Picton to Lyttelton

CORRIDOR MANAGEMENT PLAN

1 71 74

2018-2028

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

Table of contents

Table of figures

Executive summary

The Picton to Lyttelton corridor comprises of SH1 from the Port at Picton through to Yaldhurst, where it intersects with SH73, and SH74, which connects to SH1 at Belfast and skirts around Christchurch City, continuing south through to the Port of Lyttelton. The corridor also includes SH71, providing a link between SH1 at Kaiapoi to Rangiora. The Main North Line rail corridor runs alongside SH1 from Picton to central Christchurch. A freight spur line provides the connection through to the Port of Lyttelton, crossing SH74 at Heathcote.

The corridor is approximately 386 km long (3.4% of the state highway network). The total value of assets along the corridor is $705M (3.0% of the total national asset value).

The SH1 corridor provides the only road link along the east coast of the northern portion of the South Island. It provides a vital link for freight and tourism, and functions as the key access route for local journeys between townships. The road and rail corridor is currently closed north of Kaikoura through to Clarence following the devastating Kaikoura earthquake in November 2016, requiring a 2.5-hour detour via Lewis Pass.

SH 71 is a key commuter link for residents travelling to Christchurch; SH74 provides a crucial link to the Port of Lyttelton, the third largest port in NZ.

SH1 is the South Island's premier north-south inter-regional highway. Along with the South Island Main Trunk Line, the 350-km corridor from Picton to Christchurch forms the primary connection between the North Island and New Zealand's second biggest city. At Picton, the corridor is a gateway for tourists and freight coming to the South Island via the inter-island ferries. At the southern end, it becomes a collector route for commuters from the Waimakariri and Hurunui Districts to the main employment and education centre of Christchurch City.

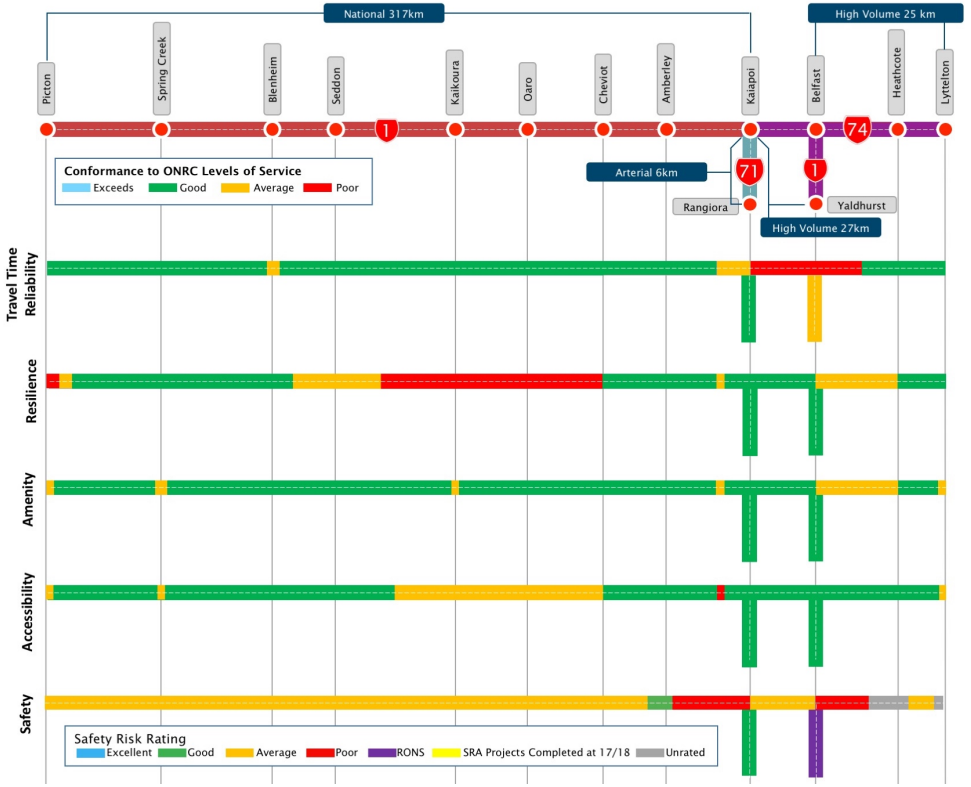
The SH1 route has been adversely affected by the Kaikoura earthquake in November 2016 with long term full closures in the section between Clarence and Kaikoura. Reconstruction and re-instatement work is currently underway to reopen the State Highway through the North Canterbury Transport Infrastructure Recovery (NCTIR) alliance. This Corridor Management Plan looks beyond the reinstatement of the closed section of corridor, to identify and address the known pressures and future considerations for the route.

Deficiencies on SH1 including low overbridges and constrained tunnels restrict access by over dimension and longer HPMV vehicles, requiring a lengthy detour via Lewis Pass. The state highway is also a very popular tourist route with a wide array of tourist activities, and there is a desire to promote further tourist activity in the area and encourage longer stays.

Approaching Christchurch, the corridor carries around 50,000 vehicles per day. Planned and projected residential growth will lead to increased peak hour demand on SH1 and SH71, particularly from growing residential areas in the Waimakariri District.

High traffic volumes at the southern end of the corridor lead to travel time reliability problems, particularly during the morning peak south of Woodend. For the remainder of the corridor, there is little evidence of a significant travel time variability issue

Figure 1 - Performance of the corridor against ONRC outcomes



Safety is a particular problem for the corridor. North of Ashley River, the highway passes through varied terrain including rolling hill country, challenging mountainous terrain and constrained winding coastal stretches. The variable standard of the road along this length of highway is out of context with its status as a "National" route and a tourist highway. Large sections have a KiwiRAP safety rating of less than the 3-star target. Between Kaikoura and Kaiapoi, SH1 is classified as a High Risk Rural Road with the majority of the crashes a consequence of cornering and run off road. Coupled with the inconsistent nature and unforgiving roadside environment, high numbers of fatal and serious injuries are recorded on this corridor.

Introduction

Purpose

What is the corridor management plan?

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

The corridor management plan considers a combination of:

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

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

Why is it needed?

The corridor plan provides a link between the 30 year, long term planning outlook, the 10-year medium term investment programme and the 3-year land transport programmes for the next funding round.

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

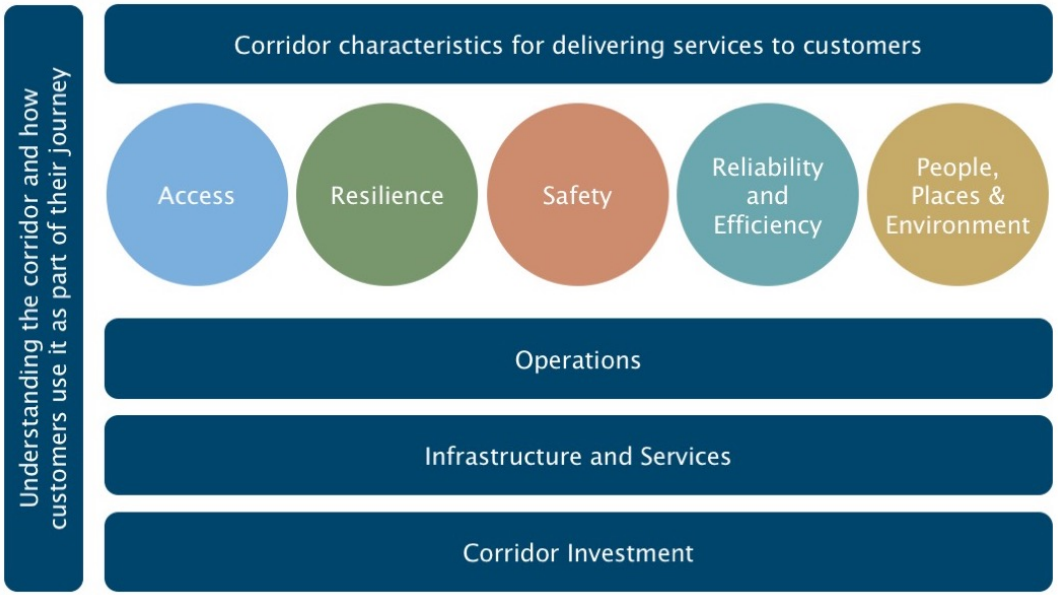
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on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

How will we use it?

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

In conjunction with the 30-year 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 Picton to Lyttelton corridor comprises of SH1 from the Port at Picton through to Yaldhurst, where it intersects with SH73, and SH74, which connects to SH1 at Belfast and skirts around Christchurch City, continuing south through to the Port of Lyttelton. This Corridor Management Plan also covers SH71, providing a link between SH1 at Kaiapoi to Rangiora. The Main North Line rail corridor runs alongside SH1 from Picton to central Christchurch. A freight spur line provides the connection through to the Port of Lyttelton, crossing SH74 at Heathcote.

The SH1 corridor provides the only road link along the east coast of the northern portion of the South Island. It provides a vital link for freight and tourism, and functions as the key access route for local journeys between townships. The road and rail corridor is currently closed north of Kaikoura through to Clarence following the devastating Kaikoura earthquake in November 2016, requiring a 2.5-hour detour via Lewis Pass.

SH 71 is a key commuter link for residents travelling to Christchurch; SH74 provides a crucial link to the Port of Lyttelton, the third largest port in NZ.

The regional economy

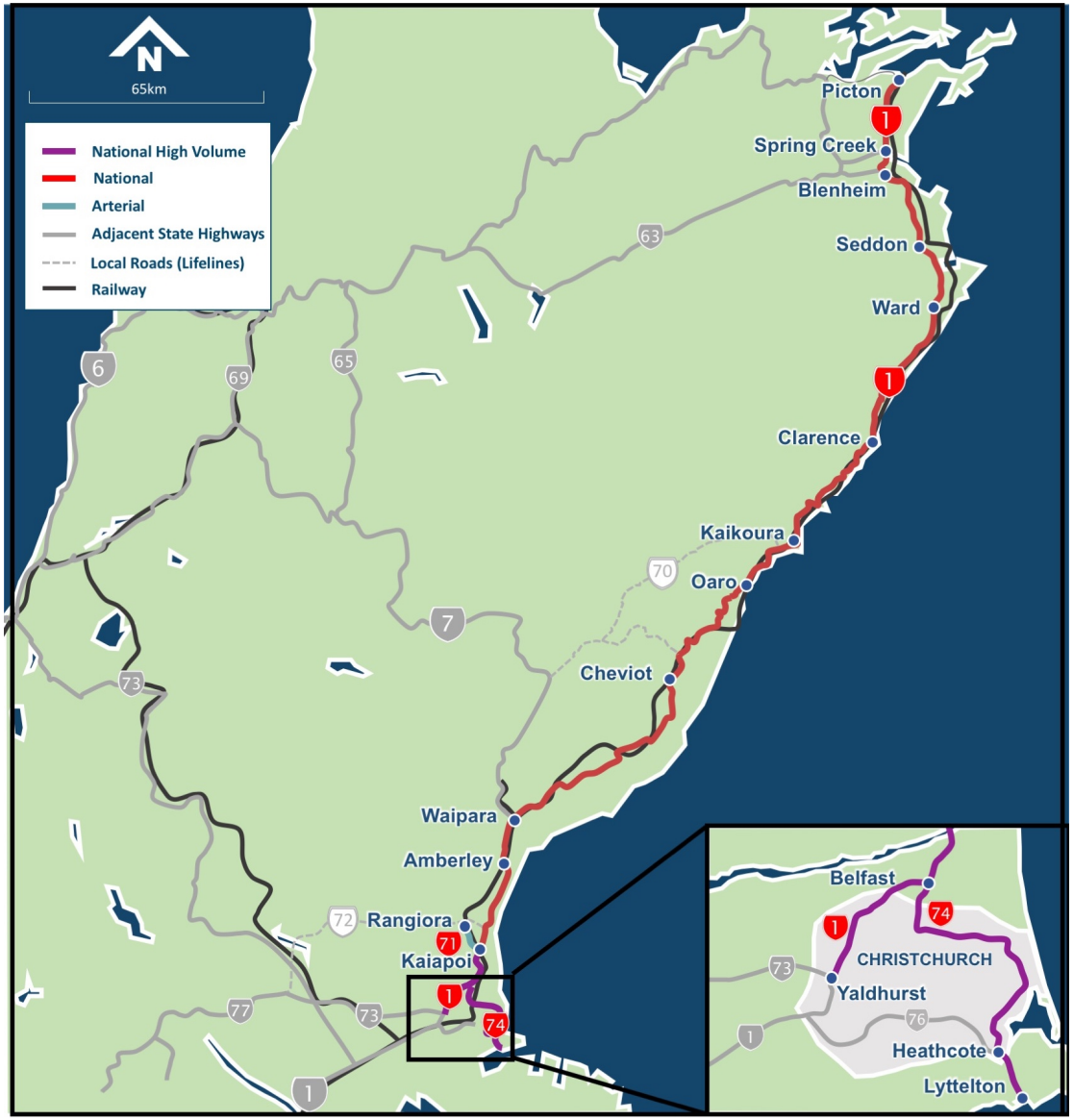
The corridor covers two regions, Marlborough to the north of Clarence, and Canterbury to the south. Christchurch is hub of the Canterbury region and is the second largest city in NZ, and the largest in the South Island. It is home to 333,000 people, representing 8% of the national population. The City provides 8.6% of national employment and generates 9.2% of New Zealand's Gross Domestic Product (GDP). Lyttelton Port is of significant national economic importance, handling 13.9% of NZ's container movements.

Christchurch has a strong manufacturing base, however more people are now employed in the construction industry following the Christchurch earthquakes in 2010 and 2011. The outer suburbs of Christchurch, including Rangiora and Kaiapoi have experienced significant expansion and population growth, as people have moved away from earthquake damaged homes in the central city. The tertiary and health care sectors are major contributors to the regional economy, and Christchurch Airport provides the tourist gateway to the South Island.

Kaikoura is located in North Canterbury, and is a major tourist drawcard; key attractions focus on viewing marine life including whales, dolphins and seals. The loss of through access to Kaikoura has had a devastating effect on the region's economy. The estimated loss in tourism spend was approximately $21 million for the first seven weeks following the Kaikoura earthquake.

Blenheim is the largest town in the Marlborough region, which is NZ's largest wine and aquaculture region, and a major horticultural and pastoral farming area. The port at Picton offers a strategic link for tourists and road and rail based freight between the North and South Islands.

Figure 3 – Corridor overview



Understanding our customers

Key Customers

The key customers utilising the corridor are diverse, and utilise a range of transport modes. Different customers have different needs, expectations, and personal circumstances for using the transport system. Therefore, what customers value from the transport network needs to be understood in the context of who they are.

Daily commuters to Christchurch

Commuting by car is the dominant transport mode for commuters. Following the Christchurch earthquakes in 2010 and 2011, rapid population migration occurred in towns to the north, south and west as other parts of the City were red-zoned and abandoned. Many businesses have relocated out of the CBD. Land use change and development in Christchurch has been abrupt, requiring an evolving response to the ongoing changes. The dispersion and changes to land use have resulted in significant growth in the number of commuter vehicles driving to and from Christchurch each day. Bus use has reduced since the 2006 census; however, Christchurch has one of the highest cycle mode shares in NZ, with 7.0% of the City's residents travelling to work by bicycle.

Insights into daily commuter users:

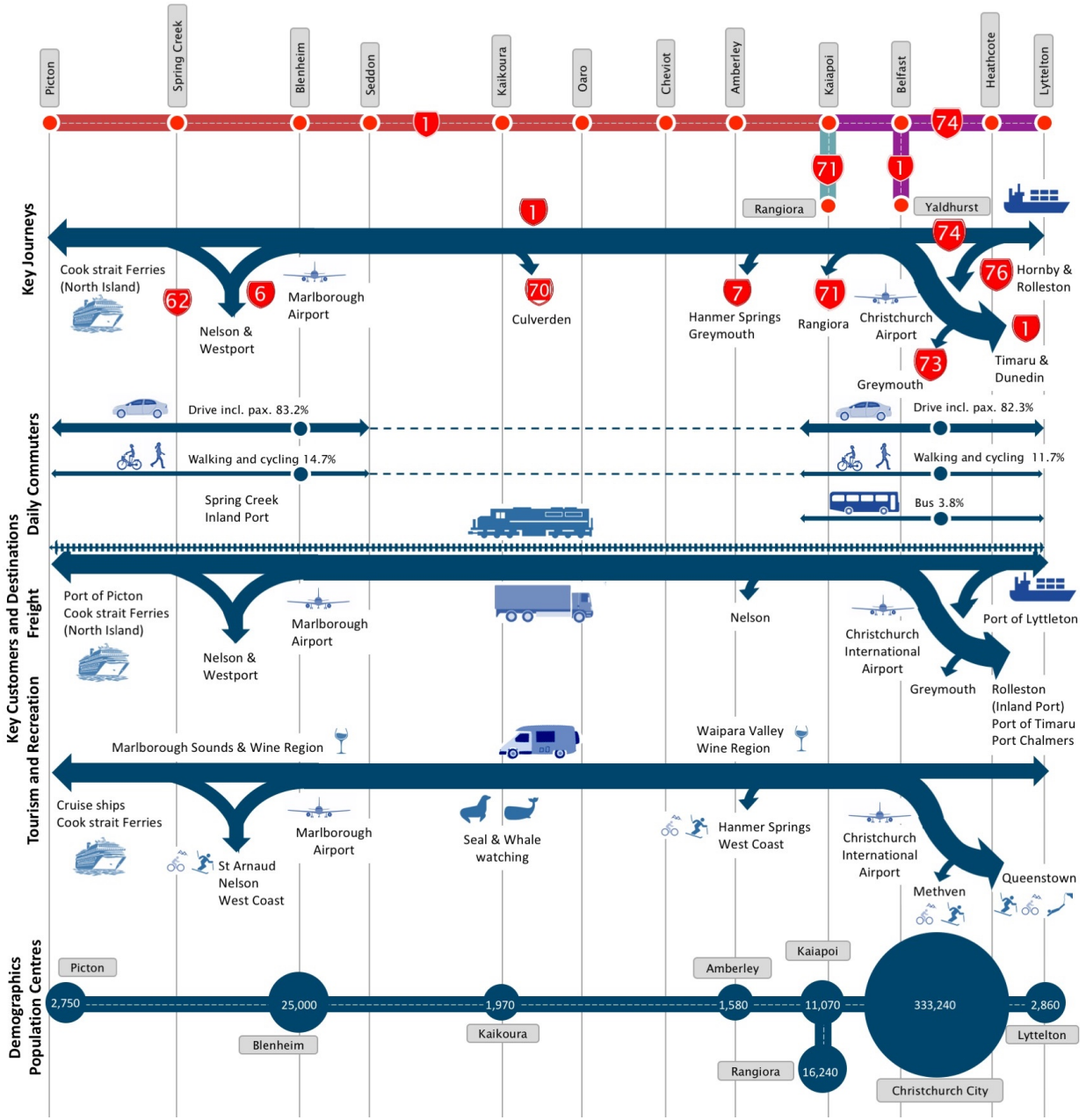
Road use: The road environment in Christchurch is constantly changing and drivers need to be informed of road works and disruptions. While commuters have a number of transport choices, many businesses and residents have dispersed, reducing the viability of non-car modes.

Road knowledge: While commuters are generally familiar with their route, road works, road closures result in ongoing changes to routes and unpredictable journey times.

Pain points: Changing commuter patterns have resulted in high levels of congestion, particularly to the north of the City due to traffic from new urban growth areas. Morning peak traffic is funnelled from the motorway to highway and onto the local road network, resulting in delays and side friction.

