Nelson to Wanaka

CORRIDOR MANAGEMENT PLAN

6 67 67A

2018-2028

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

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Executive summary

The Nelson to Wanaka corridor comprises SH6 from its roundabout junction with Haven Road adjacent to the Port of Nelson through to its junction with SH84 east of Wanaka. It also includes SH67 which links SH6 to Mokihinui as well as SH67A via Westport to Cape Foulwind. The TranzAlpine railway also provides a rail connection between Greymouth and Christchurch for passengers and freight.

The corridor is approximately 833 km long (7.3% of the state highway network) and the longest corridor in the South Island. The total value of assets along the corridor is $988M (4.3% of the total national asset value).

The corridor forms an important north-south spine that provides access to West Coast communities located between Albert Town in the south and Nelson to the north. It links with several east west highways providing access across the ranges and supports resilience by allowing for a long-distance alternative to SH1 at the northern end of the corridor. It traverses several regions including Nelson, Tasman, West Coast, and Otago.

SH6 is a key tourist and freight route providing access to tourist sites and the Port of Nelson. The corridor itself is popular with tourists as it provides exceptional vistas and scenic routes along the West Coast.

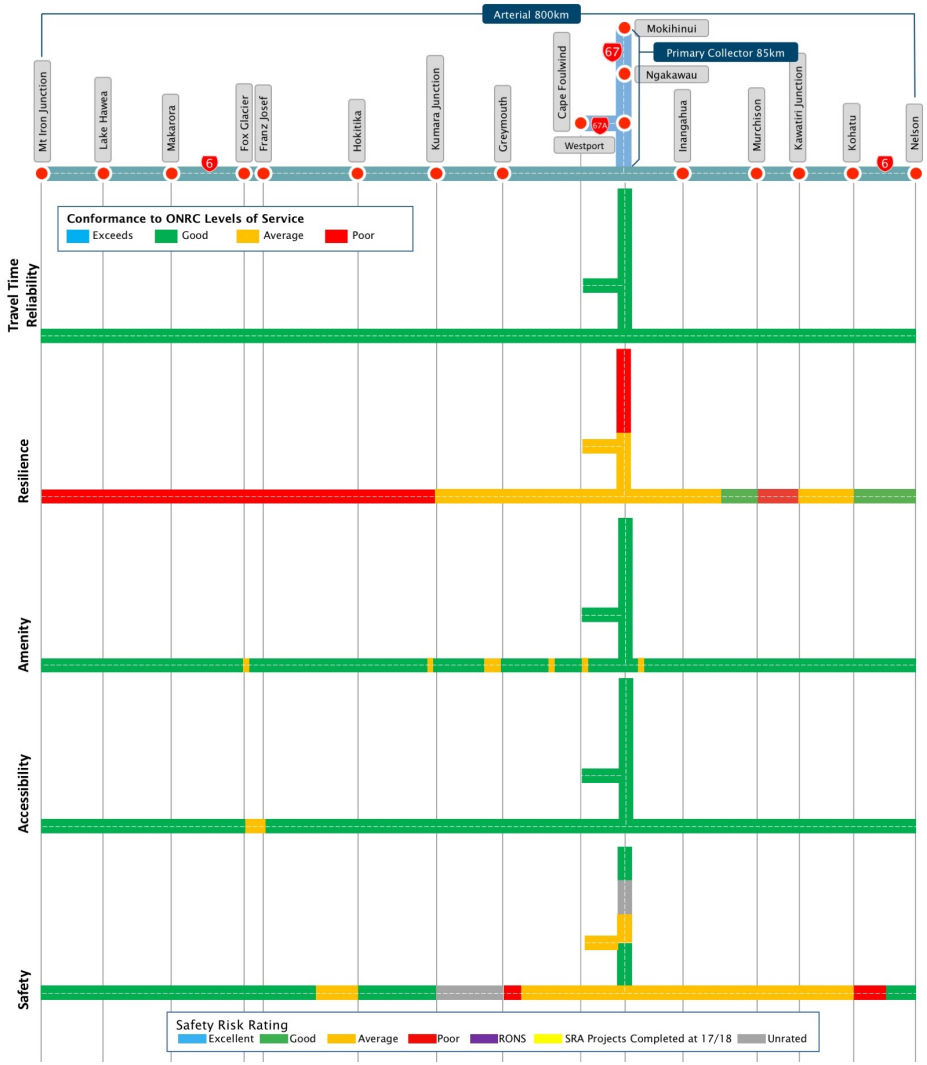
The Nelson to Wanaka corridor represents one of the most isolated sections of State Highway in the country. Safety, resilience, and corridor accessibility are the primary concerns for customers on this corridor. Periodic long-term closures caused by natural events or other incidents can result in large diversionary routes and consequent disruption to communities and industry.

Resilience is a key consideration for the Nelson to Wanaka corridor. Being located on the west coast of the South Island means that the area is vulnerable to natural events such as land slippage, rockfall and coastal erosion. It is also exposed to the elements, particularly strong winds, driving rain, snow and ice, especially on the higher ground.

The corridor is challenging for customers with undulating hills and twisting corners. This increases the risk of accidents arising from roadside hazards and vehicles leaving the carriageway. As a key tourist route a number of locations experience high numbers of walkers and cyclists particularly close to the major tourist centres.

Many tourists arriving into Queenstown or Nelson use the corridor for leisure purposes. They are likely to be less familiar with the challenging terrain of New Zealand especially if arriving from overseas which makes them more vulnerable to safety related problems. These customers require improved information about journey times, driver behaviour and appropriate stopping places. The corridor also serves as a key connector for the cycling and trail routes along the West Coast with pick up/drop off activity becoming increasingly popular.

Figure 1 - Performance of the corridor against ONRC outcomes



Future scenarios for the corridor will be an increased focus on resilience and tackling the constraints that limit connectivity for communities.

The need to ensure resilience and continued operation is important for the region. For each day which the State Highway is closed, $1 million is lost from the local economy and this is only likely to increase as the region's tourism industry continues to expand.

Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Nelson to Wanaka 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 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.

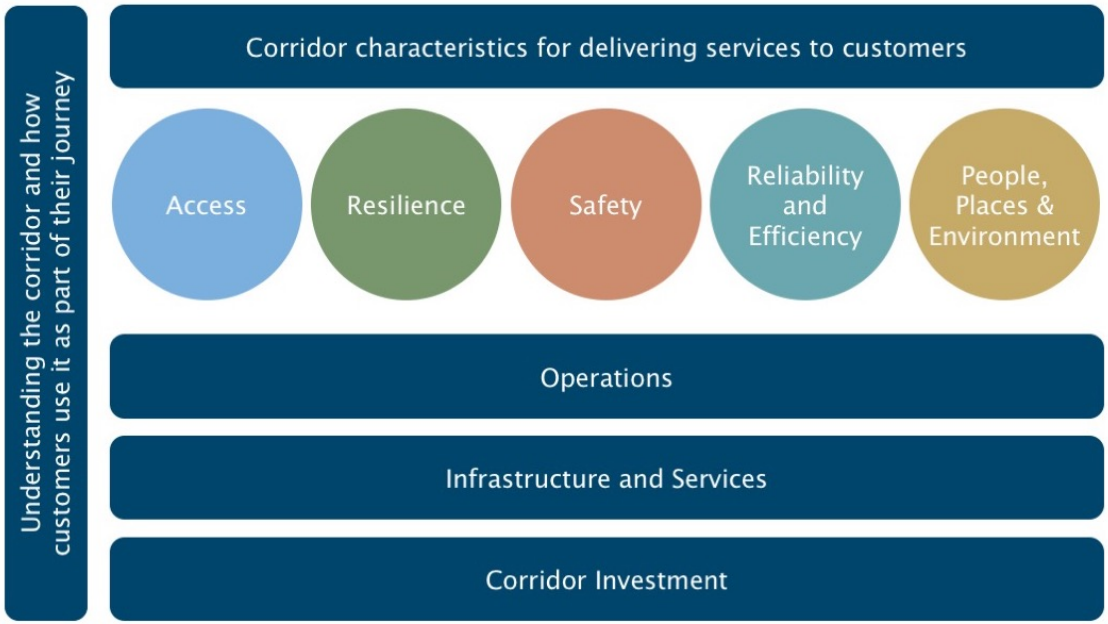
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on 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 Nelson to Wanaka corridor comprises SH6 from its roundabout junction with Haven Road adjacent to the Port of Nelson through to its junction with SH84 east of Wanaka. It also includes SH67 which links SH6 to Mokihinui as well as SH67A via Westport to Cape Foulwind. The SH6 component is approximately 740km in length with SH67/SH67A adding a further 65km resulting in a combined corridor length of over 800km.

The corridor forms an important north-south spine that provides access to West Coast communities located between Albert Town in the south and Nelson to the north. It links with several east west highways providing access across the ranges and supports resilience by allowing for long distance alternative to SH1 at the northern end of the corridor. It traverses several regions including Nelson, Tasman, West Coast, and Otago.

When the corridor is unavailable many of the businesses and settlements become totally isolated with unfeasibly long diversions. This results in most customers choosing not to travel at all, dramatically impacting on access to key services and the delivery of time sensitive goods.

SH6 is also a key tourist and freight route providing access to tourist sites and the Port of Nelson. The corridor itself is popular with tourists as it provides exceptional vistas and scenic routes along the West Coast.

The regional economy

The West Coast region has a population of just over 32,000 residents with a further 46,400 (Census, 2013) living in Nelson (in combination this equates to less than 3% of New Zealand's population).

The three largest contributors to the West Coast economy are minerals, diary/forestry and construction which combined accounted for 56% of the regions $1.87 billion GDP total in 2015 (MBIE, 2015). The corridor plays a key role in supporting these sectors by providing connections to markets and/or distribution points for goods and by linking the local work force to employment sites.

The West Coast regions are increasingly becoming a tourist destination with the corridor itself playing a part; for example, SH6 is regularly identified as one of the world's best driving roads. Coastal communities have diversified to support tourism and provide a variety of recreational activities and accommodation that bolster the local economy. This sector accounted for more than 5% of the region's economy in 2015 and 11.9% of the regions filled jobs.

The GDP of the Nelson/Tasman region amounted to $3.8 billion in 2015 (MBIE). Manufacturing continues to play a key role in the economy accounting for around 13% of the total. Increasingly however tertiary sector industries such as property operations and professional and management roles are playing a greater role with each accounting for 8.3% and 8% of the total respectively in 2013.

Figure 3 – Corridor overview

Understanding our customers

Key customers

The key customers utilising the corridor primarily use private or rental vehicles. However, each of these customers has different needs, expectations, and personal circumstances for using the transport system.

Daily commuter

Most commuting is local, in and between the settlements located along the corridor, and is almost exclusively undertaken by private motor car. Nelson is the exception, where a there is a good bus service in operation, with patronage predicted to increase 23% by 2018.

Insights into daily commuter users:

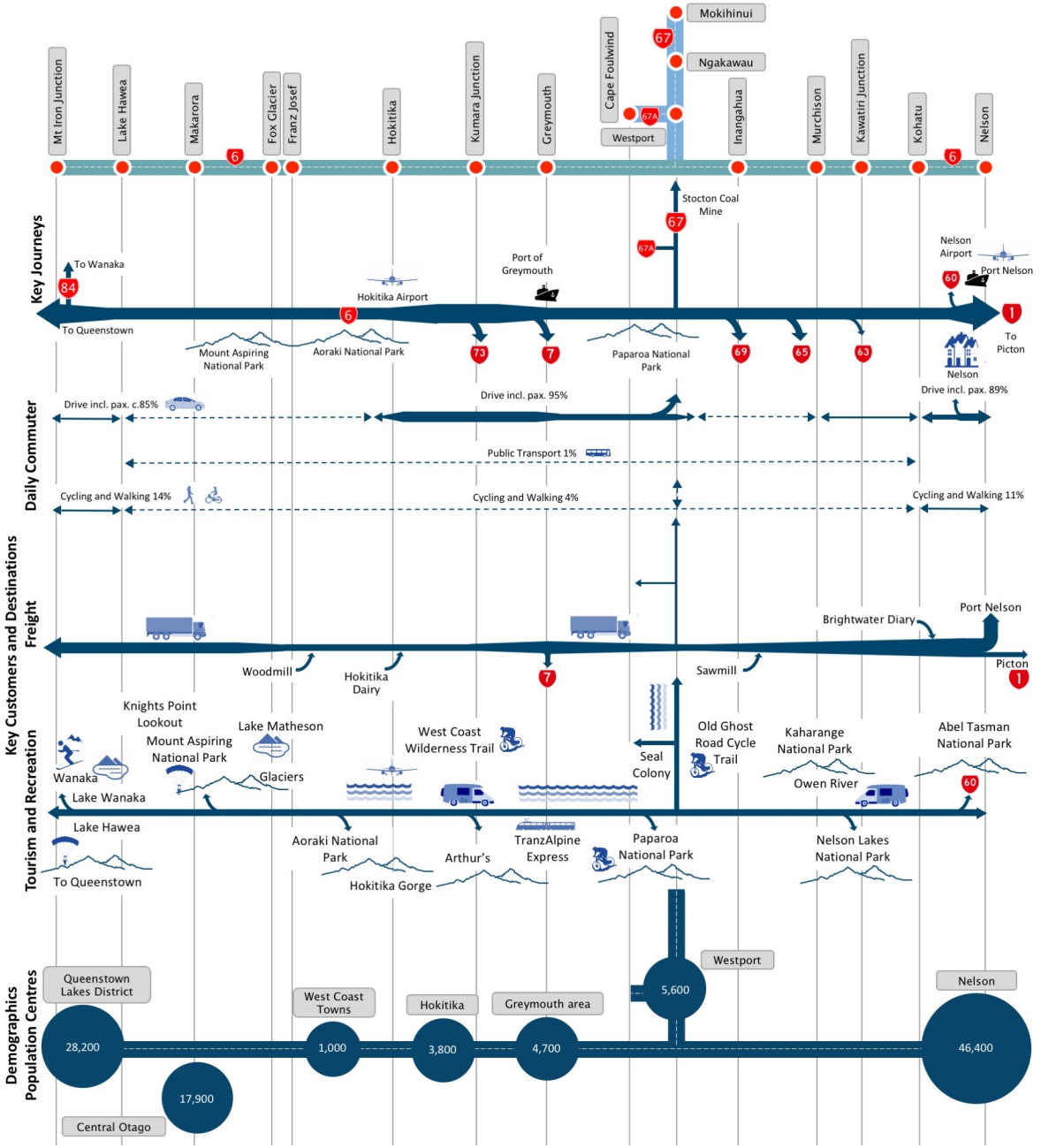
Road use: Daily commuters are looking to maintain good journey time reliability particularly within the few large centres on the corridor such as Nelson and Greymouth. Increasingly cycling is being promoted as a viable alternative, particularly in Nelson. This has been successful, with Census 2013 data showing that around 9% now cycle to work.

Road knowledge: Commuters on the road network have good local knowledge due in part to the limited alternatives available. Should incidents occur, diversions can be significant and tricky to navigate, which then act as a barrier to commuting activity.

Pain points: Pain points exist at key intersections within Nelson such as Rocks Road, Tahunanui Lights, Haven Road, and from Richmond into the city from the Three Brothers roundabout access points. As part of the diversion route for north-south travel in the event of SH1 being unavailable, sections of SH6 between SH63 at Kawatiri Junction and SH65 can become increasingly busy. This was demonstrated by the long-term closure of SH1 at Kaikoura following an earthquake in November 2016 where over double the normal traffic volumes used this route. Diverted traffic then has an effect on commuter traffic along the corridor particularly those travelling to and from Nelson.

Daily commuters expect: Good journey time reliability, and availability of real time information both before making a journey and whilst travelling.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

SH6 represents the main tourist route along the western coast of the South Island that provides access to key tourist centres such as Franz Josef and the National Parks. In 2016 more than 1.3 million guest nights were recorded in the west coast region and a further 2.2 million in the Nelson/Tasman region (note this figure also includes the Marlborough region) (Statistics NZ, 2016). The corridor itself is a tourist destination providing spectacular vistas across the southern plains and rugged coastlines of the west coast. Several camp sites are located close to the corridor and have direct access from the State Highway. Recreational pursuits including tramping, cycling, hunting and fishing are common along the corridor.

Insights into tourist and recreational users are as follows:

Road use: The corridor is used as both a route between places and a link to natural features including National Parks and coastlines. Whilst private cars and campervans dominate, tourist buses also regularly use the corridor. The peak time for users is traditionally during the summer months (MBIE, 2015).

Road knowledge: Due to the nature of the terrain and its transition between mountains and the coastline, the corridor is often undulating with sharp turns and steep gradients in places. Sight lines are an issue, especially through wooded areas and adjacent to cliff faces, making a challenging drive for those not used to the conditions. Drivers new to the area are often not prepared for the real journey times encountered, being much longer than anticipated due to the slower speeds required to navigate the corridor safely. The lack of traffic on some sections of the corridor can result in confusion for overseas drivers with no visual prompts for which side of the carriageway to travel.

Pain points: Many sections along the corridor present challenging road conditions especially on ascents and descents from mountain ranges. Localised congestion particularly during peak summer periods can exist around key tourist centres such as Franz Josef where car parking can be limited and causes a build-up of traffic. Slips and flooding cause short term maintenance concerns. Several one-way bridges are sited along the corridor and may cause driver uncertainty if unfamiliar.

