

Queenstown to Rangitata

CORRIDOR MANAGEMENT PLAN

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2018-2028

Table of contents

Executive summary	i
Introduction	1
Purpose	1
The corridor at a glance	2
Corridor overview	2
The regional economy	2
Understanding our customers	3
Key customers	3
How we deliver services along the corridor	5
Transport partners	5
Network Outcomes Contracts approach	6
Drivers for change	7
Understanding customer levels of service on the corridor	8
Current levels of service performance.....	8
Improving the customer experience.....	10
Access	11
Resilience	15
Reliability and efficiency	17
Safety	19
People, places, and environment	21
Understanding the infrastructure assets	23
Asset condition and performance	24
Asset condition and performance pressures	30
Asset condition and performance future considerations	30
Investing in the corridor	31
Summary investment	31
Investing in access and resilience	33
Investing in reliability and efficiency	36
Investing in safety	38
Investing in people, places and environment	40
Investment pressures	42
Investment future considerations	43
Appendix A – Information sources	44

Table of figures

Figure 1 - Performance of the corridor against ONRC outcomes	i
Figure 2 - Corridor management plan framework	1
Figure 3 - Corridor overview	2
Figure 4 - Key customers, journeys, and destinations	3
Figure 5 - Map of associated local authorities	5
Figure 6 - NOC process.....	6
Figure 7 - Current ONRC levels of service performance	8
Figure 8 - Significant corridor planned improvements	10
Figure 9 - Corridor characteristics	11
Figure 10 - Horizontal alignment	12
Figure 11 - Corridor capacity	13
Figure 12 - Resilience	15
Figure 13 - Reliability and efficiency	17
Figure 14 - Safety	19
Figure 15 - People, places, and environment.....	21
Figure 16 - Corridor asset base	23
Figure 17 - Summary asset condition and performance	23
Figure 18 - Asset condition 1	24
Figure 19 - Asset condition 2	25
Figure 20 - Asset condition 3.....	26
Figure 21 - Asset condition 4.....	27
Figure 22 - Asset condition 5.....	28
Figure 23 - Asset condition 6.....	29
Figure 24 - Corridor investment.....	31
Figure 25 - Access and resilience investment.....	33
Figure 26 - Access and resilience investment 2	34
Figure 27 - Reliability and efficiency investment	36
Figure 28 - Safety investment	38
Figure 29 - People, places and environment investment.....	40

Executive summary

The Queenstown to Rangitata corridor comprises: SH6A from Frankton to Queenstown, SH6 from Frankton to Cromwell and onward to the Haast Pass turnoff, SH8A from Tarras to Luggate, SH8B linking SH6 and SH8 at Cromwell, SH8 from Cromwell to Washdyke, SH79 from Fairlie to Rangitata, SH80 from SH8 to Mount Cook Village, SH82 from Kurow to north of Waimate, SH83 from Omarama to Pukeuri, and, SH84 from Haast Pass turnoff to Wanaka.

The corridor is approximately 723 km long (6.3% of the state highway network). The total value of assets along the corridor is \$745M (3.2% of the total national asset value).

The corridor is the primary inland route connecting Canterbury and the inland Otago, which are also linked by international airports in Queenstown and Christchurch. The topography of the corridor is variable and includes coastal and rolling terrain, travels alongside lakes, alpine areas, gorges and mountain passes. The scenic opportunities contribute to its increasing appeal as a key journey. However, the isolated nature of the corridor means there are limited alternatives for travel between the two regions.

Visitors make up an increasing percentage of road users on the Queenstown to Rangitata corridor, with freight growth on selected parts of the corridor. High levels of commuter traffic occur predominately along SH6/SH6A between Cromwell and Queenstown, with these areas experiencing significant population growth.

The corridor connects some of the most popular tourism destinations in New Zealand. The corridor is a journey in itself, due to the stunning alpine environment created by the Southern Alps. In addition to tourism, the predominant customers are freight, rural dwellers, and commuters specifically in the Queenstown Lakes District.

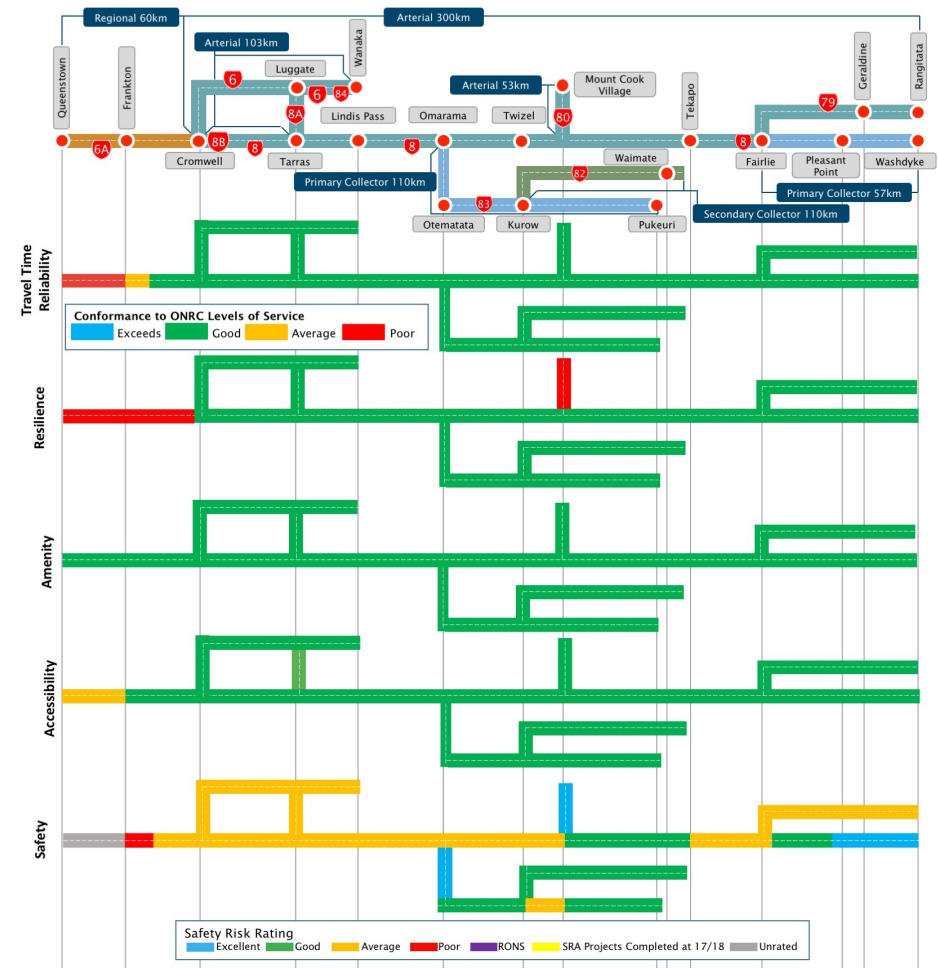
The Queenstown Lakes District (including parts of Central Otago District) is under considerable pressure from the rate of population and tourism growth. Tourist numbers in New Zealand are projected to increase from over 3 million in 2015 to just over 4.5 million in 2022. The regions expected to experience the highest tourist numbers include Canterbury and Otago. Residential development along SH6 and SH6A is increasing pressure on these sections of highway. Delayed investment decisions have contributed to the inefficient operation of SH6A and parts of SH6 towards Lake Hayes.

Tourists have certain expectations from their journey, which the corridor currently does not provide. For example, journey time reliability is regularly affected by congestion in the Queenstown Lakes District, and snow and ice during winter across the whole corridor. The scenery along the journey requires regular and safe stopping points for photo opportunities; these are not currently provided at many popular photo locations.

The vulnerability of the corridor to natural hazards and winter weather conditions, such as snow and ice, requires proactive management and real-time availability of information to all customers.

Freight movements are projected to increase. This is largely due to the need to supply services to the growing tourism and construction industries, and the increasing conversion of land to dairying, especially throughout the Mackenzie District.

Figure 1 - Performance of the corridor against ONRC outcomes



The highest priority for this corridor is investment in transport capacity and proactive management of travel demand within the Queenstown Lakes District. This area and the balance of the corridor also require a stronger focus on understanding and responding to tourist expectations from this journey.

Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Queenstown to Rangitata corridor, as measured against the One Road Network Classification performance framework. It is intended to describe the investment story, i.e. why invest in this corridor, in a context everyone can understand whether the activities are delivered through investment in the State Highways maintenance, operations, renewals and improvements programmes.

The corridor management plan considers a combination of:

- The **pressures** on the system that are resulting in increased demand or a reduction in levels of service
- The **current state** of the system and how it is performing
- The **response** the Agency is investing in to deliver the customer levels of service along the corridor.

It is important to note that this is a first-generation Corridor Management Plan, therefore, we expect it to be improved as we learn from this approach. It sets a firm foundation to improve from in the next 2-3 years, utilising a common framework and consistent data sets across the 30 corridors.

Why is it needed?

The Corridor Management Plan provides a link between the long-term planning outlook, the 10-year medium term investment programme, and the 3-year land transport programmes for the next funding round.

Traditionally, the approach to investing in maintenance and renewals is to consider each asset activity in isolation, i.e. pavement, structures, drainage, and in isolation of capital expenditure. The Corridor Management Plan approach considers all assets within the corridor and takes a holistic view of the customer levels of service they provide throughout the corridor.

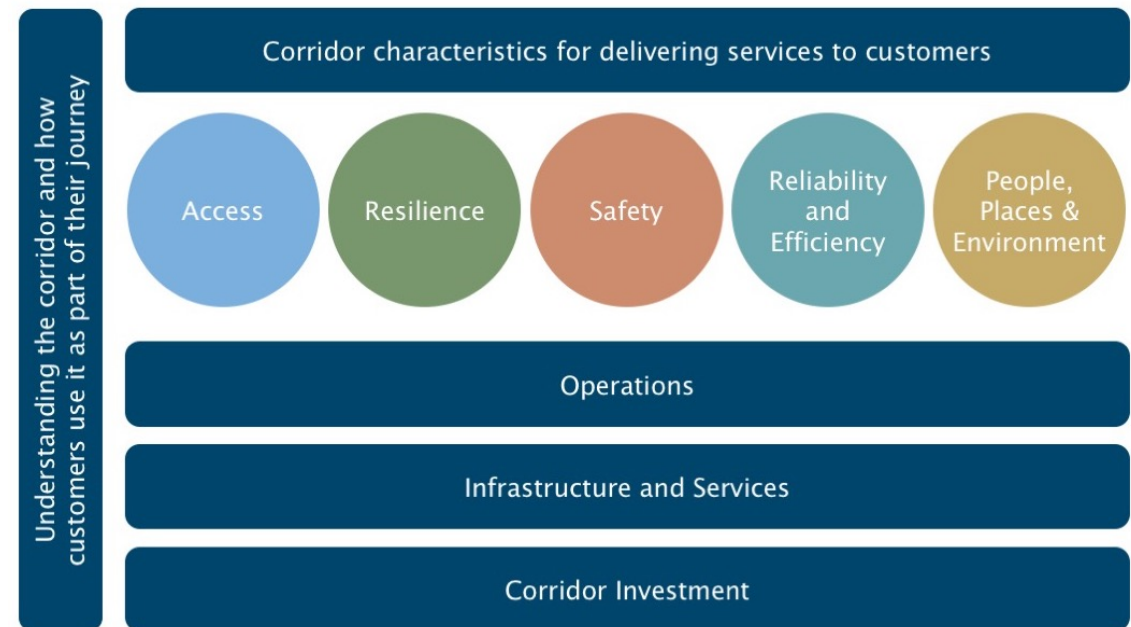
Planning is currently undertaken at the regional level, but significant journeys typically traverse more than one region. By considering these significant customer journeys and destinations, the Corridor Management Plan is a vehicle to engage in regional and inter-regional conversations. This is done by focusing on the issues that are important and that may extend beyond the state highways network.

How will we use it?

The Corridor Management Plan will provide the customer story and case for investment in maintenance, renewal and improvement on the corridor. This is based on targeting maintenance to achieve the appropriate customer levels of service within the context of providing value for money. The information presented helps to inform the business case for investment in state highways for the subsequent triennial period.

In conjunction with the long-term view, the Corridor Management Plan will provide for engagement with key stakeholders and partners to shape the future of the corridor. It responds to the needs of the users of the corridor to shape the future service levels.

Figure 2 – Corridor management plan framework



The corridor at a glance

Corridor overview

The Queenstown to Rangitata corridor comprises: SH6A from Frankton to Queenstown, SH6 from Frankton to Cromwell and onward to the Haast Pass turnoff, SH8A from Tarras to Luggate, SH8B linking SH6 and SH8 at Cromwell, SH8 from Cromwell to Washdyke, SH79 from Fairlie to Rangitata, SH80 from SH8 to Mount Cook Village, SH82 from Kurow to north of Waimate, SH83 from Omarama to Pukeuri, and, SH84 from Haast Pass turnoff to Wanaka.

The corridor is the primary inland route connecting Canterbury and the inland Otago, which are also linked by international airports in Queenstown and Christchurch. The topography of the corridor is variable and includes coastal and rolling terrain, travels alongside lakes, alpine areas, gorges and mountain passes. The scenic opportunities contribute to its increasing appeal as a key journey. However, the isolated nature of the corridor means there are limited alternatives for travel between the two regions.

Visitors make up an increasing percentage of road users on the Queenstown to Rangitata route, with freight growth on selected parts of the corridor. High levels of commuter traffic occur predominately along SH6/SH6A between Cromwell and Queenstown, and to a lesser extent, Wanaka and Queenstown, with these areas experiencing significant population growth.

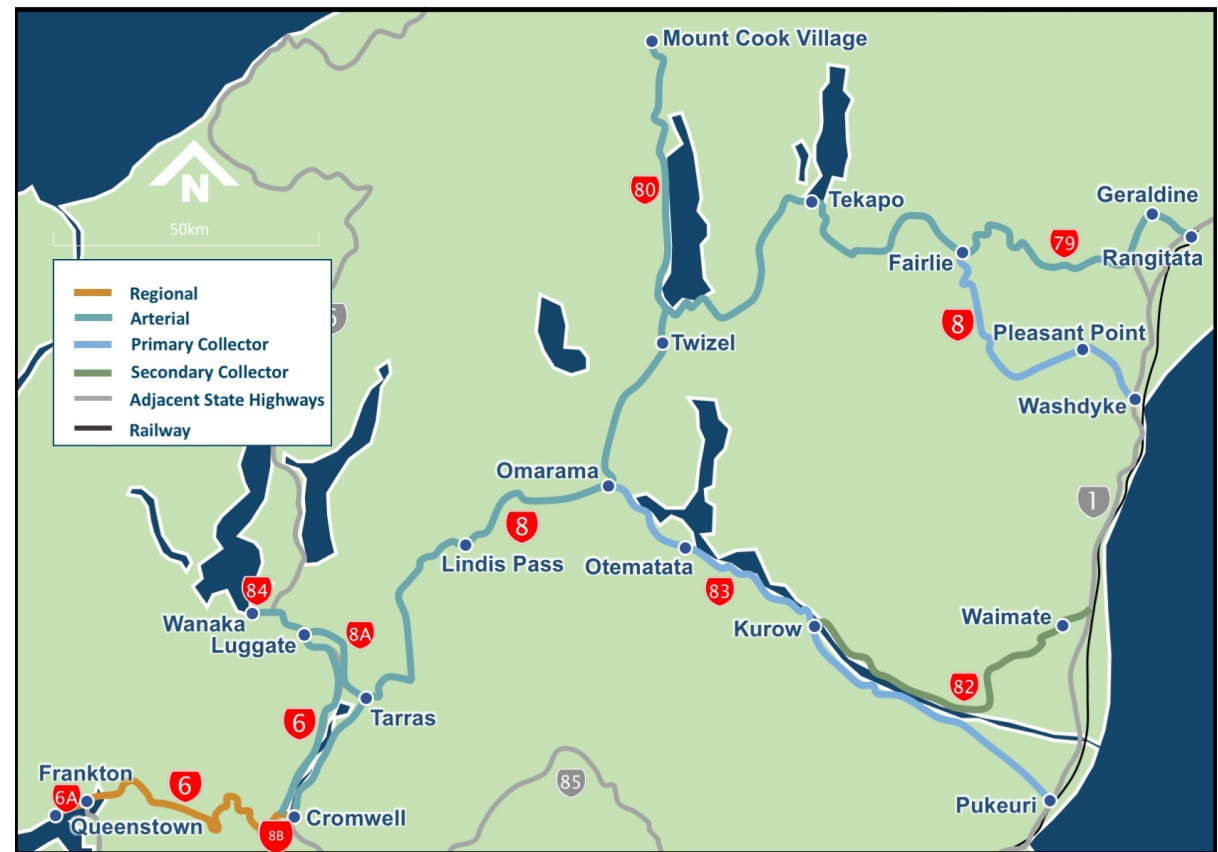
The regional economy

Canterbury and Otago have estimated regional populations of 586,400 and 215,000 respectively, with over 80% of people living in the main urban areas of Christchurch and Dunedin, both of which are outside the corridor. The remaining 20% are dispersed throughout the rural area and rely heavily on the corridor for their economy and community needs.

The Canterbury region generates 13.6% of New Zealand's Gross Domestic Product (GDP). Within the corridor, the main industry that contributes to this is agriculture, particularly dairy farming. North Otago, Mackenzie District and Waimate have experienced considerable growth in dairying over the past 10 years with investment in irrigation which is continuing to increase dairy outputs.

The Otago region generates 4.2% of New Zealand's GDP with tourism being the main industry. Viticulture and horticulture are the main primary industries in the region. Over the past 10 years, resident population growth in the Queenstown Lakes District has been among the highest in New Zealand. The populations of Queenstown, Wanaka and Cromwell increase to three times their usual size during the summer and winter peaks. Queenstown receives 20% of the total visitor spend in New Zealand and is recognised as a world-class tourist destination. Smaller areas throughout the corridor such as the Mackenzie Basin and Waitaki also benefit heavily from international tourism. Safe and reliable transport infrastructure along the Queenstown to Rangitata corridor is a critical enabler to supporting economic growth in tourism and agriculture in both regions.

Figure 3 – Corridor overview



Understanding our customers

Key customers

Different customers have different needs, expectations, and personal circumstances for using the transport system. Therefore, what customers value from the transport network needs to be understood in the context of who they are. The key customers utilising the corridor are diverse, and can often have competing needs at similar times of the day.

Daily commuter

The corridor is primarily rural with daily commuter activity generally occurring only between Cromwell and Queenstown, and to a lesser extent between Wanaka and Queenstown. Alternative modes to increase effective capacity, such as public transport and cycling, are limited. Increasing growth pressures continue to exacerbate congestion and place significant demand on network capacity, particularly between Cromwell and Frankton and beyond to Queenstown. Tourism and residential growth in and around Tekapo may, in time, create additional commuter demand.

Insights into daily commuter users:

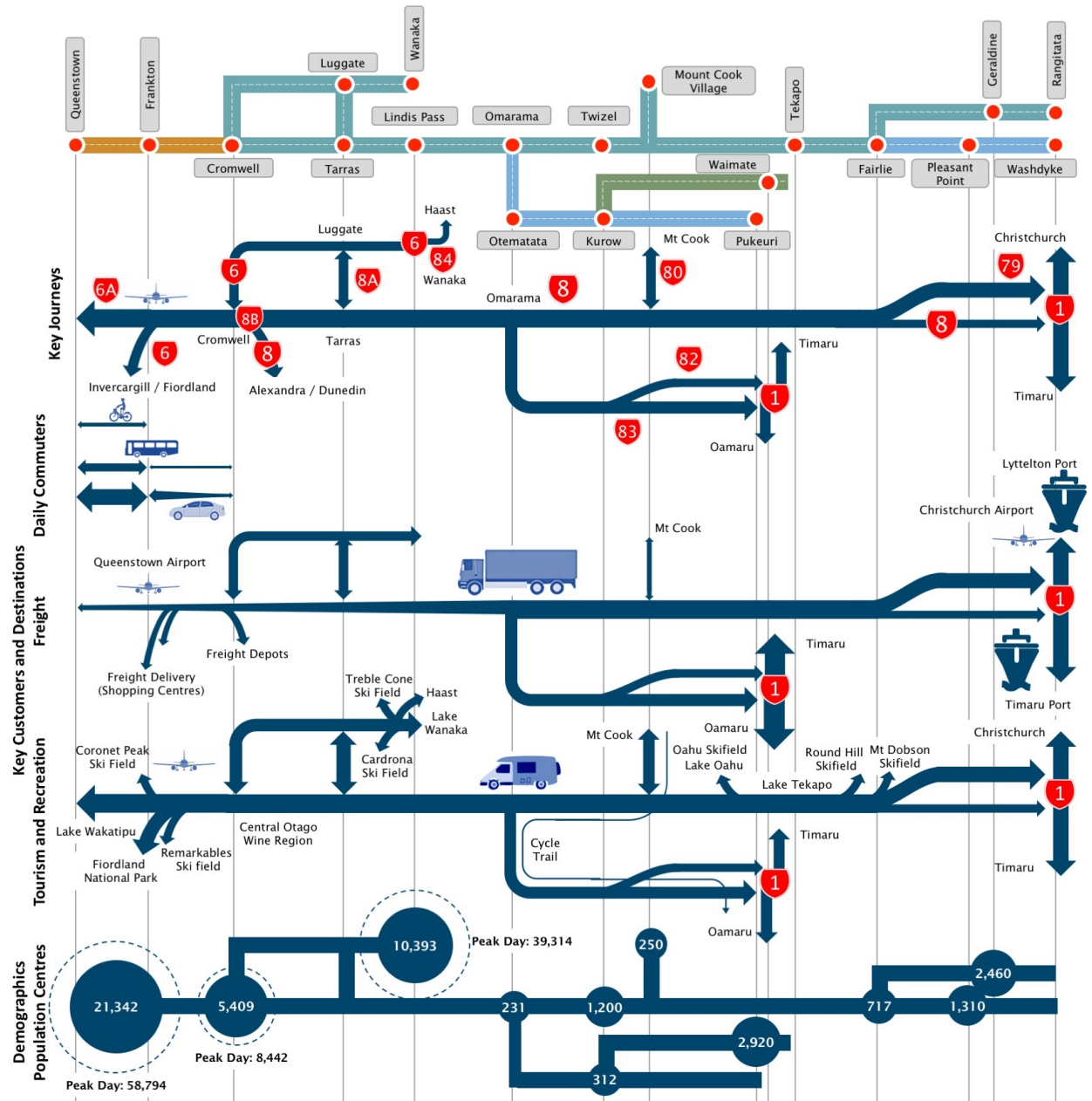
Road use: Private vehicles are the predominant mode of commuter transport.

