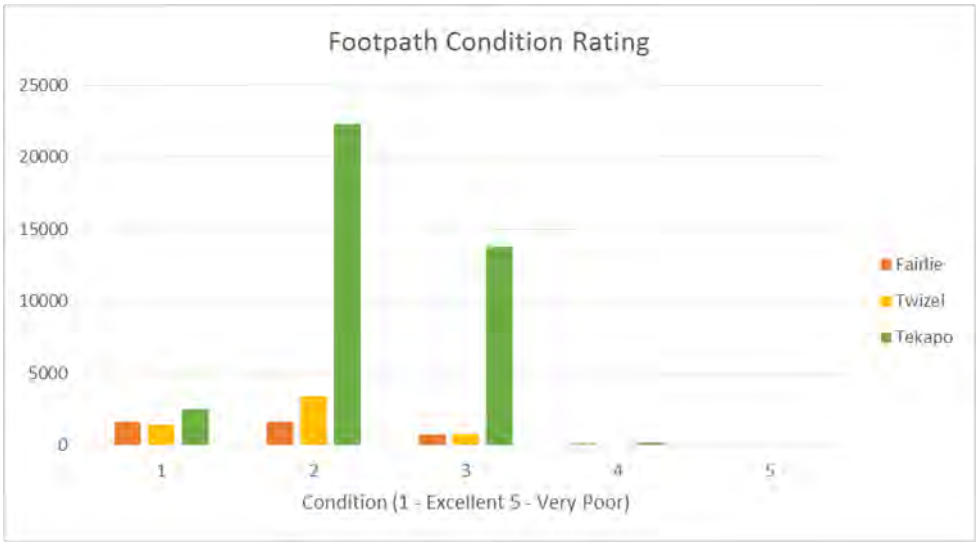
Over the next 10 years 40% of the current assets will reach the end of their "useful lives". This is probably due to similar age of 'Twizel' town taken over in 1985 and large area of Tekapo developed in the 1970's.

Figure 29: Footpath Remaining Useful Life (based on length)



Condition rating is carried out, prior to LTP budgeting, for all footpaths with a condition scale of 1 to 5, 1 being excellent and 5 being very poor. Figure 30 shows the latest condition of pavements in each of the three urban areas in the District. There is a significant portion of the asset that does not have a current condition rating, however the majority of these lengths are grass or gravel.

Figure 30: Footpath Condition Rating



Footpaths Current Capacity and Performance

The District Plan states that any new residential developments Mackenzie urban areas are to have footpaths on both sides of the street, 1.5m wide and be surfaced in AC. Safety footpaths are being considered for urban fringe development where the footpath will be 1.5m wide with a gravel surface. The provision going forward is to ensure there is a sealed footpath on each of our urban roads of which a number of them are likely to shared paths to support the uptake of multi modal transport given the absence of public transport in our area.

8.8.2 Footpath Operations and Maintenance Plan

Footpath maintenance is undertaken by our road maintenance contractor.

Footpath maintenance includes:

- repairing damaged sections of footpath, usually broken by vehicles, tree roots or old service trenches.
- pothole repair
- relaying uneven pavers and removing similar tripping hazards
- repairs around utility services
- old trench repairs
- •removing weed or grass growth from the footpaths
- removal of overhead tree growth etc. to retain a “passageway” for pedestrians

Maintenance Strategy

Maintenance needs are identified from observations made by staff and contractors in the course of their duties. Works are prioritised using the following criteria:

- the safety of pedestrians may be compromised (attended to immediately)
- if it is likely that the area of distress may expand or the methods of repair change such that the cost of any repair will increase
- subsequent maintenance or renewal work depends on the completion of the maintenance repair
- aesthetics (e.g. minor water ponding/untidy appearance)

A 24 hour customer complaints service is provided. The maintenance contracts require the contractors to maintain a suitable level of preparedness for prompt and effective response to asset failures and emergencies and specify maximum response times.

Asset failures are responded to with the initial objective of making safe as quickly as possible by the most economic method available and/or making temporary repairs if major repairs or renewals are required.

Maintenance Standards

The technical LoS required are detailed in the maintenance standards that implement these technical LoS is set out in Council specifications contained in the road maintenance contracts.

The consequences of lowering these standards are:

- reduced safety
- accelerated footpath deterioration and additional consequential costs
- lower level of service (ease of use, appearance)

Maintenance Programme

Footpath maintenance is currently funded under non-subsidised roading facilities maintenance. Going forward it is thought that shared pathways are the way to go, especially in our main towns to service cyclist and pedestrians. Where there is tourism present in our main centres some of these should be fully funded by NZTA/ central government. The maintenance budget is primarily based on historical levels of expenditure $30,000 allocated for 2018/19. The financial forecasts are presented in Appendix III.

8.8.3 Footpaths Renewal/Replacement Plan

The types of renewal work undertaken to restore footpaths to the required condition include resurfacing and reconstruction.

Resurfacing
This provides a smooth waterproof surface by overlaying with a thin layer of asphaltic concrete or chip seal coat. The existing surfacing is removed and replaced with a new surface (where the footpath profile is such that the surface level can't be built up with an overlay).

Reconstruction
This allows for full reconstruction of the base course and surfacing layers when the footpath structure has deteriorated to an extent where resurfacing is not practical. Justification for work can be based on the condition of the kerb and channel or the condition of the carriageway rather than the footpath condition. Footpaths may be constructed on different alignments from existing to improve safety, accessibility, avoid known problems, reduce life-cycle costs and/or improve aesthetics.

Renewal Strategies
Work needs are identified through inspections by staff and contractors with improvements programmed. Priorities are based on condition, pedestrian volume, and location to schools public and tourist areas.

Replacement of footpaths will proceed in commercial and shopping areas as funds are available with the priority being set by consideration of existing standards and pedestrian volumes.

Council notifies residents in the street before any works are undertaken to confirm requirements.

Renewal Standards
Levels of Service requirements are for all footpaths to be a minimum of 1.5m wide. They are optional in rural roads, required on both sides along urban streets for any new development. Asphalt is the preferred surface material used for all renewals and concrete for new construction because of its longer life and superior surface. Alternative materials are used for aesthetic reasons in new developments and to match existing materials or reduce costs. The aim is to have at least one sealed footpath in each urban street going forward (which is likely to be the sunny side). Ideally to a community facility e.g. school, sports centre, etc. the aim is to have a sealed footpath on either side of the road to the facility.*

Renewal Programme
The renewal budget for 2015/16 is $100,000. The financial forecasts are presented in Appendix III.

The renewal programme has been suspended due to the pending roll out of Ultra-Fast Broadband in Fairlie, Tekapo and Twizel. Council has confirmed that it will ramp this back up after fibre has been laid to renew the full width of the footpath as part of the UFB reinstatement.

8.8.4 Footpaths Asset Development Plan

The addition of footpaths and pedestrian access ways occurs in one of the following ways:

- Extensions constructed by Council where no footpath previously existed to improve the level of service (particularly in relation to special treatments in high profile commercial areas)
- Taking over new footpaths constructed within sub divisional development (constructed at the developer's expense)

- Requests form Councillors, Public, and Staff
- Safety improvements
- Pedestrian demand

Where possible this work is incorporated with other development work to save on establishment costs. For example, new safety footpaths on Mt Cook Road in by Fairlie were completed during the installation of the trunk water main along Mt Cook Road in December 2010. A 400m long gravel footpath was constructed over the pipe trench concurrent with the water main work, thus saving in establishment and excavation costs. People living in the Reserve and along Mt Cook Road are now able to safely and conveniently walk into town on a footpath well clear of SH8. The same is planned for the Doon St water main replacement going forward.

Council officers plan as part of the transportation strategy for the Mackenzie District to carry out a walking and cycling strategy as part of this LTP to support these alternative modes of transport going forward.

8.9 STREET LIGHTING

8.9.1 Street Lighting Background Data

Street Lighting Scope and Nature of Asset

The purpose of street lighting is to provide sufficient lighting levels in streets to allow the safe and efficient movement of vehicles, cyclists and pedestrians provided that this lighting does not adversely effect on the visual amenity of the District as defined in the District Plan (Section 11 Issues 2 & 3).

Council administers the maintenance and power consumption of street lights throughout the District including those on the state highways owned by NZTA whose direct costs are recovered from NZTA.

The Council's streetlights are attached to poles either owned by the Council, NZTA or by Alpine Energy. The maintenance contractor (Netcon) is required to maintain the light fittings and mounting brackets and those poles belonging to both the Council and NZTA. Netcon maintains the poles on behalf of Alpine Energy poles. The demarcation point is the pole fuse which is the supply point to Alpine Energy's power network. Therefore the reticulation to each pole is not the Council's or NZTA's property.

Street lighting asset data is held in RAMM.

Street Lighting Current Condition

The asset has been developed over a number of years. The majority of the light fittings are now low pressure sodium to meet the requirements of Council's District Plan that has provisions to protect the night sky. These fittings have been standardised to match the other makes of lights in neighbouring districts to reduce maintenance expenditure. Council has strict lighting controls in the District Plan for Tekapo and Twizel to protect the night sky. Low pressure sodium lights are generally required to meet this standard. The low pressure sodium bulbs are becoming harder and harder to source with them having to now be bulk ordered and shipped from the other side of the world and cost are currently increasing due to this. Council are very keen to take up NZTA's offer of 85% FAR to change out our entire streetlight inventory to LED fittings. We already have a fitting, GL520 300k, that compiles with the international dark sky reserve as Council has already changed out a number of fittings in Twizel that had failed and now await approval from NZTA on our business case for the remainder. This will

provide large energy savings as well as reducing maintenance cost given that for each LED fitting we show get twice the life of the LPS bulbs minimum.

The Council does not formally rate the condition of streetlights. There is an on-going inspection and maintenance regime under the routine maintenance contract.

Street Lighting Current Capacity and Performance
Streetlight capacity and performance issues relate to light intensity, reliability and safety.

The District street lighting other than on the state highways has evolved from perceived need rather than being based on standard performance design requirements. Older fluorescent and mercury vapour lanterns had been upgraded over the last ten years to low pressure sodium. The change out to LED fittings will provide improved performance, resilience and energy savings.

To date the management of the street lighting asset has been largely left to the maintenance contractor (Netcon). This has generally worked well with no major issues to date.

Reliability
Most complaints are largely about light outages and are really negligible in number. The change out to LED fittings will see a significant increase in reliability, providing a better service to the community.

8.9.2 Street Lighting Operations and Maintenance Plan

Maintenance of Council streetlights is competitively contracted out. Maintenance of streetlights covers regular inspections, the replacement of failed bulbs/fittings, and repair of damage. Maintenance works are undertaken to:

- Maintain LoS
- ensure safety to the public
- protect the investment in assets by extending the life of the assets
- minimise repair costs

Maintenance Strategy
The current maintenance strategy is:

- Failed assets are identified through inspections by contractors, staff observations, and customer complaints
- Repairs are carried out on demand and within the specified response timeframes. Faulty, accidently damaged or vandalised lanterns, lamps, control gear columns and associated equipment, are repaired immediately when there is a hazardous situation.
- Develop maintenance programmes from the schedules of defects identified during routine inspections. Repair options and priorities are determined by considering the effects on:
  - public safety (top priority)
  - LoS (traffic movement and pedestrian safety)
  - future costs if the work is not done

Maintenance Standards
All replacement lamps are compatible with the lantern and control gear, and have illumination characteristics compatible with the original lamp and be compliant with the international dark sky reserve in Tekapo and Twizel.

All maintenance work must comply with the current Electricity Act and Regulations.

Maintenance Programme
The majority of streetlight maintenance is reactive therefore budgets have been based on historical costs with an allowance made for increased costs associated with an increase in the number of lighting assets on the network and inflation. Maintenance costs are included for under Traffic Service maintenance. The financial forecasts are presented in Appendix III. Council seeks to recover the cost of accident damage from those responsible.

Deferred Maintenance
Current maintenance funding levels appear adequate and there is no significant backlog of routine maintenance.

8.9.3 Street Lighting Renewal/Replacement Plan

Asset renewal is undertaken when a streetlight, or significant component of a light, has reached the end of its economic life. Renewal works involve the replacement of either the complete pole and lantern or individual components (e.g. lantern, controllers, bracket, pole, etc.).