"Journey has taken longer than anticipated"

Tourist and recreational users expect: For some tourist and recreational users the charm of the corridor is its undulation making for rugged vistas and challenging driving conditions. For overseas visitors and tourists in general, there is a need to balance access to these natural vistas with safe driving conditions.

Freight operators

Freight movements are focused on primary industries particularly dairy and forestry. These are critical to the overall performance of the region's economy, and provide vital employment opportunities along the corridor. Port Nelson provides both national and international shipping lines for local producers and is dependent on road access as there are no rail connections. Across the corridor, the majority of goods are carried by road, with the exception of the dairy and coal industries that utilise the rail connections to Christchurch and beyond.

"Road becomes an alternative to rail when needed"

Insights into freight operators are as follows:

Road use: The corridor is used to provide freight access to sites across the South Island. Connections with other State Highways are important to provide connectivity to east coast sites and Christchurch, the South Island's main city and hub. Due to the nature of the products transported, vehicles are often large and articulated which causes issues for vehicles when navigating the corridor. SH6 is also the first/last section for freight to and from Port Nelson.

Road knowledge: Freight operators have limited choices when traversing the corridor and as such knowledge of available routes is high. They also tend to have a good overview of planned closures and possible diversion routes.

Pain points: Much of the corridor is inaccessible for oversized and overweight vehicles due primarily to the high number of single lane bridges. Some of these structures are unable to accommodate either HPMV or 50MAX vehicle types.

The corridor is susceptible to frequent and long closures that are exacerbated by its isolated location which can make it hard for emergency and utility services to reach incidents in good time. Alternative routes are prohibitively long for time sensitive goods and many are not suitable for large heavy vehicles. Dairy products are particularly susceptible to delays and are reliant on predictable journey times for transportation to processing or market.

Freight operators expect: The corridor to be available with reliable travel times. Information on incidents should be delivered as soon as is practicably possible. Precise and updated information on suitable routes for HPMV and 50MAX vehicles should also be provided.

How we deliver services along the corridor

Transport partners

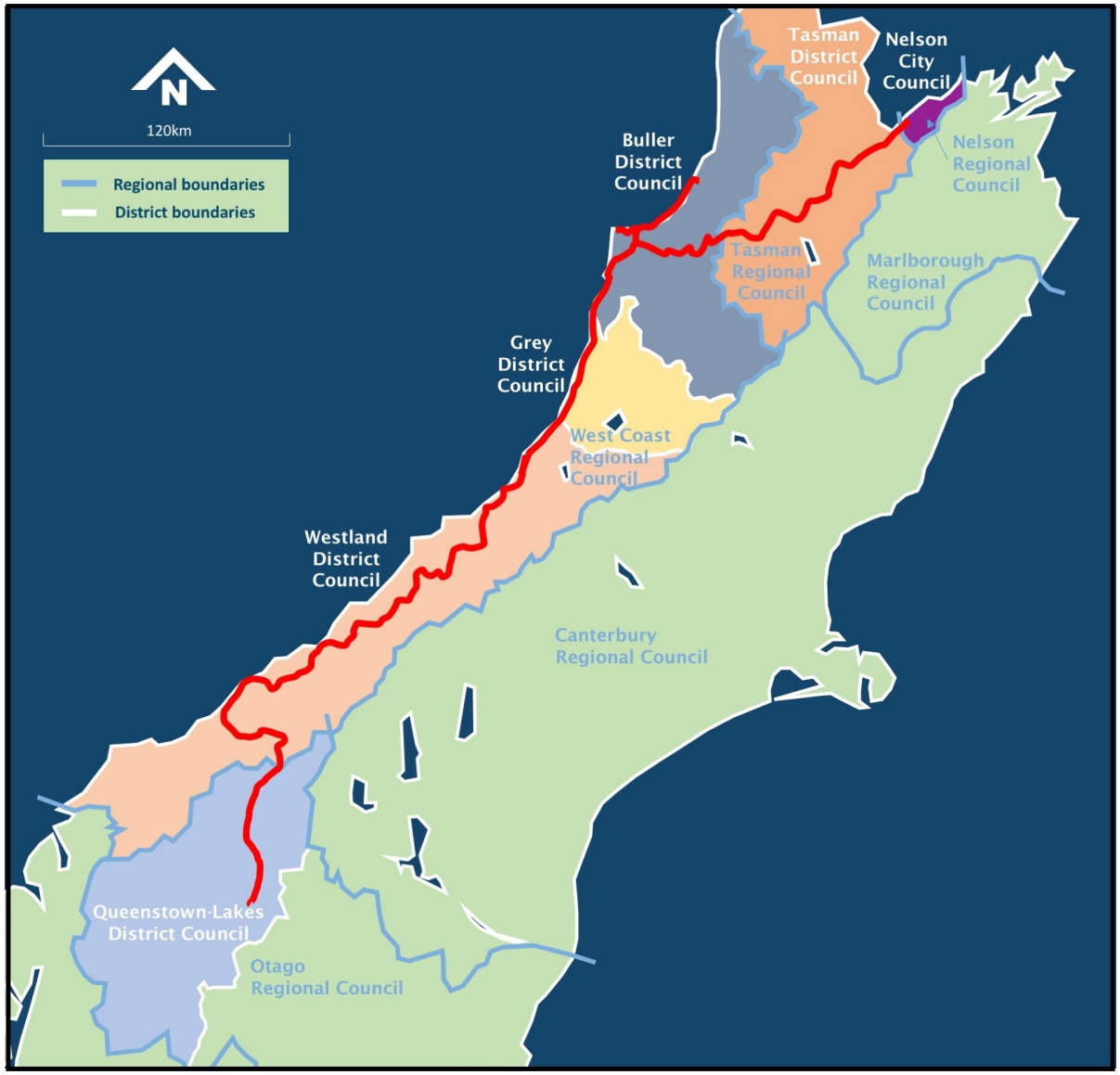
The New Zealand land transport system comprises more than State Highways. To provide customers with a reliable and safe vehicle journey requires the use and co-ordination of many interlinking networks. As such, the Agency works and partners with other transport and road controlling authorities to provide a consistent nationwide one network approach.

On this Nelson to Wanaka corridor, we work closely with the Territorial Local Authorities (TLA's) and Regional Councils shown in Figure 5.

Collaboration along the corridor

The Transport Agency discusses issues with stakeholders including freight groups, AA, NZ Police, Iwi, Kiwi Rail, and bus companies, for greater insight into problems faced on the corridor, to better inform proposed solutions.

Figure 5 - Map of associated local authorities



Network Outcomes Contracts approach

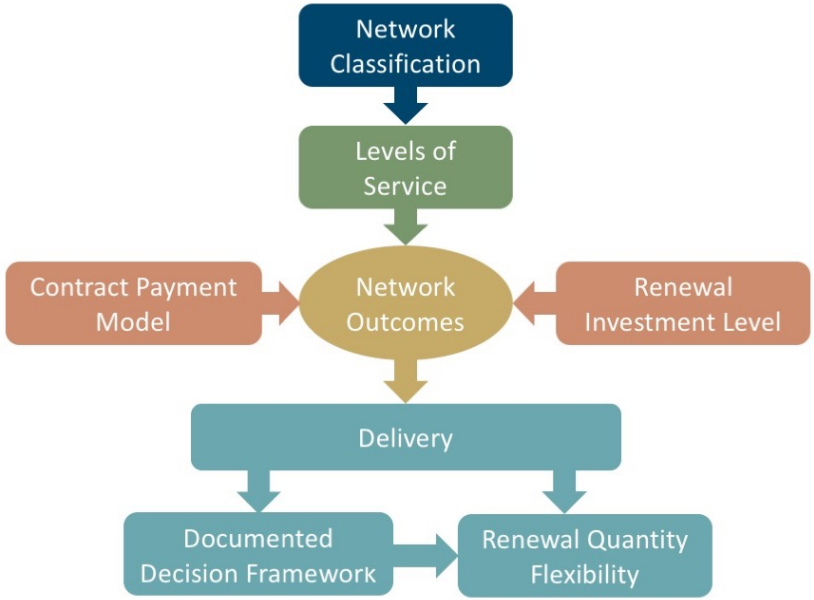
Network Outcome Contracts (NOC) are aimed at improving the effectiveness of service delivery for maintenance and operations of the state highway network. Elements of previous procurement methodologies (PSMC, Hybrid and Traditional models) have been integrated into the NOC contract model which delivers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

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

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

The contract process for the NOC is shown below:

Figure 6 - NOC process



Collaborative delivery of services

The Nelson to Wanaka corridor crosses three NOC contracts areas. Namely the Nelson Tasman, West Coast, and Central Otago NOCs, and are discussed in turn below.

Nelson Tasman Network Outcomes Contract

The Nelson Tasman NOC contract is undertaken by Tasman Journeys, a consortium comprising Fulton Hogan, Opus, Donaldson Civil, Ching Construction, Nelson Civil Contracting, and Delta. The contract commenced on the 1st April 2016, and was awarded for five years with an opportunity for a further 2 years based on performance.

This contract is supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites (194PT)** – HTS was awarded the contract which began on 1st April 2016 on a 3+1+1 year term.
- **Structures Consultant Contract (719N)** – Opus International Consultants was awarded the contract which began on 1st July 2015 as a 3+1+1 year term.

West Coast Network Outcomes Contract

The West Coast NOC contract is undertaken by Fulton Hogan. The contract commenced on the 1st September 2015, and was awarded for seven years.

This contract is supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites (NZTA 63020)** – Agfirst was awarded the contract on 1st January 2012 as a 3+1+1 tear term, with both extensions granted and is currently on another contract extension.
- **Bridge Management Contract (NZTA 63115)** – OPUS was awarded the contract which began on 1st July 2014 on a 3+1+1 year term.

Central Otago Network Outcomes Contract

The Central Otago NOC contract is undertaken by Aspiring Highways (Fulton Hogan). The contract commenced on the 1st October 2016, and was awarded for seven years with an opportunity for a further 2 years based on performance.

This contract is supported by the following specialist maintenance contracts:

- **Traffic Monitoring Sites (PS O/210)** - Ag First was awarded this contract which began on 1st July 2014 as a 3+1+1 term to run until 30 June 2019.
- **Structures Consultant Contracts (PS O/207)** – Opus was awarded this contract which began on 1st July 2014 as a 3+1+1 term to run until 30 June 2019.

Drivers for change

The Nelson to Wanaka corridor caters for a variety of customers. The drivers for change associated with the corridor are primarily catering to increasing tourism growth, and resilience to support communities and local industry with strong links to ports and service centres in Nelson and Christchurch.

Regional growth and development

West Coast

The Tai Poutini West Coast Growth Study published in September 2016 identifies some of the key economic opportunities for the West Coast region. It focuses on five key messages of which transport and infrastructure is one.

Increased road resilience through the upgrade of visitor routes is identified as key to economic growth within the region. The study suggests this should be supported by the development of major schemes to enhance the provision of more suitable diversionary routes.

Nelson Tasman Region

The regional prosperity strategy released in 2014 by the Nelson Regional Economic Development Agency outlines targets which the region will aim to meet by 2020. These targets are to be supported by investment in various sectors, including transport.

Transport is also identified as a key component of supporting growth within the region, with one of the main roading issues identified as the Nelson Arterial Route which includes upgrading some of the key roads within the city.

Nelson urban area

Nelson is the largest urban settlement within the corridor and plays an important role across the wider Nelson, Tasman, and Marlborough regions as an economic hub. It is also home to the area's largest port and airport.

Nelson City Council has identified a Long-term Plan for the city from 2015 to 2025. This identifies several outcomes for transport across the region. These focused on urban and rural environments, efficient infrastructure, and providing access to a range of social, educational, and recreational facilities across the region.

Tourism

This corridor is becoming increasingly popular with tourists travelling from Picton to Queenstown via Nelson and Glaciers, or anywhere in between. Many self-drive tourists arrive into Picton via the Interislander ferry where they either follow SH6 via Nelson and the Abel Tasman National Park or follow SH63 reconnecting with the corridor at Kawatiri Junction.

Most tourists are concentrated on the southern part of the corridor where the main attractions such as Fox Glacier and Franz Josef are located.

Increasing expectations of tourists such as signage, stopping places and facilities will need to be considered as part of corridor development.

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 (LoS) for customers. With the knowledge of current LoS experienced by customers, we can better target investment to meet future intended service levels.

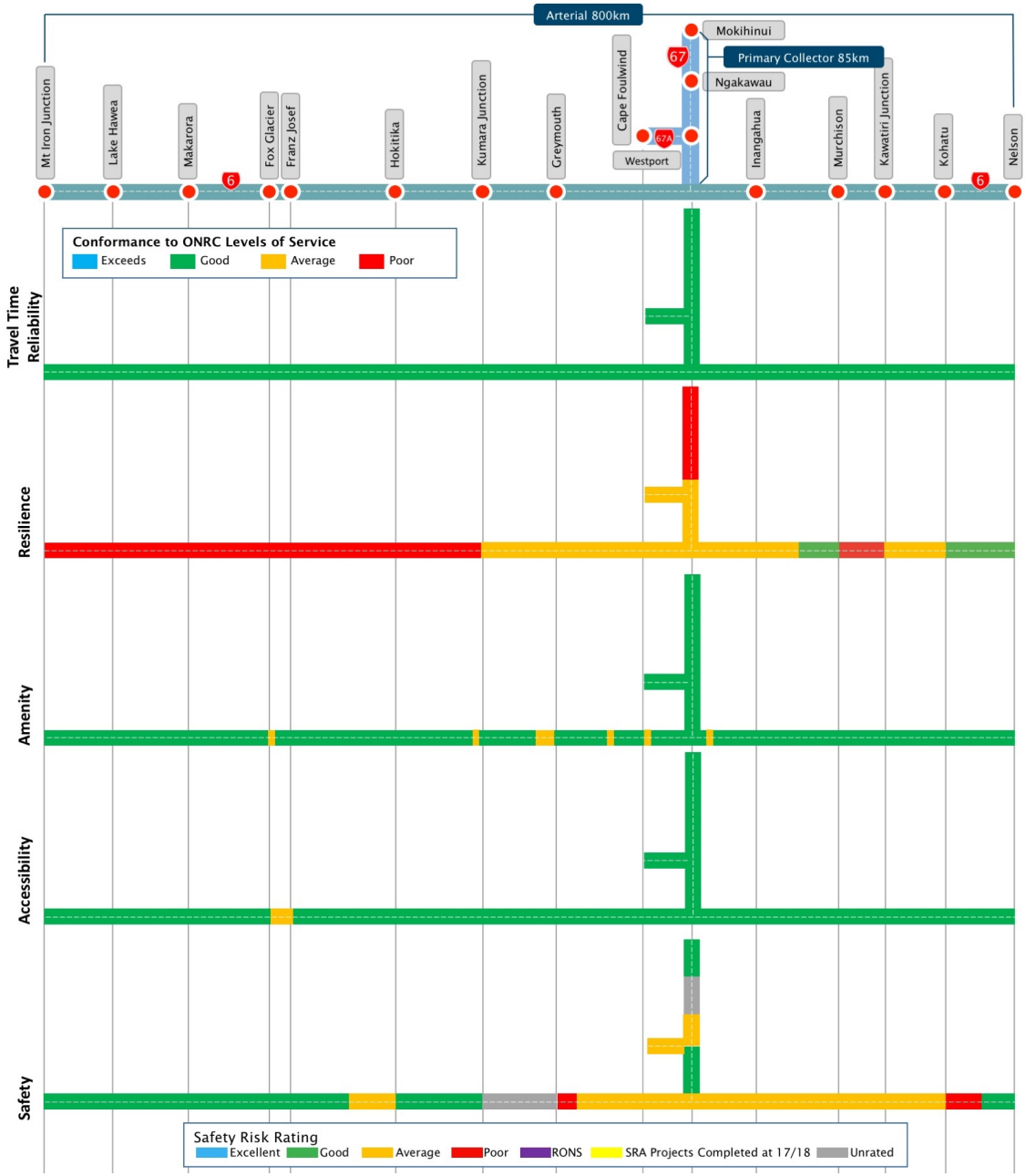
Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road classification

SH6 from Nelson to Albert Town is classified as an arterial route. SH67 and SH67A towards Mokihinui and Cape Foulwind respectively are classified as a Primary Collector.

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 Nelson to Wanaka 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

Travel time is good across the whole corridor and is appropriate for routes classified as arterial and primary distributor. Whilst there are some congestion issues in and around Nelson and the port, they are relatively minor and considered to be acceptable for a route classified as arterial.

Resilience

Resilience across the corridor is average or poor for its classification due to the lack of alternative routes available and the risks to the network from future structural failures in the event of earthquakes and land slip. There are also issues related to coastal erosion across the corridor adjacent to the western coastline. This is particularly prevalent south of Hokitika and on SH67 approaching Mokihinui.

Amenity

Amenity is considered good across the corridor, with a generally smooth road surface available for customers. Some areas of roughness exist around Thomas Bluff, located between Fox Glacier and Makarora, and Bruce Bay, located approximately 50km south of Fox Glacier, and with slumping a regular occurrence throughout the corridor.

Accessibility

Accessibility is considered good on most the corridor. Some issues relating to access of walking trails exist particularly on SH6 south of Bruce Bay and on approaches to SH67 and SH67A.

Safety

The safety rating across the corridor is variable. Areas with a lower safety rating are mainly related to the lack of passing opportunities available and narrow road widths. There is an increased safety risk from roadside hazards along the corridor. Sharp bends and undulating terrain contribute to an unforgiving road environment.