Daily Commuters expect: Predictable journeys at peak times, accurate and up to date information about traffic (peak and off peak), weather, road conditions, road closures and hazards, and transport mode choice to provide a more reliable and accessible transport network.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

The highway is an important corridor for domestic and international tourists (through route access is currently unavailable following the Kaikoura earthquake in November 2016). Picton provides connections to the North Island via the Cook Strait ferries; SH1 provides connections to the towns and cities along the South Island's east coast, and the main connection to Christchurch airport. The corridor is also used for tourists connecting to Marlborough Sounds and Nelson to the North; and Queenstown and Dunedin to the South.

Christchurch Airport is New Zealand's tourism gateway to the South Island. It is the country's second busiest airport, with over 1000 weekly domestic and international flights. Major attractions in and around Christchurch include Christchurch Botanic Gardens, the International Antarctic Centre, the TranzAlpine scenic train and Orana Wildlife Park.

Kaikoura is renowned for its natural environment and abundance of marine life and attracts high numbers of domestic and international tourists. The Marlborough Region is NZ's largest wine region, and is the gateway to the Marlborough Sounds. Tourists visit the area to view whales, dolphins and seals, and enjoy locally produced wine and seafood.

Insights into tourist and recreational users are as follows:

Road use: The corridor has high numbers of tourists over the summer and shoulder periods. Some tourists may have timebound ferry and airport connections. Others may have tight holiday schedules and undertake long distance road journeys following a long international flight. These factors can increase risk taking and exposure to fatigue.

Road knowledge: Many international tourists have not experienced New Zealand roads or conditions. Some tourists are driving unfamiliar vehicles such as campervans, and may be inexperienced driving on the left. Travel times are often underestimated, given the varied terrain and limited passing opportunities, and travellers may take risks if they have time critical transport connections.

Pain points: Limited passing opportunities may make it difficult for drivers to overtake slower vehicles that may result in delays. The corridor is particularly demanding and features sections of narrow carriageway and hundreds of out of context curves. The challenging road environment can be particularly tiring for long distance regional journeys.

Tourist and recreational users expect: Ease of travelling around the country, straightforward connections between modes, well signposted directions to key attractions and landmarks, easy access to information, and places to stop for breaks and take photos when undertaking regional journeys. Cell phone reception aids tourists to access information and advise others of delays or changes to their schedule.

Freight operator

The combined road and rail corridor provides one of New Zealand's most important freight links, providing access via SH74 to the Port at Lyttelton, New Zealand's third largest container port. Each year an average of 2.7 million tonnes of freight is moved by road, with a further 0.8 million tonnes moved by rail. At the northern end of the corridor, the SH1 terminates at Port Marlborough in Picton, which serves as the South Island terminal port for inter-island freight ferries. The corridor provides the only unrestricted HPMV route between Christchurch and Picton.

Freight drivers are currently unable to travel a return journey between Picton and Christchurch in a single shift

Insights into freight operators are as follows:

Road use: Schedule and times are critical; many northern journeys are destined for the Port of Picton. Ferry schedules influence the travel patterns on the highway and can result in time pressures and platooning. Following the Kaikoura earthquake and the closure of SH1, freight drivers can no longer travel between Picton and Christchurch and back in a single shift, making freight logistics more complicated.

Road knowledge: Knowledge of road conditions is high, verging on technical. Confidence of managing difficult conditions is high, and drivers are willing to take calculated risks to keep business going. Freight drivers are aware of the high numbers of tourists on the corridor and their limitations.

Pain points: Time bound and platooning traffic as a result of ferry arrivals and departures can increase delays and lead to risk taking. Crashes and weather conditions result in intermittent road closures, threatening the resilience of the route. Road closures in the central part of the corridor requires a detour via Lewis Pass, adding 150 kilometres to the journey on lower classified roads. The steep topography, winding coastal route, narrow road alignment and high numbers of inexperienced tourist drivers contribute to a challenging environment that increases the safety risk to all users on the corridor.

Freight operators expect: Infrastructure that enables goods to be transported safely and reliably. This includes viable and practical alternative routes that enable trucks to complete their journeys safely. Freight operators need convenient places to stop and rest, with access to services and facilities that are located in areas that provide adequate parking and enable trucks to safely re-join the traffic stream. Passing lanes provide opportunities for trailing vehicles to overtake and reduce risk taking, especially over mountainous terrain. Information about road conditions and potential delays should be readily accessible to enable freight operators to make timely decisions to reduce travel time and costs.

How we deliver services along the corridor

Transport partners

The land transport system comprises more than State Highways. To provide customers with a reliable and safe journey usually requires the use of two or more transport infrastructure provider's networks. As such the Transport Agency works with other network providers to provide a one network approach. The Transport Agency works closely with the five local authorities and two regional councils along the corridor shown in Figure 5.

Collaboration along the corridor

Marlborough roads

Marlborough Roads is an established alliance between Marlborough District Council and the NZ Transport Agency. The alliance is responsible for the management and maintenance of all public roads within the district including the State Highway network.

Christchurch transport operations centre

Christchurch Transport Operations Centre (CTOC) was established in 2013 to better manage traffic and transport operations across the City. CTOC is a partnership between Christchurch City Council, ECan and the NZ Transport Agency, and was initiated to provide coordinated and reliable travel information following the Christchurch earthquakes. With the large amount of road works underway, CTOC can adjust traffic light phasing and coordinate temporary traffic management to reduce delays.

The North Canterbury transport infrastructure

The North Canterbury Transport Infrastructure Recovery (NCTIR) alliance is a joint venture between NZ Transport Agency, KiwiRail, and four construction companies to manage the rebuild of the SH1 road and rail corridor following the Kaikoura earthquake. NCTIR's scope also includes managing the upgrade and interim maintenance of the alternate highway route between Picton and Christchurch, along State Highways 63, 6, 65 and 7 (Lewis Pass), and the Inland Road between Kaikoura and Culverden.

Safe roads

"Safe Roads and Roadsides" is one of the four components of the New Zealand Road Safety Strategy for 2010 to 2020. The Safe Roads Alliance, SRA, was established to progress the improvement and delivery of safe roads and roadsides outcomes. The SRA develops a national highway improvement programme at its Hamilton office and the projects are then delivered via the partners at regional office level. On this corridor, Safe Roads are working on improvements to SH74 and on SH1 at Weld Pass

Figure 5 - Map of associated local authorities

Network Outcomes Contracts approach

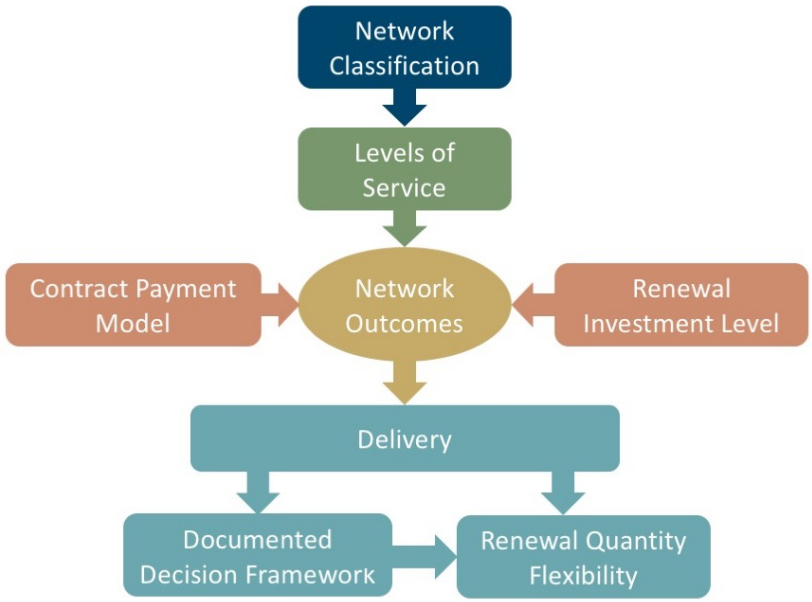
A new approach has been introduced for maintenance and operations through the introduction of Network Outcome Contracts (NOC) aimed at improving the effectiveness of service delivery. By capturing the best elements of the three historic procurement methodologies (PSMC, Hybrid and Traditional models) into this new contract model will deliver 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 is in place to represent 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 Picton to Lyttelton corridor crosses over two NOC contract areas; North Canterbury and Marlborough.

North Canterbury Network Outcomes Contract

The North Canterbury Network Outcomes Contract is delivered by Downer. In relation to this corridor, the contract covers SH1 between the Waimakariri River and Tirohanga (just north of Kekerengu), and SH71. The contract commenced on 1 May 2017 for a five-year period, with the option to extend for a further two years based on performance.

This contract is supported by the following specialist maintenance contracts:

- **Traffic signal maintenance** Traffic signal maintenance is managed by the Christchurch Transport Operations Centre (CTOC).
- **Traffic monitoring sites -** Traffic monitoring across North Canterbury is managed by HTS. This contract was awarded on 1 November 2016, with a contract term of five years (2+1+1+1).
- **Street lighting maintenance –** Street lighting is managed by NZ Transport Agency and maintenance is undertaken by the relevant local authority.
- **Regional bridge and structures:** The professional services contract for regional bridges and structures was awarded to OPUS on 1 July 2015 for three years, with a further one year right of renewal.

Marlborough Roads Network Outcomes Contract

The Marlborough Network Outcomes Contract is delivered by HEB/Opus Joint Venture. In relation to this corridor, the contract covers SH1 between Tirohanga and Picton. The contract commenced on 1 July 2013 for a five-year period.

- **Traffic monitoring sites -** HTS delivers professional services for traffic monitoring across North Canterbury. This contract was awarded on 1 November 2016, with a contract term of five years (2+1+1+1).
- **Street lighting maintenance –** Street lighting maintenance is managed by Marlborough Lines, who were awarded a five-year contract on 1 July 2013.
- **Regional bridge and structures:** The professional services contract for regional bridges and structures was awarded to OPUS on 1 July 2015 for three years, with a further one year right of renewal.

Drivers for change

The key driver for change on this corridor is the impact of the 2016 Kaikoura Earthquake. Significant works have been completed to re-open the route to general traffic, however the section between Kaikoura and Clarence remains closed. The corridor is critical to the economic prosperity of not only the communities through which it passes, but the South Island and New Zealand economy. Not only has this changed the main north-south route between Picton and Lyttelton, it has transformed the urban form of Christchurch having a significant and permanent impact on the transport network.

Looking beyond the impacts of the Kaikoura Earthquake, the key drivers for change will be responding to the needs of tourism and improving the resilience of the transport network – both road and rail.

Along with the main trunk railway line, the 350-kilometre corridor from Picton to Christchurch forms the primary connection between the North Island and New Zealand's second biggest city. At Picton, the corridor is a gateway for tourists and freight coming to the South Island via the inter-island ferries. At the southern end, it becomes a collector route for commuters from the Waimakariri and Hurunui Districts to the main employment and education centre of Christchurch City. The remaining sections of corridor provide connectivity between small towns, key production areas and their markets, and tourist destinations enroute.

Improving resilience

Prior to the Kaikoura earthquake, the road and rail corridor carried the largest rural freight volumes in the South Island, and has one of the highest volumes of freight in the country. The freight task is expected to increase by 85% in Canterbury and 50% in the Marlborough/Tasman/ Nelson Regions by 2042. This will require a resilient transport network which can cater for these increasing demands.

Midland Port and MetroPort inland ports have been recently constructed at Rolleston, providing new distribution centres for freight operators. Both facilities offer road and rail access to shipping, and will reduce the volume of freight vehicles travelling through Christchurch City to Lyttelton, and to the Port of Timaru. This will improve connectivity and efficiency of freight supply chains.

Demands on the state highway network in Christchurch have resulted in an $800 million investment in an orbital highway/motorway network for the city. This will increase capacity of the highway, improve freight efficiency and provide road safety benefits. Improvements to Christchurch's state highway network will build resilience into the City's infrastructure and strengthen its role as the economic hub of the South Island.

Meeting the demands of tourism

The state highway is a popular tourist route with a wide array of tourist activities, and there is a desire to promote further tourist activity along the corridor and encourage longer stays. With tourism a significant contributor to the economic wellbeing of many communities along the corridor, increasing emphasis on tourism can be expected with a corresponding demand for improved facilities for tourists – including safe stopping places, and good signage.

Changing land use patterns in Christchurch

Christchurch is a key hub supporting regional primary production, processing and export, through logistics, research and development, and manufacturing. The city's economy is closely linked to its relationship with the wider region, particularly the agricultural sector.

The Canterbury Earthquakes resulted in unprecedented change to the city with rapid population migration to smaller settlements within the Waimakariri and Selwyn districts, along with a de-centralisation of commercial and retail activity. Growth in these outer urban districts, and the dispersal of the central city core has resulted in significant changes to transport and land use development patterns.

SH1 Awatere Bridge Tranz coastal train

Understanding customer levels of service on the corridor

Current levels of service performance

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

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

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

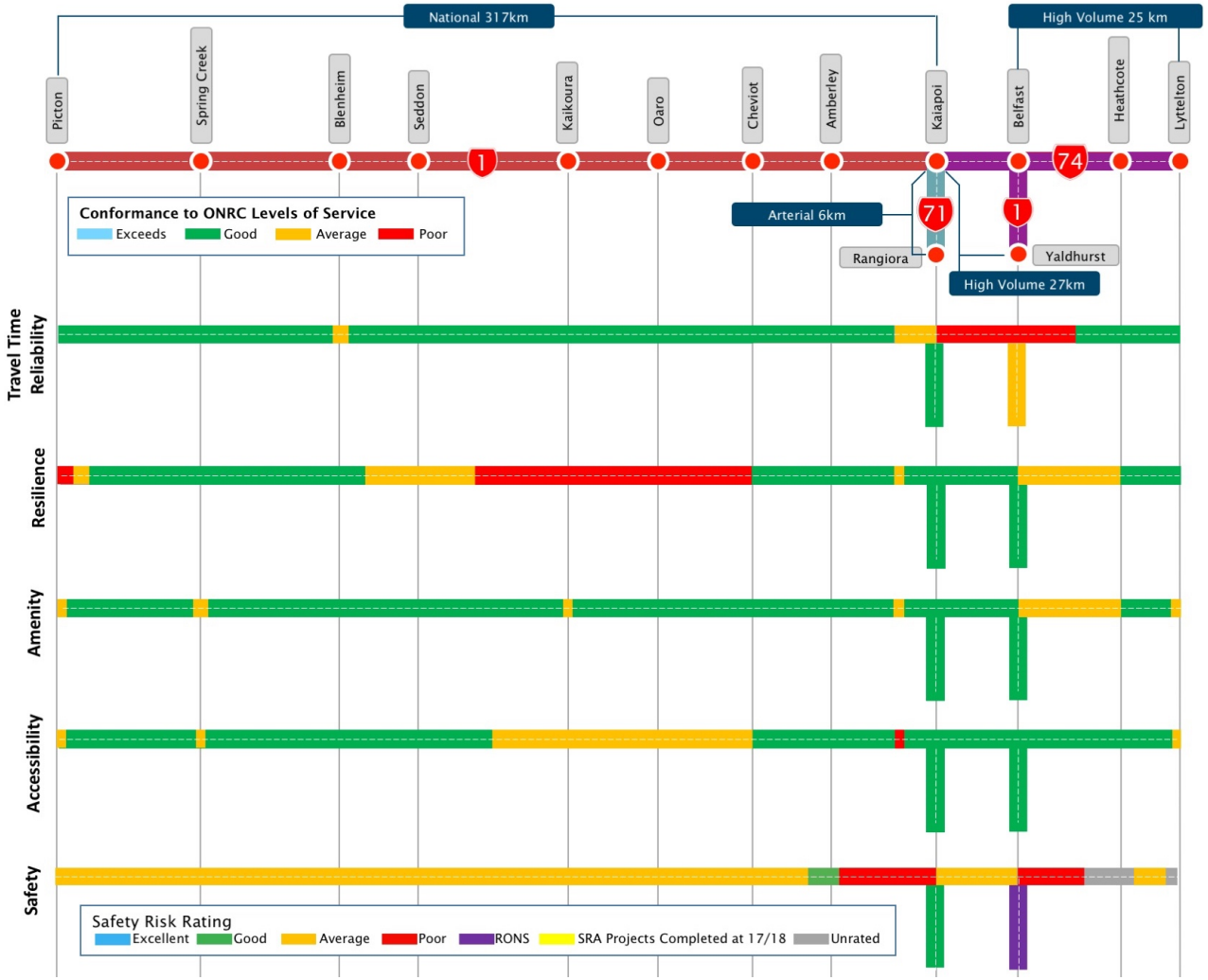
Road classification

The SH1 corridor between Picton and Kaiapoi is classified as National by the ONRC framework. Between Kaiapoi and Yaldhurst, (SH1), and from Belfast to Lyttelton (SH74), the corridor is classified as National High Volume, recognising the importance of these routes that service Christchurch City, Christchurch Airport and the Port of Lyttelton. SH71 to Rangiora is classified as an arterial road.

Figure 6 shows how the Picton to Lyttelton corridor is performing against the ONRC Levels of Service expected for each section of the corridor. Levels of service performance has been determined by workshop participants in the development of this corridor plan. It is not based upon consolidated evidence from the ONRC technical measures.

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 6 shows how the Picton to Lyttelton 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 reliability on most of the corridor is generally good, with little variability in travel times. Platooning has been identified in Picton, following interisland ferry arrivals. Journeys through the Hundalees and Cheviot Hills are slow, however these are generally consistent and have negligible effect on travel time variability. Travel times south of Woodend can be variable at peak times as a result of commuter journeys to Christchurch

Resilience

The coastal segments of the corridor have a poor resilience risk, and are susceptible to rock falls, slips, flooding and inundation. The mountainous sections through the Hundalees and Cheviot Hills are also unstable, and the road corridor is vulnerable to slips and rock falls. Between Kaikoura and Seddon there are no practical lifeline routes; the only feasible detour is via Lewis Pass and Murchison. Lower levels of resilience at Koromiko, Dashwood, Saltwater Creek on SH1, and between Burwood and Bexley on SH74 are due to flooding of low lying areas.

Amenity

There are noise and vibration issues in Picton and Blenheim, and on SH74 between Burwood and Heathcote. Noise resulting from engine braking and lower air quality provide a lower amenity rating at Lyttelton Tunnel.

Views along the Kaikoura Coast are exceptional, with high value natural and coastal landscapes. Yet there are few dedicated stopping areas for photo opportunities and breaks, meaning customers are unable to enjoy the scenic landscapes and views, or may pull over in unsafe locations.

Accessibility

Woodend experiences severance as a result of high traffic volumes on SH1 (17,000 vpd), combined with commercial and residential areas located on either side of the highway. With no traffic signals in the vicinity, there is no platooning of vehicles, resulting in few gaps for local road users to access and cross the highway. Through Picton heavy vehicles travelling to and from the Port often use local streets. Lyttelton has a lower accessibility rating due to the high proportion of heavy vehicles travelling through the town. Blenheim has poor pedestrian access across SH1, and it can be difficult to get onto the state highway from some side streets due to higher traffic volumes.

Over dimension vehicles are constrained by low overbridges and two pairs of narrow tunnels and must use either the Inland Route (Route 70), or the alternate route via Lewis Pass when travelling between Picton and Christchurch.

The road environment for cyclists on SH1 is hazardous, with inconsistent shoulders along much of the corridor, and the high posted speed limit results in a threatening environment for vulnerable road users.

Safety

Most of the rural section of the corridor has a KiwiRAP two to three-star rating, which is below the 3-star rating sought for a National route. The corridor features over 400 out of context curves, and sections of the corridor are less than 8.5 metres wide. Many drivers are undertaking long inter-regional journeys, increasing the risk of driver fatigue crashes. The remoteness of parts of the highway can also exacerbate the severity of injuries, given the long response times. In some areas, heavy vehicles make up 20% of the traffic volume which can make it difficult for other vehicles to overtake. Expected increases in freight volumes on SH1 may lead to increasing safety risks on this corridor.

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.