Renewal Strategy
Renewal needs are identified from routine inspections and asset registers. The strategy relating to the renewal of streetlight assets, or components of those assets, is to:

- replace faulty or damaged assets when replacement is more economic than repair
- replace faulty or damaged lanterns which cannot be repaired because of obsolescence or replacement parts are unobtainable
- replace existing assets/components that do not meet current design/safety standards
- earlier than end of life replacement of obsolescent technology is the least cost solution.

Works are prioritised according to:

- public safety
- benefit/cost savings available (e.g. power efficiencies)

Guidelines
Future lighting installation will be designed to the AS/NZS 1158:2005 suite of standards adjusted to conform to the requirements of Section 11 of the District Plan.

The following gives a brief summary of each standard:

- AS/NZS 1158.0:2005 Road Lighting – Introduction: Serves as a general introduction to the AS/NZS 1158 series and provides definitions of lighting categories and technical terms essential to the understanding of other Standards in the series especially Parts 1.1, 2, 3.1 and 6.
- AS/NZS 1158.1.1:2005 Road Lighting – Vehicular Traffic (Category V) lighting – Performance and design requirements: Specifies performance and design requirements for Category V lighting schemes as described in AS/NZS 1158.0. Also specifies data needed to design for and assess compliance with those requirements.
- AS/NZS 1158.3.1:2005 Road Lighting – Pedestrian Area (Category P) lighting – Performance and design requirements: Specifies performance and design requirements for Category P lighting schemes as described in AS/NZS 1158.0. It also specifies the luminaries' data and other data that is needed to facilitate the lighting design and the assessment of compliance with the requirements of this Standard.

Renewal Programme
The required level of renewal depends on:

- the age profile of streetlights
- the condition profile of streetlights
- the level of on-going maintenance
- the economical lives of the materials and components used
- the available funding approval

The assumed average economic life for streetlights is shown in Table 32.

Table 32: Assumed Average Economic Life for Lighting Components

Component	Assumed Average Economic Life
All lanterns	20 years
Light columns	40 years
Brackets	40 years

The renewal budget is included under traffic services maintenance. The financial forecasts are presented in Appendix III.

8.9.4 Street Lighting Asset Development Plan

The installation of additional street lights will be assessed on the basis of the objectives and policies detailed in Section 11 of the District Plan.

Streetlights are acquired or upgraded as part of:

- power under-grounding work
- minor improvement works
- upgrading work to improve the level of service (e.g. spacing)
- extensions constructed by Council where no streetlights previously existed
- taking over new streetlights installed with sub-divisional development (constructed at the developer's expense)

Development Strategy
Candidates for minor street lighting and footpath lighting are ranked according to the criteria of:

- night time foot traffic
- night time vehicular traffic
- existing night time illumination levels
- geometry of the road or intersection
- special features (trees, parks, bridges, lack of footpaths, social conditions)

8.10 DISPOSAL PLAN FOR ALL ASSETS

In general Council has no specific plans for disposal of components of the Roading asset. Details for specific assets are included in Table 33.

Table 33: Circumstances for Disposal of Assets Summary

Asset Description	Disposal Plan	Comments
Land	None	Areas of unformed legal road reserve, berm areas surplus to requirements or areas being informally occupied by adjoining landowners may be identified for disposal in future. However issues of access will need to be considered in any road stopping and disposal considered.
Sealed Roads	None	Council may, when it is the lowest life-cycle cost, allow a sealed road to revert to an unsealed road.
Unsealed Roads	None	When the LoS provided by a formed public road is no longer required in that location
Bridges	None	See Bridge Replacement Strategy (2010-2050) Bridges that are on no-exit roads, providing property access only (not to residences) that have reached the end of their economic life and that NZTA share of replacement funding is in doubt will be considered for disposal. Ownership would be transferred to the main users (local property owners). Old bridges that are being replaced by Council and there is no value in that structure may be disposed of for future by private parties.
Drainage	None	
Traffic Services	None	
Footpaths	None	
Street Lighting	None	Disposal activity for streetlights relates to lanterns, controls and poles which have been replaced with new components. Components which can be used as spare parts are retained in storage. Other surplus assets have no commercial value, and are disposed of.

8.11 ALPS TO OCEAN CYCLEWAY

8.11.1 Alps to Ocean Background Data

Cycleway Scope and Nature of Asset

The Alps to Ocean cycle trail is 312km long beginning in the Southern Alps at Aoraki/Mt Cook National Park, descending 780m through the Mackenzie basin down the Waitaki Valley to Oamaru and the Pacific Ocean with multiple access points and options to begin or end the ride or to ride only local sections. The route traverses a unique geological glacial moraine alpine plateaus and alluvial river gravels. The route has been carefully selected to avoid major river crossings and utilises existing dam and bridge structures. The route utilises a combination of on road low volume roads and off-road shared use (1.5 metre) paths.

For the purposes of the route description and cycle trail specification, the Trail has been divided into 8 logical segments. The route sections and distances are given below:

- Section 1 — Aoraki Mount Cook National Park — Braemar/Mount Cook Station Road: 35 km
- Section 2 — Braemar/Mount Cook Station Road to Twizel: 42 km
- Section 3 — Twizel to Lake Ohau Lodge: 38 km
- Section 4 — Lake Ohau Lodge to Omarama: 45 km
- Section 5 — Omarama to Otematata: 24 km

- Section 6 — Otematata to Kurow: 40 km
- Section 7 — Kurow to Duntroon: 28 km
- Section 8 — Duntroon — Oamaru: 54 km

Council administers Sections 1, 2 and 3, located within Mackenzie District.

Section 1: Mt Cook to Braemar/Mount Cook Station Road, 35km
The Cycle Trail begins at the White Horse Hill Campground, 2km north of Aoraki Mount Cook Village. From here a 7.2km off-road trail to access the Aoraki Mount Cook Airport.

One of the major hurdles for the route has been the securing a safe and appropriate method for crossing the Tasman River. The preferred option for crossing the river is by way of helicopter from the Aoraki Mount Cook Airport. This option is preferred for its safety, reliability and minimal capital expense. There has also been the option of been transported by hovercraft (H2 Explore) but this has been held up due to noise and consenting issues.

On the eastern shore of the lake, the route traverses conservation land and legal river bed following a combination of existing four wheel drive tracks and newly constructed track to the Jollie Car Park at the top of Hayman Road.

Section 2: Braemar/Mount Cook Station Road to Twizel, 42km
From Braemar/Mount Cook Station Road the trail currently continues along a combination of the Braemar/Mt Cook Station and Hayman Roads (unsealed) and lakeside trail past the Tekapo B Power Station through to the intersection with State Highway 8 (SH8). An off-road track follows the shoreline of the lake from the intersection, to the Lake Pukaki Visitor Centre. Crossing State Highway 8, the route follows an existing gravel track through Meridian hydro land before traversing a trail through Department of Conservation tussock grasslands to SH8 on the outskirts of Twizel.

Section 3: Twizel to Lake Ohau Lodge, 38km
The trail leaves Twizel on local roads, travelling along Glen Lyon Road to the canal bridge adjacent to Loch Cameron. Cyclists follow the Meridian Canal Road to the edge of Lake Ohau. An off-road track leads to the Lake Ohau Weir. The trail will then follow the bottom of Lake Ohau. From this point a track follows the Lake Ohau Road to the Ohau Lodge.

8.11.2 Alps To Ocean Trail Standard

Grade Description
The entire cycleway within the Mackenzie District is designed as a “grade 2” track. This allows cyclists a smooth ride with gentle climbs, with riders able to ride side by side at times.

Road Condition
Sections of the cycleway are currently on unsealed road. Where the track is on unsealed road, this section of the track will only meet a Grade 2 standard immediately after maintenance grading or the application of a wearing Course (every ten years) or when cycling in smooth wheel tracks.

Maintaining the Standard
Maintaining the standard of the cycleway on roads requires monitored as the success of this venture and the economic benefits it brings to the District will only be realised if the track is well used and maintained.

9 FINANCIAL SUMMARY

9.1 INTRODUCTION

The total Mackenzie District National Land Transport Programme for 2018/19 for operations, maintenance, and renewals is $3.5M. The overall roading budget is $5.9M. The difference is for other "direct expenses" such as Administration, Employment, Consultancy and Non Funded Depreciation.

The following table summarise the budgets presented within the lifecycle management section. In addition budgets for "Other Direct Expenses" are developed and are included within the totals. In accordance with good practise, and the procedures used so far within this AMP, the budgets are shown in today's dollars unless noted otherwise.

9.1.1 10 Year Funding Forecast

Table 26 sets out the Council's 10 year expenditure forecast for the Land Transport activity. This programme reflects the application for funding initially requested from NZTA for the 2018/21 NLTP period. This will be finalised once the NLTP programme is approved by NZTA. NZTA has notified Council that it is increasing the roading programme that is co-funded, by 8% on the 2012-2015 level. Council has decided to proceed with its proposed programme as planned.

9.1.2 Capital Works

The main capital works allowed for over the 10 years 2018-2028 is covered under low cost low risk (WC 341). Work to be completed using this funding primarily consists of bridge renewals/replacements, other minor improvements and minor safety works. The amount forecast for Capital works is $300,000 per year over the 10 year period. Audit requires these capital works projects to be split to identify whether new capital is growth or LoS related. Generally capital projects identified are related to meeting LoS requirements.

There are a number of improvement projects that Council considering that have been identified during the Transportation Strategy. Even though these are still to be finalised, initial estimates put this work at $9M over 10 years.

Table 34: Proposed Future Capital Works Programme

ROADING	LTP Budget Yr 1 2019	LTP Budget Yr 2 2020	LTP Budget Yr 3 2021	LTP Budget Yr 4 2022	LTP Budget Yr 5 2023	LTP Budget Yr 6 2024	LTP Budget Yr 7 2025	LTP Budget Yr 8 2026	LTP Budget Yr 9 2027	LTP Budget Yr 10 2028
	(thousands)									
Roading Professional Services										
0868925. Plant and Equipment	0	0	0	0	6,105	0	0	0	0	6,941
District Roading										
2548193. Vested Assets	721	665	95	0	1,187	0	0	1,480	0	0
2548211. Unsealed Road Metalling	650	668	685	703	722	740	760	779	800	820
2548212. Sealed Road Resurfacing	500	514	527	757	555	570	585	600	615	631
2548213. Drainage Renewal	70	72	74	76	78	80	82	84	86	88
2548214. Sealed Road Pavement Rehabilitation	200	205	211	216	222	228	234	240	246	252
2548215. Structures Component replacements bridges	50	51	53	54	56	57	58	60	62	63
25482151. Structures Component replacements cattle stops	10	0	11	0	11	0	12	0	12	0
2548222. Traffic Services Renewals	60	62	63	65	67	68	70	72	74	76
2548310. Footpaths - Surfacing	30	31	32	361	370	380	58	60	62	63
2548341. Minor Improvements	300	308	316	325	333	342	351	360	369	379
2548395. Sealing Past Houses	140	144	153	162	155	159	0	0	0	0
Total Roading Capital Expenditure	**2,731**	**2,719**	**2,219**	**2,719**	**9,859**	**2,623**	**2,209**	**3,734**	**2,325**	**9,314**

Table 35: Annual Net Cost – Funding Impact Statement

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
Targeted rates	1152	1590	1799	1517	2495	2693	2886	3202	3437	3733	4080
Subsidies and grants for operating purposes	771	851	856	878	1046	1059	1086	885	890	915	902
Internal charges and overheads recovered	0	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tac, fines, infringement fees and other receipts	26	28	29	29	30	31	32	32	33	34	35
Internal charges and overheads applied	59	163	179	220	263	292	349	441	537	644	832
Total operating funding (A)	**2008**	**2632**	**2863**	**2644**	**3834**	**4075**	**4353**	**4560**	**4897**	**5326**	**5849**
Payments to staff and suppliers	1553	1751	1793	1870	1884	1931	2014	2029	2080	2171	2191
Finance costs	69	0	0	0	0	0	0	0	0	0	0
Internal charges and overheads applied	17	17	17	20	21	29	30	31	32	33	33
Total applications of operating funding (B)	**1639**	**1768**	**1810**	**1890**	**1905**	**1960**	**2044**	**2060**	**2112**	**2204**	**2224**
Surplus (deficit) of operating funding (A-B)	**369**	**864**	**1053**	**754**	**1929**	**2115**	**2309**	**2500**	**2785**	**3122**	**3625**
Finance costs	0	0	0	0	0	0	0	0	0	0	0
Subsidies and grants for capital expenditure	1055	938	958	989	1120	1042	1063	1097	1119	1154	1178
Development and financial contributions	0	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding (C)	**1055**	**938**	**958**	**989**	**1120**	**1042**	**1063**	**1097**	**1119**	**1154**	**1178**
Capital expenditure											
To meet additional demand	0	0	0	0	0	0	0	0	0	0	0
To improve the level of service	0	0	0	0	0	0	0	0	0	0	0
To replace existing assets	2201	2010	2054	2124	2719	2574	2623	2209	2254	2325	2380
	2201	**2010**	**2054**	**2124**	**2719**	**2574**	**2623**	**2209**	**2254**	**2325**	**2380**
Increase (decrease) in reserves	-777	-208	-43	-381	330	583	749	1388	1650	1951	2423
Total applications of capital funding (D)	**1424**	**1802**	**2011**	**1743**	**3049**	**3157**	**3372**	**3597**	**3904**	**4276**	**4803**
Surplus (deficit) of capital funding (C-D)	-369	-864	-1053	-754	-1929	-2115	-2309	-2500	-2785	-3122	-3625
Funding Balance ((A-B)+(C-D))	0	0	0	0	0	0	0	0	0	0	0

9.2 FUNDING STRATEGY

The first priority is to maintain and operate the existing network in its current condition, at the lowest lifecycle cost, then allow for renewal expenditure that revitalises a component of the network that has worn out. In the 2018/19 year $1.4M of budgeted expenditure is to be spent on maintenance and operation with $1.96M to be spent on renewals and $390k to be spent on low cost low risk to address safety issues, and transportation strategy issues in the district. The remaining allocation, as defined in the draft 2018-2028 LTP, is used to fund administration costs and also accounts for non-funded depreciation.

