

Frankton to Milford Sound

CORRIDOR MANAGEMENT PLAN



2018-2028



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Executive summary

The Queenstown to Milford corridor is unique with its primary function being tourism. The corridor comprises SH6 from Frankton via the Devil’s Staircase to the junction of SH97 at Five Rivers where it continues along SH97 to Mossburn then connects to SH94 from Mossburn to Milford Sound. As an alternative to travelling on SH97, drivers can travel further south on SH6 (which forms the main link between Invercargill and Queenstown) to Castlerock where it intersects with SH94 to continue their journey to Te Anau and to Milford Sound. SH95 to Manapouri is also included in the corridor.

The corridor is approximately 331km long (2.9% of the state highway network). The total value of assets along the corridor is \$414M (1.8% of the total national asset value).

The corridor is subject to variable conditions as the main tourist link between Queenstown and Milford Sound characterised by unspoiled mountain landscapes, rainforest carpeted valleys towards Milford Sound and urban areas at the Queenstown end. SH94 being the only road connection from Te Anau to Milford Sound is significant for road transport, forming the gateway to the major tourist attractions that Southland region has to offer. The roading network itself is part of the promoted experience and therefore is a significant enabler of the regional and national economy.

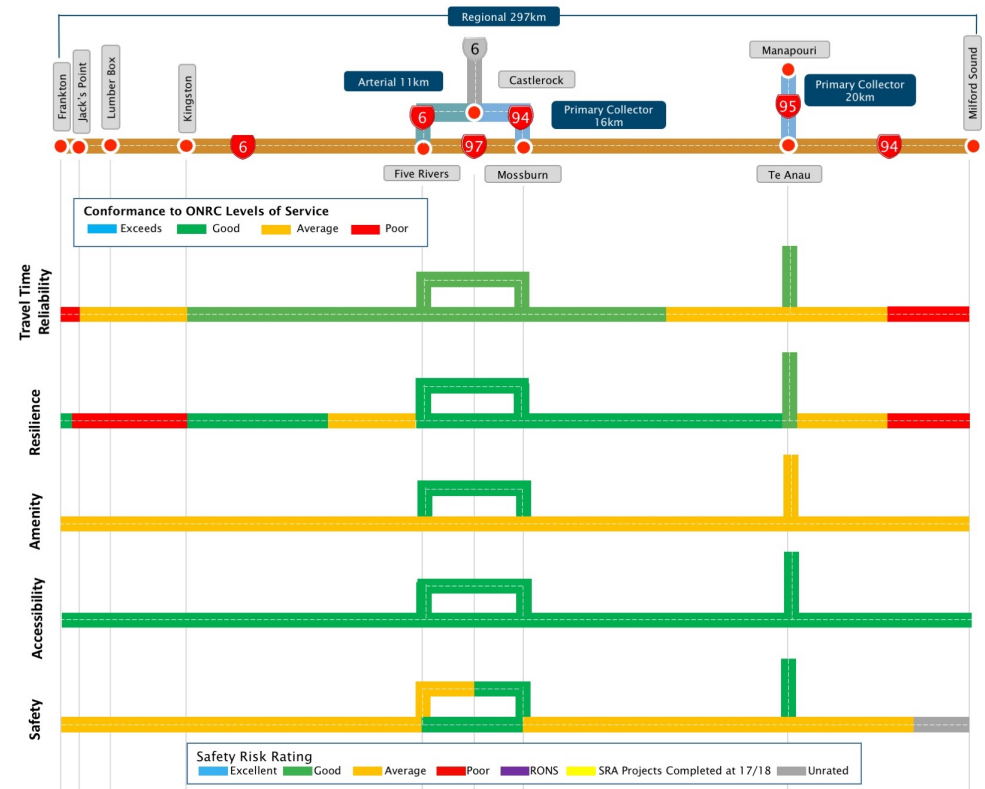
Customers along this corridor are a combination of well-informed tourist operator buses/coaches, first time visitors to New Zealand and recreational drivers with varying levels of road knowledge and driving abilities. The drive itself is promoted as part of the journey.

Route accessibility and safety have been the primary concerns for the corridor- disruption of the route can bring the tourism industry supported by Milford Sound to a virtual standstill. Increasing customer demand is and will continue to increase pressure on reliability and resilience of the route into the future.

There is a general acceptance of closures at times when weather conditions are severe or an incident occurs but customer expectations for the route to Milford Sound to stay open and re-open following an incident are putting pressure on the NZ Transport Agency. Future considerations will need to strive for a balance between business profitability and customer safety. Understanding the high resilience risk of the corridor due to environmental factors, the need to work towards finding improved methods for minimising closures through preventative maintenance and when they occur, reducing closure times and informing the travelling public will be paramount in informing travel decisions on the increasingly popular route. There is no alternative local road network from Te Anau to Milford Sound, SH 94 is the only land transport route across this challenging terrain.

The mixture of slower moving vehicles (tour coaches and campervans) and time constrained travellers, lack of passing lanes, challenging topography and the tidal nature of the traffic impacts the journey experience. Provision to improve travel time reliability will become increasingly important as visitor numbers increase.

Figure 1 - Performance of the corridor against ONRC outcomes



Infrastructure upgrades, preventative maintenance and timely advice of disruption and improved communication are essential components to managing and maintaining an effective service. The corridor has seen investment in advanced warning technologies, increasing demand means the further interventions may be required with both upfront capital investment and ongoing investment in maintenance and operations.

Managing assets, increasing route capacity and making improvements the corridor faces constraints as a significant proportion of the corridor (SH 94) passes through the UNESCO heritage site of the Fiordland National Park governed by the Fiordland Park Management Plan.

Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Frankton to Milford Sound 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 plan provides a link between the 30 year, 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.

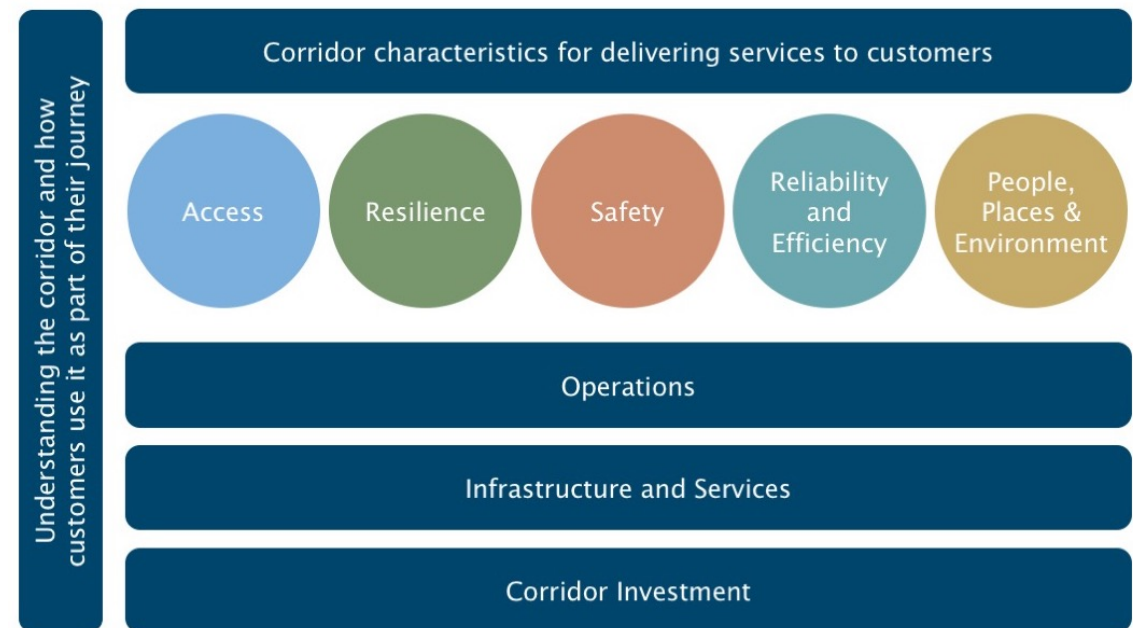
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on the issues that are important and 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, based on targeting maintenance to achieve the appropriate customer levels of service within the context of providing value for money. The information presented in the corridor management plan 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 Milford corridor is unique with its primary function being tourism. The corridor comprises SH6 from Frankton via the Devil's Staircase to the junction of SH97 at Five Rivers where it continues along SH97 to Mossburn then connects to SH94 from Mossburn to Milford Sound. As an alternative to travelling on SH97, drivers can travel further south on SH6 (which forms the main link between Invercargill and Queenstown) to Castlerock where it intersects with SH94 to continue their journey to Te Anau and to Milford Sound. SH95 to Manapouri is also included in the corridor.

The corridor is subject to variable conditions as the main tourist link between Queenstown and Milford Sound characterised by unspoiled mountain landscapes, rainforest carpeted valleys towards Milford Sound and urban areas at the Queenstown end. It extends along the shore of Lake Wakatipu, skirting the foot of the Remarkables and the Hector Mountains, and rises over a narrow and winding section known as 'The Devil's Staircase'. Kingston to Te Anau is characterised by rural landscapes apart from Red Tussock Reserve. The road from Te Anau to Milford at its highest point climbs to 940 metres above sea level and runs along the shoreline of Lake Te Anau, Lake Gunn and Lake Fergus. It runs parallel to Eglington River, passes through the Fiordland National Park, the Hollyford Valley and dense forest before emerging at the Homer Tunnel revealing steep mountainous terrain through to Milford Sound. SH94 being the only road connection from Te Anau to Milford Sound is significant for road transport, forming the gateway to the major tourist attractions that Southland region has to offer. The roading network itself is part of the promoted experience and therefore is a significant enabler of the regional and national economy.

The regional economy

Both Otago and Southland regions rely heavily on tourism for economic sustainability, of which Queenstown is the main destination. The Queenstown Lakes District relies heavily on the tourism sector with more than 1.8 million visitors contributing \$1.6 billion annually from both international and domestic visitors to the district. Ski fields and adventure operations are key attractions to the area, consequently providing a high density of accommodation and facility development. Property and commercial developments in Frankton are also key contributors to the economic strength of the area.

Over half of Southland region's land falls within conservation areas and parks. This conservation land is home to the Fiordland National park and Milford Sound, part of the UNESCO World Heritage Site, bringing high economic value to the region through tourism. Due to limited development and accessibility of this area, limited accommodation facilities towards Milford Sound and with the tourism aspirations of Queenstown (3 guest nights minimum), the journey from Queenstown to Milford is promoted as a return day trip.

The Southland region also supports agri-business and exports, where 12% of the region is employed in dairy farming (compared to the NZ average of 3%), commercial fishing at Deep Water Basin (e.g. blue cod, lobster, crayfish and Paua) in Milford is also a contributor to the regional economy. As a consequence of tourism, these regions have historically experienced high seasonal population growth. This trend is now shifting to a more continuous flow of tourists year-round resulting in shortened shoulder seasons. With accessibility being vital for economic success, adequate transportation facilities are necessary to provide for this increasing demand.

Figure 3 – Corridor overview



Understanding our customers

Key customers

The key customers utilising the corridor are diverse, and utilise a range of transport modes. 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.

Traffic flow

Insights into the corridor traffic flow:

Road use: The corridor predominantly caters for tourism related traffic. The region experiences significant population growth directly attributable to tourists with a vast majority of customers utilising the corridor are first time (visitor) drivers and tourist operator coaches.

The corridor is also used by freight operators to a much lesser extent and daily commuters (largely locals supporting the service industry) mainly between Kingston and Queenstown and between Te Anau and Milford Sound. Vehicles along the corridor range from hire vehicles (of ranging quality, types and safety ratings), camper vans, buses (small and large) and trucks (smaller freight trucks and large HPMVs).

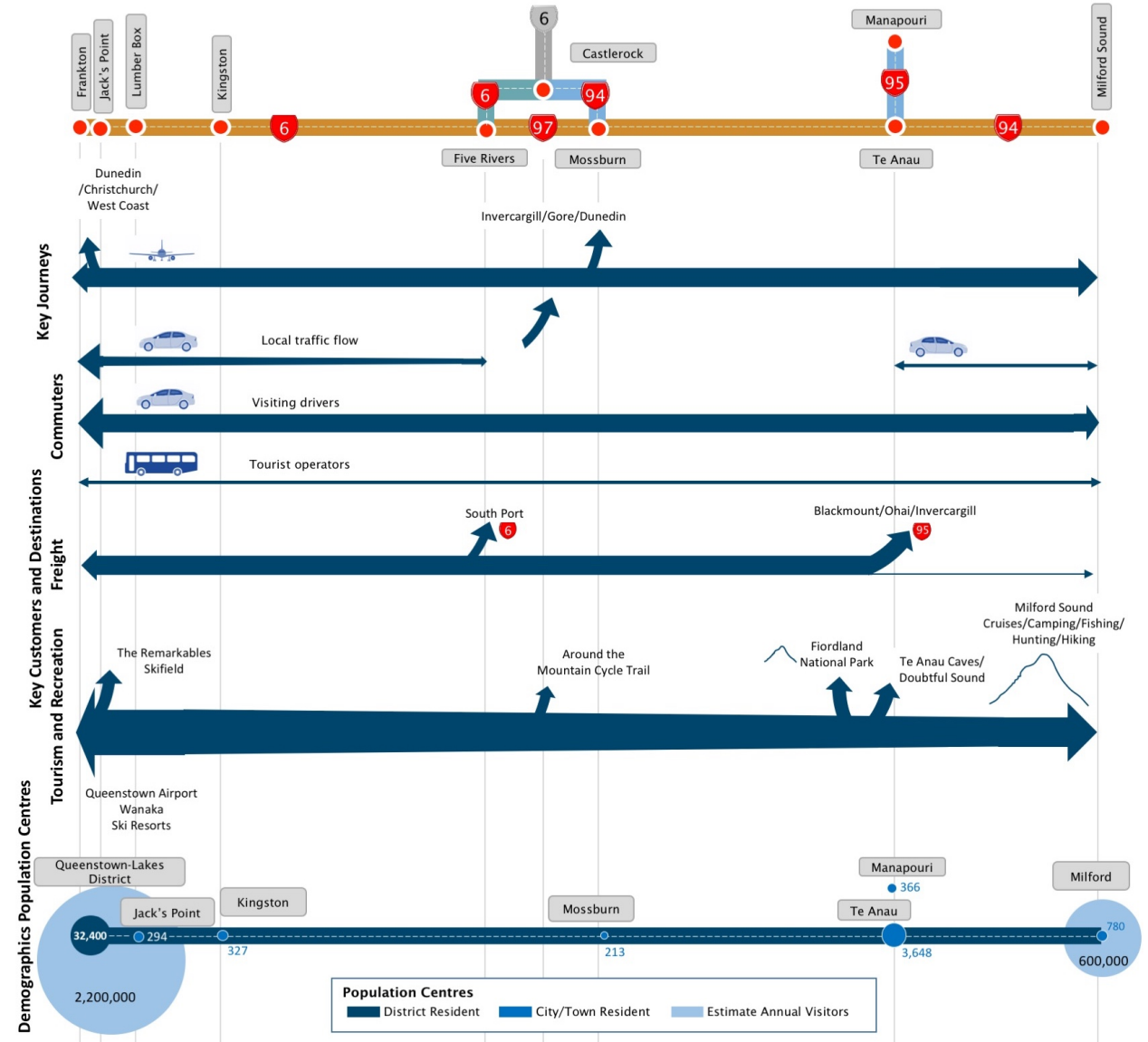
Daily traffic flow on the corridor is largely tidal, with journeys towards Milford Sound in the morning to coincide with cruise timings, and returning journeys in the evening. Historically seasonal, traffic flow is now extending into the shoulder seasons, resulting in constant traffic through the year.

Road knowledge: Many of the self-driving visitors are unfamiliar with their route and the terrain, while tourist coach drivers, freight operators and local commuters are much more aware of the route and its challenges.

Pain points: Conflict between the familiar and the unfamiliar driver can create issues in terms of travel time reliability and safety.

Commuters expect: Predictable journeys at peak times, safe roads, passing opportunities and accurate and up-to date information about hazards and road conditions.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

Tourism is the largest economic enabler for the corridor, where both Queenstown and Milford Sound capitalise on tourist spending through their natural beauty and adventure tourism operations. Milford Sound is acclaimed as NZ's most famous tourist destination, resulting in continual growth in visitor numbers and shorter shoulder seasons which is increasing pressure on the corridor. 2016 saw 585,500 adult fare paying passengers on Milford cruises, up from 382,130 in 2014, with campers staying at Department of Conservation (DoC) camp sites on the Milford Road doubling between 2014 and 2015 to 55,000 overnight stays.

The corridor provides the only State Highway access through Southland to connect visitors to the Fiordland National Park. Key attractions here include Milford Sound, the Lakes, NZ Great Walks (including Milford Track), cycling, fishing, boat cruises and the natural beauty of the area. Manapouri has a small airport facility open 5 days a week catering for charter flights and private hires. Milford Airport caters for scenic, charter and private flights.

Just over half of the visitors on this corridor travel via tourist coach operations while an increasing proportion are choosing to travel as 'free independent travellers' self-driving in rental cars/campervans.