Road knowledge: Local commuters are familiar with their route, however being geographically constrained means there are few viable alternatives to avoid congestion at peak times of the day.

Pain points: Unpredictable journey times. Growth in demand and delayed upgrades contribute to congestion, particularly at peak times between Lake Hayes and Queenstown. Limited viable alternative transport modes or routes for commuters.

Daily commuters expect: Predictable journey times in all weather conditions, consistent operating speeds, accurate and up to date information on traffic conditions, timely and proportionate investment in transport infrastructure to avoid congestion at peak times. They also expect all drivers to be familiar with the road rules and drive at or near the posted speed.

Figure 4 – Key customers, journeys, and destinations



Tourist and recreational users

Tourism is a major contributor to the economies of Otago and Canterbury. The route between Queenstown and Christchurch connects several of the most popular tourism destinations in New Zealand including Queenstown, Wanaka, Mt Cook, Tekapo, Twizel and the Southern Alps. The environment provides significant recreational opportunities for locals and tourists across all seasons. The environment is the key attraction of the lifestyle on offer throughout the corridor.

International and domestic tourism growth is projected to continue and self-drive tourism is increasing in popularity. Initiatives such as the Starlight Highway near Fairlie, and the Alps to Ocean Cycle Trail add to the popularity of the corridor and the pressure to provide a reliable, safe, and comfortable journey for customers. Road knowledge can often be limited, which has implications on the safety of all corridor users, particularly during peak seasons. Journey time reliability, wayfinding and amenity are important for tourists. Long journeys and variable road conditions also contribute to safety issues for all corridor users.

Insights into tourist and recreational users are as follows:

Road use: Heavy recreational and tourism use all year round. Domestic and international tourists. Noticeable increase in free and independent travellers.

Road knowledge: Domestic tourists are more familiar with New Zealand roads and journey times, but may be less familiar with alpine environments and a growing need to share the corridor with international tourists. International tourists have less knowledge of the road, environmental conditions, journey times, road rules, and general driving culture.

Pain points: An increasing number of self-drive tourists with expectations of higher and more consistent standards from the corridor. Sharing the road with local drivers, freight and cyclists. Need for safe places to pull over, and safe access points to destinations. Black spots for cell phone coverage. Limited way finding information and passing/slow vehicle lanes. Limited accommodation when journey times are underestimated. Lack of skills and equipment to drive in snow and ice. Weather conditions impacting on reliable journey times. The aggregated impact of these pain points results in a poorer overall visitor experience and tension with local customers. Some tourists attempt to complete the entire journey in a single period, contributing to fatigue-related crashes.

Tourist and recreational users expect: A journey that is memorable and matches the marketed expectations of the New Zealand experience. Good directional signage to popular destinations including travel times, reliable information on road availability, and driving conditions via mobile phones. Safe places to stop, readily available amenities such as accommodation when journey plans are changed. Reliable journey times. Consistent road environment with limited 'out of context' areas.

Freight operator

Canterbury has the highest freight task in the South Island and will account for over 60% of forecast growth over the next 30 years, driven by export demand and population increase. The conversion of land to dairying in the Mackenzie Basin and Waitaki Valley is increasing heavy vehicles along sections of the corridor, such as SH82 and SH83. While the state highway network carries the greater part of the road freight, there are also substantial flows on parts of the local road network, especially for the farm to factory journeys and where efficiencies in journey time are presented. The growth in tourism also contributes to freight demand in Canterbury and Otago requiring an increase in the movement of goods and services to visitor destinations and activities.

A significant proportion of the freight demand for the inland part of Otago and Queenstown Lakes is serviced from outside the region through road transport over the Lindis Pass. This includes freight such as building supplies from Invercargill and fuel from Dunedin. Cromwell is increasingly being used for storage and freight forwarding throughout Central Otago. Freight movement needs to operate as efficiently as possible to minimise transport costs to businesses. Journey time reliability and resilience of the transport network are important needs for freight operators and their customers.

Insights into freight operators are as follows:

Road use: Increased frequency and weight of heavy vehicles for efficient freight movement. Use of local road alternatives where the state highway results in longer journey times or a more arduous journey, or to avoid conflicting customer needs along the corridor such as frequently stopping tourists seeking amenity outcomes.

Road knowledge: Knowledge of road conditions is high given the environment. Confidence of managing difficult situations is high.

Pain points: Sections of narrow carriageway in some areas, for example SH79 and SH82, forcing heavy vehicles to drive on unsealed shoulders creating maintenance and safety issues. Winter road conditions impact on resilience and travel time predictability. Limited places for overtaking. Limited alternative routes, particularly if perishable goods are being carried. Sharing the road with other customers, often tourists, who seek more amenity value from the corridor beyond function.

Freight operators expect: Infrastructure that supports commercial activity including alternative routes that cater for freight trucks safely with consistent width and visibility, convenient places for trucks to stop, and more frequent passing opportunities. Up to date and reliable information to efficiently move between destinations.

How we deliver services along the corridor

Transport partners

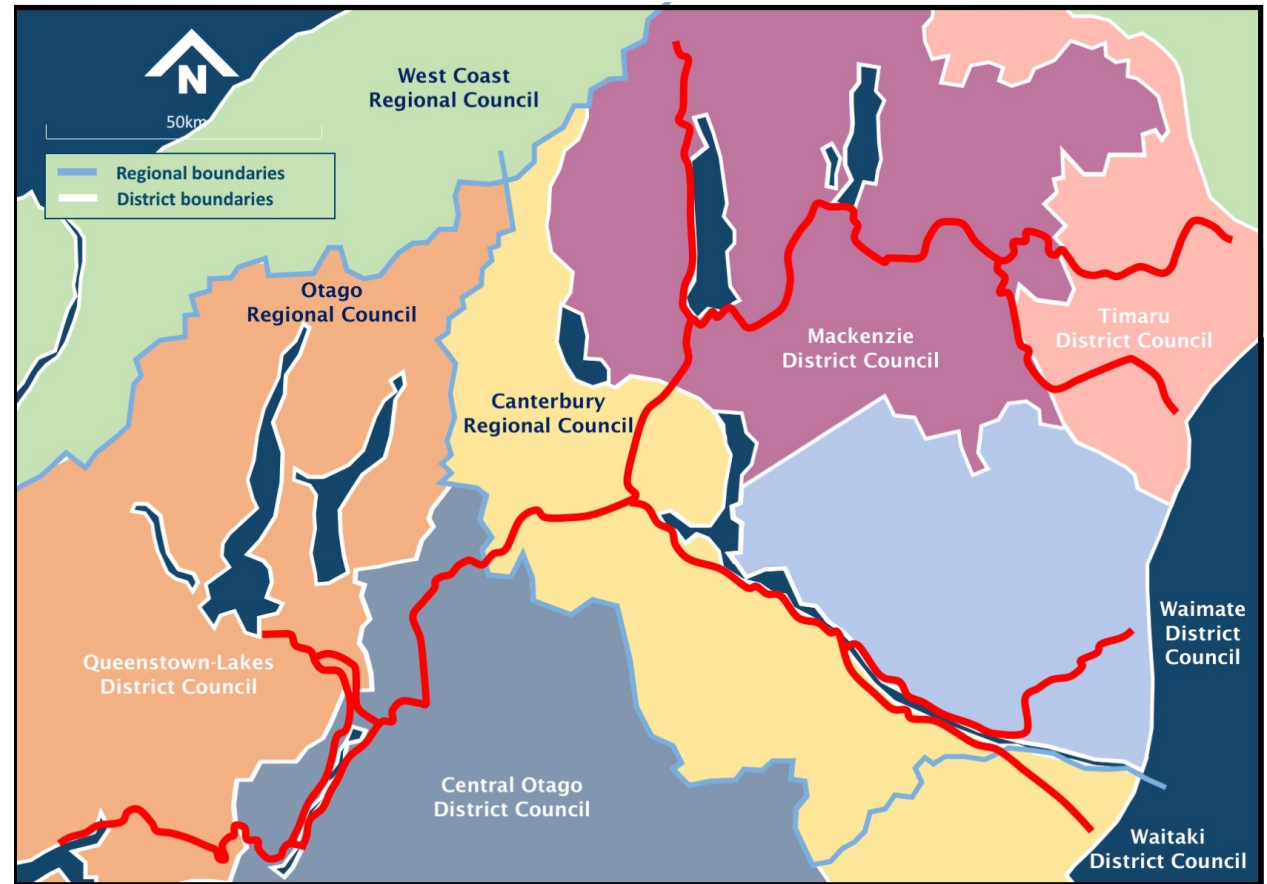
The land transport system includes much more than state highways. To provide customers with a reliable and safe vehicle journey requires the use and co-ordination of many interlinking networks. As such, the Transport Agency works and partners with district and regional councils as well as the transport industry to provide a consistent nationwide 'one network' approach.

Collaboration along the corridor

In Queenstown, a cross-agency governance transport group has recently been established to provide a coordinated response to growth pressures, particularly on SH6A.

The NZ Transport Agency also works closely with the Department of Conservation as a key landowner along the corridor.

Figure 5 - Map of associated local authorities



Network Outcomes Contracts approach

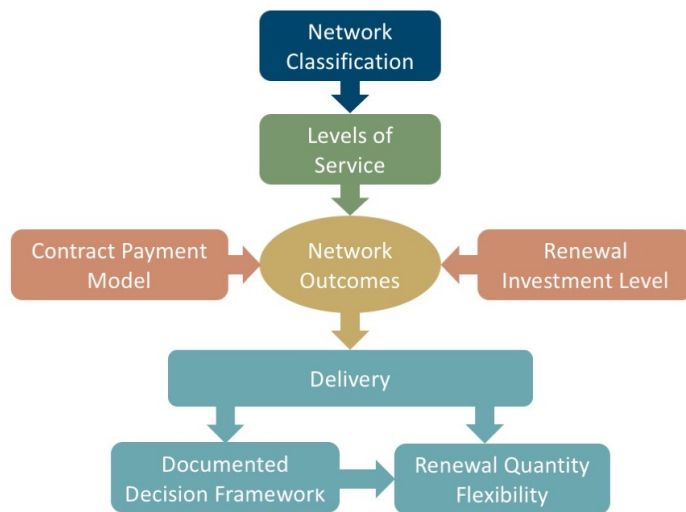
Network Outcome Contracts (NOC) are aimed at improving the effectiveness of service delivery for maintenance and operations of the state highway network. Elements of previous procurement methodologies (PSMC, hybrid and traditional models) have been integrated into the NOC contract model, which delivers services through a primary supplier incorporating both professional services and physical works for all key maintenance activities.

To support this, a central Governance and Management Group represents the interests of the Maintenance and Operations teams in the delivery of the NOCs. This group resolves issues, looks at opportunities for improvement, recommends changes to the national contract documentation, and ensures a consistent application, understanding and implementation of the NOC delivery model.

The core scope of work typically includes, but is not limited to, maintenance, operations and renewals. The core scope of work typically excludes transport planning, ITS maintenance and management, capital works, emergency works reinstatement, Traffic Operation Centre activities, bridge and other structures management and repairs.

The contract process for the NOC is shown below:

Figure 6 – NOC process



Collaborative delivery of services

The Queenstown to Rangitata corridor crosses over three NOC areas.

Central Otago Network Outcomes Contract

The Central Otago NOC is undertaken by Fulton Hogan (PW O217/01) and commenced on 1 October 2016. The NOC includes SH6, SH6A, SH8 (Cromwell to Lindis Pass), SH8A, SH8B, and SH84. This is a seven-year contract with the option, for a further two years, supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites:** Otago Traffic count data in Otago and Southland is contained in a combined Otago and Southland region contract. The contract is undertaken by AgFirst Consultants which commenced on 1 July 2014 for a 3-year period with potential (3+1+1).
- **Regional Bridge and Structures:** Otago - undertaken by Opus International Consultants (PS O/207) commencing on 1 July 2014 for a 3-year period with potential for (3+1+1). Some routine structures maintenance sites with more specialised work are put to the market.

Coastal Otago Network Outcomes Contract

The Coastal Otago NOC (PW O217/01) is undertaken By Downer NZ and commenced on 1 July 2016. The NOC includes SH8 (Lindis Pass to Ruataniwha Dam) and SH83. This is a seven-year contract with the option, based on performance, of a further two years, supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites:** Otago Traffic count data in Otago and Southland is contained in a combined Otago and Southland region contract. The contract is undertaken by AgFirst Consultants which commenced on 1 July 2014 for a 3-year period with potential (3+1+1).
- **Regional Bridges and Structures:** Otago - undertaken by Opus International Consultants (PS O/207) commencing on 1 July 2014 for a 3-year period with potential for (3+1+1). Some routine structures maintenance sites with more specialised work are put to the market.

South Canterbury Network Outcomes Contract

The South Canterbury NOC (NZTA 63088) is undertaken by Downer and commenced on 1 April 2014. The NOC includes SH8 (Ruataniwha Dam to Washdyke), SH79, SH80 and SH82. This is a seven-year contract with the option, based on performance, of a further two years, supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites:** Traffic counting undertaken for Canterbury and West Coast, Contract 63020 ends on 31 December 2016. This is due to be retendered.
- **Regional Bridge and Structures:** Bridge management contract for Canterbury and West Coast, Contract 63115 for a three-year period (+1+1) ending on 30 June 2017.

Drivers for change

The Queenstown to Rangitata corridor caters for variable levels and types of customers under rapidly growing demand. The drivers for change associated with the corridor are briefly described below.

Queenstown metro

Queenstown Lakes District is identified in the National Policy Statement on Urban Development Capacity as one of five high-growth urban areas in New Zealand, along with Auckland, Tauranga, Hamilton, and Christchurch. The population of the greater Queenstown Lakes District is projected to increase by over 100% from 29,700 in 2013 to 62,200 in 2043, with most growth expected in the Queenstown / Frankton / Lake Hayes / Arrowtown / Speargrass Flat areas. In line with population growth and growth in visitor numbers, it is anticipated that there will be an increase in freight task over time, particularly in the movement of manufactured and retail goods, construction materials, and waste. The Frankton business park will likely provide a hub for construction and commercial activities to support Queenstown's future growth, and remain the focus for heavy vehicle movements into Queenstown.

Future focus (10 years +)

- Integrated and strategic growth / land use and transport planning
- Prioritising deferred transport infrastructure investment
- Collaboration between all key agencies, including tourism operators.

Key journeys

Queenstown to Rangitata is part of a key tourist journey between Christchurch and the Queenstown and Central Otago districts. The stunning natural environment, climate and destination points along the route, significantly contribute to the overall journey experience. The population in Queenstown, Wanaka and Cromwell increases by two or three times during peak summer and winter seasons with substantial increases also experienced in Twizel and Tekapo. Peak times are becoming less obvious as the population grows. For example, in Tekapo, Twizel and Fairlie, 100% occupancy rates are experienced for most of the year. Queenstown Airport experienced 1.65 million passenger arrivals in 2016 with 2026 projections for domestic passenger numbers to double, and international passengers to nearly triple. Christchurch airport is New Zealand's second busiest airport with international visitor arrivals also growing. Airline seat availability grew by 7% during 2016 to 7.9 million

with long haul passengers growing by 18%. Tourism growth requires a good understanding and response to tourist expectations, particularly on this key journey characterised by long travelling distances with limited amenities and unfamiliar and challenging road conditions.

Intensification and land use changes

The intensification of land use from investment in irrigation is seeing previously arid land now used for dairy farming and cropping, particularly throughout the Mackenzie Basin and along areas of SH82 and SH83. As land use changes, the journey experience also changes, impacting tourists, local communities and freight operators. The pace of this change needs to be identified and managed, particularly where infrastructure is no longer fit for purpose. Failure to do this has the potential to negatively impact on the efficiency of freight operators as well the visitor experience. It also places the useful life of assets at risk of faster deterioration if not managed proactively.

Regional economic development strategy

The MBIE Regional Growth Programme for Canterbury is helping the region ensure its long-term economic prosperity, recognising the impact of the earthquakes on Christchurch and the Canterbury region. The Canterbury Regional Economic Development Strategy (August 2015) has several work programmes that have a level of interdependency to transport planning in the region and include:

- integrated regional transport planning and infrastructure development
- freshwater management and irrigation infrastructure
- regional visitor strategy.

Actions include development of a regional transport forum involving key stakeholders to identify barriers and opportunities within the transport network, strengthening connections with neighbouring authorities, and developing a stronger evidence base for decision-making. A Regional Visitor Strategy has also been proposed to recognise the growth in tourism and the relevance of this to the Canterbury region. These initiatives should assist in determining the role of corridor in achieving wider economic strategies, particularly for tourism. Of importance is the opportunity, through this collaborative approach, to identify collective roles and responsibilities of all agencies in ensuring that the corridor continues to be fit for purpose for the customer.

There is no similar regional economic development strategy for Otago.

Understanding customer levels of service on the corridor

Current levels of service performance

The One Network Road Classification (ONRC) is a framework that categorises roads throughout the country depending on the purpose they serve. Importantly, it will also help New Zealand to plan, invest in, maintain, and operate the road network in a more strategic, consistent and affordable way throughout the country.

Over time, all roads in a category should offer an increasingly consistent and fit for purpose customer level of service (LoS) for road users. With the knowledge of current LoS experienced by customers, we can better target investment to meet future intended service levels.

Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road classification

The Queenstown to Cromwell section of SH6 and SH6A is classified regional as it includes the largest population centre in the corridor and connects to Queenstown Airport, a key entry point for domestic and international travel to the South Island.

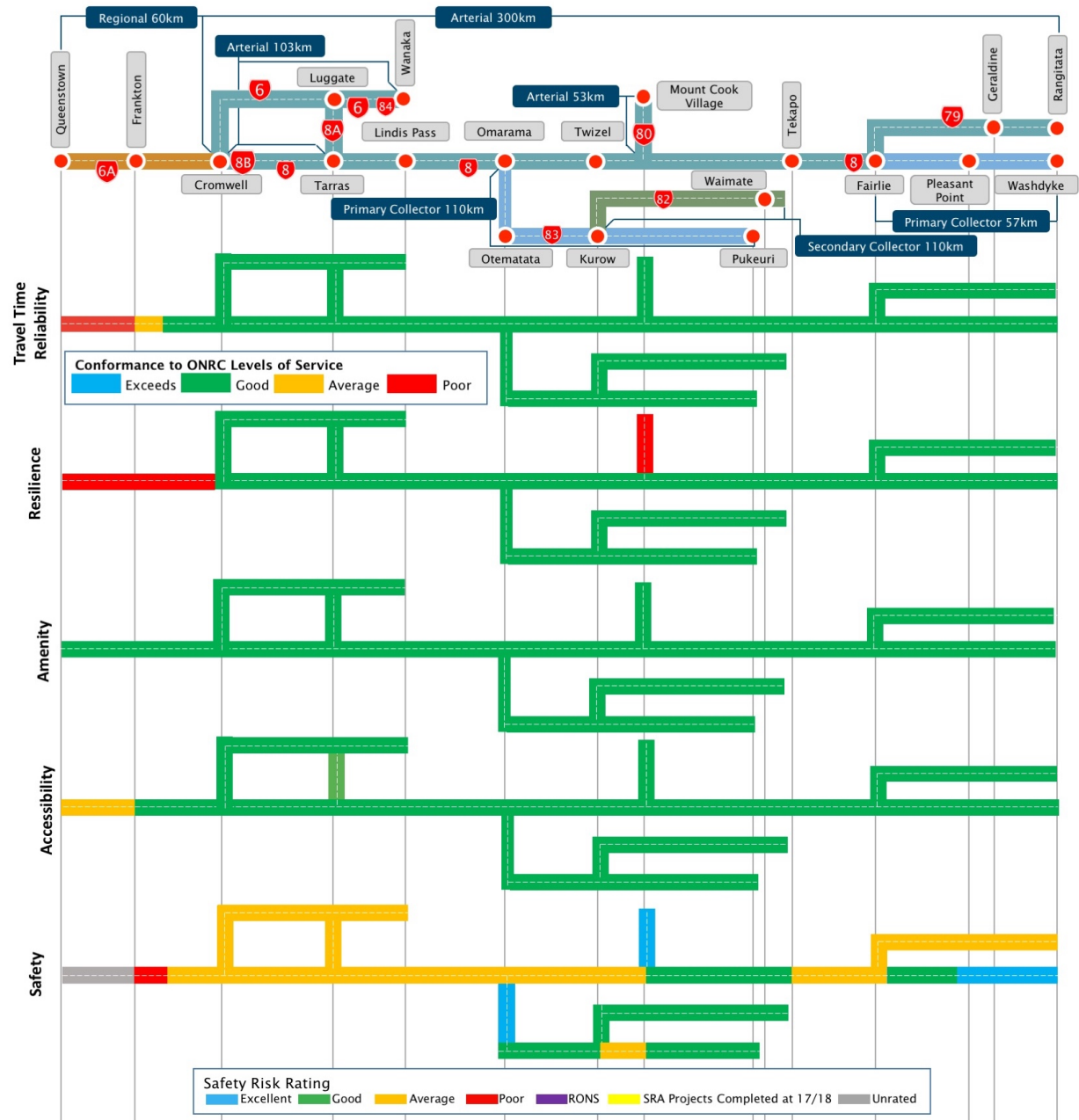
Cromwell to Wanaka and through to Fairlie and Rangitata is classified arterial and includes SH6, SH8/SH8A/SH8B, SH80 to Mount Cook, SH84 and SH79.