Funding for the management, maintenance, renewals and improvements of the road network is provided from the District roading rate and co-investment received from NZTA.

In determining the larger improvement projects to be undertaken NZTA requires a full better business case be developed to justify the request for funding. Preference is given to projects which can be shown to be economically justified, attract subsidy and have the necessary Council funding available.

9.2.1 Financial Assistance

The co-investment rate for operation, maintenance, renewals and improvement works varies from one roading authority to another. There has been a major review of the co-investment rate determination process and this has equated to a drop in assistance given to the Mackenzie District.

Currently Mackenzie District Council receive a base Financial Assistance Rate of 52%, reducing to a base of 51% in Yr 1 of the LTP (2018/19). The other significant change the rate for Low Cost Low Risk and other projects continue to be funded at the same FAR. Previously Council's base rate was 53% with Minor Improvements funded at 63% this put strain on our ability to fund project works especially with works driven by increased demand. As subsidised roading activities make up a large proportion of the roading budget and therefore the total Mackenzie District Council budget, this change in base rate had a significant effect on rating requirements. Hopefully this new determination will see the base FAR stabilise at that rate for some time to allow effective planning for managing the network effectively.

9.3 ROAD ASSET VALUATION

The last valuation of the roading infrastructural network and associated assets was undertaken as at 1 July 2016 and is summarised in the Table 36. The valuation is updated 3 yearly to take into account capital works and additions to the road network.

The valuation consists of an assessment of the replacement cost, depreciated replacement cost and the annual depreciation or decline in service potential of the network. The annual depreciation or decline in service potential is the amount the asset declines in value over a year as a result of the remaining life of the asset reducing. Provision is required to be made to fund this depreciation so as to make suitable allowance for the future replacement or renewal of the asset.

Depreciation is provided on a straight-line basis on all physical assets at rates which write off the cost of the asset to the estimated residual value at the end of its assumed effective life.

Expenditure on renewing or improving the capacity of the asset is capitalised annually as are assets which are vested in Council by developers. Capital work in progress is not depreciated. The total cost

of this work is capitalised at the end of the financial year in which it is completed and depreciated from then onwards.

Table 36: Roading Infrastructure Valuation

Summary	ORC 1 July 2016 ($)	ODRC 1 July 2016 ($)	Depreciation to Date ($)	Annual Depreciation ($)
Pavement	83,651,833	67,182,132	16,469,701	1,074,532
Footpath	6,008,862	3,534,295	2,474,567	120,703
Structures	27,933,391	12,327,502	15,605,889	315,478
Drainage	9,417,982	3,613,371	5,804,610	93,322
SWC	10,090,236	5,888,614	4,201,622	88,206
Signs	683,027	113,785	569,241	31,234
Lights	3,742,322	1,410,817	2,331,505	117,419
TOTAL	**$141,527,652**	**$94,070,517**	**$47,457,135**	**$1,840,895**

The total optimised replacement cost of the Roading Infrastructure was assessed to be $141,527,652 as at 1 July 2016. The total optimised depreciated replacement cost was assessed to be $94,070,517.

9.3.1 Valuation Methodology

All assets are valued using depreciated replacement cost (DRC). A DRC valuation requires:

- Determination of quantities of assets optimised to relate to those required for current service delivery and foreseeable demand
- Unit rates for replacement with modern engineering equivalent assets
- Effective lives that take account of local influences
- Depreciation that defines current value given a definable remaining life.

The NZ Infrastructure Asset Valuation and Depreciation Guidelines 2006 give direction as to the overall methodology applicable to a DRC valuation for roading assets. This has been applied in this case to achieve a suitable valuation for Council Improvements and Infrastructure Asset Valuation.

Borrowing costs are excluded from the valuation.

Update from Valuation Report

The primary data source for this revaluation was Council's RAMM database. For a number of assets RAMM was not populated or fully up to date at the time of re-valuation, therefore secondary sources were used as follows:

- Bridges: RAMM database
- Cattle stops: all data in RAMM except construction dates, which were based on data from the previous valuation
- Footpaths: Council inventory data supplied in form of excel spread sheet
- Street Lights: RAMM database

9.4 ESTIMATED REQUIRED ASSET EXPENDITURE

When assessing the expected annual renewal expenditure an indication of the appropriate level of expenditure required can be gauged by comparing the estimated renewal requirement against the Annual Depreciation for each asset component in light of the average age of that asset component. If the asset is "young" then an amount less than the Annual Depreciation (AD) would be a likely requirement and as the asset ages a larger amount, probably greater than the AD would be likely. The 2016 Council Valuation report is summarised in Table 27. Networks with relatively evenly spreads of asset ages and expiry dates should approach a balance between these amounts. However, when Council is forced to defer maintenance to achieve NZTA budgetary constraints it will take longer to realise that balance.

The AD is an amount of money which represents the estimated annual renewal needs of the asset. It does not include the amount required to cover maintenance or running costs such as electricity for streetlights.

In considering the above it is possible to identify whether the current renewal expenditure is:

- approximately matching the theoretical renewal requirement
- less than the theoretical renewal requirement
- greater than the theoretical renewal requirement

Each Road Asset component has been looked at to determine the outcome in relation to its budgeted expenditure. A comparison between forecast expenditure for 2018/19 and the Annual Depreciation for each asset type is shown in Table 37.

Table 37: Comparison between Forecast Expenditure and Annual Depreciation

Asset Type	Component Description	2018/19 Renewals Forecast	AD Cost (% renewals vs. AD)
Pavement	**Total Estimated Annual Need (AD)**		**$1,074,532**
	Unsealed Road Metalling	$650,000	(126%)
	Sealed road Resurfacing	$500,000	
	Pavement Rehabilitation	$200,000	
	Total Renewals	**$1,350,000**	
Footpaths	**Total Estimated Annual Need (AD)**		**$120,703**
	Footpaths - Surfacing	$30,000	(25%)
	Total Renewals	**$30,000**	
Structures	**Total Estimated Annual Need (AD)**		**$315,478**
	Structures component replacements (including bridges cattle stops and fords)	$50,000	(16%)
	Total Renewals	**$50,000**	
Drainage	**Total Estimated Annual Need (AD)**		**$181,528**
	Culverts, catch pits, soak pits, side drains and all surface water channels (including all concrete K&C, dish channel, mountable kerbs, earth surface water channels)	$70,000	(39%)
	Total Renewals	**$70,000**	
Traffic Services	**Total Estimated Annual Need (AD)**		**$148,653**
	Signs	$60,000	(47%)
	Lights (Subject to LED replacement completed)	$10,000	

Asset Type	Component Description	2018/19 Renewals Forecast	AD Cost (% renewals vs. AD)
	Total Renewals	**$70,000**	

From the comparison shown in Table 28, it can be seen that expenditure is probably appropriate for most assets in relation to the Annual Depreciation. However, underinvestment is indicated for Structures and Drainage assets. Council and roading staff will be required to continue to assess the budgeted expenditure level on an ongoing basis taking in to account the current use, age and condition of the network components.

9.4.1 Minor Improvement Projects

Previously NZTA recognised the importance of road safety improvements that can be made to most networks and provided co-investment at a rate of 51%. NZTA's general approved level of improvements funding level amounts to 5% of the total maintenance and renewal programme. It would appear that the emphasis has shifted away from road safety with NZTA as now, those very worthwhile projects previously funded at 10% above base, are now to be funded at the base rate. The works that qualify for this expenditure include but are not limited to:

- Bridge Replacements
- Small isolated geometric improvements
- Intersection improvements
- Lighting improvements for safety
- Provision of guard railing
- Sight benching to improve visibility
- Safety footpaths that conform to NZTA policy

Council has allowed in its 2018/19 budget funding of $390,000 for low cost low risk projects of local roads. It is anticipated that this application to NZTA will be approved in full and it has been supported by the bridge replacement programme.

9.5 KEY FACTORS ASSUMED

Key factors assumed in the financial forecasts are as follows:

- NZTA will continue to provide financial support to Council for the road network
- The Council will continue to fund the level of service currently set out in this AMP and set out in the 2015-25 LTP
- The dollar values shown in this Plan are October 2017 dollars
- Renewal costs are best available estimates, based on current network needs, some especially very long term estimates (greater than five years), are rough order of cost estimates that need to be further researched and refined
- The effects of known very likely or future developments are included.
- Assumptions made on Total Useful Lives and Residual Useful Lives of the assets in relation to the asset valuation.
- The asset data is considered to be reliable and fit for the purpose for developing the long term financial forecasts.

- Reduction in NZTA's Funding Assistance Rate (FAR) by 1% every year to a base co-investment rate of 51% (first year of the LTP 2018)
- No account has been made for potential change in level of service and resultant co-investment as direct result of implementing One Network Road Classification.
- The current level of development will slow down by about a third but continue at that rate for the duration of this plan.

10 ACTIVITY MANAGEMENT IMPROVEMENT PLAN

10.1 STATUS OF AM PRACTICES

This section provides details of how Council plans to improve its transportation asset management practises, included in the Transportation AMP.

This AMP has previously been reviewed and updates incorporated including improvements to ensure "Core+" level Asset Management is met. Council is committed to a continual improvement as outlined in this section of the AMP. A key objective is to dovetail the activity management planning process with the other key planning processes particularly the Community Plan (LTP).

10.2 IMPROVEMENT PROGRAMME

The review and improvement of this AMP requires resource and budget in order to complete the selected improvement tasks. Table 38 outlines the items for improvement, relative urgency, resource, priority, budget and the authority sought to give approval to complete each item.

10.3 MONITORING AND REVIEW PROCEDURES

10.3.1 3 Year Review

This AMP is to be reviewed on a 3-yearly basis, with the next full review taking place in 2020. During the three year period leading up to this review, the items in the Improvement Programme will be addressed within the timeframes indicated. These improvements can then be incorporated into the next review of the AMP.

This AMP is also audited externally with the review including process, data integrity and Levels of Service. The last external audit was completed by New Zealand Transport Agency in 2017.

10.3.2 Annual Review

At the completion of each annual budgeting period the financial forecasts are to be updated to include the new Yr. 10 figures and any changes made to the intervening budgets by the Council.

By the end of July each year asset inventory data to be updated in RAMM to reflect the previous financial year's maintenance and renewal activities. Data accuracy is to be verified by completing a random 10% network audit.

10.3.3 30 Year Infrastructure Strategy

During the AMP review process the high level implications contained within the AMP are incorporated into the 30 year infrastructure strategy.