Insights into tourist and recreational users are as follows:

Road use: The 600km return journey from Queenstown to Milford and back is promoted as part of the tourist experience. Many of the tourists and coach operators drive long distances to make organised activities and timelines with the journey promoted as a day trip.

Road knowledge: The journey to Milford Sound is picturesque with variations in landscape and conditions. Many self-driving international visitors are new to New Zealand's roads and conditions. Travel times can be underestimated leading to potentially unsafe behaviour further exacerbated by limited or no knowledge of places on the journey where the road narrows, becomes winding, or is at risk from natural phenomenon (snow, ice, rainfall, wind, slips etc.).

Pain points: Weekend travel and holiday periods can be busy, where up to 50 coaches and hundreds of vehicles a day can be expected during good weather and school/public holidays. The road can be closed at short notice impacting the local economy. Businesses in the region allow for a 30-day contingency, but increasing tourist demand is resulting in higher expectations for the corridor to remain open with minimal disruptions.

"I want to be able to stop and enjoy the journey and have the confidence of being safe enroute"

Tourist and recreational users expect: Picturesque travel without hassles or road safety concerns. Good directional signage, real time information and ample opportunities to stop, utilise facilities and to take photos. Appropriately placed and adequate amenities such as food outlets, public toilets and gas stations provided along the corridor. Appropriate signage of key tourist destinations and internet connectivity, facilitating a seamless journey.

Tourism operators

Insights into tourism operators are as follows:

Road use: The corridor is not a key freight route. Despite the high coach/bus service, heavy vehicles only account for around 10% of the total volumes along the corridor between Queenstown and Te Anau, dropping away sharply on the route from Te Anau to Milford.

The corridor sees heavy usage by tourism operator run coaches and buses that run on tight schedules. Under normal driving conditions, drivers have only a 30-minute buffer to complete the Queenstown-Milford-Queenstown return journey within NZ Transport Agency's logbook requirements, and still be able to drive commercially the next day. With traffic volumes increasing in and around Queenstown, this buffer is reducing, which has both personal and business implications.

Road knowledge: Road knowledge amongst tourist operators is high. The drivers are aware of the terrain and its challenges.

Pain points: Any delays on the corridor are critical for the tour operators as they erode into their 30-minute buffer. The Devil's Staircase section of SH6 on the corridor is winding with sharp turns making it difficult to navigate, as is the section of the corridor between Te Anau and Milford Sound. Slow and unfamiliar drivers on these sections of the route can result in delays and lead to frustration and potential for risk taking behaviour by the time bound tourist operators.

Tourist operators expect: Infrastructure that supports tourist activity for the maximum number of days in the year. Information about road conditions, delays and closures allowing considered decision-making and confidence in meeting customer demands and business health and safety obligations.

"Milford road is business. If there is an incident, I want to be back on the road quickly"

How we deliver services along the corridor

Transport partners

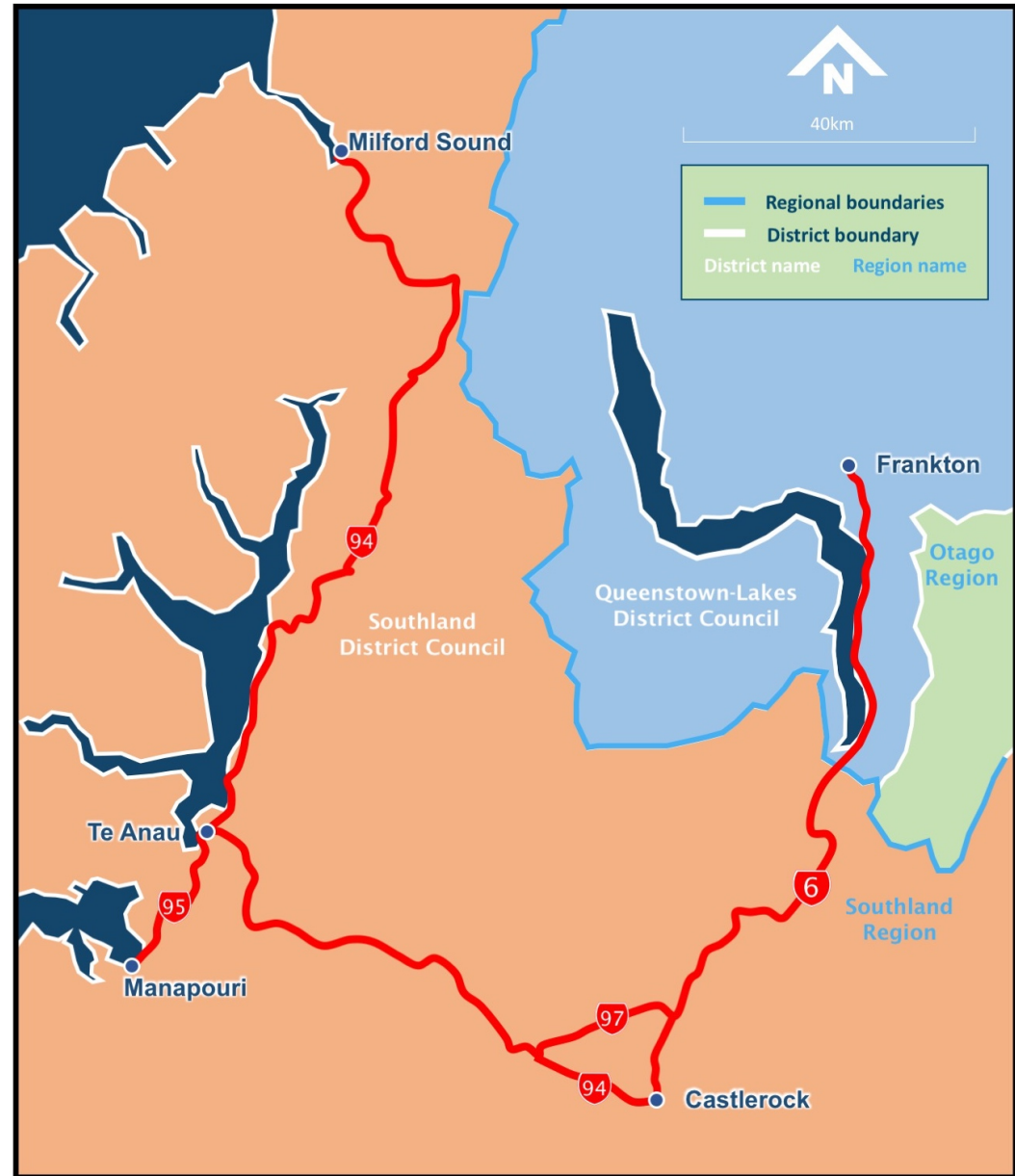
The land transport system comprises more than State Highways. To provide customers with a reliable and safe journey usually requires the use of two or more transport infrastructure provider's networks. As such, the NZ Transport Agency works with other network providers to provide a one network approach.

Collaboration along the corridor

NZ Transport Agency work closely with the TLAs and regional councils along the corridor shown in Figure 5. A significant proportion of SH94 is within the Fiordland National Park governed by the Fiordland Park Management Plan impacting works on the road. As such, a close relationship is maintained with key stakeholder, the Department of Conservation (DoC).

Currently the NZ Transport Agency is collaborating with Southland District Council, Queenstown Lakes District Council and DoC on the management of the corridor.

Figure 5 - Map of associated local authorities



Network Outcomes Contracts approach

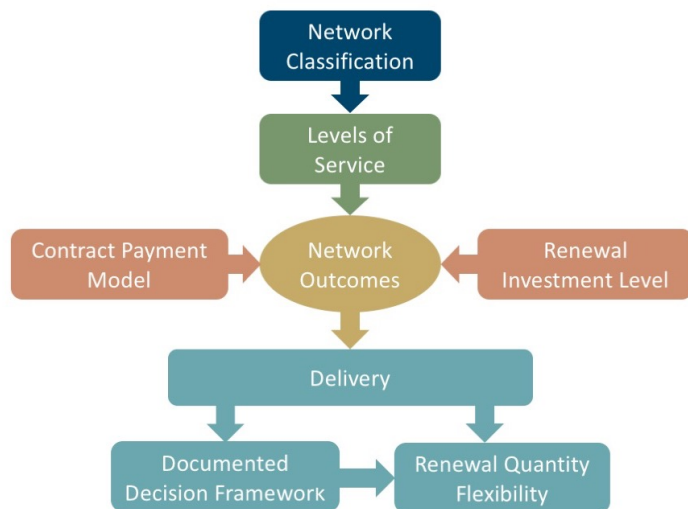
Network maintenance and operations is managed through the Network Outcome Contracts (NOC) aimed at improving the effectiveness of service delivery. By capturing the best elements of the three historic procurement methodologies (PSMC, Hybrid and Traditional models) the NOC contract model delivers services 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 NOCs is shown in Figure 6 below:

Figure 6 - NOC process



Collaborative delivery of services

The Queenstown to Milford Sound corridor crosses over two NOC areas and one existing Alliance contract as outlined below. Central Otago and Southland NOC extends to Te Anau, with the Milford Alliance beginning from Te Anau.

Central Otago Network Outcomes Contract

The Central Otago contract undertaken by Aspiring Highways is Fulton Hogan led with support from Opus International Consultants, Base Construction, and Whitestone Contracting. The contract commenced on 1 October 2016 for a seven year period with the option based on performance for a further two years. The contract covers 537km of SH within Otago, of which 42km are within this corridor.

This contract is supported by the following specialist maintenance contracts:

- **Traffic signal maintenance Queenstown** – Aspiring Highways, Fulton Hogan has Dunedin based Otago Electrical & Communications (OEC) as a subcontractor Campbell Electrical Queenstown does the emergency works.
- **Traffic monitoring sites** – are directly managed by the NZ Transport Agency. AgFirst is the contractor for data collection. The contract was let on 11 July 2014 and is a 3+1+1 contract with an end date of 30 June 2019.

Southland Network Outcomes Contract

The Southland contract undertaken by Southroads as the lead with support from Downers and MWH. The contract commenced on 1 March 2016 for a seven year period with the option based on performance for a further two years. The contract covers 674km of SH within Southland of which 170km are within this corridor.

This contract is supported by the following specialist maintenance contracts:

- **Traffic monitoring sites** – are directly managed by the NZ Transport Agency. AgFirst is the contractor for data collection. The contract was let on 11 July 2014 and is a 3+1+1 contract with an end date of 30 June 2019.
- **ITS and traffic signals** – This is managed by Southroads as part of the Southland NOC. There are no traffic signals on this corridor within the contract area.

Milford Alliance Contract

The Milford Road Alliance contract is a partnership between Downers and NZ Transport Agency. The contract commenced in May 2016 and ends in 2024. The contract covers 120km of SH94 within Southland between Te Anau and Milford, of which the full length is within this corridor.

- **Traffic monitoring sites** – Managed by the NZ Transport Agency with AgFirst as the contractor for data collection. The contract was let on 11 July 2014 and is a 3+1+1 contract with an end date of 30 June 2019.
- **ITS and traffic signals** -- Managed by the Milford Road Alliance.

The Bridges and structures contract for all three areas is held by Opus International Consultants, and commenced on 1 July 2014. It's a 3+1+1 contract with an end date of 1 July 2019.

Traffic Operations Centre

Traffic in Homer Tunnel is managed (one way during the hours of 8am to 6pm) from the Traffic Operation centre (TOC), which is operated by the Milford Alliance at the chapel, close to the Homer Tunnel. The TOC has video cameras leading to the tunnel and both video and thermal cameras in the tunnel to facilitate monitoring of the vehicles on the route. The technology in the operation centre helps preventing incidents and allows for quick response in the event of an incident.



Slip clearing near Lake Fergus on SH 94

Drivers for change

This corridor has a distinctive geographic profile and is unique in its predominant demand coming from tourism. A major driver for change going forward is the increased demand for the road to remain open with minimal disruption, driven largely from a strong tourism market year-round, and the urban growth towards Frankton in Queenstown.

Implications of delays and closures on the corridor are well understood by the NZ Transport Agency. As such, it is well-managed with a world class avalanche programme, robust post road closure/disruption event (planned and unplanned) management, preventative management, local weather prediction mechanisms at Milford Sound, the traffic operations centre at Homer Tunnel and close coordination with tourism operators despite the limited cell phone coverage on a significant portion of SH94. However, increasing tourist numbers and increased demand for the corridor to remain open, means an increased pressure on the corridor moving forward.

Continued tourism growth is predicted for Milford Sound, Queenstown and Te Anau following significant growth over the past years. This is reflective of a strong global economy and success of New Zealand Tourism promoting this area as an internationally recognised destination. Active promotion of the self-driving experience is already resulting in more vehicles on the corridor throughout the day. This is expected to increase conflict between slower sightseeing journeys and time constrained 'through' journeys. As such, there is likely to be increasing necessity to provide safe stopping and slow vehicle bays to accommodate this mixed purpose use, and ensure reliable journeys are achievable.

On the other end of the corridor, towards Queenstown, SH6 presents challenges related to urban growth. Traffic growth at the northern access point to the corridor between Frankton and Jack's Point is likely to result in an additional 8-10,000 daily trips and result in additional intersections providing access off SH6, potentially affecting the speeds/efficiency of the northern section of the state highway when fully operational.

Predicted growth will increase pressure on an already at capacity assets like the Homer Tunnel, meaning alternatives may need to be considered. Other key assets within the corridor will likely reach capacity in the near future (single lane bridges and single lane sections of the corridor), limiting the ability of the corridor to function as required. The future investment profile will need to consider capacity upgrades to these assets and consider travel demand management solutions to future proof the corridor, ensuring its ability to provide secure and reliable journeys and meet the sought ONRC LoS for the corridor.

The risk of visiting drivers potentially causing a death or serious injury to either themselves or others could jeopardise New Zealand's reputation as a safe place to visit. This creates pressure on the corridor to function in a manner that ensures safety while facilitating the economic maximisation of the region. Pressure is exacerbated on the corridor due to the promotion of 12-14 hour Queenstown to Milford return journey as a day trip partially due to tour operators being based in Queenstown, few accommodation facilities along the corridor and the Queenstown Lakes District Council regulation of minimum 3 guest nights.

Often the customer journey on this corridor is part of a longer journey, resulting in potentially fatigued drivers. This creates additional pressure on the corridor which needs to be maintained in a way that minimises risks and meets customer expectations while facilitating business aspiration to maximise economic returns of the increasingly popular journey.



A section of SH94 leading to the eastern entrance to the Homer Tunnel

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 what 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 particular category should offer an increasingly consistent and fit for purpose customer level of service (CLOs) for road users. With the knowledge of current CLOs experienced by customers, we can better target investment to meet future intended service levels.

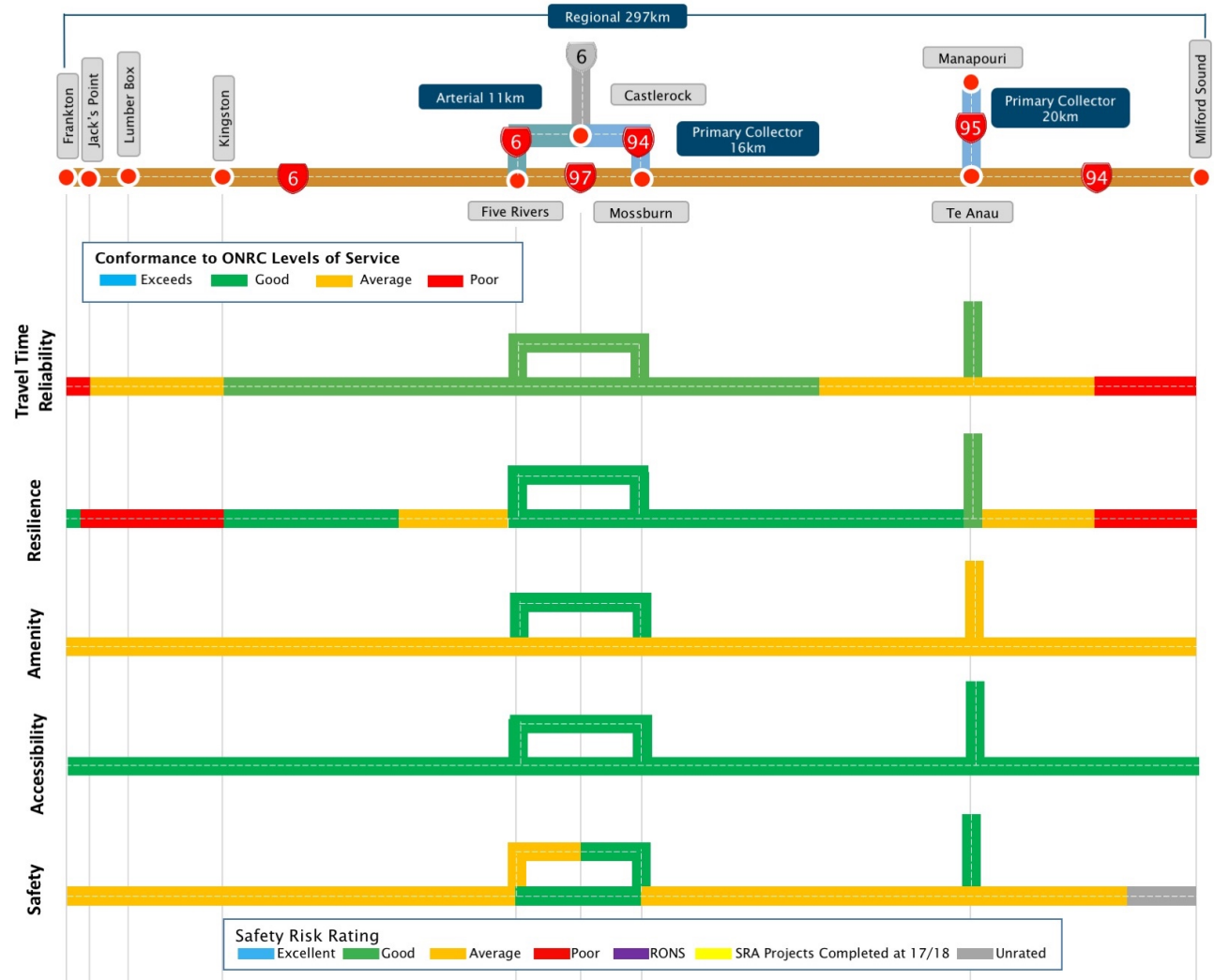
Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road classification

SH6 is Regional classification from Frankton (BP Roundabout to Kawarau Falls Bridge) through to intersection with SH97 from where the Regional route continues, meeting SH94 at Mossburn for the journey through to Milford. SH6 that continues south is classified as an Arterial and can be used as a slightly longer alternative route via Five Rivers to join SH 94, classified as a Primary Collector through to Mossburn. SH95 to Manapouri is also classified as a Primary Collector. The aspirational levels of service along this corridor is higher, due to the economic importance and tourism factor.