There is increasing conflict between active modes and vehicular traffic on the tourist trail routes which navigate the State Highways such as the Tasman's Great Taste Trail and the West Coast Wilderness Trail.

Since 2000, most crashes that occurred on the corridor resulted from vehicles leaving the carriageway such as at cliff banks, ditches or colliding with trees (NZTA, 2016). A high number of overseas drivers also use the corridor and the West Coast and Otago regions are included as part of the Visiting Drivers Project.

All the local authorities through which the corridor traverses are in the Top 20 in New Zealand by proportion of crashes involving overseas drivers with Westland the highest in the country at 37% (Department for Transport, 2016).

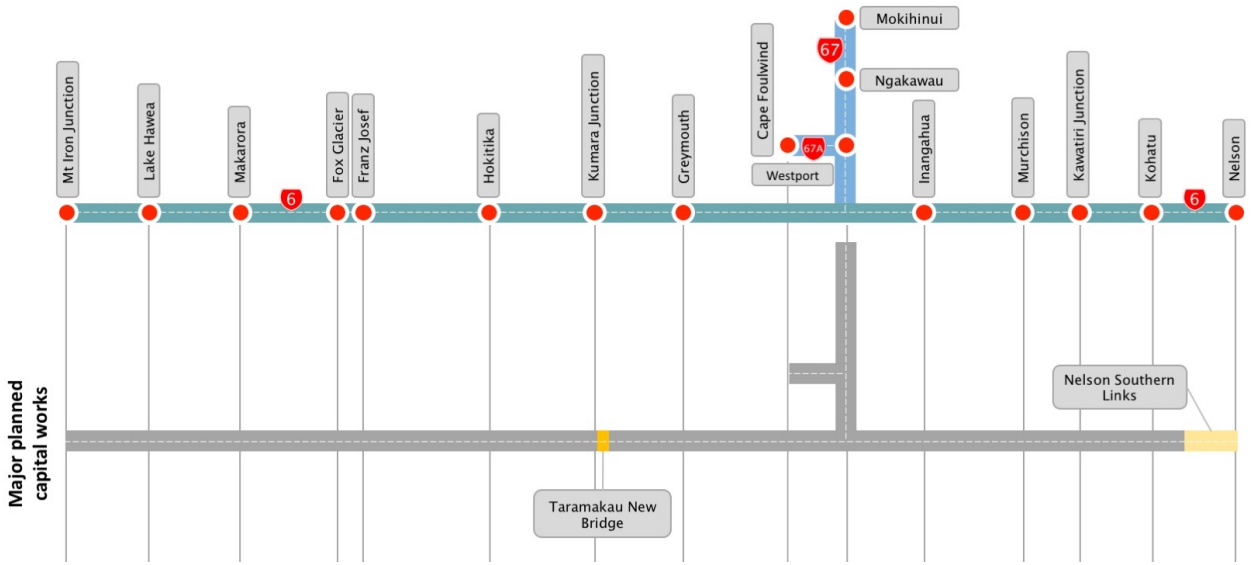
Improving the customer experience

In responding to Customer Levels of Service it is important to acknowledge that significant improvements to the corridor are planned or underway as part of wider resilience and transport programmes. Slow vehicle bays will also be provided at key terrains across the corridor.

When completed, the planned improvements on the corridor will result in an improved customer experience through a reduction in the number of one lane bridges, increased resilience in the network ensuring that the road remains open for longer, and the provision of slow vehicle bays to help all traffic flow better across the corridor.

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

Figure 8 – Significant corridor planned improvements



New Taramakau Bridge sod turning

Access

Carriageway configuration

In general, the carriageway is configured with two lanes opposing and minimal passing lanes. There are over 30 one lane bridges along the length of the corridor. As the corridor approaches Nelson, a small section of dual carriageway exists as part of the Stoke bypass to the south of the city.

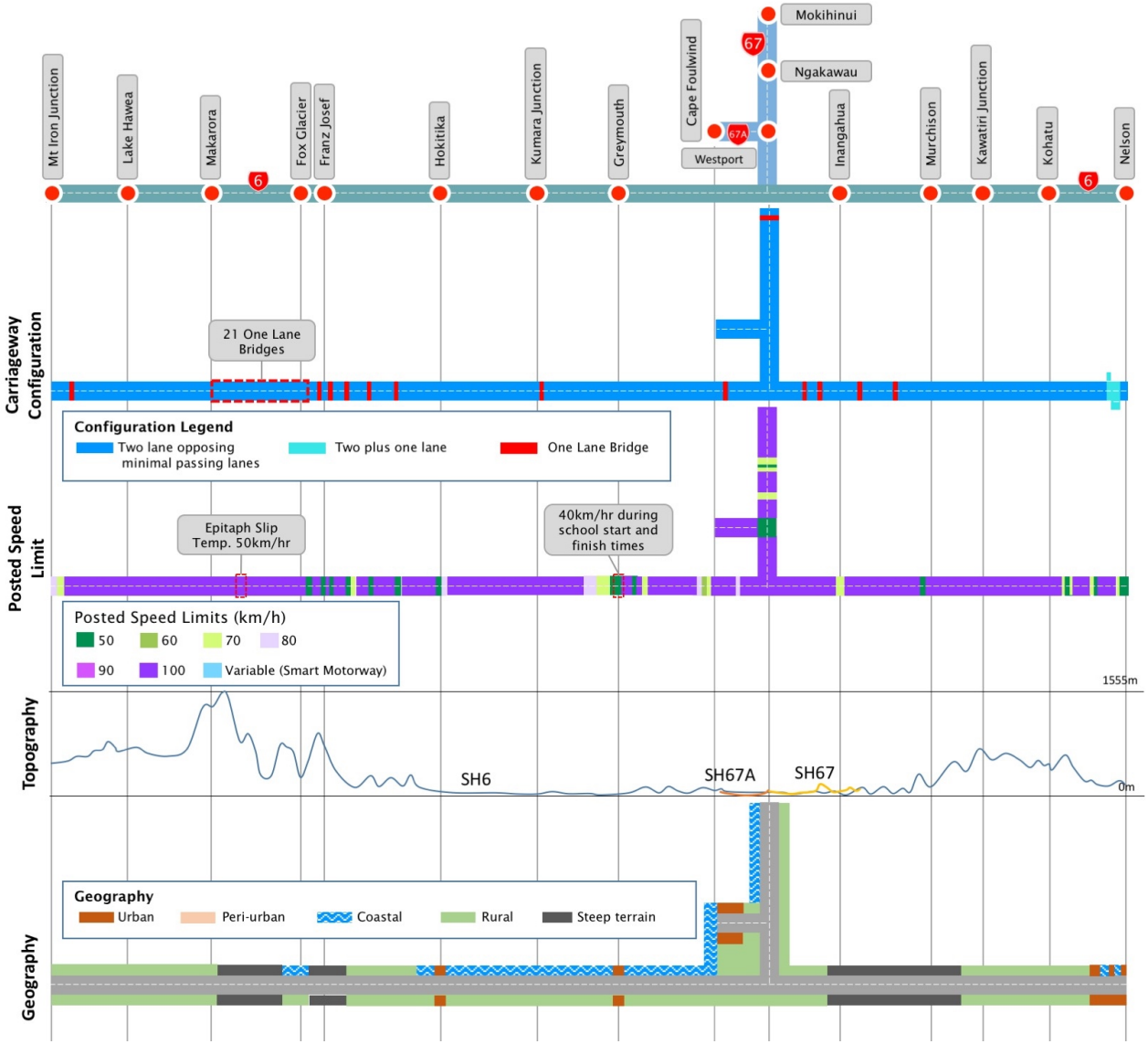
Speed limits

Most the corridor has a speed limit of 100km/h which reflects the rural nature of the corridor. This is reduced to 70 or 80- km/h around specific sites due to safety concerns. Where the corridor travels through urban centres, the speed is limited to 50km/h.

Topography/geography

The corridor is undulating as it crosses the southern plains. Its geography is a mixture of high mountains and coastal routes. At the south end of SH6 on approaches to Albert Town the terrain is flatter as it crosses between Lake Hawea and Lake Wanaka. The corridor traverses the Southern Alps and key peaks include Haast Pass and Fox Hill in the south and through the Kahurangi National Park in the north.

Figure 9 - Corridor characteristics

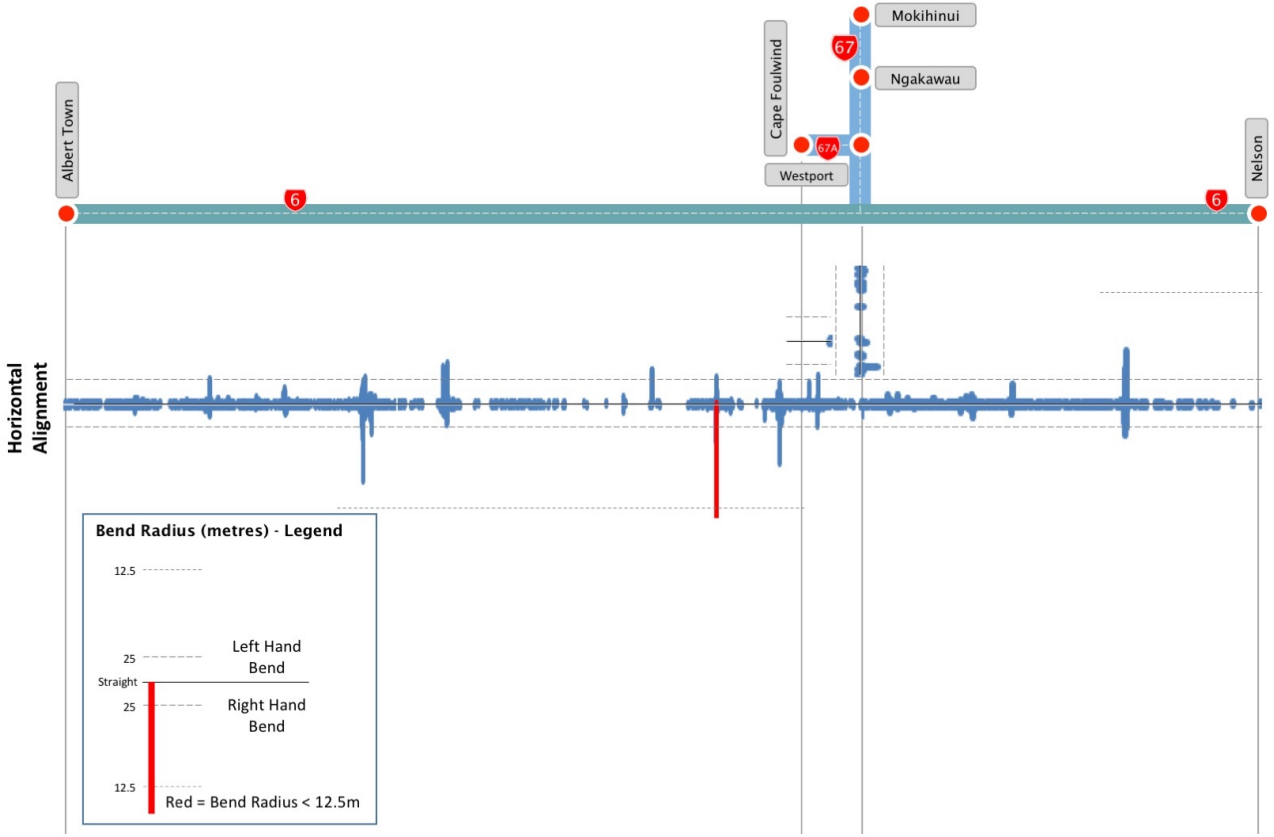


Horizontal alignment

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. Sharper bends with a radius below 25m occur at Atapo, Punakaiki, Kumara Junction, Te Taho, Fox Glacier, and Haast Pass. The severe bend with a radius below 12.5m occurs at Ten Mile Creek.

Figure 10 - Horizontal alignment



Volumes

Traffic volumes are fairly consistent in the rural parts of the corridor. Heavy vehicle volumes increase on the approaches to Nelson and its port as well as on approaches to SH7 which provides linkages with SH1 and Christchurch from Greymouth. Larger traffic volumes are seen between Hokitika and Greymouth, as the major urban centres on this part of the corridor. Whilst flows are consistent over the corridor, summer peaks can occur particularly towards the southern end of the corridor as tourists arrive in the region via Queenstown.

The 14 November 2016 Kaikoura earthquake led to the diversion of traffic onto SH6 that would originally have used SH1 to access the top of the South Island. Figure 11 shows the consequent increase in traffic flows on the northern part of SH6 where there was more than a doubling of flow in the section north of Murchison. The recorded decrease in heavy vehicles between Kumara Junction and Nelson is due to these vehicles travelling via SH63, a more direct route to Blenheim and Picton.

HPMV routes

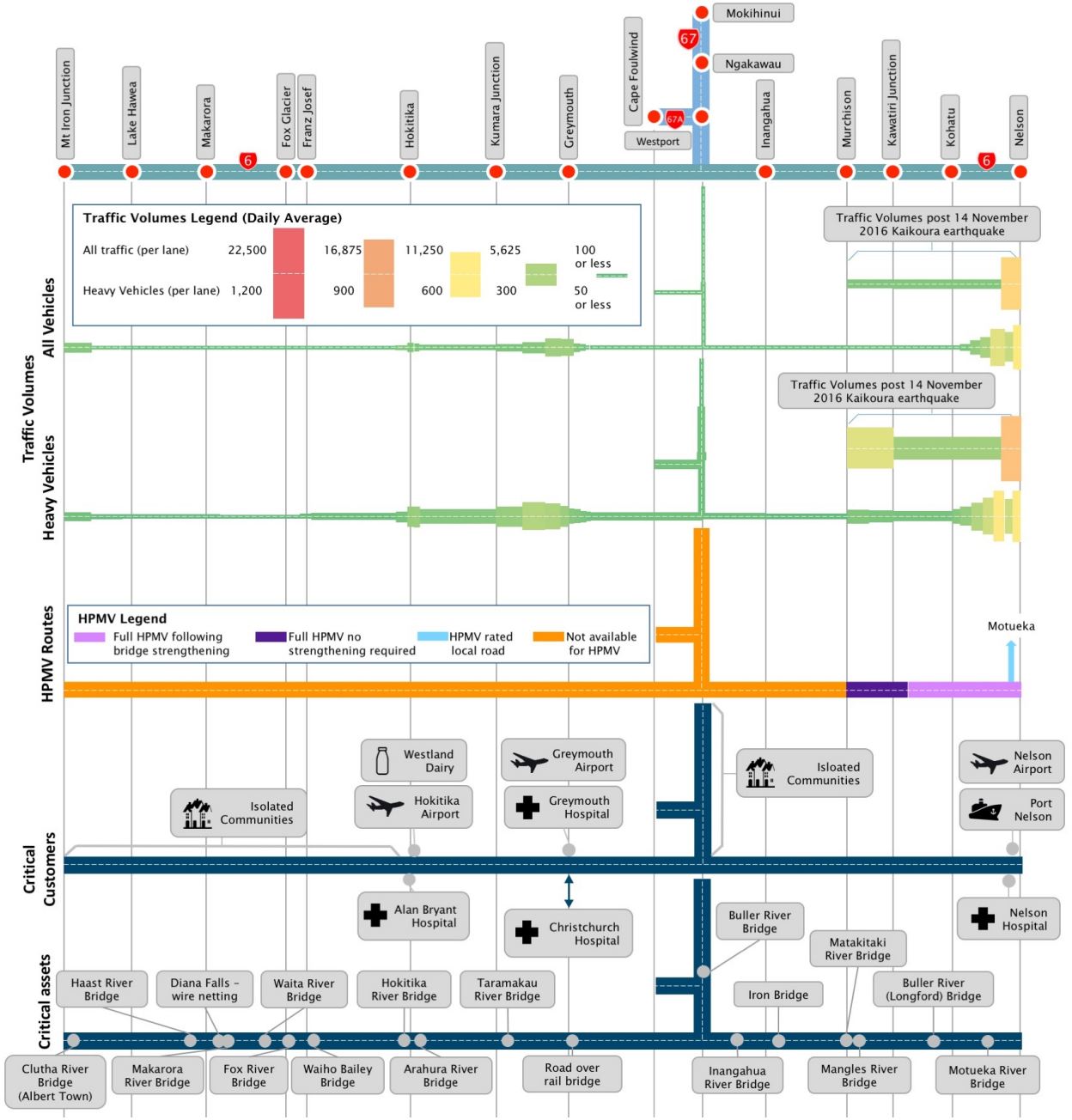
The majority of the corridor is not available for HPMVs, however a small section of the corridor north of Murchison on the approach to Port Nelson has been strengthened to HPMV standards.

Critical customers and assets

There are a number of critical customers adjacent or close to the corridor which rely on the corridor to be open 24/7 and are vulnerable to having short term interruptions. These include otherwise isolated communities for which the corridor is crucial such as Westport, the West Coast settlements, and Mokihinui, as well as time critical sites such as Greymouth Hospital and Port Nelson. Providing continued linkages with Christchurch is also important as the city is home to many of the key employment and social functions that communities on the west coast link into.

Critical road assets along the corridor requiring enhanced maintenance include a number of the bridges, several coastal protection structures, road and rail crossings, and the wire netting installed to prevent rock falls.