Major works are being undertaken to reinstate the SH1 road and rail corridor, following the Kaikoura earthquake in 2016. This work is being undertaken by the NCTIR alliance, and it is anticipated that the highway will be reopened by the end of 2017. Programme Business Cases for SH1 have recently been completed to identify safety, resilience, efficiency and amenity improvements to address existing corridor deficiencies. The Opawa Bridge replacement near Blenheim is currently being planned and delivered.

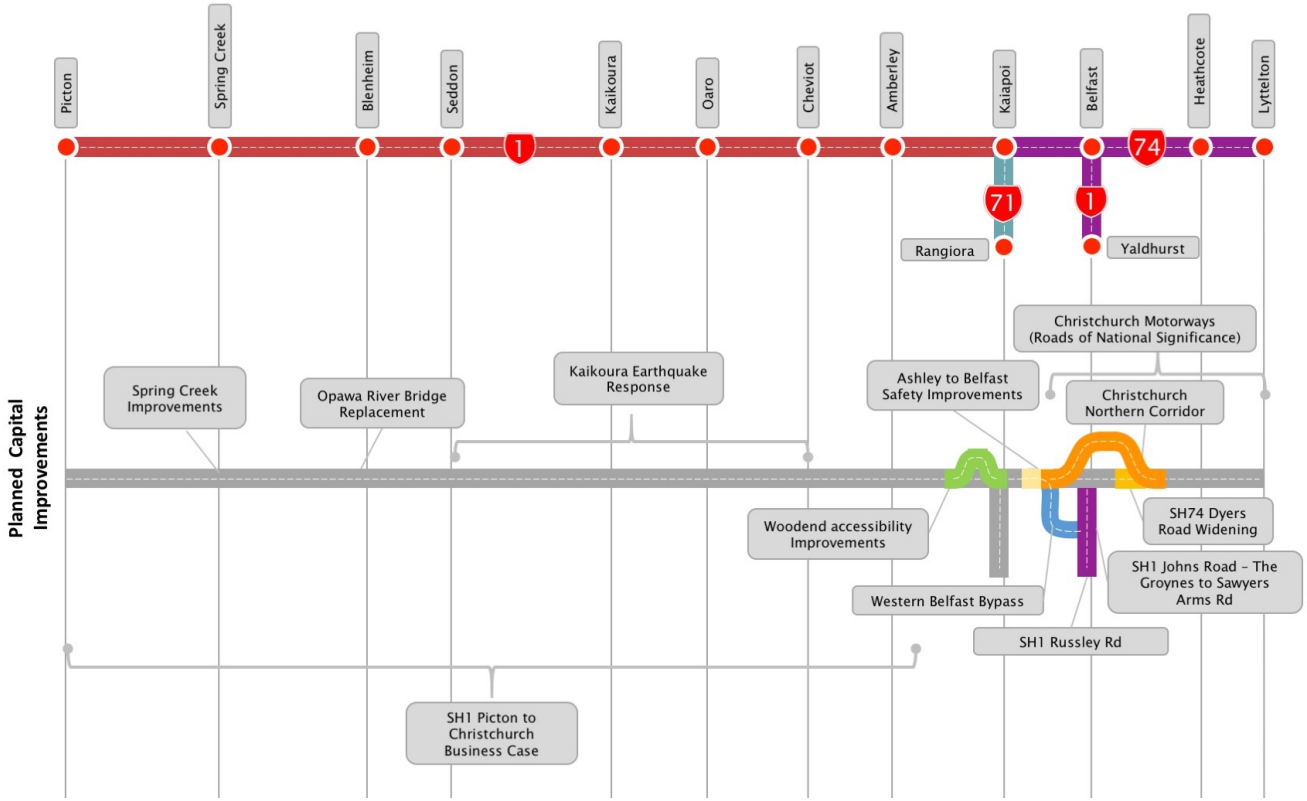
Significant works are being undertaken to provide a network of motorways around Christchurch's as part of the Roads of National Significance (RoNS) programme. This includes the Christchurch Northern Access corridor that will provide a bypass for through traffic and freight travelling to the Port; the Christchurch Western Corridor that includes four-laning SH1. A new fire protection deluge system is being installed in the Lyttelton Tunnel to improve safety and reduce delays in the event of a fire.

When completed, the planned improvements on the corridor are expected to result in improved safety outcomes and network performance. The Christchurch RoNS improvements are expected to reduce congestion, improve travel times and reliability for commuter and freight journeys. The RoNS will also result in improved access to the Central City,

The NZ Transport Agency, are also undertaking accessibility improvements through Woodend, and widening and realigning SH74 at Bromley. The realignment of SH1 to bypass Woodend has been designated, with further planning work to be undertaken.

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

Figure 8 – Significant corridor planned improvements



SH1 from Picton to Christchurch is a national strategic route and has a critical freight task connecting the North and South Islands

Access

Carriageway configuration

Most of the corridor north of Kaiapoi is relatively consistent, featuring two opposing lanes with few passing lanes. The southern section features some lengths of multilane motorway and four lane divided roads. Improvements as a result of the Christchurch RoNS project will provide a more consistent carriageway configuration between Belfast and Yaldhurst.

Speed limits

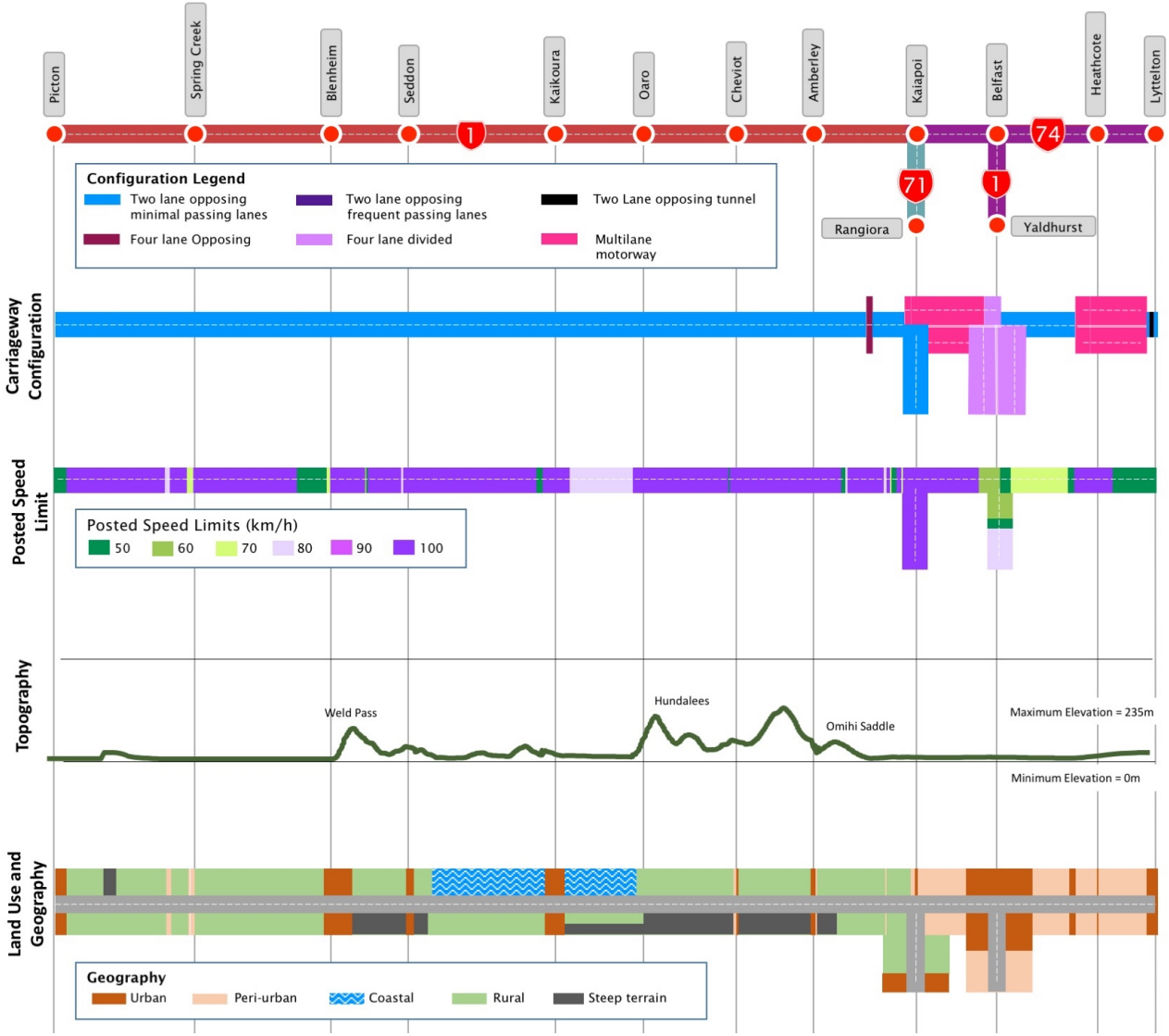
North of Christchurch the corridor is generally 100km/h, except where the corridor passes through urban areas and small communities, where lower speed limits are posted. A 10 kilometre stretch of SH 1 south of Kaikoura to Oaro has an 80km/h posted speed limit as the corridor is constrained and winding. Through the Hundalees, the highway features a tight and winding alignment and vehicle speeds are significantly lower than the posted limit of 100km/h. Lower speed limits on SH74 are in response to residential land use and access through the Lyttelton Tunnel.

Topography/geography

Between Seddon and Blenheim, SH1 crosses Weld and Dashwood Passes, and the Wither Hills. The Kaikoura Ranges are a key feature of the central segment of the corridor. In the vicinity of Kaikoura, the road weaves along the coastline, and is often constrained by steep mountains and the sea. The Hundalees are located between Oaro and Cheviot and present a particularly challenging driving environment.

The northern and southern extents of the corridor are predominantly flat. The corridor transitions from high density urban environments in the south, to rural and coastal townships and settlements in the north.

Figure 9 - Corridor characteristics



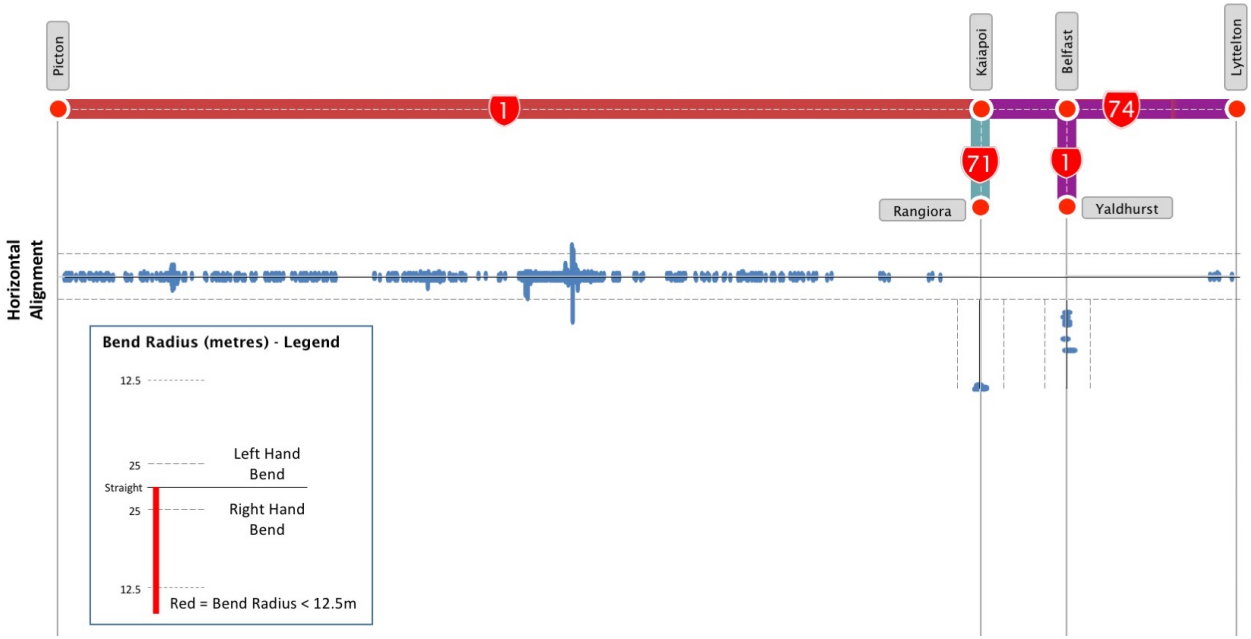
Horizontal alignment

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 between Picton and Waipara. The southern end of the corridor south of Waipara is relatively free of out of context curves, particularly within the Christchurch urban area. Sharper bends with a radius below 25m occur over the Hundalees.

Since 1964 the Lyttelton Tunnel has been a critical road link between the Port of Lyttelton and Christchurch, reducing the travel distance between the two by around 8km. This tunnel is a vital transport artery for delivering the goods and services needed to rebuild Christchurch.

Figure 10 – Horizontal alignment



Volumes

Traffic volumes are generally consistent along much of the corridor, however traffic flows substantially increase on the approach to Christchurch. North of Woodend, volumes are generally low, with the exception of Blenheim, which has moderate traffic flows. Blenheim also experiences high volumes of heavy vehicle traffic. Traffic and freight volumes increase south of Woodend, with moderate traffic flows on SH1, SH71 and SH74. Very high freight volumes are experienced in the vicinity of Heathcote and Lyttelton, due to the convergence of SH76 and SH 74, and the proximity to the Port and industrial areas.

HPMV routes

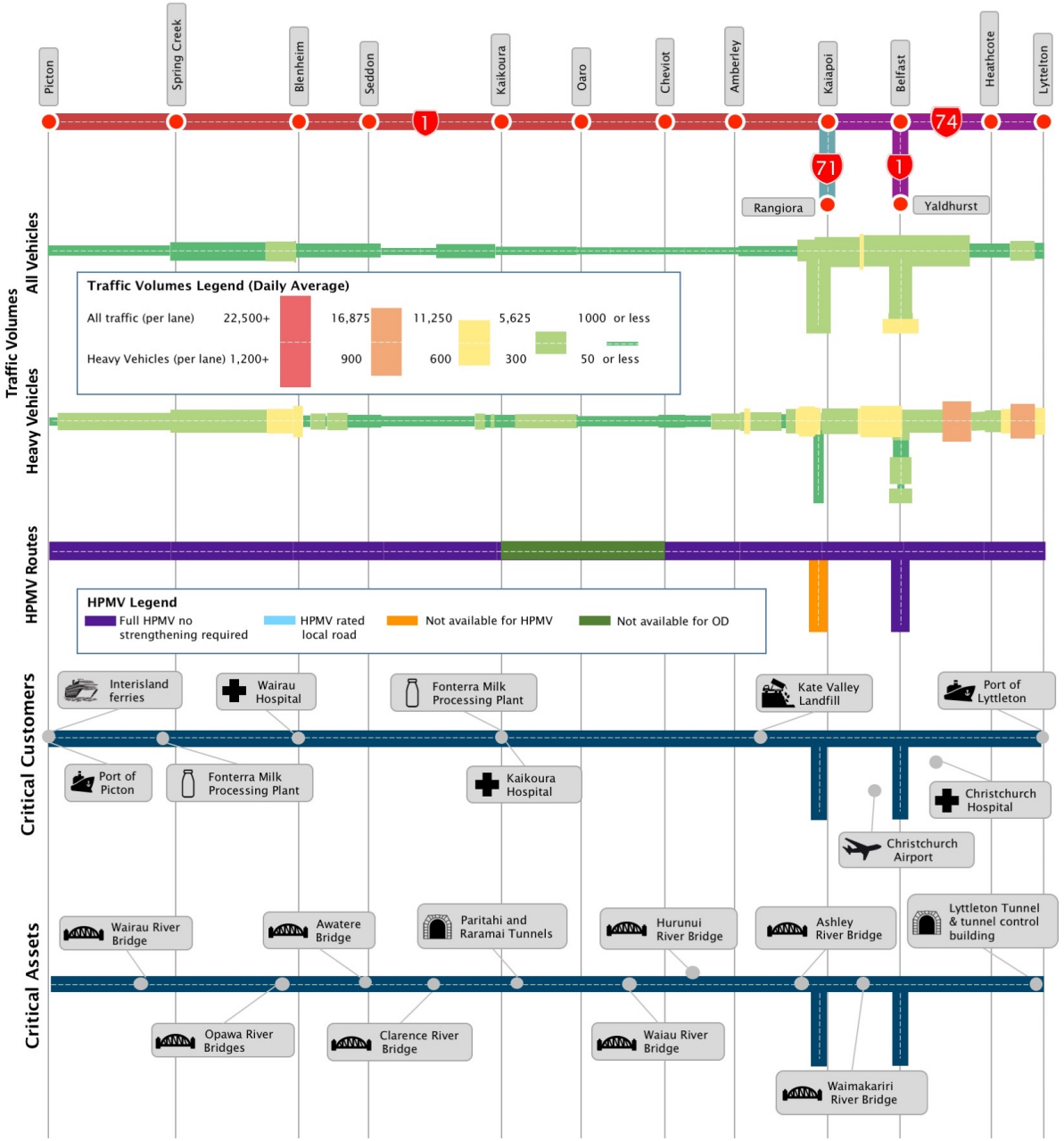
The corridor between Picton to Christchurch, and the section of SH1 from Belfast through to Yaldhurst Road (SH73) are suitable for HPMV traffic. However, SH71 from Kaiapoi to Rangiora is unsuitable as a HPMV route. SH1 can be intermittently closed as a result of crashes of inclement weather (e.g. snow, flooding or slips); in this case there are no alternative unrestricted HPMV routes connecting Christchurch to the northern portion of the South Island. Over dimension and some HPMV are unable to access SH1 between Cheviot and Kaikoura (Raramai & Parititahi Tunnels).

Critical customers and assets

There are a number of critical customers adjacent or close to the corridor that rely on the corridor to be open 24/7 and are vulnerable to having short term interruptions. These include Christchurch Airport, Christchurch Hospital, Kate Valley landfill and the Ports of Lyttelton and Picton.

There are also critical assets along the route that need an enhanced maintenance focus to ensure they do not fail or significantly interrupt services along the network. Most critically is the Lyttelton Tunnel that carries high volumes of freight to the Port. The alternative route via Evans Pass and Sumner Roads is closed for repairs until 2018 meaning that some over dimension and dangerous goods must be escorted through the tunnel.

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:

- **Topography and landform:** Sections of the corridor are constrained by mountainous and coastal landforms, and no practical alternative routes are available between Kaikoura and Seddon. The tight and narrow alignments limit or constrain access for larger vehicles, such as at Paratitihi tunnel or through the Hundalees where vehicles have been stuck.
- **Maintenance access:** Maintenance access for some sections of the corridor can be challenging given the isolation of some areas. Pavement repairs through the Hundalees can be difficult as a result of the carting distance; asphalt must be brought in from Christchurch, but the temperature of the mix needs to remain hot enough to lay.
- **Access to port of Lyttelton:** Access to the Port of Lyttelton is restricted to the Lyttelton Tunnel, as Evans Pass and Sumner Road are closed following damage during the Christchurch earthquakes. Dangerous goods and some over dimension vehicles must be escorted through the tunnel, requiring the road to be closed to all other traffic.
- **Picton port access:** Higher traffic volumes and freight traffic on local roads results in increased maintenance costs for the local authority. Kent St is being used as the primary traffic and freight route to Picton Port, instead of SH1 (Wairau Road/ Auckland St). Heavy vehicles including logging trucks also use Dublin Street to exit the Port, however this has a steep incline at Auckland St (SH1).
- **Over dimension routes:** Most over dimension trucks and some longer HPMVs are unable to travel the length of SH1 between Picton and Christchurch as a result of two railway overpasses and the two sets of tunnels south of Kaikoura. A single lane bridge at Hurunui also poses a constraint for some wider vehicles. The inability for legal vehicles to be accommodated on SH1 is inconsistent with the ONRC National classification of the corridor. Over dimension vehicles must undertake a detour via the Inland Road (Route 70), or via Lewis Pass and Murchison.
- **Rail corridor:** The rail corridor closely interacts with this highway corridor and there are implications for access, operations, efficiency and safety. Access requirements constrain basic highway maintenance, especially north of Kekerengu, where slips require ongoing maintenance and there is little separation between road and rail. A Rail Protection Officer is required on site when working within five metres of the live rail line. Train shunting at Picton port can cause stacking of vehicles along SH1 at Dublin Street, Picton. Jurisdiction can impede prompt resolution of simple maintenance issues, such as vegetation control and visibility of rail crossing approaches or can delay resolution of safety concerns.

