

Wellington to Woodville

CORRIDOR MANAGEMENT PLAN



2018-2028

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Executive summary

The Wellington to Woodville corridor comprises SH2 from its intersection with SH1 at Ngauranga, on the foreshore of Wellington Harbour, to its intersection with SH3 at Woodville, providing the central spine to the Wairarapa road network. The Wairarapa rail line generally follows the same alignment providing alternatives to road travel for freight and commuters. The corridor includes SH58 which links SH2 at Haywards, to SH1 at Paremata, on the Porirua Harbour, along with SH53 from its intersection on SH2 at Featherston through to Martinborough.

The corridor is approximately 191 km long (1.7% of the state highway network). The total value of assets along the corridor is \$351M (1.5% of the total national asset value).

SH2 is one of the two main routes in the Wellington region that connect Wellington City to the lower north island and provides a connection to the South Island via SH1 and the Wellington Port (CentrePort). SH2 also provides an important connection via SH58 to Porirua. Within the Wellington region the corridor connects the economic activity centres of Wellington City, the Hutt Valley, the Wairarapa and beyond including Palmerston North and Hawkes Bay.

Customers on the route is mainly a mix of city commuters to and from the Wairarapa, and freight between Wairarapa and Wellington.

The SH2 corridor passes through urban environments at the south with coastal and rivers to the east of the corridor before traversing the steep windy terrain of Rimutaka hills, continuing through the flat terrain through the Wairarapa where it follows the terrain up and over Mount Bruce to the end of the corridor in Woodville.

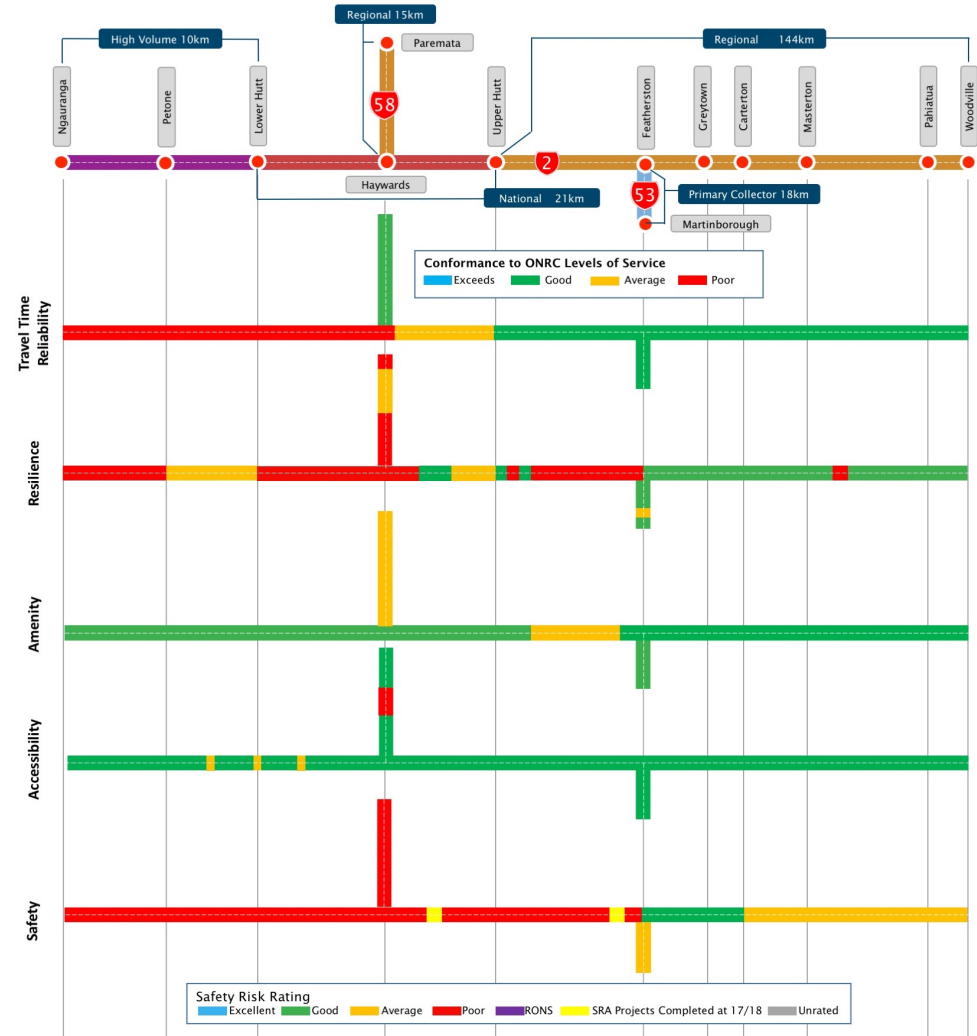
The corridor pressures relate to resilience, safety and reliability. The multi-modal corridor requires continual balance of modes and access to modes within the one transport network to operate efficiently. Safety of customers along sections of the corridor is poor and the application of the Speed Management Guidelines on this corridor where topographical features constrain customers to travel below the current posted speed limit is essential.

