People First
Southland District Council

Appendix 'X'

An Overview of every Separate Significant Part of the Activity, and of the Location, Material Type, Condition, Performance, Remaining Life, Capacity and Criticality of the Assets Associated with the Activity

1. Overview

Southland District Council control, operate and maintain all public roads on legal road reserve in the Southland District (except state highways, which are the responsibility of NZTA and National Parks roads which are the responsibility of the Department of Conservation). Council aims to provide a level of service that is appropriate to the location and function of and demand on the road.

In developing the roading activity management plan the Council's roading asset has been separated into the following components:

- Sealed Carriageways
- Unsealed Roads
- Bridges and Large Culverts
- Footpaths
- Street Lighting
- Traffic Services
- Public Transport

The construction and maintenance standards and response times for all components vary according to the demand based road groups Council has adopted.

Generally speaking the public are reasonably satisfied with the current level of service provided by the roading network, although with a desire to have fewer gravel roads. Provided maintenance standards are achieved on the gravel roads most ratepayers consulted accepted that the service provided is adequate within the confines of the available budget.

The network is subjected to increasing demand and damage from heavy traffic associated with dairying and forestry along with calls for improved safety to cope with increasing tourist demands.

These factors combined with an aging network, much of which is reaching the end of its economic life, means there is significant pressure on the roading budget. Added to this is the fact that the network is slowly increasing in size through widening of sealed roads, some seal extensions and roads being vested in the Council through subdivision. Further pressure will come onto the network with the possible introduction of 50T heavy vehicle routes, which are being investigated by the MOT.

From a safety and maintenance perspective much of the network is below the desired width for the use made of the network, and deficient in terms of the clear zone provided adjacent to the road carriageway. This will be improved through long term planning and construction of improvements either as part of a pavement rehabilitation or individual widenings where these can be justified and afforded.

2. Sealed Roads

2.1 Introduction and Overview

Southland District Council own, operate and maintain all economic public roads on legal road reserve in the Southland District (except state highways which are the responsibility of NZTA) and aim to provide surfacing and a pavement structure which is appropriate to the location and function of the road.

The District's sealed surfaced roads constitute 39% of the road network and carry 83% of the traffic volume. The objective of sealed roads is to provide a safe, skid resistant surface with consistent and predictable geometric standard with an acceptable width.

a) Data Sources

Details of the sealed road network are held in the RAMM system. This includes inventory data such as the length, width and start and end points of each road section. The data includes some of the history of the section from initial construction and sealing, further treatment and reseals.

There have been several rating systems used and these are to be added to the data to assist decision making in the future.

These ratings added include:

- Pavement rating by visual inspection – biannual.
- High speed data including skid resistance, once only to date (with second lot of data overdue as at March 2009), texture, roughness, rutting and geometric details – biannual.
- Non destructive strength testing by FWD (across the full network with previously untested sections tested in 2008).
- Traffic counts to provide vpd, speed and axle configuration. A minimum of 350 counts per annum are undertaken.

Historical Data

Modern construction and maintenance timing and material use are well recorded in the RAMM database, some historic data is of variable quality.

b) Physical Parameters

The sealed roads within the District link State Highways with various parts of the district as well as individual properties and the unsealed road network. The aim is to provide a safe network with a consistent speed environment but this is constrained by the topography.

Rather than the traditional road hierarchy Southland District Council have adopted a demand based road-grouping system. Utilising the adjustment factors created by various demands, as detailed in Table A.3 all of the District's roads have been categorised into groups.

The following are the sealed road groupings split by contract areas:-

Table X.2.1 Sealed Road Groups Details

ARAMP Group	Central Area	NW Area	SE Area	Joint Bdy Rds Maintained by others	Totals
Group 1 ADT 800+	41.4	9.7	45.9	0.0	97.0
Group 2 ADT 400-799	118.3	143.7	125.1	6.3	393.4
Group 3 ADT 200-399	194.6	101.2	142.2	2.1	440.1
Group 4 ADT 50-199	435.6	366.9	172.1	2.5	977.1
Group 5 ADT 0-49	24.8	12.4	13.2	1.3	51.8
Sealed Roads Sub Totals	814.7	633.9	498.6	12.2	1959.3

Table X.2.2 below shows the current design minimum standards set for each road group. (These are the standards to which all new and upgraded rural roads are constructed. They are based on the demands identified for each road and the resultant adjusted traffic volume level.) It also shows the level of compliance achieved.

Table X.2.2 Current Design Minimum Standards

Road Group	Rural Seal Width (m) Design Target	% Compliance with Target Set Width (2008)	Unsealed (Grassed) Shoulder Width (m)	Bridge Width Min (m) *
1 & 2	7.5	28%	2.0	8.0
3	7.0	24%	1.5	8.0
4	6.5	25%	1.5	8.0 / 4.2
5	6.0	38%	1.5	4.2

Key:

- * For most road groups bridges would normally be two lane.
- This is assessed on a case basis depending on traffic use, road alignment and local issues

Only 25% of sealed roads achieve these design levels of service. Over time with rehabilitations this percentage with increase. Stand alone seal widening will target the higher use roads that are well below width and are a long way off needing rehabilitation. The standalone programme will only address those that are more than 0.5m under width. If part of a route is incomplete it will be specifically targeted.

The road groups have been reviewed which has altered the figures in Table X.2.1 and Table X.2.2.

c) Average Annual Daily Traffic (AADT)

The traffic volumes on the sealed roads are generally low by New Zealand standards. The length of roads falling into the adjusted traffic volume ranges is shown in Table X.2.1.

d) Asset Valuation

The sealed pavements were valued on a component basis as follows as at 1 July 2008.

Table X.2.3 Table of Full Breakdown of Assets and Their Value

Component	Replacement Value ($,000s)	Depreciated Replacement Value ($,000s)
Formation	334,856	334,856
Sealed Pavement Structure	305,350	204,339
Pavement Surfacings	53,506	27,512

(Drainage and traffic facilities are covered elsewhere in this Plan)

The formation is valued on the basis that it does not depreciate as regular maintenance (slip clearing, etc) will allow it to provide adequate service indefinitely. Its value is calculated by adopting a series of assumptions relating to location, topography, etc. These are set out more fully in the full MWH August 2008? Valuation report.

The pavement structure consists of a gravel subbase layer which is regarded as permanent and therefore does not depreciate. This has a stronger gravel basecourse layer over the top which is depreciated over time. From a valuation perspective, it is assumed that at the time the pavement reaches the end of its life, the basecourse is replaced and the existing basecourse becomes part of the subbase layer, therefore maintaining its integrity and value.

The pavement surfacings over the basecouse provide a running surface from vehicles and protects the gravel layers by reducing the water that enters them. These pavement surfacings (normally chip seals) generally have a life span of 5 to 20 years and are therefore depreciated over this time span.

2.2 Capacity

The capacity of the sealed road network is the measure of its ability to accommodate the volume and type of traffic carried. The width has an effect on safety giving opposing traffic enough room without causing unnecessary damage to the seal edge and unsealed shoulder. The strength of the road governs the capacity of the road to carry repeated heavy loads for the design period.

Width

The current levels of road width compliance with the adopted standards are very low. To achieve the full standards a substantial amount of funding will be required as approximately 1,460km of sealed road will require widening.

The target widths and levels of compliance are shown in Table X.2.2 and in more detail in Appendix F, Attachment C, including the proposed programme to achieve compliance with the target widths.

This will include most of the widening occurring as part of a rehabilitation with the rest as standalone seal widenings.

Table X.2.4 shows the proportions of sealed road travel which occurs at various levels of sealed width compliance.

Table X.2.4 Road Capacity vs Demand

Total sealed length (km)		1,956
Total VKT's (km) on sealed roads		178,621,181
Length meeting standard (km)		489
% meeting standard		25%
VKT's on roads meeting standard	52,336,383	29%
Length meeting or within 0.5m of standard (km)		1,102
% meeting or within 0.5m of standard		56%
VKT's on roads meeting or within 0.5m of standard	101,553,907	51%
Length meeting or within 1m of standard (km)		1,575
% meeting or within 1m of standard		81%
VKT's on roads meeting or within 1m of standard	141,274,940	79%

Clear Zones

A key issue relating to safety and associated with the road width is the clear zone. This is the area beyond the edge of the traffic lane which reduces the risk of harm to vehicle occupants if they run off the road. The philosophy is to have space so that the driver can regain control and get back on the road or stop without rolling the vehicle or hitting a solid object.

Draw backs with clear zones include the cost of producing and maintaining them along with the increased perception of safety which can lead to increased speed. One way to reduce the perception of safety is to make the road feel narrower by allowing grass or low growing vegetation to grow up to the edge of the sealed carriageway.

The existing standards for clear zones are as follows:

Table X.2.5 Southland District Council Clear Zone Width Standards

Class	Definition	Speed Limit	Fill Slopes			Cut Slopes		
			<6:1	5:1 - 4:1	>3:1	3:1	4:1 - 5:1	<6:1
Group 1 800+ VPD	Rural Arterial	100km/h	6.00	8.00	NA	3.50	5.50	6.00
		90km/h	5.00	6.00	NA	3.00	4.50	5.00
		70-80km/h	4.50	5.00	NA	3.00	3.00	4.50
		<60km/h	3.00	3.50	NA	3.00	3.00	3.00
Group 2 & 3 200-799 VPD	Arterial / Collector / Local	100km/h	5.00	6.00	NA	3.00	4.50	4.50
		90km/h	3.50	4.50	NA	2.50	3.00	3.00
		70-80km/h	3.00	3.50	NA	2.50	3.00	3.00
		<60km/h	2.50	2.50	NA	2.50	2.50	3.00
Group 4 & 5 0-199 VPD	Residential / Minor Local	100km/h	5.00	6.00	NA	3.00	4.50	4.50
		90km/h	3.50	4.50	NA	2.50	3.00	3.00
		70-80km/h	3.00	3.50	NA	2.50	2.50	3.00
		<60km/h	3.00	3.00	NA	2.00	2.00	2.00
Groups 7,8 & 9	Unsealed	70-80km/h	3.00	3.50	NA	2.50	2.50	2.50
		<60km/h	2.50	2.50	NA	2.50	2.50	3.00

As part of the development of this Plan update, the above standards were reviewed and compared with those used by other roading authorities.

As a result of this review and discussions with Council it was decided to retain these standards as the ideal, where it is sensible to try to achieve this level. It was also agreed that greater consistency in the application of the clear zone standard along a route would be sought.

Safety

The Land Transport Safety Authority (LTSA) (now NZTA) monitors crash data on behalf of Road Controlling Authorities (RCA). Each year LTSA reviews crash data from the previous five years and reports on results, trends and key safety issues. The information is used to assist in the development of engineering, education and enforcement programmes. All RCAs are grouped to provide a reasonable comparison through areas with similar characteristics. Southland District is part of Group D, which is defined as 'Provincial Towns and Hinterland' with population between 20,000 and 75,000 and rural crashes typically between 25% and 90% of all crashes. Table X.2.6 below shows results for the five-year period 2003-2007.

Table X.2.6 Reported Crashes and Injury Crashes on Southland District Local Sealed Roads

	2003	2004	2005	2006	2007
Crashes	100	81	98	101	89
Injury Crashes	61	40	58	63	49

Strength

Currently all roads in the SDC network are designated as Class 1 roads meaning from a strength point of view there is no restriction on the level of legal load they can carry. Each road has different characteristics in terms of when and how it was built, what conditions exist under the road and the level of repeated heavy traffic that uses the road. These factors all impact on how long the road can continue to carry heavy traffic prior to needing rehabilitation.

In the future it is likely that the 50T route trials which are currently underway will lead to the option for RCA's to designate 50T routes suitable for use by heavier trucks. These routes will be considered by Council following consultation with local industry and a positive net value outcome can be demonstrated.

2.3 Condition

In ascertaining the condition of a sealed road, failure modes are used as indicators. The failure modes of bituminous pavements include, but are not limited to, shallow shear failure, roughness, rutting, cracking, stripping, ravelling, loss of surface texture and skid resistance, flushing, edge break and potholes. The condition of the District's sealed road network with respect to some of these indicators is described in the following paragraphs. Most of these failure modes can now be detected by high speed data collection (HSDC), in particular roughness, rutting, loss of surface texture, skid resistance and flushing.

Shallow Shear

Shallow shear occurs when the load imposed on the pavement exceeds the ability of the basecourse to resist and the aggregates rotate to the side with least lateral support. It has a rotary action and bulges up to the side of the rut formed.

Shallow shear usually occurs when the seal over a rutted area does not have the elasticity to cover the expanded area. Cracking of the seal occurs, water enters the basecourse aggregate and weakens it so it cannot cope with the loading. The ruts and associated bulges hold water, causing a rough and uncomfortable ride which is also unsafe.

Roughness

Roughness is a measure of aspects of the longitudinal profile of a pavement. It was originally developed to indicate the quality of ride, as perceived by a road user, and is now also used to indicate the structural deterioration of the pavement. It is not seen as a particularly useful indicator in Southland as the mode of failure is often very rapid, and Council avoids the practice of waiting until vast sums of money have been spent on patching a road before it is justified for rehabilitation. This keeps long term maintenance costs down and leaves the roads smoother.

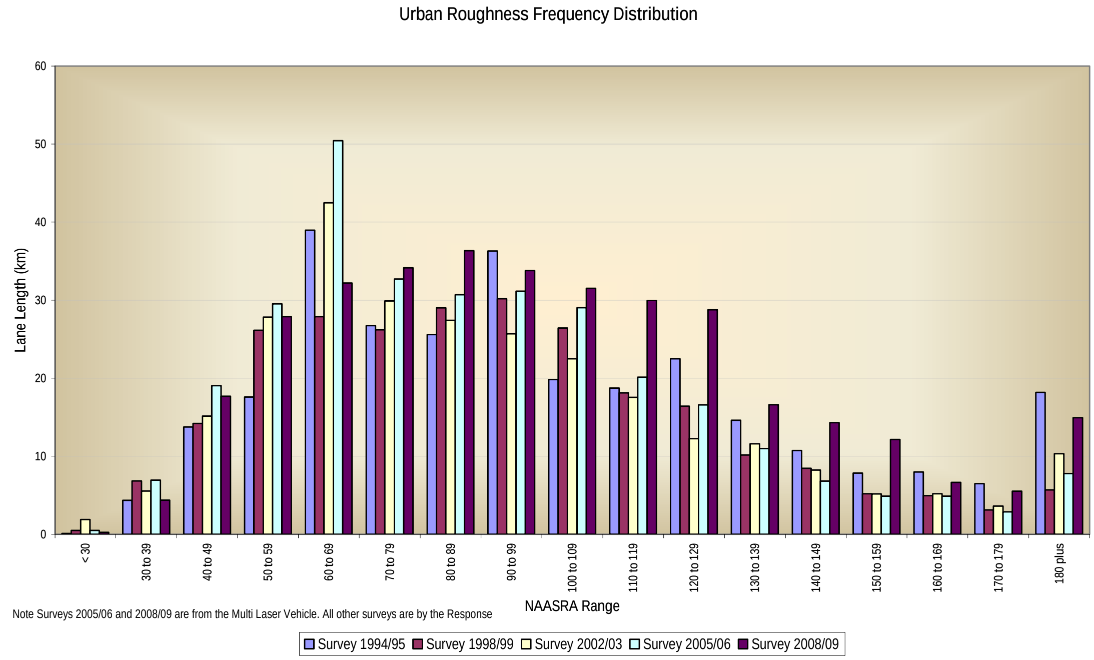
NAASRA (National Association of Australian State Road Authorities) count is the commonly used unit of measurement of roughness. The unit IRI (International Roughness Index) is gradually replacing NAASRA count as the unit for roughness measurement. As a general guide, roughness of a new sealed surface should not exceed 65 NAASRA (IRI 2.5).

The distribution of roughness over the entire sealed network as measured from four surveys is shown in Figure X.2.8 and X.2.9. Table X.2.7 shows average roughness values from these HSDC surveys.