Future considerations

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

- **Freight growth:** The road and rail corridor between Picton and Christchurch carries the largest rural freight volume in the South Island. The freight task is expected to increase by 85% in Canterbury and 50% in the Marlborough/ Tasman/ Nelson Regions by 2042. Growth in heavy vehicles on the corridor will increase deterioration, safety risks and community severance, and may contribute to reduced efficiency. Additional wear and tear on the route will increase maintenance costs and require future improvements to meet the ONRC classification of this corridor.
- **Tourism growth:** Increasing tourism growth will also place pressure on upgrading the road to a higher safety standard that caters for unfamiliar drivers. Higher tourist demands on the corridor will increase the need for facilities including stopping places, freedom camping sites and pedestrian and cycle infrastructure. More information on destinations and places of interest are needed to support tourist journeys
- **Customer expectations:** SH1 has a number of deficiencies including sections of narrow carriageway, a single lane bridge and confined tunnels that are out of context with the national classification and economic importance of this route.
- **Changes to the State Highway network in Christchurch:** Following the completion of the RONs projects in Christchurch, the section of SH1 between Dickies Road and Johns Road will be revoked. This may require changes to the level of service on the road to align with the subsequent ONRC classification, or additional maintenance costs prior to handover to the local authority.
- **Over dimension routes:** Providing access to over dimension vehicles for the full route of SH1 is being considered through the Picton to Christchurch business case process. A decision on the business case will determine the extent of investment in the corridor.
- **Picton port access:** Changing the designation of access routes to Picton Port is being considered through the Picton to Christchurch business case process.
- **Access:** Some access (particularly places of interest) on this corridor are poorly located on bends, with inadequate sightlines and require consideration. Vehicles towing boats and trailers parking or accessing boat ramps about Kaikoura impact traffic on SH1. Ohau Point attracts high numbers of tourists, but there are few appropriate places to park.
- **Rail corridor:** Continue to work closely with KiwiRail to improve communication and processes.

Resilience

Critical parts of the SH1 corridor have a high resilience risk profile as a result of storm inundation, flooding, slips, snow, and crashes. The Kaikoura earthquakes resulted in 200 slips on SH1 between Cheviot and Clarence, as well as damage to bridges, road surfacing, embankments, tunnels, culverts and retaining walls, closing the road for five weeks. A full closure of SH1 between Kaikoura and Clarence remains in place, however restricted access to Kaikoura from the South is available during daylight hours. A number of substantial rainfall events since the Kaikoura earthquake has resulted in further slips and rockfalls, requiring intermittent closures of the highway between Cheviot and Kaikoura. The alternative route for journeys between Picton and Christchurch is via Lewis Pass and Murchison, resulting in a 7-hour journey (compared to 4.5 hours via SH1).

The Lyttelton tunnel on SH74 provides a critical heavy vehicle link between Christchurch and the Port of Lyttelton. However, the alternative route via Evans Pass/Sumner Roads over the Port Hills has been closed since the February 2011 earthquake, and is not expected to reopen until 2018 as it sustained significant damage.

Vulnerabilities

Most of the corridor north of Cheviot is subject to frequent slips and rockfalls. The corridor is susceptible to flooding for much of its length, particularly on the coastal sections around Clarence and Kaikoura.

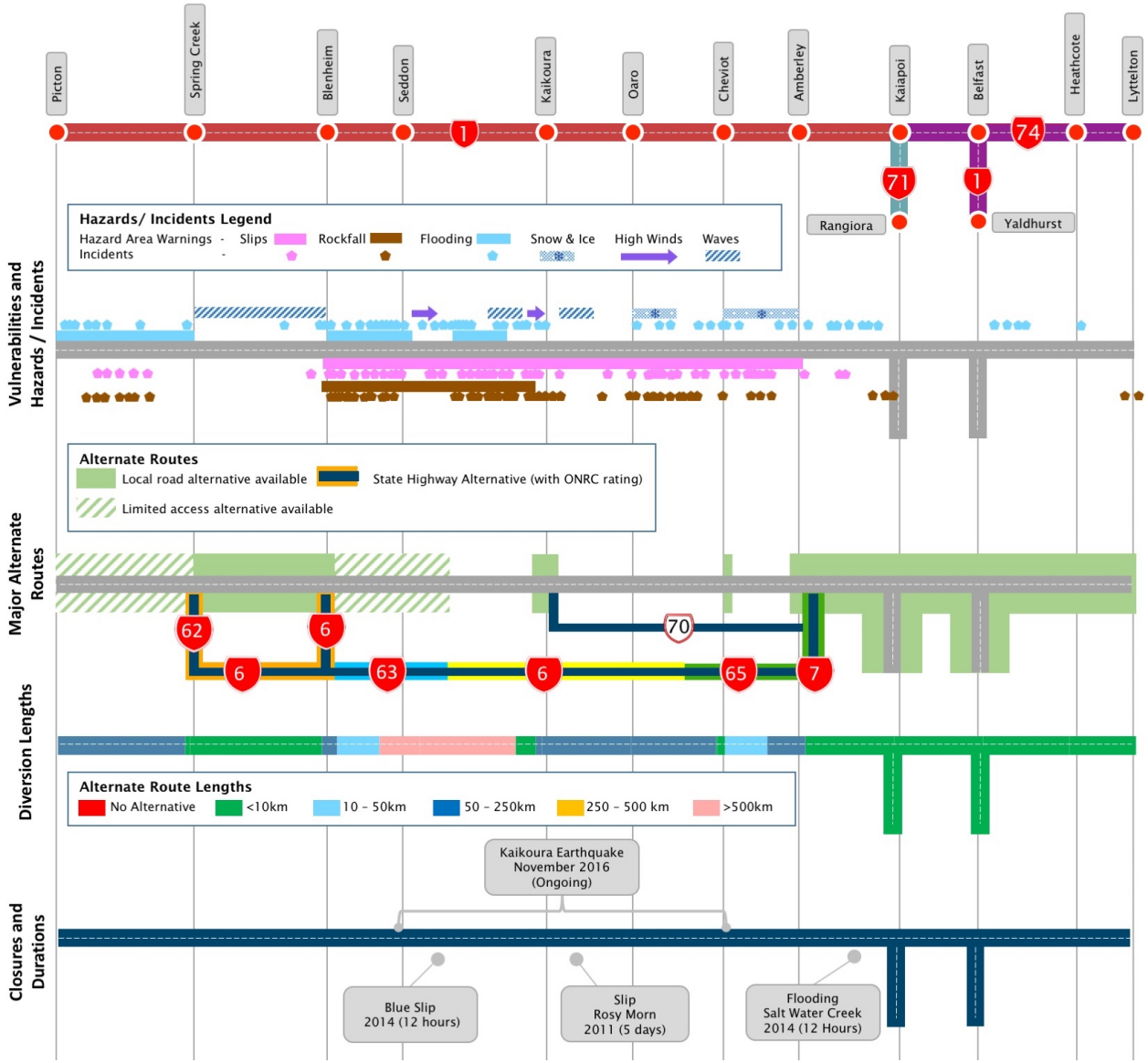
Alternative routes and diversion lengths

The corridor is a crucial link, providing the most direct route for tourism and freight journeys between Wellington and Christchurch. Prior to the closure of SH1, the local journey between Kaikoura and Clarence was 40 kilometres. Currently the only available route between these towns is via Lewis Pass and Murchison adding nearly 500km to the journey.

Closures and duration

Unplanned road closures and duration of interruption (greater than 10 hours) along the corridor in the last 5 years are shown in Figure 10.

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:

- **Slope stability:** Slope instability along the northern section of the corridor results in frequent slips and rockfalls occurring immediately south of Picton; between Kaikoura and Clarence; at Blue Slip and White Slip (near Kekerengu); and through the Hundalees. Steep cuttings south of Seddon are now more vulnerable to slips following the Kaikoura earthquake and there is an increased risk of trees falling onto the corridor as the toes of banks have been undermined. Ongoing maintenance is required to secure banks, and clear culverts of silt. At key sites, implementation of gabion walls and rock pinning has been undertaken to improve slope stability and safety. However, implementing preventative measures on towering banks through the Hundalees is costly.
- **Limited alternative routes:** Between Kaikoura and Seddon there are no practical alternative routes to SH1. The only alternative is via Lewis Pass (SH 63, SH6, SH65, SH7), which adds 2.5 hours to the journey travel time. Following the Kaikoura earthquake, communities were isolated until the Inland Road (Route 70) was opened five weeks later.
- **Earthquake and tsunami risk:** The east coast of the South Island between Christchurch and Picton has been subject to a sequence of earthquakes over the last seven years. The coastal area is also recognised as being vulnerable to tsunami; the Kaikoura earthquake resulted in a tsunami up to seven metres in places. While it is not possible to mitigate against these events, providing alternate routes builds resilience into the road network.
- **Flooding and inundation:** Flooding and inundation through coastal and low-lying areas frequently result in closures of SH1, such as at Para Swamp, Travis wetland, Dashwood, Saltwater Creek and between Half Moon Bay and Oaro.
- **Lifeline routes:** Weather events that result in closures of the corridor generally also impact on local road alternatives, so that detours may not be available.
- **Drainage:** Sections of the corridor are prone to high intensity rainfall events. The Kaikoura Coast and the Hundalees are unable to cope with intense rain events. The drainage capacity through these areas is insufficient to contain large flows, resulting in surface flooding, slips and scree on the road. The terrain in Koromiko is flat, and the capacity to contain water is limited. Shingle fans adjacent to the corridor south of Kekerengu result in silt run off, clogging drains and washing debris onto the road.
- **Ice and snow:** Isolated sections of the corridor are subject to occasional winter weather events. Ice intermittently occurs through the Cheviot Hills, and snow sometimes falls through the Hundalees resulting in occasional road closures.
- **High winds:** High winds through the plains at Hapuku pose a risk to high sided trucks and campervans.

Future considerations

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

- **Maintenance management:** Increased investment to mitigate resilience risks such as enhanced drainage, sea wall protection, construction of retaining walls, rock pinning, and benching or battering rock faces should be considered for known areas of weakness.
- **Lifeline routes:** For the more isolated and vulnerable sections of the corridor, investment in quality repairs and renewals should be undertaken given the fragility and remoteness of parts of this network. Improvements and enhanced maintenance of alternative routes should also be considered in future investment planning.
- **Use of technology:** It is difficult to timely communicate with road users about network conditions in the event of a disruption. Permanent variable message signs are provided at key gateways, however there is a lag in their activation, which can result in delays and poor customer level of service. Providing real time communication about delays or hazards will enhance the journey experience and reduce delays. Improving the cell phone coverage along the corridor will provide benefits to road users.
- **Bridge replacements:** Replacement of the Ashley River Bridge needs to be considered as the existing bridge is within 10 years of its service life. The bridge is very narrow and not resilient to earthquakes. Ongoing urban growth to the north of Christchurch is resulting in higher traffic volumes and adding pressure to the structure. The alternative crossing of Ashley River is via Cones Road at Ashley, requiring a 25km detour from SH1.
- **Anzac Drive Bridge:** The Anzac Drive Bridge across the Heathcote River, built in 2000, suffered rotational damage in the second major Christchurch earthquake. It is operating at reduced capacity and the abutments require replacement.

Reliability and efficiency

Efficiency

Travel time for much of the corridor is consistent. However, during holiday peak periods (Christmas and Easter), efficiency through Kaikoura and Blenheim reduces. On the approach to Christchurch, low levels of service are experienced during commuter peaks. Lower levels of service depicted in rural areas in Figure 11 are reflective of the need to reduce speed when travelling through the challenging and mountainous areas of SH1; they do not indicate congestion and high traffic flows through these areas.

Variability

Most of the corridor performs well for variability, however there are very high levels of variability north of Christchurch as a result of commuter traffic to and from Christchurch. No variability data is available for SH74 to Lyttelton, and SH71 to Rangiora.

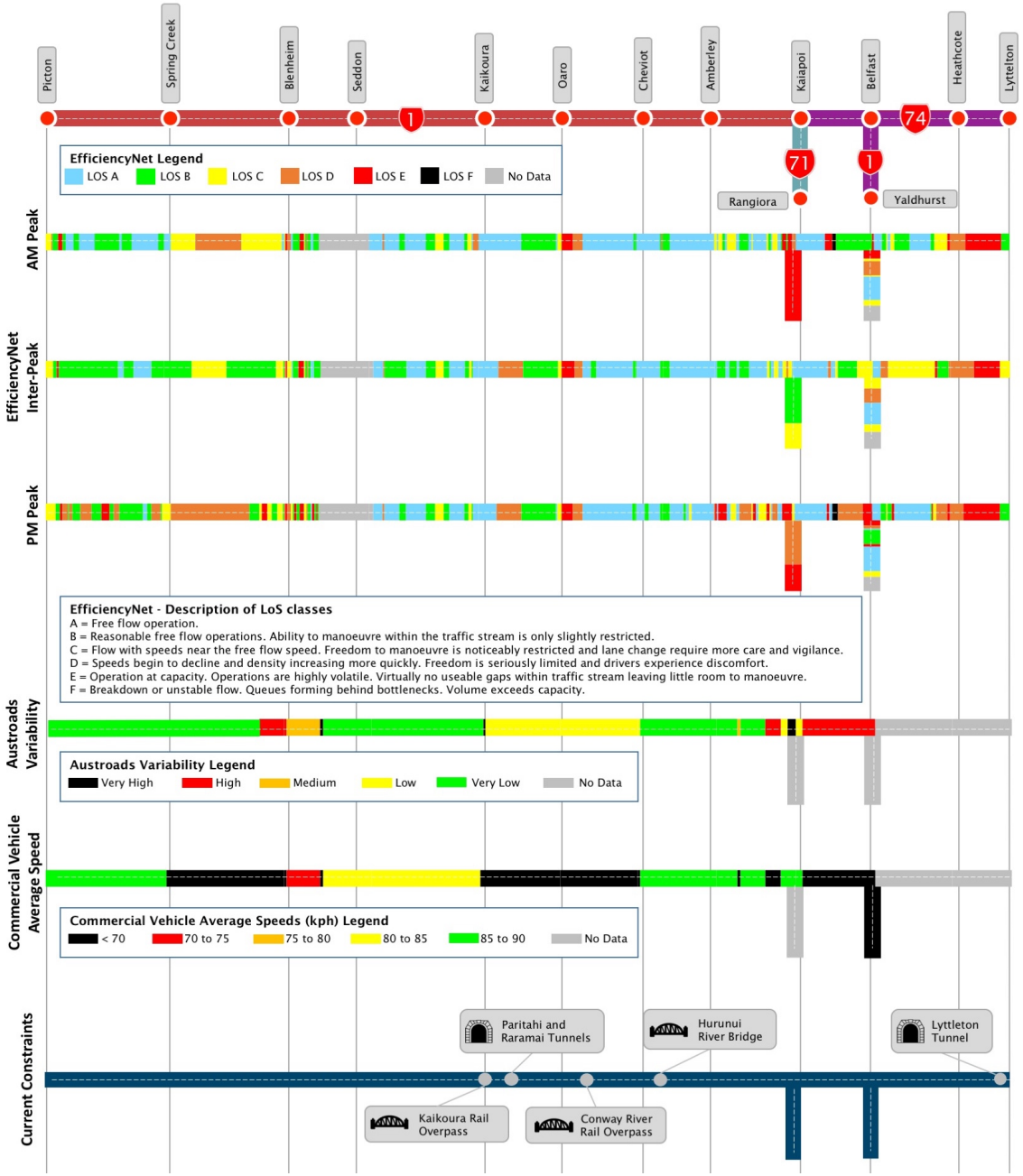
Commercial vehicle average speed

Average speeds for commercial vehicles for a substantial portion of corridor are generally above 80km/h. However, the 70km section between Kaikoura and Cheviot has an average commercial vehicle speed below 70km/h due to the Hundalee Hills. Speeds are also lower between Blenheim and Spring Creek, and through key townships including Blenheim, Seddon, Amberley, Woodend and Christchurch due to lower posted speed limits. No data is available for SH74 and SH71.

Current constraints

Height and width constraints are located on the corridor, preventing access by over dimension vehicles and even constraining legal sized vehicles. These are depicted in Figure 11. Tight alignments through the Hundalees have also resulted in some longer vehicles getting stuck.

Figure 13 - Reliability and efficiency



Pressure

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

- **Closure of SH1:** The current detour for through traffic movements between Picton and Christchurch requires an additional 2.5-hour journey time and much longer travel times for local journeys (e.g. Clarence to Kaikoura), Ongoing slips and rockfalls result in intermittent closures of vulnerable sections of SH1. Major crashes that result in fatalities or serious injuries can also require the closure of the state highway. These delays and lengthy detours adds significant economic costs, particularly for freight journeys.
- **Urban growth:** Urban development in the northern suburbs of Christchurch and Waimakariri are increasing travel demand on this corridor. Congestion between Woodend and Belfast is common at peak times, resulting in significant travel time variability.
- **Slower vehicles on the corridor:** Agricultural vehicles commonly access the corridor, as there are few alternative routes. For example, higher concentrations of farm vehicles occur in the Marlborough region during the autumn grape harvest period. Tourists driving campervans and freight vehicles also contribute to slower and unreliable journeys times for tailing vehicles, as few passing lanes are provided on the corridor. High numbers of construction vehicles involved in the rebuild and improvements to the highway will also contribute to unreliable travel times on this corridor.
- **Few passing opportunities:** The carriageway configuration for this corridor is predominantly two lanes, with only a handful of passing opportunities along the whole length. Some of these passing lanes are too short and motorists delayed by slower vehicles may perform risky merges. Disembarking vehicles from the interisland ferries often travel in a platoon.
- **Road works:** The Kaikoura earthquake resulted in substantial damage to the pavement of on the corridor. Cracks have been sealed and areas of upthrust repaired, however pavement roughness, as well as temporary signals and reduced speed limits to manage the damaged corridor result in travel time variability for those sections that are open.
- **Over dimension access:** The two sets of tunnels south of Kaikoura and rail overbridges at Conway River and Kaikoura limit access to over dimension and some long HPMV vehicles. Alternative routes are via Lewis Pass, or the Inland Route (Route 70) and add significant time delays to the through route journey time and reduce efficiency.
- **Pavement instability:** Weak pavement structure and groundwater issues are common in the vicinity of adjacent wetlands including Para Swamp (south of Picton) and Travis Wetland at Burwood. A high-water table in Blenheim has resulted in a weak pavement subgrade requiring ongoing maintenance, exacerbated by higher traffic volumes through the town. North of Kekerengu, ongoing movement of pavement requires continued maintenance and repair.

Future considerations

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

- **Maintenance disruption:** Road and bank repairs, maintenance and improvements following the Kaikoura earthquake will be ongoing. This will lead to unpredictable journey times as a result of reduced speed limits, partial road closures, use of temporary signals and detours, impacting on the reliability of this route.
- **Timeliness of incident response:** Being able to respond quickly and efficiently to incidents on the network is important to maintaining reliable and efficient journeys. This is particularly the case for sections of the corridor that have no practical alternative routes.
- **Use of technology:** The ability to efficiently and effectively communicate with road users in real-time following an incident will enable road users to take detour routes where available, reducing travel time delays.
- **Passing opportunities:** Additional passing opportunities have been recommended in the Programme Business Case for this corridor to reduce delay and travel time variability.
- **Over dimension routes:** Investment to provide for over dimension access on SH1 will improve efficiency and improve the level of service for these vehicles.
- **Proposed relocation of Avonside Girls and Shirley Boys High School:** This will modify transport and land use patterns in the vicinity of the Travis Road/ Anzac Avenue roundabout (SH74). The impact on traffic and congestion will require consideration as will pedestrian and cycle access and amenity.