SH8 from Fairlie to Washdyke, and Omarama to Pukeuri along SH83 are classified primary collector.

Kurow to Waimate along SH82 is a secondary collector road.

Overleaf provides additional context to explain the current levels of service along the corridor based on the road classification.

Figure 7 – Current ONRC levels of service performance







Summary of current performance

Figure 7 shows how the Queenstown to Rangitata corridor is performing against the ONRC Levels of Service, as they relate to each of the three current classifications.

Levels of service performance has been determined by workshop participants in the development of this corridor plan and is therefore not solely based upon consolidated evidence from the ONRC technical measures.

A simple four-point assessment has been utilised as follows:

	Exceeds	The level of service provided by the section of corridor for the activity under consideration exceeds what is required for a highway of that classification
	Good	The section of corridor generally meets the LOS requirements for the activity and ONRC
	Average	The section of corridor meets some but not all of the LOS requirements for the activity and ONRC classification
	Poor	The section of corridor generally fails the LOS requirements for the activity and ONRC classification, or there is a significant gap in the LOS for some aspects of the activity.

Travel time reliability

The corridor generally performs well except for SH6A and SH6 from Frankton to Ladies Mile. The two-lane Shotover Bridge creates a pinch point along with the Frankton roundabout. Significant and frequent congestion issues are created by the number of tourist routes that pass through this section of corridor, the location of Queenstown Airport and the traffic departing from it and arriving to it on a constant basis, increasing commuter traffic, and changing land use requiring access to the state highway.

Resilience

Despite the alpine environment that the corridor runs through, the ONRC performance requirements for the road classification are generally achieved. The main issue is along SH6 between Frankton and Cromwell, which is a critical transport route servicing Queenstown. The Nevis Bluff and the Kawarau Gorge are the most vulnerable parts of this section of corridor. A major earthquake is very likely to create slips and rockfalls that will close the state highway for long periods of time. Alternative routes via the Crown Range are not suitable for heavy vehicles.

Amenity

While the corridor generally achieves the ONRC requirements, the pace of change in terms of the number and type of customers using the corridor is likely to eventually reduce this rating from good to average. Particularly in terms of tourist expectations of levels of service, for example; stopping areas, public toilets, and the increasing residential development of the Queenstown Lakes District.

Accessibility

The corridor meets some, but not all, of the level of service requirements along SH6A and SH6 from Ladies Mile to Queenstown. Here, there are some restricted access points onto the state highway and some bus stops, although there is limited public transport services. The priority of roads in some areas, such as SH8A, needs to be reviewed as priority is given to local roads over the state highway.

Safety

Sections of the corridor are characteristic of narrow road geometry and are prone to snow and ice, these pressures impact on the safety of this corridor. While the latter can be an issue across the whole corridor, the greatest impact is on Lindis Pass and Burkes Pass due to the alpine environment. Further pressures on the corridor include unfamiliar drivers, limited passing opportunities and unsafe stopping locations in key tourist hot spots.

There are multiple high personal risk sections along the corridor. Most of the high personal risk sections are between Omarama and Waimate. Majority of the corridor has a 3-star KiwiRAP rating with some pockets of 2-star. This rating denotes there is some major deficiencies in the road geometry.

A high potential exists to reduce fatal and serious injuries near Frankton through comprehensive and targeted medium-high cost improvements.

The Visiting Drivers Project is anticipated to help improve safety along the corridor.

Improving the customer experience

In responding to Customer Levels of Service, it is important to acknowledge that improvements to the corridor are planned or underway.

There are no significant improvement projects along this corridor.

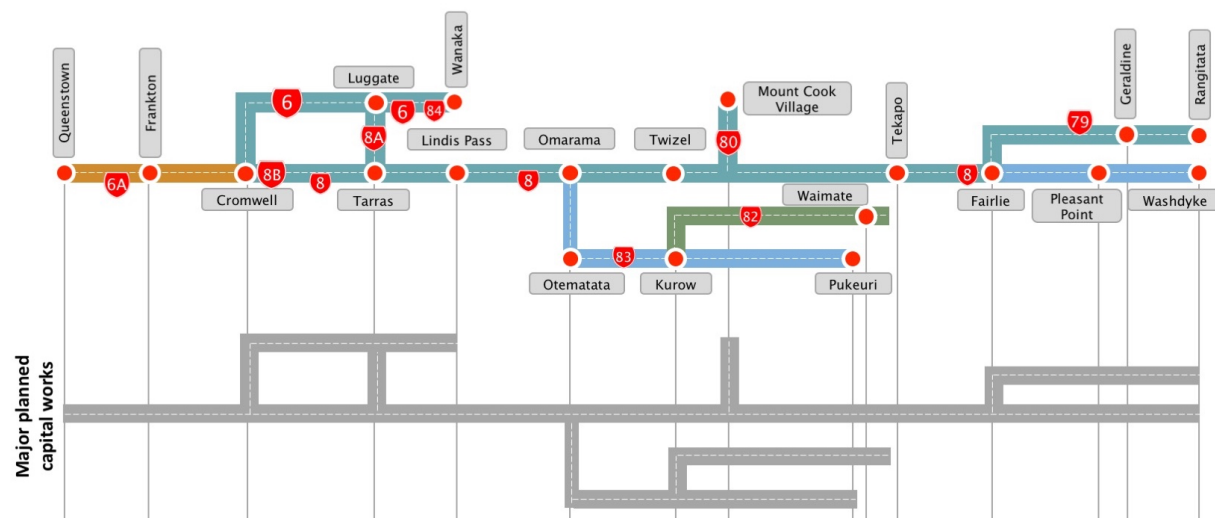
In the Canterbury region, there is an ongoing programme of minor improvements to the state highway and local roads in the Mackenzie, Timaru and Waimate districts, including improvements to the SH79 and SH1 intersection.

In the Otago region, projects focus on SH6 and SH6A between Queenstown and Cromwell and include the Eastern Access Road, and various corridor and bridge improvements.

When completed, the planned improvements on the corridor will result in areas of improved performance as measured against ONRC outcomes.

Planned improvements are discussed in greater detail later in this document.

Figure 8 – Significant corridor planned improvements



Resurfacing of SH80 to Mt Cook

Access

Carriageway configuration

The carriageway configuration is two lanes throughout except for a short section near Frankton. One lane bridges are located near Luggate, south of Tarras, Elephant Hill, and Geraldine. There are minimal passing lanes throughout the corridor; however, long stretches of road provide opportunities for safe passing in some areas.

SH79 and part of SH82 have narrow carriageway widths.

Posted speed limits

The operating speed differs in some areas such as through the Kawarau Gorge on SH6, Lindis Pass on SH8, SH79 and a portion of SH82 due to narrow road widths and winding roads.

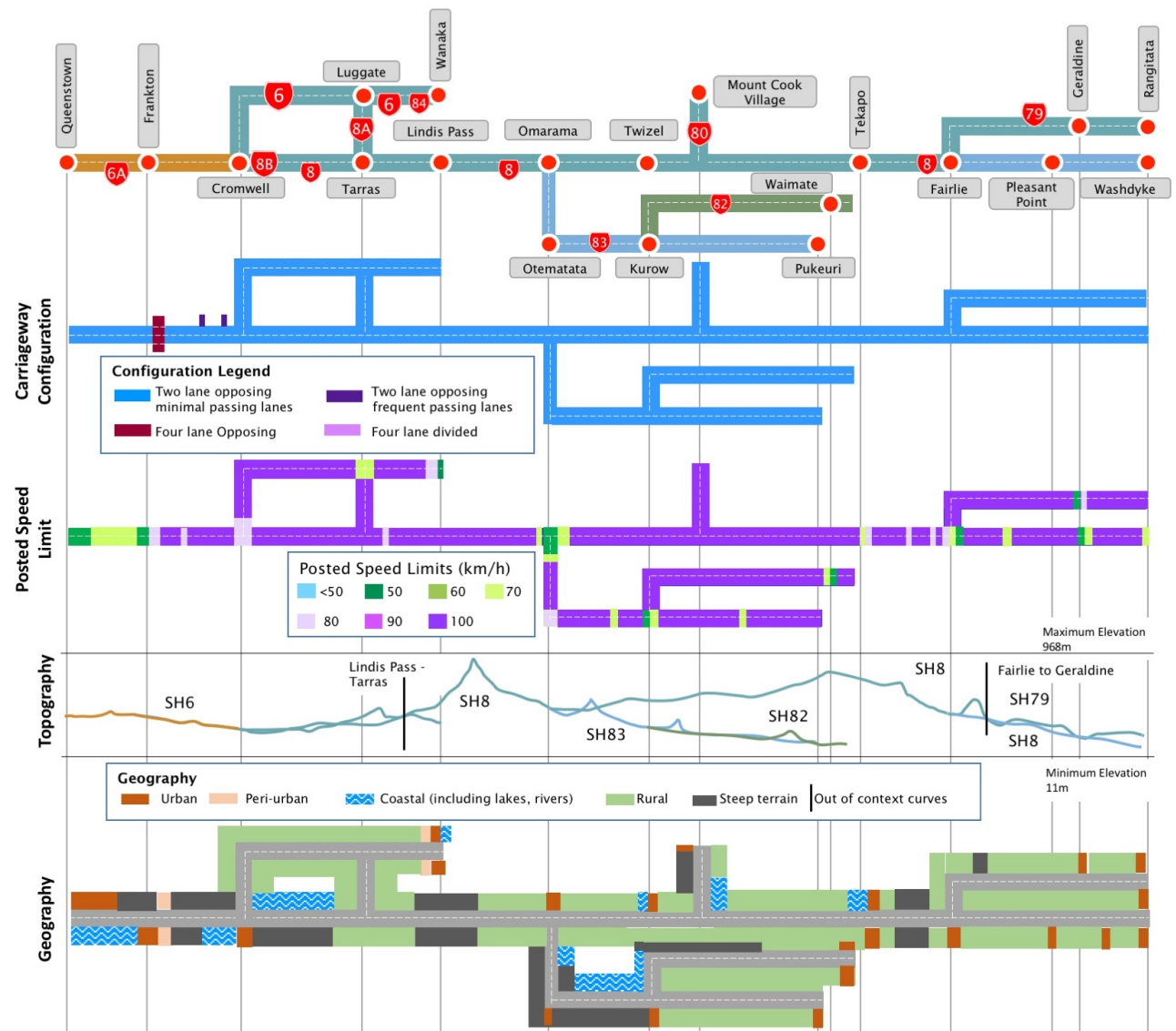
Topography/geography

The topography is dominated by the alpine environment with Lindis Pass and Mount Cook/Tekapo providing the highest points throughout the journey. Alpine features including steep terrain, significant lakes and vast open valleys contribute to the visual attractiveness of this corridor and the tourism opportunities it provides.

The topography and snow/ice during winter creates a challenging environment for customers, particularly those unfamiliar with New Zealand roads. The change of context from long, wide and open roads to sections of confined winding and narrow roads require customers to readily adjust to the changes of environment.

The Fairlie to Geraldine and Omarama to Waimate/Pukeuri sections include gorges and rivers, and provide a gradual descent to sea level.

Figure 9 – Corridor characteristics

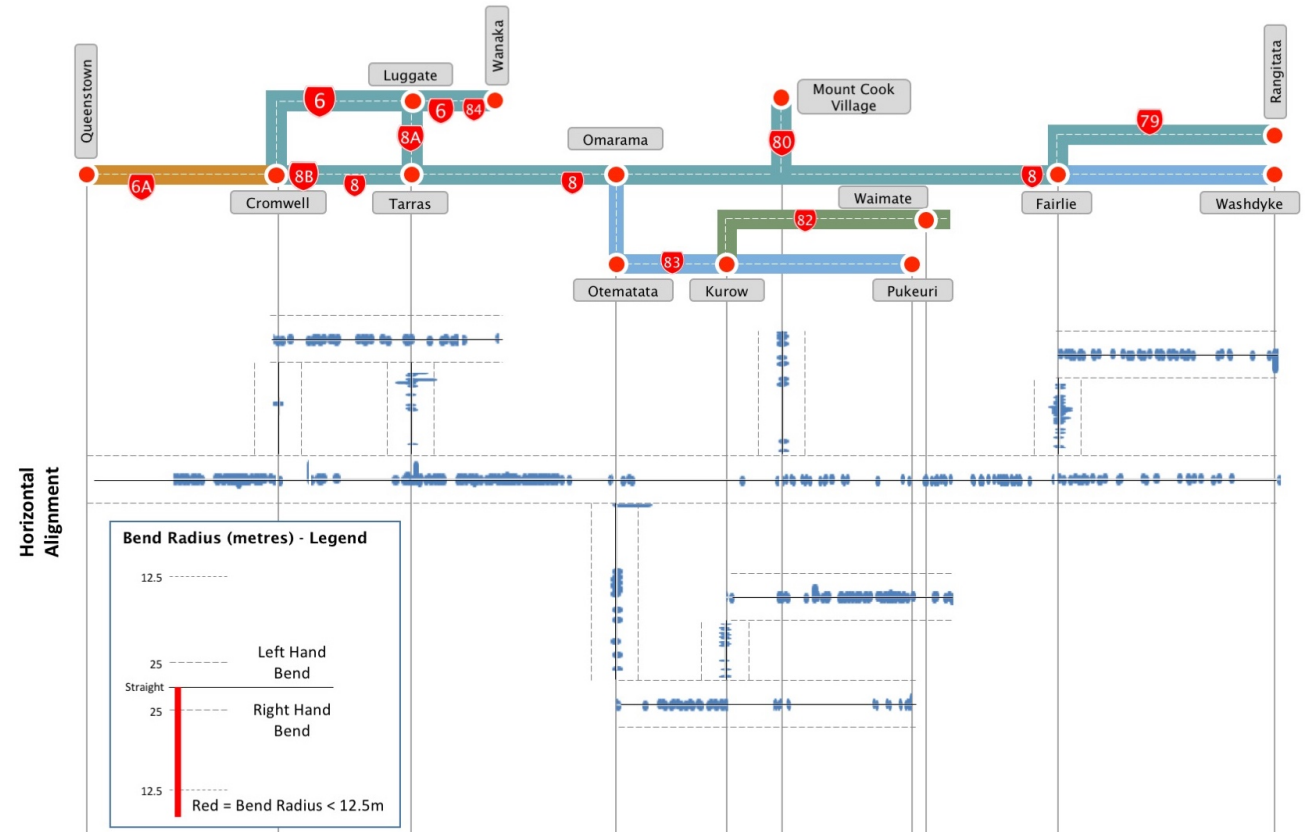


Horizontal alignment

The infographic shows the location and extent of the out of context curves along the corridor. The height of the bar is an indication of the severity of the curve calculated as $\frac{1}{radius^2}$, meaning the taller the bar, the smaller the radius of the curve. Note: Unlike other infographics, the horizontal alignment infographics are drawn in proportion to the length along the corridor. As such they are not shown in context with the intermediate points which have been excluded.

The corridor contains a regular occurrence of larger radius curves, with higher concentrations through Lindis Pass on SH8, Kawarau gorge on SH6, and Waihou Downs on SH82. There is one sharp bends with a radius below 25m on the corridor on SH8A near Luggate.

Figure 10 - Horizontal alignment



Volumes

SH6A from Queenstown to Frankton has the highest traffic volumes and is the most significant pressure point along the corridor due to population growth and the area providing a key access point for tourism in the South Island. Frankton to Cromwell and Cromwell to Wanaka have the next highest traffic volumes due to commuter and tourism traffic movements.

The balance of the corridor has comparatively low traffic volumes, particularly between Omarama and Waimate/Pukeuri. Heavy vehicle use follows the same pattern, although volumes increase along SH79 from Fairlie to Geraldine.

HPMV routes

The length of corridor from Queenstown to Rangitata has full HPMV rating and provides important freight connections on SH6, SH8, and SH79. The remaining sections of the corridor are not available for HPMV use.

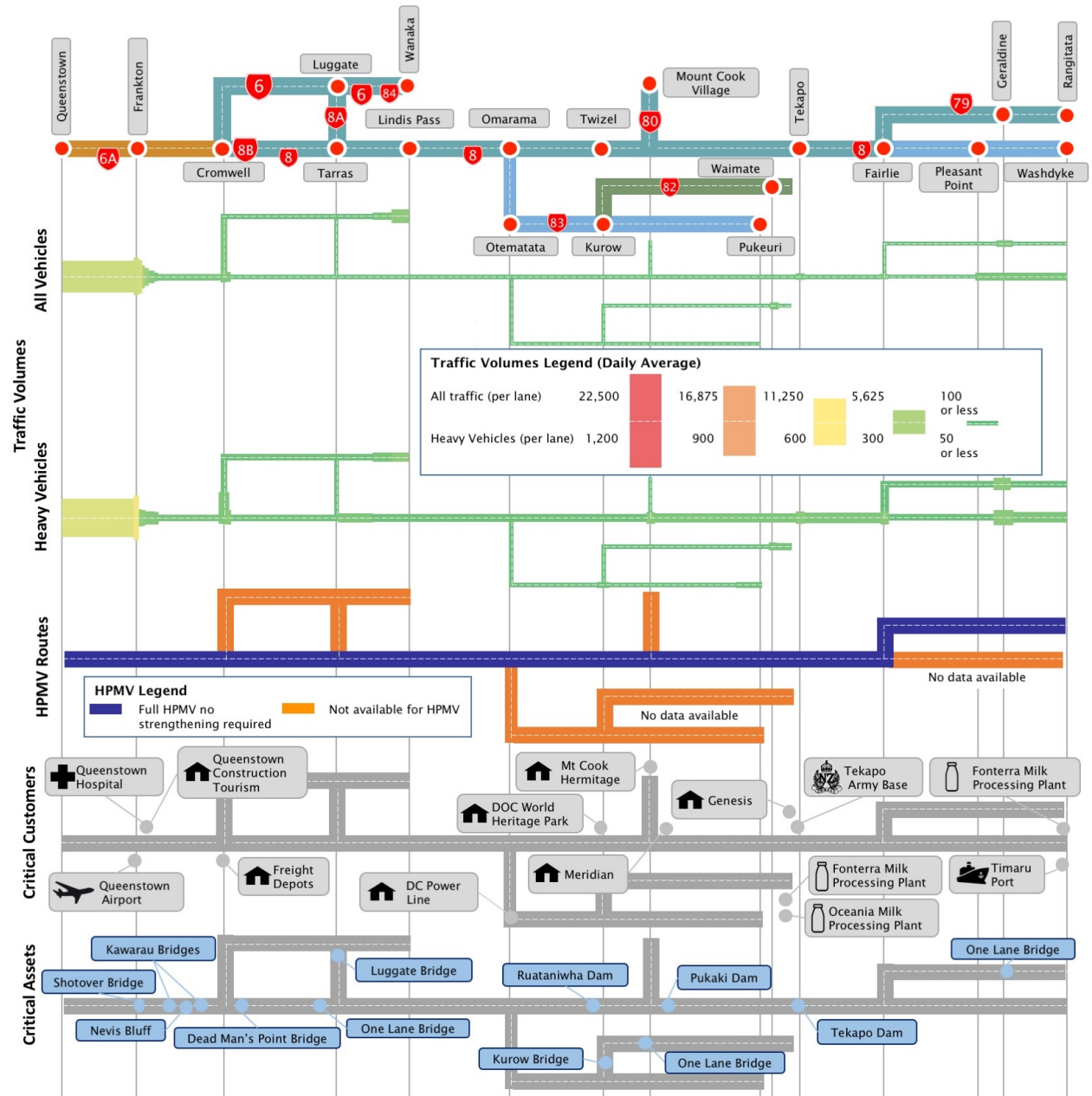
Critical customers and assets

There are several critical customers along, or close to, the corridor. They rely on the corridor to be open 24/7 and are vulnerable to short-term interruptions. Examples include timely access to Queenstown Hospital, Queenstown Airport and services to the construction and tourism industries.