Table X.2.7 Summary of NAASRA Roughness

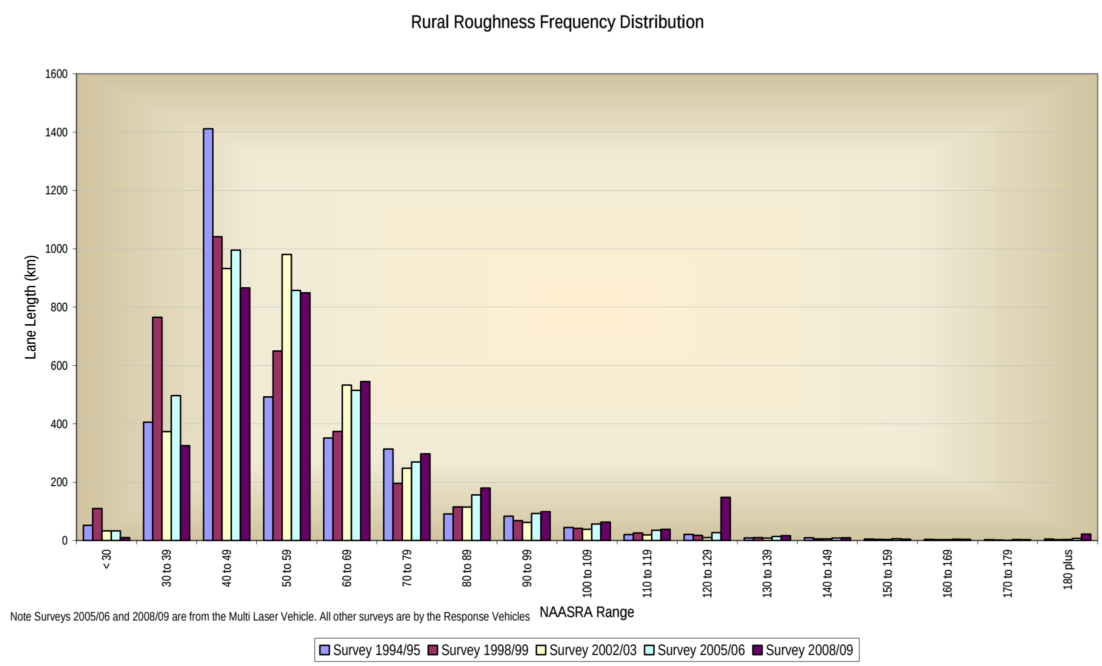
Description	All Roads	Rural	Urban
Total kms	1956.0	1764.3	191.7
Measured mean NAASRA (September 2008)	69	63	109
Measured mean NAASRA (June 2005)	60	57	92
Measured mean NAASRA (June 2002)	59	56	95
Measured mean NAASRA (June1994)	59	55	104

Table X.2.8 Urban Roughness Frequency Distribution



An ageing pavement will increase in roughness because of failures and repairs of these. If a pavement forms ruts they will sometimes be smoother initially prior to cracking and shear failures. It is an indicator of the performance of the network as a whole and upward trends need to be noted. Urban streets tend to have higher readings because of trenches and services covers. Also short lengths of road are harder to construct to a smooth standard.

Figure X.2.9 Rural Roughness Frequency Distribution



Rutting

Rutting (or troughs or channels of instability) refer to longitudinal wheel path depressions usually accompanied by smaller longitudinal ridges on either side of the rut. Table X.2.9 gives a summary of rutting derived from the HSDC surveys in July 2005 and October 2008.

Table X.2.10 Rutting Summary

HSD Rutting	2005	2008
Sealed Road Length (centre line km)	1,936	1,956
Sealed Left Lane Length (km)	1,921	1,928
Sealed Right Lane Length (km)	1,887	1,911
Wheel Path Length measured (km)	7,617	7,679
% of Wheel Path length with rut depth >= 20mm	0.34%	0.39%
Lane Length (km) with rut depth >= 20mm	26.2	29.7

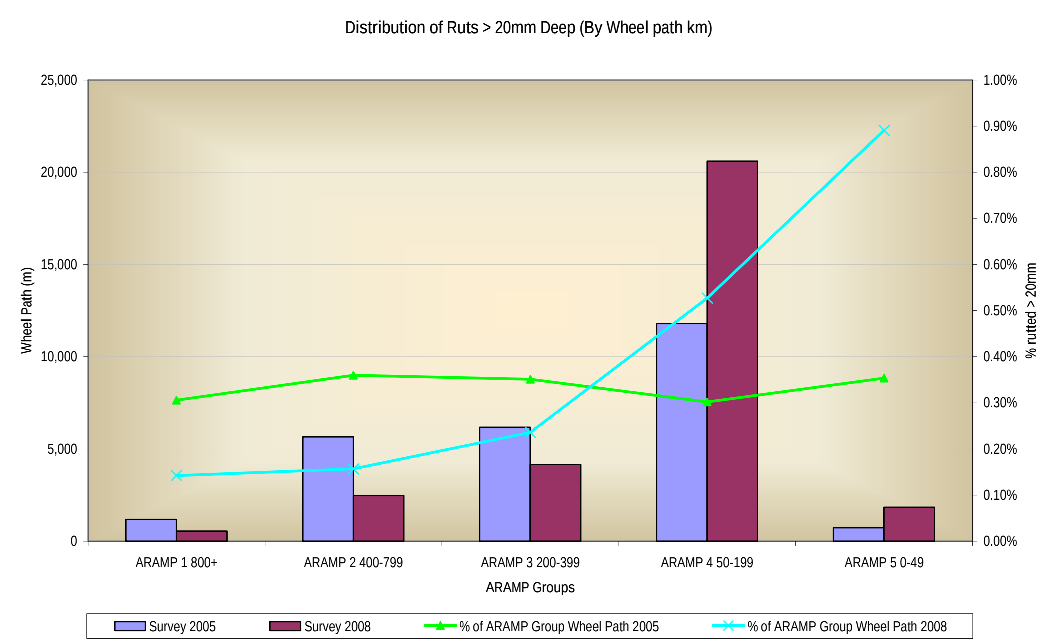
Note:

- Difference in left lane length when compared to centre line length is due to Stewart Island not being surveyed and short roads where it is not possible to survey.
- Wheel path length is the total length of individual wheel tracks. This means there are normally two wheel paths for every lane.

Rutting occurs by two mechanisms. If the pavement depth is insufficient to spread the loading to the subgrade the subgrade will deflect and this deflection or rut will transfer to the surface shape. The other mechanism is if the basecourse is weak it will breakdown over time and deform under load and not recover its original shape especially if it was contaminated with clay or very silty running course.

Rutting is a good indicator of the roads strength and increases in rutting directly correlate to a lower pavement life. If the subgrade is weak improved drainage will slow the pace of the final failure.

Figure X.2.11 Distribution of Ruts >20mm Deep



This graph shows that the ruts are spread quite evenly across the network with slightly more in Group 1 which has the heaviest use. Group 5 will most likely have the thinnest construction depth. The trend in rutting should be carefully monitored to display network health. The 20mm rut is the depth to monitor but intervention will not generally occur until the ruts are 30mm deep.

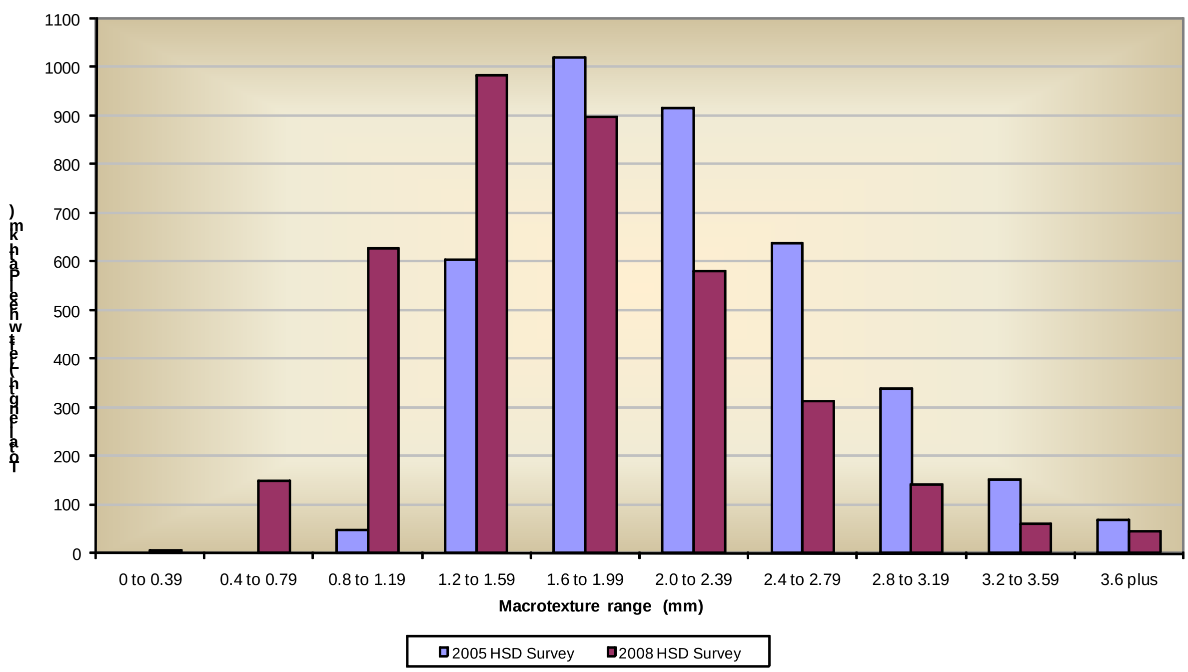
Macrotexture

Texture, both macro and micro, are dominant contributors to skid resistance. Macrotexture is used as an overall indicator of seal condition, in terms of the extent of flushing, and is measured using HSDC.

Macrotexture is expressed in terms of a Mean Profile Depth (MPD) and measured in millimetres, and represents the height of stone aggregates protruding above the bitumen binder. As stone aggregates are somewhat angular in shape, a channel is formed between stone chips that allows water to drain out and prevent inundation of the road surface during rain. MPD of <0.5mm is generally indicative of flushing.

Macrotexture measurements from the HSD surveys in July 2005 and September 2008 are illustrated in Figure X.2.12 and X.2.13.

Figure X.2.12 Macrotexture Frequency Distribution All Sealed Roads



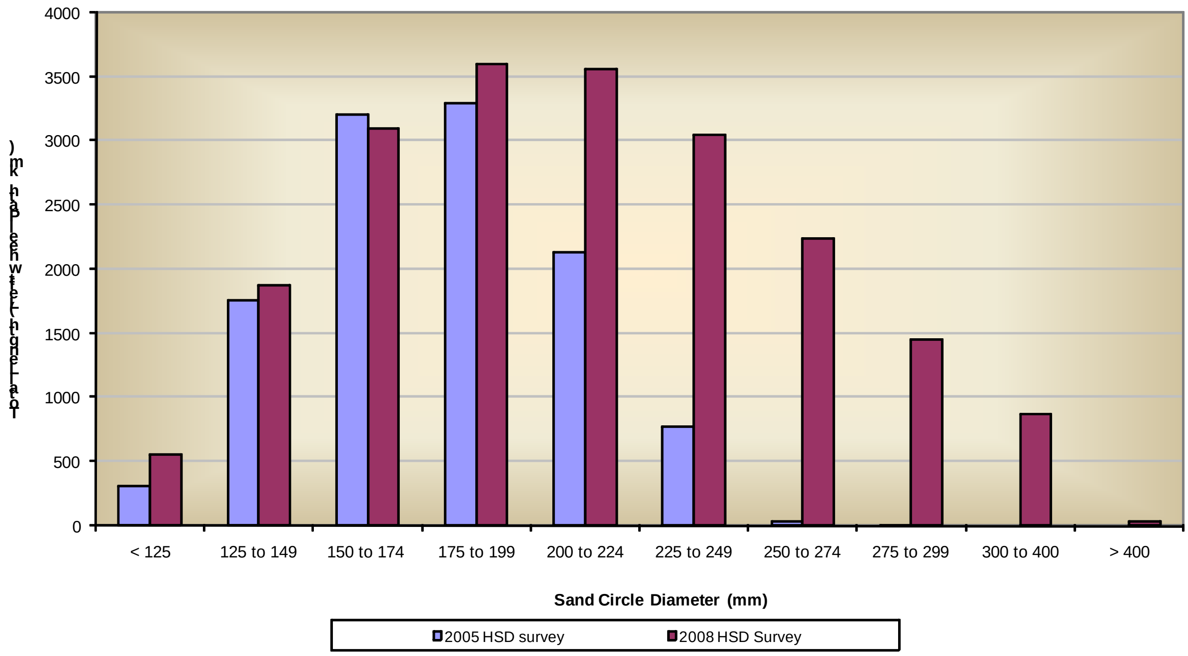
The scale of the graph is too large to show isolated areas of flushing which are out on the network.

The graph compares the left wheel path (LWP) between the two surveys as the LWP has the heaviest loading and therefore tends to become smoother first.

What this graph shows when comparing 2008 to 2005 is a shift to the smoother/flushed end of the graph. This may reflect the effect of aging seals and pavements but there are some concerns regarding the 2005 data as it does not show any LWP length in the 0 to 0.39 and 0.4 to 0.79mm bins when it is know that in 2005 there existed small sections of LWP that were completely flushed.

The 2005 data was analysed at 25m intervals where as the 2008 data was at 10m intervals. This difference in interval length may also explain some of the apparent shift in results to the smoother/flush end of the graph.

Figure X.2.13 Sand Circle Diameters Distribution



Sand circles provide an indication of flushing. The graph compares the left wheel path (LWP) between the two surveys as the LWP has the heaviest loading and therefore tends to become smoother first.

The graph shows the similar shift towards the smoother/flushed end of the graph as the macrotexture graph X.2.12 when comparing 2008 to 2005.

The sand circle data is another way of looking at the macrotexture survey results. The larger the sand circle diameter the lower the mean profile depth.ie the smoother the road and the more likely it is to flush.

The 2005 data was analysed at 25m intervals where as the 2008 data was at 10m intervals. This difference in interval length may explain some of the apparent shift in the results to the smoother/flush end of the graph.

Future testing will help confirm if reducing texture or increasing sand circle diameter is a trend or a function of how the measurements were taken and processed.

Skid Resistance

Microtexture is used as a measure of skid resistance of the seal. Microtexture measurements have been made for the sealed network using a grip test survey during December 2002/January 2003. A more detailed survey is now overdue. Results are expected in May 2009.

Microtexture refers to roughness of the stone surface, which can be seen with the aid of magnifying glass and felt by hand. Stone chips are basically conglomerations of hard particles embedded in a matrix of relatively soft materials. Effects of traffic and weathering wear away the soft materials exposing hard particles protruding above surface thus providing the microtexture needed for skid resistance. Microtexture helps in draining out water from tyre-aggregate interface thereby imparting skid resistance.

Microtexture is the dominant contributor of skid resistance on low speed roads, however as speed increases both microtexture and macrotexture contribute to skid resistance. The coefficient of skid resistance measured by a grip test is a measure of friction. During dry periods dust, oil and rubber adhere to the stone surface thereby reducing its skid resistance. New Zealand Mean Summer SCRIM Coefficient (NZMSSC) is used as the indicator of skid resistance in New Zealand. SCRIM is an alternative test to measure skid resistance.

Requirements for skid resistance vary between locations. Sections of roads leading to controlled intersections need the highest level of skid resistance and are classified as Site Category 1 while a mid-block section of a divided carriageway is the least demanding (Site Category 4). For each site category an Investigatory Level (IL) has been prescribed in Transit New Zealand's guide for skid resistance. When the NZMSSC at a site falls below the IL it warrants further investigation, and frequently resurfacing or other treatment will need to be programmed.
A summary of skid resistance measurements from the December 02/January 03 survey is shown on Table X.2.14.

The survey did not include those roads about to be sealed or rehabilitated, nor did it include many urban sealed roads.

Table X.2.14 Skid Resistance of Sealed Roads

Site Category	Event Code	Investigatory Level (IL)	Lane Length Assessed (km)	Lane Length (km) Not Meeting IL	Lane Length (km) Not Meeting TL	% Not Meeting IL	% Not Meeting TL
1	Pedestrian crossing	0.6	2.6	1.9	0.5	74.62%	19.23%
2	Stop, GW, Rail, 1 lane Bdg, <45CNR	0.55	51.5	18.3	2.78	35.51%	5.40%
3	Minor RD, 2 lane Bdg, <65CNR	0.5	221.2	17.8	1.4	8.02%	0.63%
4	Urban Carriageway No events	0.45	35.1	0.5	0	1.51%	0.00%
5	Rural Carriageway No events	0.4	2580.7	3.4	0.28	0.13%	0.01%
			2891.2	41.9	4.96	1.45%	0.17%

The target level (TL) is the stage at which repairs should be carried out to provide a consistent level of service. This is a 0.1 lower level than the investigatory level.

Performance

Performance of the carriageway assets has been assessed in terms of customer satisfaction, capacity and safety.

The following are the results of Customers Surveys over the past four years. Each has been conducted around March of the year shown. Table X.2.17 provides details by area.