Table 38: Improvement Plan

Section	IP Ref	Item	Status 06/11/2017	Further Action Proposed for previous IP Items	Priority	Est Cost $,000	Target Completion	Internal / External Resource
General		Collect data for ONRC measures	Some input measures need regular collection, set up programme in combination with Timaru DC		1	0	Commence 30/6/2018	UDT from Timaru
Sealed Pavement Management		Further analysis of seal lives through the installation of calibration sites document and recommendations			3	5	30/6/2020	In case and PS analysis
		Carry out falling weight deflectometer (FWD) testing to assess pavement strength given we know they are limited from historic dig outs that have been completed as well as see in the form of frost heave in winter months.			2	20	30/1/2020	Combine work programme with collaboration group
		Complete test pits to confirm pavement depths to add to our knowledge of the network			1	0	30/11/2018	In house
		Investigate the cost high speed data (HSD) capture, roadroid, laser profile meter testing and other apps that may be developed to gather evidence.			3	25	30/6/2020	Combine work programme with collaboration group
		Improve traffic count data and create traffic model to build an entire, reliable traffic flow model of the network.			1	5	30/11/2018	Some PS support
		Plot sealed pavement repairs on a network map to view any trends and areas that may require further pavement rehabilitation.			1	0	Commence 30/6/2018	In house
		Write up and publish a formal maintenance intervention			1	5	30/6/2020	Some PS support

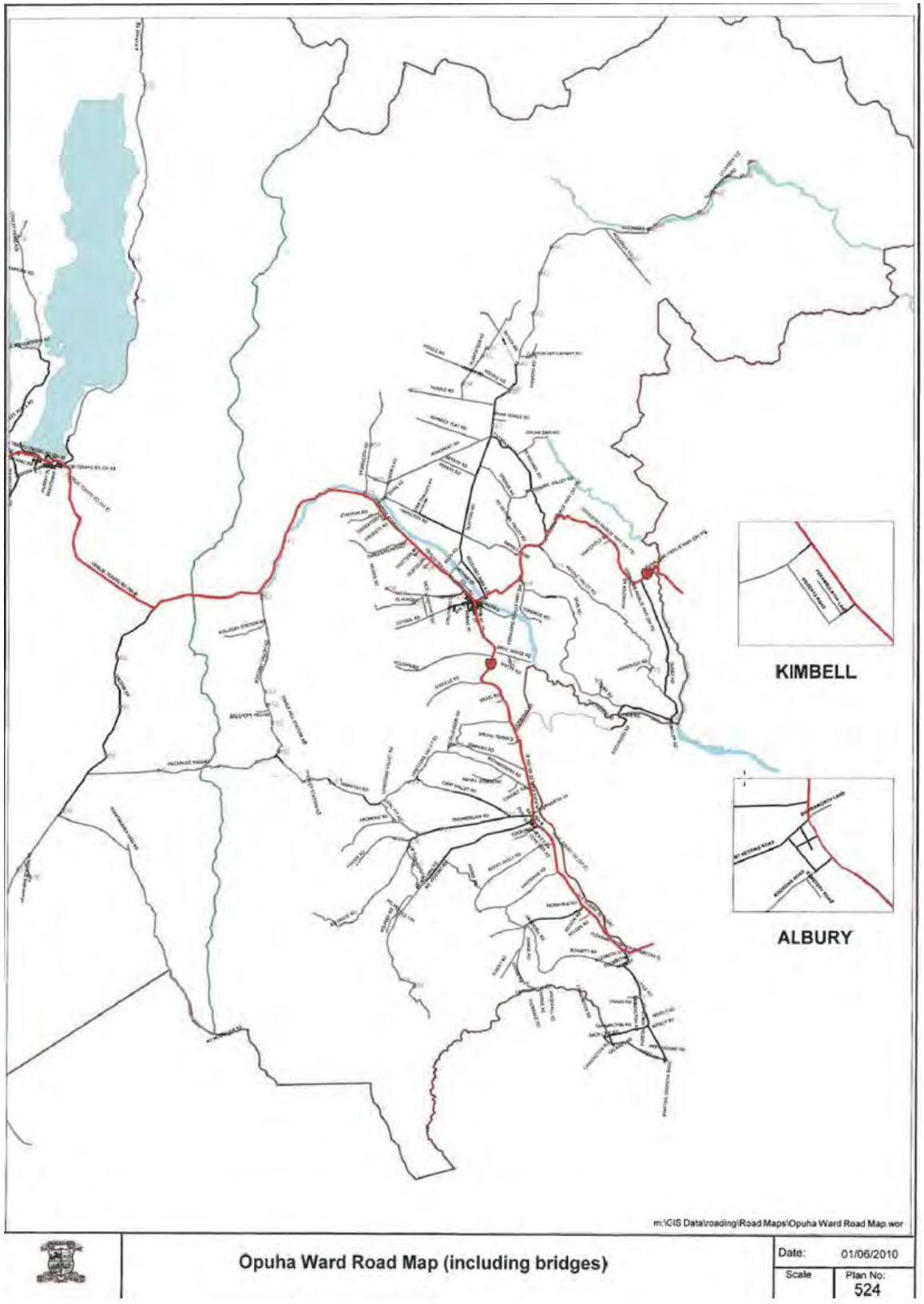
Section	IP Ref	Item	Status 06/11/2017	Further Action Proposed for previous IP Items	Priority	Est Cost $,000	Target Completion	Internal / External Resource
		strategy document to outline intervention for various levels and types of faults.						
Unsealed Pavement Management		Review grading schedules			1	0	Commence 30/6/2018	In-house & Maintenance Contractor
		Continue to monitor gravel loss surveys on most completed wearing courses to better understand the wear.			1	0	Commence 30/6/2018	In-house
		Build a user defined table to enable better lifecycle management of unsealed roads and to forward plan works.			2	0	30/1/2020	Combine work programme with collaboration group
		Continue to trial and improve granular metaling material from different sources trying to improve performance on our unsealed roads but reducing grading, improved environmental performance and greater resilience.			1	0	Commence 30/6/2018	In-house & Maintenance Contractor
Drainage		Assess the most effective way of completing drainage maintenance works.			1	0	30/1/2019	In-house & Maintenance Contractor
		Culverts that can't currently handle the flows under peak discharge, assess the catchment area and calculate the peak discharge vs the time of concentration to see if the existing culvert is sized correctly or is insufficient and requires replacement.			2	0	30/1/2019	In-house

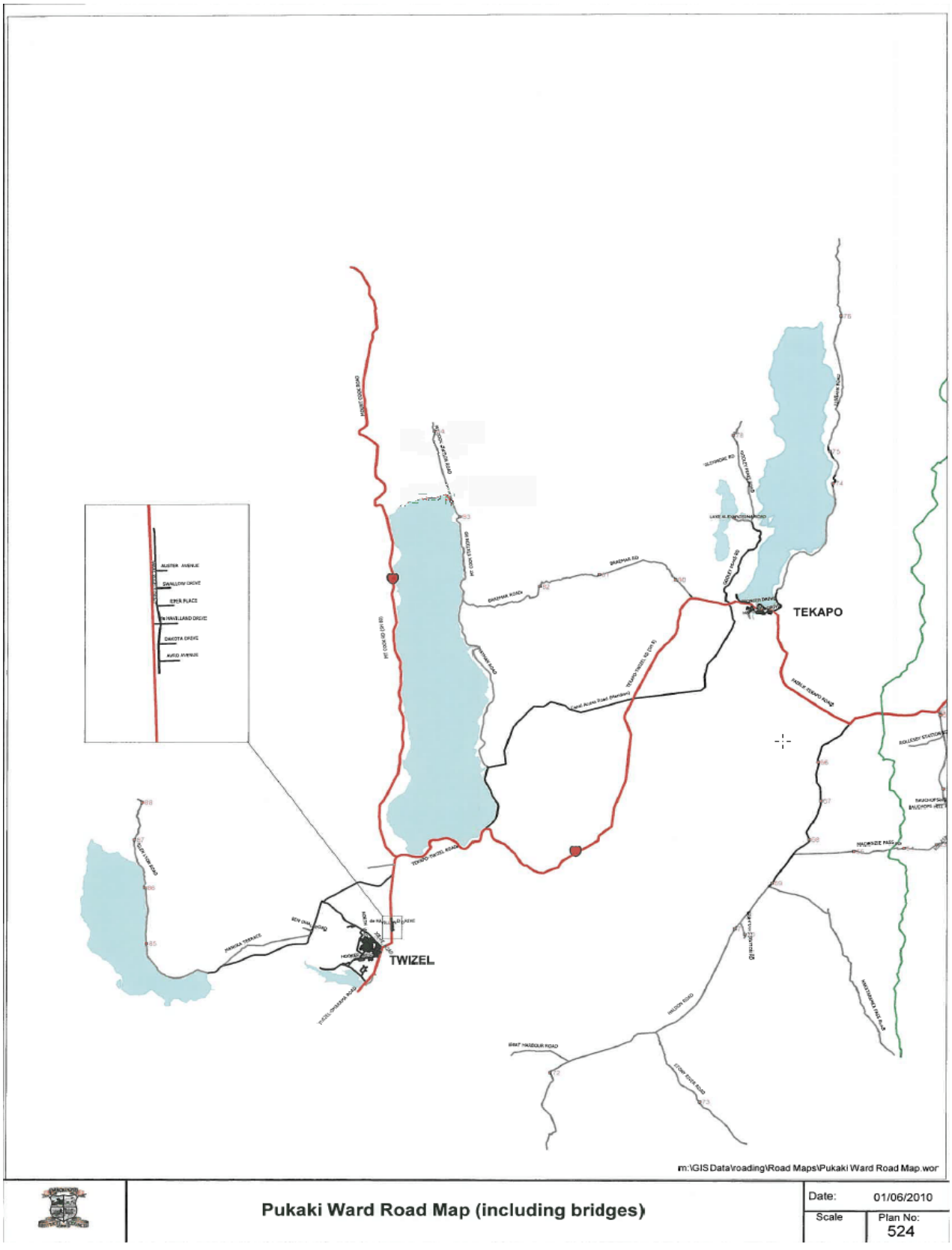
Section	IP Ref	Item	Status 06/11/2017	Further Action Proposed for previous IP Items	Priority	Est Cost $,000	Target Completion	Internal / External Resource
		Assess culvert types and materials to ensure best value for money is being achieved for the whole of life.			3	0	30/6/2019	In-house
		Assess if with change in product there are cost savings on cartage/ installation.			3		30/6/2019	In-house
		Try to remove high shoulder, detritus material or vegetation that may impede or block flow of water into or alone water way.			2		30/1/2019	In-house & Maintenance Contractor
		Create a list of essential drainage to maintain on an annual basis			1		30/1/2019	In-house & Maintenance Contractor
		Assess if drainage maintenance is under invested given lowest in peer group for this work category			3		30/6/2019	In-house
Bridges		Assess overweight permits and determine heavy vehicle requirements across network.			1	0	30/1/2019	In-house
		Look into the impacts of 50 Max operating on our network and consider risks of opening area.			1	5	30/1/2019	Some PS support
		Assess HPMV requirements and work out how many are non-compliant on important routes			1	5	30/1/2019	Some PS support
Environmental Management		Consider Climate Change Policy (in development) and the potential for developing a reserve fund for emergencies.			3	0	30/1/2020	Combine work programme with collaboration group
Traffic Services		Recording a list of seasonal signage and keeping it up to date.			1	0	30/1/2019	In-house & Maintenance Contractor

Section	IP Ref	Item	Status 06/11/2017	Further Action Proposed for previous IP Items	Priority	Est Cost $,000	Target Completion	Internal / External Resource
		Keeping similar levels of service across tourism routes.			1	0	30/1/2019	In-house & Maintenance Contractor
		Ensure a similar message is communicated across ONRC classifications.			2	0	30/1/2019	
		Optimise signage to limit the costs but provide an adequate level of service.			2	0	30/6/2019	
Low Cost Low Risk		Gather further information on tourism activities and pedestrian movements			1	5	30/3/2019	Some PS/survey assistance
		Assess network for larger projects which were previously difficult to complete due to the Ex Minor Improvement funding limit.			2	0	30/6/2019	In-house
		Keep assessing rental accommodation in our towns to monitor growth and tourism numbers			2	0	30/3/2019	Some PS/survey assistance
		Further discussions with highway staff to ensure projects are aligned.			1	0	Ongoing	In-house
		Finalise projects and complete design work for the various projects in our urban centres and rural areas			2		30/6/2019	In-house
Implementation		Revise and seek endorsement for Procurement Strategy			?		?	