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 Frankton to Milford Sound 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 performs poorly in terms of travel time reliability between Frankton and Jack's Point largely driven by the residential growth, airport traffic and travel time reliability issues at Kawarau Bridge (currently a single lane bridge where delays are excessive during peak hours). At the other end of the corridor, variable alpine weather conditions, particularly through winter, can heavily impact both safety and reliability over the full corridor. With no passing lanes and limited passing opportunities in many areas, travel time reliability is often impacted by inability to overtake the slower travellers. The Devil's Staircase section of SH6 and SH94 north of Te Anau perform poorly against expectation due to the combination of challenging terrain and narrow widths, variable climatic conditions, physical choke points (Falls Creek one lane bridge and Homer Tunnel), rugged natural beauty, slowing traffic and lack of passing opportunities. The challenge arises from the need to achieve a balance between the functionality of the corridor vs maintaining the natural environment. Addressing travel time reliability issues is, and will continue to be, a key investment priority in ensuring a successful customer journey.

Resilience

The 120km section of SH94 north of Te Anau offers no alternative route. Alpine climatic conditions and challenging topography contributes to a high frequency of closures (slips, rock falls, downed trees, flooding, avalanches and severe weather). The ability to open the road following an incident is often impacted by poor weather and the physical constraints of the remote natural environment. A compounding factor is the limited capacity to accommodate stranded tourists in Milford, and limited cell phone coverage. The Devil's Staircase along Lake Wakatipu between Queenstown and Kingston also performs poorly against levels of service due to a high frequency of closures (caused by extreme weather, flooding, slips and rockfall), and the length of alternative journeys when these closures occur. Resilience of the route is a key investment driver on this corridor given the economic significance for the region and the country.

Amenity

The amenity value of this route is exceptional due the natural rugged beauty of the terrain framing the corridor. The character of the route is protected and enhanced through the provision of regular stopping places at known locations along the corridor. The amenity value of the route could be enhanced by the strategic placement of the many stopping places along the corridor to provide safe and appropriate stopping opportunities. The level of comfort is reduced slightly along Milford Road north of Te Anau and between Lumber Box to Kingston (Devil's staircase) due to the challenging terrain, tight alignments and extreme climatic conditions impacting ability to deliver and maintain the road to acceptable smoothness.

Accessibility

Traffic volumes along this corridor are low with tidal (peak morning and night) and seasonal (increasingly consistent) flows. As a Regional route, the corridor is generally performing well, primarily due to the low numbers of both customers and general population along the length of the corridor resulting in limited accessways and intersections. Good signage along the route keeps the driver informed.

Safety

The corridor meets a KiwiRAP 3-star target over its length except for a few isolated areas, specifically SH94 north of Te Anau and either side of Kingston, where challenging terrain, alpine environments, narrow widths and minimal passing opportunities impact delivery of expected levels of service..The low volume section from Te Anau to Milford also has high personal risk due to the challenging terrain, constrained and steep road geometry, unforgiving driving conditions combined with limited space for improvements resulting in overall poor safety performance. Compounding the safety risk is the limited capacity to accommodate tourists in Te Anau and in Milford Sound. As a key investment driver on this corridor, improving road safety is a key focus of all planned improvements packages

Improving the customer experience

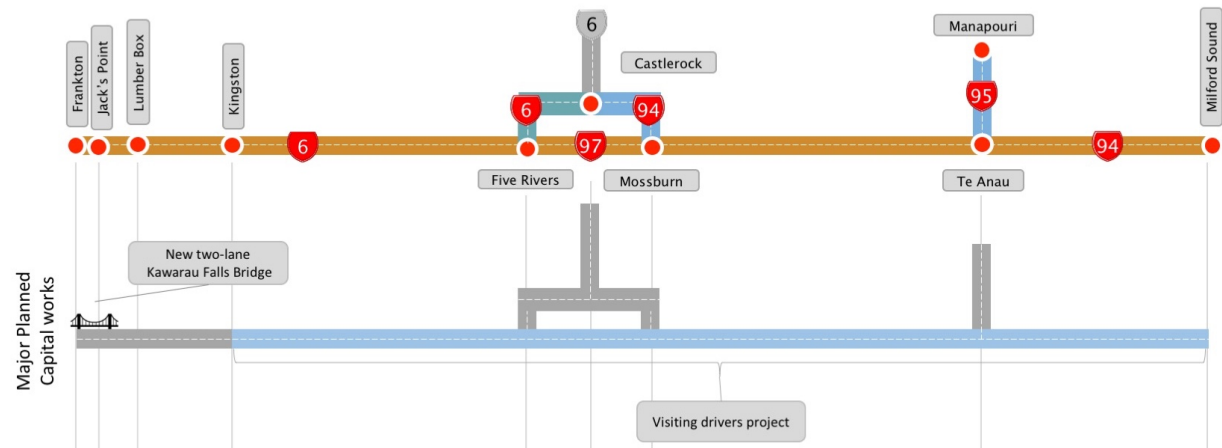
In responding to Customer Levels of Service, it is important to acknowledge that significant improvements to the corridor are planned or underway.

- The single lane Kawarau Falls Bridge, an essential link on SH6 south of Queenstown, is being replaced by a two-lane bridge, with completion in the second half of 2017. The new bridge will result in more predictable journey times for bridge users, eliminate often lengthy traffic delays at the current bridge, especially on peak ski season days and facilitate safer and more efficient movement of freight and people south of Queenstown, to key destinations including Milford Sound.
- Homer Tunnel Safety Improvements investigation will assess options for improving the tunnels safety and then identify a preferred safety option. Improving the safety of this tunnel is a priority for the NZ Transport Agency on a route that is so important to the prosperity of our tourism industry.
- The programme of improvements planned as part of the Visiting Drivers project include Falls Creek Bridge widening, Five Rivers intersection improvements, markings, signage, safety barriers, hazard removal, shoulder widening/sealing and visiting drivers' education campaigns. With the Detailed Business Case now completed, delivery of the program will commence in 2017.

When completed, the planned improvements on the corridor are expected to result in significant improvements to corridor performance as measured against ONRC outcomes, particularly in the area around Frankton Flats and SH94 from Te Anau to Milford Sound.

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

Figure 8 – Significant corridor planned improvements



Access

Carriageway configuration

The lanes on this corridor are narrow at times with minimal shoulder widths and a number of problematic out of context curves along the straight stretches. Passing opportunities are limited especially on SH6 along Devil's Staircase where the seal is narrow and the terrain is winding, and on SH94 within the Fiordland National Park which is also narrow and winding.

The 'Around the Mountain Cycle Trail' (175km track that begins in the Queenstown Lakes District and continues into Southland District) crosses SH6 at Garston and Athol (south of Kingston) and shares the road reserve between Castlerock and Mossburn.

Speed limits

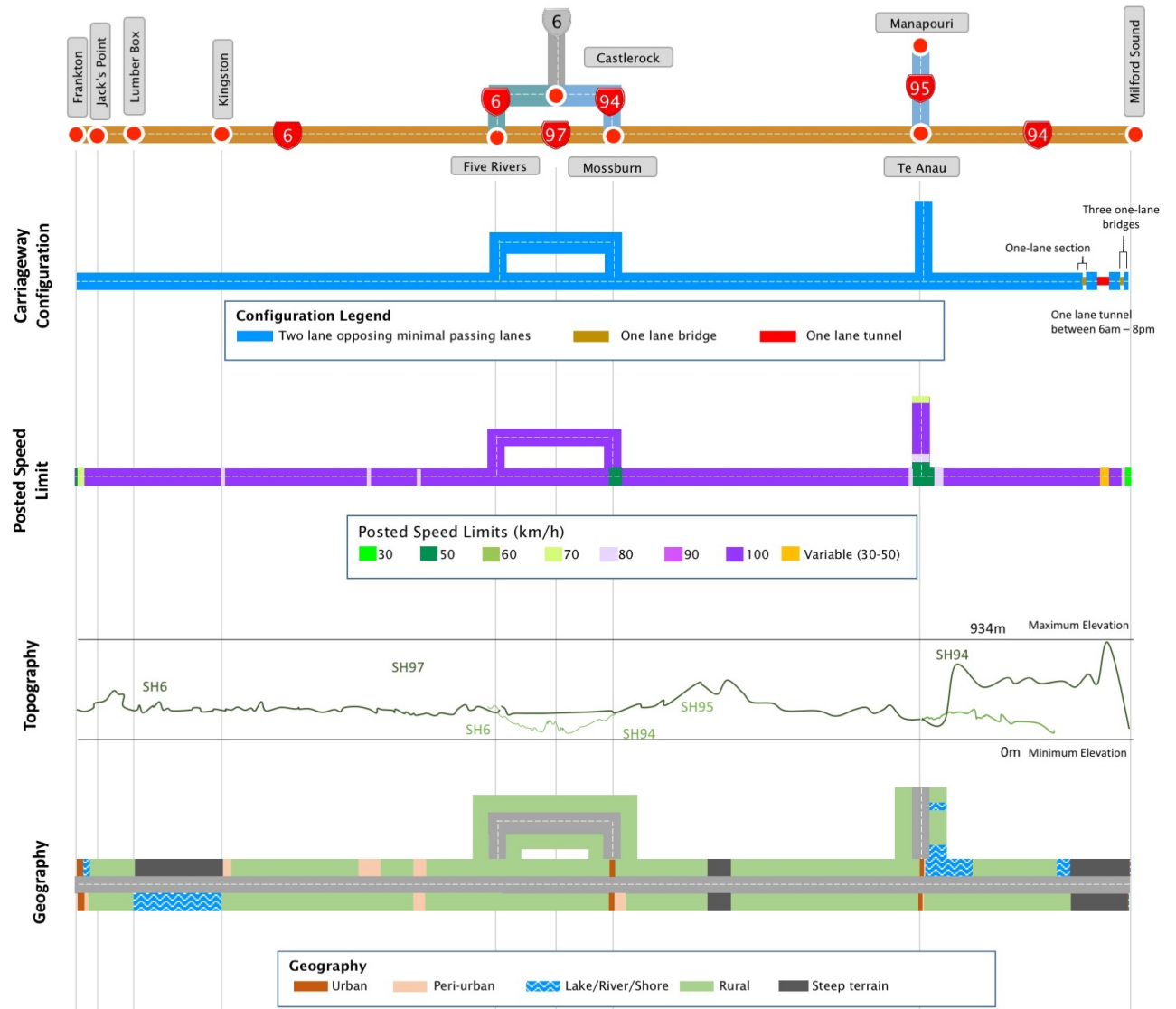
The geometry of significant lengths of the corridor means that the maximum open road speed limit cannot be achieved, particularly through the Devil's Staircase and the winding sections of dense forest and steep alpine terrain of Milford Road. Heavy vehicles, large campervans, and older hire vehicles are particularly affected with slower speeds through these sections.

The Speed Management Guide and package of improvements suggested in the Visiting Drivers Project may result in changes to the posted speed limits.

Topography/geography

The corridor features challenging steep and narrow terrain along the Devil's Staircase and a mixture of open rural landscapes and flat to rolling rural land to sections passing through dense forest, along water bodies and very steep alpine terrain within the Fiordland National Park. The water bodies make up a dominant feature of the corridor.

Figure 9 - Corridor characteristics

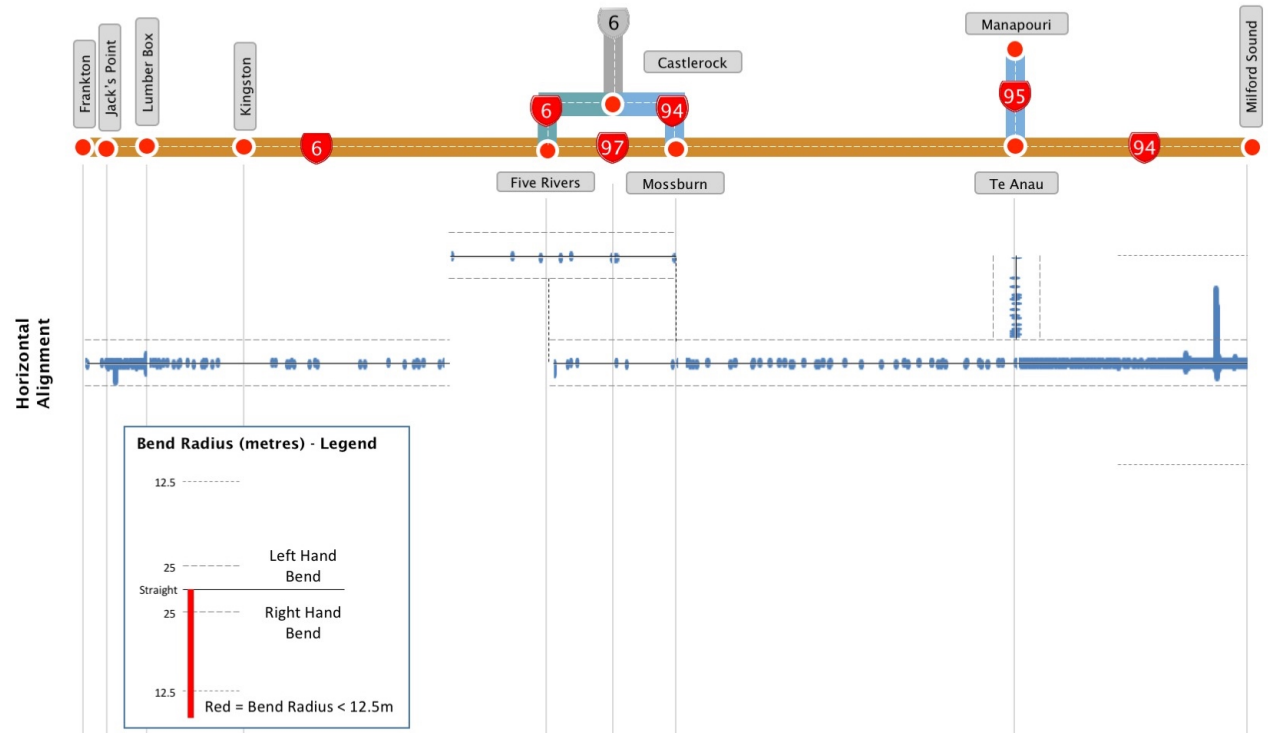


Horizontal alignment

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 on SH6 between Jack Point and Lumber Box, and on SH94 between Te Anau and Milford Sound. West of Homer tunnel there are a number of sharp bends with a radius below 25m.

Figure 10 - Horizontal alignment



High-tech camera's, Homer Tunnel on State highway 94 to Milford Sound

Volumes

Traffic volumes (both light and heavy) are high in and around Queenstown and Frankton extending to Jack's Point driven by strong demand for local trips, but drop away quickly to the south. Volumes along the corridor vary seasonally from an average daily traffic count of 200 off season to 1600 during peak season that is not represented by the annual average daily traffic flows shown in Figure 11. A notable increase in volume east of Te Anau and along SH95 is caused by vehicles using this section as an alternative to the local network.

Promotion of the journey as a day trip results in tidal traffic flow, with the main direction of travel to Milford Sound in the morning and towards Queenstown in the evening.