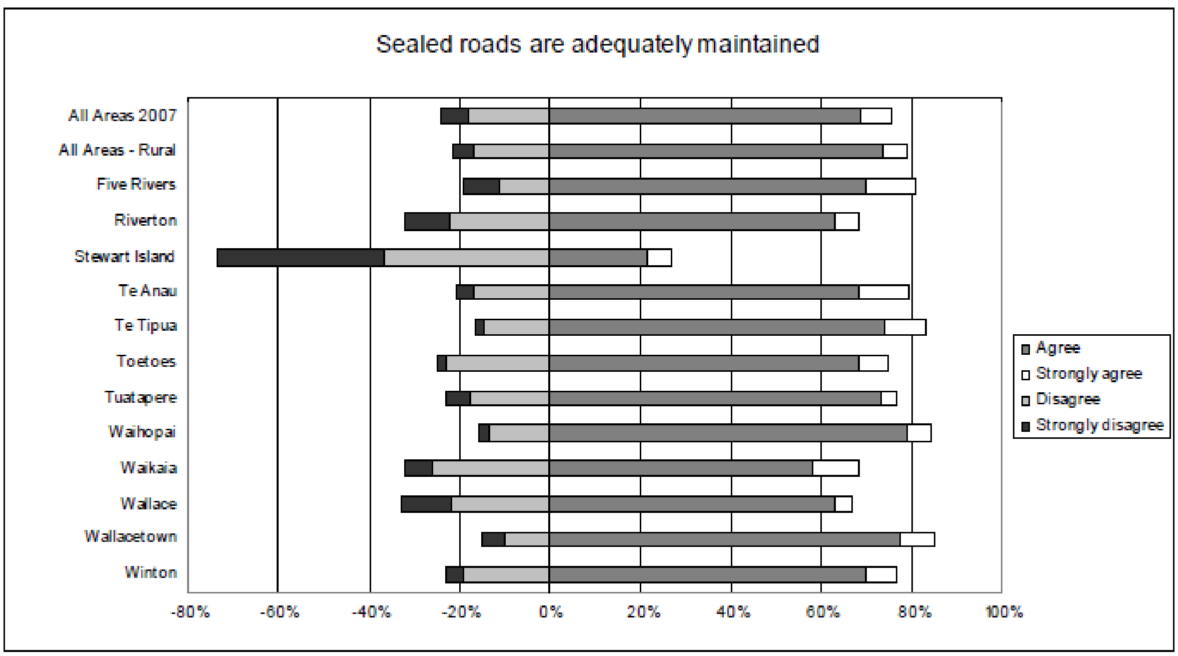
Table X.2.15 Satisfied Customers

	2005	2006	2007	2008
Rural Roads Safe and Effective Network	85.2%	Question no longer asked		
Sealed Roads are Adequately Maintained	73.8%	76.0%	79.9%	75.9%

Table X.2.16 Unsatisfied Customers

	2005	2006	2007	2008
Rural Roads Safe and Effective Network	14.8%	Question no longer asked		
Rural Roads Maintenance of Sealed Roads	26.2%	24.0%	20.1%	24.1%

Table X.2.17 Sealed Roads Are Adequately Maintained



2.4 Remaining Life

2.4.1 Influence of Local Factors and Past Practices on Pavement Characteristics, Implications for Assessing Pavement Condition

Soil Types/Subgrades

The three predominant soil types in the Southland District are silt, various types of clay and alluvial gravels.

Silts and alluvial gravels provide a good base for roads as long as the topsoil has been removed and drainage is provided.

Clays and peats are more difficult but Southland District has relatively cheap road building materials with good construction characteristics available.

Bulk Fills
Bulk fills are available as rough river or pit run aggregates or quarried rock. These are generally close to our roads and plentiful.

Subbases
These come from river or pit run materials. In the South Eastern area many suitable size aggregates are clay bound and not usable. Therefore suitable subbases are more expensive because of additional cartage costs.

Basecourse
These come from river or pit run materials. In the coastal areas the stone size is small and require screening to remove the small fraction to produce larger stone to crush and are therefore more expensive, especially in the South Eastern area. To counter this subbase materials are being stabilised to provide the required quality at a reduced price.

There are three particularly difficult past practices that have affected the network. The first is that little benching was undertaken prior to the construction of the roads, meaning that some of these areas are unstable allowing slips to occur.

The next practice was to quickly produce a smooth surface prior to sealing a seal extension by placing either a layer of fine material or a deep layer of running course on top of the basecourse. Since these materials cannot cope as well with the heavy loads, they rut, crack and allow water into the pavement layer and fail more quickly than if good quality material is used throughout.

The third practice was constructing roads with poor drainage leaving the district with a need to be proactive in improving drainage.

2.4.2 Remaining Life of Sealed Pavements

The inventory of sealed network held in the Council's RAMM database contains information on dates and details of initial construction and subsequent renewals, for all pavements but some of the data regarding initial construction date is approximate only.

Pavement Rehabilitation Requirements
Table FB1 in Appendix F Attachment B shows the estimated length of pavement requiring rehabilitation each year, for all sealed roads (based on 2006 LTAcMP). This shows both the history of pavement construction and the future projections. The updated 2009 projections are shown in Table F.B.3.

An increasing programme of road rehabilitation is required due to the condition and age profile of the network and the current and future projected loadings on the pavements. This is detailed in Appendix F Attachment B.

2.5 Issues

- Many roads exceed the recommended traffic volume for their width. These issues are discussed in Appendix F, Attachment C.
- Stewart Island's roads do not meet the road group standards and to meet the standards would be inappropriate. The integrity of the network is at risk from coastal erosion, poor drainage and lack of aggregate sources on the island. (Progress has been made on these issues and more will be by June 2009).
- There are also other parts of the network that are at risk from coastal erosion.
- The skid resistance of the network has not been completely remeasured since 2002/03 and should be looked at again to monitor changes. A review also needs to be undertaken to ensure all areas identified as problems in the previous survey have been actioned.
- Use the programme of falling weight deflectometer testing to further knowledge of the network.
- Investigations are required to improve the understanding of the relationship between maintenance techniques and the performance of sealed roads.
- Continue to upgrade classification of existing pavements/treatment lengths to allow easier analysis considering:-

  i) Age;
  ii) Loading;
  iii) Critical demands; and
  iv) Pavement condition characteristics;

  and analyse the condition rating information against these.

3. Unsealed Roads

3.1 Introduction and Overview

Southland District Council own, operate and maintain all economic public roads on legal road reserve in the Southland District (except state highways which are the responsibility of NZTA) and aim to provide a pavement structure and riding surface that is appropriate to the location and function of the road.

The District's unsealed metal surfaced roads constitute just over 60% of the road network and carry only 17% of the traffic volume. Nearly 73% of the unsealed roads carry less than 50 vpd. The objective of unsealed roads is to provide all-weather travel for all types of vehicles.

a) Data Sources

Some 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. Also included are locations of culverts.

No formal condition rating information has been collected to date across the network. Within the South Eastern Alliance Maintenance Contract a system has been developed for condition rating the unsealed network. This process will be trialed over the next three to five years and if considered successful a similar system can be applied to the other contract areas.

The Alliance partners have also conducted a trial using Ground Penetrating Radar to determine pavement depths on the South Eastern network. This trial has indicated good correlation with associated test pit investigations and further work is planned in the next twelve months.

Historical Data

Little historic data is formally held on the construction and maintenance of the unsealed roads. The current North Western and Central Area maintenance contracts include an underpinned gravel quantity for maintenance surface dressing. The quantities included in past contracts have proven to be insufficient to maintain the desired level of surface. Condition rating of the South Eastern Area under the Alliance Contract has confirmed a substantial deficit and has resulted in an increase in gravel allowance across the whole network during the 2007/08 year.

Analysis of RAMM historic maintenance cost data and contract payment information shows that the cost of maintaining one kilometre of unsealed carriageway within the Southland District is currently averaging $1,420 per year (including renewals). Total expenditure over the past three years is detailed in Table X.3.1 following. Capital expenditure for the 2007/08 year includes $750,000 special "R" funding approved by Land Transport New Zealand to allow a catch-up on gravel road metal application. A further $1,200,000 is included in the 2008/09 year.

Table X.3.1

	Total Expenditure		
	2004/2005	2007/2008	2008/2009
Unsealed carriageway maintenance	1,791,400	1,735,500	1,158,000
Unsealed carriageway capital expenditure	1,622,855	3,062,000	3,440,000

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b) Physical Parameters

The unsealed roads, which are spread throughout the district, are generally lower volume roads that provide access from individual properties to collector or arterial roads. 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.

Rather than the traditional road hierarchy Southland District Council have adopted a demand based road-grouping system. Utilising the adjustment factors created by various demands, as detailed in Table A.3 all of the District's roads have been categorised into groups. The following are the unsealed road groupings.

Table X.3.2

Road Type	Group	Demand Adjusted Traffic volumes (average annual number of vehicles per day)	% of Overall Network
Unsealed Raods	Group 7	80 +	5.2%
	Group 8	20 - 79	34.4%
	Group 9	0 - 19	20.7%
Dirt Tracks	Group 10	Case specific	0.5%

The unsealed roads have developed from tracks to roads with the vegetation removed and gravel added to fully constructed gravel roads. This has taken place over the past hundred years with the standards and requirements in terms of width and strength improving over time.

The following are the standards to which new roads are constructed. They are based on the demands identified for each road and the resultant adjusted traffic volume level. Table X.3.3 below shows the current design minimum standards set for each road group.

Table X.3.3 Gravel Road Widths – Targets

Road Group	Unseal Width (m) Design Target	Acceptable Minimum Widths	Bridge Width Min (m) *	Demand Adjusted Traffic Volumes (average annual number of vehicles per day)
7	7.5	7.0	8.0 / 4.2	80+
8	6.5	6.0	8.0 / 4.2	20-79
9	3.5	5**	4.20	0-19
10	Case Specific			Case Specific

Note:

* For Group 7 roads, bridges under 6m long would normally be 2 lane, as would the higher use Group 8 bridges. This is assessed on a case basis depending on traffic use, road alignment and local issues.

** Includes shoulder width.

Given the lack of compliance with the design carriageway widths and the general lack of concern (as evidenced through complaints) regarding gravel road widths, a two tier approach to gravel road widths has been adopted. This recognises that in terms of priorities for expenditure a lower width is acceptable to the general public and specific widening efforts should only take place where specific problems have been identified either as a result of public complaints or safety concerns being raised.

Table X.3.4 (Based on 2001 with Width Measurements Data)

Road Group	Urban Unsealed Width (km)	Rural Unsealed Width (km)	Total (km)	Complaying with Design levels of Service (km)	Complying with Design levels of Service %
7	7.8	249.0	256.8	8.9	3.5%
8	23.5	1674.5	1697.9	301.3	17.7%
9	13.4	1013.2	1026.6	386.9	37.7%
10	2.3	23.6	25.9	N/A	N/A
Total	47.0	2960.2	3007.2	697.1	23.2%

c) Average Annual Daily Traffic (AADT)

The traffic volumes on the unsealed roads are generally at the lower end of the scale. These range from 5 to 170 vehicles per day. The proportion of roads falling into the adjusted traffic volume ranges is shown in Table X.3.2.

d) Table of Full Breakdown of Assets and Their Value

Asset Valuation

The unsealed pavements were valued on a component basis as follows as at 1 July 2008.

Table X.3.5

	Replacement Value ($,000s)	Depreciated Replacement Value ($,000s)
Formation	267,855	267,855
Unsealed Pavement Structure	41,656	36,930

(Drainage and traffic facilities are covered elsewhere in this Plan)

The formation is valued on the basis that it does not depreciate as regular maintenance (slip clearing etc) will allow it to provide adequate service indefinitely. Its value is calculated by adopting a series of assumption relating to location, topography etc. These are set out more fully in the full MWH August 2008 Valuation report.

The unsealed pavement structure is assumed to consist of a permanent sub-base layer protected by a maintenance metal layer, which is replenished as required to maintain the overall structural integrity.

The assumption that the sub-base layer is permanent is not borne out by what is currently happening on the network, i.e.:

- The need to carry out rehabilitation of gravel roads with insufficient strength to carry current loadings.
- The difference between current application rates of maintenance metal (running course) and the theoretical amounts required.

This is detailed further in Appendix F.

3.2 Capacity

The capacity of the unsealed roads is governed by their widths and strength being suitable for the volume and type of traffic carried. The width has a major effect on safety giving opposing traffic more room to avoid each other. This is particularly important in locations of low visibility around curves or over brows of hills. The strength of the road governs the capacity of the road to carry repeated heavy loads, particularly in wet conditions. This becomes particularly apparent during logging, quarrying, dairy conversion and other carting operations.

The strength of the gravel roads is covered more fully in Sections 3.3 and 3.4.

Safety

The Land Transport Safety Authority (LTSA) (now NZTA) monitors crash data on behalf of Road Controlling Authorities (RCA). Each year LTSA reviews crash data from the previous five years and reports on results, trends and key safety issues. The information is used to assist in the development of engineering, education and enforcement programmes. All RCAs are grouped to provide a reasonable comparison through areas with similar characteristics. Southland District is part of Group D, which is defined as 'Provincial Towns and Hinterland' with population between 20,000 and 75,000 and rural crashes typically between 25% and 90% of all crashes. Table X.3.6 below shows results for the five-year period 2003-2007.

Table X.3.6 Southland Crash and Casualty Incidence (Local Roads) – 2003-2007

Area	Injury Crashes per			Casualties per		
	10,000 (1) Population	100M vkt*		10,000 (1) Population 2004	100M vkt*	
		Urban (2)	Rural		Urban (2)	Rural
Southland District	58	80	30	91	101	47
Group D	31	31	24	46	40	35
All New Zealand	27	36	26	36	46	38

Note: * 100 million vehicle kilometres travelled 2005
(1) Figures for local SDC roads.
(2) Based on very small number of crashes. Also have very few urban traffic counts and expect estimates for urban traffic volumes to be low.

From the 2007 Report the following table shows the proportion of rural crashes which occur on gravel roads. These figures need to be considered in terms of the huge gravel road network SDC have and the small numbers involved.

Figure X.3.7

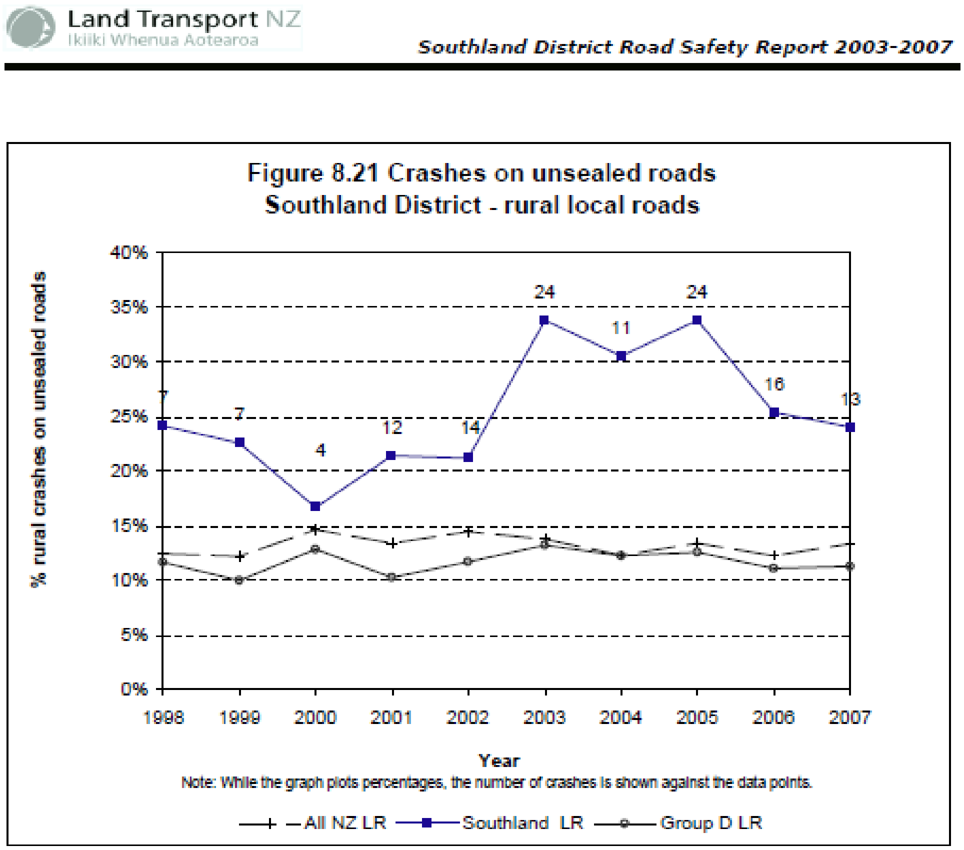


Table X.3.8 Crashes and Injury Crashes on Southland District Local Unsealed Roads

	2003	2004	2005	2006	2007
Crashes	41	29	41	39	34
Injury Crashes	27	11	28	19	19

3.3 Condition

The roads are surfaced with a range of locally obtained and imported materials. Over time the maintenance contracts are aimed at improving this surface as detailed later in this section.

Performance

Performance of the carriageway assets has been assessed in terms of customer satisfaction, capacity and safety.