There has been considerable investment in the conversion of farms to dairy through large irrigation schemes and the expansion of processing plants in South Canterbury and North Otago. Reliable and efficient freight movement is essential to support this fast-growing industry. Some areas along the state highway are located over dams, spillways and control gates.

The starting point of the interisland power link at the Benmore Dam is accessed from SH83. This line supplies power to the North Island, therefore reliable access for operations and in the event of emergencies is essential.

Figure 11 - Corridor capacity



Pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Access** include the following:

Queenstown Lakes District

- **Rate of growth:** Growth in customers on the corridor is consuming the capacity of the transport network at a rate much faster than anticipated. Regular congestion in and around Frankton/Queenstown (often gridlock at peak times) impacts negatively on daily commuters and visitors. This makes it difficult to reach destinations within the planned journey time. SH6A from Queenstown to Frankton forms part of many key journeys and is under pressure due to extent of visitors and urban development occurring.
- **Residential development:** The growth of areas requiring connections to the corridor increases pressure on the capacity and efficiency. The pressures are similar in Cromwell and Wanaka, although to a much lesser degree than that experienced in Queenstown.

Whole corridor

- **Traffic volumes:** Increased traffic volumes placing pressure on intersections and access points at towns and tourist destinations. Many areas require upgrade, a change to the road priorities, or establishment of viewing/stopping areas. Examples include the SH84/SH6 intersection, access at Tekapo, and the Crown Range Road/SH6 intersection.



Bridge over Lake Dunstan

Future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **Access** are as follows:

Queenstown Lakes District

- **Alternative modes:** It is critical that in the short term, SH6A and SH6 around Frankton have reliable and affordable public transport, park and ride facilities, cycling facilities, and pedestrian connectivity to help ease congestion and maximise the effective capacity of this section of corridor. In the medium to long term, consideration of alternative access and modes of transport is required to manage demand for car journeys into Queenstown. For example, ferries from Queenstown Airport to central Queenstown.
- **Implementation of Queenstown Integrated Transport Programme Business Case:** Implementation of the 30-year programme of supply and demand interventions identified in the Business Case. Particularly, planned improvements to the affordability, reliability and priority of bus services within the Wakatipu Basin; and improved arterial access into the Queenstown town centre and demand initiatives including a parking strategy and improved cycling facilities.
- **Integrated landuse planning:** Consider ways of collaborating with Council to better manage transport demand through land use planning. This could include multi-use development in some areas, higher density housing close to employment areas, and strategies for seasonal worker accommodation. Land supply is limited in the Wakatipu basin and demand for housing is putting pressure on neighbouring districts through reliance on this corridor for commuting.
- **Subdivision pressure:** Access and capacity improvements will need to be considered along SH84 into Wanaka, as the Three Parks subdivision expands and increases pressure on this section of the corridor.

Whole corridor

- **Travel information:** Operate the network to influence where and when people undertake their journeys. VMS showing journey times and making journey time information readily available via mobile phones in advance of journeys being a key way of achieving this.
- **Tekapo/Twizel growth:** Extent of land development and tourism activity occurring in Tekapo and Twizel and impact of this on the network in terms of safe access to destinations. Specifically, the mix of customers and increased numbers of tour buses and campervans wanting to access onto and off the corridor.
- **Review ONRC classification:** Monitoring the growth and changing profile of traffic volumes on SH79 and SH82 to determine the need to raise the ONRC classification to reflect the extent and type of customers that utilise this section of the corridor.

Resilience

Being an inland, alpine route exposes this corridor to several natural hazards and severe weather events. There are also sections where few viable alternative routes are available.

Vulnerabilities

This corridor is susceptible to slips, rockfalls, flooding, snow, ice, and freezing weather conditions during winter. The topography also physically restricts the viability of alternative routes.

Alternative routes and diversion lengths

This corridor is one of only two main routes into and out of Queenstown capable of carrying all traffic types. In the event of a major earthquake, it is anticipated that each of these routes will be closed by slips and debris.

The journey over the Lindis Pass between Tarras and Omarama is the primary route connecting Central Otago with Canterbury. The Lindis Pass is occasionally closed overnight due to snow/ice. Although the vulnerabilities do not change as the corridor continues north, the availability of alternative routes increases with more state highway and local road connectivity.

A concern is that there is no land-based access alternative to Mt Cook Village in the event of a prolonged closure of SH80.

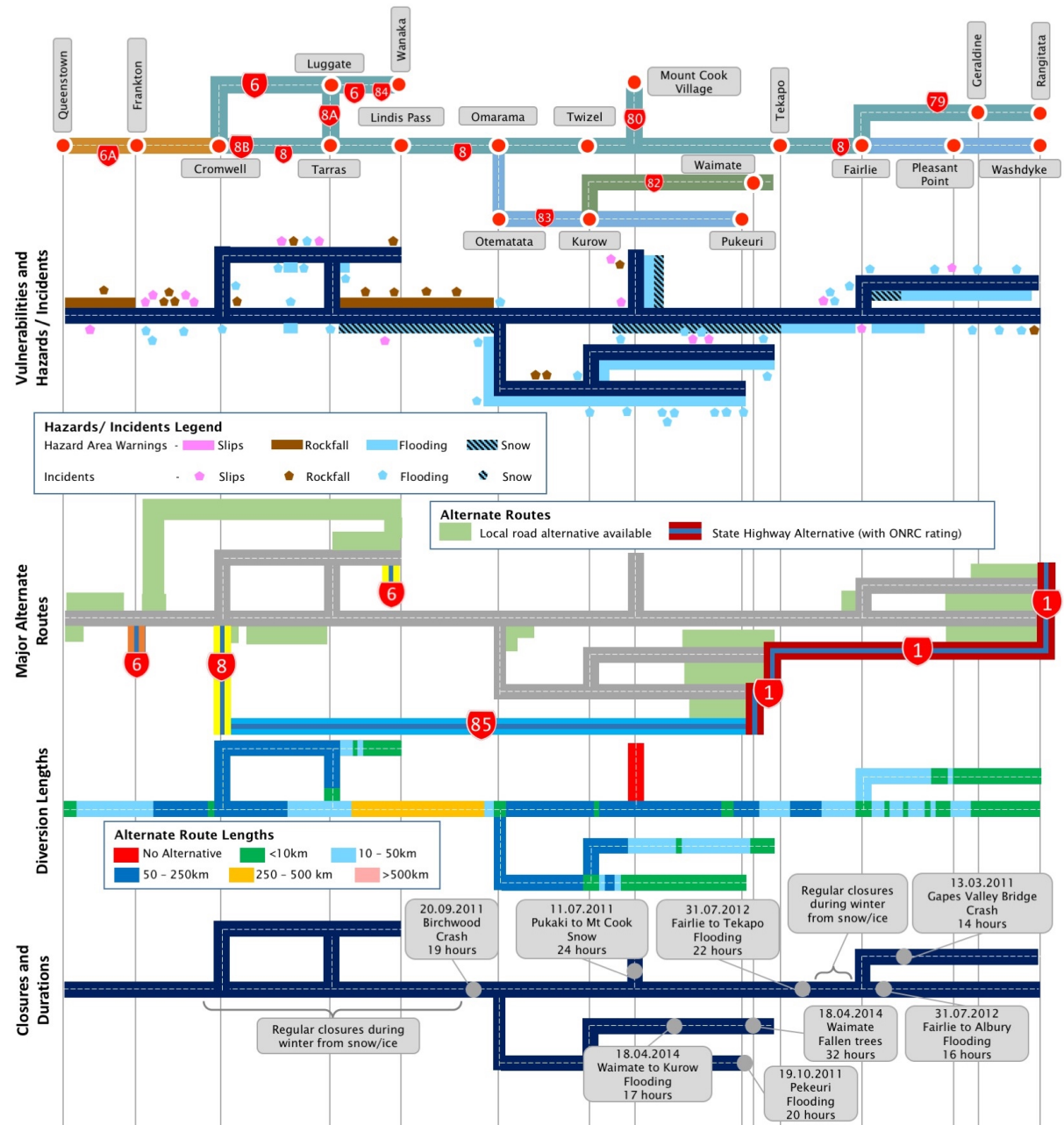
SH82 and SH83 are alternative routes if SH8 and SH79 are closed.

Closures and duration

Numerous road closures have occurred in recent years. Snow, fallen trees and major crashes have closed the corridor, sometimes for over 10 hours at a time.

Many parts of the corridor have closures during the winter months for durations shorter than 10 hours, particularly after a heavy snowfall. This can be highly disruptive to the travel plans of winter tourists seeking snow for leisure pursuits.

Figure 12 – Resilience



Pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Resilience** include the following:

- **Winter issues:** Snow and ice are the main vulnerabilities on the corridor with alternative routes often affected by this as well. A grader is located at the base of the Lindis Pass during winter to ensure an immediate response to snowfall events. The only viable alternative route when the Lindis Pass is closed is a 400km diversion. SH80 to Mount Cook Village has no alternative option, with travel by air or lake the only alternatives should the highway be closed. It is unlikely that alternative routes can be built affordably due to the topography of the area. Road closures can have a significant impact on the journey experience, particularly where information on road closures has not been readily available or where customers choose to ignore the advice given.
- **Mobile Phone Coverage:** There is an increasing customer expectation of consistent and 24/7 access to mobile phone coverage across all journeys for information and for safety when incidents occur. Coverage black spots exist throughout the corridor, for example at the Lindis Pass. This also impacts emergency services response times and emergency maintenance response.
- **Slips and rockfalls:** This is an issue along SH6 at Nevis Bluff and the Kawarau Gorge, and increases the vulnerability of this section of corridor to road closures.
- **Geographically constrained and isolated environment:** Queenstown has a significant reliance on the Kawarau Gorge for the transport of goods and services, making it a critical lifeline for Queenstown. Kawarau Gorge is a challenging/vulnerable environment with no suitable alternatives for heavy vehicles should the road be closed, which would be highly likely in an extreme earthquake event. There are geographical constraints on what can be achieved to improve the capacity and safety of this part of the corridor.

Future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **Resilience** are as follows:

- **Lifelines:** Planning for evacuation could be considered where the route is severed/ connectivity is lost for extended periods of time especially in risk areas like Mt Cook Village where there are no alternative routes. Plans for extracting stranded communities and tourist noting that costs associated with evacuations will increase as visitor numbers grow. Utilisation of the Lifelines Project to plan for the impact of a severe earthquake event on SH6A and SH6 near Queenstown and surrounding areas, including the Kawarau Gorge and the Lindis Pass.

Reliability and efficiency

Efficiency

Most of the corridor performs well at all times, with levels of service reductions occurring mainly around urban areas and small communities.

The area most affected by lower levels of service during peak times is Queenstown to Frankton/Cromwell/Wanaka, due to commuter and tourism traffic volumes. This is particularly exacerbated during holiday periods.

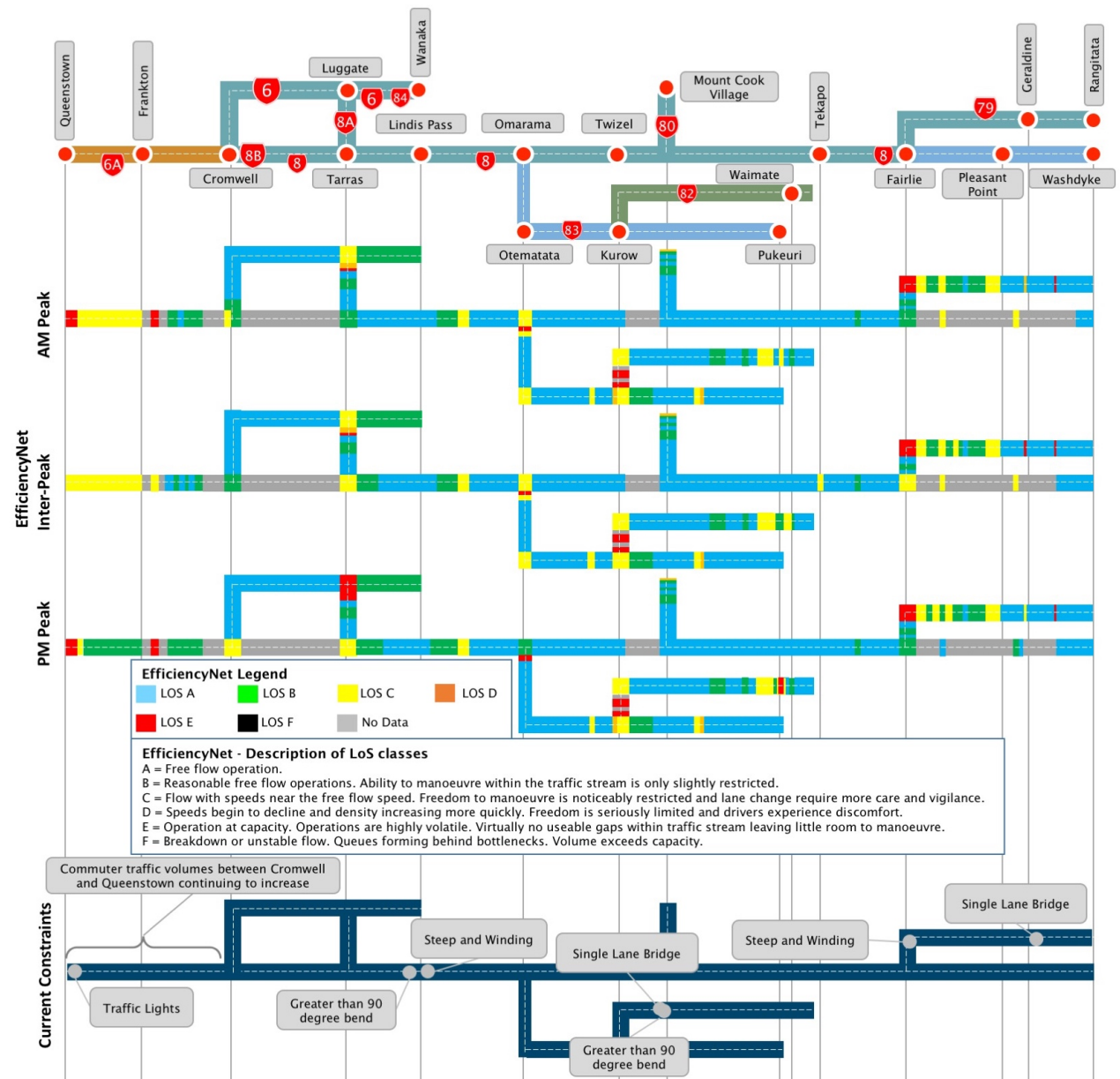
Low levels of service are experienced in and around Luggate, Kurow then east along SH82, and Fairlie then east along SH79. This is due to the steep and winding nature of this part of the journey, which slows down the operating speed of heavy vehicles.

Current constraints

The major current constraints on the network affecting journey reliability and efficiency are shown in Figure 13.

In addition to this, the lack of reliable data to support investment decisions, particularly in Queenstown, is a key constraint to addressing the growing transport problems that this area is facing.

Figure 13 - Reliability and efficiency



Pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Reliability and Efficiency** include the following:

Queenstown Lakes District

- **The rate of population and tourism growth:** The rate of population and tourism growth combined with the limited capacity of the network places pressure on the speed of responsiveness necessary to accommodate demand. The rate of capacity consumption exacerbates the impact of delayed decisions to invest, disruption from project delays and from the under sizing of upgrades.
- **Congestion:** Commuter and tourism traffic volumes continue to increase from Queenstown to Frankton along SH6A and sections of SH6, impacting the ability of customers to carry out their business efficiently and within their anticipated journey time. With all traffic having to negotiate the SH6/SH6A intersection, there are increasing delays on the corridor.
- **Increasing number of events requiring road closure or access:** Growing demand from recreational and sporting events such as Warbirds over Wanaka and the Queenstown Marathon, for use or closure of sections of state highway are creating more pressure on an already constrained section of the corridor.

Future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **Reliability and Efficiency** include the following:

Queenstown Lakes District

- **Implementation of Queenstown Integrated Transport Programme Business Case:** Considerable improvements to the corridor between Arrow Junction and Queenstown are planned in the Queenstown Integrated Transport Programme Business Case for the Wakatipu Basin. These are aimed at addressing reducing levels of service during peak times, particularly at the intersection of existing major routes at Frankton, and new connections onto the corridor from residential and commercial development.
- **Event management strategies:** Ability to accommodate growth in sporting and recreational events that require road use and road closures. These events underpin the attractiveness of the region for visitors. Council and the NZTA must work collaboratively with event providers to minimise negative impacts to all users and stakeholders.
- **Queenstown access alternatives:** Advancement of alternative access routes into and around Queenstown to improve efficiency on this corridor. An alternative SH6 route to the west of the airport would provide an alternative route for customers not wanting to travel into Queenstown town centre or onwards towards Glenorchy. This would also improve resilience with an alternative route.

Whole Corridor

- **Information and communication:** Ability to capture and communicate travel time information readily on network. This includes the ability utilise 'push' notifications of real time road information to customers. The benefits of a more informed customer and asset manager are significant, particularly in terms of visitor safety and positive visitor experience. Identify priority areas such as the journey between Queenstown and the airport.

Safety

Collective risk

The level of collective risk is rated low or medium-low across much of the corridor although there are segments of medium and medium-low risk. A small section of the corridor around Frankton has a medium-high collective risk. The urban area around Queenstown and Frankton is unrated.

Personal risk

Personal risk is low to medium for most of the corridor. The high-risk areas are near Tarras and the Lindis Pass, near Otematata on SH83 and from Kurow to Waimate on SH82. Medium-high risk areas include from Tarras to Wanaka. Small pockets of medium-high ratings are also present on SH6 between Frankton and Cromwell and Twizel and Tekapo.

Star rating

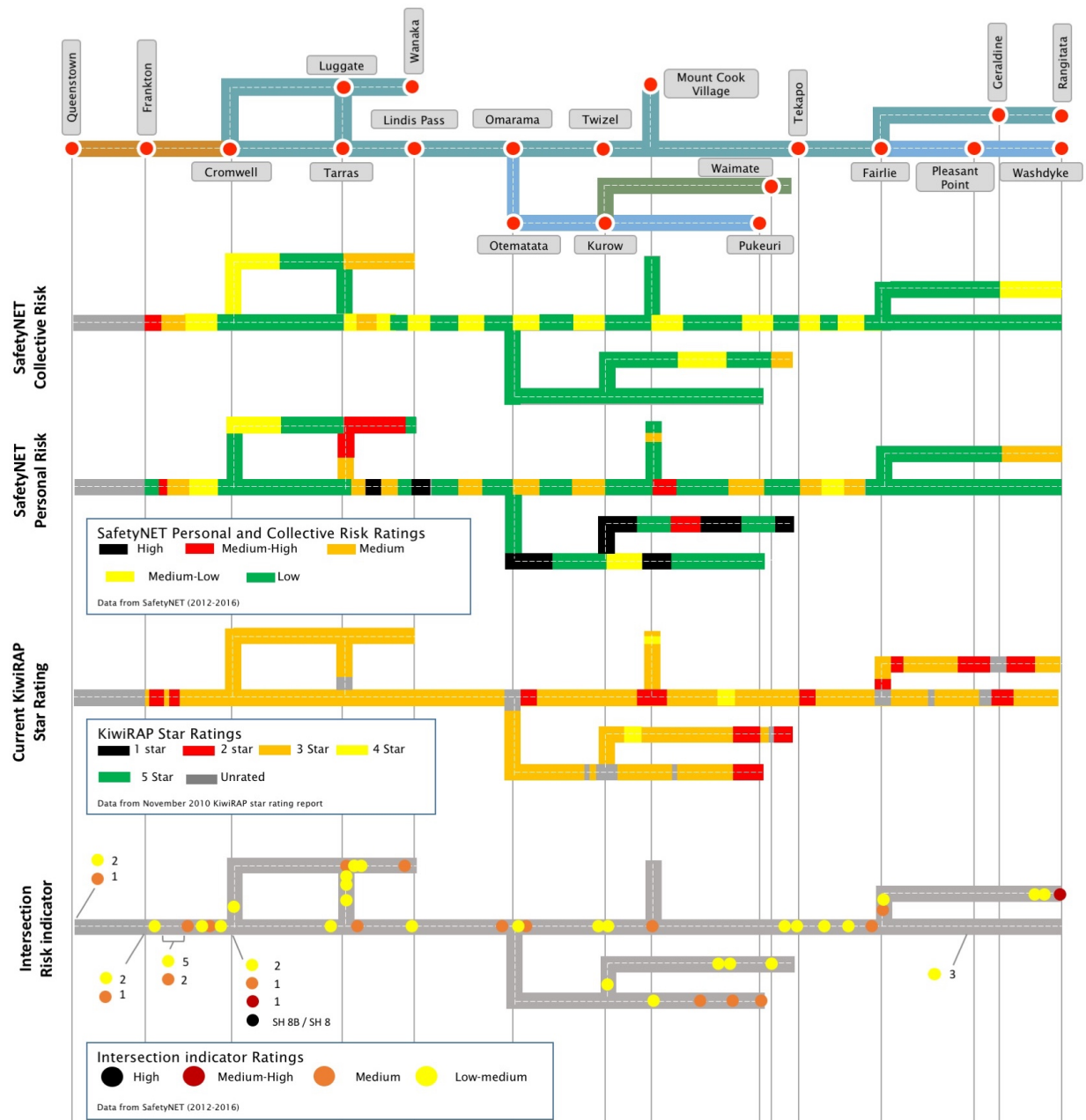
Most of the corridor at present has a 3-star KiwiRAP rating with small pockets of 2 and 4-star ratings. Sections of 2-star ratings are predominantly present towards the northern end of the corridor around Tekapo, Pukeuri, Waimate, Geraldine and Rangitata as well as close to Frankton and near Omarama.