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 the following:

- **Provision of access to key communities and services:** Due to the lack of alternative access and long diversionary routes, there is a need to keep the corridor open. The corridor is particularly vulnerable to natural events such as slippages and coastal erosion which can lead to long closures. It is also susceptible to inclement weather, especially during winter on the higher ground where snow, ice, and strong winds are regularly experienced.
- **Use as a diversionary route:** Sections of the corridor are used as a diversionary route in the event of the closure of other state highways on the South Island. The corridor is used as required, dependent on the circumstances of the event, for example, the 2016 Kaikoura earthquake led to customers being required to divert to the west coast and onto the northern sections of the corridor. Whilst the increase in traffic volumes can generally be accommodated for short periods, the corridor was not designed for significantly higher flows over sustained periods of time.
- **Limited access for HPMV and over dimension vehicles:** There are a number of physical constraints which limit the ability of HPMV and over dimension vehicles to serve the primary industries or fully traverse along the corridor, particularly single lane bridges.
- **Localised congestion within Nelson and Richmond:** At key intersections (such as Rocks Road, Tahunanui, and Haven Road) localised congestion causes delays for all users including heavy vehicles accessing the Port.
- **Safe stopping places in rural areas:** The corridor is regarded as one of the world's greatest coastal driving routes. However, visitors attracted by the spectacular vistas along the corridor often stop in inappropriate places due to the lack or limited provision of stopping bays.

Future considerations

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

- **Ensuring resilience of the corridor:** The corridor has proven vital as a diversion route following the 2016 Kaikoura earthquake. A combination of infrastructure improvements, enhanced maintenance and additional ITS features will help ensure it can continue to provide this crucial function as well as providing the vital lifeline to the communities and businesses on the west coast.
- **Increased provision of stopping bays on key vista points on the corridor:** The provision of stopping bays in safe and convenient locations will help mitigate unsafe stopping by visitors.
- **Intersection improvements in Nelson urban area:** Options to improve key intersections within Nelson should be considered. These include the junctions of SH6 with Haven Road, Parkers Road, and Whakatu Drive. This would look to ease congestion and improve conditions for pedestrians and cyclists at the pressure points.
- **Visiting drivers programme:** Continue to provide information to visitors who have not driven in New Zealand before. Informing visiting drivers of hazards, they may encounter to prepare them for the conditions they may face, and how to conduct themselves safely on the highway network to reduce the risk of accidents.

Resilience

Significant parts of the corridor have a high resilience risk profile resulting from the impact of both planned/unplanned events and limited availability of alternatives. Where alternative routes are available these often involve long, time-consuming diversions which are usually unsuitable for heavy vehicles.

Vulnerabilities

The pavement on the corridor is variable and can suffer from high dynamic loading due to tight corners, and degradation due to extreme weather events. Consequently, a relatively large amount of planned maintenance works is required to ensure an adequate standard of road surface is maintained.

The corridor is susceptible to rock fall, slippages, and coastal flooding across large sections, particularly through The Neck, Victoria Forest Park, and on approaches to Seddonville via SH67. A number of protection methods are used including rock fall nets, groynes, and sea rock protection.

Alternative routes and diversion lengths

A limited number of alternative routes are available using the State Highway network, and are exceptionally long and time consuming. For example, a closure occurring at Fox Glacier on SH6 would result in a diversionary route of over 1,150km, adding a further 14 hours to the journey. The 14 November 2016 Kaikoura earthquake resulted in the closure of sections of SH1 around Kaikoura. The event highlighted the criticality of alternative routes, and the limited number of alternative routes available.

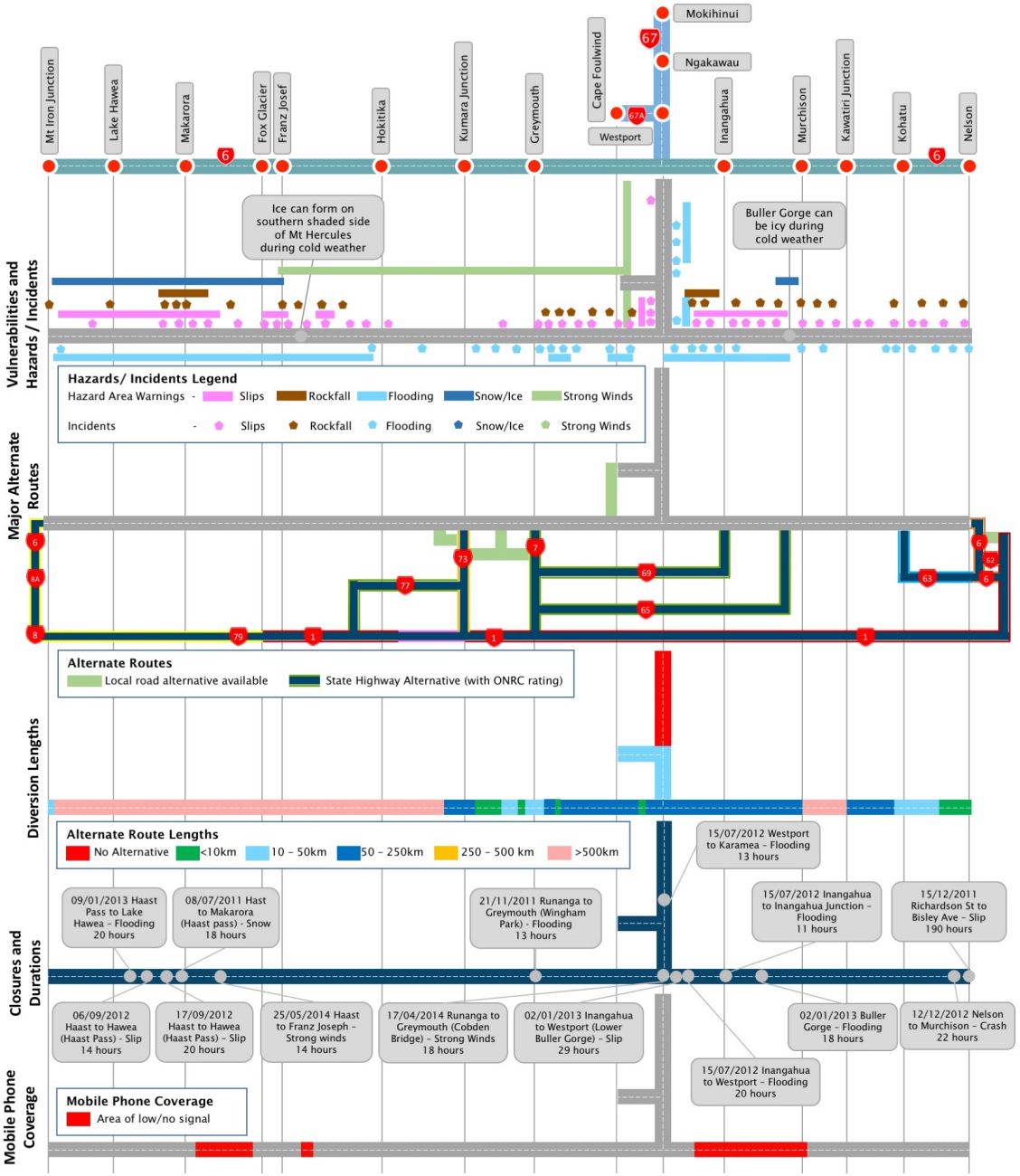
Mobile phone coverage

There is a lack of mobile phone coverage along large sections of the route as depicted in Figure 12.

Closures and duration

Slippages, rock fall, flooding, and crosswinds are the main cause of major unplanned closures on the corridor. In total 14 major, unplanned road closures have occurred in the last 5 years with the longest lasting 190 hours. Each closure is estimated to cost the local economy around $1 million per day.

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:

- **Closures and long diversion routes:** There is a high risk from rock falls, landslips, coastal erosion, and flooding, which not only cause disruption to the general public, but also inhibit the ability of utility and emergency services to respond and reinstate the network. Should closures occur, diversion routes are long and time consuming (over 700km in some cases).
- **SH1 diversion route:** The section of SH6 between SH63 and SH65 is part of the diversionary route for North-South traffic when SH1 is closed. The 2016 Kaikoura earthquake resulted in the closure of sections of SH1 for many months, and during this time traffic on this diversion more than doubled placing an unforeseen strain on an asset that was being used for a purpose beyond that which it was designed for. The use of roads as alternative routes needs to be considered in future planning.
- **Inclement weather events:** The corridor experiences vastly different weather conditions across its length. In the winter, this can make some areas impassable. Areas to the south of the corridor through the Alpine Passes are regularly closed during winter months. The corridor also experiences strong gale force winds on its coastal passes, and can result in the corridor being closed for several hours.
- **Nature, terrain, and geometry:** The characteristics of the corridor creates access difficulties for emergency services, thus when closures for unplanned events do occur they can take a substantial amount of time to clear. This results in unnecessary delays on the network.
- **Lack of mobile phone network coverage:** Currently sections of the corridor offer no mobile phone reception to customers meaning that should accidents, breakdowns or incidents occur, motorists are unable to contact the appropriate services. Satellite phone coverage is also limited along some sections of the corridor.

Future considerations

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

- **Frequency of maintenance requirements:** The corridor experiences significant degradation and poor levels of service on sections, requiring frequent works to be undertaken and blocking of traffic in the process. Due to the low traffic volumes on the corridor, justification of high levels of CAPEX funding is unlikely, but would allow investment in higher quality assets which require less frequent maintenance.
- **Improve monitoring and response times:** Linking as much of the corridor to the ITS system will allow for issues to be identified sooner and delivery of a timelier response. Real-time monitoring, particularly around known incident prone spots, will allow for reduced response times. Due to the long diversionary routes, the ability to reduce the time of closures and blockages will be vital for customers.
- **Improved communication:** Providing increased customer information to aid choices before reaching incidents allows for improved customer experiences. By utilising ITS systems, VMS can also be used to ensure that customers are directed to the correct route when travelling, avoiding unsuitable detours. As telecommunications improve, SMS push messaging could also be considered.
- **Proactive corridor protection:** Many of the issues along the corridor have been identified and include rockfalls and coastal erosion locations. Provision of additional protection at key sites should be considered, including rock fences, groynes for erosion management, and access to vehicles for clearing snow and ice.
- **Improve mobile phone coverage:** Engage with mobile network providers to seek opportunities to provide improved coverage as part of other road improvements or integration with ITS services.

Reliability and efficiency

Efficiency

In general, the corridor performs well in terms of capacity and congestion. Some local delays can occur on the approaches to Port Nelson and during peak tourist periods.

Levels of service are mixed across the corridor. Most of the coastal parts of the corridor generally achieve higher levels of service ranging from LOS A to LOS C between Greymouth and Hokitika. Mountainous regions on approaches to Fox Glacier and Nelson have highly variable levels of service. This area also has sections at lower levels of service.

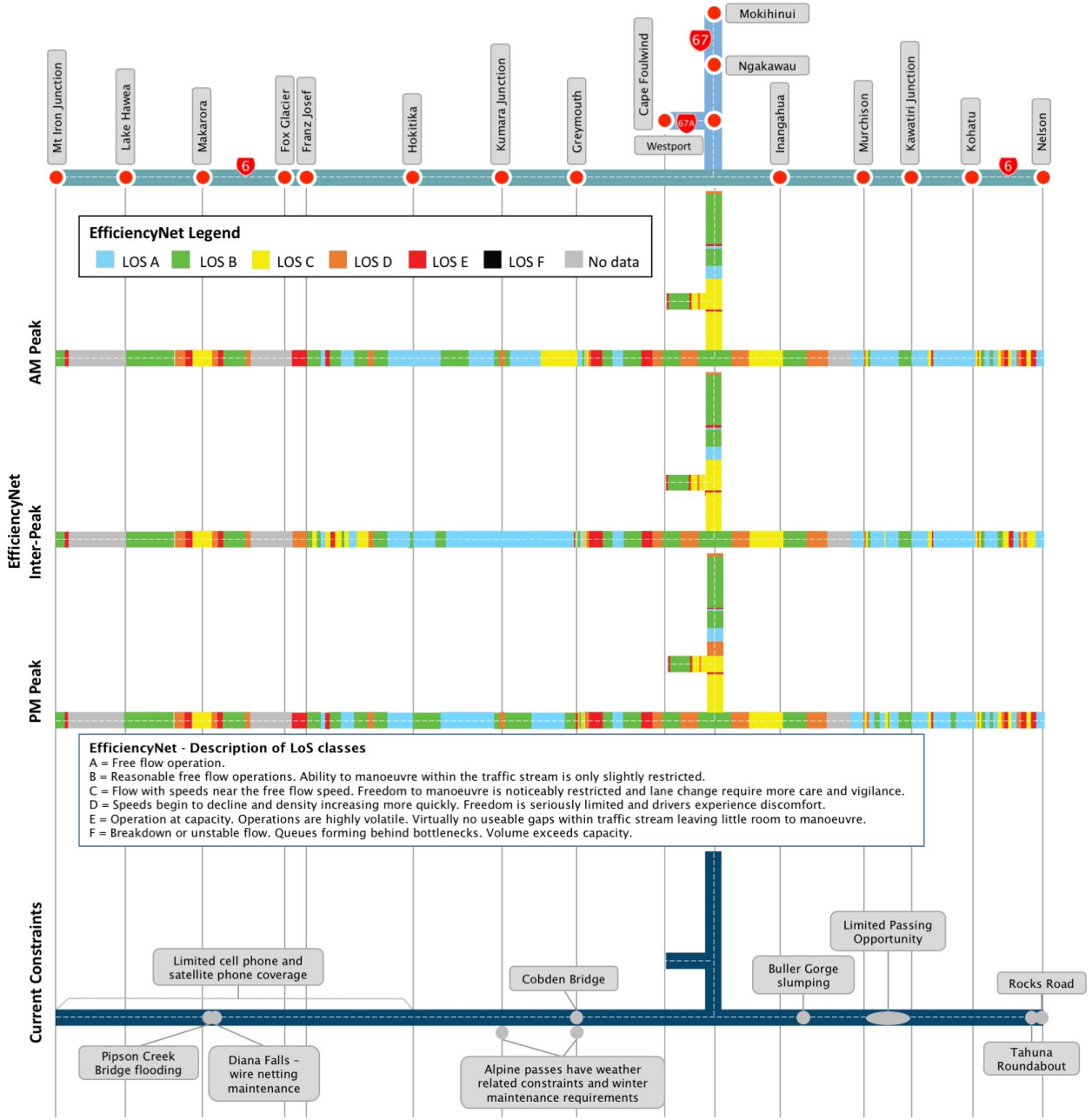
Within Nelson there are efficiency concerns on the section of SH6 between Richmond and the city. This section is currently subject to an operating framework strategy that will review potential infrastructure and ITS solutions.

Current constraints

The major current constraints on the network affecting journey reliability and efficiency are shown in Figure 13. Alpine passes, particularly over Fox Hill can often be unpassable resulting in unpredictable journey times. The corridor also has a high number of one lane bridges on SH6, many of which are reaching the end of their operational life. These can cause delay and frustration particularly those which are joint road/rail bridges or located close to the large settlements. This corridor is also unable to accommodate oversized and overweight HPMVs for most its length.

Within the Nelson urban area, constraints associated with congestion exist on both the Haven Road roundabout, Rocks Road/Tahuna Road intersection, Parkers Road, and Whakatu Drive.

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 follows:

- **Limited passing opportunities:** There are few places on the corridor to overtake on the corridor. This is further exacerbated by steep inclines in the mountainous areas which result in vehicles travelling slowly, especially those caught behind HPMVs. Driver frustration can prevail which may lead to unsafe behaviour.
- **Seasonal demand:** Demand on the corridor can increase during tourist seasons, particularly during summer months when the tourist season is at its peak. The southern parts of the corridor between Hokitika and Albert Town and onwards to Queenstown experience a noticeable increase in tourists during these times of the year.
- **Topography constraints:** Changes in topography means that carriageway configurations are windy and undulating in nature. This results in a challenging driving experience, and vehicles being unable to reach optimal speeds in relation to posted speed limits.

Flood water pouring under the SH6 Waiho River Bridge in south Westland

Future considerations

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

- **Intersection improvements:** Many intersections on SH6 are at T-junctions where the State Highway does not have priority over other routes such as SH65 and within Greymouth. The provision of improved signage will ensure that unfamiliar users do not overshoot junctions and be required to turn back.
- **Increase passing opportunities:** Identified improvements include providing additional slow vehicle bays on sections of SH6 around Inangahua and Fox Glacier. More opportunities could be investigated to provide both slow vehicle bays and passing lanes on appropriate sections of the corridor.
- **Signage:** Provision of improved signage on particularly steep or curvy sections of the road network including the use of detection signage can help those which are unfamiliar with the corridor. This will help provide some early visual guidance of impending changes on the corridor.
- **Provision of Nelson Southern Link:** Continue to develop the Nelson Southern Link to provide an alternative route to Rocks Road. This will provide a safe and more resilient route to the city and port and allow future improvements to Rocks Road to encourage active travel modes and open up the waterfront location.

Safety

Collective risk

The corridor is rated low or medium-low collective risk, except for three key sections of medium-high risk near Albert Town, from Kumara Junction to Greymouth and between Kohatu and Nelson. SH67 and 67A is also rated low and medium-low risk.

Personal risk

Personal risk rating along the corridor is varied. There are multiple small high personal risk segments scattered along SH6 between Makarora and Kawatiri Junction. SH67 is of medium risk to Westport and low and medium-low to Mokihinui and Cape Foulwind.