The following are the results of Customer Surveys over the past 5 years. Each has been conducted around March of the year shown. The road user perception of gravel roads is that they are of inferior quality to sealed roads due to issues with roughness, dust, mud, corrugations, potholes and soft areas. These are all issues which are being dealt with to some degree by the maintenance contractors, to keep the deficiencies within acceptable limits.

Table X.3.10 details the satisfaction levels in each Ward.

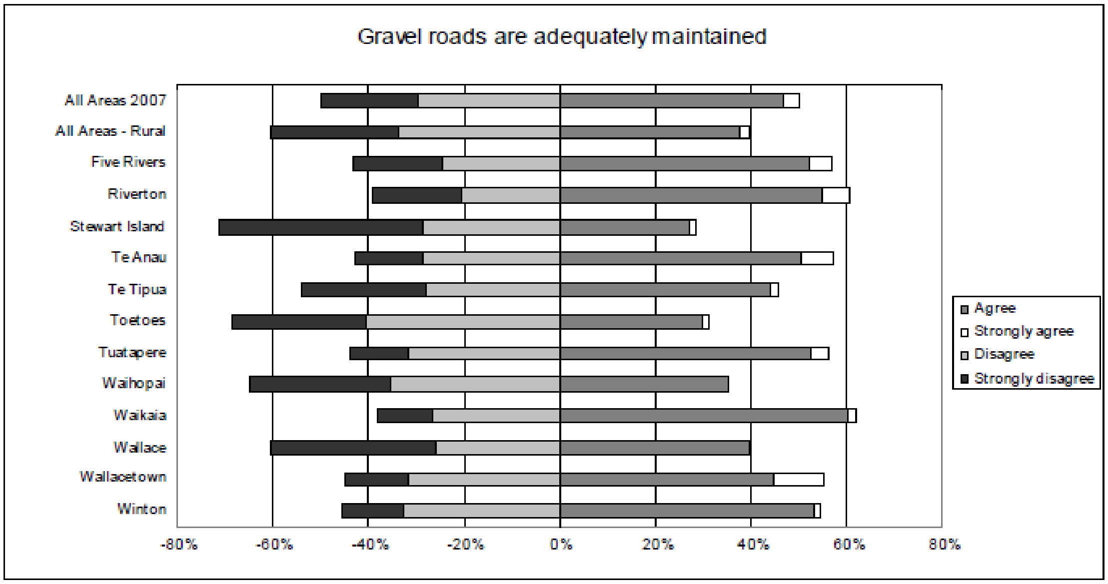
Gravel road users are unlikely to be satisfied until their road is sealed, but this is not possible given the large network and cost involved. The current trend towards lower vehicles with wider lower profile tyres is only exacerbating this trend. Increased dairy tanker traffic on the gravel road network increases the maintenance requirement and is likely to result in a decreased satisfaction level. A sealed road costs far more to construct and maintain, so cannot be justified in lightly trafficked situations. Despite this there is ongoing pressure for seal extensions.

Table X.3.9 Evaluation of Level of Satisfaction with Council Services: Rural Roads

	Satisfied					Dissatisfied				
	2005	2006	2007	2008		2005	2006	2007	2008	
Rural Roads – safe and effective network	85.2%	?	?	?		14.8%	?	?	?	
Rural Roads – maintenance of gravel roads	52.8%	57.0%	56.6%	50.0%		47.2%	43.0%	43.4%	50.0%	

? - Unknown as question no longer included in customer survey.

Table X.3.10



Gravel roads are adequately maintained[1]					
	Sample	Strongly Agree %	Agree %	Disagree %	Strongly Disagree %
All Areas 2002	761	3.2	47.5	29.7	19.6
All Areas 2003	802	5.0	49.0	27.5	18.5
All Areas 2004	674	8.7	50.5	24.4	16.4
All Areas 2005	636	4.9	47.9	30.6	16.6
All Areas 2006	674	7.3	49.7	26.9	16.1
All Areas 2007	675	5.0	51.6	26.9	16.5
All Areas 2008	762	3.3%	46.7%	29.8%	20.2%
All Areas - Rural	304	2.0%	37.8%	33.6%	26.6%
Five Rivers	65	4.6%	52.3%	24.6%	18.5%
Riverton	84	6.0%	54.8%	20.2%	19.0%
Stewart Island	59	1.7%	27.1%	28.8%	42.4%
Te Anau	77	6.5%	50.6%	28.6%	14.3%
Te Tipua	50	2.0%	44.0%	28.0%	26.0%
Toetoes	57	1.8%	29.8%	40.4%	28.1%
Tuatapere	57	3.5%	52.6%	31.6%	12.3%
Waihopai	37	-	35.1%	35.1%	29.7%
Waikaia	71	1.4%	60.6%	26.8%	11.3%
Wallace	73	-	39.7%	26.0%	34.2%
Wallacetown	38	10.5%	44.7%	31.6%	13.2%
Winton	86	1.2%	53.5%	32.6%	12.8%

[1] *2002 to 2006 ratings relate to "satisfaction" and "dissatisfaction" with the maintenance of roads rather than "agree" and "disagree" with the statement. This information is included in the table for general trend analysis only.*

Residents from Stewart Island (71%), Toetoes (69%), Waihopai (65%), Wallace (60%) and rural residents (60%) were more likely to disagree that gravel roads were adequately maintained than residents from other areas.

Asset Condition

The unsealed road asset is in a reasonable but constantly changing condition depending on traffic use, weather, position in its maintenance cycle etc.

The Alliance Condition Rating trial will provide useful data to accurately record variations in network condition. Further work is required to be able to demonstrate condition against Public Perception and this work is ongoing.

This condition is monitored through Contractor and Council Area Engineer inspections, as well as complaints and queries from users.

Routine Maintenance Plan

Background

The asset management objective is to create, operate, maintain, rehabilitate and replace assets at the required level of service for present and future customers in a cost effective and environmentally sustainable manner. The maintenance strategy has been developed to achieve cost effective maintenance to maintain the assets to meet the intended levels of service.

The Council has determined that the most effective way to achieve the objectives is to contract out the maintenance works to commercial contractors. This allows competitive tendering of the maintenance works to ensure a true market value for the works.

The District is divided into three separate contract areas. The North Western and Central area contracts are performance based using specified deliverables within the contract. The South Eastern Area has the Countries first Alliance Contract used in a road maintenance environment. This contract has a best for network approach that has resulted in the condition rating process being put in place. This concentrates maintenance efforts on a best for network basis rather than just potholes, loose gravel and corrugations.

The surfacing of gravel roads is one of the main areas which both types of contracts aim to improve by encouraging the Contractor to produce a stable bound surface. This may be done in a variety of ways including adding clay and silt, either from the edge of the road or imported, adding well graded metal, stabilising existing material with lime or cement, rolling after laying etc.

Council have participated in a national trial of Otta Seals to minimise dust nuisance. This trial is indicating substantially reduced dust and also reduced long term maintenance costs.

Contractor Performance Monitoring

Performance monitoring is undertaken by the Council Area Engineers on the North Western and Central contracts.

Response times and performance criteria are specified within the Contract documents. The Alliance management team have developed a set of measurable outcomes based on the Council desired levels of service. A regular and systematic audit process has been put in place to ensure the desired outcomes are met.

Nationally there is a move to improve modelling of unsealed roads. This offers the opportunity to improve maintenance cost forecasts based on road condition, rather than historical costs. Once the results of the Alliance condition ratings have been fully evaluated further unsealed modelling may be possible.

At this time, the forecast cost for structural maintenance of unsealed roads is based on a HCV growth of 5% per year and an assessment of the costs of the underpinned quantity components of the gravel road lump sums.

The underpinned qualities allowed for in the contracts are continuously being refined as more is learned about the deterioration of the network and the loss of gravel. Adding to the knowledge is the completion of a national five year gravel loss survey exercise. While the results were not fully conclusive, indications point to a loss rate of around 7mm per annum as opposed to the 4 to 5mm per annum previously allowed for.

This also fits better with the evidence from the field which indicates that the 4 to 5mm per annum is not keeping up with the roads needs.

Allowances are therefore being made in the contracts for an average of 7mm (loose measure per annum) which involves 35mm depth being applied every 5 years.

3.4 Remaining Life

The remaining life of the network with ongoing maintenance and renewal is indefinite. The formation is assumed not to depreciate as regular maintenance (slip clearing, etc) will allow it to provide service indefinitely.

The unsealed pavement structure is assumed to consist of a permanent sub-base layer protected by a maintenance metal layer, which is replenished as required to maintain the overall structural integrity.

Background

Renewal expenditure is work that extends an existing asset's life. Potentially a road can last indefinitely, provided sufficient investment is made on the road through its life to keep it in a good state of repair. Generally well used roads are not allowed to fall into a state of disrepair that forces a substantial re-construction. Activities like maintenance metalling and metal strengthening are undertaken to avoid the road falling to this state. These activities are renewals.

The need for new capital works may be caused by increased traffic loading rather than condition. For example, new development in an area may increase the traffic on a particular road, and to cater for this, the road may need to be improved through widening.

The type of works that are included under the classification of renewals are:

- Pavement rehabilitation
- Maintenance metalling

Both these fall under the NZTA Work Category 211, Unsealed Road Metalling.

The type of works that are included under the classification of new capital are:

- Road Widening (to reduce road deterioration and increase safety).

This work can be done under Work Category 324, Road Reconstruction or 341, Minor Improvements.

Renewal Strategy

For roads, the main parameter that signals the need for road renewals is the road condition and increasing maintenance costs to maintain the required level of service. As the road surface deteriorates, the road surface gets rougher with increased potholing and failures. The renewal strategy is based around measuring and forecasting the deterioration of the roads and scheduling investment in renewals when the level of deterioration becomes unacceptable.

With the unsealed roads, deterioration can in some cases be very rapid – i.e. a road which was adequate when used by the occasional heavy vehicle becoming impassable when logging or dairy conversion takes place along it.

The logging situation is more predictable due to the time it takes for trees to mature. With the dairy situation a farm can be sold and work start very quickly. Monitoring consents for dairy sheds can help with this.

The determination of what level of deterioration is acceptable is described under Levels of Service.

Pavement Rehabilitation Treatments

Pavement rehabilitation treatments are pavement renewal of a limited area in which there are no geometric improvements. These may include overlays, rip and relays and chemical stabilisation.

3.5 Issues

Seal Extensions

The District has a large proportion of unsealed roads and there is continual pressure to seal them, predominantly by the rural community. The policy to invest in seal extensions changes over time depending on the community and the elected Council. Sealing of the roads has significant consequences in the long term because of maintenance and asset deterioration issues. The decision to extend the seal is therefore not one that can be confidently forecast.

The last major seal extension carried was on the remaining unsealed section of the Southland District Council's section of the Chasland's Highway. A forecast of future subsidised seal extension work beyond this year has not been undertaken. No allowance has been made for subsidised seal extension work in the long term. During the annual plan process this may need to be reviewed for a specific special case, particularly on tourist routes such as Haldane Curio Bay and Slope Point Roads.

While there is an ongoing desire from ratepayers for seal extension of their own road or the ones they travel on the most, there is also a realisation that SDC cannot afford to seal all of its roads. A rough order of cost (ROC) estimate to seal the remaining 3,000km network of unsealed road is $525 million with an increase in long term annual maintenance of $10 million pa. Even to seal a 100m strip in front of every house on every unsealed road has an estimated ROC of $75 million (based on 3,000 properties at $25,000 each) with an increased maintenance cost of $1.0 million pa.

Otta Seals may in the future provide a viable option to full seal extension where dust is the primary reason for public complaint. At $45,500 per kilometre this may be a financially viable option in the future. More data needs to gathered on the long term life and costs of these before proceeding with more than the trial sites.

Special Purpose Roads

Historically some roads attract 100% NZTA subsidy because of their national significance in terms of tourism, industry, etc along with their use, revoked SH status and current condition. The Transport Management Act 2003 repealed section 104 of the TNZ Act 1999 which related to special purpose roads. NZTA are developing policy in response to this legislation change but at this point they are paying the 100% subsidy. The Council's policy is to fully maintain all the Special Purpose Roads within the funds available from NZTA.

The maintenance of special purpose roads includes for:

- Pavement maintenance.
- Amenity and safety.
- Traffic services.

The maintenance of the special purposes roads is covered under the maintenance contracts to the same level of service as other roads with a similar hierarchy.

Due to its distance from the rest of the network, the Lower Hollyford Road is maintained by the State Highway maintenance contractor and consultant in the area.

Gravel Road Widths

These need to be remeasured and the information used to help develop a widening programme.

General Issues

- Investigations are required to improve the understanding of the relationship between maintenance techniques and the performance of unsealed roads.
- Investigate and identify an appropriate gravel road rating system. Needs to be identified and implemented for unsealed road maintenance.
- Investigate improved techniques for metalled surfaces.
- Further investigate whether stabilising agents produce any economic benefit to the road network. This includes further evaluation of Otta Seals.
- Carry out a new inventory survey to check gravel road widths against full contract compliance and progress to target widths.
- Continue involvement in national study of gravel loss to allow better management of asset and more accurate calculation of depreciation.

4. Bridges and Large Culverts

4.1 Introduction and Overview

Physical Parameters

The Southland District Council's roading network (at 30 June 2008) included 998 structures that satisfy the NZTA bridge subsidy criteria by having a waterway or clear area greater than 3.4 m^2. These structures are constructed from a number of materials in different styles and are summarised in Table X.4.1.

Table X.4.1

Bridge Type	Number	Total Roadway Length (m)
Armco Culvert	56	201
Boundary (SDC Responsibility)	12	180
Boundary (Other Council's Responsibility)	6	173
Box Culvert	116	471
Concrete Bridge	422	7,276
Concrete Pipe Culvert	15	38
Pedestrian Bridge	1	53
Steel / Concrete Bridge	40	1,163
Steel / Timber Bridge	53	1,175
Suspension Bridge	1	62
Timber Bridge	131	1,033
Stock Underpasses	138	584
Woodstave Pipe Culvert	7	16
TOTAL	998	12,425

The Southland District Council has a half share of the asset value of the boundary bridges. The maintenance of the boundary bridges is shared with the Southland District Council taking responsibility for the management and maintenance of 12 of the boundary bridges and other councils taking responsibility for the 6 others.

Electronic data relating to each bridge structure is stored in the RAMM Bridges module hosted by CJN Technologies. The data has been built up from historical bridge files as well as electronic data from the previous BRIMMS and MWH databases. This has also been supplemented with information gathered during the 2005/06 structural bridge inspections. Data is gathered and updated following all random inspections.

Where available this data includes the structure location, structure type, construction material, construction year, design loading and current weight restriction and also contains photos and inspection records where these have been carried out.

Historical Information

Where it is available historical information about each bridge is stored in a file at the offices of MWH in Invercargill. These files are owned by the Southland District Council and will be returned to the Southland

District Council on termination of the professional services contract. The contract files associated with the construction projects and historical maintenance files are stored at the Southland District Council Archives in Invercargill.

Asset Valuation

Annual asset valuations are carried out making use of the RAMM Asset Valuation Module (RAVM) module and the information stored in the RAMM bridges inventory. Valuations are carried out on the basis of replacing the existing bridge or culvert with a structure of equal length and the same number of lanes constructed from concrete. The results of the 2008 Valuation are included in the table below. Note that stock underpasses have not been included in the valuation as they are considered as being owned by the landowner.

Table X.4.2

Bridge Type	Number	Quantity	Unit	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Armco Culvert	56	2087	m²	$6,284,726	$1,701,457	$147,094
Boundary (SDC Responsibility)	12	180	m	$905,965	$431,212	$8,178
Boundary (Other Council's Responsibility)	6	216	m²	$887,352	$437,749	$9,927
Box Culvert	121	3407	m²	$10,716,186	$8,932,780	$89,301
Concrete bridge	417	7263	m	$88,526,684	$61,883,429	$737,886
Concrete Pipe Culvert	15	358	m²	$1,337,197	$1,163,773	$11,143
Pedestrian Bridge	1	53	m	$102,230	$85,191	$852
Steel / Concrete Bridge	40	1163	m	$12,261,639	$7,623,829	$128,463
Steel / Timber Bridge	53	1175	0	$10,955,068	$4,704,075	$177,515
Suspension Bridge	1	62	m	$711,122	$334,227	$7,111
Timber Bridges	131	1033	m	$9,595,885	$2,442,284	$170,354
Woodstave Pipe Culvert	7	177	m²	$527,209	$239,777	$12,314
Totals	**860**			**$142,811,263**	**$89,979,783**	**$1,500,138**

Boundary bridges are included at half their asset value.

4.2 Capacity

Asset Capacity / Performance

A number of different design loading standards have been adopted throughout the history of the bridge network with all new structures designed to either HN-HO-72 or 0.85HN (Class I) standards as per the NZTA Bridge Manual. The distribution of the different loading standards are shown in the table below. Note that the design loading should not be confused with the current capacity of the bridge.