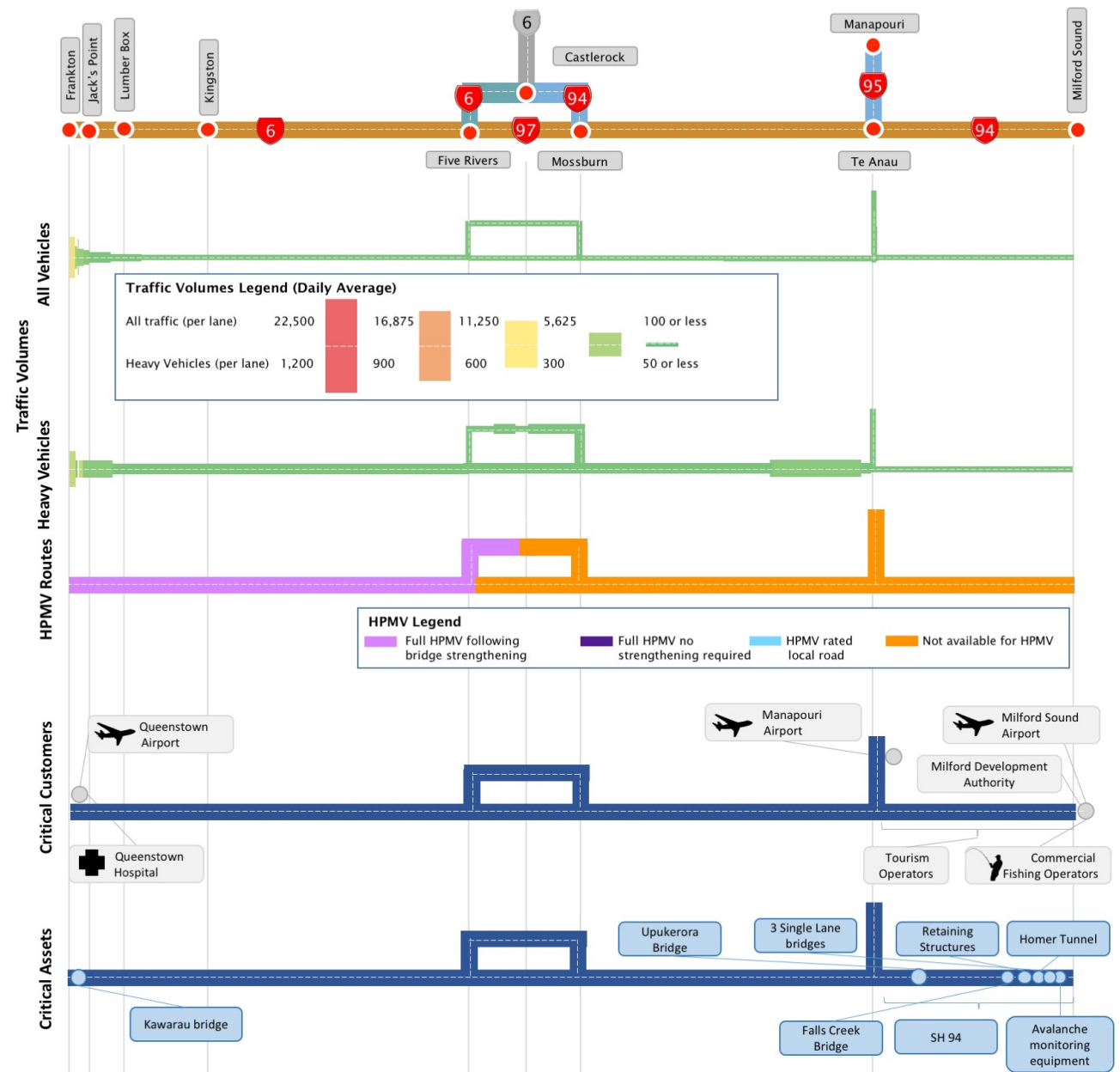
HPMV routes

Freight movements are generally low on the corridor. The corridor caters mostly for non HPMVs including tourist buses, goods supply carriers, time critical commercial fishing freight, stock trucks (during late autumn when stock are transferred from Southland to Central Otago for winter grazing and then brought back in spring) and smaller fuel tankers supplying fuel to Te Anau, Mossburn, and Manapouri. Over dimension loads are restricted at Homer Tunnel and there are no alternative road options. SH6 is a key route for over dimension vehicles due to bridge restrictions either side of Balclutha and Alexandra.

Critical customers and assets

Many local businesses exist to provide tourism related services and therefore rely on the corridor to be open for business. For example, DoC sites, hotels, food providers, coach operators, adventure operators and commercial fishing operators at deep water basin. Day/overnight Milford cruises and cruise ships with customers transferred to Milford Sound in small boats or docked in Dunedin with customers accessing the Sound on buses are also key customers of the route. There are also a number of critical assets along the route including Homer Tunnel, the traffic operations centre, bridges, retaining walls, monitoring equipment and SH94 from Te Anau to Milford Sound.

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** are as follows:

- **Topography and landform:** The corridor navigates narrow, steep and/or winding landform, surrounded by dense forest and vulnerable to environmental events making it prone to closures both planned and unplanned restricting access on SH94.
- **Limited construction season:** The construction season aligns with peak tourist season meaning there is a short window each day and throughout the year to complete works without impacting on traffic. The pavement temperatures do not allow for major pavement works during the winter season.
- **Increasing tourist demand throughout the year:** There is an expectation from customers, businesses and tour operators, of the route being available throughout the year with minimal planned and unplanned closures. When the route is closed, there is substantial pressure to re-open the road in the absence of an alternative route (on Milford Road) due to the economic significance of the corridor and the remoteness of the communities it serves.
- **Pressure on critical assets:** Demand for daily commute to Milford from Te Anau could also see an increase given the limited accommodation facilities at Milford Sound combined with the 3-night minimum policy in Queenstown, placing further pressure on critical assets like the Homer Tunnel and single lane bridges already nearing capacity and causing long queues.
- **Lack of alternative routes:** Constraints where traffic is reduced to a single lane, particularly the Homer Tunnel, can lead to lengthy queues during peak times. Incidents in the tunnel can prompt tunnel closure, restricting access to Milford Sound in the absence of alternative routes.
- **Supporting infrastructure exceeding capacity at peak times:** Tourism growth in Milford Sound is creating pressure on the supporting infrastructure such as parking and stopping areas along the corridor and in Milford Sound. These are already exceeding capacity during peak periods and coming under increasing pressure during the shoulder season. This has flow on effects resulting in people parking on the State Highway impacting on the customer journey, accessibility to and operation of the network.
- **Temporary traffic management:** The corridor supports a number of events including the Milford Mountain Classic, Tour de Lakes, Peak to Peak, Tour of Southland, the Burt Munro challenge all of which are managed with warnings and rolling closures where needed. The increasing popularity of the route and of the events however, may put additional pressure on managing the corridor in a way that minimises disruption.

- **Increasing freight movement on SH6:** Growth pressure presented by Jack's Point and its neighbouring Hanley Downs residential development will increase expectations of infrastructure performance. This is also resulting in higher freight movements from Invercargill comprising building materials and prefabricated units.

Future considerations

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

- **Maintaining or developing assets with greater resilience:** Longer life, and lower maintenance requirements especially along SH94 given the lack of alternatives, challenging terrain, frequent incidents and closures and increasingly consistent demand on the corridor during peak periods should be consideration going forward.
- **Maintenance timing:** may need to change in response to continuous daytime demand on the corridor, for example, works could be done at night, especially on SH94.
- **Public transport:** Increased emphasis on public transport to cater for the daily commuters between the new residential developments at Jack's Point and Queenstown to manage traffic demand should be considered.
- **Non-asset solutions:** Continued implementation and further investigation of low cost and non-asset solutions such as park and ride and public transport to relieve some of the pressure on parking demand on SH94 tourist sites such as Milford Sound, Falls Creek, the Mirror Lakes and Pop's View.
- **Solutions to manage visitor demand should be considered:** Options could include limits on overall number of visits, frequency and timing of visits, and the actual sites to be visited along SH94. NZ Transport Agency could work with the Queenstown Lakes District Council and encourage a re-evaluation of the 3 minimum guest nights policy.
- **Future access to Milford Sound:** Given the current tourism growth, environment and the raised expectations of the corridor to remain accessible, alternatives access to Milford Sound (options investigated in recent times but not progressed) may need to be re-examined in light of the fact that the route passes through Fiordland National Park, restricting activity. Other non-road alternatives (sea and air) could be investigated for viability.

Resilience

The corridor, especially SH94 from Te Anau provides the only access to Milford Sound. Although the entire corridor is subject to vulnerabilities, this section of the road as well as the Devil's Staircase section of the corridor between Frankton and Kingston have a significant risk profile (Figure 12).

Vulnerabilities

The corridor is susceptible to a high number of natural vulnerabilities including rock fall, landslides, snow and ice, avalanches, high rainfall, flooding, tree fall and seismic events. SH6 from Lumber Box to Kingston, including Devil's Staircase alongside Lake Wakatipu is vulnerable to landslide movement, rock fall and flooding. Beyond Kingston a significant proportion of the network runs alongside river systems and lakes, making this section of the corridor vulnerable to washouts and flooding of low lying sections. Sections between Te Anau and Milford Sound within the Fiordland National Park experience heavy rainfall.

Rock falls and slips are a major risk on the corridor along the rocky alpine section of SH94. This section is also at risk from tree fall and tree slides, along with regular snow, ice and avalanche activity during the winter months.

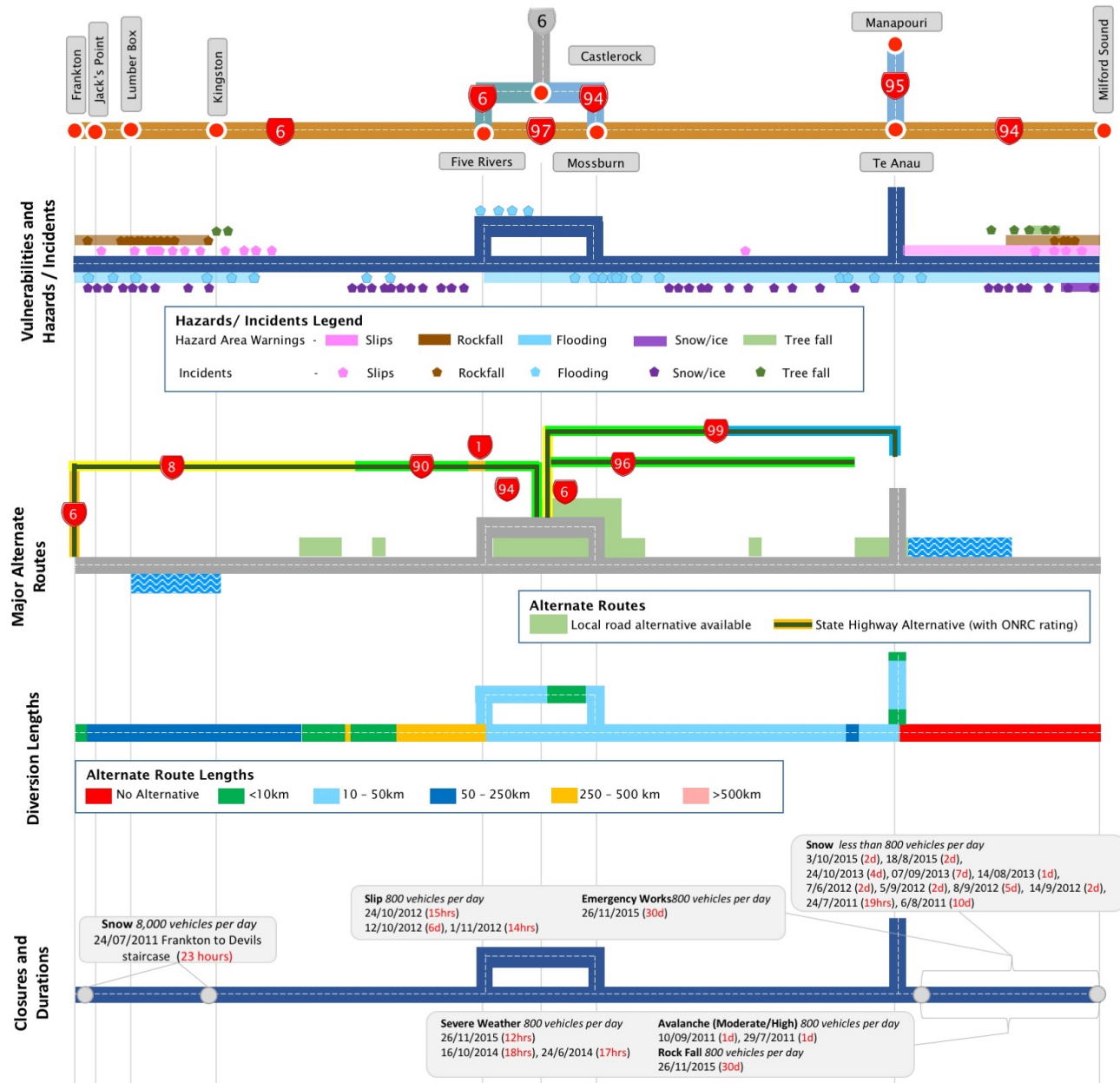
Alternative routes and diversion lengths

SH94 from Te Anau to Milford Sound has no alternative route and has limited access by light aircraft and boat, which are susceptible to weather conditions. The remaining corridor has alternatives available either through the State Highways or the local network.

Closures and duration

Over the past five years, there have been 22 major unplanned road closures, the longest being 30 days with 90% of these occurring on Milford Road (SH94) between Te Anau and Milford Sound. Typically, rockfall, emergency works and winter closure results in longer duration of closures than avalanche occurrences.

Figure 12 – Resilience



Pressures

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

- **Increased exposure to vulnerabilities:** Climatic conditions of SH94 towards Milford Sound with intensive snow and rainfall patterns, increase the risk and frequency of flooding, erosion and degradation of rocks, soils and slopes within and alongside the corridor. Risks arising from such challenging conditions are exacerbated by the growth in tourism increasing exposure to the vulnerabilities and adding pressure on the route to be re-opened promptly following an event.
- **Risk identification:** Limited historic records (particularly of SH94, the Homer Tunnel was only opened in 1953), and understanding the number of complex natural vulnerabilities, along with changing environmental conditions, make predicting the likes of rock falls, landslides, tree falls and tree slides, and impact to the network very difficult. The significance of the impact of an event on the route however adds to the pressure of identifying risk areas and ensuring adequate resources and plans are in place for immediate response.
- **Vulnerable infrastructure:** The Homer Tunnel provides a manmade vulnerability that has a significant effect on the resilience of the corridor, customers and the corridor asset, with the risk of; tunnel fire; width for vehicles; rock fall inside the tunnel; air flow and vehicle emission; and tunnel portal protection from avalanche and rock fall.
- **Heightened wear and tear of infrastructure:** Flooding from river surges on the low-lying sections, tree fall, landslides and avalanches in the alpine areas result in damage to the road requiring regular maintenance. Areas alongside lakes/streams and swamps are at risk of pavement deformation with flow on effects on ride quality and longevity of infrastructure.

Future considerations

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

- **Customer technology services:** Consider further investment into monitoring and predictive capabilities (avalanche management systems; rock-fall warning systems; enhanced weather predictions). Local weather at Milford Sound is already monitored and predictions passed on directly to the tour operators. There is the potential for this area to be extended and for the information to be made available in real time to self-driving travellers.

- **Milford Road Avalanche Programme:** Continuation of the Milford Road Avalanche Programme and improvements to communication systems, technology and methodologies to manage the avalanche period and provide improved resilience against avalanche vulnerability.
- **Establish a natural vulnerability risk profile:** Utilise improving technology to track and monitor and assess risk areas (i.e. areas susceptible to tree falls, rock fall and slips, avalanches) to improve prioritisation of preventative maintenance investment and consider investment in the appropriate management of these risks which could require greater engineered controls such as cameras and monitoring equipment in locations susceptible to rockfall and avalanches for example, SH94.
- **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 Milford Sound. Plans for extracting stranded communities and tourist noting that costs associated with evacuations will increase as visitor numbers grow.
- **Incidence response readiness:** Increased investment in the readiness of first responder personnel, location of equipment, and strategic stockpiling of materials to improve response times to events which close or cause significant delays on the corridor. This could include investigation into technological solutions that could assist in locating the road after a significant snow/avalanche event, in particular within the Alpine terrain of SH94.
- **Homer Tunnel:** Continued emphasis on preventative maintenance of the Homer Tunnel to minimise vulnerability to fire, interior rockfall and portal protection from rockfall and avalanche. Improvements are planned for the Homer Tunnel to reduce the impact of natural vulnerabilities and improve resilience.
- **Landslide monitoring:** Continued monitoring and periodic intervention between Lumber Box and Kingston to prevent and to manage slow moving landslides and provide smooth long wave ride quality, particularly for tour coaches.
- **Preventive drainage maintenance:** Continued investment in preventive drainage maintenance to mitigate risk of continued deterioration and extend the life of pavements especially along low-lying sections of SH94 running parallel to Lake Te Anau and Eglington River south of Milford Sound.

Reliability and efficiency

Efficiency

The corridor efficiency is performing as expected given the environmental constraints along the route. The route features lower levels of service at either ends of the corridor creating downstream effects (e.g. the entrance to Homer Tunnel and increasing traffic through Jack's Point and Frankton).