Safety

Collective risk

Between Picton and Amberley, the corridor is predominantly low risk except for sections of medium-low/ medium risk between Kaikoura and Cheviot.

There are three sections of medium-high risk on the approach to Blenheim, as well as between Amberley and Kaiapoi and Belfast into Christchurch on SH1.

High risk areas are between Kaiapoi and the Belfast on SH1 and Kaiapoi and Rangiora on SH71.

Personal risk

Personal risk is varied along SH1with large sections being either low or medium-low. There is one high risk segment between Kaikoura and Oaro and three medium-high segments: between Seddon and Kaikoura, on the northern approach to Cheviot and between Belfast and Yaldhurst.

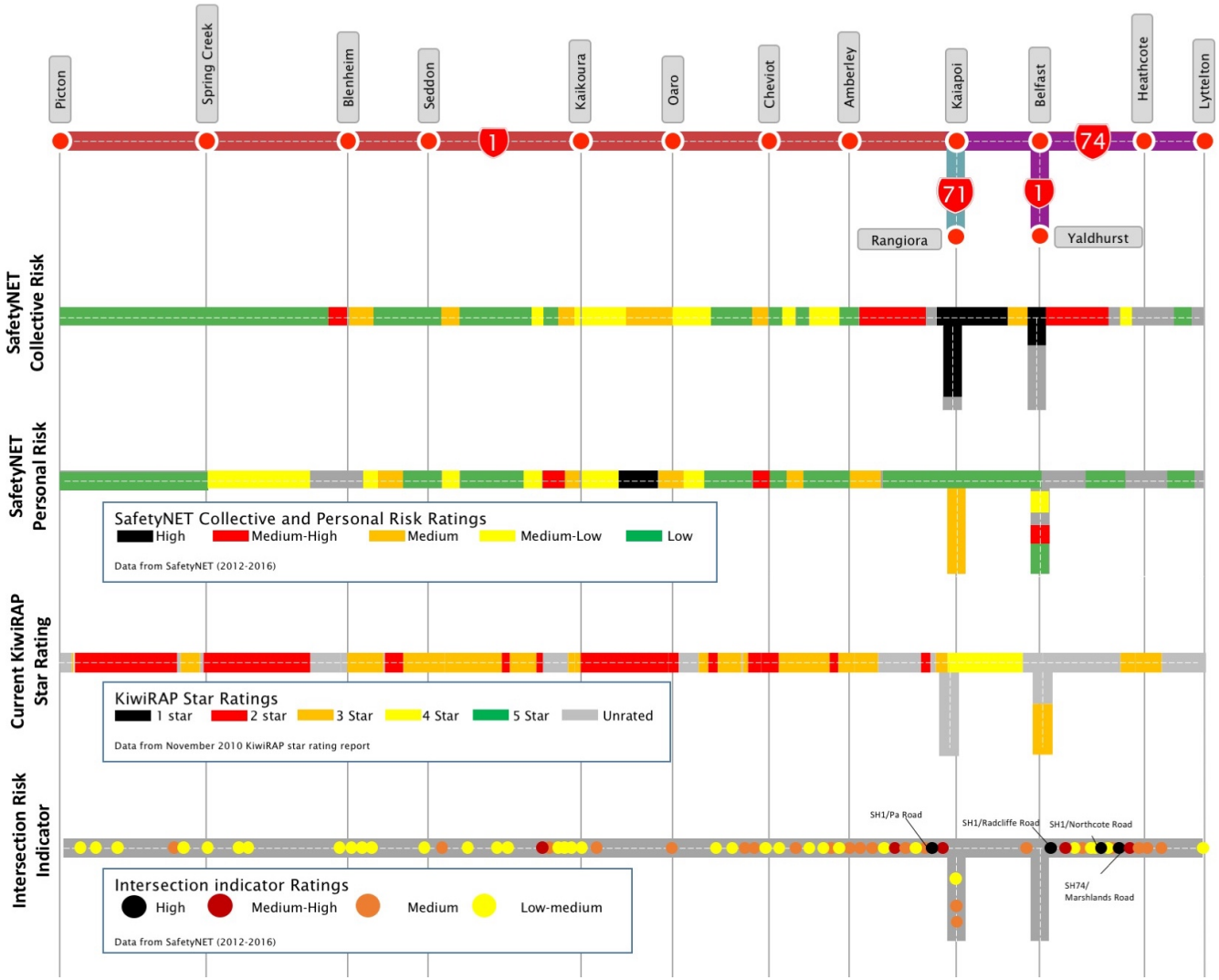
Star rating

There are large sections of 2 and 3-star ratings along the corridor and one 4-star section between Kaiapoi and Belfast. SH71 is unrated along with large sections of SH74 within Christchurch urban boundary, except for a small 3-star segment around Heathcote.

Intersection risk indicators

There are three high risk intersections along the corridor, three on SH1 and one on SH74. There are four medium-high risk intersections between Kaiapoi and Heathcote and one north of Kaikoura.

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 following:

- **Inconsistent and narrow shoulders:** The rural section of the corridor features inconsistent carriageway and shoulder widths. In some sections including the Hundalees, Cheviot Hills and Half Moon Bay, no shoulder is provided due to steep drops and sheer rock faces. In some areas, rumble strips have been fitted to manage the tight alignment.
- **Lack of passing opportunities:** Few passing lanes are available on SH1, particularly through areas of hilly terrain. Platooning traffic following ferry arrivals at Picton make it difficult to overtake slow moving traffic, leading motorists to take risks. Traffic volumes are low, but head on crashes are common.
- **Out of context curves**: The tortuous alignment contributes to poor road safety along the corridor. There are over 400 out of context curves on the corridor, many in the Hundalees between Clarence and Cheviot. There are areas of high run off road crashes including Okarahia, Cobalts Curve, and Siberian Curves. Tight bends can cause freight loads to shift, contributing to truck rollover crashes.
- **Narrow carriageway:** The corridor is narrow in many places, providing little room for driver error or hazard avoidance. Areas with high crash risk include Weld Pass and the coastal area south of Peketa. Narrow bridge alignments result in pinch points including Mirza Bridge (south of Ward), Kekerengu Bridge at The Store, Deadmans Stream (north of Clarence), and Blue Duck Bridge (Mangamaunu). Trucks occasionally clip the side supports of the Conway River rail overbridge.
- **Intersection risks:** Safety at intersections is a concern. Examples of high risk areas include: Kaikoura High School and Kaikoura (West End), with poor sightlines in both directions; Kowhai River, Leithfield, the bridge crossing features intersections on both sides and quarry access with no turn provision; Williams Street, Pineacres access to a campground and part of bus route; and Riverlands Estate in Blenheim with turning heavy vehicles.
- **Land use & side friction:** In Waikuku, commercial accesses and parking mix with SH1 high speed traffic (80km/h). Through Woodend private residences and pedestrians compete with highway traffic. Freedom campers around Kaikoura spill onto the highway from informal camp sites. Popular service stops for freight drivers, have inadequate parking provision, resulting in double parking, unsafe manoeuvring and reduced visibility. Known sites include The Store at Kekerengu, Kaikoura shops on Beach Road.
- **Driver fatigue:** The nature and length of this route can strain driver concentration and result in fatigue related crashes. Single vehicle run off road crashes and head on crashes are common crash types on this corridor, which are often attributed to fatigue.
- **Motorcycle safety:** The route is popular with recreational motorcyclists, as sections of the corridor are scenic and technical. The needs and usage by motorcyclists needs specific consideration.

Future considerations

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

- **Speed management:** The road environment along parts of the corridor is not conducive to the posted speed limit of 100km/h. Many bends are posted with curve warning signs, with some as low as 25km/h. A review of speed limits would be useful.
- **Road and bridge alignments:** The high number of out of context curves needs further consideration, areas for focus include Weld Pass and the Hundalees. Where there is a history of truck rollovers, bridge and approach alignments should be considered.
- **Corridor width:** Road widening of the narrowest sections of the corridor should be prioritised to reduce the road safety risk. General area wide treatments such as rumble strips or wire rope barriers should be considered where desirable corridor widths cannot be achieved, or through areas of lower priority.
- **Edge protection:** Initiatives to reduce the incidence and severity of run off road crashes can provide significant safety benefits and require further consideration. This may include wire rope barriers, shoulder widening, guard rails and rumble strips.
- **Maintenance:** Improvements and upgrades such a wire rope barriers provide significant safety benefit. They have ongoing maintenance and post-crash reinstatement costs that need to be incorporated into future budgets.
- **Rail infrastructure:** A review of at-grade rail crossings should be considered to identify the benefits of safety improvements, including grade separation.
- **Cycle facilities:** Cyclist usage is growing and there needs to be consideration of the risks of gaps between and of suitable facilities. Current deficiencies include crossing points and absence of off-road facilities, and narrow shoulder widths.
- **Pedestrian facilities:** Improved pedestrian crossing facilities and footpaths are required at many towns and landmarks along the corridor. Areas include urban growth north of Christchurch, (such as Woodend and Amberley) and through the township of Kaikoura.
- **Education and enforcement:** Education and enforcement campaigns should be implemented to address known safety issues for key target audiences, including tourists, freight operators and motorcyclists.

People, places and environment

Natural environment

The terrain along this corridor is varied, rolling hill country, challenging mountainous terrain and constrained winding coastal stretches. Nearly a third of the corridor flanks the Pacific Ocean, offering scenic coastal views and a renowned natural environment. The proximity of the Hikurangi off shore trench results in abundant sea life close to the shore, attracting tourists who visit to view whales, dolphins, seals and birds. Picton provides access to the pristine Marlborough Sounds region, popular with visitors. The scenic and tourism value of sections of the corridor are recognised with their inclusion in Tourism NZ's Alpine Pacific road trips.

There are few areas of high value vegetation or DOC estate adjacent to the corridor. The Wairau, Clarence and Waimakariri Rivers are significant waterways that interface with the corridor. They are ecologically sensitive environments and those in low lying areas contribute to flooding along the corridor.

Noise, vibration and air quality

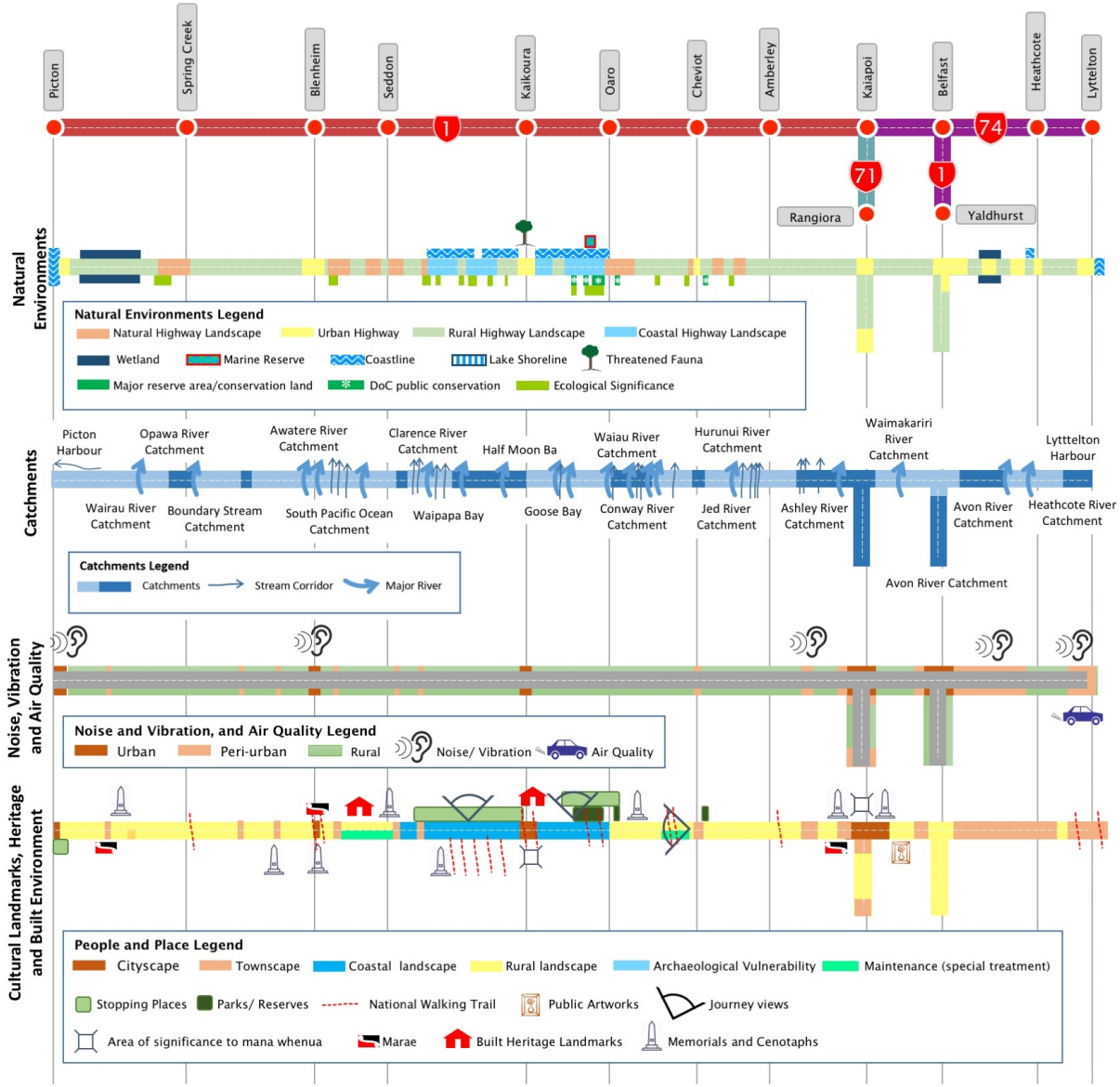
The corridor traverse's wetlands south of Picton and through Burwood, resulting in a poor subgrade leading to noise and vibration issues. Woodend experiences noise issues, with high traffic and freight volumes through residential and commercial areas. Noise issues north of the Lyttelton tunnel are a result of truck engine brakes, while lower air quality is present through the Lyttelton tunnel.

Cultural landmarks, heritage and built environment

The corridor has areas of high cultural value, with many Maori archaeological sites, including Wairau Bar, east of Blenheim. Landmarks of both Maori and European significance are accessed via the corridor including maraes, churches and war memorials. A historic stone church is located south of Ward, while a memorial to the Wairau Incident is located at Tuamarina cemetery. A new public artwork has been installed near Waimakariri Bridge. Caravans selling crayfish north of Kaikoura are renowned, and a popular stopping place for tourists.

Tourism growth has been rapid, with nearly 10% increase in international visitor arrivals to New Zealand between 2014 and 2015. More tourists are choosing independent, self-drive holidays; campervan use has nearly doubled over the last 10 years. International visitors participating in cycling has grown from nearly 7000 visitors in 2007, to more than 160,000 visitors in 2016.

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:

- **Climate change:** Impacts from more frequent and intense weather events are expected to increase the vulnerability of key parts of the corridor. This will lead to significant impacts, as these sections of corridor have few viable alternatives.
- **Vegetation management:** Biosecurity control of Chilean needle grass requires specialist maintenance treatments. Overhanging trees are an ongoing maintenance item. Protected trees at Hapuku and Spring Creek are located so close to roadside that they are protected by guard rails.
- **Fauna management:** The seal population along the Kaikoura Coast has grown, and viewing points are no longer isolated to Ohau Point. Drivers stopping haphazardly along this section of the corridor, increasing the number of pedestrians on this stretch of road.
- **Port freight traffic:** Engine brakes and rattling empty trailers from trucks departing Lyttelton Port and Picton Port can result in noise issues for surrounding residents.
- **Vibration:** Vibration is an issue adjacent to the wetlands on this corridor, particularly on SH74, where there is adjacent residential development.
- **Utility maintenance:** Poor restoration of pavement and utility covers has increased vibration and noise. Increased supervision of reinstatements may be required.
- **Stopping places:** The cultural and scenic amenity of the Kaikoura coast is recognised and highly valued. There are few formal stopping places and public amenities available enroute to enhance the journey or provide rest breaks. People will stop at inappropriate but desirable locations such as Ohau Point to view seals, Goose Bay campground, the coastal beaches, surfing at Mangamaunu.
- **Tourism:** Tourism growth has been rapid, with nearly 10% increase in international visitor arrivals to New Zealand between 2014 and 2015. There is demand for more suitable facilities to cope with the increasing tourist volumes.
- **Event management:** Management of traffic and parking during events at Grovetown marae can result in side friction and increase the number of pedestrians on the corridor.
- **Vulnerable road users:** There are limited facilities for pedestrians and cyclists through and between towns along this corridor making it hard and dangerous. Wide intersections provide for heavy vehicles, but increase pedestrian crossing distances; wine workers walk on SH1between their accommodation and Blenheim, vehicle platoons through Kaikoura make it very hard for pedestrians to cross, especially in busy summer months.

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:

- **Climate change impacts:** Climate change is expected to result in more intensive rainfall patterns and storms, increasing the frequency of flooding and sea inundation. Areas of vulnerability should be identified and mitigation undertaken to reduce or minimise risks of road failure or closure.
- **Biosecurity management:** Biosecurity imposes additional maintenance costs. More biosecurity issues are likely in the future to ensure the valued natural coastal landscape, and the economic value of the region's agriculture and horticulture are not diminished.
- **Vegetation management:** Assessment of tree stability and planting of species that can contribute to stabilising banks should be undertaken to reduce the risk of tree fall, and further erosion and slips.
- **Fauna Management:** Measures to reduce or prevent wandering stock on the road should be considered including improved fencing and barriers. Along the Kaikoura coast, sea walls and underpasses should be considered to prevent seals encroaching on roads
- **Increasing urban development:** Ongoing growth to the north of Christchurch is likely to result in higher community expectations to manage noise, vibration and air quality. Residents in new subdivisions through Woolston and Burwood may demand additional mitigation measures to manage the ongoing road vibration issues through wetlands in these areas.
- **Increasing freight traffic:** Increased heavy vehicles on the corridor is likely to result in more pressure from neighbouring residential areas to reduce noise or seek mitigation.
- **Freight stops:** Provision of improved stopping places should be considered, with sufficient space for heavy vehicle parking, as well as manoeuvring space to safely re-join traffic flow.
- **Tourist experience:** Maintaining a safe and high-quality experience for tourists is needed, building on the cultural heritage and natural features of the corridor, and supporting local communities. International tourists are often on self-drive holidays in unfamiliar vehicles. Enhanced facilities for tourists should be considered, including directional arrows and advance warning of road conditions and delays.
- **Vulnerable road users:** Needs of pedestrians, aged or young, domestic or foreign as well as cyclists in the face of increased vehicle size and density.