11 APPENDICES

11.1 DISTRICT MAP



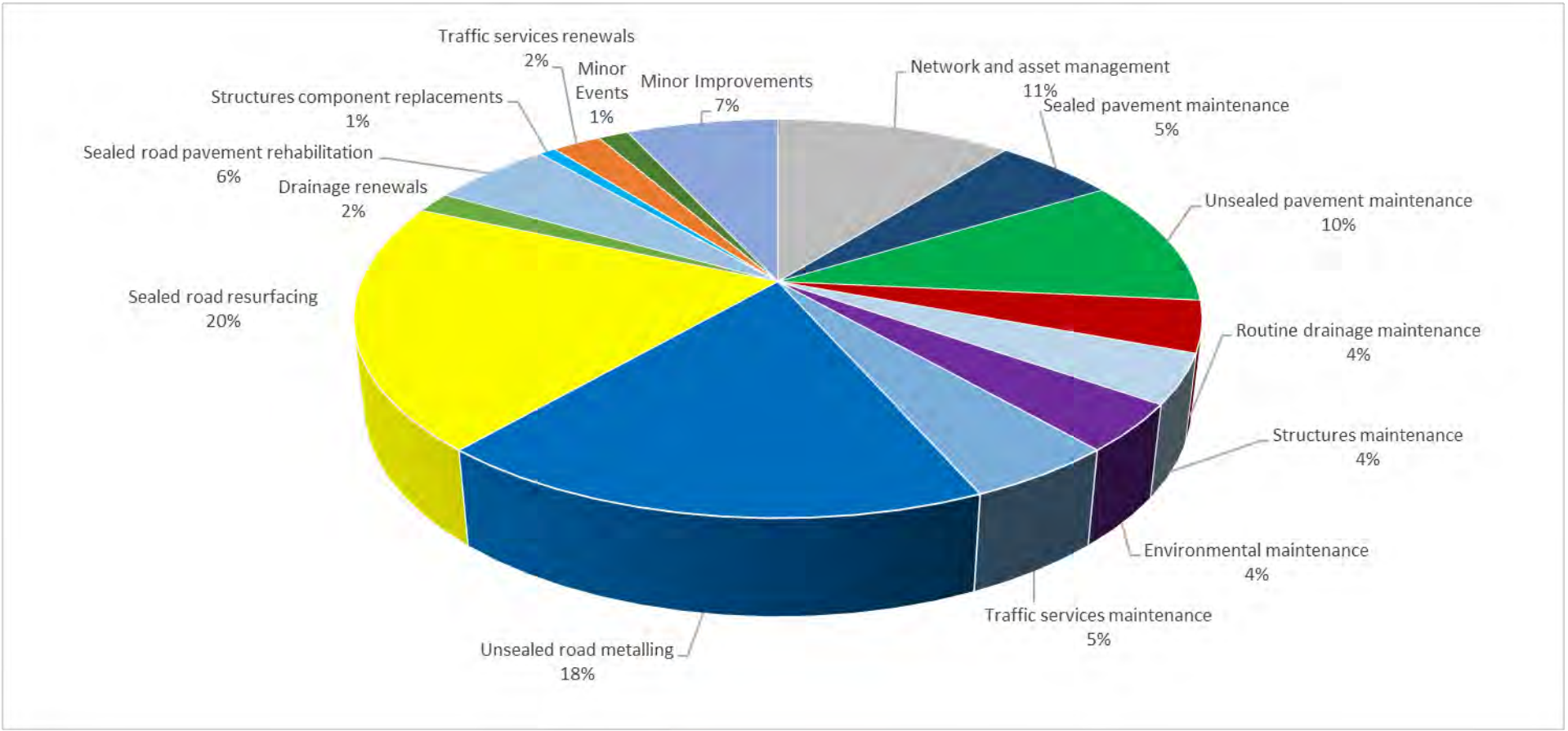


Pukaki Ward Road Map (including bridges)

Date: 01/06/2010
Scale
Plan No: 524

11.2 FINANCIAL FORECASTS

11.2.1 Transportation Proposed Expenditure by Type 2018-2021



11.2.2 Proposed Future Capital Works Programme

ROADING	LTP Budget Yr 1 2019	LTP Budget Yr 2 2020	LTP Budget Yr 3 2021	LTP Budget Yr 4 2022	LTP Budget Yr 5 2023	LTP Budget Yr 6 2024	LTP Budget Yr 7 2025	LTP Budget Yr 8 2026	LTP Budget Yr 9 2027	LTP Budget Yr 10 2028
	(thousands)									
Roading Professional Services										
0868925. Plant and Equipment	0	0	0	0	6,105	0	0	0	0	6,941
District Roading										
2548193. Vested Assets	721	665	95	0	1,187	0	0	1,480	0	0
2548211. Unsealed Road Metalling	650	668	685	703	722	740	760	779	800	820
2548212. Sealed Road Resurfacing	500	514	527	757	555	570	585	600	615	631
2548213. Drainage Renewal	70	72	74	76	78	80	82	84	86	88
2548214. Sealed Road Pavement Rehabilitation	200	205	211	216	222	228	234	240	246	252
2548215. Structures Component replacements bridges	50	51	53	54	56	57	58	60	62	63
25482151. Structures Component replacements cattle stops	10	0	11	0	11	0	12	0	12	0
2548222. Traffic Services Renewals	60	62	63	65	67	68	70	72	74	76
2548310. Footpaths - Surfacing	30	31	32	361	370	380	58	60	62	63
2548341. Minor Improvements	300	308	316	325	333	342	351	360	369	379
2548395. Sealing Past Houses	140	144	153	162	155	159	0	0	0	0
Total Roading Capital Expenditure	**2,731**	**2,719**	**2,219**	**2,719**	**9,859**	**2,623**	**2,209**	**3,734**	**2,325**	**9,314**

11.2.3 Annual Net Cost – Funding Impact Statement

	Annual Plan 2017/18	Long-term Plan 2018/19	Long-term Plan 2019/20	Long-term Plan 2020/21	Long-term Plan 2021/22	Long-term Plan 2022/23	Long-term Plan 2023/24	Long-term Plan 2024/25	Long-term Plan 2025/26	Long-term Plan 2026/27	Long-term Plan 2027/28
						(thousands)					
Targeted rates	1152	1590	1799	1517	2495	2693	2886	3202	3437	3733	4080
Subsidies and grants for operating purposes	771	851	856	878	1046	1059	1086	885	890	915	902
Internal charges and overheads recovered	0	0	0	0	0	0	0	0	0	0	0
Local authorities fuel tac, fines, infringement fees and other receipts	26	28	29	29	30	31	32	32	33	34	35
Internal charges and overheads applied	59	163	179	220	263	292	349	441	537	644	832
Total operating funding (A)	**2008**	**2632**	**2863**	**2644**	**3834**	**4075**	**4353**	**4560**	**4897**	**5326**	**5849**
Payments to staff and suppliers	1553	1751	1793	1870	1884	1931	2014	2029	2080	2171	2191
Finance costs	69	0	0	0	0	0	0	0	0	0	0
Internal charges and overheads applied	17	17	17	20	21	29	30	31	32	33	33
Total applications of operating funding (B)	**1639**	**1768**	**1810**	**1890**	**1905**	**1960**	**2044**	**2060**	**2112**	**2204**	**2224**
Surplus (deficit) of operating funding (A-B)	**369**	**864**	**1053**	**754**	**1929**	**2115**	**2309**	**2500**	**2785**	**3122**	**3625**
Finance costs	0	0	0	0	0	0	0	0	0	0	0
Subsidies and grants for capital expenditure	1055	938	958	989	1120	1042	1063	1097	1119	1154	1178
Development and financial contributions	0	0	0	0	0	0	0	0	0	0	0
Total sources of capital funding (C)	**1055**	**938**	**958**	**989**	**1120**	**1042**	**1063**	**1097**	**1119**	**1154**	**1178**
Capital expenditure											
To meet additional demand	0	0	0	0	0	0	0	0	0	0	0
To improve the level of service	0	0	0	0	0	0	0	0	0	0	0
To replace existing assets	2201	2010	2054	2124	2719	2574	2623	2209	2254	2325	2380
	2201	**2010**	**2054**	**2124**	**2719**	**2574**	**2623**	**2209**	**2254**	**2325**	**2380**
Increase (decrease) in reserves	-777	-208	-43	-381	330	583	749	1388	1650	1951	2423
Total applications of capital funding (D)	**1424**	**1802**	**2011**	**1743**	**3049**	**3157**	**3372**	**3597**	**3904**	**4276**	**4803**
Surplus (deficit) of capital funding (C-D)	-369	-864	-1053	-754	-1929	-2115	-2309	-2500	-2785	-3122	-3625
Funding Balance ((A-B)+(C-D))	0	0	0	0	0	0	0	0	0	0	0

11.3 BRIDGES - RESTRICTED

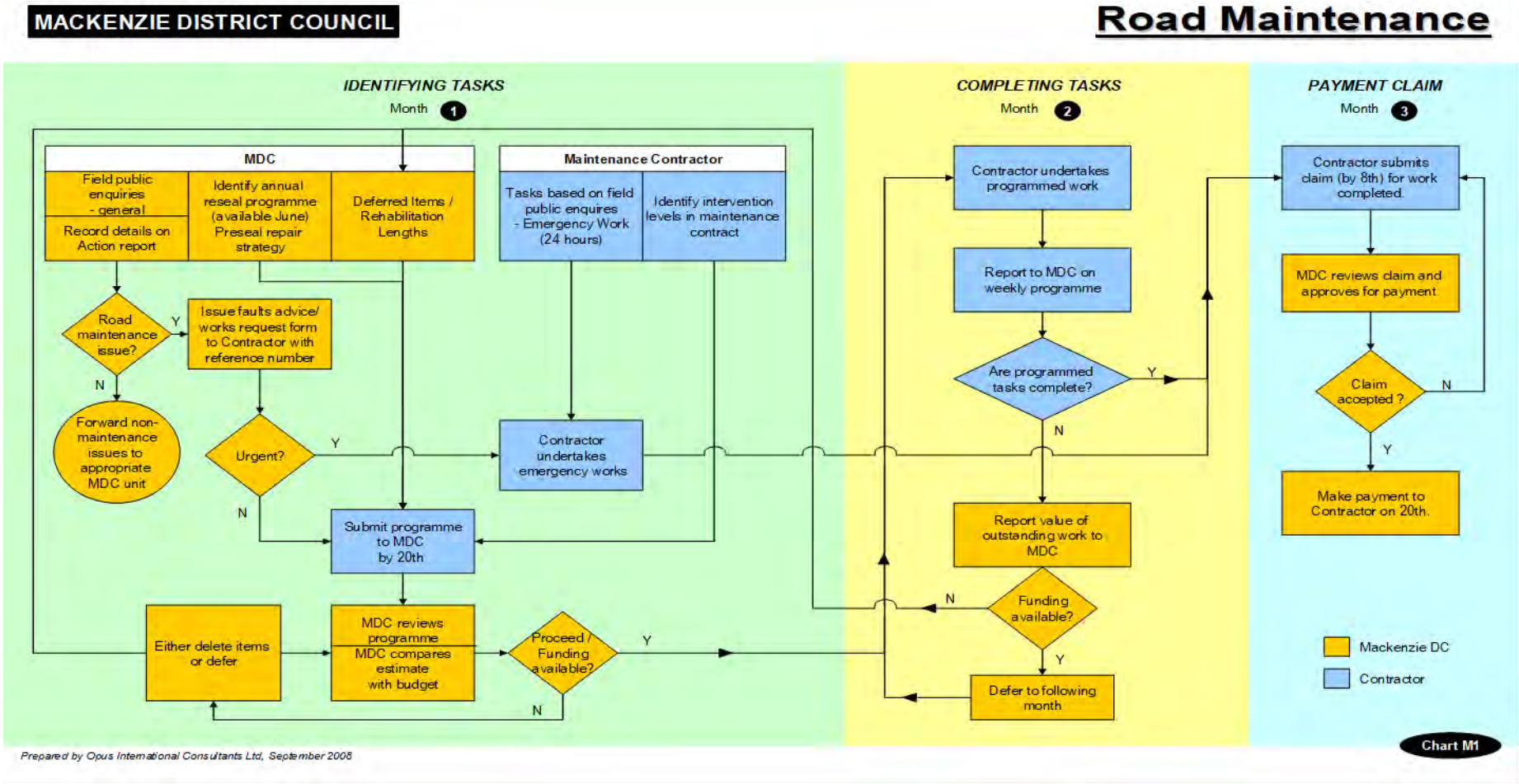
Bridge id	Hierarchy	Bridge name	Waterway	Displ (m)	Type	Restricted	No. Of lanes	Span length	Deck width	Bridge area
5	Local	Rocky Gully Bridge	Rocky Gully	17057	CBS	SPEED	1	24.6	4	98.4
9	Local	Frasers Road Bridge No 2	Delamain Stream	1044	TMB	SPEED	1	7	3	21
13	Local	Coal Pit Road No 2	Little Opawa Stream	1730	TMB	WEIGHT	1	12	4.59	55.08
25	Local	Goodmans Bridge	Wellshot Stream	5200	TMB	WEIGHT	1	17	2.05	34.85
28	Local	Oldfields Road Bridge	Wellshot Stream North Branch	560	TMB	WEIGHT	1	7.5	2.85	21.375
41[1]	Local	Clayton Settlement Bridge	North Opuha	502	JBT	SPEED	1	66	3.15	207.9
53	Collector	Lockharts Stream Bridge	Lockharts Stream	530	SBS	WEIGHT	1	14	2.9	40.6
58	Local	Single Hill Bridge		200	TMB	WEIGHT	1	12	2.75	33
70	Local	Grampians Bridge		1375	TMB	WEIGHT	1	5.6	2.25	12.6
72	Local	Stoney Creek Bridge	Stoney Creek	41340	SBS	WEIGHT	1	20.6	3.25	66.95
73[2]	Local	Stoney River Road Bridge	Stoney River	7360	TMB	WEIGHT	1	5	2.3	11.5
75	Collector	Washdyke Stream Bridge	Washdyke Stream	17175	SBS	WEIGHT	1	11	3.7	40.7
78	Local	Cass River Bridge	Cass River	16560	TMB	WEIGHT	1	124	3	372
84	Local	Jollie River Bridge	Jollie River	15520	SBS	WEIGHT	1	78	4.2	327.6
87	Local	Black Birch Stream	Black Birch Stream		TMB	WEIGHT	1			
89	Local	Mowbray Road Bridge	unknown	2670	TMB	WEIGHT	1	6.3	3.12	19.656
92[2]	Local	Stoney River Road Ford Bridge	Moffat Stream	6280	TMB	WEIGHT	1	5.8	2.28	13.224
None	Local	Fox Peak Ski Field			TMB	WEIGHT	1			