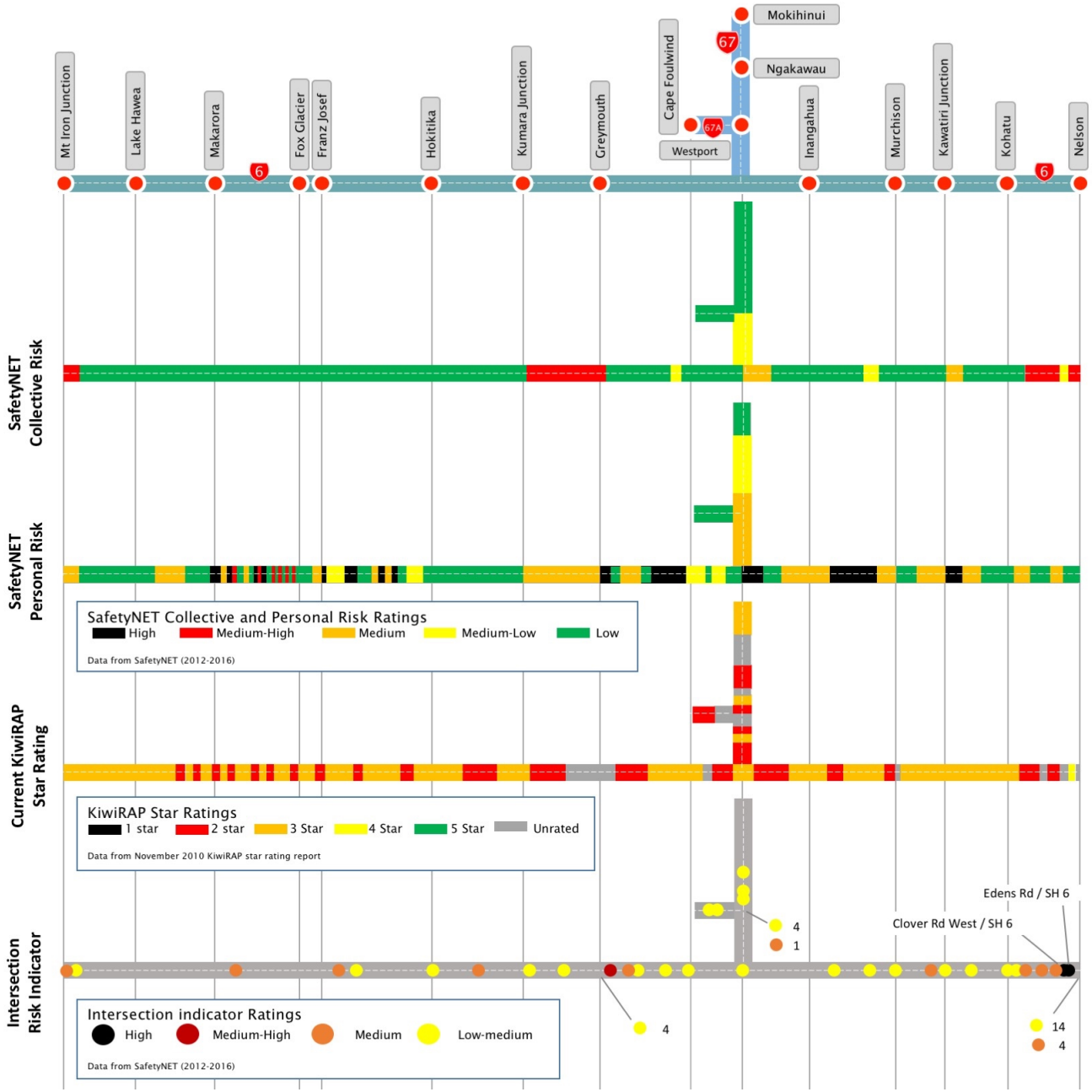
Star rating

The entire corridor is rated either 2 or 3-star except for a small 4 star area on approach to Nelson. There are small sections of the corridor that are unrated.

Intersection risk indicators

There are two high risk intersections close to Nelson on SH6. There is one medium-high risk intersection located near Greymouth.

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:

- **Tourist drivers:** A high number of domestic and overseas tourists use the corridor primarily from the south arriving via Queenstown. As a number of users are not familiar with New Zealand roads and rules, particularly those from countries which drive on the right-hand side, incidences resulting from driver behaviour are higher than expected.
- **Roadside hazards:** Due to the winding and undulating nature of the corridor, potential issues arise from roadside hazards. This includes natural hazards such as large sheer drops and geological constraints that influence the horizontal and vertical road geometry. Poor sightlines are also an issue, particularly on the windy section through mountainous and forest areas.
- **Long journeys resulting in tiredness and fatigue:** Due to the distances between communities and service centres, drivers can travel long distances before opportunities to stop are provided.

Major slip near Boundary Creek, between Makarora and the Neck* of Lake Wanaka

Future considerations

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

- **Continue Visiting Drivers project:** Working closely with NZ Police, rental car companies and local authorities as well as other key stakeholders to provide appropriate information to overseas visitors. Continue to explore innovative approaches to engaging with overseas visitors. Build on infrastructure measures which has included provided more than 50km of rumble strips on SH6 between Hokitika and Haast.
- **Explore opportunities to prevent the risk from roadside hazards:** This could include providing greater protection for vehicles which exit the road and improve sightlines through reduction of obstructing vegetation.
- **Provide more appropriate and better spaced rest areas and viewing points:** Many visitors underestimate the length of journeys in New Zealand. Providing improved rest area facilities will help more drivers remain alert when traveling on these unfamiliar routes. A review into current stopping places and facilities would help to inform rest area strategy that incorporates towns and rural settlements as places where such facilities can be accessed.

A rockfall about 4 km south of The Neck, State Highway 6

People, places and environment

Natural environment

The corridor passes through the heart of many internationally recognised National Parks including Kahurangi, Paparoa, Aoraki/Mount Cook, and Mount Aspiring. Coastline locations across SH6 and SH67 have spectacular vistas across the Tasman Sea. Southern and northern parts of the corridor are hilly with steep climbs up to a maximum peak of approximately 1,500m.

There are several catchments along the corridor, which feed into the many rivers crossed. Due to the steep terrain, intense rainfall events can very quickly cause major incidences across the corridor, caused by the high volumes and speed of water flowing through these catchment areas.

Bio-security is a concern for many National Parks that the corridor passes through. For example, invader species may be carried by a single traveller across the length of the corridor, and presents a constant threat to the natural environment.

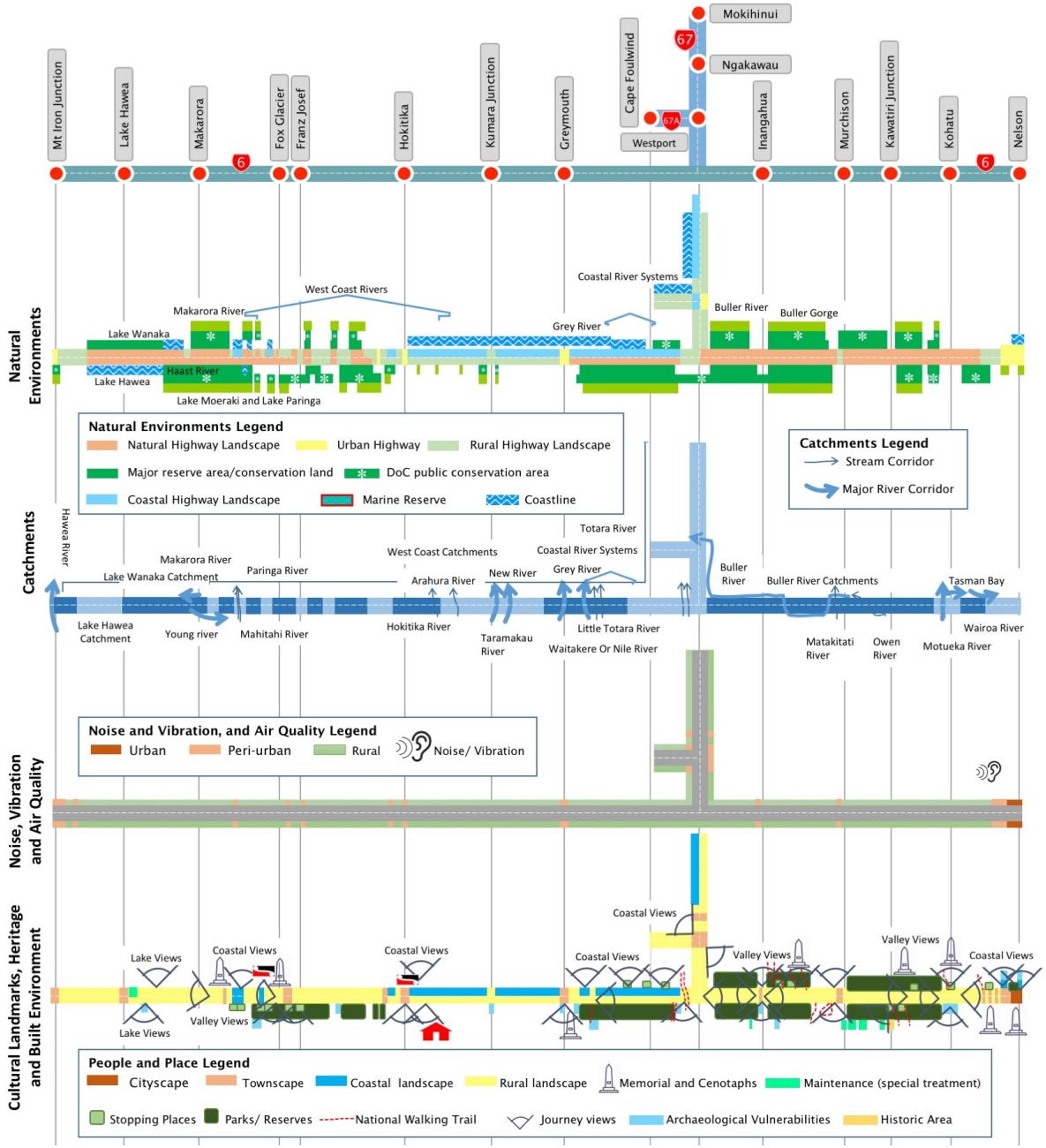
Noise, vibration and air quality

Noise, vibration and air quality are not considered to be major issues on the corridor, due in part to the low number of sensitive receptors along the corridor. Localised noise issues exist on approaches to Nelson, around urban and peri-urban areas.

Cultural landmarks, heritage and built environment

A number of monuments are located along the corridor including the Pike River memorial and Strongman memorial. Due to the limited number of settlements most built environments consist of small towns servicing local communities. Some of these sites accommodate a large number of tourists, particularly on the southern sections of the corridor. Cultural landmarks and heritage sites contribute to the journey experience for customers.

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:

- **Impact on natural environment and conservation areas:** As the corridor traverse's national parks and conservation areas, increasing damage may be incurred as vehicle and tourist numbers rise. This is having an adverse impact on roadside habitats. The corridor also allows tourists to seek access to sites that are inappropriate for visitors or are contrary to local environmental management controls.
- **Extreme weather events:** Future weather patterns are predicted to show more intense weather events. This may result in more intense coastal erosion, rock falls, and slippages, as well as localised flooding particularly in hilly parts of the network.
- **Stunning coastal views:** The vistas are exceptional on much of the corridor. This encourages tourists to stop in inappropriate and unsafe areas across the network. Programmes such as the Visiting Drivers initiative will be important to manage increasing visitor numbers, and educate visitors about safe driving practices in New Zealand.
- **Sensitive receptors:** Whilst there are relatively few settlements along the corridor, sensitive environment areas exist, in particular the urban areas around Nelson and Richmond at the northern end of the corridor.
- **The corridor is increasingly becoming a tourist destination in itself:** To accommodate this growth in visitor numbers more facilities may be required along the corridor, for example around the Alpine Plains, Fox Glacier, and Franz Josef.

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:

- **Continued engagement with stakeholders:** Engagement with local authorities and stakeholders to mitigate the impact of the State Highway network upon the surrounding natural environment. This could include information for users or implementation of regulations and controls.
- **Working with local communities:** Engagement with local communities, stakeholders, and industry groups to understand their reliance on the network for trade and the local economy, to ensure the corridor continues to provide these areas with the service they require.
- **Promoting sustainable tourism practices:** Managing the corridors' increasing popularity with visiting drivers in a way that encourages tourism without damaging the natural environment through the increased pressure of greater visitor numbers. Such as providing sufficient and adequate rest areas, viewing points, and signage to attractions to help manage demand by keeping visitors within the designated areas and prevent straying into sensitive environmental areas.
- **Resilience engineering:** Increased engineering measures and greater use of vegetation in exposed parts and identified high risk areas of the corridor are likely to be required to help mitigate the impacts of extreme weather events.
- **Protecting heritage sites:** Resulting from the increase in visitor numbers across the corridor, specific management plans may be required for landmarks, monuments, and areas of significance to local communities across the corridor to ensure their protection.
- **Noise abatement measures:** As tourist and general traffic numbers increase across the corridor some noise abatement treatments may be necessary in the urban and peri-urban areas, especially towards the more populated areas towards the northern end of the corridor.

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 833 km of road network which reflects 7.3% nationally. The total value of the assets along the corridor is $988M (excluding ITS, and, heritage and green assets).

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

Asset condition and performance summary

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

Figure 16 – Corridor asset base

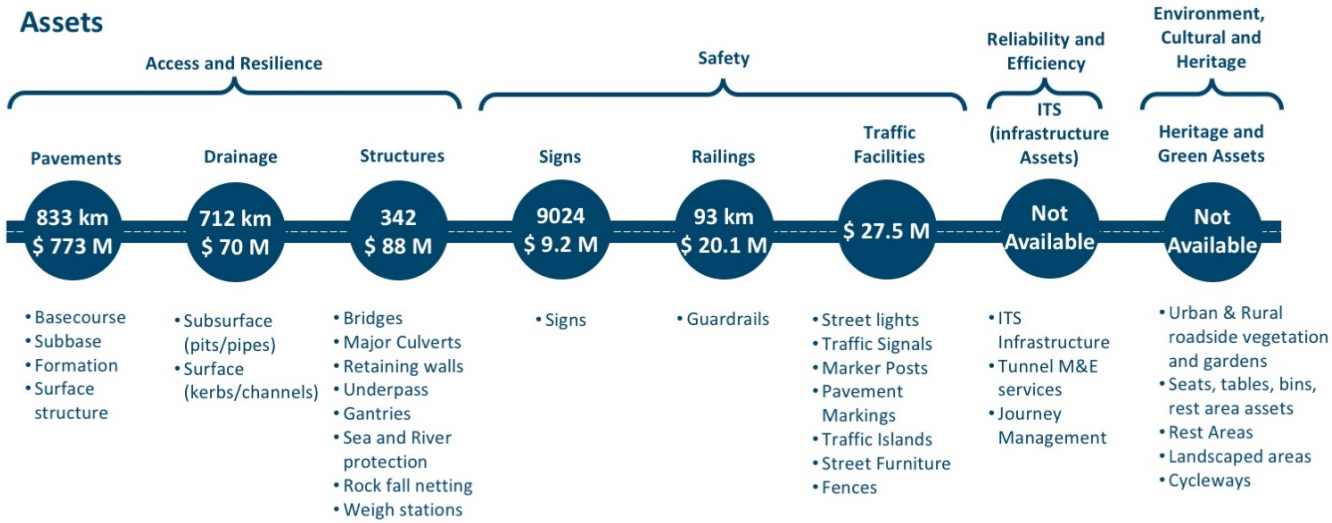


Figure 17 - Asset condition and performance

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.

The surface skid resistance percentages vary greatly along this 1600 lane-km plus corridor. There is a continuous section at the southernmost end of the corridor that stands out from the others, SH6 RS983 and RS881. It has a higher portion of surface skid resistance below the threshold limit.

The change in surface skid resistance highlights ongoing degradation in the southern RS983 & RS881 portions, in RS336 approaching SH67, and in the northern portion of the corridor between RS225, through Shenandoah, through to RS170 at Kohatu.