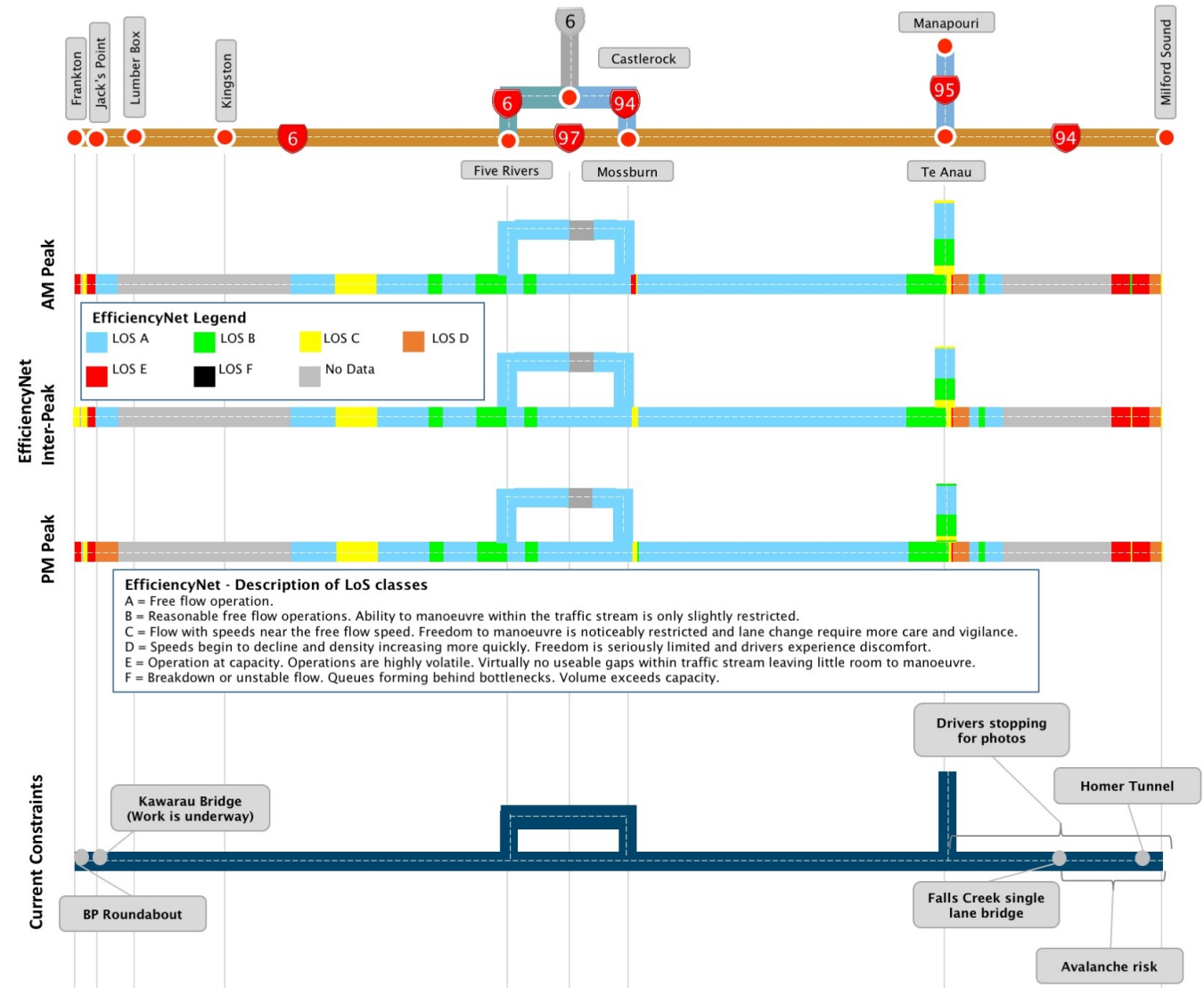
Variability

Travel time reliability is key for most customers engaging in time constrained activities, and especially critical for those that have left Queenstown late aiming to make their booked Milford Sound sailing times. Commercial operators are also under pressure to meet sailing times which is the main attraction at Milford Sound for their clients and at the same time, bound by their log book requirements to complete the return journey.

Current constraints

The current constraints on the network affecting journey reliability and efficiency include; single lane sections of the corridor as well as the single lane bridges, the Homer Tunnel (when signal controlled between 8am - 6pm), the BP roundabout in Frankton and Kawarau Bridge (to be replaced by a two-lane bridge due for completion mid 2017). Other factors such as slow-moving campervans, less experienced driving visitors also impact reliability and efficiency on the corridor especially along the challenging terrain on SH 94 and along the Devil's Staircase on SH6.

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** are as following:

- **Desire for reliable journey times:** Tourists, both domestic and international are the main customers on the corridor, many of whom are covering the full corridor as a return journey and time bound tours for whom reliable journey times are critical.
- **Desire to improve overall journey experience:** Increasing visitor numbers and a lack of passing opportunities, combined with slow vehicles, rough terrain in places and closures (either due to crashes, natural hazards or planned maintenance), can lead to increased driver frustration, risk taking, an unreliable travel time, and an overall poor journey experience.
- **Travel time delays at the BP roundabout:** The BP roundabout (SH6/6A) in Frankton is a choke point during the AM/PM peaks with significant delays also occurring during Public Holidays and large events. The downstream effects of this extends south of the Kawarau Falls Bridge to Peninsula Road with traffic delayed in all directions. Staged improvements are planned (refer to corridor improvements discussed on pg. 31).
- **Increasing traffic time delays at Milford Sound and Homer Tunnel:** Efficiency north of Te Anau is very sensitive to planned (e.g. avalanche management by controlled explosions) and unplanned environmental events. Although this section is currently managed well, increased demand especially during peak periods adds pressure to the assets in Milford Sound and Homer tunnel which are at or exceeding capacity at peak times. The traffic operations centre at the Homer Tunnel is managing the delays and expectations currently, the pressure on the system will increase with traffic growth.
- **Travel time delays between Queenstown and Jack's Point:** Increased levels of commuter traffic between Queenstown and Jack's Point driven by the residential growth at Jack's Point can potentially create congestion issues and lead to travel time delays, especially during peak hours potentially eroding the 30 minute buffer in logbook requirements for tourism operators.
- **Limitations on maintenance operations:** The tight and winding alignment limits the forward visibility through the corridor which inhibits safe maintenance operations. The traffic control required to safely manage maintenance operations can have impacts in terms of travel delay meaning it is undesirable to have multiple sites active at the same time.

Future considerations

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

- **Journey times:** Further investment in Intelligent Transport Systems (ITS) assets, educational promotion material and facilitating the development of other technology enabled measures connecting the physical and digital could improve the information available for visitors and road users. This could include real time information to convey messages to drivers of estimated journey times reflective of peak times, expected travel times, delays and weather events, phone based applications and digital applications run by external parties could be valuable.
- **Journey interruption:** Improvements and preventive maintenance measures will result in continual increase in infrastructure (stopping places, closure gates, retaining walls, rock fences, side barriers, etc.). Investment to maintain these assets as well as provision to minimise impact to customer journey as both maintenance requirements and traffic volumes increase, should be considered moving forward.
- **Visitor education:** The primary customers are visitors, investment in tourist driver education is a viable option, focusing on factors that may impact the journey including; environmental factors; changeable alpine weather; frequency of hazards on the road (slips, rock fall, trees); challenging road alignment; limited passing opportunities; and high frequency of other visitors travelling slowly. Informed customers will have more realistic travel time expectations and provide for improved trip planning and safer journeys.
- **Stopping places:** Provision of flow management in the form of stopping places and photo opportunities that are adequately placed as a means of safe speed management and are intuitive to the tourist may be considered.
- **Peak time capacity:** A number of assets (Homer tunnel, single lane bridges, narrow carriageway sections within Fiordland National Park, and parking areas) along SH94 are currently performing at or above capacity during peak times, with a continued increase in tourist numbers expected. To ensure the corridor continues to deliver acceptable levels of service around travel time reliability, upgrades (widening) to these assets will need to be considered, including provision for improvements as well as ongoing maintenance.
- **Growth impacts:** Growth towards Frankton is going to continue and is likely to increase travel times for commercial operators located in Queenstown. A physical shift of the departure/arrival point to south of Frankton could be encouraged moving forward, providing greater flexibility for operators to manage planned and unplanned closures and delays.

Safety

Collective risk

The level of collective risk is low or medium-low for most of the corridor except for two small segments between Te Anau and Milford which are rated as medium collective risk.

Personal risk

Personal risk is low for the section of the corridor between Frankton and Five Rivers, except for a limited area around Kingston. Between Five Rivers and Mossburn, approximately half of SH 97 is rated high risk. SH 94 between Castlerock and Mossburn has a medium personal risk. The level of personal risk between Mossburn and Te Anau varies significantly with segments ranging from low to high. The majority of the corridor between Te Anau and Milford Sound is rated either medium-high or high personal risk.

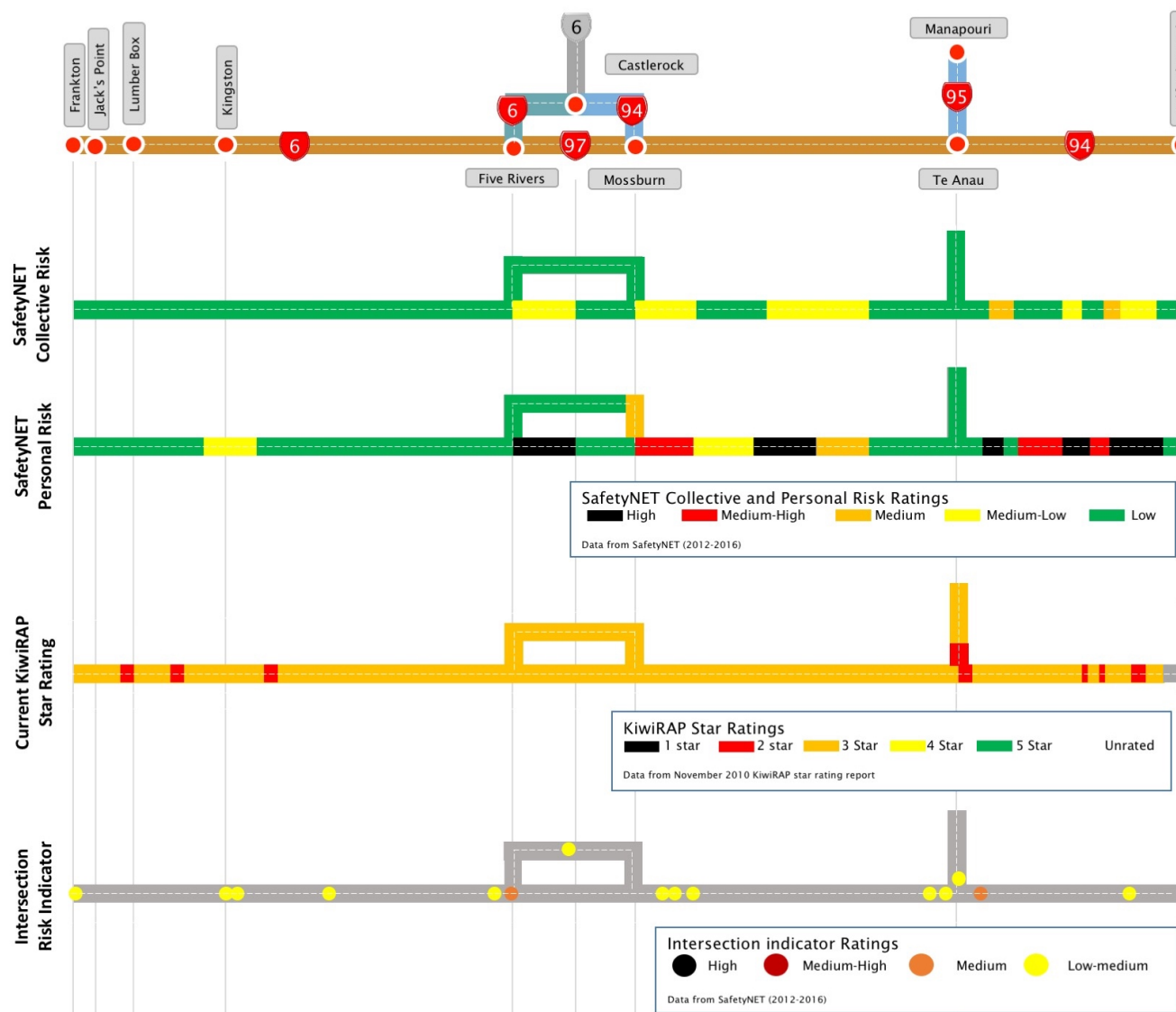
Star rating

The corridor predominantly has a 3 star rating with 2 star sections at either end of the corridor, close to Te Anau, Milford Sound, Jack's Point and Kingston. The corridor between Frankton and Milford Sound (via SH 97) is classified as Regional with the SH6, 94 and 95 sections being Arterial or Primary Collector. The minimum desired customer level of service (CLoS) in terms of safety for Regional roads corresponds to a 3 Star rating and the corridor largely satisfies this target.

Intersection risk indicators

The majority of intersections within the corridor possess a low or low-medium risk, with only two intersections having a medium risk rating.

Figure 14 – Safety



Pressures

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

- **Challenging terrain:** Due to the terrain that the corridor traverses, the journey is challenging with winding narrow formations and steep climbs and descents especially along the Devil's Staircase and northern part of SH94. Travelling the corridor requires a high level of driver skill and concentration throughout the journey. The narrow seal width, drop offs, embankments, and unprotected hazards along the corridor length, means that if a driver makes a mistake the consequence is likely to be severe.
- **Limited passing lanes:** The tidal nature of the traffic flow allows for passing opportunities along straight sections of SH6 and SH97. With the forecasted growth in tourism, extension of the shoulder season and increasing numbers of self-driving travellers, passing opportunities may become more difficult. This may lead to risky driver behaviour, especially in sections of open flat straight roads such as SH97 where drivers can consciously and sub-consciously drive at inappropriate speeds.
- **Variable weather conditions:** The alpine environment is subject to variable weather conditions and over the period of a journey can result in changed travel conditions which drivers maybe unprepared for. The route is subject to winter conditions with ice and black-ice forming in shaded sections and on bridge decks. Snowfall is frequent on alpine passes which can require chains to be fitted to vehicles to pass and/or vehicle restrictions imposed. Both ice and snow can lead to loss of control type crashes.
- **Limited communication:** The Milford Road route is isolated from main centres and townships so emergency services can take some time to respond to incidents especially given the lack of cell phone coverage and limited ability to raise alarm of an incident.
- **Fatigued drivers:** Long day trips to and from Queenstown or Te Anau can often result in fatigued drivers, as often the corridor is only part of an extended customer journey, increasing the risk of crashes.
- **Pedestrian and vehicle conflict at popular viewing points:** Popular viewing points on the corridor for example, Mirror Lakes, Falls Creek, Monkey Creek, Pop's View, East Homer Tunnel experiences congestion especially during peak periods with parking spillage on the state highway and potential conflicts between pedestrians and vehicles.
- **Effluent spillage leading causing safety concerns:** Effluent spillage from stock trucks that frequent the corridor as they move stock for winter grazing from Southland to Central Otago cause environmental and safety issues.

Future considerations

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

- **Winding sections:** Improvements to winding sections to lessen curve severity or provide additional recovery room. Implement a high level of delineation at curves including large static signage, electronic warning signs, temperature triggered active warning signs during winter, bridge abutments and asymmetrical curve widening.
- **Seal width:** Consider widening the narrow sections of SH94, particularly the single lane section before Falls Creek and sections within the National Park to allow for the safe passage of vehicles. Additional seal width would also provide recovery room for vehicles.
- **Ongoing preventative maintenance:** Ensure that the existing road assets perform to their potential including adequate skid resistance of the pavement surface, adequate drainage, and a good standard of delineation. Especially after an avalanche event where the delineation is completely wiped out.
- **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.
- **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.
- **Winter maintenance:** Such as the use of de-icing agents, grit, and warning signage within the Fiordland National Park. A higher level of intervention maybe required on the corridor at sites that are subject to severe winter conditions and growing number of visitors for example, Falls Creek and the section east of Homer Tunnel. The safety and security benefits to customers offsets the potential increase in maintenance investment.
- **Co-investment mobile black spot:** Continue to work with Ministry of Business, Innovation and Employment (MBIE) and their Mobile Black Spot Fund to achieve mobile coverage along the entire corridor. The option of co-investment could be considered.
- **Pedestrian and vehicle conflicts:** Future consideration of engineering solutions to address potential pedestrian and vehicle conflicts at popular sites on the corridor given the route popularity.

People, places and environment

Natural environment

The Queenstown to Milford corridor is characterised by variable natural environmental conditions, passing through unspoiled mountain landscapes, rainforest carpeted valleys, rural landscapes and water bodies which are a dominant feature of the corridor.

The Fiordland National Park supports a great variety of indigenous and introduced fauna. The park has a stronghold for many of the less common of New Zealand's endemic birds (e.g.; blue duck, rock wren, yellowhead, brown kiwi, the Fiordland crested penguin) and is home of the Takahē bird Recovery Programme.