11.4 RISK REGISTER

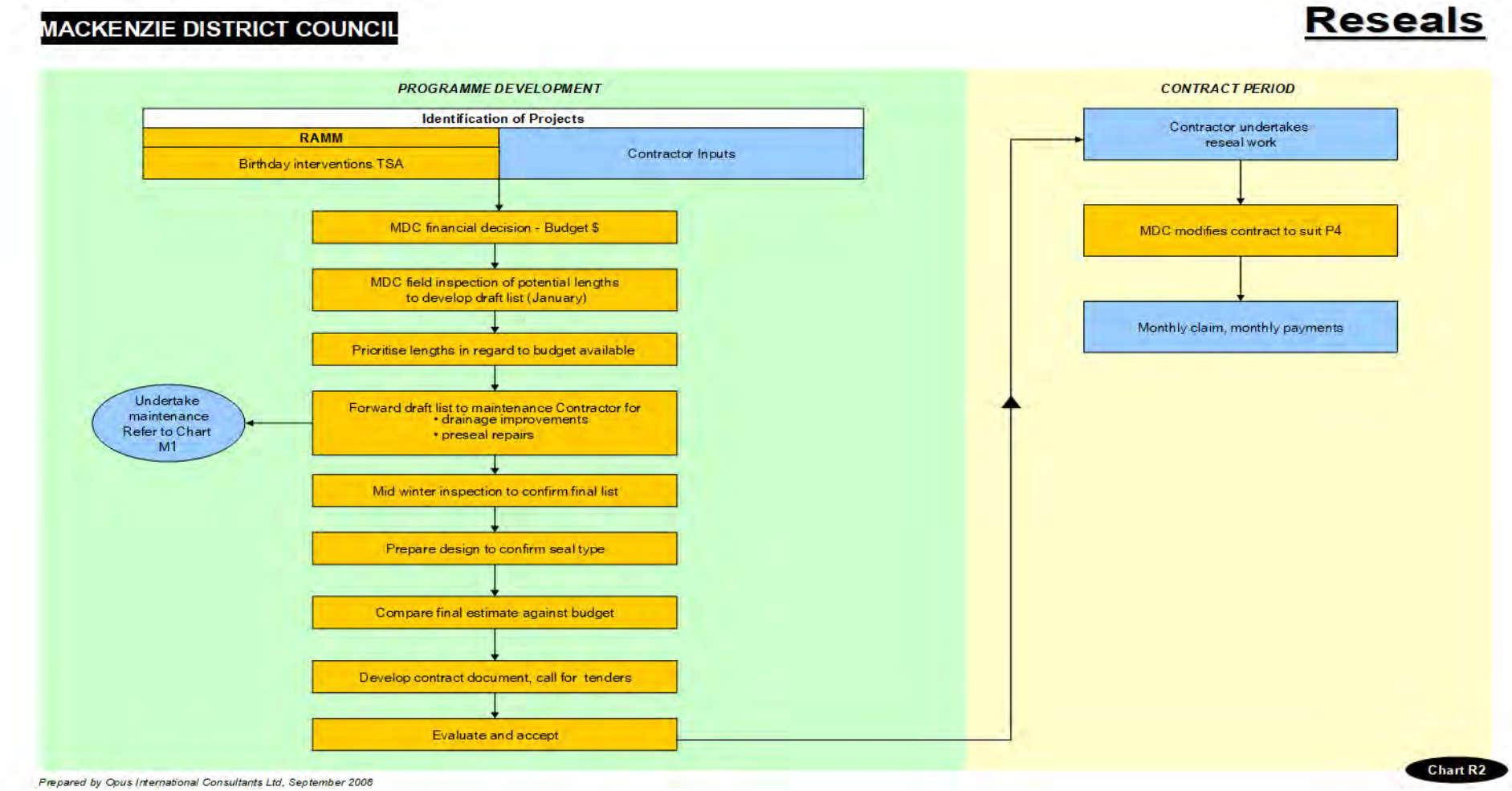
Management Activity	*Name*	*Description*	*Existing Controls*	*Assessment*				
				Consequence	**Likelihood**	**Risk**	**Treatment Option**	**Treatment Cost**