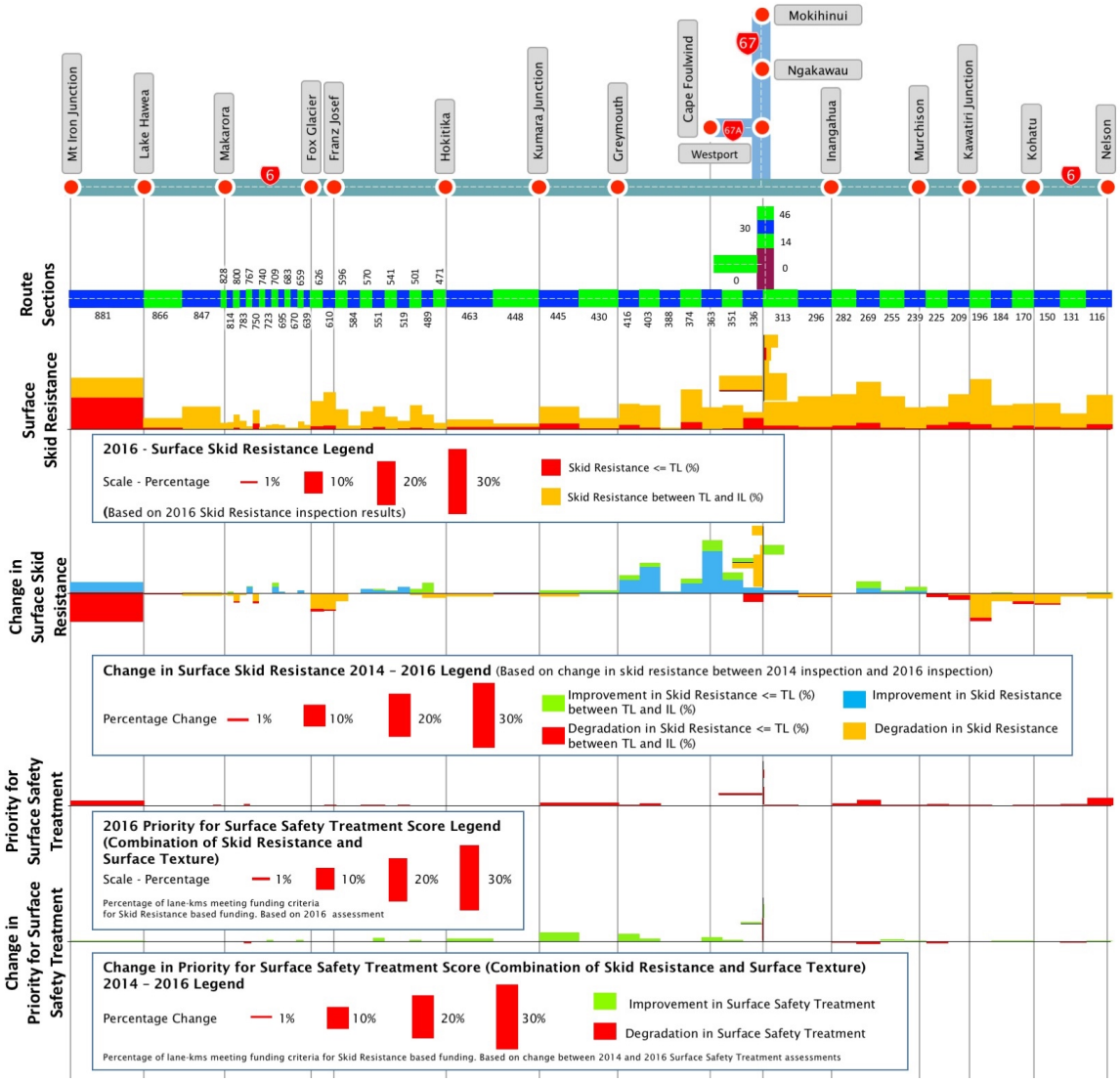
Priority for Surface Safety Treatment

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.

Very little of this corridor, only 5 lane-km, qualifies for surface skid resistance based funding. The qualifying sections are distributed along the corridor with some mid corridor showing an improvement in priority for surface safety treatment across the three-year period reviewed.

Figure 18 – Asset condition



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, 19.4% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: 6/255 west of Shenandoah, 6/767, 6/783 and 6/800 south-east of Haast, and, 67/46 around Mokihinui. 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.

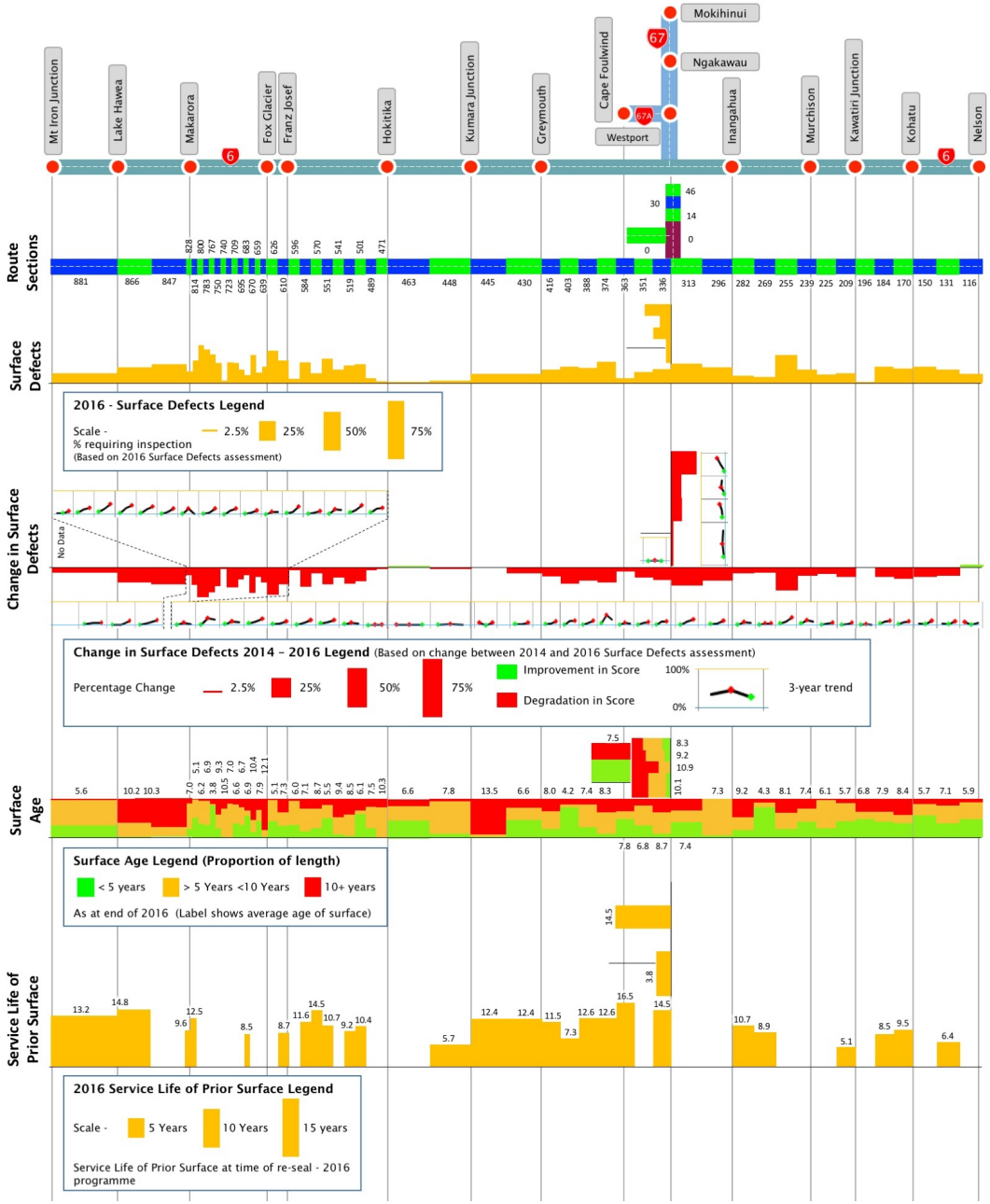
The base data is all the seal lengths and their age from RAMM. Then a weighted average is then calculated. Overall, all sections add up to 100%. The proportion is the length of corridor in a particular age band as a percentage of the total length of that section.

The sections of corridor with the oldest age profile are 6/445 south of Taramakau River, 6/847 and 6/866 between The Neck and Hawea, and, 67/0 through Westport.

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.

Figure 19 – Asset condition 2



Overall the re-surfaced sections achieved an average service life of 10.5 years, with sections6/336 south of Westport, 6/363 north of Fox River, 6/570 through Whataroa, 6/866 north of Hawea, and, 67/30 through Hector achieving a service life in excess of 14 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 sections 6/584 around Lake Wahapo, and, 6/610 south to Franz Josef.

Proportion of travel on smooth roads

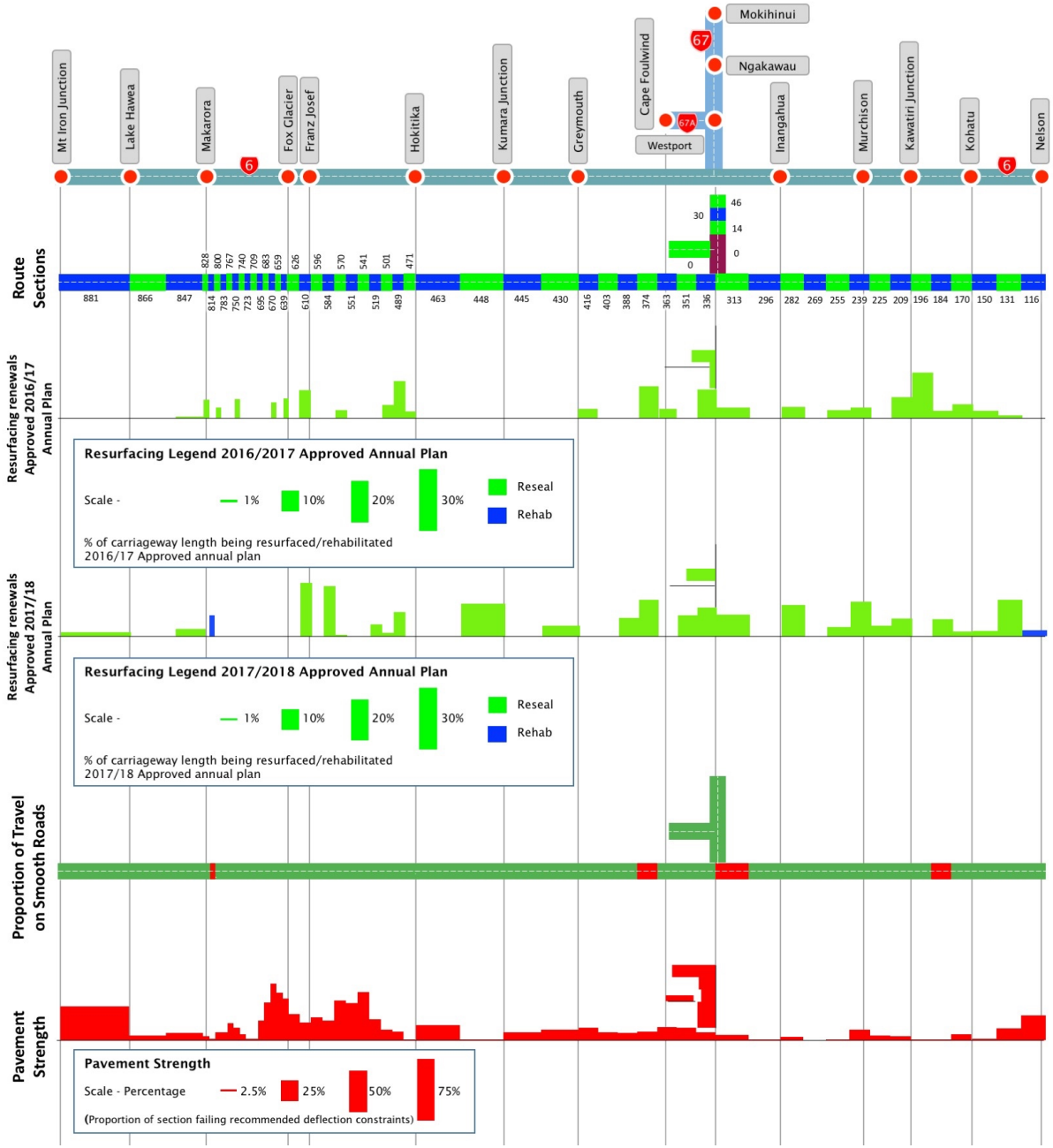
The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not.

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 SH67/46 south of Mokihinui, SH6/541-570 Harihari between and Whataroa, SH6/639-670 between Fox Glacier and Bruce Bay, and, SH6/881 Between Lake Hawea and Wanaka.

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:

Alternative Route Function: Performance and condition of the SH6 segments serving the P2CLPH (Picton to Christchurch Lewis Pass Highway) are suffering from extreme loading following the Nov 2016, requiring high levels of remediation, maintenance and management.

Premature pavement failure: sandwich seals on SH6 between Richmond and Inangahua from the 2010/2011 season are scabbing and failing prematurely along whole lengths. Some sites are that bad they have had to be advanced in the reseal programme. Also looking to contractor for resolution.

Rocks Road: pavement is wearing rapidly, stormwater management is challenging, maintenance costs are high, customer expectations high (commuters and port freight) and is the most contentious part of Nelson end.

Hope Saddle: high stress corners are deteriorating rapidly and require greater durability.

Wanaka to Albertown: poor skid resistance performance and increasing traffic volumes with growth and land use intensification.

Albert Town Bridge: starting to see performance issues during peak holiday times as the single lane bridge reaches capacity.

Neck to Makarora: out of context curves, rockfall, slips, scour and slumping drive roughness and uncomfortable user experience.

Haast Pass summit: low tolerance for reduced performance as water sensitive materials unforgiving and more expensive to reinstate than to protect. Feature of pavements is accelerated degradation and permanent deformation if lose waterproofing.

Corduroy pavements: Many of the older West Coast pavements were built upon original corduroy pavements through swampland that are now going out of shape as the old logs decompose producing high roughness, poor user experience and requiring speed reductions. These have a particular impact on comfort for tourist coaches and for ambulances.

LTPP Benchmark sites: along the West Coast stretch this corridor includes Long Term Pavement Performance benchmark sites – these sites receive minimal maintenance as part of a national programme monitoring 63 sites around New Zealand and this information is then used to calibrate and further develop pavement prediction models.

Operations and maintenance costs: Operations and maintenance costs higher, but necessary to ensure optimal life out of the asset in an environment where capital works are unlikely to be easily justified.

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:

Hope Saddle: consider use higher cost treatments that are more durable, such as UTA or Asphalt and high skid resistance surfacing.

Rocks Road: Rocks Road may require specialised treatments for presence of heavy port traffic and cyclists as well as consideration of constraints on hours of work and accessibility for maintenance. The Great Taste trail may have also maintenance implications for shoulder provision considerations.

Albert Town Bridge: traffic monitoring should be installed on the single lane bridge to inform the future case.

Single lane bridges: need adequate monitoring to inform the future case for both capacity and resilience across the many watercourses. Such as Makarora River Bridge – requires strengthening (weight restrictions) to adequately provide for HCV traffic.

Haast Pass summit: the high cost of reinstatement and route risk may warrant a more durable treatment or investment for this remote section of the highway.

Corduroy pavements: The older corduroy pavements are beginning to degrade and their future requires consideration as current maintenance approaches and mill and fill chasing will have a limited life and as customer experience degrades.

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	$24,567	$26,061	$39,352
	Renewals	$29,831	$35,655	$50,068
	Improvements	$6,931	$1,500	$0
Reliability and Efficiency	Maintenance and Operations	$7,388	$7,773	$11,647
	Renewals	$436	$393	$697
	Improvements	$68,805	$44,090	$17,400
Safety	Maintenance and Operations	$19,285	$20,588	$30,960
	Renewals	$3,270	$4,119	$6,014
	Improvements	$6,486	$1,500	$0
People, places and Environment	Maintenance and Operations	$4,645	$4,873	$7,319
	Renewals	$217	$214	$312
	Improvements	$0	$0	$0
	Total	**$171,862**	**$146,766**	**$163,770**

Figure 21 – Corridor investment

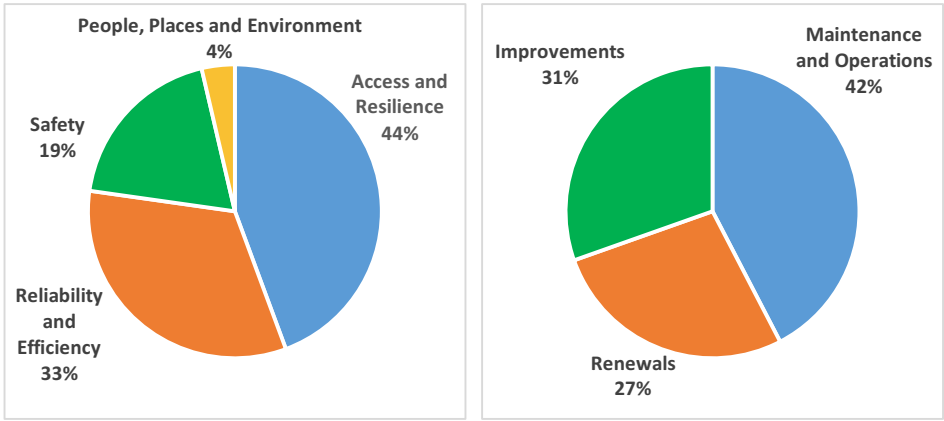


Table 2 - Summary investment by work category ($000)