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 386 km of road network which reflects 3.4% nationally. The total value of the assets along the corridor is $705M (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

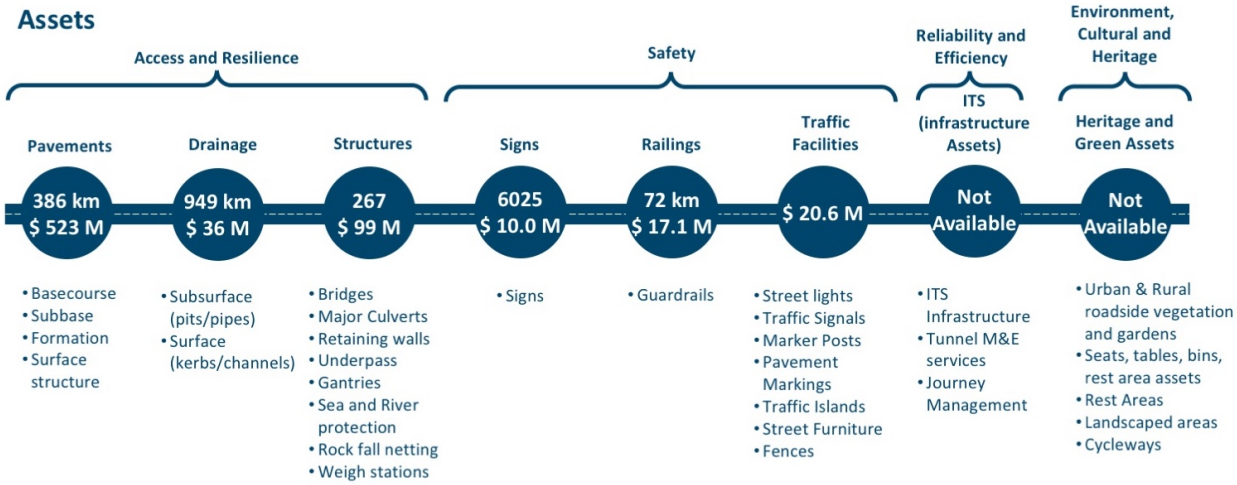
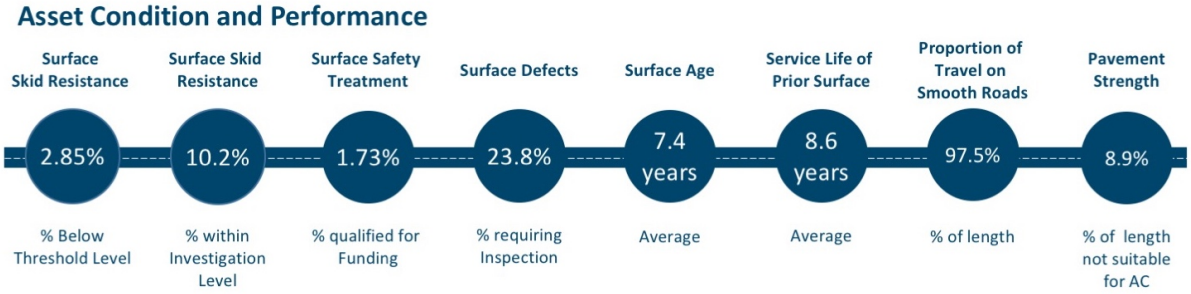


Figure 17 - Asset condition and performance



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.

Sections SH1S/179 and SH1S/185 between Oaro and Hundalee, and SH74/22 Lyttelton Tunnel show significant levels of both surface skid resistance below the threshold limit and within the investigation limits. Overall, the corridor has shown a slight improvement in the levels of surface skid resistance over the three years.

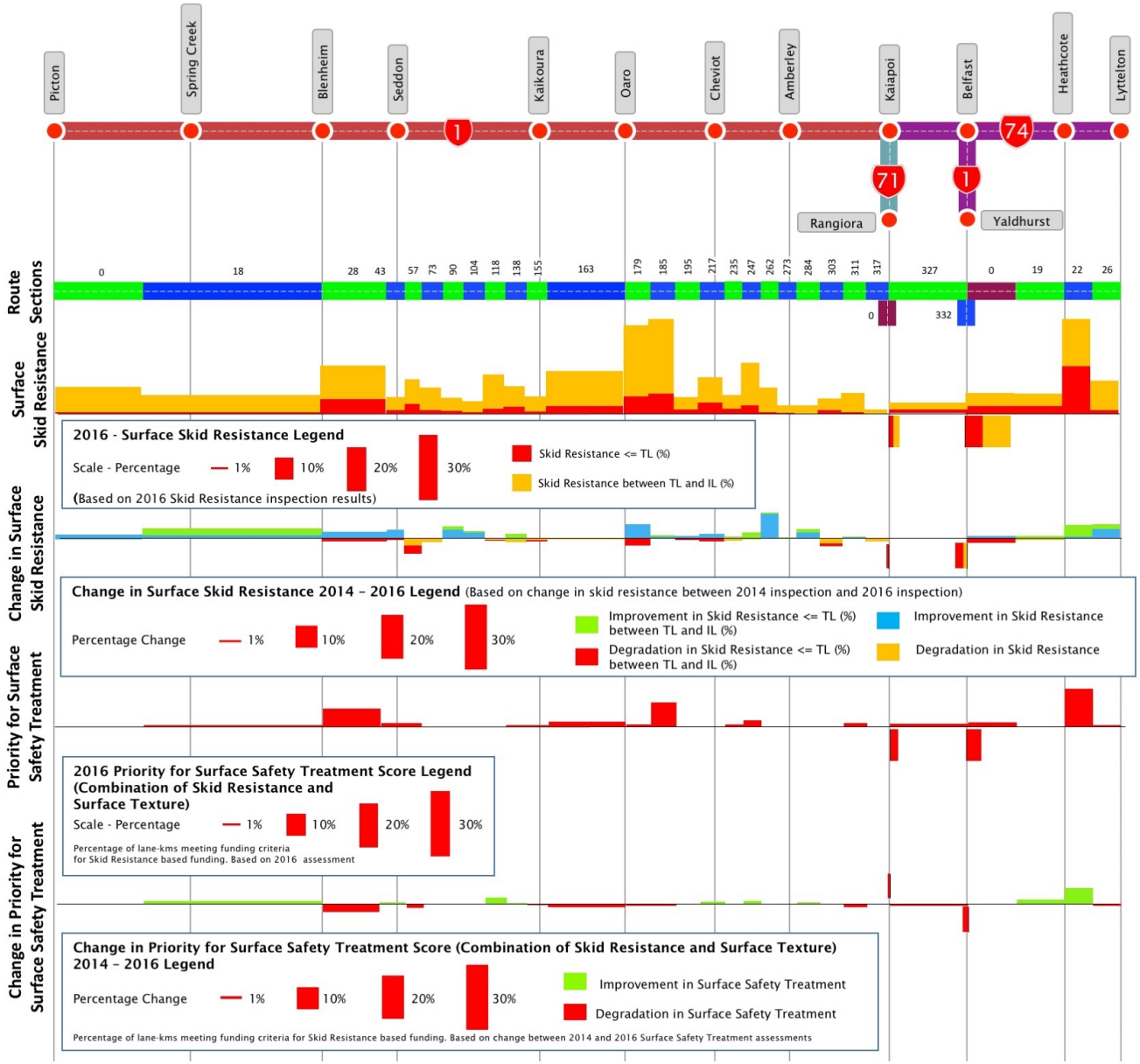
Priority for surface safety treatment

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

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

A moderate percentage (1.56%) of the corridor achieved Skid Assessment Length that qualifies for funding. This equates to 13.1 lane-km of the 832 total lane-km of the corridor. The

Figure 18 – Asset condition



sections with the highest priority for surface safety treatment qualifying for funding are, SH1S/185 north of Hundalee, and SH74/22 Lyttelton Tunnel. Overall the level of priority for surface safety treatment qualifying for funding remained static other than an appreciable improvement on SH72/22 Lyttelton tunnel.

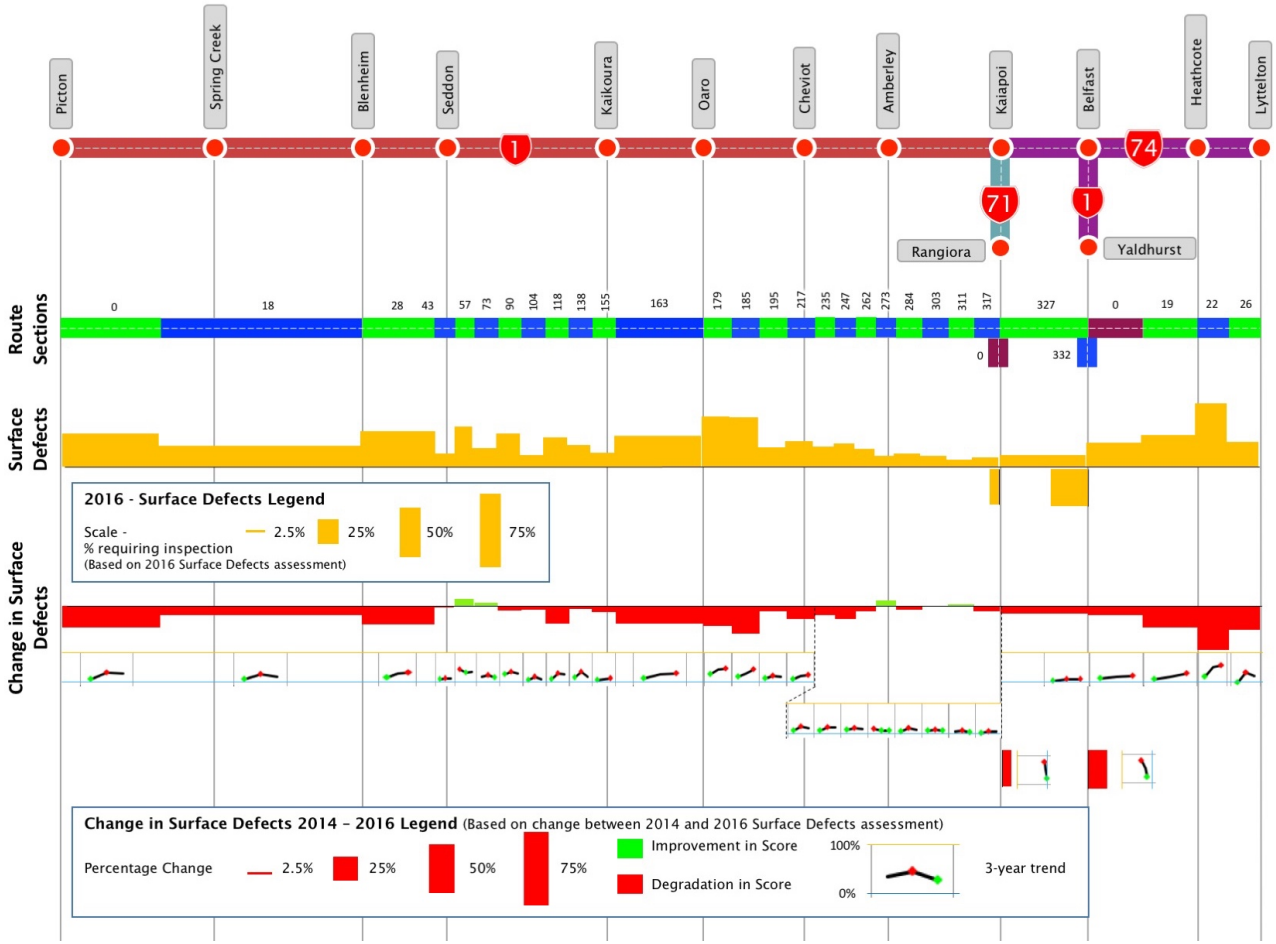
Surface defects

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, 23.8% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: SH1S/179 and SH1S/185 between Oaro and Hundalee, and, SH74/22 Lyttelton Tunnel. These sections also show a significant level of degradation in score over the last three years.

Figure 19 – Asset condition 2



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.

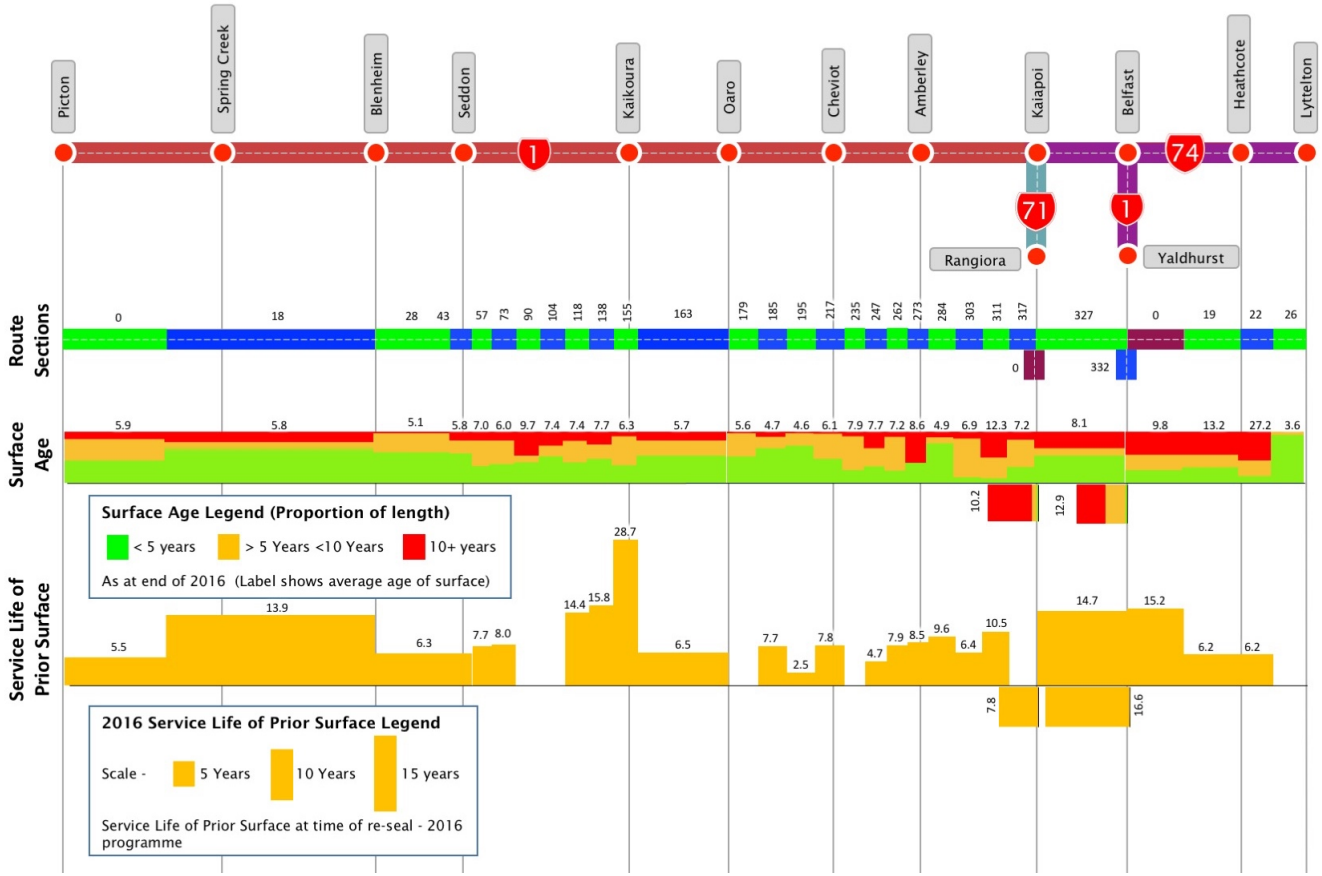
The sections of corridor with the oldest age profile are SH1S/311 between Waikuku and Woodend, SH1S/332 between Belfast and Yaldhurst, SH71/0 between Kaiapoi and Rangiora, SH74/19 around Ferrymead, and, SH74/22 Lyttelton Tunnel. This is consistent with surfacing south of Kaiapoi being more durable asphalt.

Service life of prior surface

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

Overall the re-surfaced sections achieved an average service life of 8.6 years, with sections SH1s/138 and SH1S/155 between Mangamaunu and Kaikoura, SH1S/332 between Belfast and Yaldhurst, and, SH74/0 between Belfast and Woolston achieving an average service life in excess of 15 years.

Figure 20 – Asset condition 3



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 SH1S/28 between Blenheim and Seddon, and SH1S/185 over the Hundalees.

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.

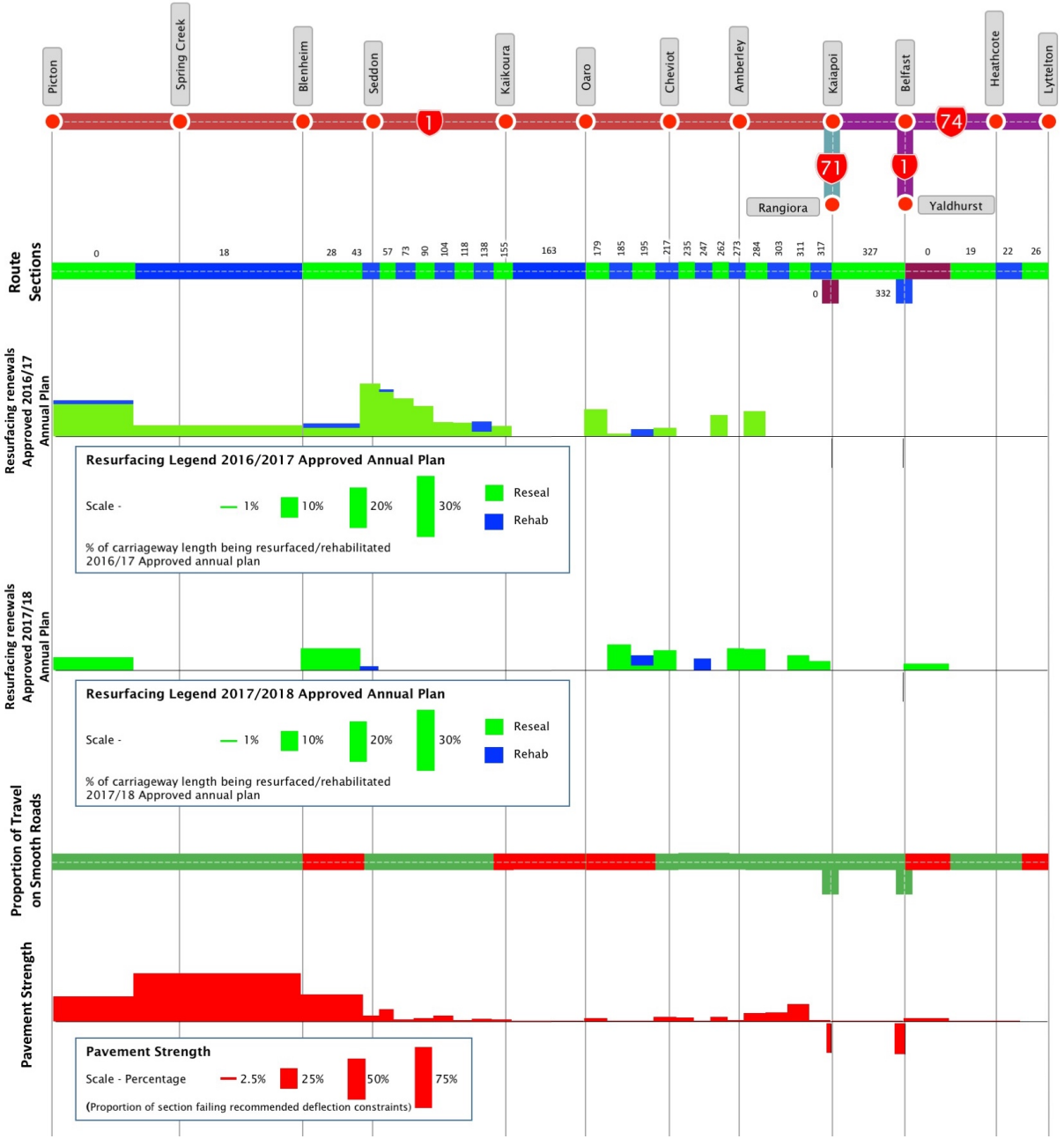
Pavement strength

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

The pavements within the North Canterbury maintenance area are noticeably stronger than those further north. In the Marlborough area pavement strengthening works are proposed for sections of SH1S/18 and SH1S/28.