11.5 MAINTENANCE PROCEDURE CHARTS

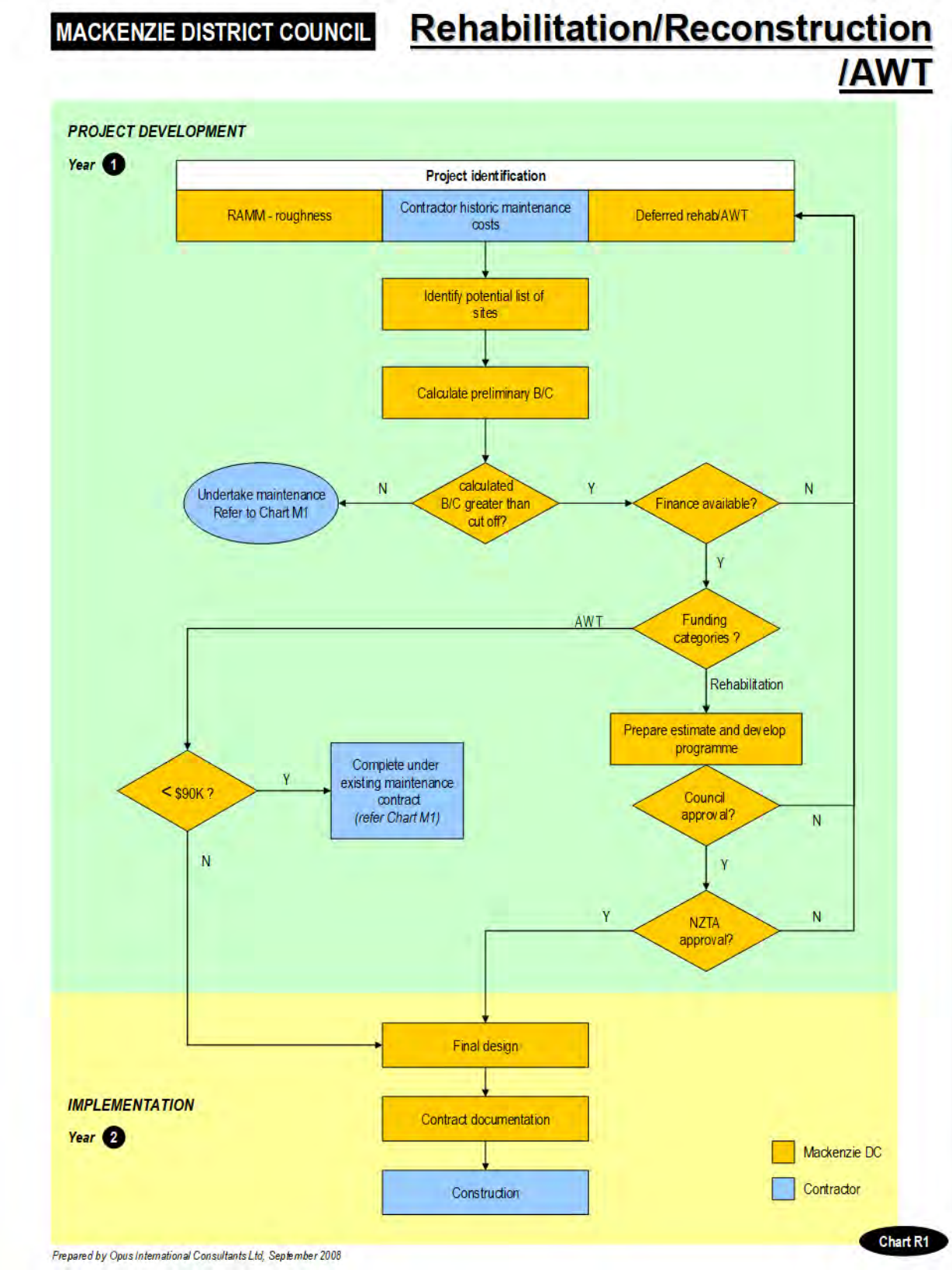
11.5.1 Road Maintenance



11.5.2 Reseals



11.5.3 Rehabilitation/Reconstruction/AWPT



11.5.4 Seal Extension

MACKENZIE DISTRICT COUNCIL

Seal Extension

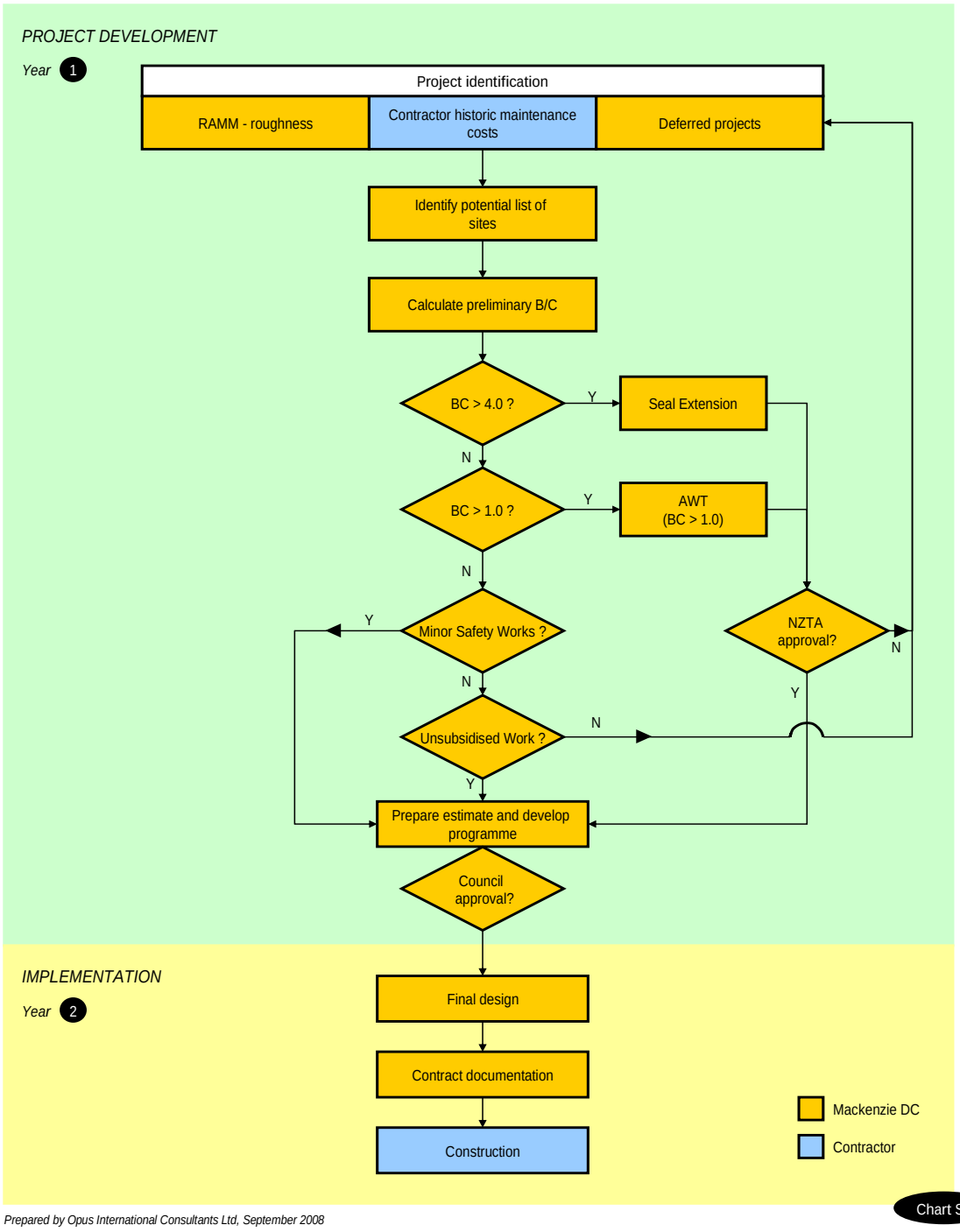


Chart S1

Prepared by Opus International Consultants Ltd, September 2008

11.5.5 Pavement Marking

MACKENZIE DISTRICT COUNCIL

Pavement Marking

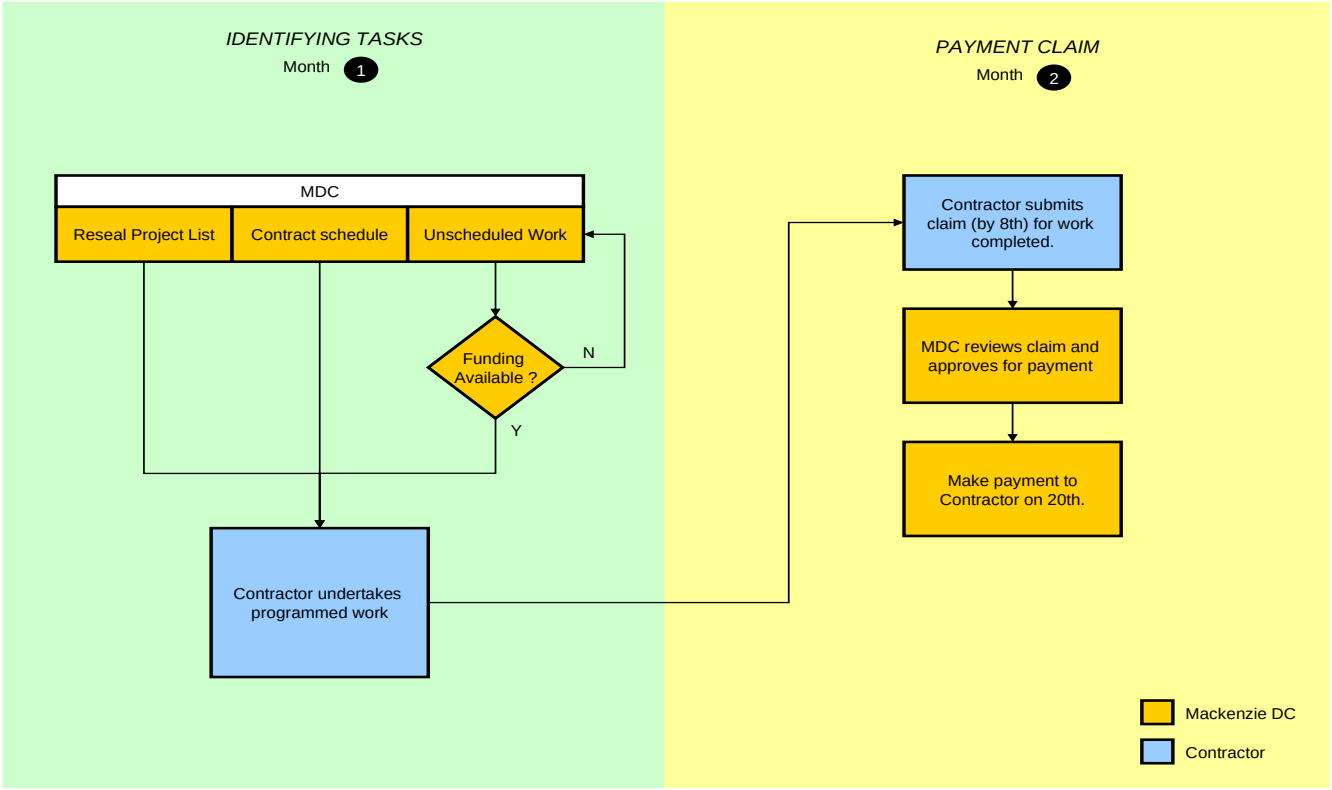


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Chart P1

11.5.6 Kerb and Channel

MACKENZIE DISTRICT COUNCIL

Kerb and Channel

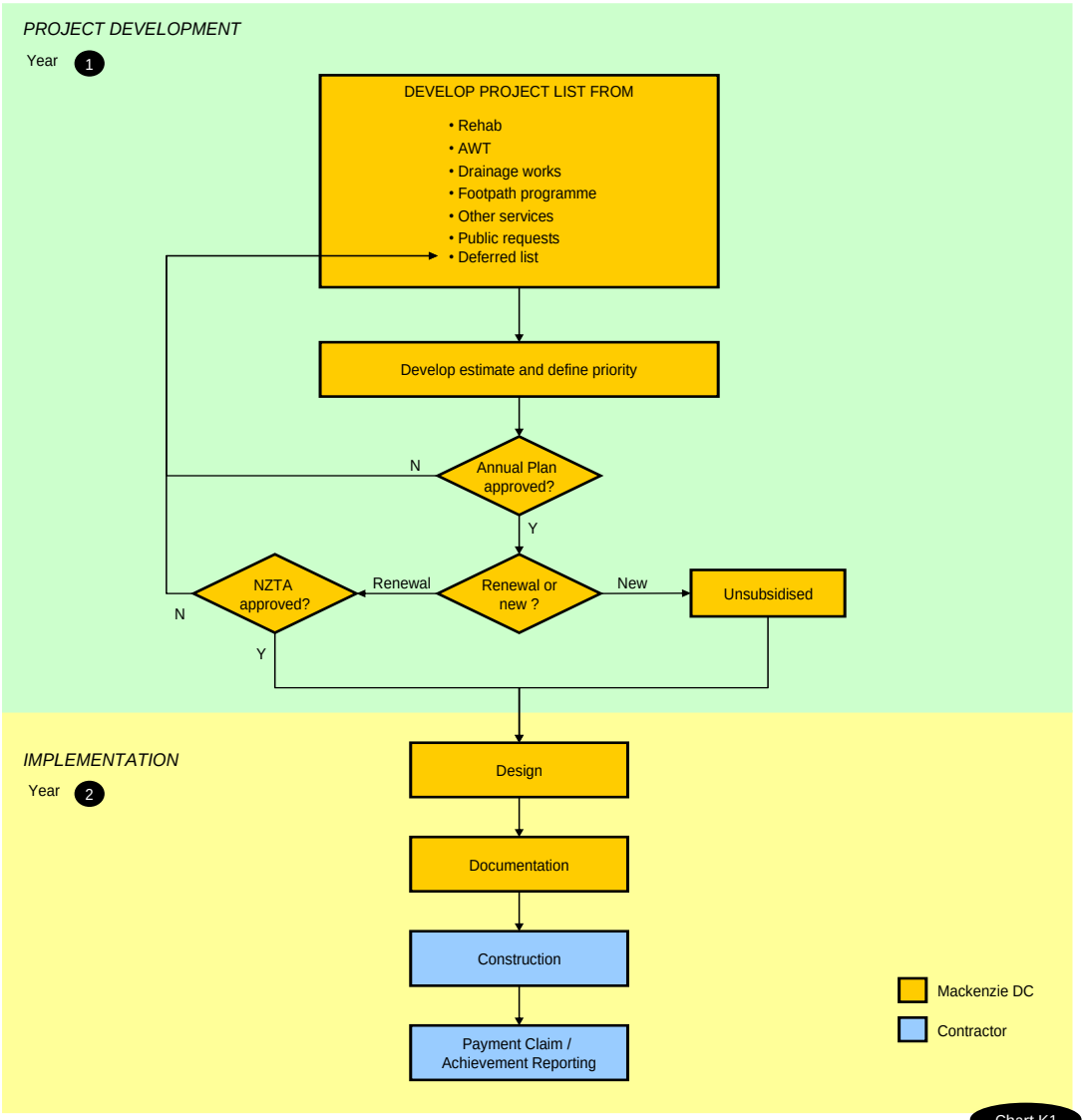

Chart K1

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11.5.7 Footpath Construction