Outcome	Work Category		2018-2021	2021-2024	2024-2028
Access and Resilience	111	Sealed Pavement Maintenance	$3,799	$4,100	$6,260
	112	Unsealed Roads	$6	$7	$10
	113	Drainage Maintenance	$1,560	$1,793	$2,822
	114	Structures Maintenance	$5,334	$5,620	$8,441
	121	Environmental Maintenance	$7,578	$7,921	$11,879
	122	Traffic Services Maintenance	$112	$190	$286
	124	Cycle Path Maintenance	$37	$62	$88
	151	Network & Asset Management	$4,928	$5,113	$7,679
	161	Property	$1,213	$1,256	$1,886
	211	Unsealed Road Metalling	$17	$18	$27
	212	Sealed Road Resurfacing (excl. surface skid resistance)	$18,419	$23,259	$26,918
	213	Drainage Renewals	$1,328	$1,339	$1,858
	214	Pavement Rehabilitation	$5,569	$6,548	$13,684
	215	Structures Component Replacements	$4,295	$4,234	$7,187
	222	Traffic Services Renewals	$203	$256	$394
	321 - 341	Improvements	$6,931	$1,500	$0
Reliability and Efficiency	121	Environmental Maintenance	$3,172	$3,304	$4,962
	123	Operational Traffic Management	$2,726	$2,934	$4,400
	151	Network & Asset Management	$1,268	$1,308	$1,943
	161	Property	$222	$228	$342
	222	Traffic Services Renewals	$436	$393	$697
	321 - 341	Improvements	$68,805	$44,090	$17,400
Safety	111	Sealed Pavement Maintenance	$5,063	$5,133	$7,665
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$1,292	$1,623	$2,529
	114	Structures Maintenance	$697	$788	$1,211
	121	Environmental Maintenance	$724	$829	$1,245
	122	Traffic Services Maintenance	$6,961	$7,375	$11,047
	124	Cycle Path Maintenance	$24	$47	$66
	151	Network & Asset Management	$4,004	$4,242	$6,371
	161	Property	$519	$550	$826
	212	Surface Skid Resistance	$1,752	$1,953	$2,933
	214	Pavement Rehabilitation	$40	$80	$120
	215	Structures Component Replacements	$723	$792	$1,190
	222	Traffic Services Renewals	$755	$1,294	$1,772
	321 - 341	Improvements	$6,486	$1,500	$0
People, places and Environment	111	Sealed Pavement Maintenance	$450	$456	$685
	121	Environmental Maintenance	$3,539	$3,740	$5,617
	151	Network & Asset Management	$526	$544	$816
	161	Property	$130	$134	$201
	221	Environmental Renewals	$217	$214	$312
	321 - 341	Improvements	$0	$0	$0
		Total	**$171,862**	**$146,766**	**$163,770**

To be confirmed through the RLTP process

Investing in access and resilience

Operations and maintenance

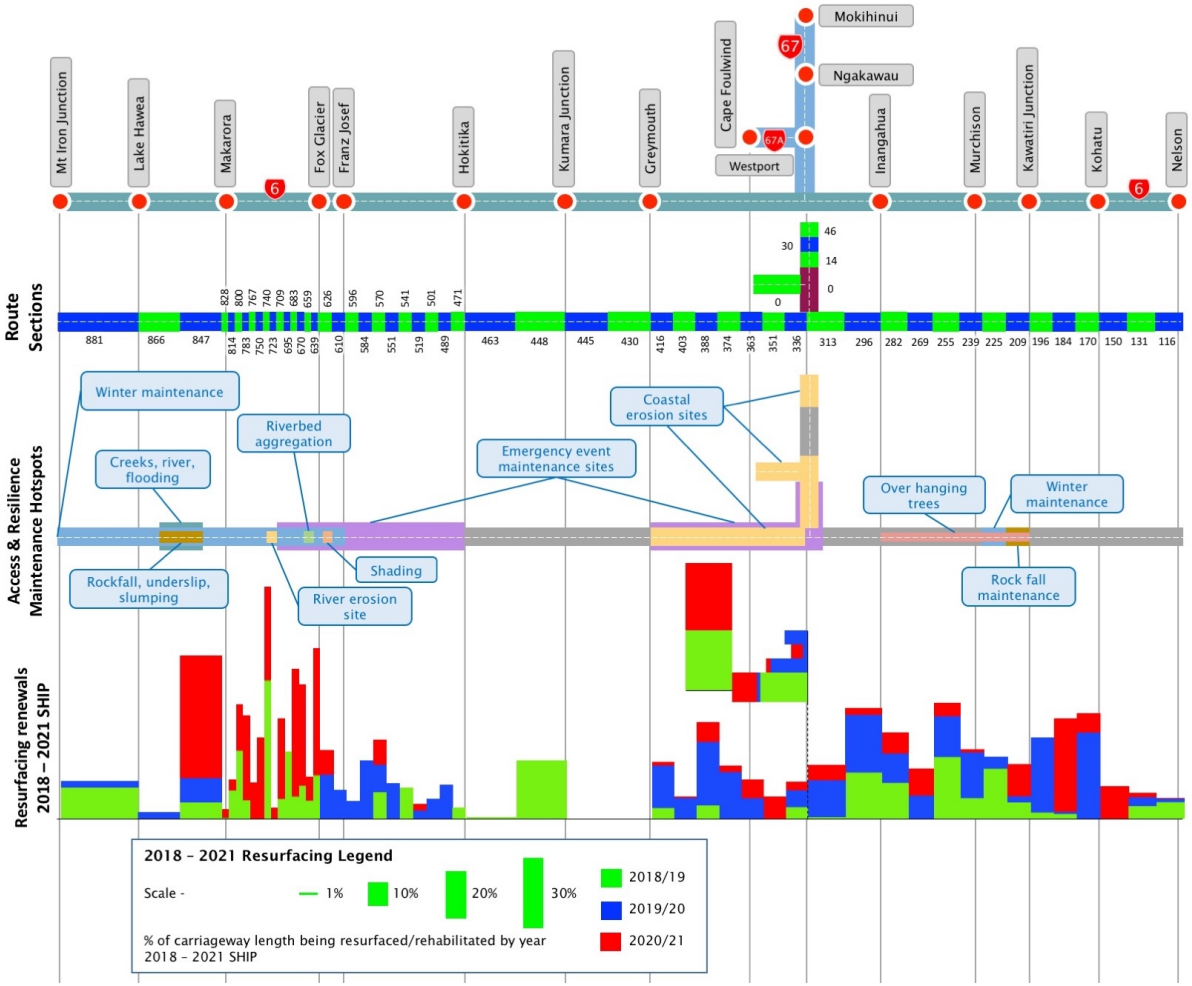
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing, structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement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

During the closure of SH1 Kaikoura, SH6 between SH63 and SH65 becomes both a critical transport and communication link to the South Island – it is the effective Achilles Heel of the transport network and is treated with a "No Failures" approach that requires additional investment.

Maintenance hot spots

- **SH6 as Alternative Route to SH1:** currently managed under NCTIR, until re-instatement of the SH1 Kaikoura route. This portion of corridor is critical as it has no alternative route between SH63 and SH65.
- **Rocks Road, Nelson (RS 116):** stormwater, rock fall and seawall resilience issues.
- **Hope Saddle:** many rock fall fences and surfacing issues, requires ongoing management and mitigation of rockfall and fences.
- **Neck to Makarora:** Rockfall, slips, scour and slumping, out of context curves, creeks and rivers. A geological hazard register is managed within the NOC and includes slump sites and rockfall/protection sites.
- **Debris Flow:** Wharf creek bridge and Pipsons creek are areas of ongoing debris flow. Some areas are self-flushing but others such as Pipson Creek, north of Makarora, require proactive annual clearing works to maintain capacity
- **Alluvial fans:** between two Makarora's, require regular maintenance especially of culverts.
- **Single lane bridges:** There are multiple aged narrow single lane bridges, each equally vulnerable to debris flow and equally inaccessible to oversized vehicles (some height limited due to the bridge design, e.g. 4.45m)
- **Buller River:** the Buller River is adjacent to SH6 for much of the way between Westport and Hope and is vulnerable to scour issues along its length continuously threatening the road and pavement.
- **Haast Pass:** constant maintenance required.
- **Coastal erosion:** SH67 is prone to flooding and coastal erosion.

Figure 22 – Access and resilience investment



Renewals

Resurfacing

The infographic in Figure 22 (previous page) 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:

6/170, 6/184 and 6/196 between Kotahu and Wairau Velley, 6/255 west of Shenandoah, 6/296 west of Inangahua, 67A/0 at Cape Foulwind, 6/639, 6/670 and 6/683 in south Westland, 6/740 north of Haast, and, 6/847 south of The Neck.

Working logistics can drive programming of renewals work through the southern and West Coast portion of the corridor, with a single contractor serving the entire area and taking through a specialised sealing team. They have a preference due to the remote location to revisit every couple of years, other than for special cases.

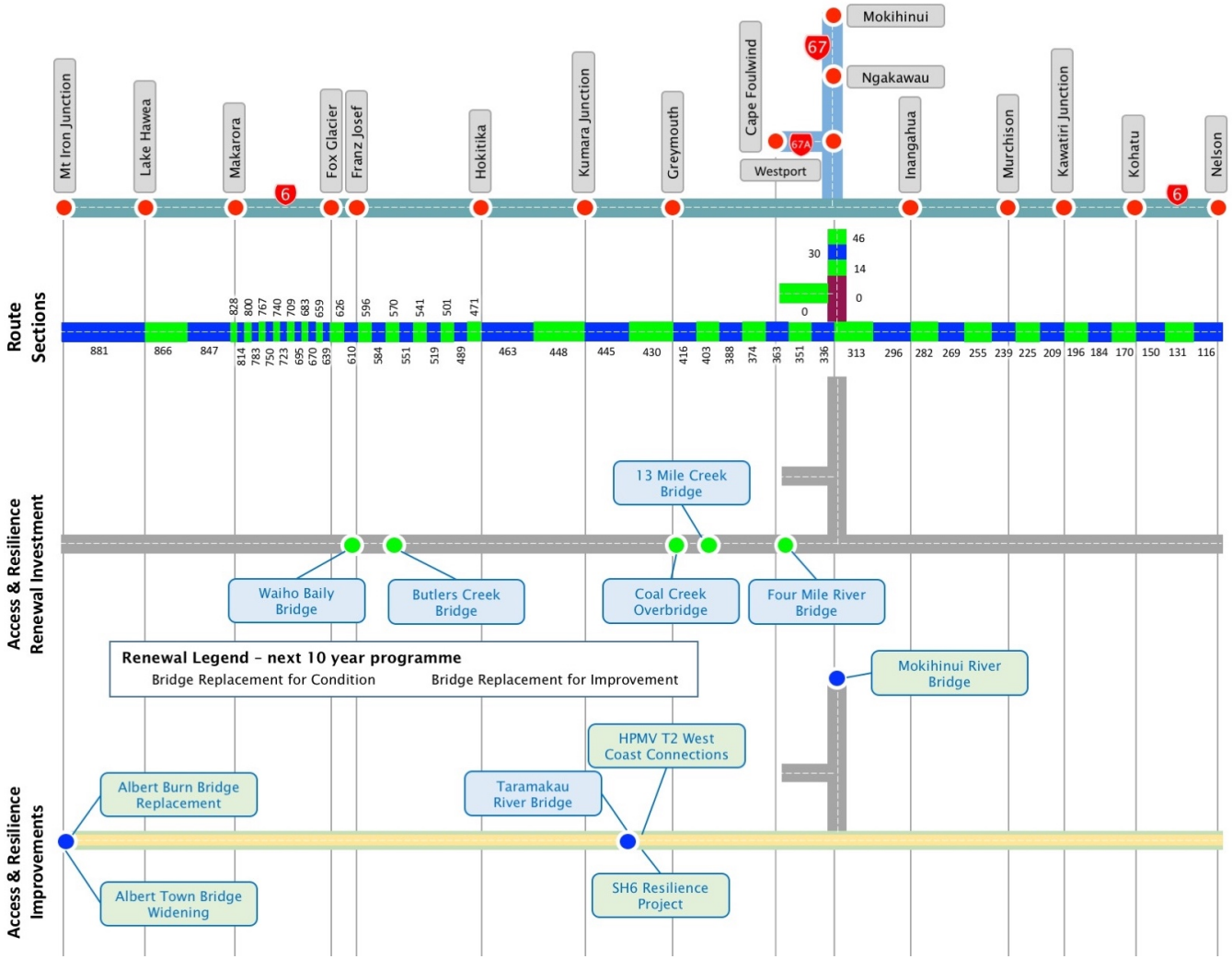
Structure renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. Five bridges are planned for replacement due to asset condition, at a total estimated cost of $6.85M.

Along this corridor bridges are critical to access and resilience; from the narrow composite bridge at the Mokihinui River, SH67, Seddonville down to the SH6 Albert Town Bridge. They become a key constraint to industrial development and access to the Ports, particularly for transport of bulk volume products.

Some of the aging structures are of heritage value and development of future options may require wider input and consultation.

Figure 23 – Access and resilience investment 2



Improvements

Structure improvement

Five bridges are scheduled to be replaced for improvement reasons, at an estimated cost of $23.4M.

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 Taramakau Bridge

> **Description**: A new two-lane bridge will be built downstream of the existing one-lane Taramakau Bridge. A section of SH6 will be realigned and an overpass built to take traffic over the railway line. An off-road cycle and pedestrian link will also be built.

Wandering stock can pose a hazard to motorists

Draft Regional Land Transport Programme considered for the SHIP

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

Table 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH6 Resilience Project		Proposed resilience improvements at locations along the SH6.
HPMV T2 West Coast Connections		Strengthening of bridges and structures between Hokitika and Waipara and connecting corridors of SH6/7/69/65/part67 to increase loading for HPMV and two bridges on SH73/67 for 50Max.
Mokihinui River Bridge, West Coast		SH67 - 50MAX bridge upgrade on the West Coast.
SH7 Waipara – Culverden Resilience Improvements		Resilience improvements on SH7. Shows Red rating in ONRC LoS Performance for Resilience within CMP.
Albert Burn Bridge Replacement		Replacement of vulnerable existing narrow bridge on poor vertical alignment with HPMV capable structure. Load limitations currently force trucks to cross at the Luggate Bridge which is increasing the maintenance of this structure.
Albert Town Bridge Widening		Existing one lane bridge will continue to come under increasing pressure due to development.

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.

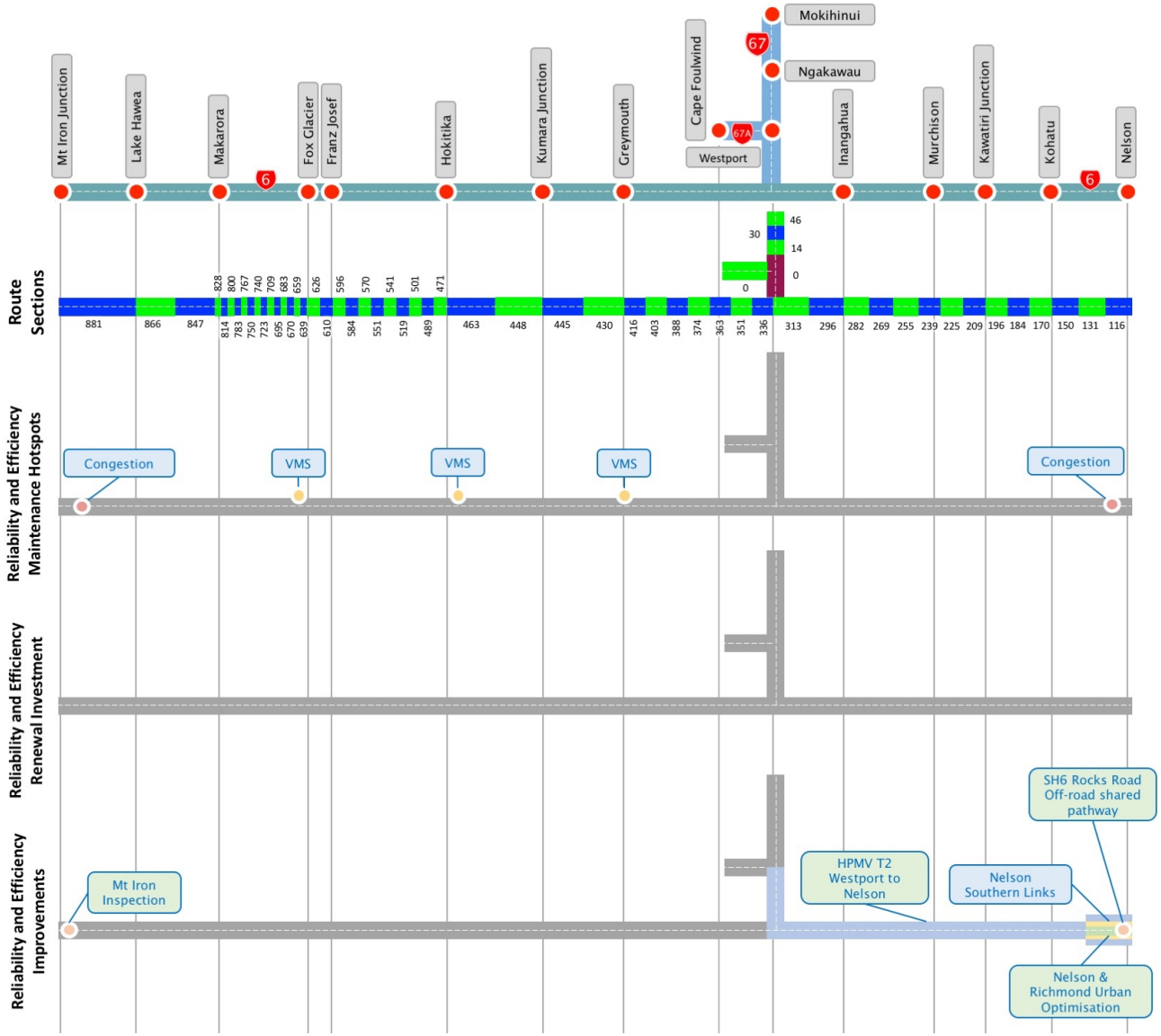
The priority for the bulk of users along this corridor is less efficiency and more continuity of access, i.e. being able to get past a slip, particularly the economic effect of tourists that may otherwise choose not to travel.