Noise, vibration and air quality

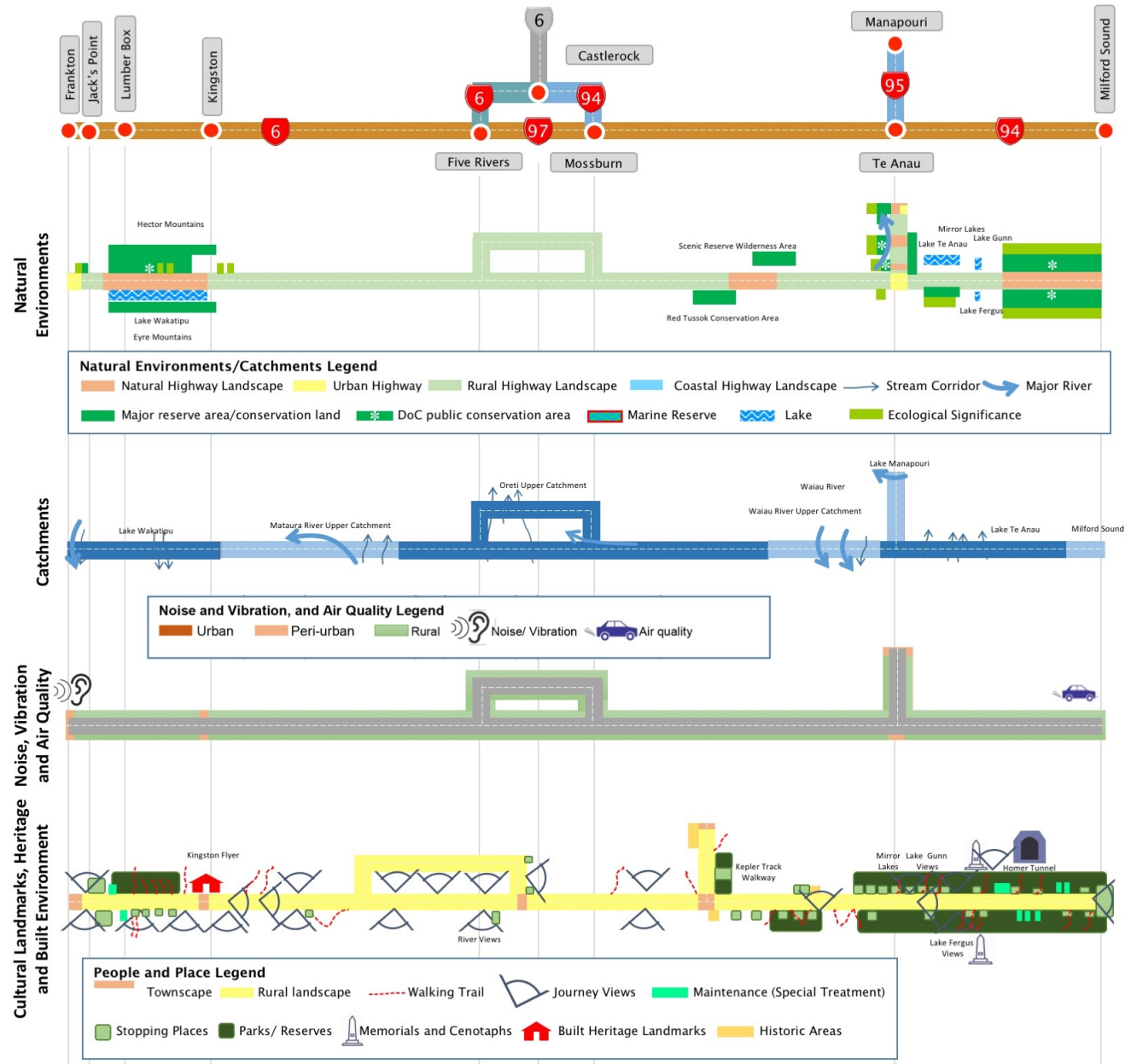
Noise and vibration are issues only at Frankton where traffic flows are higher and congestion is experienced. Increasing urban development at Jack's Point may see noise and vibration become an issue in this area. Air quality is an issue through the Homer Tunnel.

Cultural landmarks, heritage and built environment

The visual character of the corridor provides vibrancy and attractiveness to journeys and highly valued by locals and visitors for its dramatic landscapes and views. The corridor features a number of formal viewing/stopping spots as well as informal ones, some of which are located within the road reserve (10m either side of the centreline).

The bridges, Homer Tunnel and the State Highway itself make up part of the built heritage along with the 'Green Shed' and 'The Chapel' which is now the Traffic Control Centre for Homer Tunnel. The road through the Hollyford Valley follows early Maori trails between Queenstown and the West Coast, one of many pounamu trails.

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** are as follows:

Natural environment

- **Vegetation management:** Requirements are very stringent within the Fiordland National Park. This means all works within DoC conservation estate require approvals to ensure requirements of the Fiordland Park Management Plan are met, restricting measures that can be implemented.
- **Archaeological and sensitive ecological information:** There is a lack of archaeological and sensitive ecological information to ensure compliance with the Fiordland Park Management Plan and any consent conditions. As such, archaeological assessments may be needed.

Noise, vibration and air quality

- As development continues in the east (Queenstown, Frankton and Kingston), noise, vibration and air quality could become an area of concern.
- Air quality within the Homer Tunnel is a concern given the increasing vehicle numbers passing through.

Cultural landmarks, heritage and built environment

- **Amenities:** The route from Queenstown to Kingston is frequented by freedom campers especially during the peak summer season creating amenity issues and increased maintenance requirements.
- Visual amenity is a key focus within the National Park driven by DoC and the park management plan. For example, guardrails and any infrastructure are required to be painted specific colours in high amenity areas to maintain the vista and signs are required to be placed in specific locating to minimise visual effect.

Active modes

- **Tour cycling:** Although 'Around the Mountains' cycle trail currently has low usage, tour cycling is an emerging market and may experience growth in the coming years both from tourists and recreational users. Cycling and walking along much of the corridor however, cannot be safely provided for without significant investment, especially through the single lane and narrow sections.

Future considerations

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

- **Combining stopping places:** (including look outs and rest areas especially on SH 94) with places of interest and heritage sites. Utilising these places to tell local or cultural stories and further enhance the attractiveness and amenity of journeys. This includes working with mana whenua to recognise traditional Maori names for places/landmarks.
- **Human impact at stopping places and rest areas:** Littering, human waste is increasingly becoming a problem as tourism continues to increase. This impacts the customer experience and integrity of the environment, as such management of these sites could require increased investment.
- **Homer Tunnel ventilation system:** Further improvements to the ventilation system within Homer Tunnel and balancing community expectation around noise and vibration, with sensible maintenance solutions should be considered.
- Maintaining heritage value of assets such as the Homer Tunnel as network improvements are made.
- **Rationalise resource consents:** Opportunities to consolidate/rationalise resource consents, particularly for regular maintenance activities on the corridor given the challenging terrain and climatic conditions.
- **Modes investment:** Continued investment for adaptive re-use of infrastructure for new uses e.g. cycling and walking on the existing Kawarau Bridge which is being replaced by a 2 lane bridge and ensuring appropriate repairs and maintenance for long term conservation outcomes.
- Bridging the gap on the cycling infrastructure for commuter cyclists between Jack's Point and Frankton; touring cyclists along the length of the corridor; and those using the corridor for training rides such as Frankton to Kingston.
- **Advanced warning signs:** Further consideration of advanced warning signs informing visitors of serviced rest areas on the route directing users to areas that are safe and appropriate for a rest stop.

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 331 km of road network which reflects 2.9% nationally. The total value of the assets along the corridor is \$414M.

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 Environmental, People, places and environment outcomes on the network.

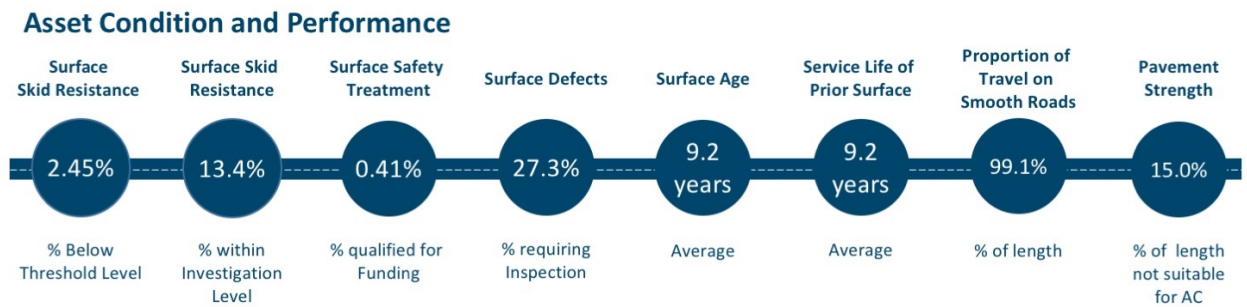
Asset condition and performance summary

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



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.

Two sections of SH6, RS1011 and RS1079 have shown a marked increase in the amount of skid resistance below the threshold limit over the last 3 years. Both these sections also show significant levels of surface skid resistance within the Investigation Limits as well as sections RS212 and RS241 of SH94. Conversely RS99 of SH94 has shown a marked improvement in both levels of surface skid resistance over the last three years.

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. A very low percentage (0.4 %) of the corridor achieved Skid Assessment Length that qualifies for funding. This equates to only 2.7 lane-km of the 658 total lane-km of the corridor.

Figure 18 – Asset condition



While insignificant the sections with the highest priority for surface safety treatment qualifying for funding are, RS996 and RS1079 of SH6, and RS0 of SH97. These three sections also show the largest increase in priority for surface safety treatment over the last 3 years.

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, 27% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: SH6 – RS996, RS1011; SH94 – RS130, RS138, RS150, RS212, and RS240. These sections also show a significant level of degradation in score over the last three years.

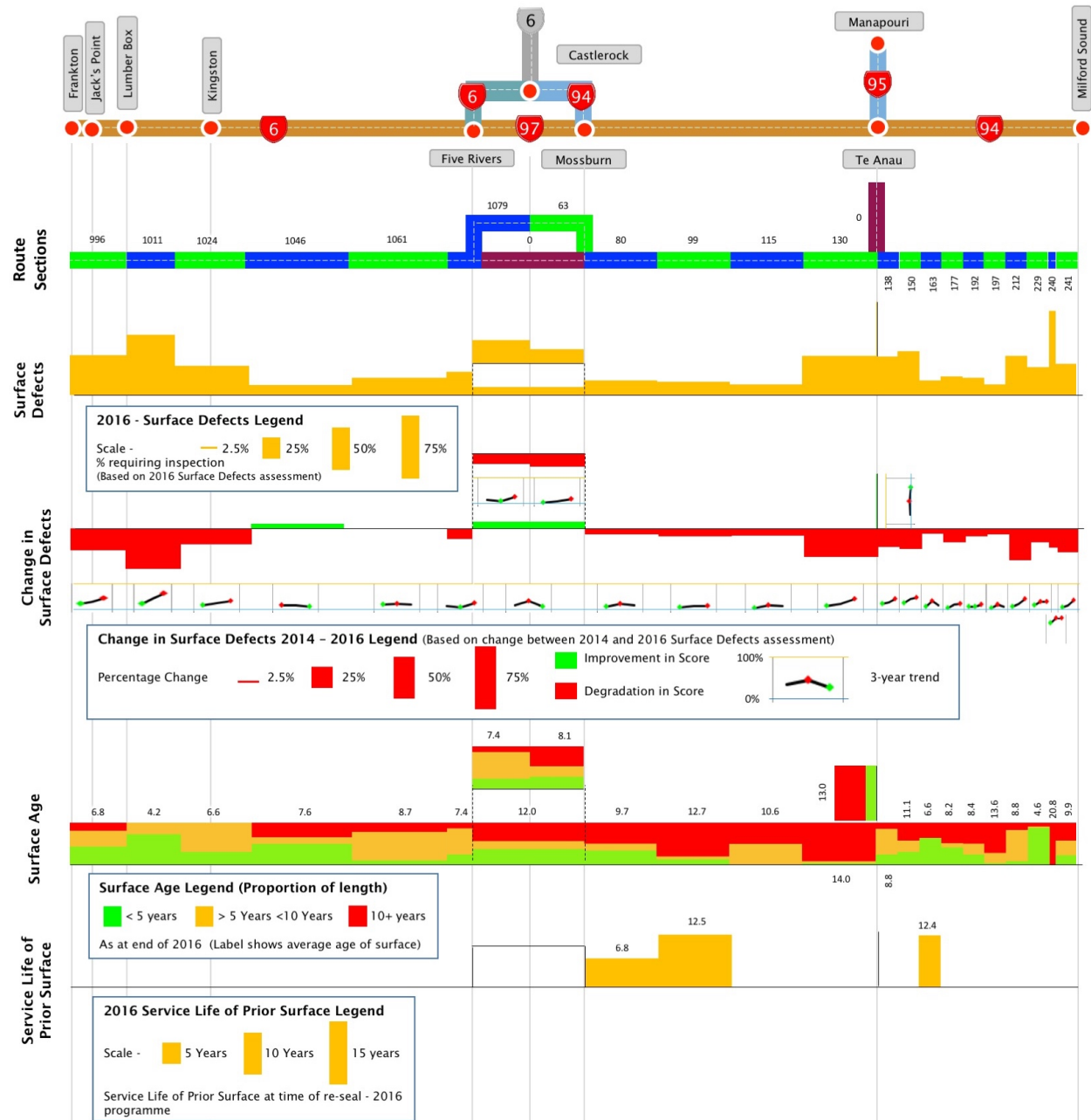
Surface age

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 SH94/99 east of The Key, SH94/130 south of Te Anau, SH95/0 between Te Anau and Manapouri, SH97/0 between Mossburn and Five Rivers, and, SH94/240 Homer Tunnel.

Figure 19 – Asset condition 2



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 9.2 years, with sections SH94/99 east of The Key, and, SH94/163 around Te Anau Downs achieving an average service life in excess of 12 years.

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 section SH97/0 between Mossburn and Five Rivers.

Proportion of travel on smooth roads

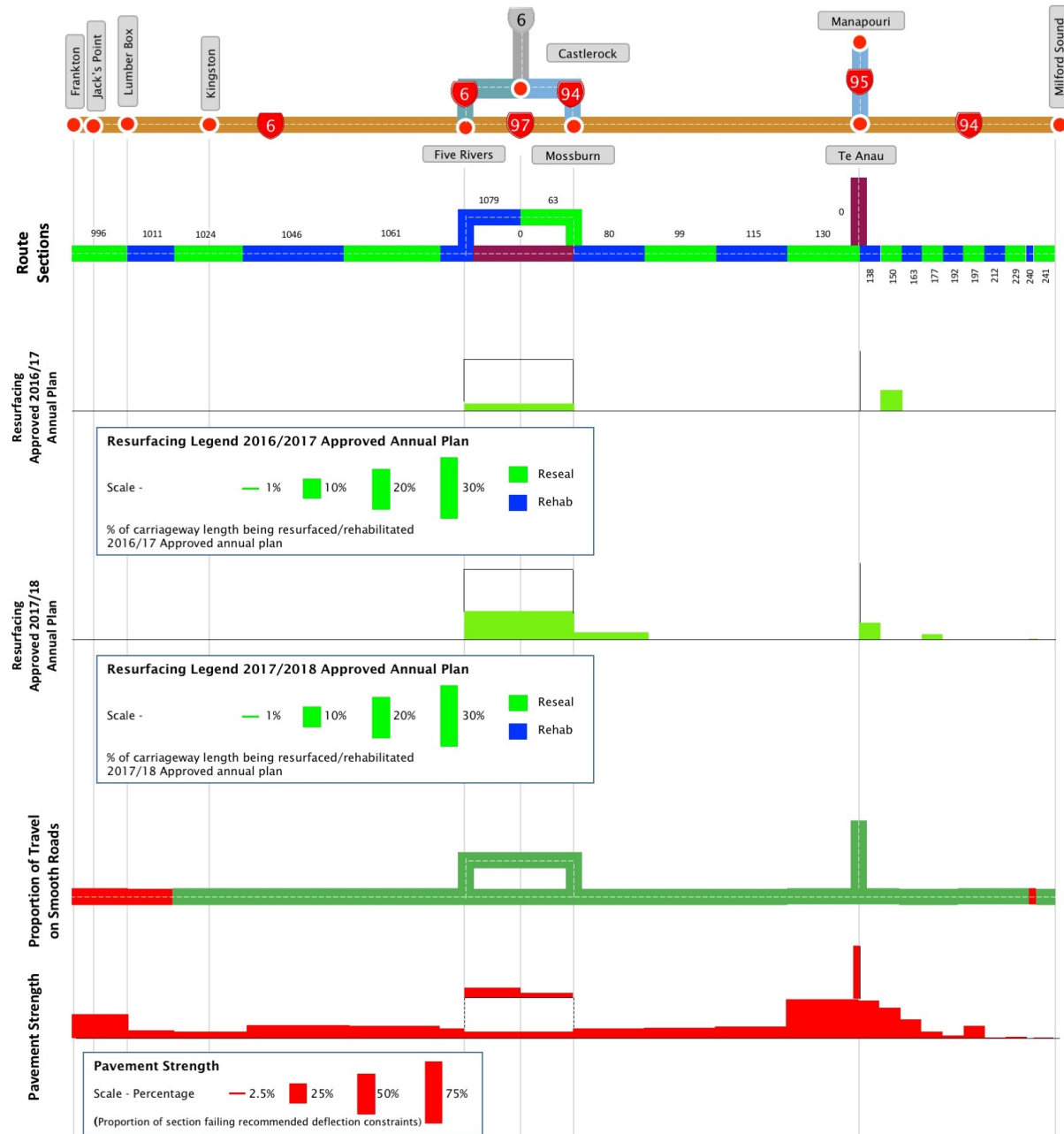
The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not. Sections of corridor that fail to meet the minimum standard for proportion for travel on smooth roads include: SH6/996 and SH6/1011 between Frankton and Devils Staircase, and SH94/240 Homer Tunnel.