The corridor is predominantly classified as either Arterial or Collector except for the section from Queenstown to Cromwell which is Regional. The minimum desired customer level of service for Regional roads corresponds to a 3 Star rating and is generally met along the corridor.

Intersection risk indicators

Intersections along the corridor predominantly have a low to medium risk rating. In Cromwell, the SH8/SH8B intersection is high risk while the SH6/SH8B is medium high. The intersection of SH79/SH1 in Rangitata is rated as a medium-high risk intersection.

Figure 14 - Safety



Pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Safety** include the following:

- **Self-drive tourism:** Self-drive tourism is increasing, particularly with international tourists who are unfamiliar with New Zealand road conditions and have unrealistic expectations of the level of service that roads to key destinations will provide. In particular, under-estimation of journey times is common, and can be a major cause of driver fatigue. Inconsistent information and road conditions along the corridor can create confusion among drivers who are often travelling long distances and must get from A to B in a specific timeframe.
- **Passing/slow lanes:** Limited passing/slow vehicle lanes, particularly through areas where there is steep and mountainous terrain, leads to driver frustration and often poor and unsafe decision-making when stuck behind slow vehicles.
- **Access to key destinations:** Access points to key destinations are not constructed for the traffic volumes they currently experience, largely an outcome of tourism growth. Examples include the entrance and exit to Quailburn Road (accessing the Clay Cliffs south of Twizel), and the right turn access to the Mt John Observatory (just outside Tekapo). This contributes to unsafe decision-making where there may be poor sightlines, limited signage, 100 km/h speed limits, and narrow carriageways.
- **Cycle tourism:** Road space for cyclists is limited throughout the corridor, which does not readily cater to the growing demand for cycle tourism. Narrow carriageways and driver behaviour impact on the safety and confidence of cyclists using key routes along the state highway. SH79 from Fairlie to Rangitata has a narrow carriageway and is steep and windy, not ideal for the combination of cyclists and heavy vehicles.
- **Scenic viewing areas:** Unsafe, unformed stopping locations in Mackenzie country, particularly around photo opportunities of Mount Cook, Lake Pukaki, Southern Alps and scenic features on SH8 and SH80, and safe stopping locations on SH79 with rural views.

Future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **Safety** include the following:

- **Stopping places and rest areas:** Review access to stopping places and rest areas with a tourist's expectations in mind to ensure they are located in appropriate places that a tourist would want or need to stop at, and provide the basic amenities that a tourist would expect to see in a tourist centric country. e.g. public toilets, places to stop and view scenic areas, picnic tables.
- **Passing opportunities:** Improving passing opportunities and slow lanes throughout the corridor to minimise the extent of time that customers get stuck behind slow vehicles.
- **Visiting drivers project:** Further investment in The Visiting Drivers Project, which is committed to the end of the 2017/18 financial year should be considered to significantly improve safety and transform the corridor into a safe system network.

Collaboration with the Rental Vehicle Association: Working in collaboration to ensure rental vehicle companies have fleet with high Australasian New Car Assessment Program (ANCAP) safety ratings, and they provide educational information to drivers around expected route conditions and driving on the correct side of the road.



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People, places, and environment

Natural environment

The journey is dominated by natural and rural landscapes with significant public conservation areas along the way, including a World Heritage Park and the largest Dark Sky Reserve in the world. Lakes, rivers and streams are located throughout the corridor and have numerous water catchment areas.

These features contribute to the stunning natural landscape on offer and the popularity of this journey, particularly to international tourists.

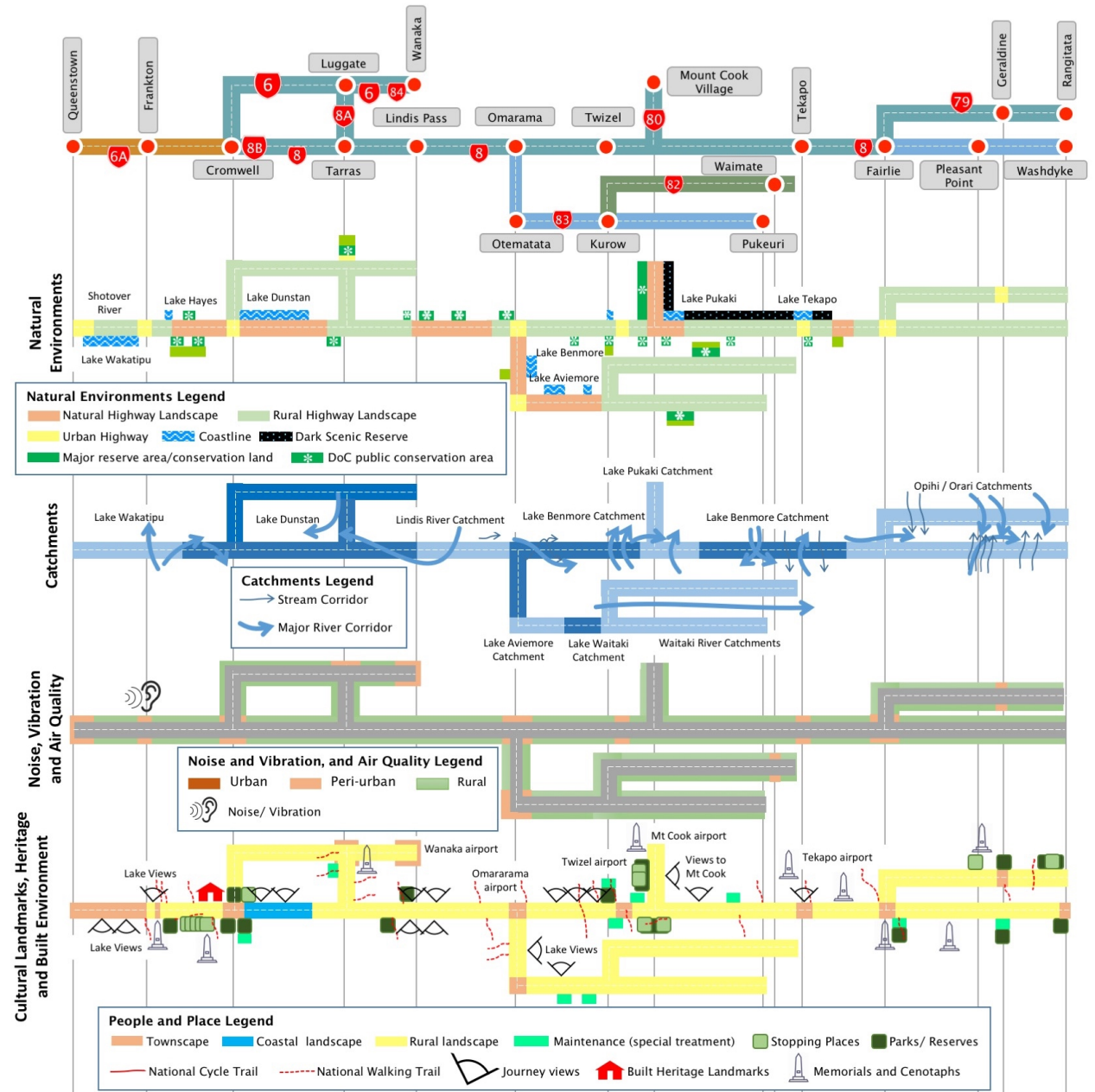
Noise, vibration, and air quality

Identified noise and vibration issues are limited to the Frankton and Cromwell section of the corridor. Urban development in areas that were previously rural has generated reverse sensitivity issues, particularly where heavy vehicles are braking to reduce speed from 100 km/h to 80 km/h. The surface material used on the state highway is contributing to noise where chip seal is often used to achieve cost saving measures.

Cultural landmarks, heritage, and built environment

Parks and reserves, journey views, and national walking trails are located throughout the journey and reflect the natural environment that the corridor is located in. Urban settlements provide opportunities for stopping places, although there are long distances between them. This is particularly so through the Lindis Pass section between Cromwell and Omarama. Tekapo and Twizel are both undergoing urban development.

Figure 15 – People, places, and environment



Pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **People, Places, and Environment** include the following:

- **Increasing severe weather events:** The increasing number of severe weather events can increase the risk of erosion and degradation of the rocks, soils, and slopes on the corridor. The management of these risks is likely to require engineered controls to ensure the corridor remains accessible to all users.
- **Stock effluent:** Stock effluent on the road surface from the seasonal movement of stock, particularly along sections of SH6 and SH8 where there are limited stock effluent disposal facilities.
- **Wilding pines:** Wilding pines overhang sections of road, casting shadows that can result in ice during winter months, and create areas of roughness due to root intrusion.
- **Noise and vibration:** Population growth creates different expectations on the level of service provided by the corridor. Most new urban developments will be constructed with acoustic glazing, which will reduce potential impacts from noise, however, other mitigation measures for noise and vibration include the type of road surface used and the speed limits that occur alongside these areas.
- **Air quality:** Increases in traffic movements including freight and tourist buses and associated impact on air quality. Note there is a monitoring station for this in Queenstown.
- **Scenic viewing areas:** Limited stopping places for scenic photos lead to poor decision-making with tourists often stopping in inappropriate places to take pictures or access cultural landmarks. For example, in Tekapo, customers crossing SH8 to access the Church of The Good Shepherd.
- **Amenities:** Tourist's expectation from the journey such as provision of adequate amenity and facilities including stopping places, rest areas, rubbish bins, and toilets.

Future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **People, Places, and Environment** include the following:

- **Strategies for tourism:** Collaborative strategies working with the tourism industry to focus on tourism customer needs and expectations and further apply the outcomes of the Visiting Drivers Project. Include consideration of consistent approaches to signage, identifying tourism destinations, road information, amenity and facility provision, and provision of rest areas. Also consider the use of technology in the development of an app for visiting drivers with relevant information.
- **Stormwater management:** Improved management of stormwater to meet increased standards, particularly in catchment areas.
- **Management of noise and vibration:** The spread of growth into rural areas will likely require higher investment in the corridor as land use and customer expectations change, for example reverse sensitivity where development adjacent to the state highway triggers a change in expectation of noise and vibration levels.
- **Stock effluent disposal sites:** Provision of stock effluent disposal sites throughout the corridor particularly along SH82/SH83, and SH79/SH8.
- **Advanced warning signs:** Further consideration of advanced warning signs informing visitors of safe stopping places for photos, parking areas to access landmarks, and serviced rest areas that are safe and appropriate for a rest stop. Consider collaboration with companies to integrate these features into in-car navigation systems in a similar manner to how service stations are.

Understanding the infrastructure assets

The following sections contain information about the condition and performance of the state highway assets within the corridor. This information is necessarily complex and therefore challenging to communicate simply. Every effort has been made to explain the base data inputs and what the information is describing in as simple terms as possible, however full comprehension does require some technical knowledge of the terms used.

Corridor Asset Base

The state highway system is a significant national asset, made up of 11,412 km of roads and associated assets. This corridor contributes approximately 723 km of road network which reflects 6.3% nationally. The total value of the assets along the corridor is \$745M.

The corridor assets have been divided into eight groups as shown in Figure 16 which directly support the access, reliability and efficiency, safety, resilience and people, places and environment outcomes on the network.

Asset condition and performance summary

The infographic shows the summary score the entire corridor achieves for each of the eight measures used in this document to assess the condition and performance of the assets. These measures are assessed in more detail along the corridor in the following sections of the document.

Figure 16 – Corridor asset base

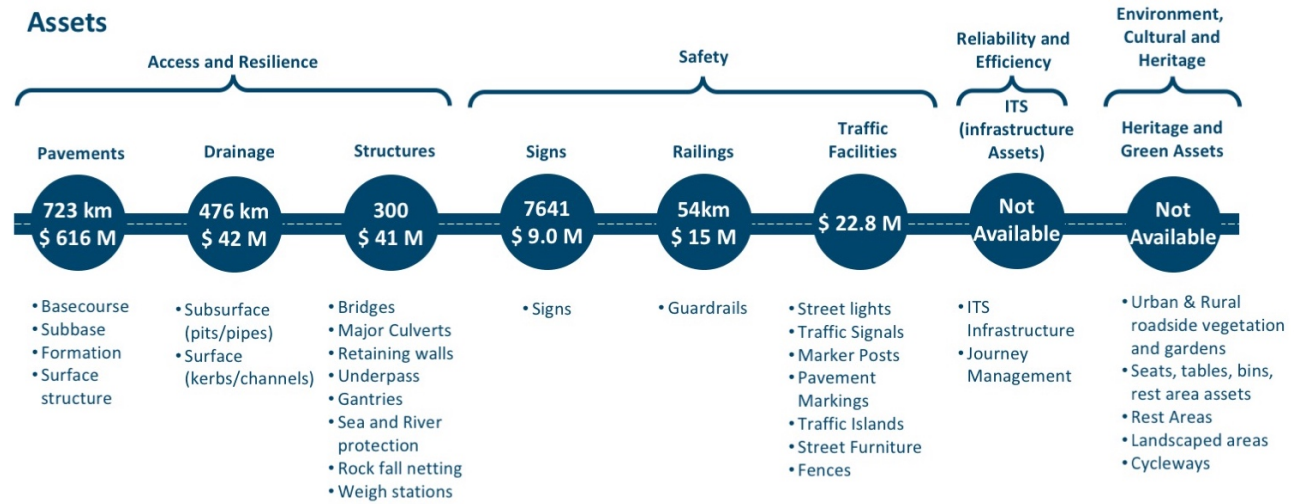


Figure 17 - Summary asset condition and performance



Figure 18 – Asset condition 1

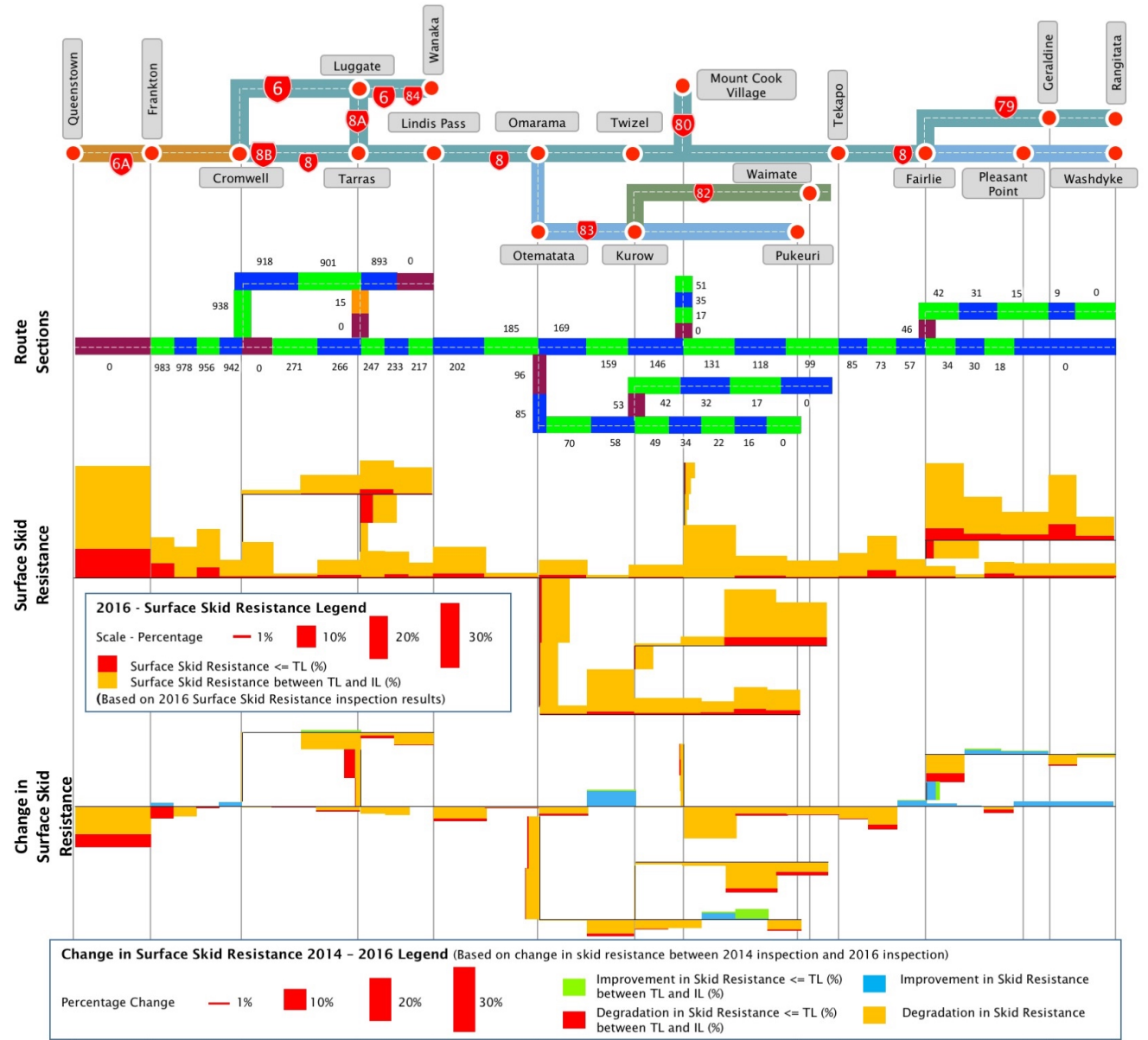
Asset condition and performance

Surface skid resistance

The infographic shows the proportion of the Route Section, as a percentage, that falls within the two levels of either threshold limit or investigation level. The change in Surface Skid Resistance infographic shows the change in the levels from the 2014 survey to the 2016 survey, as either an improvement or degradation.

The information is derived from inspection data that records a value every 10m in each direction. Each 10m length is rated as to whether it is within one of the bands: below threshold limit; within investigation limits; or above Investigation limits. The proportion is then the number of 10m lengths in that section as a percentage of all 10m lengths in that section.

Isolated route sections of the corridor show improved surface skid resistance, but many others have surface skid resistance values between the investigation and threshold levels and continued degradation of surface skid resistance below the threshold level. The greatest surface skid resistance degradation is the section of SH6A between Queenstown and near Frankton, SH6A/0 and SH6/983, and SH8A/15 near Luggate.



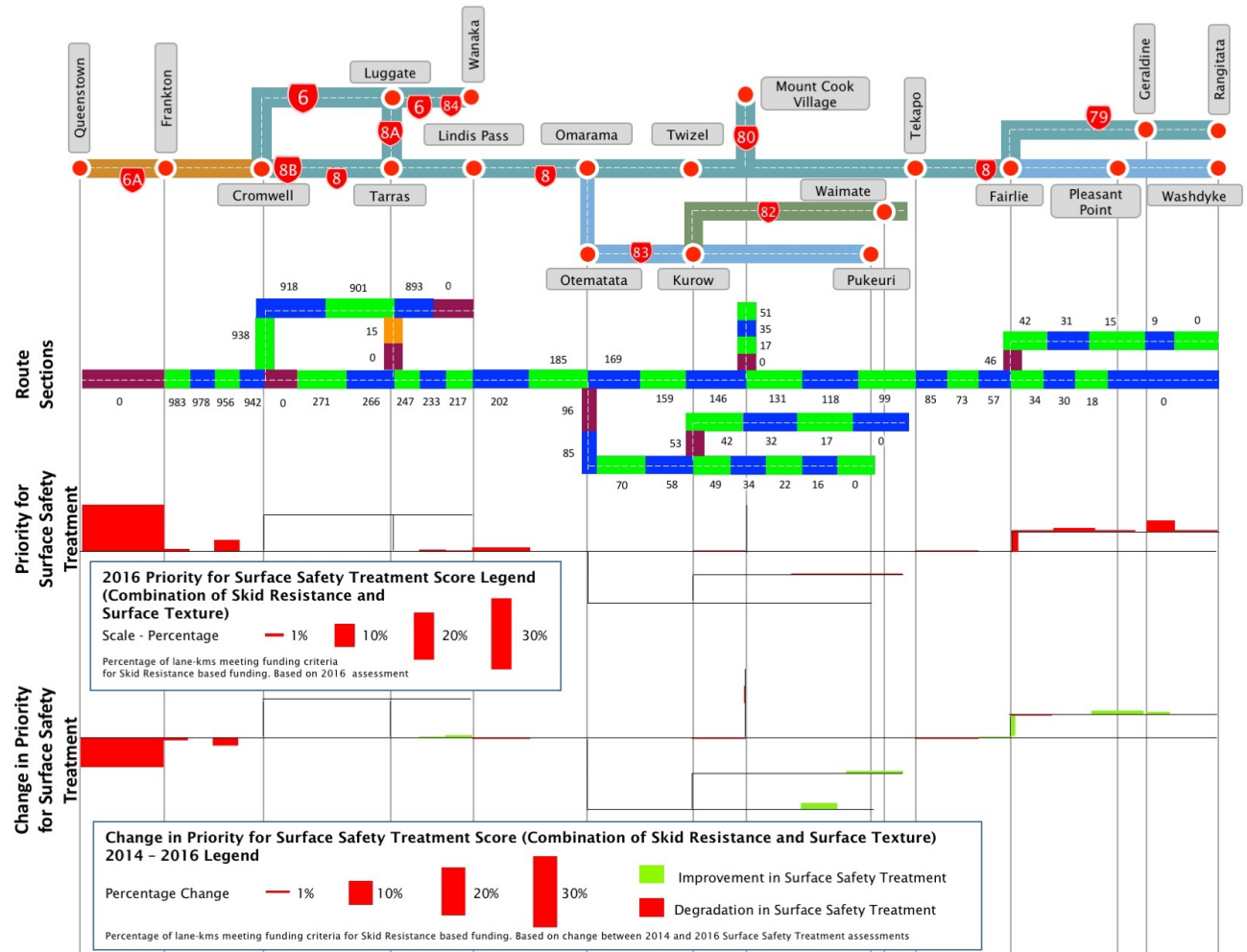
Priority for surface safety treatment

The infographics show the proportion of the Route Section that has a Priority for Surface Safety Treatment (Skid Assessment Length) that would qualify for funding, i.e. a score >140. The second infographic shows the change in these levels from the 2014 survey to the 2016 survey, as either an improvement or degradation.