Maintenance hot spots

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

- **Richmond:** there is public concern about congestion and efficiency at the three brothers roundabout - SH6 and SH60 intersection.
- **Albert Town Bridge:** is beginning to have congestion at peak times and requires traffic monitoring.
- **Signage:** VMS locations in advance of problem locations at Lake Hawea heading north, at Makarora north and south.

Figure 24 – Reliability and efficiency investment



Renewals

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

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/

Nelson Southern Link

Description: The Nelson Southern Link Investigation is considering options to improve Nelson's arterial transport network between the Annesbrook Drive and Haven Road roundabouts as part of the Government's Accelerated Regional Roading Package for state highway projects.

options to more effectively connect the Annesbrook Drive and Haven Road roundabouts

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 though the SHIP, and cover the next 10 years.

Table 4- Draft regional programme considered for SHIP

Project	Funding Status	Description
Nelson & Richmond Urban Optimisation		Undertake and identify short, medium and long-term improvements to optimise state highway through traffic and local network access in and around the high urban growth community of Richmond.
SH6 Rocks Road Off-road shared pathway		Construction of an off road shared pathway cantilevered structure off the Rocks Rd Seawall to a provide a safe passage for pedestrians and cyclists between Bisley Ave and Haven Road. This project is linked Nelson to the Southern Link Investigation and is being investigated in parallel.
HPMV T2 Westport to Nelson		Project is on a major freight route on a Regional Strategic/Connector state highway corridor and providing for HPMV along this route has the potential for a nationally significant contribution to economic growth and productivity.
Mt Iron Inspection		Existing intersection configuration is going to come under increasing pressure due to development.

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: road delineation including audio-tactile markings (ATP), safety wire rope barriers, appropriate speed limits, and control of roadside vegetation.

Maintenance hot spots

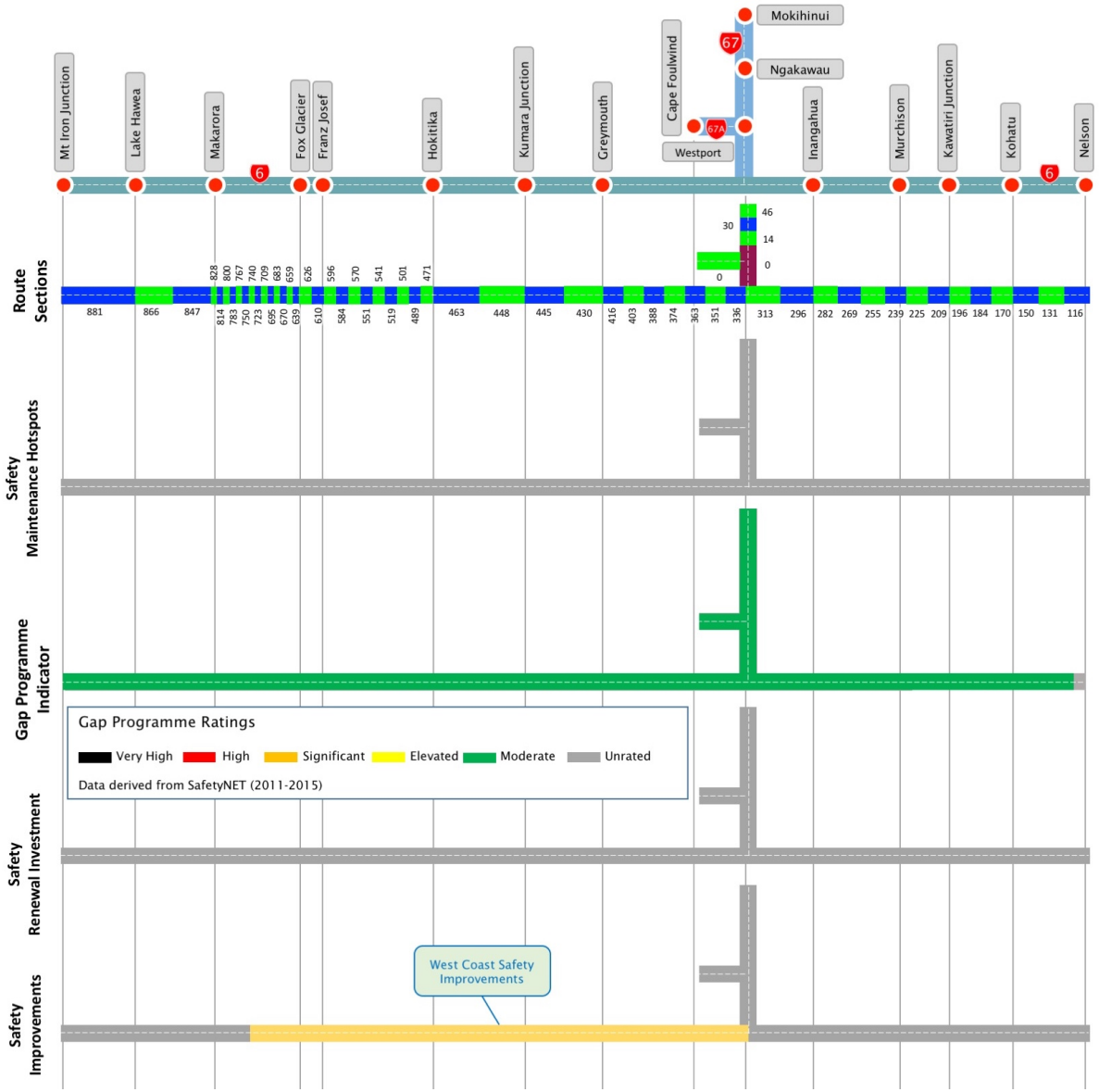
No specific maintenance hotspots were identified for the corridor. The general maintenance issues related to safety along the corridor are described in the Investment Pressures section later in this document.

Gap programme indicators

The potential for reducing fatal and serious injuries across the corridor 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.

There is a moderate potential for reducing fatal and serious injuries along the corridor through targeted, low cost, high coverage improvements.

Figure 25 – Safety investment



Renewals

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

Winter maintenance

Improvements

Draft Regional Land Transport Programme considered for the SHIP

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

Table 5- Draft regional programme considered for SHIP

Project	Funding Status	Description
West Coast Safety Gap Improvement		Safety gap improvements identified for the SH in the West Coast region.
Weigh Right Regional Construction		Improve weigh pits to improve overweight detection and to meet new vehicle and safety standards.
Speed Management Implementation		Transport planning activity to enable development of Regional Speed Management Plan in conjunction with partner Road Controlling Authorities
Minor Improvements 18/21		Activities will be targeted to low cost safety, optimisation and resilience activities which contribute to the Transport Agency's goals of either reduce the level of deaths and serious injuries, improve urban network capacity in our major centres or to reduce the resilience risk on our key routes through preventative maintenance activities.
Accelerated LED Renewals for SH Street Lighting		To replace all street lights with more cost-effective LEDs to save costs on power and maintenance.

Investing in people, places and environment

Operations and maintenance

The main areas of investment into people, places and environment are: control of litter, provision of rest areas and stopping points, hazard management environmental compliance and where it can be justified, pavement rehabilitation.

Maintenance hot spots

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

Freedom camping: Freedom camping around lake Hawea, some on Lake Wanaka and at the informal stopping areas along the corridor. Rubbish removal and fly tipping/dumping is a growing maintenance cost.

Renewals

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

Improvements

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

Figure 26 – People, places and environment investment

Investment pressures

Access and resilience

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

- **Single lane bridges:** There are multiple aged narrow single lane bridges, some of which are also height constrained, that limit the size or route choice of commercial vehicles, particularly large vehicles such as may be required for establishing new industries or during a civil defence recovery response.
- **Improve monitoring and response times:** Linking as much of the corridor to the ITS system will allow for issues to be identified sooner and delivery of more timely responses. Real-time monitoring, particularly around known incident prone spots, will allow for reduced response times. Due to the long diversion routes, the ability to reduce the time of closures and blockages will be vital for customers.
- **Frequency of maintenance requirements:** Higher priced and more frequent treatments are required for robustness, and to keep route open by ensuring less interruptions. The corridor experiences significant degradation and poor levels of service on remote sections, requiring frequent works to be undertaken and blocking of traffic in the process. Due to the low traffic volumes on the corridor, justification of high levels of CAPEX funding is unlikely, but would allow investment in higher quality assets which require less frequent maintenance.
- **Resilience engineering:** Increased engineering measures and greater use of vegetation in exposed parts and identified high risk areas of the corridor may be required to help mitigate or reduce the impacts of extreme weather events.
- **Identifying the right level of maintenance:** the appropriate levels of ongoing maintenance required for highway portions that have a significant alternative route function needs greater consideration. Usually such routes are required to act at a higher level of service and ONRC classification than their everyday usage, which can have an immediate effect on road safety conditions as well as overall levels of service to both corridor users and adjacent land uses.

Reliability and efficiency

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

- **Magazine Point to Rocks Road, SH6 Nelson:** most congested volumes and laden vehicles to Port Nelson and Nelson Airport (Annesbrook Road). Is the most expensive stretch to maintain with high customer expectation. Further investment may be required beyond that provided to meet expectation.
- **Albert Town Bridge, SH6:** starting to see performance issues from growth at the Albert Town Bridge, will eventually require two-lane capacity across the river e.g. widened or added parallel bridge. Consider development of business case for the future of the bridge and or route.
- **Hours of Work:** Access to the corridor for maintenance is coming under pressure in busier urban and commercial areas. Pressure on the working window between hours of operation, seasons and the summer peak tourist season. Night works may be required at the Nelson end, but then also pressure from residents, especially through Tahunanui and Rocks Road.
- **Post Event inspections:** post winter and post event inspections and “eyes-on” the corridor are essential, because of the potential for rapid deterioration of surfaces or carriageway.
- **Inform and Advise:** informing tourists and commercial vehicles about events. Limited communications along parts of the corridor can constrain timely advice.

Safety

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

- **Response time to crashes:** Effective communication speeds the response to crashes or incidents providing improved outcomes – survivability and reduced closure delay.
- **Delineation:** Maintaining delineation at a level that is optimal creates a need for constant monitoring and attention, particularly where there are the low levels of traffic and relative remoteness of much of the corridor.
- **Wire rope barriers:** Safe Roads Alliance work proposes more use of wire rope barriers as a response to high levels of personal risk. This will place an increased burden on maintenance to keep these assets in a serviceable condition and increase safety assets requiring maintenance. Increasing use of wire rope barriers, both on medians and shoulders creates an increased and less predictable maintenance cost for these sacrificial assets.
- **Curve Warning Signage:** as part of the Visiting driver safety programme there is additional curve warning signage that needs regular maintenance.
- **Managing Drivers:** travel distances are long and at times demanding, even more so when a detour or travel by an alternative route is required. Facilities, amenities and adequate advice such as via signage are required of distances between locations or for driver relief, fuel, trucks.
- **Bridges:** signage, markings and end treatments require ongoing maintenance to highlight the increased risk due to narrowing and single lane shared road sections.
- **Working on the Road:** maintenance costs need to allow for complete closure of the road and complete lane closures to ensure safe access for maintenance purposes.
- **ATP:** as ATP is added to the corridor there needs to be consideration of its 6-year renewal cycle both in terms of working window and budget.
- **Winter Maintenance:** the corridor is much less hospitable during winter weather conditions and requires winter maintenance regimes and post winter inspections as the carriageway can deteriorate rapidly and quickly become unsafe.

People, places and environment

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

- **Vegetation management requirements and environmental compliance**: Along the entire corridor are likely to increase as tourism exposure and implications on the New Zealand environmental reputation widens resulting in operational cost implications.
- **Cycleways:** Rocks Road specialist treatment and cyclist provision around the Nelson/Richmond urban areas.
- **SH 6 alternative SH1 route:** maintenance of rest areas and additional amenity facilities added for duration of alternative route function.
- **Rivers Risk:** rivers are identified as an explicit risk that create additional operation costs, can change rapidly and influence the durability and access across the multiple rivers along this corridor. In some areas bridge density is high making the corridor very vulnerable with a consequential cumulative cost increase with successive weather events.
- **Campervan Convoys:** a recent phenomenon and maturation of self-drive tourism is convoys of camper vans, which creates additional pressures on capacity at stopping areas, vehicle overtaking or delay effects and single lane bridges.
- **Visitor driver programme:** the visitor driver programme has proven effective in addressing the different needs of tourist drivers such as adding signs, stopping places, but to remain effective these signs will require good maintenance and ongoing attention.
- **Sensitive Environments:** maintenance and management through Mt Aspiring National park requires co-operation with DoC, such as co-ordination and consenting of works along the coastline and watercourses and for specialised aspects such as Fish passage and sensitive receiving environments.
- **Overhanging Trees:** overhanging trees and vegetation are an issue, particularly in snow and ice prone mountain pass areas such as between Glenhope and Murchison at SH65. Snow fall can drop trees and make the road impassable.
- **Stock Effluent:** there is a stock effluent station based at Appleby that requires consideration of maintenance and operation costs.
- **Heritage New Zealand:** The corridor has many features of interest to tourists including the presence of multiple examples of Callender-Hamilton galvanised steel Truss bridges (12? on this corridor).

Investment future considerations

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

- **Surface skid resistance:** Ongoing, continued investment into the reduction of surface skid resistance will be required to ensure the corridor performs in terms of the desired safety outcomes. Investigation into alternative pavement materials which provide an improved balance between cost and benefit may be warranted.
- **Future levels of service:** Future proofing and maintaining appropriate levels of service for communities will be a key consideration for investment along this corridor as it continues to face changes in land use, travel behaviour, demand and mode share. …and something about the alternative route function perhaps
- **Development of alternative routes:** The lack of good HCV alternative routes requires increased investment in mitigation to ensure the main corridor remains available. Investment in improving local road alternative could have a positive impact on maintenance costs. IN particular the repeated constraint of multiple narrow aged single lane bridges requires further consideration.
- **Increasing urban development along the corridor:** The corridor will require protecting from reverse sensitivity at either end as growth continues, particularly where this creates higher expectations and a maintenance burden (such as noise reducing surfacing or noise attenuation treatment and constraints upon hours of work within the corridor. Noise and vibration are increasing concerns where heavy vehicles and urban areas abut. SH6 at Nelson end carries heavy loads to Nelson Port well into hours of darkness and through traffic signals creating additional noise from acceleration and braking as well as usual road running. There is increasing pressure and expectation that road noise can and will be managed, through signage and surfacings.
- **Timeliness of incident response:** Being able to respond quickly and efficiently to incidents on the network is important to maintaining reliable and efficient journeys for customers, this requires a higher level of response – both in identification and response.
- **Narrow bridges:** The future profile and levels of service provided by the aged and narrow single lane bridges along this corridor are closely linked to future economic capacity and opportunities for the communities. The structures strategic business case needs to be developed including consideration of tourist cycle usage, commercial bulk transport and self-drive tourists as well as resilience. The bridge management plan needs inclusion as an essential aspect of managing this corridor.
- **Freight access:** Future maintenance and improvements on SH6 and SH67 need to consider opportunities to improve the access of freight vehicles and to the Ports of Greymouth and Westport, balanced with community outcomes and economic efficiencies.
- **Geological instability:** the entire corridor is highly variable and geologically instable with slumping and rockfall present along the entire route, coastal and alpine areas alike. This is further exacerbated by the climatic extremes across temperatures, rainfall and seasonal fluctuations. The costs to maintain can vary significantly, but events are most likely to influence multiple sites concurrently.
- **Makarora River Bridge:** This bridge requires strengthening. Currently there are weight restrictions.
- **Provide more appropriate and better spaced rest areas and viewing points:** Many visitors underestimate the length of journeys in New Zealand. Providing improved rest area facilities will help more drivers remain alert when traveling on these unfamiliar routes. A review into current stopping places and facilities would help to inform rest area strategy that incorporates towns and rural settlements as places where such facilities can be accessed. The issue is how to safely maintain, particularly where there is the explicit need for an alternative route function.
- **Intersection with SH84 at Mt Iron** is an unconventional double T layout that requires users to make a dog-leg movement and needs to be upgraded.

Large landslip closed State Highway 6 on the West Coast between Haast and Makarora in 2013

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

Section	Infographic	Information Source	Date
	Closures	NZTA 2011-2015_Treis_incidents_by_region.xlsx	2015
Reliability and efficiency	Efficiency	NZTA – MapHub EfficiencyNet	2016
	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			
Overview	Corridor Asset Base	NZTA_ 2017 Values by Corridor.xlsx complied by Opus International Consultants from RAMM and other asset information sources	
	Asset Condition and Performance	Summarised from the data sets described below	
Asset condition and performance	Surface Skid Resistance	SCRIM data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Safety Treatment	SAL data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Defects	100m Priority data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Age	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Service life of Prior Surface	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Resurfacing	Resurface data derived from forward works programme	2016
	Proportion of Travel on Smooth Roads	STE data derived from RAMM by NZTA Data Quality and Access team	2016
	Pavement Strength	Deflection data derived from RAMM by NZTA Data Quality and Access team	2016
Investing in the Corridor			
Summary Investment	Summary Corridor Investment	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
	Summary investment by work category	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
Investing in access and resilience			
	Maintenance Hot Spots	Network Manager and Regional Staff	2017

Section	Infographic	Information Source	Date
Investing in access and resilience	Resurfacing 2018 - 2021	Resurface data derived from forward works programme	
	Renewal Investment	National Bridge Replacement Programme National bridge replacement programme 2017 LCMP data.xlsx	
	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		

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	

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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