MACKENZIE DISTRICT COUNCIL

Footpath Construction

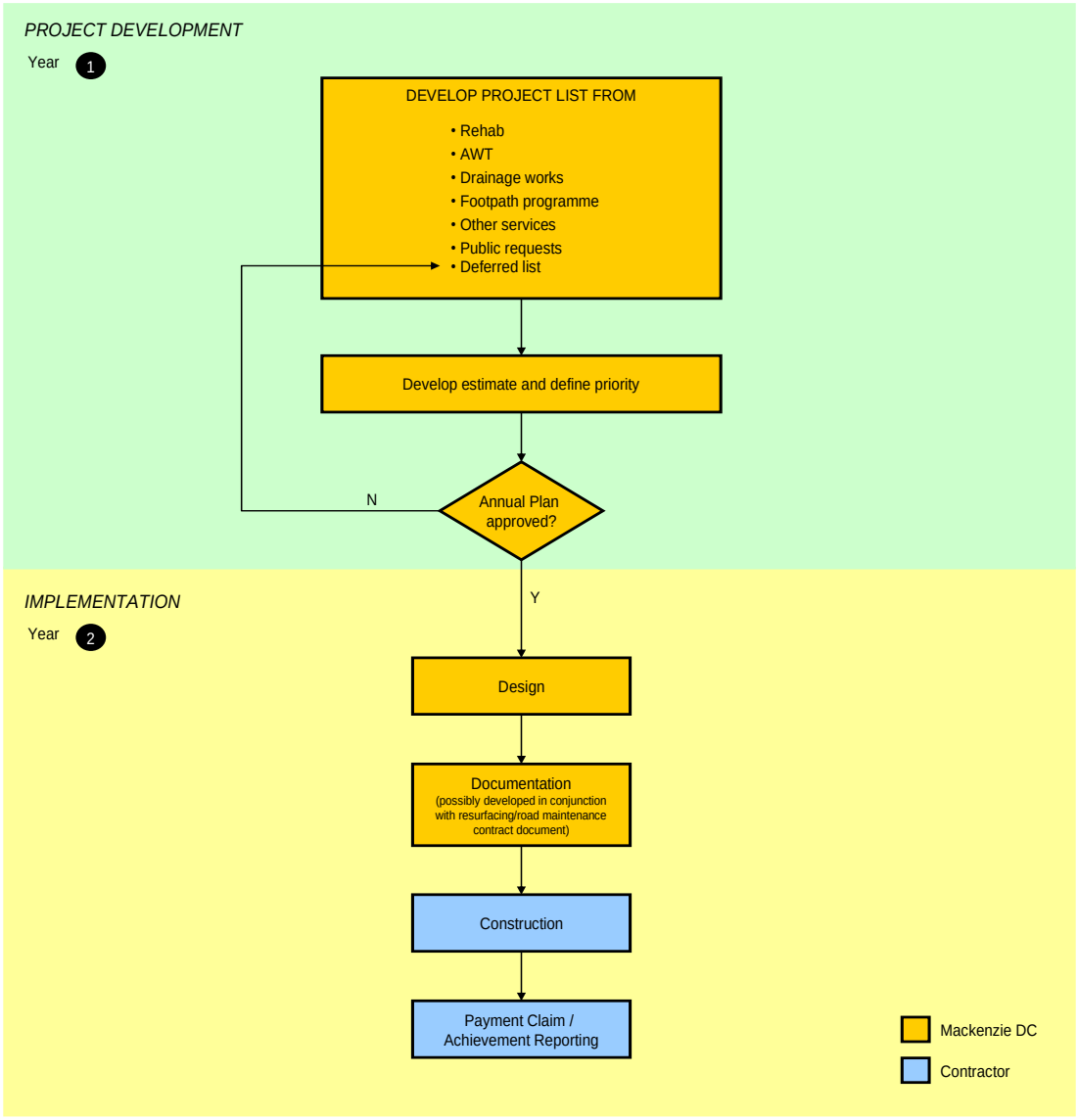

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Chart F1

11.5.8 Footpath Resurfacing

MACKENZIE DISTRICT COUNCIL

Footpath Resurfacing

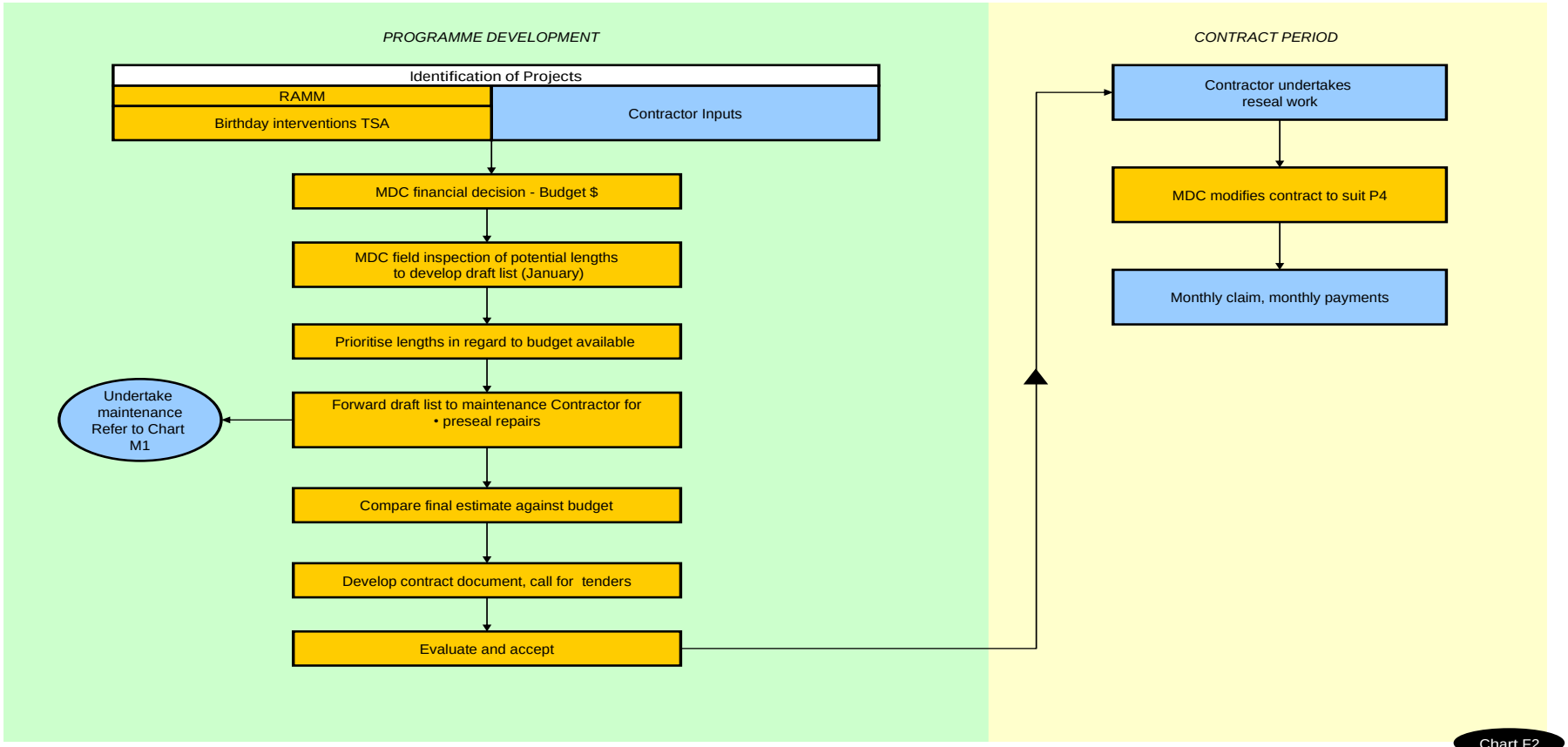

Chart F2

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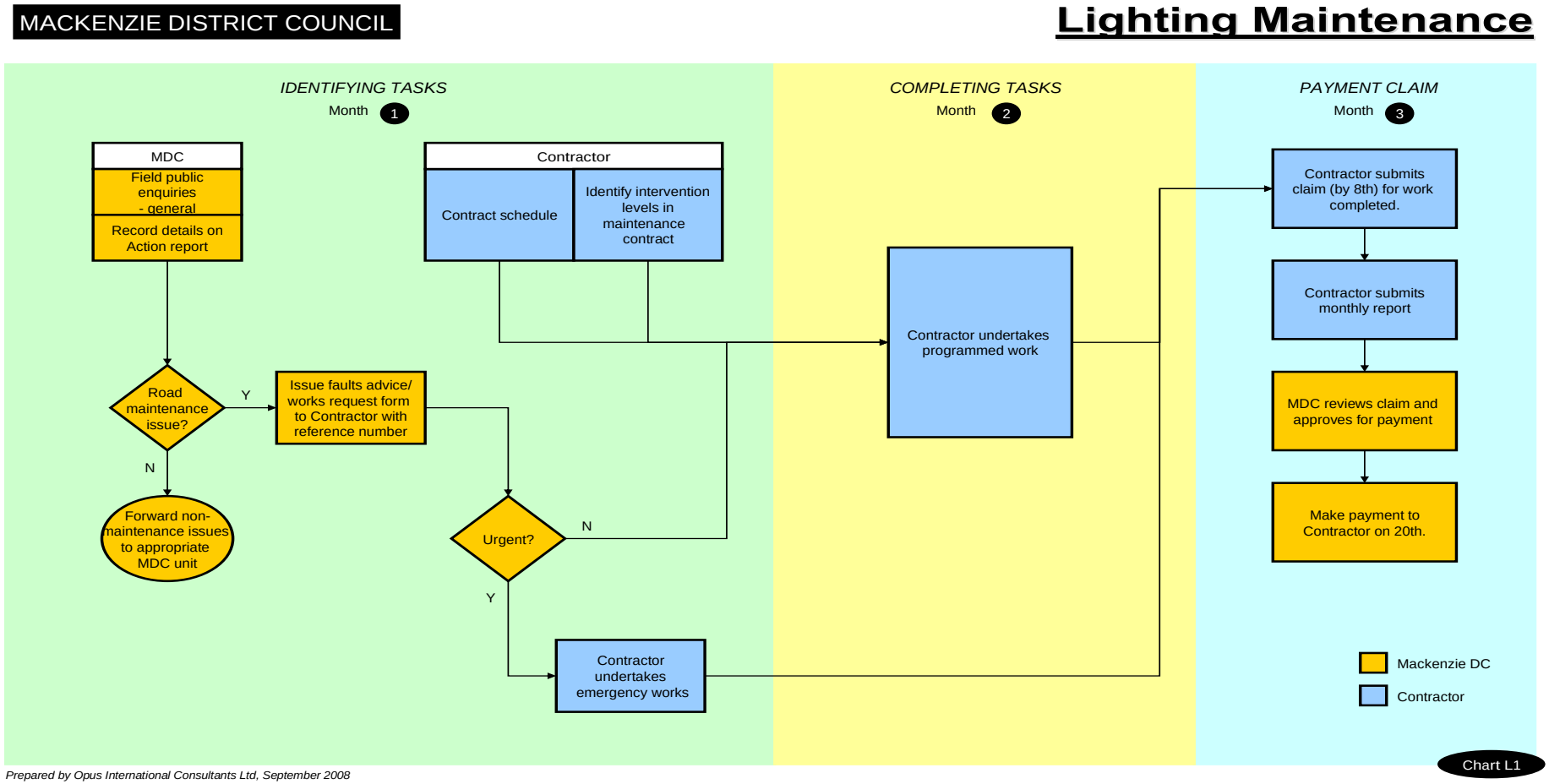
11.5.9 Lighting Maintenance

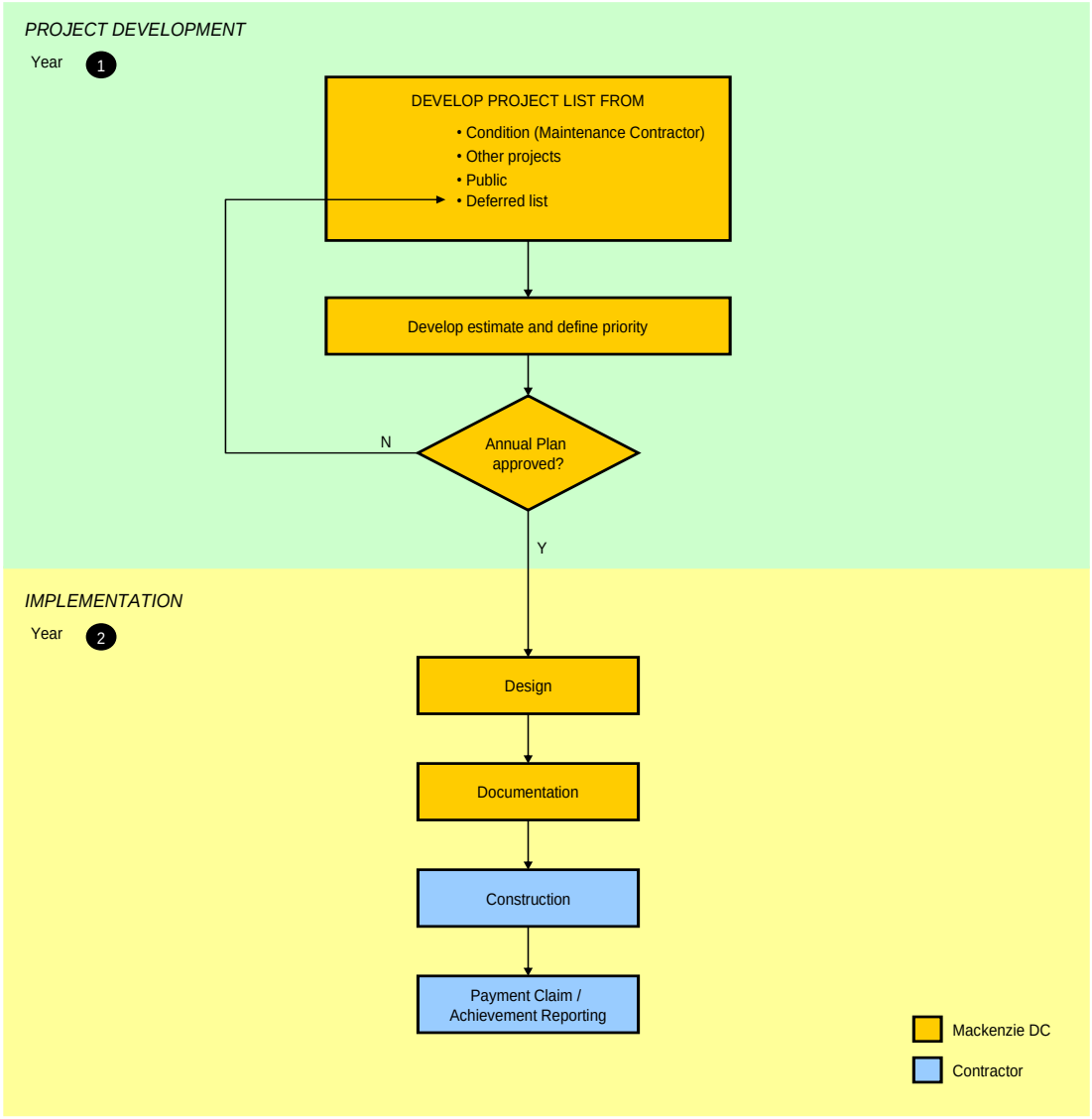


Prepared by Opus International Consultants Ltd, September 2008

11.5.10 Lighting Replacement

MACKENZIE DISTRICT COUNCIL

Lighting Replacement



Prepared by Opus International Consultants Ltd, September 2008

Chart L2