Taken from inspection data that is normally recorded every 100m in each direction. Each 100m assessment length is rated and if it achieves a score over 140 it qualifies for funding. The proportion is then the length of route section that qualifies for funding as a percentage of the total length of that section.

Surface skid resistance based funding is available for 8.8 lane km of this corridor, derived from small pockets of length across the corridor. The worst areas, showing increased priority for surface safety treatment, are along SH6A between Queenstown and Cromwell, particularly RS0, between Queenstown and Frankton.

Figure 19 - Asset condition 2



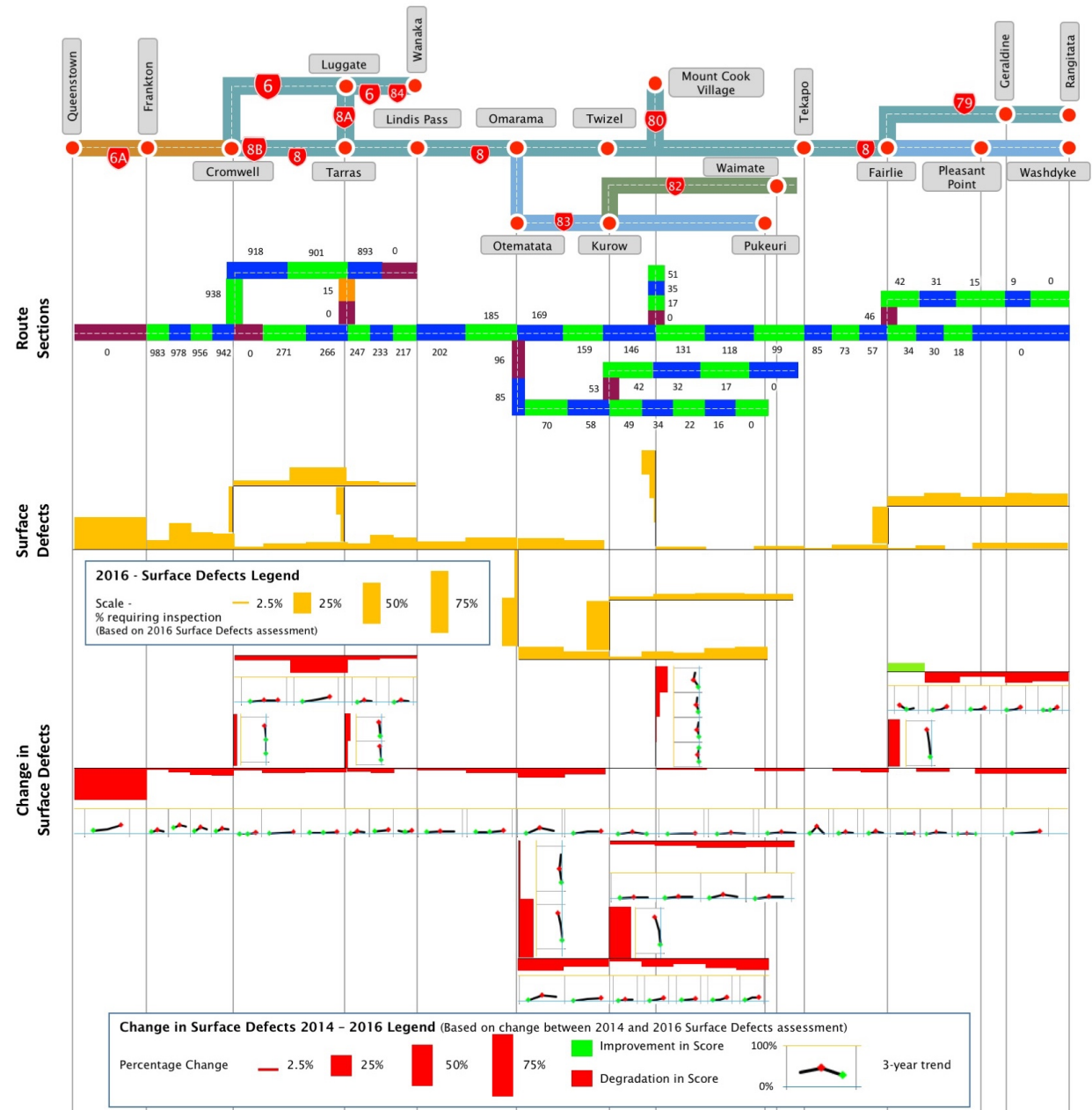
Surface defects

The infographics show the proportion of the Route Section that has a Surface Defects (100m Priority) score that would signal the need for further investigation, i.e. a score >20. The second infographic shows the change in these levels from the 2014 survey to the 2016 survey, as either an improvement or degradation, as well as the three-year trend.

The Surface Defects score is made up of a number of measures which all contribute to the overall score including: roughness, rutting, shoving, flushing, and design life. Any 100m section achieving a score over a total of 20 rates as flagged for inspection. The proportion is then the length of corridor that is flagged for inspection as a percentage of the total length of that section.

Overall, 10.1% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: SH6A/0 between Queenstown and Frankton, SH6/901 south of Luggate, and SH6/978 between the Kawarau and Arrow Rivers. These sections also show a significant level of degradation in score over the last three years.

Figure 20 – Asset condition 3



Surface age

The infographic shows the weighted average age of road surface, and the proportions of surface age that fall within the three age bands.

The base data is all the seal lengths and their age from RAMM. Then a weighted average is then calculated. Overall, all sections add up to 100%. The proportion is the length of corridor in a particular age band as a percentage of the total length of that section.

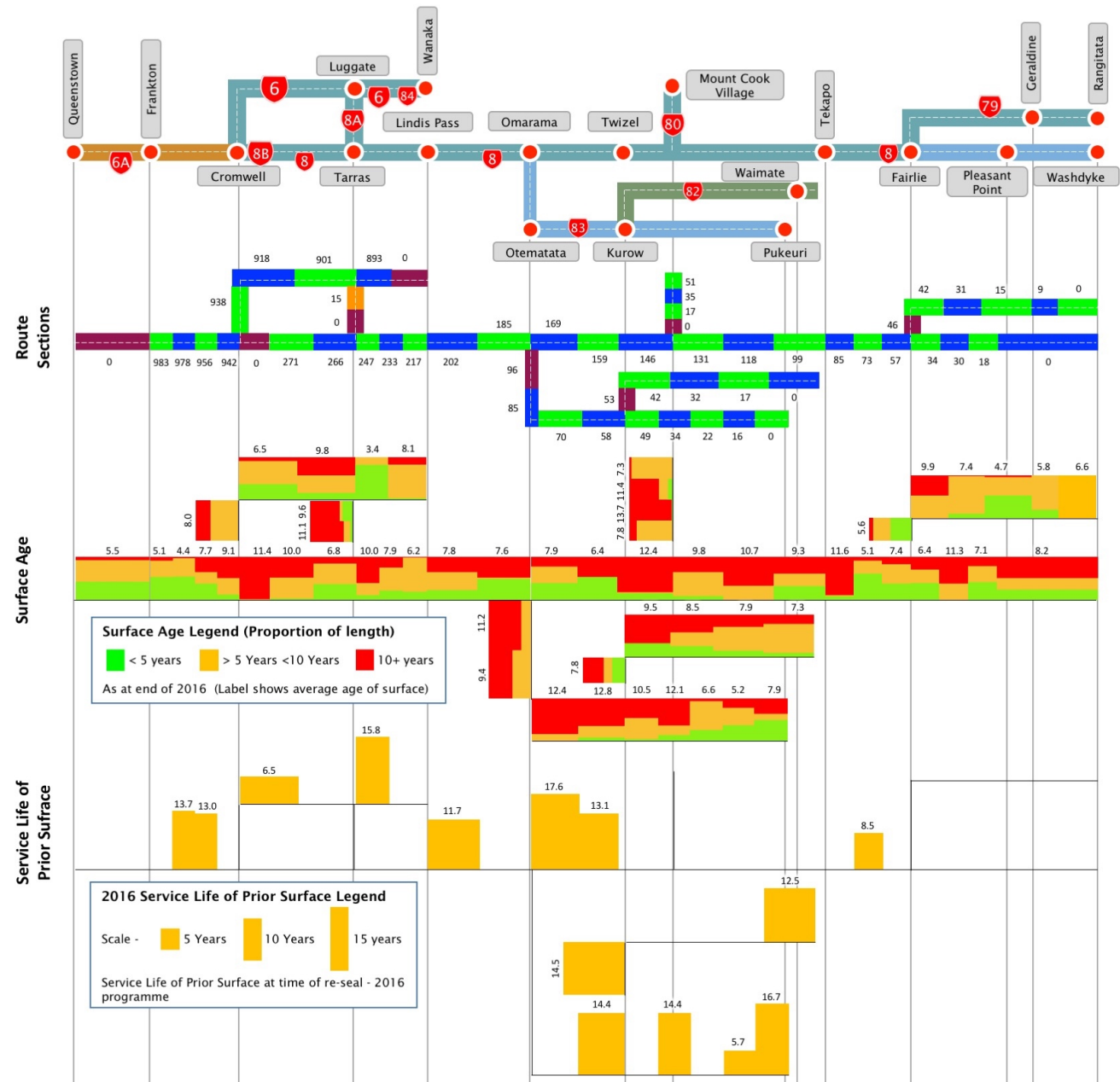
The sections of corridor with the oldest age profile are SH8/30 north of Cave, SH8/85 south of Lake Tekapo, SH8/146 around Twizel, SH8B/0 in Cromwell, SH80/17 and SH80/35 alongside Lake Pukaki, SH83/58 and SH83/70 between Kurow and Otematata, and, SH83/96 east of Omarama.

Service life of prior surface

The infographic shows the weighted average age achieved for the sections of road surface that were resurfaced in the last financial year (2015-16). The infographic only shows sections where re-surfacing work was undertaken in the 2015/16 season. The value is derived from the weighted average age of the sections of seal that were overlaid by a new first coat seal. This is a standard ONRC measure.

Overall the re-surfaced sections achieved an average service life of 14.1 years, with sections SH6/893 between Albert Town and Luggate, SH8/169 north of Omarama, and, SH83/0 northwest of Pukeuri achieving an average service life in excess of 15 years.

Figure 21 – Asset condition 4



Resurfacing

The infographics show the proportion of Route Sections planned for resurfacing in the 2016/17 and 2017/18 approved annual plans, confirmed through the RAPT tour, as an indication of the response to the surface condition described previously, and current surface condition.

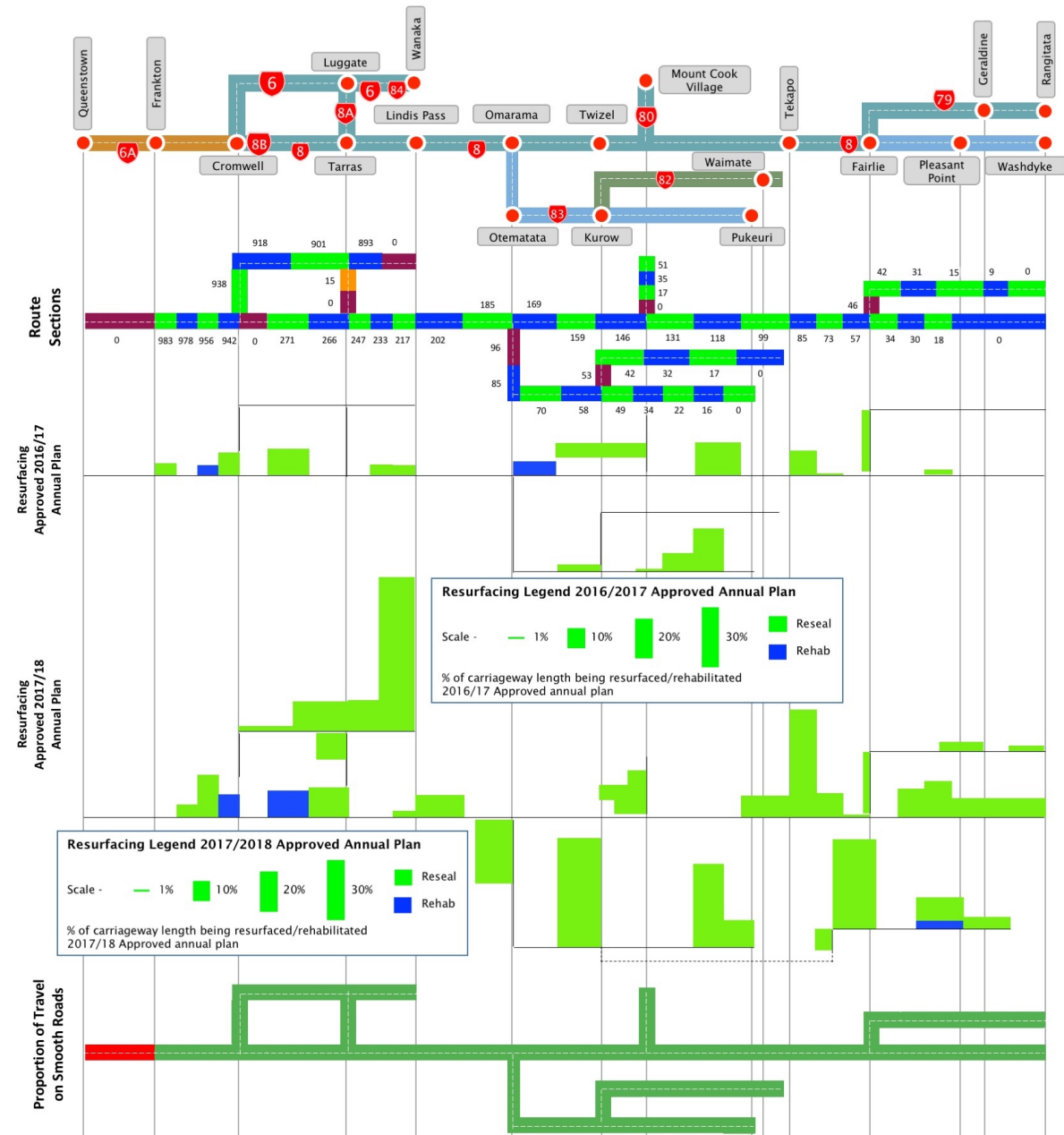
The major resurfacing works are planned for sections SH8/85 south of Lake Tekapo, SH83/58 North of Kurow, and, SH84/0 between Albert Town and Wanaka.

Proportion of travel on smooth roads

The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not.

The corridor exceeds the target for proportion of travel on smooth roads for its entire length, except for SH6A between Queenstown and Frankton.

Figure 22 – Asset condition 5



Asset condition and performance pressures

The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Asset Condition and Performance** are as follows:

- **Quality of new construction:** There is a lack of confidence around new construction achieving full life is lower requiring earlier intervention or additional remedial maintenance.
- **Customer Expectations:** Much of the route is being maintained to a level higher than its classification would dictate. At least in part this is due to the requirement to cater for the high proportion of international tourists using the route, who have a higher expectation of wide, easy to negotiate carriageways with a high aesthetic value, and a higher than usual safety requirement. Use is by unfamiliar drivers on curvy roads in demanding/wider/less manoeuvrable vehicles.
- **Frankton to Cromwell:** This section is under pressure, is constrained either side which limits the addition of extra lanes and supporting high volumes of heavy traffic. Staged renewal of AC
- **Maintenance season:** There is a relatively short maintenance season due to extremes of weather and higher summer seasonal road use.
- **Kawarau Gorge:** There are a large number of heavy vehicles using this section, with volumes increasing as Queenstown grows. The road is also narrow in parts.
- **Cromwell to Wanaka SH8A:** – Luggate Bridge is a single lane timber deck bridge. Deck repairs on the bridge require complete closure.
- **SH83:** – Irrigation of farmland is impacting drainage, due to low outfalls. Further land-use changes will further exacerbate this issue.
- **Lindis Pass:** Managing the affects permafrost on vulnerable pavement during the winter months.

Asset condition and performance future considerations

The future considerations relating to corridor pressures, intervention triggers and appropriate levels of investment related to **Asset Condition and Performance** are as follows:

- **Future Aggregate source:** There is a need to source a new source of high performing chip, as Parkburn (Central) source is becoming limited. Greater use or increased reseal cycles, or a shorter life approach may hasten this impact.
- **Old Pavements:** Generally, pavements on this corridor are old and reseal layers are building up, so it is likely a future wave of rehabs will be required.
- **Seal widths:** Seal widths are coming under pressure, especially older style designs and with the increase in heavy vehicles.
- **Growing trends:** There has been an increase of roads flushing, loss of texture, shorter lives, winter maintenance increase at more locations.
- **Growth of Queenstown:** The rapid growth of the Queenstown urban area, and the associated infrastructure strain this is causing, is placing a strain of the corridor's ability to support predicable, reliable and efficient journeys. A meaningful response will be required, both in terms of additional assets, and a suitable operational approach.
- **Formation:** If narrow parts of the corridor were to be widened then there would be an impact due to other corridor features, culverts, bridges etc., which would need to be looked at and eventually transitioned to allow wider carriageway.
- **Long term solution for SH6A:** A longer term solution for Frankton Road will be required, that responds to the need to minimise traffic and pedestrians in a high tourist area.
- **Mt Iron Intersection:** The intersection of SH6 and SH84 will require re-configuration in the future, to cope with expected growth and address safety concerns that would be exacerbated with increased traffic.

Investing in the corridor

The **Customer Levels of Service** shapes our response to our investment in maintenance, renewals and improvements. The NZ Transport Agency must consider the impact we have on our customers, the environment, communities, iwi, and the NZ economy in everything we do.

Decisions must be evidence based, informed and transparent with investment targeted to the right treatment, in the right place, at the right time while considering a range of competing priorities for investment. This requires significant analysis of various alternatives and options and expertise in applying appropriate judgement in collaboration with our service delivery partners.

Right treatment, right place, right time

A range of factors have been considered to determine the best point at which to intervene with maintenance and/or renewal treatments and improvements along the corridor.

Intervention works will be programmed to ensure:

- The right treatment,
- At the right place, and,
- At the right time.