Table X.4.3

Design Loading	Number of Bridges
Class I	127
120% Class I	11
H20 - S16 - 41	5
H20 - S16 - 44	45
H20 - S16 - T16	101
HN - HO - 72	300
Unknown / Not Recorded	409
Total	**998**

There are 66 (7% of network) bridges posted with weight or speed restrictions below 100% Class I in the network which were formally notified to the public in May 2008. A number of these posted bridges are on routes with very low traffic counts and low percentages of heavy vehicles and their posting has little effect on the operation of the network. There are also a number of posted bridges that are located on legal road reserve but the road is unformed. The target level of service is to provide 100% Class I structures where possible and affordable.

The posting calculations for each bridge are based on an on-site inspection which includes an individual rating of the condition of the structural members. The posting calculations are stored in the bridge hard file while the structure posting is also recorded in the bridge database. The capacity of timber beams has been assessed by assuming a value of f_b = 19 MPa. This value has been determined by individually load testing a number of used timber beams which have been recovered from structures that have been replaced. This value is considered to be conservative.

As a result of the 2005/06 bridge structural inspections an additional 34 bridges were added to the posted bridge list due to deterioration in their condition. The full list is shown in Appendix F, Table H.3. The bridges in the list are all bridges with timber or steel beams and timber decks.

Concrete structures can be assessed for posting based on existing information about the steel quantity and concrete grade. Where this is unavailable the procedures set out in the NZTA Bridge Manual are followed to assess strength. Currently there are no posted concrete structures in the district.

Structures on low volume roads and with a good alignment to the road are generally been constructed as single lane bridges with a clear width of 4.0m between kerbs. This was increased to 4.2m in 2006 to cope with the large amount of overwidth agricultural machinery using the network. Where funding permits and when the bridge is on a poor alignment to the road it is designed as a two lane bridge with 8.0m clear width between kerbs. The current distribution of single and two lane bridges as well as clear widths between kerbs is as shown in Table X.4.4 below.

Table X.4.4

No. of Lanes	Width range (m)	No. of Bridges
Single	W < 3.5	14
	3.5 < W < 3.8	79
	3.8 < W < 4.0	65
	4.0 < W < 4.2	110
	4.2 < W < 4.4	83
	4.4 < W < 4.6	50
	4.6 < W	19
	Total	**420**
Two lane	W < 7.0	32
	7.0 < W < 7.2	16
	7.2 < W < 7.4	67
	7.4 < W < 7.6	129
	7.6 < W < 7.8	15
	7.8 < W < 8.0	23
	8.0 < W < 8.2	25
	8.2 < W < 8.4	17
	8.4 < W	254
	Total	**578**
	Grand Total	**998**

Side protection on bridges is selected based on the volume of traffic using the road as well as the mix of traffic using the road. The alignment of the road to either side of the bridge and the consequences of an accident are also considered when determining the required type of barrier. For example a road with a high traffic volume, high proportion of heavy traffic and for a structure with poor alignment and which is elevated above the stream bed a steel guardrail would be fitted.

Bridges on low volume roads with good alignment and lower consequences of an accident are fitted with a timber handrail and sight rail. The purpose of the timber sight rail is to act as a visual guide for the driver rather than as a barrier to prevent the vehicle from leaving the bridge.

The different types of barrier and the number of bridges fitted with each type are summarised in Table X.4.5 which follows.

Table X.4.5

Barrier Type	Number of Bridges
Armco Guard Rail (W section)	145
Steel Post and Wire	22
Steel Post and Tube	97
Concrete Post and Steel Rail	49
Concrete Parapet	34
Timber Handrail	497
No Barrier / Unknown	154
Grand Total	**998**

4.3 Condition

The bridges are spread fairly evenly across the district, which offers a number of different climates. Structures in the south eastern area tend to suffer from damp conditions while those in the north experience dry warm conditions in the summer and freezing temperatures in the winter. The damp conditions have a significant effect on the life of timber structures, which deteriorate faster when they are in service in wet conditions. Timber structures in drier conditions require less maintenance of the deck and generally have a longer life. Reinforced concrete structures tend not to suffer as greatly from the temperature variations but construction can be hampered in the cooler northern conditions.

Construction sites close to the sea are less suitable for steel structures as the chlorides in the air attack the steel work and cause rusting to occur which shortens the life of the structure. Reinforced concrete structures must be carefully designed and constructed in these zones to ensure they achieve their full design life.

Different soil types also have a bearing on the type of structure that is considered for a replacement. Certain areas of the district have very peaty soils which lower the pH in the stream channel. For steel Armco culverts this attacks the waterline where there is also oxygen present, shortening the life, sometimes to 10-15 years.

Asset Condition

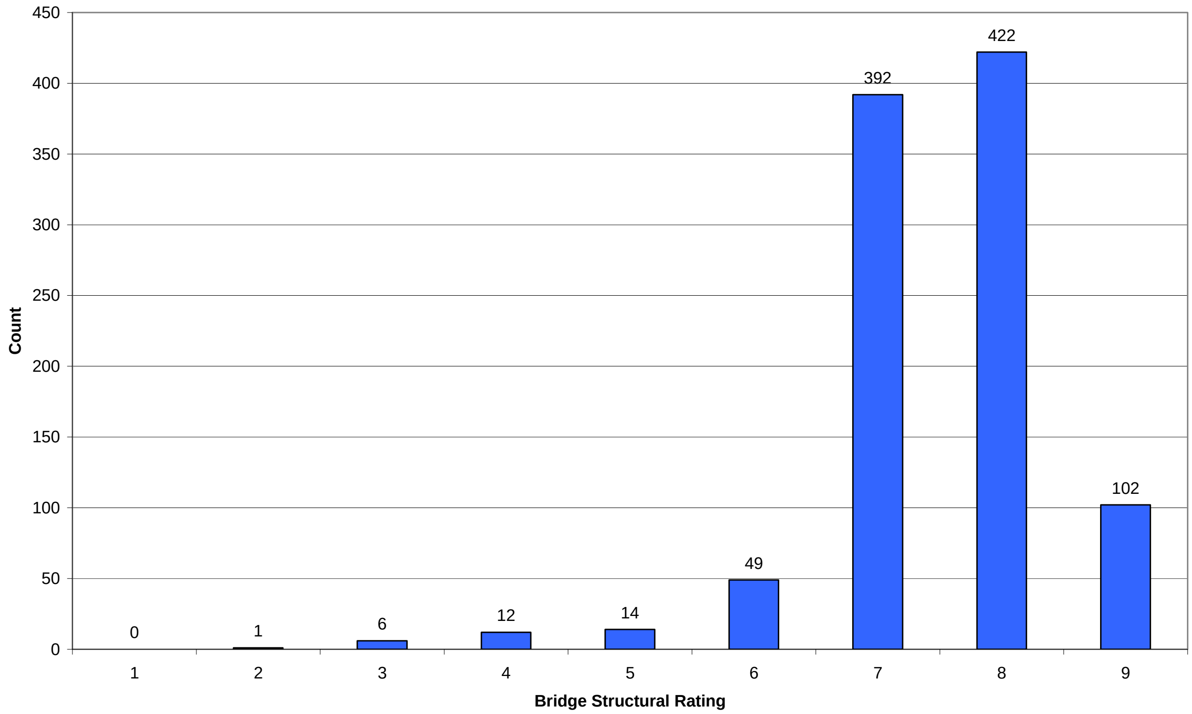
The bridge network is in generally good condition due to a regular inspection and maintenance programme that has identified faults, and repairs have been made before they threaten the capacity of the structure. Where the cost of repairing the deterioration of the structure has become significant and uneconomic the option of replacing the structure has been taken.

The maintenance contractor inspects all bridges on a yearly basis and also after a significant event such as a flood or earthquake to identify, report and repair minor maintenance issues that do not require structural design. The Professional Services Engineer carries out inspections on a 6 yearly basis to assess condition at a more detailed level and estimate the remaining economic life of the structure.

During the 6 yearly inspections each element of the structure and also the overall structure is given a rating on a scale of 1 to 9. The alignment of the road and river and other issues such as waterway adequacy and scour at the site are also assessed. A rating of 1 implies that the structure is in very poor condition and is due for replacement and a rating of 9 means that the structure is in as new condition and no work is required. Grades between 2 and 8 imply differing levels of maintenance work from heavy duty to minor and also give an indication of the urgency of the work.

Figure X.4.6 shows the number of structures rated 1 to 9. These ratings were determined during 2005/06 detailed inspections. The ratings include the lower Hollyford Road bridges which had not been rated previously but were inspected as a part of the 2005/06 inspections.

Figure X.4.6 Bridge Structural Rating Count

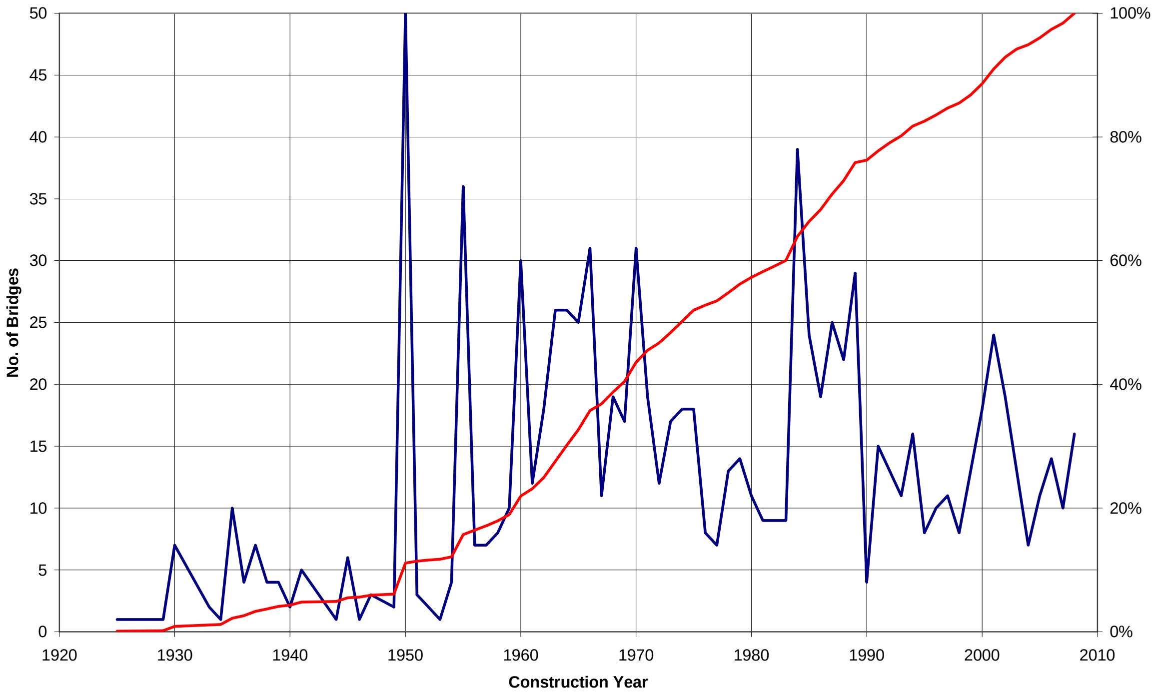


4.4 Remaining Life

The oldest bridge recorded in the bridge database was constructed in 1925 and approximately 15% of the bridges are more than 50 years old. The graph below shows the distribution of ages of the structures. Note that the peaks around 1950 and 1955 are due to these years being used as a default guess for structures where historical information about construction dates do not exist. The small peak around 2000 reflects the high number of stock underpasses that were installed in that period. This information is shown in Figure X.4.7.

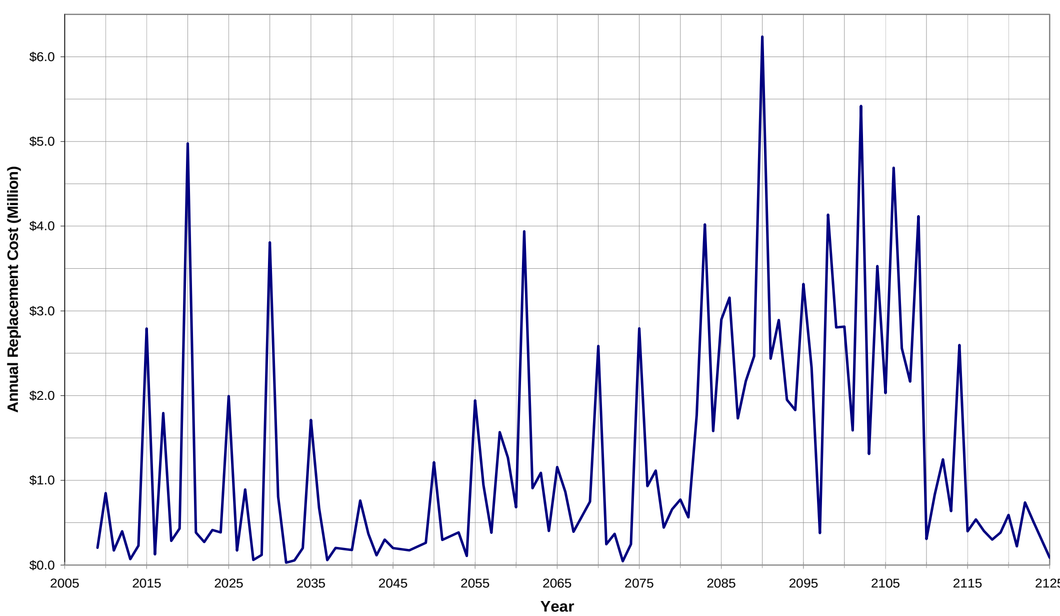
The red line in Figure X.4.7 shows the cumulative increase in the number of bridges from 1925 to today. Areas where the gradient of the line is the steepest indicates times when growth in the network was the greatest.

Figure X.4.7



During the valuation process the remaining life of each bridge is estimated as well as its replacement cost. This is used to develop a predicted annual replacement cost. The data from the latest valuation is shown in Figure X.4.8 below. The remaining useful lives determined during the 2005/06 detailed inspections are still to be compiled and included with this data.

Figure X.4.8 Projected Replacement Cost vs Year



Note:

- The peaks that occur in 2015 and 2020 are due to assumed construction dates for timber bridges and armco culverts and the total asset life that has been assigned for the asset type.
- The remaining life for these asset types can be extended through upgrading and by posting a weight restriction for a short period which will reduce the magnitude of the peaks. Also as these times get closer, detailed inspections will be able to spread the replacement dates based on the actual condition of each bridge .
- Figures exclude inflation.

4.5 Issues

- The information from the detailed inspections of the all of the District's bridges need to be complied and loaded into RAMM.
- A detailed 10 year bridge replacement programme needs to be completed and agreed.
- Carry out a review of past bridge replacements and upgrades to assist in developing end of life predictions for the bridge inventory.

4(a) Drainage Control Facilities

4.1(a) Introduction and Overview

This section covers non bridge drainage control facilities including road culverts under 3.4m^2 end area, surface water channels and their crossing pipes and kerb and channel. It does not include reticulated urban stormwater networks which are covered by a separate Activity Management Plan.

Physical Parameters (Road Culverts)

As at December 2001 there were only 1,136 of an anticipated 15,000 road culverts recorded.

SDC only hold information on the location of 90-95% of culverts on its unsealed network and a portion of its sealed roads. There is limited information on the size, age or construction of these culverts. In order to minimise the impact of the lack of information available, neighbouring Clutha District Council's asset register has been used to make assumptions for the Southland districts asset register. A comparison of the frequency of these culverts and those recorded on Southland's rural network has been tabulated below. When consideration is taken of an estimated 5%-10% under reporting of culverts from the Southland survey the results show an excellent correlation.

Table X.4.9 Frequency of Road Culverts

District	Frequency of Culverts			
	Sealed		Unsealed	
	Urban	Rural	Urban	Rural
Clutha District	1.28/km	2.86/km	3.22/km	3.21/km
Southland District	-	2.82/km	-	2.74/km

In order to extrapolate the Clutha culvert data to Southland, the frequency of culverts (above), the average length, the construction type, and the size distribution needs to be determined.

Table X.4.10 Assumed Distribution of Road Culvert Characteristics

Culvert Size Category (mm)	Average Culvert Length (m)		Proportion in Size Category	Types		
	Rural	Urban	(%)	Concrete	Earthen	Other*
<300	11.70	15.30	68%	58.4%	7.7%	1.6%
301 to 450	13.90	15.00	12%	11.1%	1.1%	0.3%
451 to 600	14.50	17.50	8%	7.4%	0.0%	0.2%
601 to 900	15.20	17.10	5%	5.2%	0.0%	0.1%
901 to 1200	14.40	14.30	3%	2.6%	0.0%	0.2%
1201 to 2000	24.50	15.10	4%	3.8%	0.0%	0.4%

Key:

- * Other refers to forms such as asbestos and steel

The true distribution, size and condition of culverts will be fully inventoried as part of the maintenance contracts.