Pavement strength

Recommended deflection constraints for thin asphaltic surfaces is used as a measure of pavement strength. The infographic shows the proportion of the Route Section that fails to achieve the recommended deflection constraint for the classification of road, based on lane-km.

The sections of corridor with the highest proportion of pavement failing to meet the deflection constraints occur at SH6/996 between Frankton and Lumber Box, and SH94/130, SH94/148 and SH94/150 around Te Anau.

Figure 20 – Asset condition 3



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:

- **Lumber Box to Kingston:** There is deep seated land movement which is leading to uneven road surface, regular rockfalls.
- **Erosion:** Lakeside erosion is occurring at the southern end of Lake Whakatipu near Kingston
- **Flushing:** Flushing is occurring in a number of areas including SH6/1061 and SH6/1079 between Athol and Castlerock, and, SH94/80 west of Mossburn.
- **SH97:** Older seals need resealing, and new seals needing second coats due to new seal suffering from flushing.
- **Winter Maintenance:** Winter maintenance in alpine areas will continue to be an ongoing pressure. There is a move away from CMA in favour of NAAC for treatment of ice.
- **Fiordland National Park:** Any aggregate used inside the national park must be sourced from within the park.

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:

- **Freedom Campers:** An increase in freedom campers is causing pressure on corridor amenity and travel time reliability.
- **Homer Tunnel:** The management of the tunnel in its current form is difficult. Crews sometimes have to be stationed on the Milford side in winter due to access issues. Safety upgrades will need to be considered in the future.
- **Changing maintenance window:** Maintenance must be worked around heavy vehicle logbook hours of bus drivers and the tidal traffic flow at Milford. A proposed change in the Milford Sound boat timetable will reduce opportunities to undertake maintenance between significant traffic tidal flows.



Milford Road proactive rockfall management

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	\$9,106	\$9,704	\$14,611
	Renewals	\$8,699	\$9,996	\$14,026
	Improvements	\$10,500	\$0	\$0
Reliability and Efficiency	Maintenance and Operations	\$8,935	\$9,449	\$14,190
	Renewals	\$110	\$118	\$184
	Improvements	\$0	\$0	\$0
Safety	Maintenance and Operations	\$6,353	\$6,784	\$10,202
	Renewals	\$1,437	\$1,533	\$2,279
	Improvements	\$0	\$0	\$126,700
People, places and Environment	Maintenance and Operations	\$874	\$927	\$1,404
	Renewals	\$48	\$48	\$72
	Improvements	\$4,700	\$3,700	\$0
Total		\$50,763	\$42,260	\$183,668

Figure 21 – Corridor investment

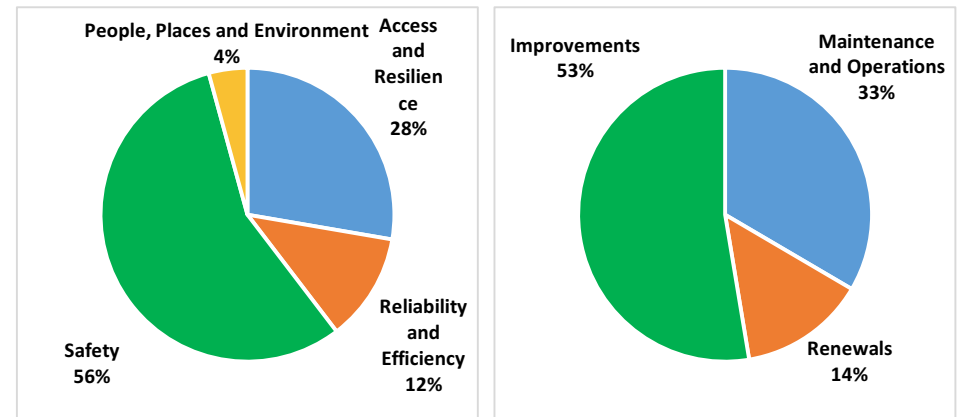


Table 2 - Summary investment by work category (\$000)

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Access and Resilience	111 Sealed Pavement Maintenance	\$1,612	\$1,715	\$2,569
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$238	\$244	\$389
	114 Structures Maintenance	\$2,026	\$2,174	\$3,286
	121 Environmental Maintenance	\$2,495	\$2,679	\$4,024
	122 Traffic Services Maintenance	\$20	\$51	\$75
	124 Cycle Path Maintenance	\$7	\$8	\$12
	151 Network & Asset Management	\$2,173	\$2,275	\$3,416
	161 Property	\$535	\$559	\$839
	211 Unsealed Road Metalling	\$7	\$8	\$12
	212 Sealed Road Resurfacing (excl. surface skid resistance)	\$5,167	\$5,774	\$7,122
	213 Drainage Renewals	\$134	\$147	\$221
	214 Pavement Rehabilitation	\$1,998	\$2,583	\$4,443
	215 Structures Component Replacements	\$1,337	\$1,408	\$2,115
	222 Traffic Services Renewals	\$56	\$76	\$113
321 - 341 Improvements	\$10,500	\$0	\$0	
Reliability and Efficiency	121 Environmental Maintenance	\$2,474	\$2,622	\$3,939
	123 Operational Traffic Management	\$5,868	\$6,213	\$9,331
	151 Network & Asset Management	\$495	\$514	\$768
	161 Property	\$98	\$101	\$152
	222 Traffic Services Renewals	\$110	\$118	\$184
	321 - 341 Improvements	\$0	\$0	\$0

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Safety	111 Sealed Pavement Maintenance	\$1,711	\$1,801	\$2,699
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$1,065	\$1,127	\$1,693
	114 Structures Maintenance	\$540	\$586	\$881
	121 Environmental Maintenance	\$67	\$98	\$147
	122 Traffic Services Maintenance	\$1,286	\$1,374	\$2,083
	124 Cycle Path Maintenance	\$0	\$0	\$0
	151 Network & Asset Management	\$1,456	\$1,552	\$2,332
	161 Property	\$229	\$245	\$368
	212 Surface Skid Resistance	\$1,008	\$1,112	\$1,669
	214 Pavement Rehabilitation	\$18	\$36	\$53
	215 Structures Component Replacements	\$88	\$105	\$158
	222 Traffic Services Renewals	\$322	\$281	\$398
	321 - 341 Improvements	\$0	\$0	\$126,700
	People, places and Environment	111 Sealed Pavement Maintenance	\$50	\$54
121 Environmental Maintenance		\$535	\$571	\$870
151 Network & Asset Management		\$232	\$242	\$363
161 Property		\$57	\$60	\$89
221 Environmental Renewals		\$48	\$48	\$72
321 - 341 Improvements	\$4,700	\$3,700	\$0	
	Total	\$50,763	\$42,260	\$183,668

To be confirmed through the RLTP

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:

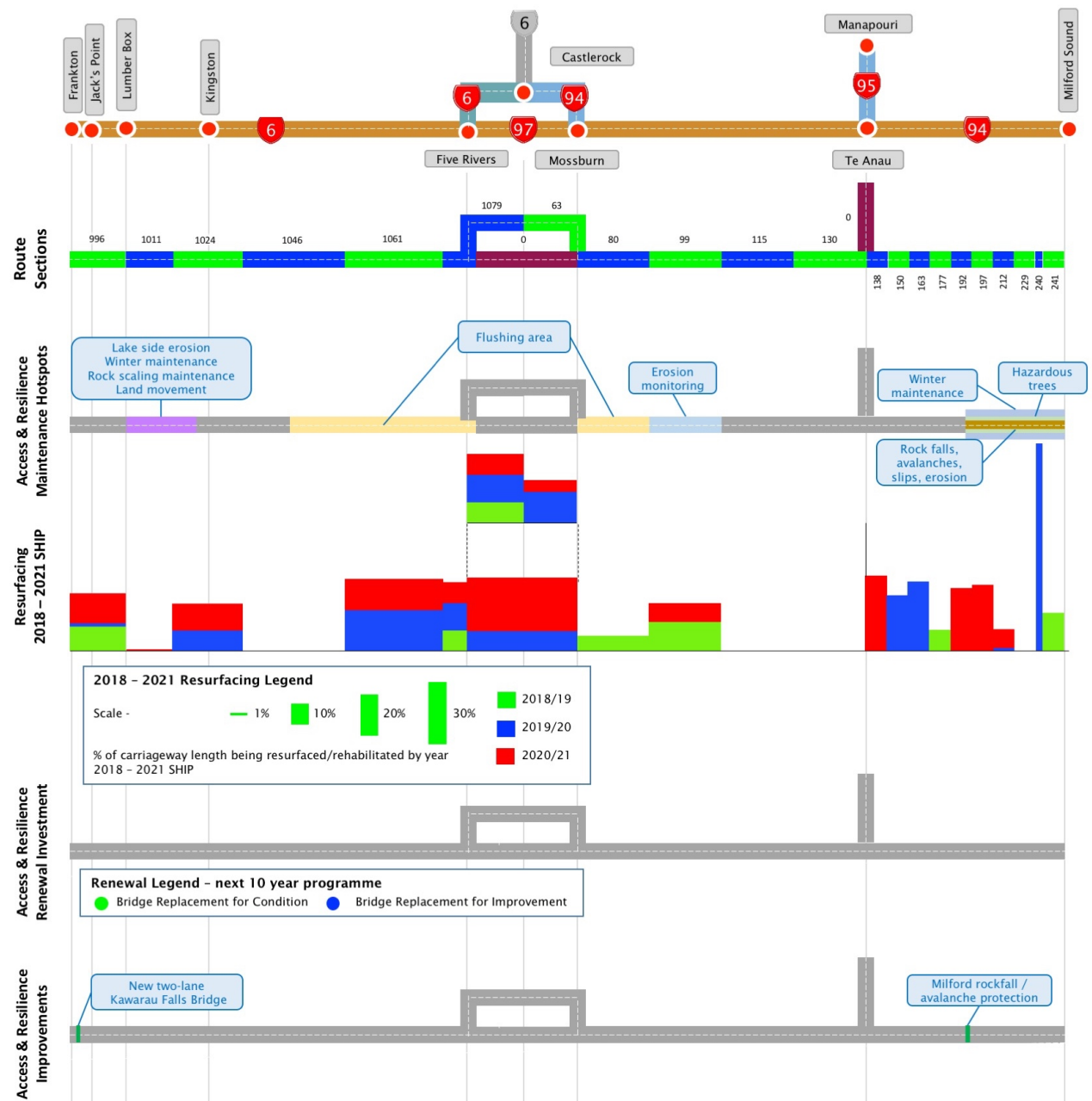
- **SH6/1011 Limber Box to Devils Staircase:** This area requires additional attention to address lakeside erosion, land movement, winter maintenance, and to perform rock scaling maintenance.
- **SH94/197 to SH94/241 Mirror Lakes to Milford Sound:** This area has an avalanche risk in winter, also rockfalls, over-slips and under-slips, and falling trees are resilience issues.

Access is always an issue and sometimes there is a need to helicopter in plant and equipment as the road is impassable.

This is a very remote location with no alternative routes. During winter, there is a requirement to accommodate staff at Milford due to the potential for loss of access from the Te Anau side.

- **Pavement flushing:** On sections SH6/1061 and SH6/1079 between Athol and Castlerock, and, SH94/80 west of Mossburn, pavement flushing is occurring.
- **SH94/99 The Key:** There is an issue with river erosion that is monitored after every significant rainfall to gauge deterioration.

Figure 22 – Access and resilience investment



Renewals

Resurfacing

The infographic 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: SH6/1061 and SH6/1079 between Athol and Castlerock, SH97/0 between Mossburn and Five Rivers, and, SH94/240 – Homer tunnel.



Construction of the new Kawarau Falls bridge is well underway.

Improvements

Planned

The following projects are planned and underway. Details of the project progress can be found on the Transport Agency website at: <https://www.nzta.govt.nz/projects/>

SH6 – New two-lane Kawarau Falls bridge project

Description: Replacement of single lane with 2-lane bridge. The Kawarau Falls Bridge, an essential link on SH6 south of Queenstown and is being replaced by a two lane bridge as the existing single lane bridge doesn't have the capacity to manage the increased traffic volumes.

Draft Regional Programme considered for 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
Milford rockfall / avalanche protection		<p>Realignment to avoid avalanche path on eastern approach to tunnel.</p> <p>Relocation of visitor attraction/stopping location. High velocity catch fencing at two locations.</p>

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:

- **SH6/996 Frankton to Lumber Box:** Access to this part of the corridor to do maintenance is difficult due to the amount of traffic, and needing to maintain access to the airport.
- **SH6/996 between Frankton and Remarkables turnoff:** Active traffic management is put in place at peak periods during ski season to ensure efficient traffic movement.
- **SH94/197 Mirror Lakes to Cascade Creek and SH94/241 tunnel to Milford Sound:** Access is managed and controlled during winter as part of the winter maintenance processes, i.e. the road is closed during ploughing and gritting.
- **SH94/229 to SH94/241:** Weather stations to enable early warning of weather related reliability issues are in place in this section.
- **SH94: Mossburn to Milford Sound, and SH97:** Cell-phone coverage is patchy to non-existent along this part of the corridor, presenting issues with reporting incidents and delaying response.

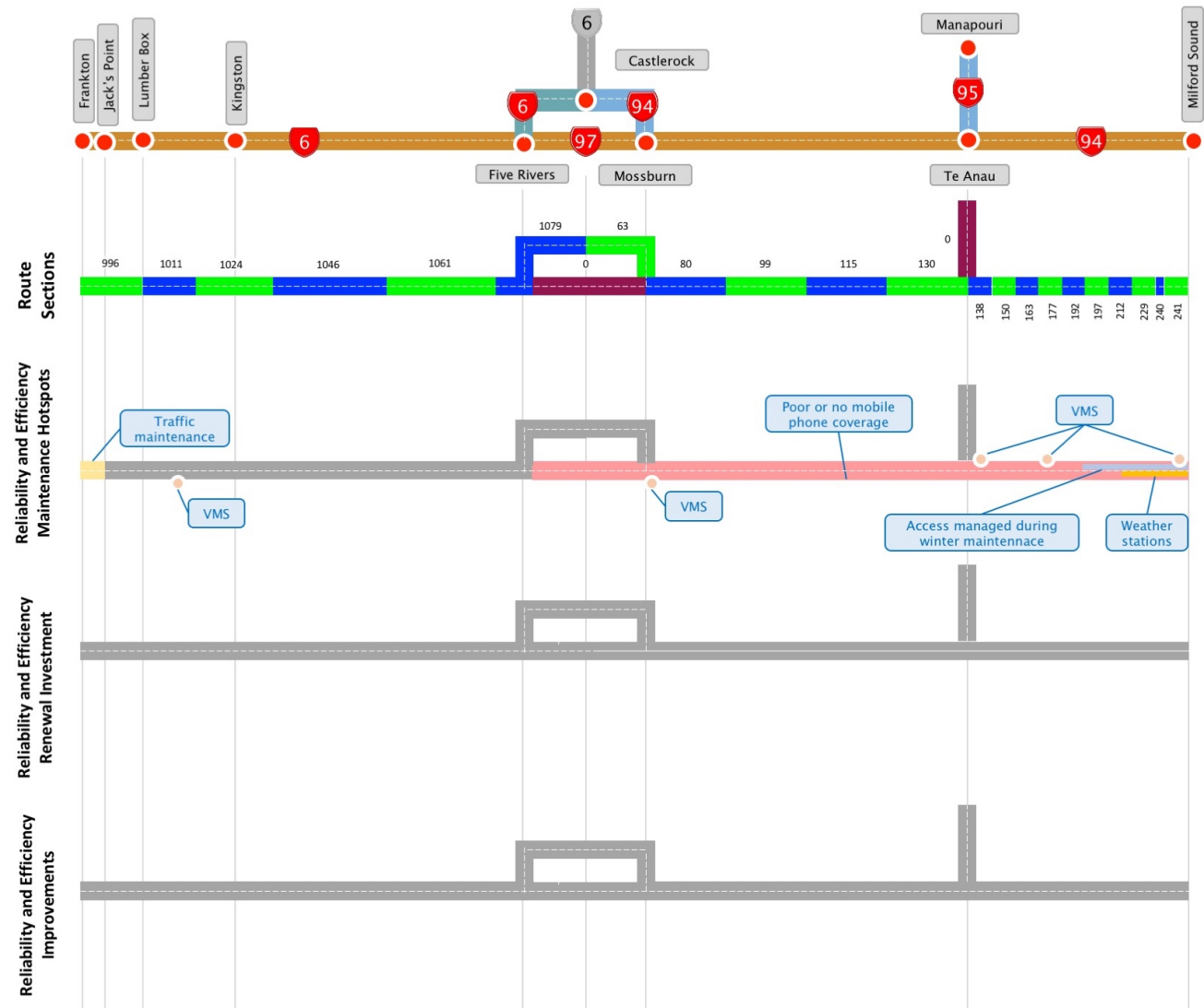
Renewals

There are no reliability and efficiency related renewals planned for the corridor.