Interventions will:

- Be based on minimising whole of life, whole of system costs and be underpinned by facts derived from enhanced asset information and modelling
- Define the most appropriate approach to asset maintenance, inspection and renewal, supported by reliability, availability, maintainability and safety specifications
- Use a risk-based approach to determining intervention requirements to specified levels of reliability
- Use resilience requirements to a specified range of weather conditions, considering climate change
- Define how sustainable development requirements are to be addressed

Summary investment

The proposed investment in the corridor is as follows:

Table 1- Summary corridor investment (\$000)

Outcome	Expenditure Category	2018-2021	2021-2024	2024-2028
Access and Resilience	Maintenance and Operations	\$12,319	\$12,964	\$19,432
	Renewals	\$18,316	\$22,846	\$32,974
	Improvements	\$16,817	\$1,500	\$0
Reliability and Efficiency	Maintenance and Operations	\$4,320	\$4,549	\$6,813
	Renewals	\$278	\$253	\$433
	Improvements	\$51,900	\$46,900	\$0
Safety	Maintenance and Operations	\$9,218	\$9,675	\$14,516
	Renewals	\$2,925	\$3,021	\$4,056
	Improvements	\$6,500	\$18,500	\$0
People, places and Environment	Maintenance and Operations	\$2,008	\$2,091	\$3,138
	Renewals	\$118	\$126	\$187
	Improvements	\$0	\$5,289	\$0
Total		\$124,719	\$127,714	\$81,549

Figure 24 – Corridor investment

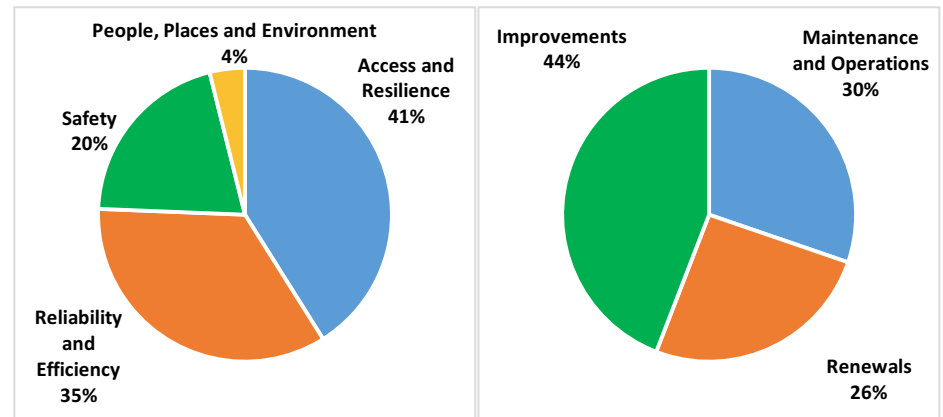


Table 2 - Summary investment by work category (\$000)

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Access and Resilience	111 Sealed Pavement Maintenance	\$2,230	\$2,314	\$3,452
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$830	\$923	\$1,385
	114 Structures Maintenance	\$1,521	\$1,620	\$2,435
	121 Environmental Maintenance	\$4,146	\$4,428	\$6,651
	122 Traffic Services Maintenance	\$88	\$131	\$180
	124 Cycle Path Maintenance	\$15	\$16	\$25
	151 Network & Asset Management	\$2,799	\$2,835	\$4,258
	161 Property	\$689	\$696	\$1,046
	211 Unsealed Road Metalling	\$10	\$10	\$15
	212 Sealed Road Resurfacing (excl. surface skid resistance)	\$12,168	\$14,977	\$19,072
	213 Drainage Renewals	\$429	\$468	\$695
	214 Pavement Rehabilitation	\$3,783	\$5,496	\$10,374
	215 Structures Component Replacements	\$1,773	\$1,717	\$2,549
	222 Traffic Services Renewals	\$153	\$178	\$268
321 - 341 Improvements	\$16,817	\$1,500	\$0	
Reliability and Efficiency	121 Environmental Maintenance	\$1,681	\$1,779	\$2,672
	123 Operational Traffic Management	\$1,762	\$1,885	\$2,827
	151 Network & Asset Management	\$750	\$759	\$1,125
	161 Property	\$126	\$126	\$190
	222 Traffic Services Renewals	\$278	\$253	\$433
	321 - 341 Improvements	\$51,900	\$46,900	\$0

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Safety	111 Sealed Pavement Maintenance	\$2,555	\$2,635	\$3,935
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$457	\$446	\$677
	114 Structures Maintenance	\$557	\$605	\$909
	121 Environmental Maintenance	\$268	\$316	\$475
	122 Traffic Services Maintenance	\$3,334	\$3,546	\$5,326
	124 Cycle Path Maintenance	\$8	\$8	\$12
	151 Network & Asset Management	\$1,744	\$1,813	\$2,724
	161 Property	\$295	\$305	\$458
	212 Surface Skid Resistance	\$1,621	\$1,760	\$2,643
	214 Pavement Rehabilitation	\$23	\$44	\$67
	215 Structures Component Replacements	\$219	\$244	\$367
	222 Traffic Services Renewals	\$1,062	\$972	\$980
	321 - 341 Improvements	\$6,500	\$18,500	\$0
	People, places and Environment	111 Sealed Pavement Maintenance	\$168	\$177
121 Environmental Maintenance		\$1,468	\$1,539	\$2,309
151 Network & Asset Management		\$299	\$301	\$453
161 Property		\$74	\$74	\$111
221 Environmental Renewals		\$118	\$126	\$187
321 - 341 Improvements	\$0	\$5,289	\$0	
	Total	\$124,719	\$127,714	\$81,549

To be confirmed through the RLTP process

Investing in access and resilience

Operations and maintenance

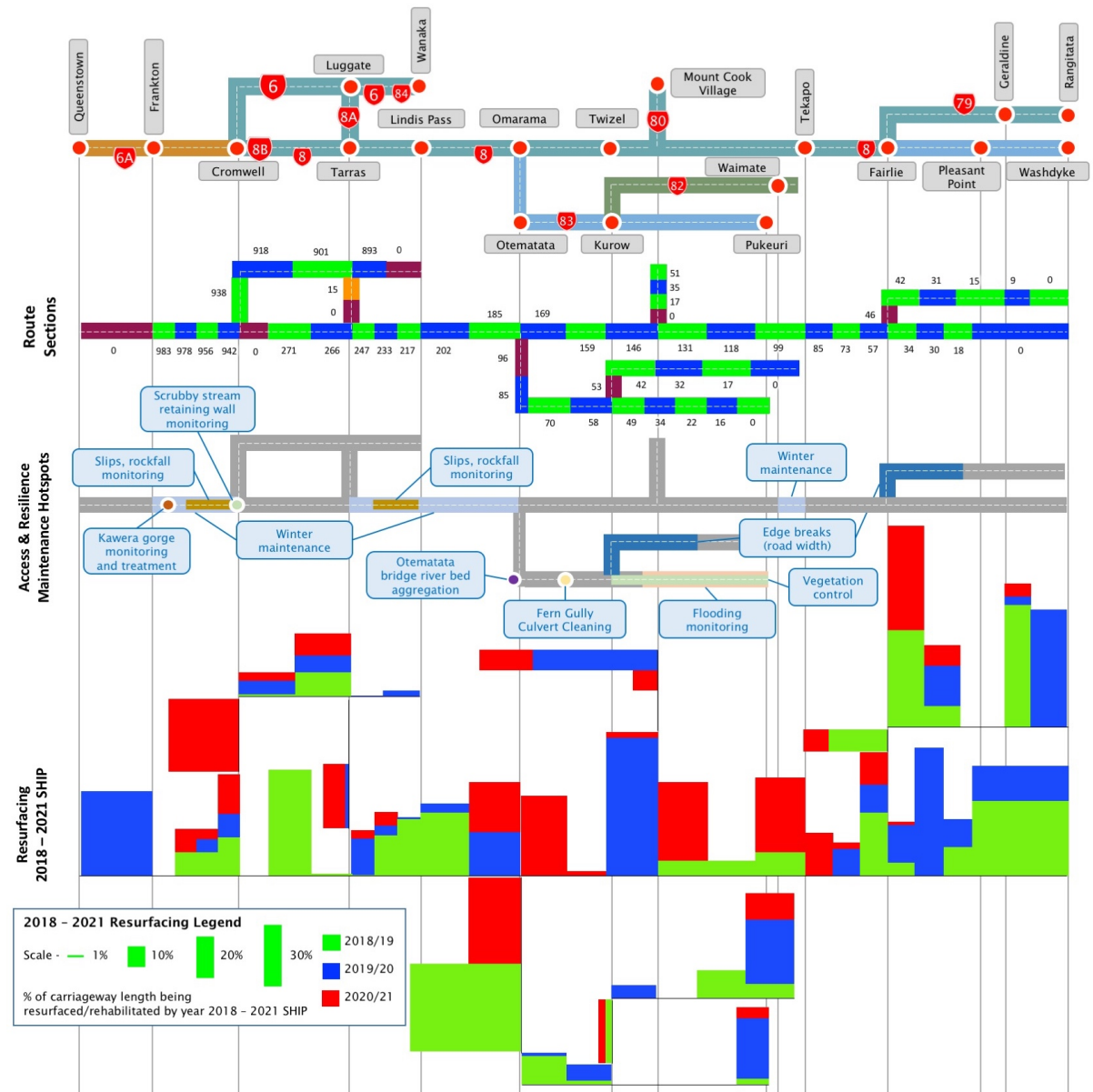
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing and structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement deterioration specially through improved drainage.

Maintenance hot spots

The following maintenance ‘hotspots’ require additional monitoring or cause an increased maintenance burden along the corridor:

- **Nevis Bluff SH6:** This section is requiring significant monthly helicopter inspections due to potential rockfall.
- **SH79 – Geraldine to Fairlie, Mt Cook Road, and SH82 (Waimate to Kurow):** This section features narrow road widths and experiences constant seal edge break caused by heavy vehicles.
- **Tarras to Lindis Pass:** Along this section, rockfalls and winter maintenance are the main issues encountered.
- **Burkes Pass SH8:** This section of corridor between Fairlie and Tekapo requires winter maintenance during the colder months of the year.
- **Frankton to Cromwell:** Significant issues through the Gibbston valley and Kawarau gorge are ice due to shading on the winter months, and rockfall from the many bluffs along this section of corridor.
- **SH83:** Changes in land-use to dairy farming and increasing irrigation is causing drainage issues, and increased asset degradation due to heavy vehicles.
- **Fern Gully culvert SH83/58:** This culvert requires regular cleaning to avoid flooding.
- **Otematata river bridge SH83:** There is ongoing riverbed aggradation at the site of this bridge.
- **Scrubby stream retaining wall RS6/942:** Slumping is an issue with this retaining wall.
- **SH83 Pukeuri to Duntroon:** In this low-lying section of corridor flooding is an ongoing issue.

Figure 25 – Access and resilience investment



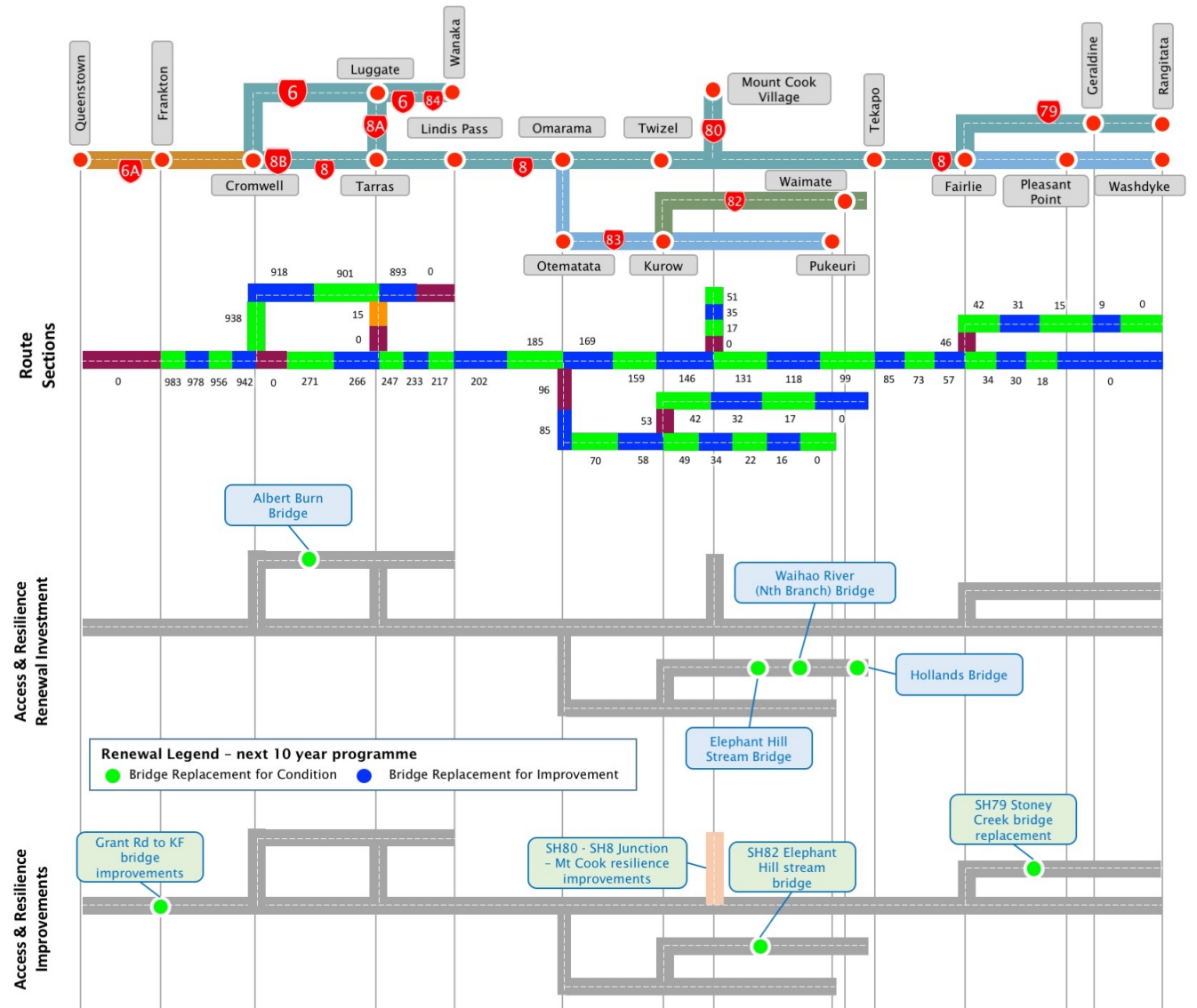
Structure renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. Four bridges are planned for replacement due to asset condition, at a total estimated cost of \$5.0 M.



Tourist Bus Lake Dunstan

Figure 26 - Access and resilience investment 2



Renewals

Resurfacing

The infographic in Figure 25 shows the proportion of route section by carriageway length planned for resurfacing within the period 2018/19 to 2020/21, the three-year span of the SHIP. This is also broken down in to the individual years to indicate the timing of expenditure over the three-year period.

Significant investment in resurfacing is planned for sections: SH8/146 north of Twizel, SH79/0 and SH79/9 between Rangitata and Geraldine, SH79/42 east of Fairlie, and, SH80/51 at Mount Cook Village.

Improvements

Planned

There are no currently planned access and resilience related improvements underway on this corridor.

Draft Regional Land Transport Programme considered for the SHIP

The following table shows the list of projects being considered through the Draft Regional Land Transport Programme through the SHIP, and cover the next 10 years.

Table 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH79 Stoney Creek Bridge		Proposed replacement of SH79 Stoney Creek Bridge to improve live load capacity.
SH82 Elephant Hill Stream Bridge		Bridge Replacement as per Network Operations programme.
SH80 SH8 Junction - Mt Cook Resilience Improvements		Resilience improvements on SH8 between SH8 Junction and Mt Cook village. Shows Amber rating in ONRC LoS Performance for Resilience within CMP.
Nevis Bluff Rockfall Protection		Ongoing work by Opus under NMM contract but capital project required. International peer review recommends staged high velocity catch fences.
Grant Rd to KF Bridge Improvements		This project will address the capacity constraint on SH6 at Frankton, particularly at the intersection of SH6/SH6A. This will include 4-laning from Grant Rd to Lucas Place and a replacement of the existing roundabout with either traffic signals or a larger roundabout. Integrated into this project will be improvements for pedestrian and cycle access (most likely grade separated) and a dedicated access to the existing bus hub location with bus priority measures. It is also likely to include the development of a new bus hub at the current location.

Investing in reliability and efficiency

Operations and maintenance

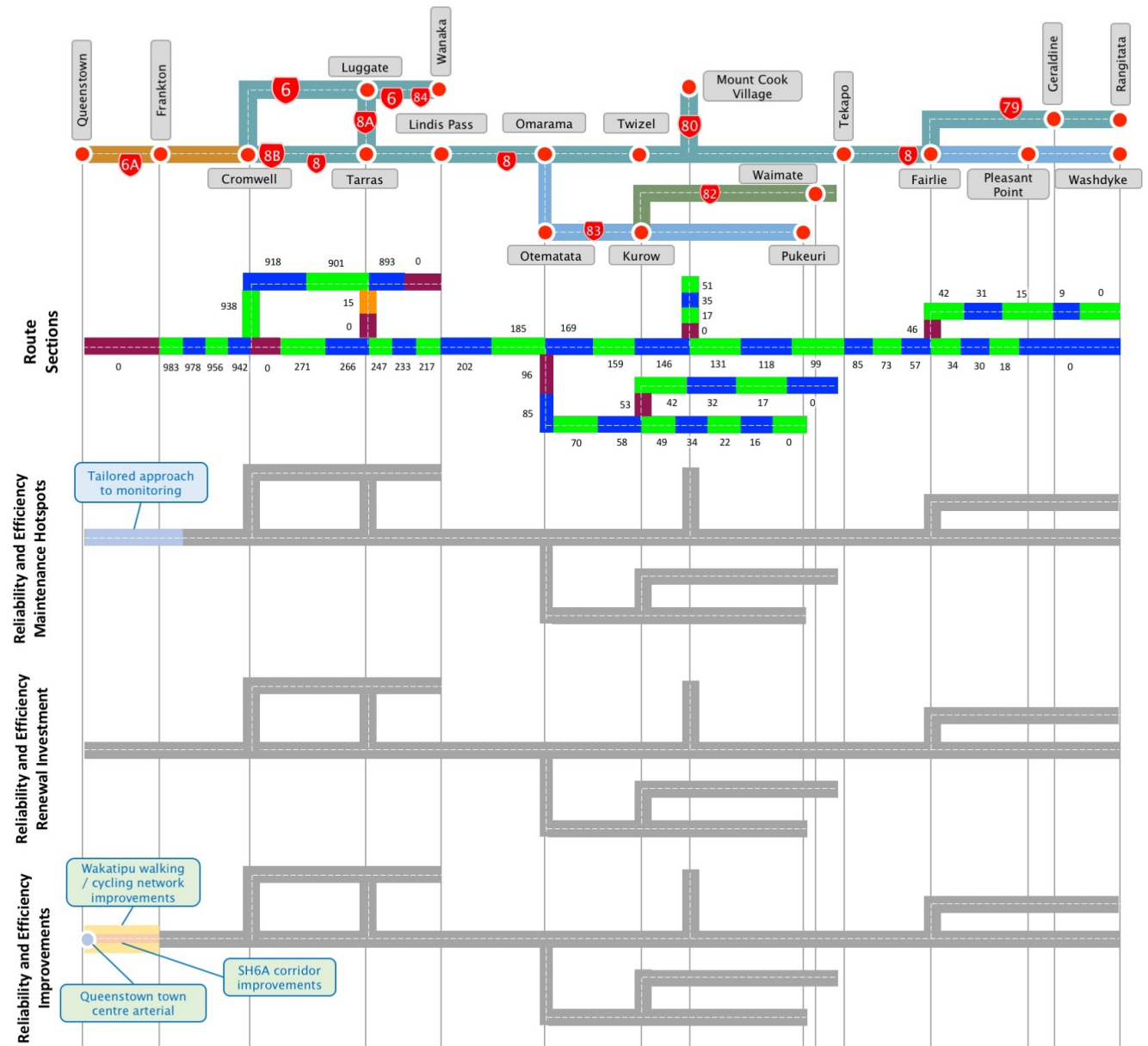
The main areas of investment to provide and preserve reliability and efficiency are environmental maintenance through keeping potential obstructions clear of the highway, wayfinding signage, and operational traffic management.

Maintenance hot spots

The following maintenance ‘hotspots’ require additional monitoring or cause an increased maintenance burden along the corridor:

- Queenstown to Shotover river:** There is increasing congestion on this section due to growth in Queenstown and Cromwell, and an increase in tourist numbers. This is resulting in the need for increasing night works and a tailored approach to maintenance to avoid undue impacts on tourism.

Figure 27 – Reliability and efficiency investment



Renewals

Additional investment is planned to upgrade ITS, paint additional lane arrows, and add rumble strips, and signage

There is a significant amount of minor works planned for next three years that will impact road users in terms of travel time.



Improvements

Planned

There are no currently planned reliability and efficiency related improvements underway on this corridor.

Draft Regional Land Transport Programme considered for the SHIP

The following table shows the list of projects being considered through the Draft Regional Land Transport Programme through the SHIP, and cover the next 10 years.

Table 4- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH6A Corridor Improvements		Improvements to access and efficiency including bus priority along SH6A between the BP roundabout and Stanley Street.
Queenstown Town Centre Arterial		A new town centre arterial will improve access and efficiency particularly for public transport and to facilitate access to a new town centre public transport hub and provides access to plan change 50 areas. The development of the new town centre public transport hub is an integral part of this project. This will be a joint activity with QLDC (50/50 funding split).
Wakatipu Walking/Cycling Network Improvements		Walking and cycling facilities adjacent to SH6 including improvements to connections for residential areas of Shotover Country/Lake Hayes estate, Jacks Point/Henley Downs and the Wakatipu trails. Upgrading of the existing Frankton track connecting Frankton to Queenstown as a safe alternative to SH6A on road cycling

Investing in safety

Operations and maintenance

Safer Journeys Goal 2016 to 2020 is to reduce the likelihood of crashes occurring and to minimise the consequences. The main areas of investment into ensuring safer journeys include: specialist pavement treatments, road marking including audio-tactile markings (ATP), signage, edge markers, safety barriers, speed limits, roadside vegetation control, and, street lighting.