Currently the maintenance contractors in all three contract areas are picking up culvert inventory and condition data. This collection of information is only part way through and is therefore not in useable format to fully update the proceeding data.

This culvert inventory data should have been completed in time to be used to fully update this data for the production of the 2009 LTCCP, but unfortunately this has not been the case. In the South Eastern Area, the Foveaux Alliance have picked up the size and location of all culverts on the unsealed roads and as at October 2008 were working through the sealed road network. This information will be taken from spreadsheets and loaded into RAMM. In the other areas various information has been collected but has not been provided in a state that it can be loaded into RAMM.

Physical Parameters (Surfaced Surface Water Channels)

Throughout the District (mainly in urban areas) there are a variety of surfaced surface water channels used to collect and discharge stormwater runoff to drains and soakholes. The extent of those which are recorded in the RAMM database is shown in Table X.4.11.

Table X.4.11 Surfaced Surface Water Channels

Asset Description	Quantity	Unit
Dished Channel (Asphalt)	27	m
Dished Channel (Concrete)	4,953	m
Dished Channel (Sealed)	2,257	m
Kerb & Channel (Concrete)	121,595	m
Kerb Only (Concrete)	3,184	m
Mountable Kerb & Channel (Concrete)	11,572	m
Mountable Kerb Only (Concrete)	143	m
Other Type	19	m
Total	**143,750**	**m**

Physical Parameters (Earth Surface Water Channels)

Throughout the District, but mainly in the rural areas, earth surface water channels collect and discharge stormwater runoff to drains and soakholes.

In total there are 8,946km of earth surface water channels recorded in the District on both sealed and unsealed roads. The width and depth of these vary depending on the location, topography, timeframe of when they were constructed or redeveloped.

There is no data held anywhere on accessway culverts which are associated with these earth surface water channels.

Asset Valuations

The replacement value of drainage control facilities as at July 2008 based on the Roading Formation, Pavement, Drainage facilities and Minor Structures Valuation report is as follows:

Table X.4.12

Drainage Component	Replacement Cost ($)	Depreciated Value ($)
Surfaced Surface Water Channels	12,650,125	8,233,000
Road Culverts	56,745,500	28,372,800

The rate for the supply and placement of drainage features does not vary significantly by location within the district and thus a single rate for each feature was used to calculate the replacement cost of the assets. The rates allowed for:

- Engineering Fees (6%).
- Establishment (4%).
- Supply, placement and compaction of backfill.

SDC has information on the location of most culverts on unsealed roads. This information was used to establish the frequency of culverts in rural areas by terrain type. The distribution of culvert size, construction and length was obtained by reviewing neighbouring Clutha District Council's asset register as this was considered to give a more realistic result than a drive-over sample of SDC's culverts.

Details of catch pits and sumps are not included in the valuation above. This data is in the SDC Hansen system and is not included in the roading valuation. In future it should be.

The earth surface water channels are not valued separately as they are valued as part of the overall road formation.

Historical Data

This information is yet to be determined.

4.2(a) Capacity

The capacity of the culverts is generally sufficient to pass regular storm events. Where this is not the case, reports from local landowners, maintenance contractors and SDC staff inspections leads to a review of culvert size being carried out. Where the culvert size is sufficiently undersize to warrant upgrading and the budget allows, replacement is carried out through the maintenance contract. During major flooding events the culvert capacities are often exceeded which is something that most residents are stuck with.

4.3(a) Condition

Asset Capacity/Performance

Current asset performance is assessed as being adequate on the basis of recent condition rating results, public complaints and comments from maintenance contractors.

In 2001 SDC did not have a full inventory for culverts. They held information on the location of 90-95% of culverts on the unsealed network and a small proportion of the sealed roads. There was no information on the size, age or construction of these culverts.

Under the maintenance contracts the contractor is required to record the size, location, material type and condition of all culverts that have not been marked on the network, leading to full network coverage over the first four years of each contract. The collected information will be put onto the computerised road asset management system (RAMM). Following this completion, methods will be put in place to regularly rate the condition of this asset.

As discussed earlier in this section this information is incomplete at this stage and has not been used to update this section.

The condition of the earth surface water channels vary throughout the network. Historically an exercise has been carried out to rate all of these earth surface water channels in the South Eastern and Central Maintenance Contract Areas with rating from 1 to 5 (5 is very poor). The results are summarised in Table X.4.13.

This information is provided to the Maintenance Contractor to prioritise reformation work. This work is critical as the better the drainage the longer the life of the pavement.

Table X.4.13 Ratings of Surface Water Channels (SWC's) in 2002

Area	Sealed Centre Line Length (m)	1	2	3	4	5	Total Surveyed Length	Date (year)
South East	491,341	171,743	433,049	209,441	162,760	6,199	983,192	2002
Central	719,755	1,440	476,268	619,132	336,527	6,144	1,439,511	2003

Key:

Priority	Description	Benefit of Improving	Description of Problem	Proposed Timetable
1	Excellent	Nil	Works well, full width and depth	Just need to keep clean
2	Good	Minor	Works well but lacks width	Just need to keep clean
3	Average	Significant	Adequate, but could do with additional depth and width	As budget allows
4	Poor	Large	Poor drainage, water slow to get away, affecting sub-grade	Year 2-3
5	Very Poor	Very large	Very poor drainage, holding water at seal edge, saturating pavement layer	Year 1

4.4(a) Remaining Life

Currently there is insufficient data available to determine the remaining life's of the culverts. Generally very few have got to the age and condition that it has lead to a collapse. They are inspected by the maintenance contract each year.

Every two years, as part of RAMM condition rating, a condition assessment is carried out on the kerb and channel. The maintenance contractors check the culvert conditions annually. As a result of these inspections those drainage facilities that need it are replaced. There is no formal programme for this as it happens on an "as required" basis.

The earth surface water channels are regarded as being part of the permanent formation. They require ongoing cleaning and reformation to improve drainage or relocate the drainage when the road is widened.

4.5(a) Issues

- The full culvert inventory including size, location, material and condition needs to be completed to allow better management of the asset.
- Greater priority needs to be given to improving the earth surface water channels to get the maximum life out of pavements. The maintenance contractors need to ensure that all of the poorest earth surface water channels (rated 4 and 5) are reformed as a top priority.
- In the future the valuation of the roading asset should include the value of catch pits, sumps and their connection to the reticulated stormwater system.

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5. Footpaths

5.1 Introduction

Most townships within the District have footpaths of some sort. They extend from the permanent material type to barely formed gravel surfaces. The network in each town has been constructed on an as required basis without having an overall township management plan to work from. Table X.5.1 shows the quantities of the various types of footpaths in each township.

Standards and satisfaction levels vary from town to town dependant on when construction took place and how it was completed. New subdivisions have been constructed to meet the Council Subdivision Standards. These standards are also used for new construction when upgrades take place.

Satisfaction levels are shown in Table X.5.2.

5.2 Capacity

The Council Subdivision Standards are used as a basis for Capacity requirements. These are based on the number of houses being serviced. A significant number of streets within existing townships will not comply with the subdivision standards. There has not been an attempt made to increase the existing network across the District in recent years. The predominant issue is the quality of the existing footpaths rather than the physical capacity of the footpaths. There has been a theoretical exercise carried out to check non-compliance of existing footpaths against the design criteria of the subdivision standards. This needs to be completed and discussed with local communities to see how they wish to apply the standards in each case.

5.3 Condition

The Council Maintenance Contractors carryout regular footpath inspections and report within the monthly reporting system. These inspections are focused on keeping the required clear zone around the path and removal of trip hazards. Individual township plans are required to locate all footpaths, access their condition and remaining life. This project should be completed over the next three years.

5.4 Remaining Life

Due to the lack of condition ratings a forecast of remaining life is difficult to make accurately. Using assumed ages and expected lives, the profile of renewal requirements has been developed in Appendix F.

5.5 Issues

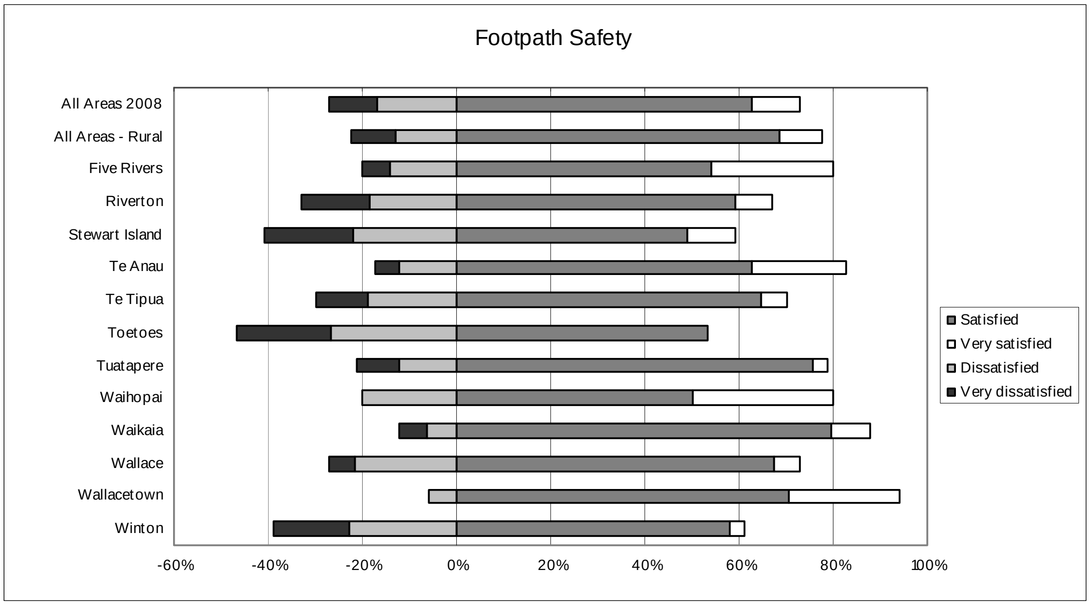
- The lack of records relating to extent, location, condition and future maintenance requirements prevents good long term planning for this asset. Over time this information can be gathered and full plans put in place. Maintenance expenditure comes from each township's Misc Roading Account. Maintenance is carried out on an as required basis to the level of funding available. Long term plans are not available or worked to.

- Community Boards and Community Development Area Committees make decisions about renewal and new capital works in their areas. These local people set the priorities for their township. The costs are budgeted from local rates and are included within each areas accounts.
- Use condition information to produce an upgrading and replacement programme, along with defined levels of service.

Table X.5.1 Footpath Network (as at 30 June 2008)

Town	Asphaltic Concrete		Concrete		Dense Graded Emulsion Mix		Interlocking blocks		Metal		Seal		Other		Totals	
	m2	m	m2	m	m2	m	m2	m	m2	m	m2	m	m2	m	m2	m
ATHOL															0	0
BALFOUR			4,616	2,732			7	3							4,623	2,735
BROWNS	291	107							894	445					1,184	552
COLAC BAY	2,047	834	942	707											2,989	1,541
CURIO BAY															0	0
DIPTON															0	0
DRUMMOND															0	0
EDENDALE	1,707	841	13,629	6,876					1,852	1,060					17,188	8,777
FORTROSE															0	0
GARSTON															0	0
GORGE ROAD	215	122	126	60					299	199					639	381
LIME HILLS															0	0
LUMSDEN	2,077	777	3,905	1,946					1,474	638					7,456	3,361
MAKAREWA WORKS*															0	0
MANAPOURI	180	136	7,396	5,186					3,489	2,587					11,065	7,909
MONOWAI															0	0
MOSSBURN	325	165	5,047	3,383					136	66					5,509	3,614
NIGHTCAPS	70	34	8,098	4,146					1,182	372					9,351	4,552
OHAI	36	21	9,784	5,557							147	85			9,968	5,663
ORAWIA															0	0
OREPUKI	897	297	695	617											1,593	914
OTAUTAU	3,266	1,721	17,301	9,256			228	69	572	402					21,368	11,448
RIVERSDALE	724	319	4,350	2,523					127	66					5,200	2,908
RIVERTON	5,453	1,976	16,971	12,975			16	5	6,750	4,919	1,572	625	286	148	31,048	20,648
RURAL	2,494	1,038	2,802	1,997					1,801	647					7,096	3,682
STEWART ISLAND			462	339			1,194	598	122	112	298	232			2,076	1,281
TE ANAU	14,006	7,712	70,619	42,761			12,330	6,049	217	115					97,172	56,637
THORNBURY			1,250	833											1,250	833
TOKANUI	623	324	39	13					1,054	460	1,062	470			2,777	1,267
TUATAPERE	1,713	533	13,192	8,136			24	8	868	291	567	151			16,363	9,119
WAIANIWA			300	100											300	100
WAIKAIA			850	367							291	101			1,141	468
WAIKAWA									71	59					71	59
WAIMAHAKA															0	0
WAIRIO															0	0
WALLACETOWN	705	232	2,223	1,289											2,928	1,521
WINTON	25,162	11,342	6,167	3,068	4,746	2,266	524	147	25,288	11,480	3,231	1,429			65,117	29,732
WOODLANDS	286	175	366	188					1,247	553	360	90			2,259	1,006
WYNDHAM	7,199	2,923	15,342	7,429					368	201	249	113			23,158	10,666
Totals	69,475	31,629	206,472	122,484	4,746	2,266	14,324	6,879	47,810	24,672	7,776	3,296	286	148	350,888	191,374

Table X.5.2 2008 Customer Satisfaction Survey Results – Footpaths



Footpath Safety					
	Sample	Very Satisfied %	Satisfied %	Dissatisfied %	Very Dissatisfied %
All Areas 2003	669	10.0	62.5	20.6	6.9
All Areas 2004	578	11.7	64.5	17.5	6.3
All Areas 2005	552	8.7	65.7	20.0	5.6
All Areas 2006	550	8.7	63.6	20.4	7.3
All Areas 2007	490	13.4	64.1	16.7	5.8
All Areas 2008	490	10.4%	62.7%	16.9%	10.0%
All Areas Rural	131	9.2%	68.7%	13.0%	9.2%
Five Rivers	35	25.7%	54.3%	14.3%	5.7%
Riverton	76	7.9%	59.2%	18.4%	14.5%
Stewart Island	59	10.2%	49.2%	22.0%	18.6%
Te Anau	75	20.0%	62.7%	12.0%	5.3%
Te Tipua	37	5.4%	64.9%	18.9%	10.8%
Toetoes	30	-	53.3%	26.7%	20.0%
Tuatapere	33	3.0%	75.8%	12.1%	9.1%
Waihopai	10	30.0%	50.0%	20.0%	-
Waikaia	49	8.2%	79.6%	6.1%	6.1%
Wallace	37	5.4%	67.6%	21.6%	5.4%
Wallacetown	17	23.5%	70.6%	5.9%	-
Winton	62	3.2%	58.1%	22.6%	16.1%

Residents from Toetoes (47%), Stewart Island (41%), and Winton (39%) were more likely than other residents to be dissatisfied with footpaths.

6. Streetlights

6.1 Introduction and Overview

Southland District Council aims to provide a level of lighting that is sufficient for the safe and efficient movement of vehicles, cyclists and pedestrians. It also has the object in urban areas of providing a streetlight at every intersection. A major upgrade ended in 2001 to replace the older mercury vapour and fluorescent lanterns with the more cost effective and efficient high-pressure sodium fittings. These give a high output for a relatively low wattage. Some fluorescent lamps still remain particularly under verandahs in commercial areas.

Generally Council's streetlights are attached to poles owned by Powernet. The maintenance contractor (currently Network Electrical Services) is required to maintain the light fittings and mounting brackets. Powernet maintain the poles at their own cost. The demarcation point between Council and Powernet is the pole fuse, which is deemed to be the supply point to the Powernet network. Where the light is mounted on a column that Council owns then the contractor also maintains that column.

Details of the Council's street lighting asset are held on a Street Lighting Database as maintained by the street lighting maintenance contractor. This database has deficiencies at present because the network company does not permit access to their database for updates of the street lighting network.

The current database shows that Council operates and maintains 2015 streetlights on 224 km of urban streets, that being an average of one light per 110 metres. A further 310 lights exist within the rural area. By definition the rural area includes small communities with speed restrictions greater than 50km/h. Council also operates on Transit New Zealand's behalf 25 rural lights, 39 urban lights and 27 pedestrian crossing lights within the District.

Valuation of the street lighting asset is not currently available.