Improvements

There are no reliability and efficiency related improvements planned for the corridor.

Figure 23 – Reliability and efficiency investment



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:

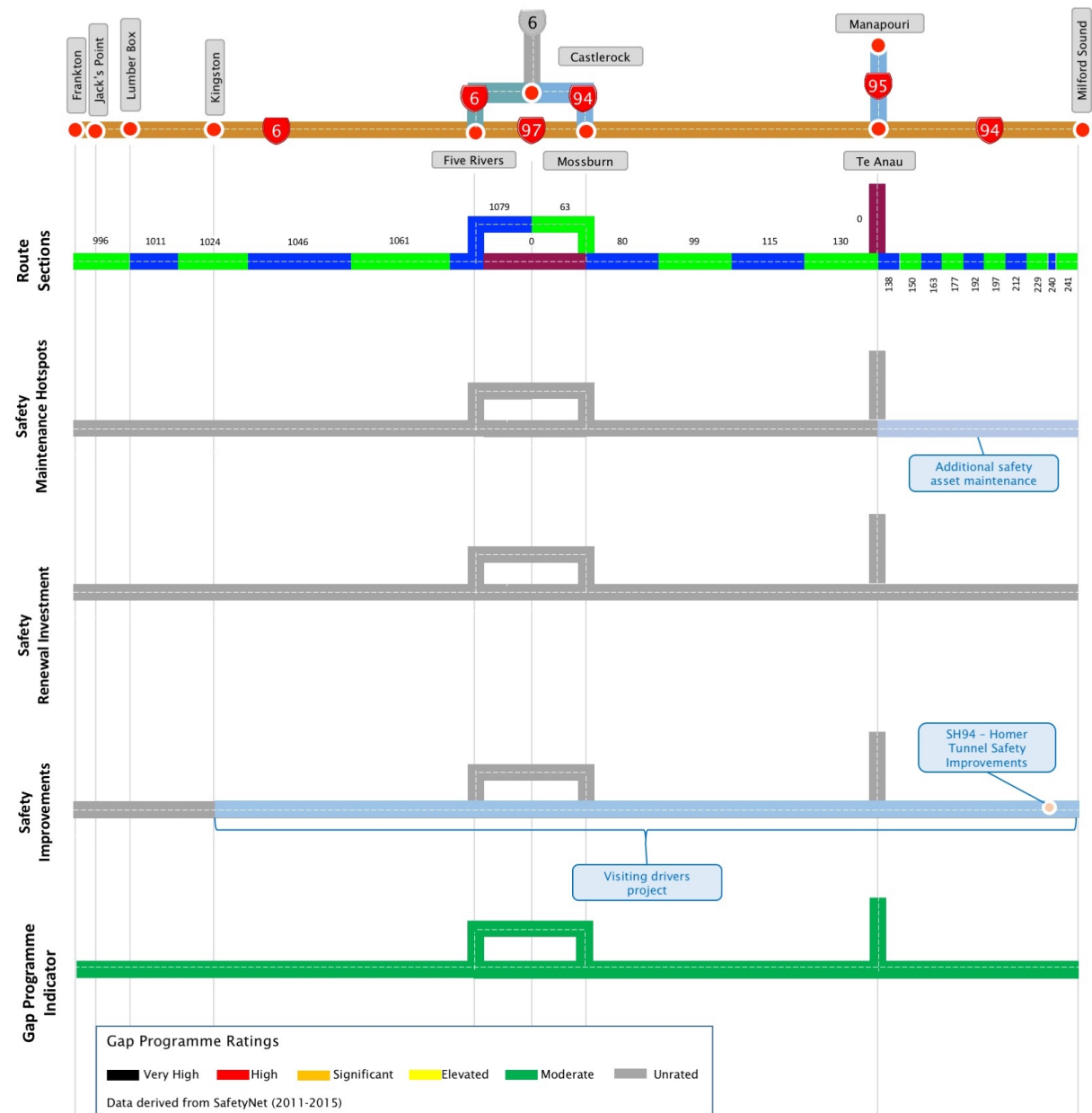
- Te Anau to Milford Sound:** Improvements through the Visiting Drivers Project are adding additional safety assets (signs, painted arrows, ATP centre lines) along this section of corridor requiring additional maintenance investment. The addition of ATP along the route is likely to result in changes to winter maintenance practices, such as the need to use CMA in place of grit.

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.

The corridor has a moderate potential for reducing fatal and serious injuries through targeted low cost, high coverage improvements.

Figure 24 – Safety investment



Renewals

There are no safety related renewals planned for the corridor.



Visiting drivers may not be familiar with New Zealand's winding road alignments.

Improvements

Planned

The following projects are planned and underway. Details of the project progress can be found on the Transport Agency website at: <https://www.nzta.govt.nz/projects/>

SH94 – Homer Tunnel Safety Improvements

Description: This will upgrade the existing temporary shelter with an avalanche and rock shelter at the western portal.

All – Visiting Drivers Project

Description: The project covers improvements between Kingston to Milford Sound (SH6, SH97, SH94). Established in March 2014 and project partners include the NZ Transport Agency, Ministry of Transport, NZ Police, tourist industry representatives, rental vehicle companies and local governments. The overarching concept of the Signature Project is “host responsibility” and the project aims to target visitors at all stages of their trip - from planning and booking to completing their journey.

The purpose of the project is to “improve road safety for and of visitors travelling on the road network, while maintaining New Zealand’s reputation as an attractive and safe visitor destination”. Education material has been prepared to aid visitors in the planning and booking, in-flight and arrival stages of their journey. At a local level a list of engineering features have been identified to improve road safety and provide an enjoyable journey. These include signage, seal widening, markings, safety barrier, intersection improvement and hazard removal.

Investing in people, places and environment

Operations and maintenance

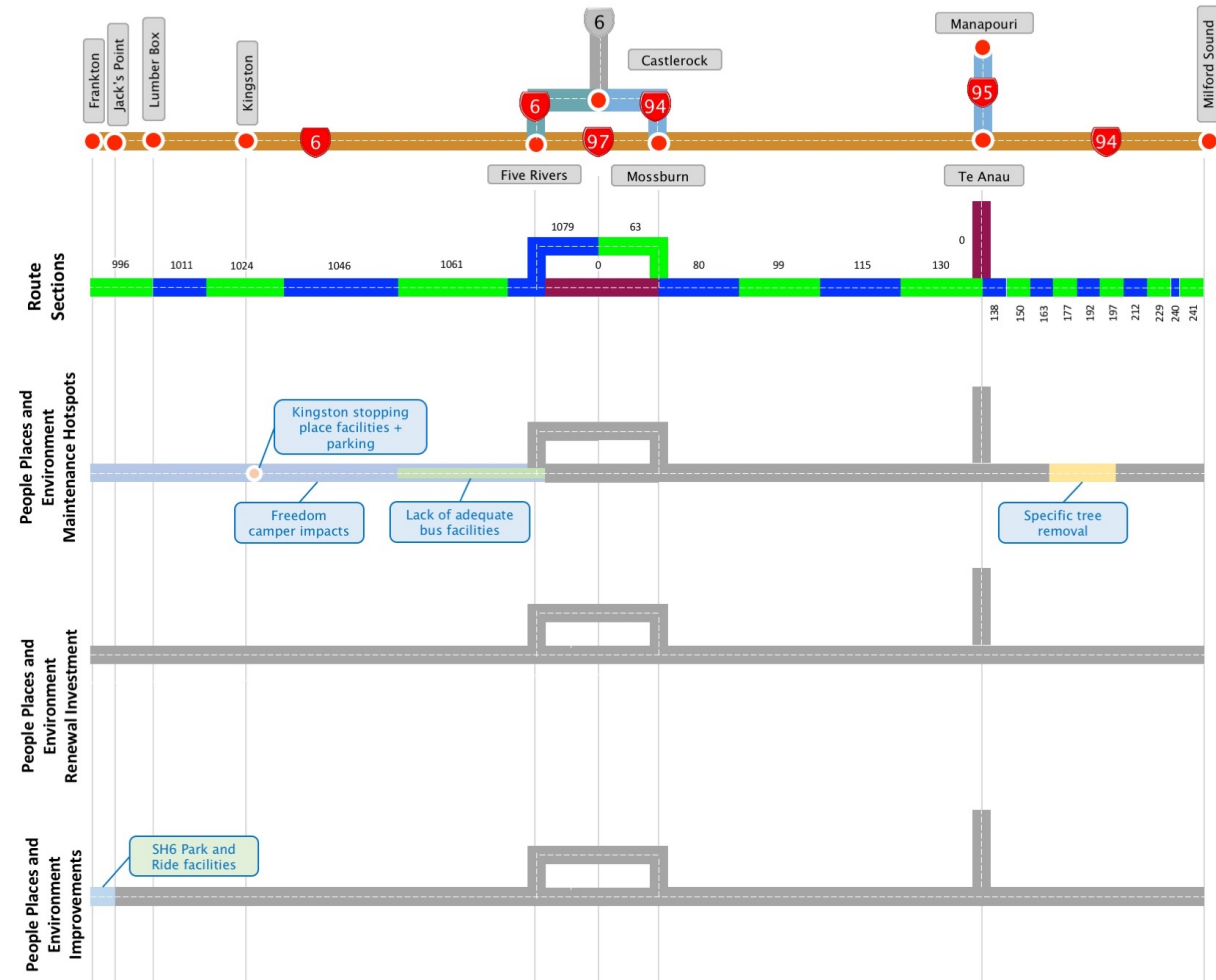
The main areas of investment into people, places and environment are: pavement rehabilitation to ensure a high proportion of travel on smooth roads, control of litter, provision of rest areas and stopping points, landscaped areas maintenance, and, environmental compliance.

Maintenance hot spots

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

- **Queenstown to Kingston:** Freedom Campers are creating extra rubbish requiring more frequent emptying of bins. In addition, the lack of toilet facilities means having to deal with human excrement.
- **Organised tourist facilities SH6/1061 and part of SH6/1079:** There are limited facilities for the volume of tourist buses wanting to stop at strategic points on the route. The size of facilities is inadequate compared to the volume of traffic now using this section of the corridor.
- **Kingston:** A large number of vehicles stopping with limited places to park means vehicles are parking on the highway shoulder, creating a safety issue. Kingston is rapidly becoming a satellite of Queenstown, increasing the commuter traffic in the area.
- **Tree removal:** Through the national park SH94/117 to SH94/197 there is a programme to remove nuisance trees.

Figure 25 – People, places and environment investment



Renewals

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



A Digger and dozer clearing snow near the Homer Tunnel

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 4- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH6 Park and Ride facilities		Park and ride facilities connecting to major PT routes adjacent to SH6 and located at Frankton, Arrow Junction and Jacks Point.

Investment pressures

Access and resilience

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

- **Limited construction season:** The construction season aligns with peak tourist season meaning there is a short window each day and throughout the year to complete works without impacting on traffic. The pavement temperatures do not allow for major pavement works during the winter season.
- **Increasing tourist demand throughout the year:** There is an expectation from customers, businesses and tour operators, of the route being available throughout the year with minimal planned and unplanned closures. When the route is closed, there is substantial pressure to re-open the road in the absence of an alternative route (on Milford Road) due to the economic significance of the corridor and the remoteness of the communities it serves.
- **Increasing freight movement on SH6:** Growth pressure presented by Jack's Point and its neighbouring Hanley Downs residential development will increase expectations of infrastructure performance.
- **Increased exposure to vulnerabilities:** Climatic conditions of SH94 towards Milford Sound with intensive snow and rainfall patterns, increase the risk and frequency of flooding, erosion and degradation of rocks, soils and slopes within and alongside the corridor. This results in damage to the road requiring regular maintenance.

Reliability and efficiency

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

- **Desire to improve overall journey experience:** Increasing visitor numbers and a lack of passing opportunities, combined with slow vehicles, rough terrain in places and closures can lead to increased driver frustration, risk taking, an unreliable travel time, and an overall poor journey experience.
- **Increasing traffic time delays at Milford Sound and Homer Tunnel:** Although this section is currently managed well, increased demand especially during peak periods adds pressure to the assets in Milford Sound and Homer tunnel which are at or exceeding capacity at peak times. The traffic operations centre at the Homer Tunnel is managing the delays and expectations currently, the pressure on the system will increase with traffic growth.

Safety

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

- **Increased maintenance burden:** The increase in safety related assets being installed as part of the Visiting Drivers Project will mean an increased asset maintenance burden.
- **Limited communication:** The Milford Road route is isolated from main centres and townships so emergency services can take some time to respond to incidents especially given the lack of cell phone coverage and limited ability to raise alarm of an incident.
- **Limited passing lanes:** The tidal nature of the traffic flow allows for passing opportunities along straight sections of SH6 and SH97. With the forecasted growth in tourism, extension of the shoulder season and increasing numbers of self-driving travellers, passing opportunities may become more difficult.

People, places and environment

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

- **Vegetation management:** Requirements are very stringent within the Fiordland National Park. This means all works within DoC conservation estate require approvals to ensure requirements of the Fiordland Park Management Plan are met, restricting measures that can be implemented. Any aggregate used inside the national park must be sourced from within the park.
- **Visual amenity** is a key focus within the National Park driven by DoC and the park management plan. For example, guardrails and any infrastructure are required to be painted specific colours in high amenity areas to maintain the vista and signs are required to be placed in specific locating to minimise visual effect.

Investment future considerations

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

- **Maintaining or developing assets with greater resilience:** Longer life, and lower maintenance requirements especially along SH94 given the lack of alternatives, challenging terrain, frequent incidents and closures and increasingly consistent demand on the corridor during peak periods should be consideration going forward.
- **Ongoing preventative maintenance:** Ensure that the existing road assets perform to their potential including adequate skid resistance of the pavement surface, adequate drainage, and a good standard of delineation. Especially after an avalanche event where the delineation is completely wiped out. Continued investment in preventive drainage maintenance to mitigate risk of continued deterioration and extend the life of pavements especially along low-lying sections of SH94 running parallel to Lake Te Anau and Eglinton River south of Milford Sound.
- **Winter maintenance:** Such as the use of de-icing agents, grit, and warning signage within the Fiordland National Park. A higher level of intervention maybe required on the corridor at sites that are subject to severe winter conditions and growing number of visitors for example, Falls Creek and the section east of Homer Tunnel. The safety and security benefits to customers offsets the potential increase in maintenance investment.
- **Seal width:** Consider widening the narrow sections of SH94, particularly the single lane section before Falls Creek and sections within the National Park to allow for the safe passage of vehicles. Additional seal width would also provide recovery room for vehicles.
- **Growth impacts:** Growth towards Frankton is going to continue and is likely to increase travel times for commercial operators located in Queenstown. A physical shift of the departure/arrival point to south of Frankton could be encouraged moving forward, providing greater flexibility for operators to manage planned and unplanned closures and delays.
- **Incidence response readiness:** Increased investment in the readiness of first responder personnel, location of equipment, and strategic stockpiling of materials to improve response times to events which close or cause significant delays on the corridor. This could include investigation into technological solutions that could assist in locating the road after a significant snow/avalanche event, in particular within the Alpine terrain of SH94.
- **Future access to Milford Sound:** Given the current tourism growth, environment and the raised expectations of the corridor to remain accessible, alternatives access to Milford Sound (options investigated in recent times but not progressed) may need to be re-examined in light of the fact that the route passes through Fiordland National Park, restricting activity. Other non-road alternatives (sea and air) could be investigated for viability.
- **Stopping places:** Consider combining stopping places (including look outs and rest areas especially on SH 94) with places of interest and heritage sites. Utilising these places to tell local or cultural stories and further enhance the attractiveness and amenity of journeys. This includes working with mana whenua to recognise traditional Maori names for places/landmarks. Littering and human waste is increasingly becoming a problem at stopping places as tourism continues to increase. This impacts the customer experience and integrity of the environment, as such management of these sites could require increased investment.
- **Co-investment mobile black spot:** Continue to work with Ministry of Business, Innovation and Employment (MBIE) and their Mobile Black Spot Fund to achieve mobile coverage along the entire corridor. The option of co-investment could be considered.
- **Tour cycling:** Although 'Around the Mountains' cycle trail currently has low usage, tour cycling is an emerging market and may experience growth in the coming years both from tourists and recreational users. Cycling and walking along much of the corridor however, cannot be safely provided for without significant investment, especially through the single lane and narrow sections.

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 compiled 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	



If you have any further queries, call our contact centre on 0800 699 000 or write to us:

NZ Transport Agency
Private Bag 6995
Wellington 6141

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