Figure 21 – Asset condition 4



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:

- **Swamps:** Areas of ongoing movement are harder to maintain smooth travel, such as Para Swamp, Koromiko SH1 and Travis Swamp SH74; as well as SH74 through the Marshland and Bromley areas.
- **Liquefaction** from the Christchurch earthquake affects much of the eastern city and is a consideration for maintaining the condition and performance of the entire length of SH74. There is a level of uncertainty about which areas will be more or less influenced.
- **Settlement:** Differential settlement such as between bridges and adjoining road and culvert joints requires ongoing monitoring and attention to minimise.
- **Seismically active** ruptured landscapes as well as slow slip movement through identified seismic fault areas can compromise asset condition and performance such as culverts, pipes and drainage structures as well as pavements and bridges. Visual monitoring is currently the most effective monitoring method.
- **Geologically sensitive** areas susceptible to erosion, screes and slips, aggrading rivers, unstable slopes and rock faces, particularly rural SH1 north of Christchurch.
- **Average ages:** Specialised surfacings are more expensive and harder to provide at remote locations. On this corridor, the difficult terrain areas are more remote and require trade-offs in treatment choices that might give shorter lives, but provide best value for money and whole of life solution.
- **Surface Skid resistance** is difficult to maintain in some of the challenging terrain as there are many tight and out of context curves. Local aggregates provide serviceable performance and can be supplemented with specialised materials where necessary.
- **Winter events**: Maintaining surfaces and access during winter can be challenging with mountainous areas such as Weld Pass, the Hundalees, and Omihi Saddle requiring particular care and attention.
- **Coastal exposure:** The Kaikoura coastal sections of SH1 are exposed to high seas, wave wash and debris, which can reduce the condition and performance of the corridor or require additional maintenance.
- **Congestion:** Change in land use around Christchurch is creating new areas of congestion, both temporary and permanent, and exacerbating other areas such as the Northern Motorway.

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:

- **Economic choice of high performance surfacings** and treatments or lower cost shorter life alternatives, in rural remote areas.
- **Longer term remediation of older pavements** – such as through Blenheim, where foam bitumen or asphalt may be suitable alternative treatments to provide strength.
- **Christchurch land use patterns** and how long to let stabilise before intervening or responding with permanent transport planning or asset management measures. Traffic patterns and corridor usage are impacted as well as treatment selections and programming of works i.e. congested site or those taking temporary heavier construction traffic or debris.
- **Post Christchurch earthquake physical effects** will need to be considered, such as changes to water table heights and impacts on Christchurch pavements – early signs of higher water tables. May influence drainage effectiveness as well as pavement life and designs.

The Opawa bridge has poor structural resilience and is too narrow

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	$19,291	$21,103	$30,582
	Renewals	$23,551	$27,050	$38,752
	Improvements	$77,000	$0	$46,000
Reliability and Efficiency	Maintenance and Operations	$12,364	$13,520	$20,348
	Renewals	$2,406	$1,826	$2,721
	Improvements	$61,058	$31,979	$52,430
Safety	Maintenance and Operations	$15,763	$16,807	$24,651
	Renewals	$2,755	$3,101	$4,657
	Improvements	$132,403	$80,000	$0
People, places and Environment	Maintenance and Operations	$4,217	$4,763	$6,818
	Renewals	$339	$182	$274
	Improvements	$0	$0	$0
	Total	$351,146	$200,330	$227,233

Figure 22 – Corridor investment

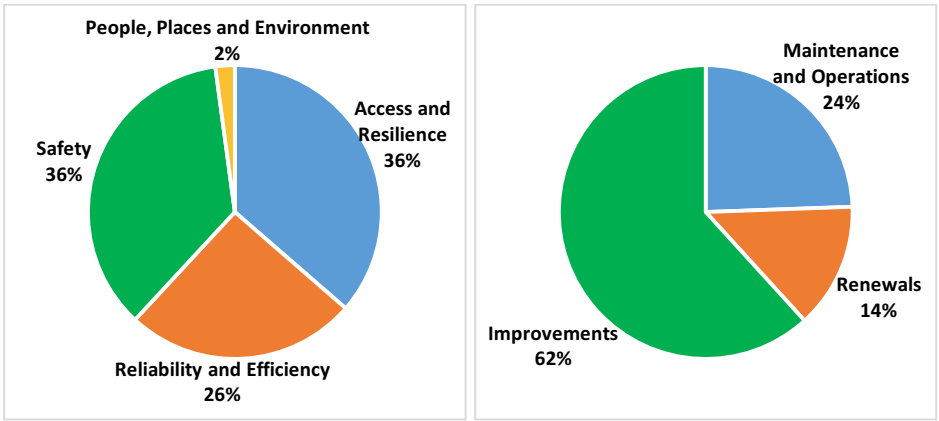


Table 2 - Summary investment by work category ($000)

Outcome	Work Category		2018-2021	2021-2024	2024-2028
Access and Resilience	111	Sealed Pavement Maintenance	$3,042	$3,501	$4,838
	112	Unsealed Roads	$5	$6	$9
	113	Drainage Maintenance	$1,630	$1,759	$2,657
	114	Structures Maintenance	$3,858	$4,006	$5,906
	121	Environmental Maintenance	$5,136	$5,740	$8,032
	122	Traffic Services Maintenance	$39	$106	$151
	124	Cycle Path Maintenance	$60	$47	$70
	151	Network & Asset Management	$4,432	$4,768	$7,161
	161	Property	$1,090	$1,171	$1,759
	211	Unsealed Road Metalling	$15	$17	$26
	212	Sealed Road Resurfacing (excl. surface skid resistance)	$11,856	$13,906	$20,196
	213	Drainage Renewals	$715	$679	$1,020
	214	Pavement Rehabilitation	$7,226	$9,097	$13,097
	215	Structures Component Replacements	$3,597	$3,162	$4,130
	222	Traffic Services Renewals	$143	$189	$284
	321 - 341	Improvements	$77,000	$0	$46,000
Reliability and Efficiency	121	Environmental Maintenance	$2,844	$3,113	$4,409
	123	Operational Traffic Management	$7,584	$8,414	$12,977
	151	Network & Asset Management	$1,736	$1,780	$2,643
	161	Property	$200	$213	$319
	222	Traffic Services Renewals	$2,406	$1,826	$2,721
	321 - 341	Improvements	$61,058	$31,979	$52,430
Safety	111	Sealed Pavement Maintenance	$3,141	$3,580	$4,956
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$357	$405	$580
	114	Structures Maintenance	$540	$637	$909
	121	Environmental Maintenance	$402	$486	$730
	122	Traffic Services Maintenance	$7,655	$8,231	$12,268
	124	Cycle Path Maintenance	$26	$3	$4
	151	Network & Asset Management	$3,177	$2,952	$4,434
	161	Property	$467	$513	$770
	212	Surface Skid Resistance	$1,715	$1,926	$2,893
	214	Pavement Rehabilitation	$36	$74	$112
	215	Structures Component Replacements	$327	$355	$534
	222	Traffic Services Renewals	$677	$744	$1,118
	321 - 341	Improvements	$132,403	$80,000	$0
People, places and Environment	111	Sealed Pavement Maintenance	$158	$186	$280
	121	Environmental Maintenance	$3,469	$3,945	$5,589
	151	Network & Asset Management	$473	$507	$761
	161	Property	$117	$125	$187
	221	Environmental Renewals	$339	$182	$274
	321 - 341	Improvements	$0	$0	$0
		Total	**$351,146**	**$200,330**	**$227,233**

To be confirmed through the RLTP

Investing in access and resilience

Operations and maintenance

The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing, structures maintenance 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.

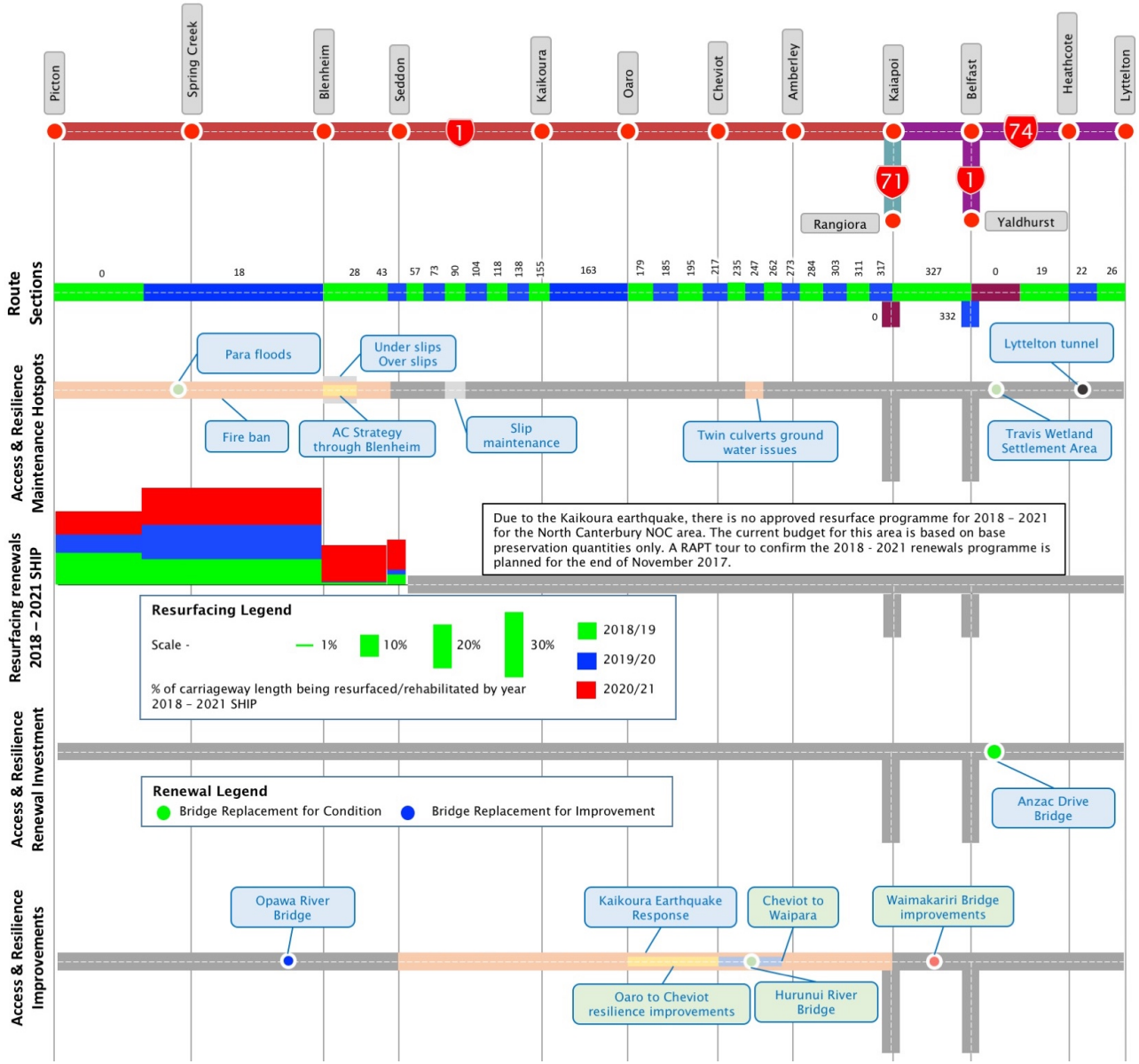
A 90km section to the north of this corridor is under management of NCTIR until the SH1 Kaikoura route is reinstated. The reinstated corridor will be more resilient because of new and refreshed assets, but will also have additional maintenance costs associated with the improved safety features.

Maintenance hot spots

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

- **Lyttelton Tunnel:** higher maintenance and operating costs from need to protect and preserve the sole freight route to Lyttelton and provide for previously excluded traffic, such as dangerous goods or over-sized loads.
- **Slips:** Maintenance of slips is required in section SH1S/90 south if Clarence. Under-slips and over-slips are occurring on section SH1S/28 south of Blenheim.
- **Asphalt:** An asphalt strategy is needed for the section of highway through Blenheim.
- **Flooding** is problematic through low lying areas around Para.
- **Drainage:** There are groundwater drainage issues on section SH1S/247 north of Greta Valley.
- **Settlement** is occurring around the Travis Wetland in Christchurch.

Figure 23 – Access and resilience investment



Renewals

Resurfacing

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

Significant investment in resurfacing is planned for sections SH1S/0 and SH1S/18 between Picton and Blenheim.

Structure Renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. One bridge is planned for replacement due to asset condition, at a total estimated cost of $8.5M.

Bridges on SH74 were impacted to varying degrees by the seismic activity during the Christchurch earthquake events. Those subject to further risk from liquefaction have been identified with the Anzac Drive bridge requiring new abutments. The Ashley River Bridge is nearing end of life (within ten years of service life) and requires development of a replacement plan.

Improvements

Structure Improvement

Four bridges are scheduled to be replaced for improvements reasons, at an estimated cost of $21.5M.

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/

Opawa Bridge Replacement, SH1S RP18/9.0

Description: The replacement of the Opawa Bridge is being investigated to improve travel on State Highway 1 north of Blenheim. This project has been advanced as part of the Government's Accelerated Regional Roading Package (ARRP) with design underway and completion of construction estimated for late 2018.

Kaikoura Earthquake Response

Description: The North Canterbury Transport Infrastructure Recovery is an alliance representing the NZ Transport Agency and KiwiRail on behalf of government, to repair by the end of 2017 the road and rail networks between Picton and Christchurch following the November 2016 Kaikoura earthquake.

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 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
Oaro to Cheviot resilience improvements		Resilience improvements identified to reduce the risk of damage or loss during natural disaster events. Improve route security.
ENR Cheviot to Waipara		Proposed resilience improvements to reduce the risk of damage or loss during natural disaster events.
Hurunui River Bridge		Bridge replacement to provide two lanes with improved approach alignment.
Waimakariri Bridge improvements		Proposed bridge improvements including constructing of a 3rd southbound motorway lane on the Waimakariri Bridge and a cycleway on the eastern side of the Waimakariri Bridge connecting the proposed Northern Arterial cycleway.

Kaikoura earthquake response diggers at work

Investing in reliability and efficiency

Operations and maintenance

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

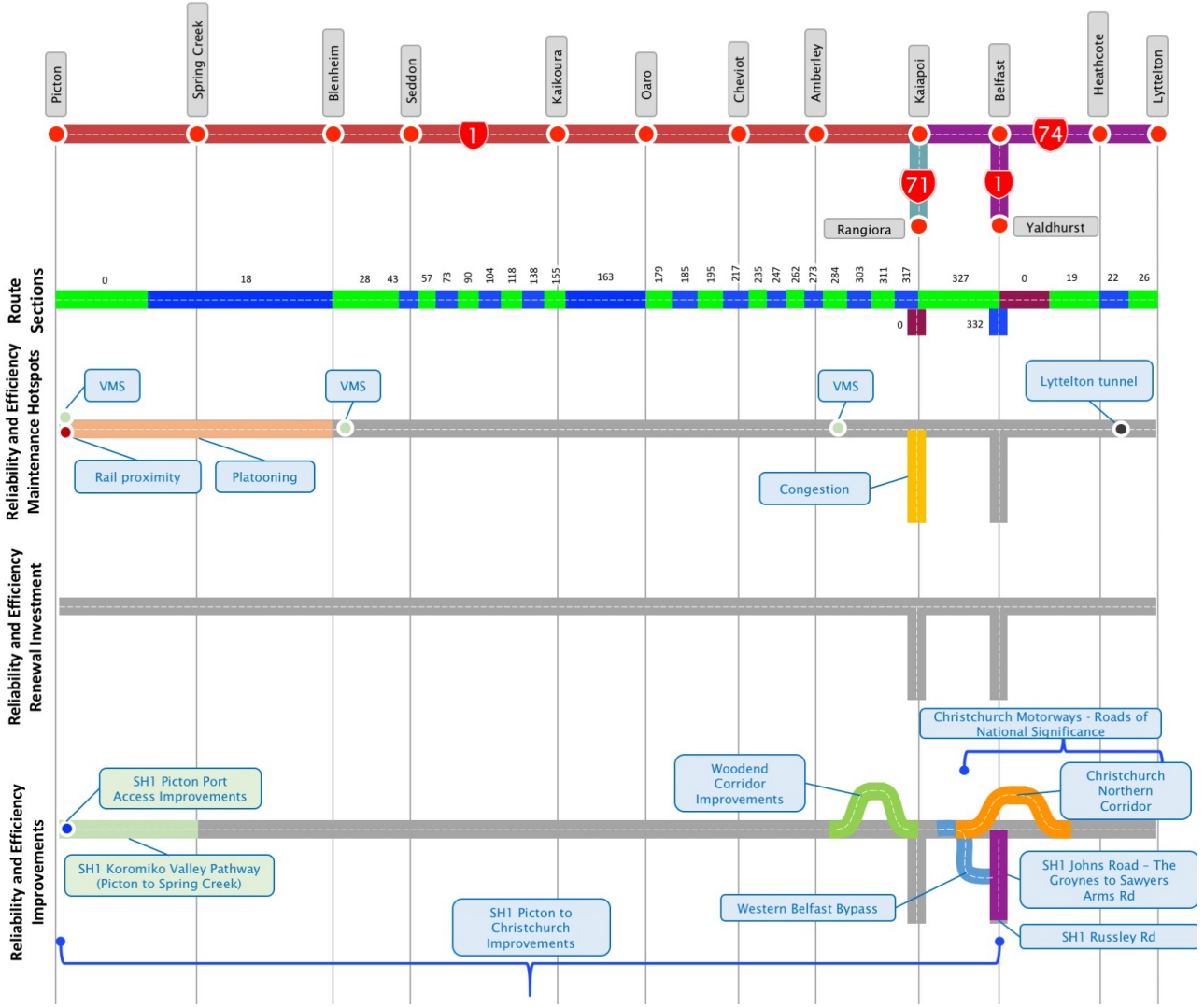
At the more developed Christchurch end of the corridor the Traffic Operations Centre, intersection management and ITS are significant to maintenance and operations. There was a lot of post-earthquake investment in SH74 to support the city Ring Road and access to Lyttelton Port.

Maintenance hot spots

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

- **Rail Proximity:** Rail operations and shunting in Picton create long delays for highway traffic.
- **SH71:** SH71 is under pressure from post-earthquake urban growth and community redistribution. There are elevated levels of commuter congestion and delays.
- **Lyttelton Tunnel:** delays due to exclusive use by dangerous goods to and from Lyttelton Port. There is no queuing capacity in Lyttelton.
- **Interislander Ferry Schedule:** Platooning effects from ferry traffic, especially first release of trucks (between Picton until Blenheim).

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/

SH1 – Woodend Corridor Improvements

Description: NZ Transport Agency plans to upgrade State Highway 1 with a bypass to the east of Woodend.

SH1 – Western Belfast Bypass

Description: Part of the Western Corridor (SH1) Programme, the Western Belfast Bypass (WBB) is a new four-lane, median separated motorway bypassing Belfast and running from the existing Northern Motorway to join Johns Road south of The Groynes entrance.

SH1 (Johns Road) – The Groynes to Sawyers Arms Road

Description: Part of the Western Corridor (SH1) Programme, this project is the upgrade of Johns Road (SH1), between The Groynes and Sawyers Arms Road.

SH1 – Russley Road

Description: Part of the Western Corridor (SH1) Programme, Russley Road (SH1) is being upgraded to a four-lane median separated road. The Russley Road/Memorial Avenue roundabout will be upgraded to an over-bridge with Russley Road going over Memorial Avenue and a large signalised intersection below allowing access across and into/out of Russley Road.

SH1/SH74 – Christchurch Northern Corridor

Description: This project combines the Transport Agency's Northern Arterial (a new section of SH74 running from just south of the Waimakariri River to QEII Drive near Winters Rd) and two Christchurch City Council projects that link QEII Drive to Cranford St and four-lane Cranford St to Innes Rd. This project will be opened from early 2018.