Table X.6.1 Number of Streetlights by Cost Area and Light Type

Cost Area	Belisha Beacon	Fluorescent	High Pressure Sodium	Incandescent	Mercury Blended	Tungsten Halogen	Total
Balfour			32				32
Edendale			105	6			111
Lumsden		1	97	4			102
Manapouri		6	40	5			51
Mossburn			37				37
Nightcaps		1	90				91
Ohai		4	74	6	2		86
Otautau		3	153				156
Riversdale			53				53
Riverton		23	262	1			286
SH Rural			25				25
SH Urban			39				39
SH Ped. Cross.	17		8		2		27
Te Anau	4	12	396			1	413

Tuatapere		2	125	4			131
Wallacetown			73				73
Winton	7	30	213	16		1	267
Wyndham	2		122	2			126
Zone 1 Rural			54				54
Zone 2 Rural		4	19				23
Zone 3 Rural		9	95				104
Zone 4 Rural		1	29				30
Zone 5 Rural		1	47				48
Zone 6 Rural		1	47				48
Other			3				3
Total	30	98	2238	44	4	2	2416

6.2 Capacity

The performance of Council's street lighting has not been assessed. All new subdivisions must comply with SDC subdivision standards. These require street lighting to comply with NZS 6701: 1983 (Code of Practice for Road Lighting) or AS/NZ 1158 (Road Lighting)

Neither of these Standards prescribes a standard for the lighting of suburban/local roads or footpath areas. The SDC Subdivision Standards have adopted the following general principles for residential and local roads and cul-de-sacs:

- Adequate illumination to provide for safe and comfortable pedestrian movement, crime prevention and identification of premises.
- Lantern height between 5.5m and 7.5m.
- Uniform spacing of lighting columns with spacing preferably not exceeding 8 times the mounting height or 60m, whichever is the lesser. The spacing may be increased to the lesser of 12 times the mounting height or 80m if using existing service poles.
- Positioning of lanterns at intersections, sharp bends, noticeable crests and dips in the road.
- Design of the lighting columns in accordance with the joint AS/NZ Standard
- Lantern type preferably a 70-watt, high-pressure sodium vapour fitting.
- Pole type preferably Octlyte or similar segmental galvanised iron construction.

In addition, a Level of Service requirement for urban areas is to provide a lantern at every intersection. Generally Council has no street light implementation policy and lighting in the District has developed in a piece-meal manner. Standards have varied over time and in many cases have been modified to take advantage of existing poles.

Council's policy is that flag lighting will be provided at intersections where safety issues are identified that would be reduced by the installation of such lighting.

There have been no reported crashes since 1980 (CAS database) with a crash-related factor code from the "street lighting" 860-869 range.

The current level of complaints is negligible. Current levels of maintenance and renewals is adequate to satisfy the public demand. The Residents Opinion and Satisfaction survey includes a question on street lighting. Residents are asked how satisfied they are with the street lighting service and the satisfaction rate has steadily risen (apart from a drop in 2006) from 80.3% in 2002 to 86.3% in 2008. 2008 results are attached as Table X.6.4.

The street lighting inventory (Database) is not directly linked to RAMM making it difficult to report progress in compliance with the desired level of service. The current data is in the process of being transferred to the dedicated RAMM inventory and management module, SLIMM, but this has not yet been achieved. In the latest lighting maintenance contract the contractor is to provide, as a one-off deliverable a data accuracy check and a condition assessment of each light. Contractors response times are being monitored through escalation or non escalation of RFS's.

6.3 Condition

The condition of the street lighting inventory is not at this time rated in any formal way. (Refer to above). Maintenance and renewal programmes have been well funded in the recent years and the overall condition of the assets is considered to be satisfactory.

Routine maintenance is divided into two categories – planned and unplanned. Planned maintenance relates to the visual inspection of lighting on a six-weekly cycle to identify faulty lamps. There is no cyclic replacement of bulbs. Unplanned maintenance relates to the repairs carried out in response to reported problems or defects. It does not involve the repair of circuit faults that fall within the domain of the network company. Irregular inspections of poles are carried out to ensure the safety of these.

Maintenance and operation of street lighting is partially subsidised by NZTA under corridor maintenance. The subsidy applies to maintenance and power costs. There is no subsidy for amenity lighting or lighting not directly related to carriageway lighting.

6.4 Remaining Life

Replacement of streetlight assets occurs when:

- Faulty or damaged lanterns cannot be repaired because of obsolescence.
- When replacement is more economic than continuing repair.

Street lighting upgrading works have been largely driven by factors other than condition of the lanterns and the poles.

Poles are replaced when the network company judges that they are no longer structurally sound.

Table X.6.2 Original Age of Lanterns in 2001

Lamp Type	Date of Original Installation (Age in years)				
	1986-90 (11-15)	1991-95 (6-10)	1996-00 (1-5)	Unknown	Total
60W Belisha Beacon		5	16		21
100W Belisha Beacon	6	1		2	9
18W Fluorescent		15	1	1	17
20W Fluorescent			10		10
40W Fluorescent	63	1		4	68
60W Fluorescent	2				2
70W Fluorescent			1		1
50W High Pressure Sodium	10	3	38		51
70W High Pressure Sodium	425	463	1005	48	1952
100W High Pressure Sodium			1		1
110W High Pressure Sodium	25			1	26
150W High Pressure Sodium	47	48	42	5	142
250W High Pressure Sodium	19	7	39	1	66
60W Incandescent	6			12	18
100W Incandescent	12	10		3	25
150W Incandescent	1				1
160W Mercury Blended	2				2
250W Mercury Blended	1	1			2
20W Tungsten Halogen		1			1
1000W Tungsten Halogen			1		1
Totals	619	555	1154	77	2416

Table X.6.3 Valuation of the Street Lighting Asset (Not Currently Available)

Lamp Type	Number	Economic Life, years		Replacement Cost	
		Lantern	Lamp	Lantern*	Lamp
60W Belisha Beacon	21				
100W Belisha Beacon	9				
18W Fluorescent	17	15	2.8		
20W Fluorescent	10	15	2.8		
40W Fluorescent	68	15	2.8		
60W Fluorescent	2	15	2.8		
70W Fluorescent	1	15	2.8		
50W High Pressure Sodium	51	15	4.7		
70W High Pressure Sodium	1952	15	4.7		
100W High Pressure Sodium	1	15	4.7		
110W High Pressure Sodium	26	15	4.7		
150W High Pressure Sodium	142	15	4.7		
250W High Pressure Sodium	66	15	4.7		
60W Incandescent	18				
100W Incandescent	25				
150W Incandescent	1				
160W Mercury Blended	2	15	5.6		
250W Mercury Blended	2	15	5.6		
20W Tungsten Halogen	1				
1000W Tungsten Halogen	1				

* Approximate cost including installation of lantern, excluding poles and cables.

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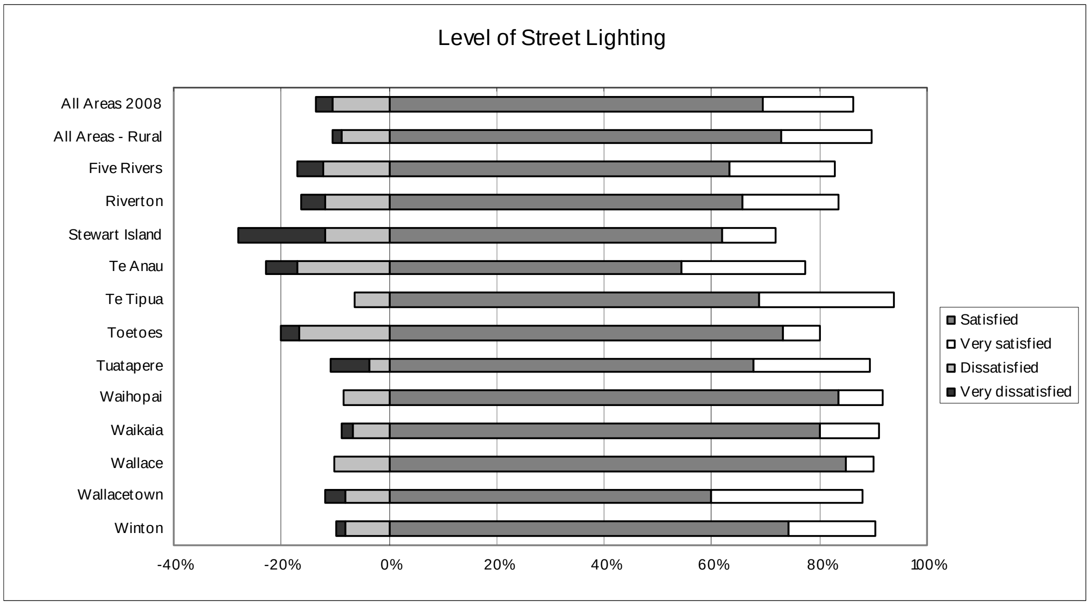
Table X.6.4 2008 Customer Satisfaction Survey Results – Street Lighting



Level of Street Lighting					
	Sample	Very Satisfied %	Satisfied %	Dissatisfied %	Very Dissatisfied %
All Areas 2003	679	11.9	68.6	15.1	4.4
All Areas 2004	595	13.9	70.0	12.4	3.7
All Areas 2005	548	11.7	72.6	13.0	2.7
All Areas 2006	544	10.6	71.1	15.2	3.1
All Areas 2007	472	18.2	66.1	11.7	4.0
All Areas 2008	490	16.9%	69.4%	10.4%	3.3%
All Areas Rural	125	16.8%	72.8%	8.8%	1.6%
Five Rivers	41	19.5%	63.4%	12.2%	4.9%
Riverton	67	17.9%	65.7%	11.9%	4.5%
Stewart Island	50	10.0%	62.0%	12.0%	16.0%
Te Anau	70	22.9%	54.3%	17.1%	5.7%
Te Tipua	32	25.0%	68.8%	6.3%	-
Toetoes	30	6.7%	73.3%	16.7%	3.3%
Tuatapere	28	21.4%	67.9%	3.6%	7.1%
Waihopai	12	8.3%	83.3%	8.3%	-
Waikaia	45	11.1%	80.0%	6.7%	2.2%
Wallace	40	5.0%	85.0%	10.0%	-
Wallacetown	25	28.0%	60.0%	8.0%	4.0%
Winton	62	16.1%	74.2%	8.1%	1.6%

Residents from Stewart Island (28%), Te Anau (23%), and Toetoes (20%) and were most likely to be dissatisfied with street lighting.

6.5 Issues

- There is a need to ensure that the streetlights maintenance contractor completes the data accuracy check and the condition rating for each light as provided in the contract. The data needs to be entered into the RAMM database inventory and management module SLIMM and allow for upgrades and new subdivisions to be updated. This work should ideally be completed within the next calendar year.

- A database in SLIMM would allow for reports to be generated to assist with monitoring of the performance of the lights and the streetlights maintenance contractor.

7. Road Signs, Marking and Traffic Control Devices

7.1 Introduction and Overview

Traffic control devices are used for the orderly control of vehicles and people on public roads. Their function is to regulate, warn, guide and inform. Their ongoing adequate performance is therefore critical to helping provide a safe consistent roading network.

Traffic control on Council owned roads is provided by the use of signs, markings, reflectorised raised pavement markers (RRPM) and edge marker posts (EMP). Additional traffic control devices present on Council roads include pedestrian crossings, roundabouts and railway level crossings.

Road Signs

A road signs inventory is held within RAMM. Information kept includes sign type, material, size, location and details of the support post it is attached to. New signs are added to the database on a regular basis, corrections made when incorrect data found and alterations made to existing sign data when changes occur with any sign. The database is considered to be 99% complete. A summary of the inventory data and value is provided in Table X.7.1.

Road signs installed are generally as prescribed by the Manual of Traffic Signs and Markings and manufactured to the standards outlined in the Road Safety Manufacturers Association's Compliance Standard for Traffic Signs.

Table X.7.1 Road Sign Types and Value

Asset Description	Quantity	Unit	Replacement Cost	Depreciaed Replacement Cost	Annual Depreciation
Guide	1,484	each	$241,210	$120,647	$29,509
Hazard Markings	848	each	$403,409	$201,706	$40,341
Heritage Trail	196	each	$50,823	$25,411	$5,082
Information General	23	each	$2,965	$1,482	$371
Information signs	3,881	each	$512,087	$256,060	$62,192
Local Authority	361	each	$87,489	$43,744	$10,482
Motorist Services	143	each	$37,452	$18,726	$4,682
Permanent Warning	6,695	each	$899,414	$449,728	$109,835
RAPID sign	7,668	each	$164,095	$82,048	$20,474
Regulatory General	2,931	each	$337,837	$169,067	$37,000
Regulatory Heavy Vehic	127	each	$28,543	$14,271	$3,568
Regulatory Parking	296	each	$19,228	$9,614	$2,403
Temporary Warning	205	each	$53,939	$26,969	$5,426
Tourist	143	each	$69,944	$34,971	$8,743
Aluminium Posts	648	each	$271,925	$135,962	$10,877
Plastic Posts	57	each	$3,567	$1,784	$713
Steel Posts	7679	each	$282,253	$141,127	$11,290
Wood Posts	10535	each	$766,715	$383,358	$51,114
Totals			**$4,232,896**	**$2,116,676**	**$414,101**

Markings and RRPMs

The markings asset is maintained under three separate P20 performance based contracts. Markings in each contract area were upgraded to reflectorised marking at the start of the individual contracts and are maintained to the standards specified in the contracts. Waterborne paint is used for all standard marking activities.

An inventory of markings is maintained within RAMM for the North-West and South East contract areas and is estimated to be 80-85% complete. The inventory of the Central area markings is not currently available in RAMM. The data is however in the process of being evaluated upon which it will be loaded into RAMM. The following summary of markings is a partial summary showing the main components that make up approximately 85% of the total asset (this includes the Central area markings). Tables X.7.2 and X.7.3.

RRPMs provide both night-time and wet weather delineation aid as well as providing an audible and tactile warning when crossed by vehicle wheels. RRPMs are installed and maintained under the 3 marking contracts. They are installed on all Group 1 roads over 6.5m wide and all Group 2 roads over 6.5m wide that are joined at both ends by a Group 1 road or a State Highway. RRPM's may be considered on a case by case basis on narrower roads. There are approximately 163km of road with RRPMs installed.

Table X.7.2 Pavement Markings Value

Asset Description	Quantity	Unit	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
RRPMs @ 20m centres	8350	each	$94,355	$47,178	$18,871
Markings	1	LS	$405,001	$405,001	$0

Table X.7.3 Pavement Markings Types and Quantities

Item	Unit	Quantity
Centre Lines (dashed and continuous)	km	1633
Edge Lines (all widths)	lane km	764
No Overtaking Lines (continuous and advance)	lane km	179
No Stopping Lines	km	11.2
White Limit Lines	each	22,466
Yellow Limit Lines	each	2,766
Pedestrian Crossings	each	17

Pedestrian Crossings

There are currently 17 formal pedestrian crossings in the district. Seven of these are used as school crossings. An audit was carried out on all crossings in 2005 after the introduction of the new Land Transport Rule: Traffic Control Devices 2004 and the requirements for pedestrian crossings it contained (as outlined in Traffic Note 1 Revision 1). None of the existing crossings would pass the warrant requirements for a crossing based on the traffic volumes and pedestrian numbers involved.

Table X.7.4 Details of Pedestrian Crossings

Crossing Location	Township	Use
Seaward Road	Edendale	General purpose
Birchwood Road	Ohai	General purpose
Alderly Street	Otautau	General purpose
Main Street at Alderly Street	Otautau	General purpose
Main Street at George Street	Otautau	School crossing
Taramea Bay Road	Riverton	General purpose
Howden Street	Te Anau	School crossing
Lakefront Drive	Te Anau	General purpose
Milford Crescent at Bligh Street	Te Anau	School crossing
Milford Crescent at The Lane	Te Anau	General purpose
Dunlop Street	Wallacetown	School crossing
Eglinton Street	Winton	School crossing
Mackenzie Street	Winton	School crossing
Wemyss Street	Winton	General purpose
Balaclava Street	Wyndham	General purpose
Ferry Street	Wyndham	General purpose
Florence Street	Wyndham	School crossing

Roundabouts

There are two roundabouts on the network, both in Te Anau. One is at the intersection of Lakefront Drive-Town Centre-Te Anau Terrace and the other is at the intersection of Park Lane-Little Park Lane-Garage Lane. Roundabouts are not recorded as assets in their own right, but the component kerbing, pavement, signs and markings are included under their respective headings.

Railway Level Crossings

There are a total of 48 level crossings in the network made up of both active and passive crossings. Active crossing are those controlled by bells and lights while passive crossings are controlled by signs only. The crossings in the network are made up of:

- 4 active crossings on the Main South Line (MSL)
- 11 passive crossings on the MSL
- 3 active crossings on the Ohai line
- 28 passive crossings on the Ohai line
- 2 passive crossings on the Kingston Flyer route

An upgrade of all railway signs was completed in 2000. Maintenance of the crossing control signs (striped poles, crossbucks, stop/give way signs) are now the responsibility of the track owner/operator while all warning signs leading up to the crossings and road markings are the Council's responsibility.