Maintenance hot spots

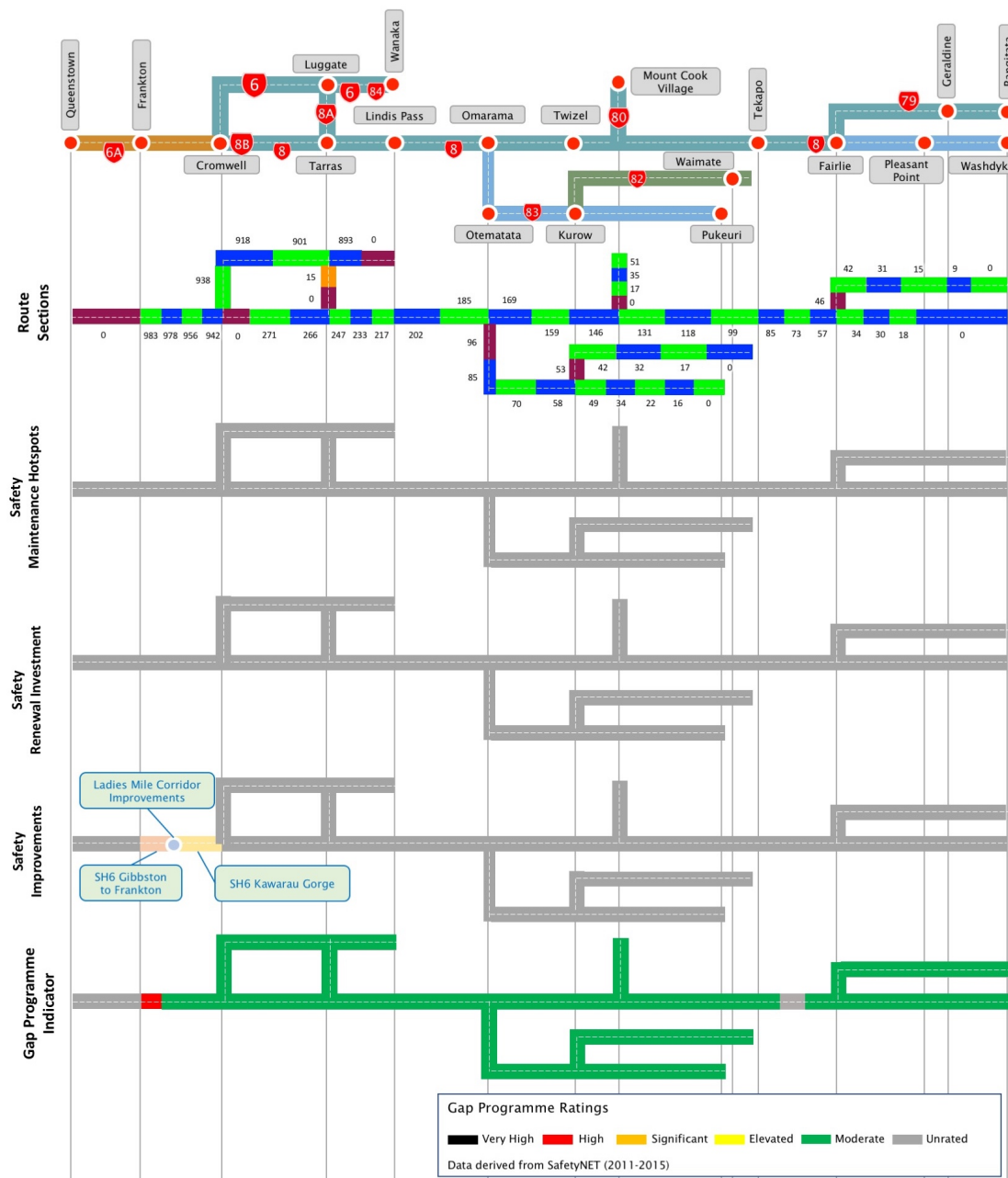
The following maintenance ‘hotspots’ require additional monitoring or cause an increased maintenance burden along the corridor:

- **Wire rope barriers** present a challenge for drainage access and winter maintenance, where the non-removal of snow causes ice, so approach is to get it off of road and not saturate the shoulder.

Gap programme indicators

- The potential for reducing fatal and serious injuries across the State Highway network has been assessed under the Gap programme. The Gap programme looks at the collective risk rating, likely level of intervention and the potential reduction in death and serious injury that may be achieved to determine a possible treatment approach. For instance, a road segment rated ‘Very High’ could potentially achieve a 50-70% reduction in fatal and serious injuries with the application of high cost improvements. Alternatively, if the risk level is “Elevated” a 10-20% reduction may be realised through targeted low cost, high coverage treatment improvements.
- A high potential exists to reduce fatal and serious injuries near Frankton through comprehensive and targeted medium-high cost improvements. From Cromwell to Washdyke, the introduction of targeted, low cost, high coverage improvements will provide a moderate potential to reduce fatal and serious injuries.
- The unrated segments are either areas where potential crash savings are low or are being addressed under other existing programmes.

Figure 28 – Safety investment



Renewals

There are no safety related renewals planned for the corridor.



Cyclists on SH8

Improvements

Planned

There are no currently planned safety related improvements underway on this corridor.

Draft Regional Land Transport Programme considered for the SHIP

The following table shows the list of projects being considered through the Draft Regional Land Transport Programme through the SHIP, and cover the next 10 years.

Table 5- Draft regional programme considered for SHIP

Project	Funding Status	Description
Ladies Mile Corridor Improvements		Capacity and safety issues related to Howards Drive which is the only access to the Lake Hayes residential development. Development down Stalker, Lower Shotover and Tucker Beach Roads require corridor and access improvements. Further population growth predicted for the area.
SH6: Kawarau Gorge		Safety project from the Safety Gap Analysis exercise
SH6: Gibbston to Frankton		Safety project from the Safety Gap Analysis exercise

Investing in people, places and environment

Operations and maintenance

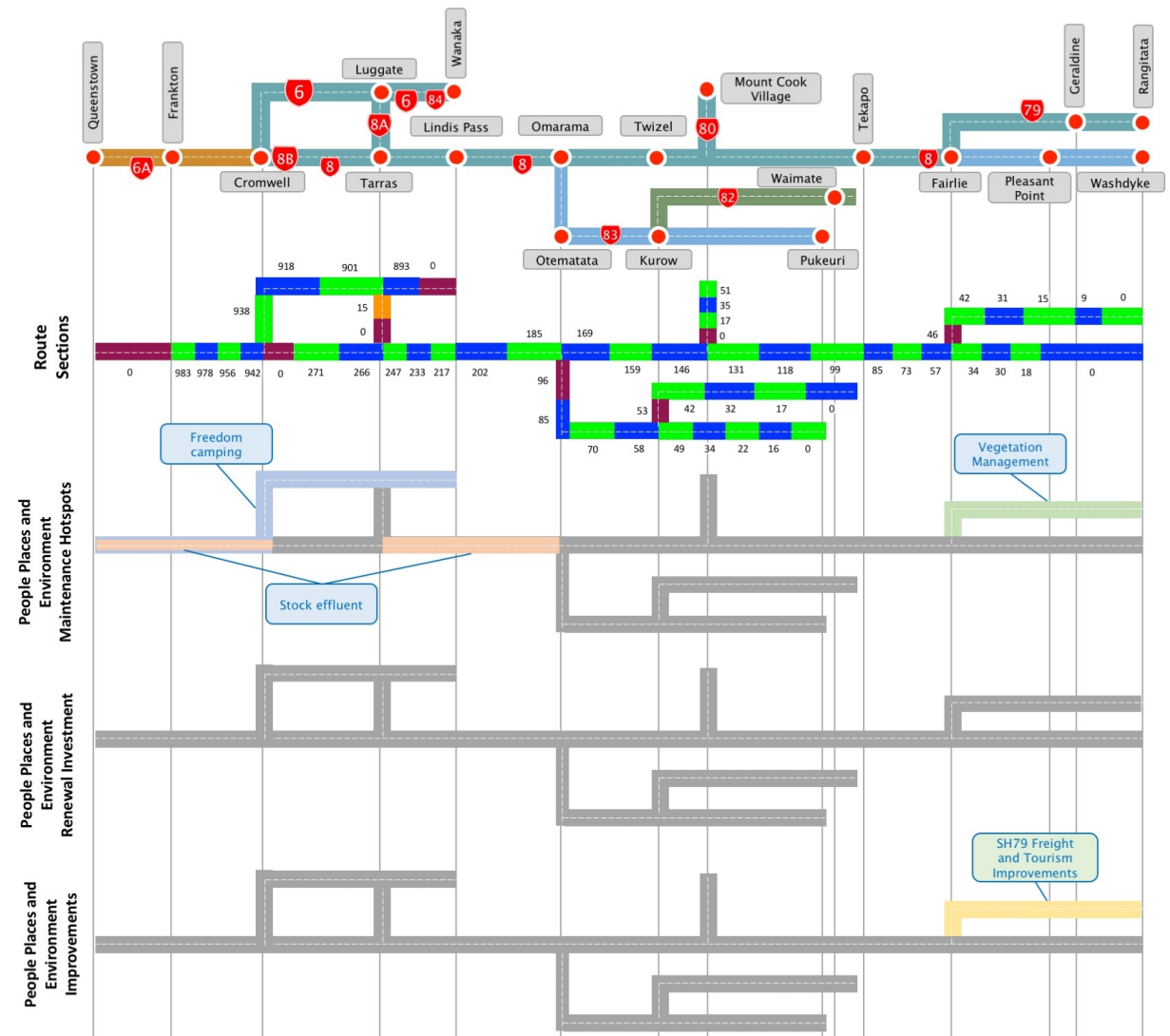
The main areas of investment into people, places and environment are: pavement rehabilitation to ensure a high proportion of travel on smooth roads, control of litter, provision of rest areas and stopping points, landscaped areas maintenance, and, environmental compliance.

Maintenance hot spots

The following maintenance ‘hotspots’ require additional monitoring or cause an increased maintenance burden along the corridor:

- **Vegetation management programmes:** Managing wilding pines and working with local farmers to manage tree planting near the corridor, particularly along SH79 and SH8.
- **Litter** – removal of bins from rest areas by both the agency and council have resulted in an increase in roadside litter.
- **Stock effluent:** Stock effluent from stock trucks is an issue between Queenstown to Cromwell on SH6, and, between Tarras to Omarama on SH8.
- **Freedom camping** is an issue between Queenstown and Wanaka requiring clean-up of litter including human effluent.

Figure 29 – People, places and environment investment



Renewals

There are no people, places and environment related renewals planned for the corridor.



Inmans Bridge, Fairlie to Geraldine SH79

Improvements

Planned

There are no currently planned people, places and environment related improvements underway on this corridor.

Draft Regional Land Transport Programme considered for the SHIP

The following table shows the list of projects being considered through the Draft Regional Land Transport Programme through the SHIP, and cover the next 10 years.

Table 6- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH79 Freight and Tourism Improvements		General improvements to support Freight & Tourism along SH79.

Investment pressures

Access and resilience

The following concerns excerpt pressure on the investment in **Access and resilience** on the corridor.

- **Quality of new construction:** There is a lack of confidence around new construction achieving full life is lower requiring earlier intervention or additional remedial maintenance.
- **Winter issues:** Snow and ice are the main vulnerabilities on the corridor with alternative routes often affected by this as well. A grader is located at the base of the Lindis Pass during winter to ensure an immediate response to snowfall events. The only viable alternative route when the Lindis Pass is closed is a 400km diversion.
- **Traffic volumes:** Increased traffic volumes placing pressure on intersections and access points at towns and tourist destinations. Many areas require upgrade, a change to the road priorities, or establishment of viewing/stopping areas.
- **Residential development:** The growth of areas requiring connections to the corridor increases pressure on the capacity and efficiency. The pressures are similar in Cromwell and Wanaka, although to a much lesser degree than that experienced in Queenstown.
- **Urban section of Queenstown:** This section of the corridor is almost inaccessible for maintenance (timewise) and is old and tired with a backlog of work pending.
- **Event responses:** Improving the response to natural hazards and winter weather events in terms of preventative maintenance and managing customer expectations through improved communication and information. This includes better predictive models for winter maintenance such as monitoring weather conditions via weather stations and use of thermal road mapping, and improvements to mobile phone coverage in some areas.

Reliability and efficiency

The following concerns excerpt pressure on the investment in **Reliability and efficiency** on the corridor.

- **The rate of population and tourism growth:** The rate of population and tourism growth combined with the limited capacity of the network places pressure on the speed of responsiveness necessary to accommodate demand. The rate of capacity consumption exacerbates the impact of delayed decisions to invest, disruption from project delays and from the under sizing of upgrades.
- **Queenstown urban area:** Investment in ITS and early warning is essential due to the long length of detours.

Safety

The following concerns excerpt pressure on the investment in **Safety** on the corridor:

- **Self-drive tourism:** Self-drive tourism is increasing, particularly with international tourists who are unfamiliar with New Zealand road conditions and have unrealistic expectations of the level of service that roads to key destinations will provide. In particular, under-estimation of journey times is common, and can be a major cause of driver fatigue.
- **Scenic viewing areas:** Unsafe, unformed stopping locations in Mackenzie country, particularly around photo opportunities of Mount Cook, Lake Pukaki, Southern Alps and scenic features on SH8 and SH80, and safe stopping locations on SH79 with rural views.

People, places and environment

The following concerns excerpt pressure on the investment in **People, places and environment** on the corridor.

- **Rest areas and stopping locations:** Providing facilities for tourists who wish take rest stops and enjoy the scenery is a growing issue. Unformed/informal stopping areas result in edge breaks and unsafe entry and exit. Toilets are a growing issue – maintaining hygiene, and sanitary conditions. This presents a catch 22 as once they are installed then attracts greater usage. Overnight access to facilities is also limited. A strategic approach to this issue will be required
- **Cycle tourism:** Road space for cyclists is limited throughout the corridor, which does not readily cater to the growing demand for cycle tourism. Narrow carriageways and driver behaviour impact on the safety and confidence of cyclists using key routes along the state highway.
- **Stock effluent:** Stock effluent on the road surface from the seasonal movement of stock, particularly along sections of SH6 and SH8 where there are limited stock effluent disposal facilities.

Investment future considerations

Consideration of investment in the corridor in future should take account of the following:

- **Queenstown:** Advancement of alternative access routes into and around Queenstown to improve efficiency on this corridor. An alternative SH6 route to the west of the airport would provide an alternative route for customers not wanting to travel into Queenstown town centre or onwards towards Glenorchy. This would also improve resilience with an alternative route. A longer-term solution for Frankton Road will be required, that responds to the need to minimise traffic and pedestrians in a high tourist area.
Implementation of the 30-year programme of supply and demand interventions identified in the Business Case. Particularly, planned improvements to the affordability, reliability and priority of bus services within the Wakatipu Basin; and improved arterial access into the Queenstown town centre and demand initiatives including a parking strategy and improved cycling facilities.
- **Stopping places and rest areas:** Review access to stopping places and rest areas with a tourist's expectations in mind to ensure they are located in appropriate places that a tourist would want or need to stop at, and provide the basic amenities that a tourist would expect to see in a tourist centric country. e.g. public toilets, places to stop and view scenic areas, picnic tables.
- **Strategies for tourism:** Collaborative strategies working with the tourism industry to focus on tourism customer needs and expectations and further apply the outcomes of the Visiting Drivers Project. Include consideration of consistent approaches to signage, identifying tourism destinations, road information, amenity and facility provision, and provision of rest areas. Also consider the use of technology in the development of an app for visiting drivers with relevant information. Further investment in The Visiting Drivers Project, which is committed to the end of the 2017/18 financial year should be considered to significantly improve safety and transform the corridor into a safe system network.
- **Subdivision pressure:** Access and capacity improvements will need to be considered along SH84 into Wanaka, as the Three Parks subdivision expands and increases pressure on this section of the corridor.
- **Tekapo/Twizel growth:** Extent of land development and tourism activity occurring in Tekapo and Twizel and impact of this on the network in terms of safe access to destinations. Specifically, the mix of customers and increased numbers of tour buses and campervans wanting to access onto and off the corridor.
- **Lifelines:** Planning for evacuation could be considered where the route is severed/ connectivity is lost for extended periods of time especially in risk areas like Mt Cook Village where there are no alternative routes. Plans for extracting stranded communities and tourist noting that costs associated with evacuations will increase as visitor numbers grow.
- **Stock effluent disposal sites:** Provision of stock effluent disposal sites throughout the corridor particularly along SH82/SH83, and SH79/SH8.
- **Advanced warning signs:** Further consideration of advanced warning signs informing visitors of safe stopping places for photos, parking areas to access landmarks, and serviced rest areas that are safe and appropriate for a rest stop. Consider collaboration with companies to integrate these features into in-car navigation systems in a similar manner to how service stations are.
- **Future Aggregate source:** There is a need to source a new source of high performing chip, as Parkburn (Central) source is becoming limited. Greater use or increased reseat cycles, or a shorter life approach may hasten this impact.

Appendix A – Information sources

Section	Infographic	Information Source	Date
Introduction	Corridor Overview Map	The Road Efficiency Group https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/onrc/	2013
Understanding our Customers			
Key Customers	Key journeys	Network Manager and Regional Staff	2016
	Daily commuters	Network Manager and Regional Staff	2016
	Freight	Network Manager and Regional Staff	2016
	Tourism and recreation	Network Manager and Regional Staff	2016
	Demographics and population centres	MBIE Regional Economic Activity Report Web Tool http://www.mbie.govt.nz/info-services/business/business-growth-agenda/regions	2015
Understanding Customer Levels of Service on the Corridor			
Customer Levels of Service	Corridor classifications	The Road Efficiency Group ONRC -right-road-right-value-right-time-combined-poster.pdf https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/onrc/	2015
Current Levels of Service Performance	Current ONRC Levels of Service Performance	Network Manager and Regional Staff	2016
Improving the Customer Experience	Significant planned improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ NZTA Safe Roads web page: https://www.nzta.govt.nz/safety/our-vision-vision-of-a-safe-road-system/safe-roads/ Submitted Regional SHIP programmes	2017

Section	Infographic	Information Source	Date	
Access	ONRC classification	The Road Efficiency Group https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/onrc/	2013	
	Carriageway configuration	Network Manager and Regional Staff Corridor drive-over Highway information Sheets	2016	
	Posted speed limit	NZTA – MapHub Speed Limits on NZ Road Network	2016	
	Topography	Elevations derived from Google Earth™	2016	
	Geography	Network Manager and Regional Staff Corridor drive-over	2016	
	Traffic volumes – heavy vehicles	RAMM Carriageway Table – December Traffic Estimates	2015	
	Traffic volumes – all vehicles	RAMM Carriageway Table – December Traffic Estimates	2015	
	HPMV routes	NZTA – MapHub High Productivity Freight Network	2016	
	Critical Customers	Network Manager and Regional Staff	2016	
	Critical Assets	Network Manager and Regional Staff	2016	
	Resilience	Vulnerabilities	NZTA – MapHub Hazard Incidents and Area Warnings	2016
		Major Alternate Routes	Network Manager and Regional Staff Desktop analysis Corridor drive-over	2016
		Diversion Lengths	NZTA StateHighways.pptx Diversion Routes	Unknown
Closures		NZTA 2011-2015_Treis_incidents_by_region.xlsx	2015	
Reliability and efficiency	Efficiency	NZTA – MapHub EfficiencyNet	2016	

Section	Infographic	Information Source	Date
	Variability	NZTA / Beca Dwg No. GIS-3391515-500-4 Network Performance - Attachments.pdf March 2012 eRUC Commercial Vehicle Data - State Highway Austroads Variability Assessment	2012
	Commercial Vehicle Average Speed	NZTA / Beca Dwg No. GIS-3391515-500-5 Network Performance - Attachments.pdf March 2012 eRUC Commercial Vehicle Data - State Highway Average Speeds	2012
	Current Constraints	Network Manager and Regional Staff Corridor drive-over	2016
Safety	KiwiRAP Collective Risk	https://nzta.abley.com/SafetyNET_2017 SafetyNET	2016
	KiwiRAP Personal Risk	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2016
	KiwiRAP Star Rating	http://www.kiwirap.org.nz From 2010 KiwiRAP star rating report.	2010
	Intersection Risk Indicator	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2016
	Gap Programme Rating	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2015
Environment Culture and Heritage	Natural Environment	NZTA - Environment and Urban Design Team	2016
	People and Place: Journeys	NZTA - Environment and Urban Design Team	2016
	People and Place: Landmarks and Heritage Places	NZTA - Environment and Urban Design Team	2016
	Noise and Vibration	NZTA - Environment and Urban Design Team	2016
	Drainage Catchments	NZTA - Environment and Urban Design Team	2016
Understanding the Infrastructure Assets			

Section	Infographic	Information Source	Date
Overview	Corridor Asset Base	NZTA_ 2017 Values by Corridor.xlsx complied by Opus International Consultants from RAMM and other asset information sources	
	Asset Condition and Performance	Summarised from the data sets described below	
Asset condition and performance	Surface Skid Resistance	SCRIM data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Safety Treatment	SAL data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Defects	100m Priority data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Age	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Service life of Prior Surface	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Resurfacing	Resurface data derived from forward works programme	2016
	Proportion of Travel on Smooth Roads	STE data derived from RAMM by NZTA Data Quality and Access team	2016
	Pavement Strength	Deflection data derived from RAMM by NZTA Data Quality and Access team	2016
Investing in the Corridor			
Summary Investment	Summary Corridor Investment	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
	Summary investment by work category	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
Investing in access and resilience			
Investing in access and resilience	Maintenance Hot Spots	Network Manager and Regional Staff	2017
	Resurfacing 2018 - 2021	Resurface data derived from forward works programme	
	Renewal Investment	National Bridge Replacement Programme National bridge replacement programme 2017 LCMP data.xlsx	

Section	Infographic	Information Source	Date
	Improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ Submitted Regional SHIP programmes	
Investing in reliability and efficiency	Maintenance Hot Spots	Network Manager and Regional Staff	2017
	Renewal Investment		
	Improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ Submitted Regional SHIP programmes	
Investing in safety	Maintenance Hot Spots	Network Manager and Regional Staff	2017
	Renewal Investment		
	Improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ NZTA Safe Roads web page: https://www.nzta.govt.nz/safety/our-vision-vision-of-a-safe-road-system/safe-roads/ Submitted Regional SHIP programmes	
Investing in people places and environment	Maintenance Hot Spots	Network Manager and Regional Staff	2017
	Renewal Investment		
	Improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ Submitted Regional SHIP programmes	



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