Draft Regional Programme considered for SHIP

Table 4- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH1 Picton Port Access Improvements		Undertake improvements to improve state highway access to Picton Port and reduce environmental impacts on the Picton community.
SH1 Koromiko Valley Pathway (Picton to Spring Creek)		Provide off road cycle paths to connect to Picton to Havelock cycle path and Spring Creek to Blenheim UCF path.
HPMV T2 Nelson to Lyttelton		Potential HPMV routes are restricted by lack of availability of the corridors due to restrictions, particularly the strength and width of bridge structures. 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.
SH73/1 Yaldhurst intersection improvements		Proposed improvements identified to improve the operation of Yaldhurst intersection
Curletts/Blenheim corridor improvements		Proposed improvements to the road layout and operation at locations along the Curletts Blenheim corridor to improve both safety and capacity.

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), guardrail and safety wire rope barriers, appropriate speed limits and advice of rural communities, and control of roadside vegetation.

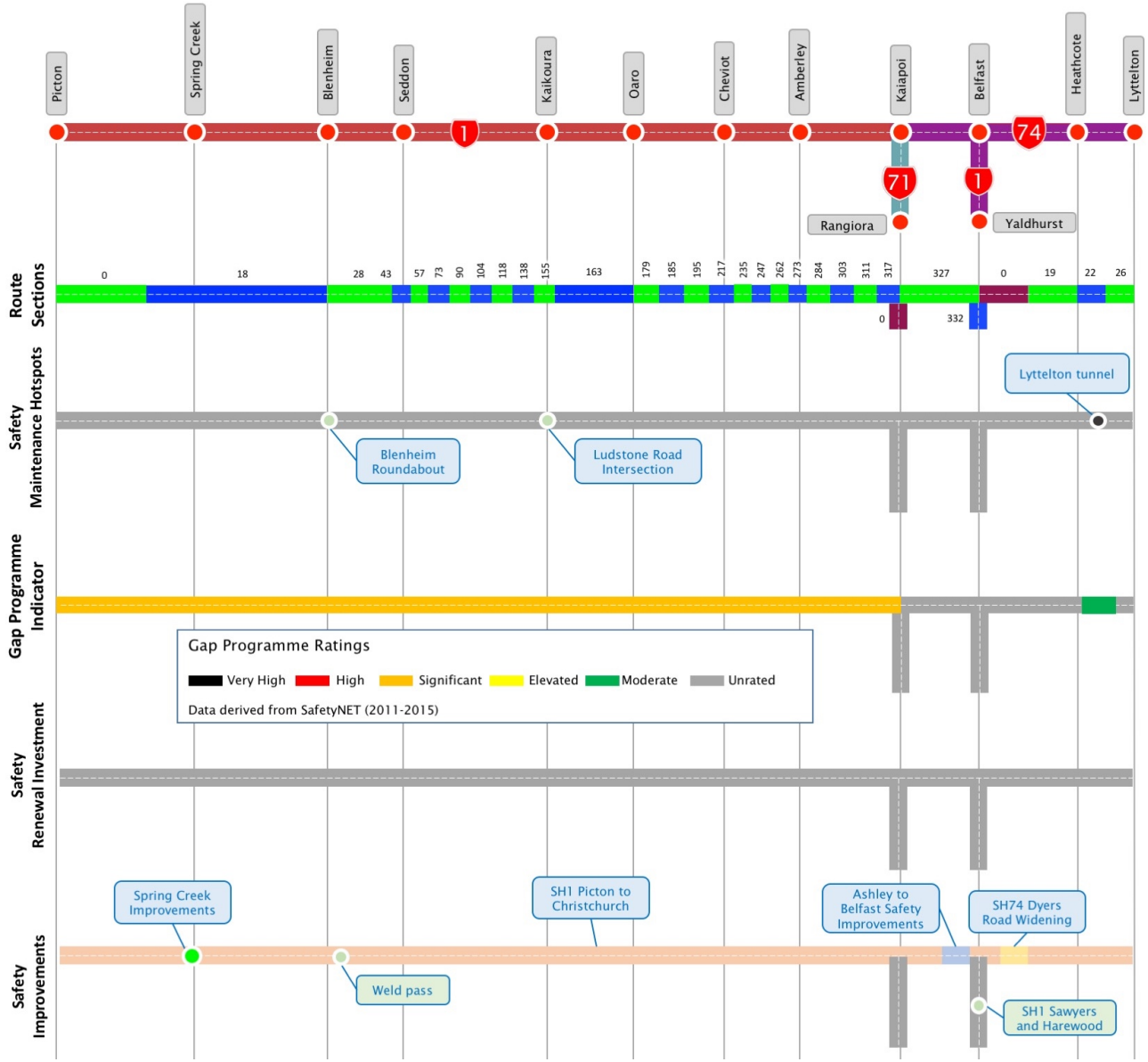
Much of the investment in rural safety on this corridor has been with barrier work and hazard protection, which is expected to continue as part of the NCTIR management, aiming to raise the safety rating to 3.5 stars.

Maintenance hot spots

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

- **Rail Crossings:** level crossings on highway and on local roads close to highway, such as Blenheim roundabout safety or through Picton. Blenheim Roundabout is a complicated intersection with rail through the centre, presenting safety risks to all users.
- **Ludstone Road intersection** in Kaikoura has a complex layout and pinch point between highway and local road through Kaikoura township, particularly for vulnerable road users.
- **Lyttelton Tunnel:** new safety features such as the Tunnel Deluge system have a greater cost for maintenance and compliance.

Figure 25 – Safety investment



Gap programme indicator

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.

From Picton to Kaiapoi, the corridor is rated as having a significant potential for reducing fatal and serious injuries through targeted low-medium cost safety improvements.

Between Kaiapoi and Rangiora and Kaiapoi and Lyttelton the corridor is unrated except for a small moderate segment between Heathcote and Lyttelton which would benefit from low cost, high coverage improvements

Unrated segments are either areas where potential crash savings are low or are being addressed under other existing programmes.

Renewals

There are no safety related renewals planned for the corridor.

Improvements

Planned

SH1– Spring Creek Improvements

Description: Improving the Spring Creek intersection and keeping people safer at one of the South Island's most dangerous intersections.

SH1 – Picton to Christchurch

Description: Strategic Business Case Investigation of the route as part of work included in the 2015-18 National Land Transport Programme.

SH74 Dyers Road Widening

Description: This project will realign and widen SH74 Dyers Road from Metro Place to Maces Road. This work will improve the safety and efficiency of this busy urban 1km section of state highway.

Draft Regional Programme considered for SHIP

Table 5- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH1 Weld Pass		We are investigating State Highway 1 (SH1) Weld Pass to find ways to help improve road safety and reduce crashes.
SH1 Sawyers and Harewood safety and reliability improvements		Proposed grade separated interchange at Sawyers and left in/out at Harewood.
Okarahia Safety Bridge Realignment		Proposed alterations to the horizontal and vertical curves of SH1 at Okarahia to improve the safety of SH1 in this location.
Cheviot to Ashley river safety and reliability improvements		Proposed improvements to enhance safety, tourism amenities and reliability of this section of corridor including Ashley Bridge Widening.
Ashley to Belfast Safety Improvements		Safe Road Alliance (SRA) Projects 18/19+ - Road safety treatments for improvement of the KiwiRAP Star Rating through prevention or reduction in severity through loss of control crashes and to achieve a safer roads and roadside environment for the SH1 corridor between Ashley to Belfast - 22kms.
Road Safety Promotion		Road safety promotion projects in the Canterbury 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: pavement rehabilitation to ensure a high proportion of travel on smooth roads, control of litter, provision of rest areas and stopping points, landscaped areas maintenance, environmental and biosecurity compliance.

Maintenance hot spots

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

- **Noise and vibration:** Blenheim is a noise and vibration maintenance area due to the high number of heavy vehicles in close proximity to residential areas.
- **Pest Species:** there are a number of pest species that require control through this corridor, particularly the northern half. These include Chilean needle grass, tree lucerne and wilding pines.
- **Northern Expressway:** along the northern expressway mowing, litter and vegetation is required to a higher standard than other rural areas. Landscaping is required to be maintained as part of consent conditions.

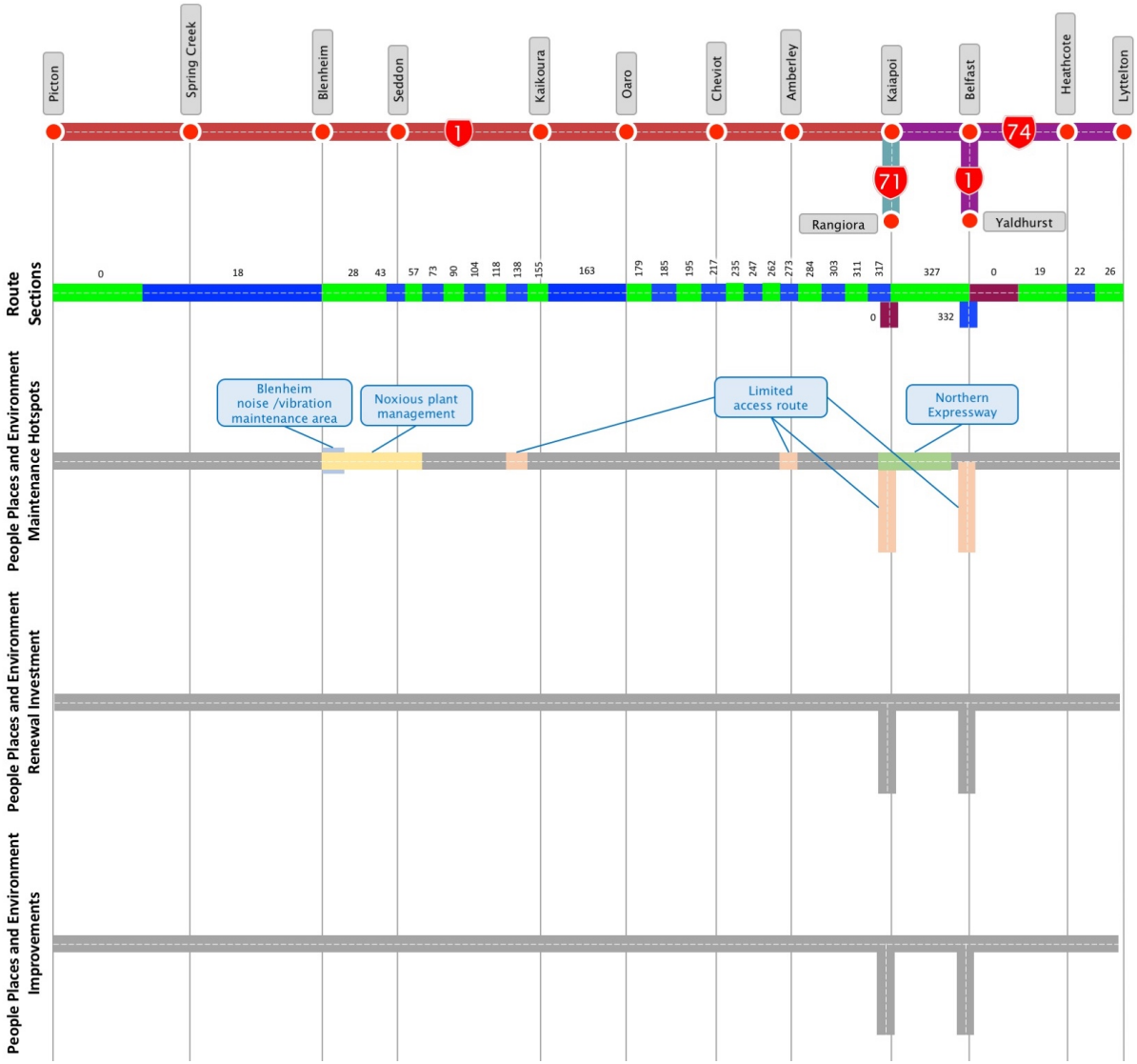
Renewals

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.

- **Maintenance Access:** the challenging topography requires additional traffic management and pavement treatments are costlier due to the remote distance, more so for specialised treatments such as for improved road holding and safety.
- **Rail corridor:** The rail corridor closely interacts with this highway corridor and there are implications and cost for access, operations, efficiency and safety.
- **Slope stability:** Slope instability along the northern section of the corridor results in frequent slips and rockfalls and ongoing maintenance is required to secure banks, and clear culverts of silt.
- **Rivers:** The rivers and bridges become pinch points for resilience, particularly when cyclic maintenance is required or when traffic must be detoured meaning that rapid reinstatement treatment choices may be preferred over lowest cost.
- **Coastal erosion:** walls, gabions and wash protection devices require ongoing maintenance and renewal in this aggressive environment.
- **Seismicity**: Much of the corridor is on active seismic fault lines and this influences investment decisions with ongoing land movement, monitoring and post event settlement.
- **Drainage** requires active management both in the rural areas with high intensity events and debris and in Christchurch City with changes in fall and permeability post the earthquakes.
- **Winter Access:** Creates extra pressure to maximise availability of route (not have closure) has led to increased use of premium products, CMA, at an increased maintenance cost.
- **Narrow Bridges** result in higher maintenance cost of narrow aging structures due to repeated bridge strike and reinstatement of supporting guardrail maintenance.
- **Temporary Traffic Management:** The pressure to maintain the route, particularly SH 71 servicing Kaiapoi and Rangiora, means less discretion in programming of works and fewer windows of opportunity for general operations and maintenance, which can increase the need, type and extent of traffic management required to access the corridor.

Reliability and efficiency

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

- **Value for Money:** the economics of treatment choice vary with distance from the plant, particularly for specialised surfacings north of Culverden or where works require lengthy disruption to use of the corridor.
- **ITS:** More ITS means a better view of the corridor, but comes at an increased cost that has not yet stabilised or fully understood. There is an increased pressure for more rapid network incident response.
- **Variable Messaging Signage, VMS:** real time information is crucial to management of incidents and providing early and accurate advice of corridor delays, both in the urban and rural areas – more real-time devices and information are desirable for improved operation.
- **Travel Time Reliability:** There is near an hour variation in the rural travel time between Ashley River and Picton, which is costly to road users, particularly freight. Summer holiday traffic impacts on the corridor when Picton ferries operate at capacity.
- **Limited passing opportunities:** There are few passing opportunities provided and this causes delays, platooning and additional vehicle operating costs.
- **Land use changes:** Accelerated land use changes and changed commuter patterns are impacting the northern Christchurch fringe with increased highway and local road traffic and greater operating costs, particularly through the Rolleston, West Melton and Burnham areas. (CSM2 will provide some relief and is scheduled for opening in 2020).
- **Street lighting:** Lighting costs are a significant and can be reduced through retiring obsolescent and outdated equipment.
- **Intersections:** Minor road access to highway are a problem. Poor and absent intersection turn facilities and poor distribution and configuration are more noticeable as landuse changes.

Safety

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

- **Maintenance, Wire rope barriers:** Improvements and upgrades such as wire rope barriers provide significant safety benefit. More installation of this safety feature comes at a greater pressure on maintenance – both cost and attention. A lot of wire rope has been installed recently and further installations are proposed. The cost to maintain is not readily identified due to the random nature of strikes.
- **Safety Features:** recovery works through Kaikoura coast aim to bring the KiwiRAP rating up to 3.5 stars which will mean much greater sacrificial safety features that will require greater and ongoing maintenance attention and cost.
- **Safety at worksites:** As traffic volumes increase and AM/PM peaks extend in duration, it becomes increasingly difficult to safely deliver maintenance and renewal requiring consideration of alternative approaches to the planning and treatment choices.
- **Intersections:** Older rural intersection designs do not readily respond to higher traffic volumes as is seen at Ludstone Road, Kaikoura intersection with SH1 – complex layout and pinch point between highway and local road through Kaikoura township, particularly for vulnerable road users and requires significant remodelling.
- **Delineation:** delineation requires constant attention to provide adequate guidance through tighter alignments and aid to night driving and wet road conditions.
- **Interislander Ferry:** The release of southbound vehicles from the ferry creates platooning behaviours and associated frustration from being delayed by slower vehicles – worse in Summer and tourist peak and further exacerbated by rail interaction through Blenheim, Picton and from local side road rail crossings.
- **Truck Safety:** Truck travel and rollover crashes are a feature of the tighter geometrics and high HCV proportion. Truck crashes require significant time and works to clear and present environmental challenges.

People, places and environment

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

- **Vegetation management:** Biosecurity controls of Chilean needle grass requires specialist maintenance treatments at additional cost.
- **Trees:** Protected trees at Hapuku and Spring Creek are located so close to roadside that they are protected by guard rails.
- **Biosecurity management:** Biosecurity imposes additional maintenance costs. More biosecurity issues are likely in the future to ensure the valued natural coastal landscape, and the economic value of the region's agriculture and horticulture are not diminished.
- **Environmental Management:** The increasing cost and need for environmental monitoring and compliance with new assets and as standards and expectations are raised.
- **Stock Effluent:** A stock effluent station based south of Blenheim requires consideration of maintenance and operation costs.
- **Geological instability:** The corridor is highly variable and geologically instable with slumping and rockfall present along the coastal and alpine areas. The costs to maintain can vary significantly, with weather events are most likely to influence multiple sites concurrently.

Weld Pass improving road safety and reduce crashes.

Investment considerations

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

- **Wire rope retrofits:** how to fund the uncertainty of maintenance with sacrificial devices such as guardrails and wire rope barriers, especially when in an asset growth phase as is happening on this corridor.
- **Freight growth:** Freight volumes are in a growth phase. The additional wear and tear on the route will increase maintenance costs and require future improvements to meet the ONRC classification of this corridor.
- **Changes to the State Highway network in Christchurch:** Following the completion of the RONs projects in Christchurch, the section of SH1 between Dickies Road and Johns Road will be revoked. This may require investment prior to handover to the local authority.
- **Post-Earthquake effects:** enduring consequence of earthquakes on drainage, pavements, roughness, travel speed, and maintenance cost. There are examples from both Christchurch and Kaikoura quakes.
- **Cyclists:** increasing usage of the corridor by cyclists and the need for consideration of road widths, surfacings, stopping areas and crossing locations.
- **Pavement instability:** weakened pavements and groundwater issues are common in the vicinity of adjacent wetlands including Para Swamp (south of Picton) and Travis Wetland at Burwood. Will need consideration how best to manage.
- **Opawa Bridge:** Opawa Bridge, SH1, Blenheim is to be replaced, need consideration of future ownership and maintenance obligations for the bridge which is a category 1 historic place.
- **Dangerous Goods Transport to Lyttelton Port:** loss of alternative routes has meant more transport of specialised escorted loads through the Lyttelton Tunnel. This practice remains a risk and creates additional delay for other users. Requires consideration about ongoing sustainability of approach.
- **Asset Growth:** going forward there will continue to be three sources of asset growth: RONS (northern corridor), NCTIR improvements, NOC projects. SH1 Kaikoura route improvements.
- **Blenheim township:** consider an integrated and co-ordinated response to issues through the township such as intersections, pedestrian amenity and at grade rail crossing and co-ordination with the pending Opawa Bridge replacement.
- **SH74 Uncertainty:** SH74 runs through the worst earthquake impacted eastern side of Christchurch and there remains uncertainty about what if any impact on pavements from silt infiltration, fines loss or increased water table heights. Similarly, there may be unknown effects further north on SH1 from the more recent Kaikoura events.
- **Structures**: Lessons about performance of structures during the Earthquakes need to be applied to maintenance programmes, design standards and monitoring. Consider installation at key sites of motion stations– ground acceleration and liquefaction were greater than current design provisions.
- **Lyttelton Tunnel:** Operations and maintenance of Lyttelton Tunnel as critical connection to Lyttelton Port, including consideration of remaining retrofit of Tunnel components and the impact of such programmes; and the ongoing provision for sustainable movement of everyday “dangerous goods” such as fuel through the tunnel.

SH74 Dyers Road from Metro Place to Maces Road

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		
	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

This publication is also available on NZ Transport Agency's website at www.nzta.govt.nz

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government