Control Structures

There are a number control structures on the network. These include threshold treatments at the entrances to various townships, which are designed to slow down traffic. These also include pedestrian refuges and traffic islands.

The sections of kerb or kerb and channel which form part of these control structures are recorded in the RAMM drainage tables, and any extra area of footpath associated with pedestrian refuges is recorded in the RAMM footpath tables.

As they are recorded in RAMM they are valued as part of these assets.

The landscaped areas in threshold treatments is not recorded currently. The area inside traffic islands is recorded as 7,407m^2 but this does not record the type of island.

These assets are maintained under various relevant sections of the routine maintenance contracts.

Additional Delineation and Safety Devices

These include edge marker posts, sight rails and guardrails. The first two are primarily to mark where the roads goes and hazards while guardrail is provided to deflect a stray vehicle back onto the carriageway.

Edge marker posts are not recorded separately in RAMM but they are valued on the basis of an estimated number of 30,612.

Sight rails and guardrails are generally assumed to be attached to bridges and valued as part of these structures. There is 1,708m of sight rail which has been valued separately.

These assets are maintained under various relevant sections of the routine maintenance contracts.

7.2 Capacity

Road Signs

There are no capacity issues with this asset type.

Markings, RRPMs, EMP's and Traffic Islands

There are no capacity issues with this asset type.

Pedestrian Crossings/Refuges

There are no over-capacity issues with this asset type. Traffic and pedestrian numbers are low enough that under-capacity is more of an issue. It should be considered whether there are better alternatives to the current pedestrian crossings.

Roundabouts

There are no capacity issues with this asset type. Traffic volumes are low enough at both existing roundabouts that delays are not an issue now or in the foreseeable future. There are no anticipated high growth areas where a new roundabout would be required.

Railway Level Crossings/Control Structures/Guardrails/Sight Rails

There are no capacity issues with these asset types.

7.3 Condition

Road Signs

Road signs are inspected on a cyclic basis with two wards being covered each month and all signs within those wards being looked at. Under this regime all signs will be inspected twice a year. The only exception to this programme is Stewart Island. These road signs are inspected yearly. In addition a number of roads have been identified as strategic in terms of traffic volume or route importance. These roads have an increased inspection regime with signs on them being inspected 4 times a year. The signs maintenance contract contains a list of these roads.

Sign reflectivity is generally engineering grade (Class 2). To date this has been seen as sufficient as the network is predominantly rural with no competing light sources. Exceptions to this include all railway signs and hazard markers (high intensity is a minimum requirement for these). “STOP” and “GIVE WAY” signs are also being upgraded with high intensity material as a need to replace them arises. This is a long term upgrade and could take 5-10 years to complete.

Markings, RRPMs and EMP’s

The condition of markings will vary greatly due to their short life span. They are repainted as required as a maintenance item.

RRPMs and EMP’s are replaced or cleaned as required as a maintenance item.

Pedestrian Crossings

The asset is maintained under the various road sign and marking contracts. They receive regular inspections and maintenance as required.

Roundabouts/Traffic Islands/Pedestrian Refuges/Threshold Treatments

Not recorded as separate assets, but maintained as part of routine maintenance of the roading asset.

Railway Level Crossings

Not a Council asset. The signs and markings associated with the crossings are covered under their respective headings.

Guardrails and Sight Rails

Maintained on an as required basis generally as part of routine bridge maintenance. Where guardrails and sight rails are separate from bridges they need to be recorded and added into a maintenance schedule. Recording of these has taken place on the seal road network.

7.4 Remaining Life

Road Signs/EMP’s

Given the number of individual components that make up these assets it is not realistic to maintain accurate data on age and remaining life. Historical financial data indicates that approximately 10% of the asset is replaced each year. This indicates an average age of 5 years with a remaining life expectancy of 5 years.

Markings and RRPMs

A requirement of a P20 performance based pavement marking contract is that there must be a minimum of three months of remaining life left at the end of the contract. In the past markings have been considered a maintenance item with no remaining life calculated.

Pedestrian Crossings

Remaining life is a product of the road signs and markings. Signs can be estimated at 5 years remaining life and markings are considered a maintenance item with no remaining life calculated.

Roundabouts/Traffic Islands/Pedestrian Refuges/Threshold Treatments

Not recorded as separate assets. The remaining lives will be governed by the lives of their component posts.

Railway Level Crossings

Not a Council asset.

Guardrails/Sight Rails

These are not fully or individually scheduled. The assets would be assumed to have a total useful life of approximately 20 years and on average to be halfway through this.

7.5 Issues

Road Signs

- A move away from engineering grade reflective material will have a 10-20% impact on the cost of maintaining the road sign asset. Anecdotal evidence indicates the likelihood of engineering grade material no longer being available in the future.
- There are estimated to be 970 uncontrolled intersections remaining on the network. The majority of these will be the intersection of 2 minor roads. Some investigation will be required on many of these to establish the priority route before a control sign can be installed. The need for physical works is also likely at many to make the control obvious and safe.
- Blue road name blades (RNB) were installed around the district between 1993-1996. They were installed at each end of all roads and at cross intersections. This has left a gap along roads with side road intersections. The side road has a RNB visible along the through road but there is no RNB for drivers exiting the side road. RNB's are desirable here for guidance and also to provide reflectorisation at an intersection that may have no other visible backdrop.
- End of maintained network signs have been installed at 20 sites where it is deemed important that the public understand that the roads/tracks beyond the signs are not maintained by SDC and therefore they need to take appropriate care. Ongoing monitoring of the network is required to identify additional sites where these signs would provide useful benefits. Two different situations exist which both involve the end of the maintained public network, these are:
  - Where the ongoing road/track is on public legal road.
  - Where the ongoing road/track is on private property.
  - Make the control obvious and safe.
- The curve warning signs need to be reviewed using the High Speed Data now available to check locations for inconsistent curve warning signs or locations that should have them but do not. The review also needs to look at which of these locations would benefit from back up chevrons.

Markings and RRPMs

- Council use P20 performance based contracts for all pavement marking.
- A performance based specification allows for different components of the markings to be remarked at different times as long as they remain above the minimum requirements. This creates inconsistencies in the standard of markings with sudden changes in the appearance of the marking occurring at random points.
- The contractors have difficulty keeping all markings above the minimum standard during the winter months. Remarking during the winter can be difficult for reasons of weather and road conditions due to stock and farm vehicle activities along the road margins.
- Inventory data for markings and RRPMs need to be completed.
- The overall network needs to be reviewed to ensure no passing lanes are provided in all locations where they are required.

Pedestrian Crossings

- Recommendations from crossing audit are to be implemented.
- The need for each crossing should be accessed and alternatives looked at as a long term objective.

Roundabouts

- No issues.

Railway Level Crossings

- No major issues with this asset that Council are responsible for.

Guardrails

- Programme of improved guardrailing needs to be developed. This is part of the development of the deficiency database.

8. Miscellaneous Activities

8.a Public Transport (Including Bus Shelters, Park and Ride Facilities, Wharves and Jetties)

8.a.1 Introduction and Overview

Southland District Council currently have no bus shelters or park and ride facilities although there are informal parking locations where people meet to rideshare.

Those wharfs and jetties owned or controlled by the Southland District Council will be covered in a separate Activity Management Plan.

Council contributes to the "Total Mobility Scheme" which helps to ensure that transportation is available for all members of the Southland community, including those with limited mobility.

Over the first 18 months of this Plan, Council will review the need for and the systems required to establish a public transport system within the District. By year 3, if warranted this may be up and running.

Further detail on this is provided in Appendix F.

8.b Noxious Plants

8.b.1 Introduction and Overview

The Council has responsibility under the Regional Pest Plant Strategy formulated under the Biosecurity Act 1993, to control pest plants on the maintained roads. The Councils' chosen method for dealing with this is to contract the work out. In the past a number of contracts have been let to agricultural chemical applicators. Typically there was one contract per ward although some wards were split into two contracts. This required significant administration to manage. Rates were raised in each ward to fund this work. The targeted pest plants were gorse and broom in all areas and Barberry and ragwort in certain areas.

8.b.2 Delivery of Service

The control of pest plants has now been incorporated in the maintenance contracts. This means the responsibility for achieving plant control lies with the maintenance contractor. The methods they use are up to them choose, it is only the end result that the Council is interested in. The contract requires that there be no plants on the roads when surveyed at six monthly intervals during the year. The contractor can employ mechanical methods, e.g. cutting or digging to control them or use chemicals if they choose.

In reality at this time they have chosen to employ sub-contractors to apply chemicals to achieve the control necessary. Ragwort and hemlock are now required to be controlled right across the District.

8.b.3 Funding

The funding for this activity is incorporated in the rates for roading. This means it is a uniform cost across the District. The scope of the work is set by the Regional Pest Plant Strategies.

9. Summary

The Southland District Council's network is reasonably mature and developed. This means that there is not much new development work required, but there is significant pressure to maintain and improve the network that the District already has.

This pressure comes from the combination of:

i) Increasing use and damage by heavy vehicles;

ii) Greater customer expectations;

iii) A national drive to improve road user safety; and

iv) The relatively short timeframe that the bulk of the sealed network was developed with much of this is reaching the end of its economic life.

Southland's legal road reserve network is approximately twice the length of the formed/maintained network. There are a number of formed roads/tracks including some bridges on the non maintained parts of the network that could cause liability problems.

10. Policy and Procedural Implications

With the pressures mentioned in X.9 Summary, Council will need to continue to balance its ability to maintain and enhance the network from a funding point of view against providing a lower level of service (LOS) at a lower cost or obtaining funding through alternative sources.

This current Plan is based on achieving and maintaining the LOS detailed in the Plan which appears to be what the Districts' residents are comfortable with.

Council has an Extent of Network Policy which attempts to define the limit of the network at particular points along legal road reserves. The Policy to date has been used on a case by case basis as issues come up. It has not been proactively applied to define the end point at which Council's responsibility for maintenance of the network finishes. In a limited number of cases signs have been put up to warn the public that a certain point is the end of the network maintained by Council.

A proactive application of the Extent of Network Policy (with appropriate signage) has the potential to better define what part of the network Council has responsibility for. This is particularly critical where there are structures on the road such as bridges and retaining walls which are not being maintained or monitored by Council, as well as areas where slips or washouts may occur.

Accurately defining the extent of the network will help clarify issues for maintenance contractors and potentially lead to a slightly smaller overall network size leading to lower maintenance costs. It may also lead to some political issues if some ratepayers have to take responsibility for a section of road which is essentially an extension of their own driveway/access.

From a safety perspective, having greater control on where utility poles can be located would provide a safety benefit. Currently these poles can be placed in the road reserve "as of right" with suitable conditions from the Council. Due to aerial trespass requirements the poles are often well off the boundary fence to avoid lines straying across the boundary.

11. Future Action and Improvements

Schedule - Future Improvement Priorities

Ref. No.	Item	Appendix Relative Urgency 1	2	3	4	5	6	Comments
X1	Investigations are required to improve the understanding of the relationship between maintenance techniques and the performance of unsealed roads					✓		Under action through Alliance Contract.
X2	Investigate and identify an appropriate gravel road rating system. Needs to be identified and implemented for unsealed road maintenance					✓		Under action through Alliance Contract.
X3	Investigate improved techniques for metalled surfaces					✓		Under action through Alliance Contract.
X4	Investigate whether stabilising agents produce any economic benefit to the road network					✓		Under action through Alliance Contract.
X5	Carry out a new inventory survey to check gravel road widths against full contract compliance and progress to target widths					✓		No longer required.
X6	Continue involvement in national study of gravel loss to allow better management of asset and more accurate calculation of depreciation					✓		Complete
X7	The detailed inspections of the all of the District's bridges need to be completed			✓				To complete.
X8	A detailed 10 year bridge replacement programme needs to be completed and agreed after completion of the inspections			✓				To complete.
X9	Carry out a review of past bridge replacements and upgrades to assist in developing end of life predictions for the bridge inventory					✓		Due by June 2011.
X10	The full culvert inventory including size, location, material and condition needs to be completed to allow and better management of the asset					✓		In progress.
X11	Greater priority needs to be given to improving the earth surface water channels to get the maximum life out of pavements. The maintenance contractors need to ensure that all of the poorest earth surface water channels (rated 4 and 5) are reformed as a top priority					✓		Under action. Business as usual.

Ref. No.	Item	Appendix Relative Urgency						Comments
X12	In the future the valuation of the roading asset should include the value of catch pits, sumps and their connection to the reticulated stormwater system					✓		Value within RAMM.
X13	The lack of records relating to extent, location, condition and future maintenance requirements prevents good long term planning for footpaths. Over a three year period this information can be gathered and full plans put in place					✓		Refer F18.
X14	Use footpath condition information to produce an upgrading and replacement programme, along with defined levels of service					✓		Refer F18.
X15	There is a need to ensure that the streetlights maintenance contractor completes the data accuracy check and the condition rating for each light as provided in the contract					✓		Refer F23.
X16	There is no method available at this stage to monitor the performance of the streetlights maintenance contractor particularly with respect to the meeting of the response times that are set in the contract. A database in SLIMM would allow for reports to be generated to complete this monitoring					✓		In progress.
X17	Where guardrails and sight rails are separate from bridges they need to be recorded and added into a maintenance schedule					✓		Have picked up on sealed roads.
X18	A proactive application of the Extent of Network Policy (with appropriate signage) has the potential to better define what part of the network Council has responsibility for. This is particularly critical where there are structures on the road such as bridges and retaining walls which are not being maintained or monitored by Council, as well as areas where slips or washouts may occur					✓		Refer R22.
X19	From a safety perspective, having greater control on where utility poles can be located would provide a safety benefit					✓		Refer E03.

Ref. No.	Item	Appendix Relative Urgency						Comments
X20	Complete review and follow up of skid resistance measurements				✓			Covered by W1.
X21	Resolve Stewart Island's roading needs					✓		Now business as usual activity.
X22	Collect more condition rating information on gravel roads						✓	In progress. Refer also X2.
X23	Monitor move away from Engineering Grade reflective material for signs and the effects on traffic services budgets					✓		Covered by F22. Ongoing business as usual.
X24	Work through remaining uncontrolled intersections to determine what to do in relation to control and priority					✓		Covered by F20.
X25	Replace/remove yellow fingerboard signs over time					✓		Ongoing business as usual.
X26	Look at installing RNB's at heads of T intersections						✓	Look at alongside F21.
X27	Monitor network for addition of end of maintained network signs					✓		Look at alongside F22.
X28	Review use/application of P20 performance based pavement marking contracts				✓			Complete/monitor.
X29	Review network in terms of need for no passing lines					✓		In progress.
X30	Complete inventory data for pavement marking and RRPM's					✓		Refer to W3.
X31	Implement recommendations from pedestrian crossing audit				✓			Complete.
X32	Complete holdlines at pedestrian crossings by 30 June 2006			✓				Complete.
X33	Provide new signs at roundabouts by end of 2007					✓		Complete.
X34	Develop programme of improving guardrails (in terms of end treatments) and providing in high risk locations					✓		Refer also F15.
X35	Community Boards and Community Development Area Committees need to make decisions about renewal and new capital works in their areas. These local people set the priorities for their township. The costs are budgeted from local rates and are included within each areas account				✓			Refer F18.
X36	Use condition information to produce an upgrading and replacement programme for footpaths, along with defined levels of service.				✓			Refer F18.

Ref. No.	Item	Appendix Relative Urgency						Comments
X37	The curve warning signs need to be reviewed using the High Speed Data now available to check locations for inconsistent curve warning signs or locations that should have them but do not. The review also needs to look at which of these locations would benefit from back up chevrons.				✓			Refer X29.
X38	Many roads exceed the recommended traffic volume for their width. These issues are discussed in Appendix F, Attachment C					✓		A long term programme is not required at this stage.
X39	Stewart Island's roads do not meet the road group standards and to meet the standards would be inappropriate. The integrity of the network is at risk from coastal erosion, poor drainage and lack of aggregate sources on the island.					✓		Progress has been made on these issues and more will be by June 2009.
X40	There are also other parts of the network that are at risk from coastal erosion.					✓		Develop list/action plan.
X41	Use the programme of falling weight deflectometer testing to further knowledge of the network.					✓		In progress. Refer F28.
X42	Investigations are required to improve the understanding of the relationship between maintenance techniques and the performance of sealed roads.					✓		Current industry good practice techniques being used.
X43	Continue to upgrade classification of existing pavements/treatment lengths to allow easier analysis considering age, loading, critical demands and pavement condition characteristics, and analyse the condition rating information against these					✓		Refer to F28.

Key:

1 = Extremely urgent (needs to be addressed now)
2 = Very urgent
3 = Urgent
4 = Reasonably or fairly urgent
5 = Not urgent
6 = A good idea for some time in the future