Communications to customers prior and during a journey will continue to be essential. Providing rapid updates and useful decision-making information when unplanned events occur has assisted customers and is valued by them.

Resilience of the corridor is key to maintaining the economic productivity of the capital. The corridor operates as a multi-modal corridor that requires each element of the one network to have maintenance and operation processes in place to enable fast response to an unplanned event. The corridor has limited or no alternative detours and closures delay just in time freight journeys. Future investments to lessen the impact of flooding events will be necessary through the southern and northern sections of SH2 and on SH53 and SH58. Consequences of

weather events including slips have increased in recent years and are expected to continue. Monitoring and remedial works to eliminate unplanned events associate with this will contribute to meeting customers level of service expectations.

Figure 1 - Performance of the corridor against ONRC outcomes



Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Wellington to Woodville 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.

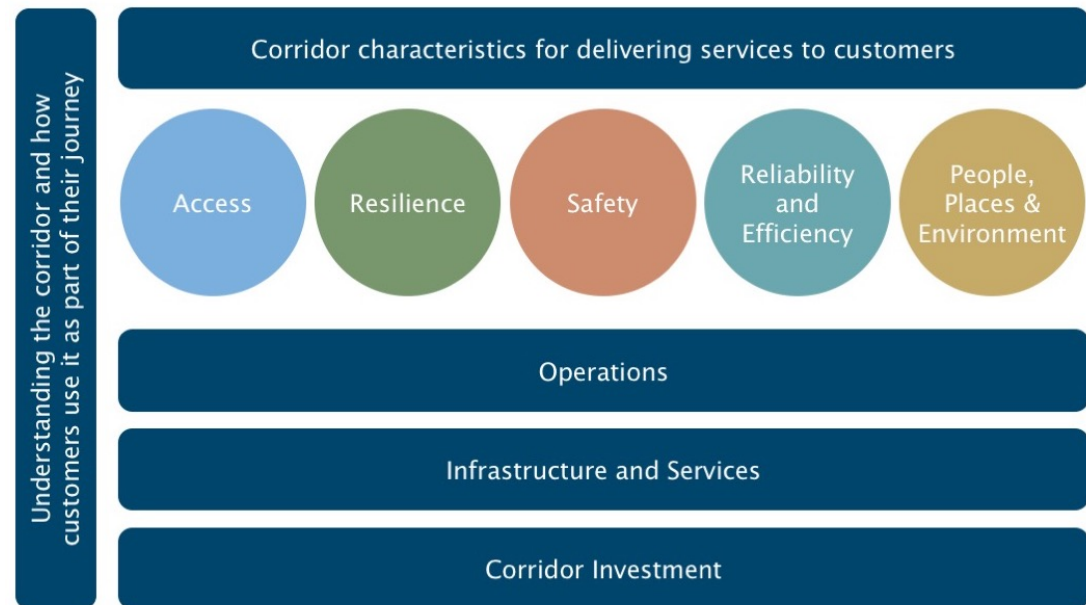
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on 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 Wellington to Woodville corridor comprises SH2 from its intersection with SH1 at Ngauranga, Wellington, to its intersection with SH3 at Woodville, providing the central spine to the Wairarapa road network. The Wairarapa rail line generally follows the same alignment providing alternatives to road travel for freight and commuters. The corridor includes SH58 which links SH2 at Haywards, to SH1 at Paremata, Porirua, along with SH53 from its intersection on SH2 at Featherston through to Martinborough.

SH2 is one of the two main routes in the Wellington region that connect Wellington City to the lower north island and provides a connection to the South Island via SH1 and the Wellington Port (CentrePort). SH2 also provides an important connection via SH58 to Porirua. Within the Wellington region the corridor connects the economic activity centres of Wellington City, the Hutt Valley, the Wairarapa and beyond including Palmerston North and Hawkes Bay.

The corridor is classified as National High Volume between Ngauranga and Lower Hutt, National between Lower Hutt and Upper Hutt and Regional between Upper Hutt and Woodville. The SH2 corridor passes through urban environments at the south with coastal and rivers to the east of the corridor before traversing the steep windy terrain of Rimutaka hills, continuing through the flat terrain through the Wairarapa where it follows the terrain up and over Mount Bruce to the end of the corridor in Woodville.

Due to the challenging terrain, particularly the Rimutaka hills, transport linkages between the east coast and lower north island are limited and result in journey times that are comparatively slow. While there are critical transport links between the east coast and lower north island areas (particularly for freight), traffic volumes on the routes are low.

In the lower north island, road is the predominant mode of transport for freight (84%) with only 12% moved by rail, and 2% by coastal shipping.

CentrePort is the key destination for freight serviced by the inland port at Waingawa in the Wairarapa, which provides the main flow of wood to the port via both rail and road freight.

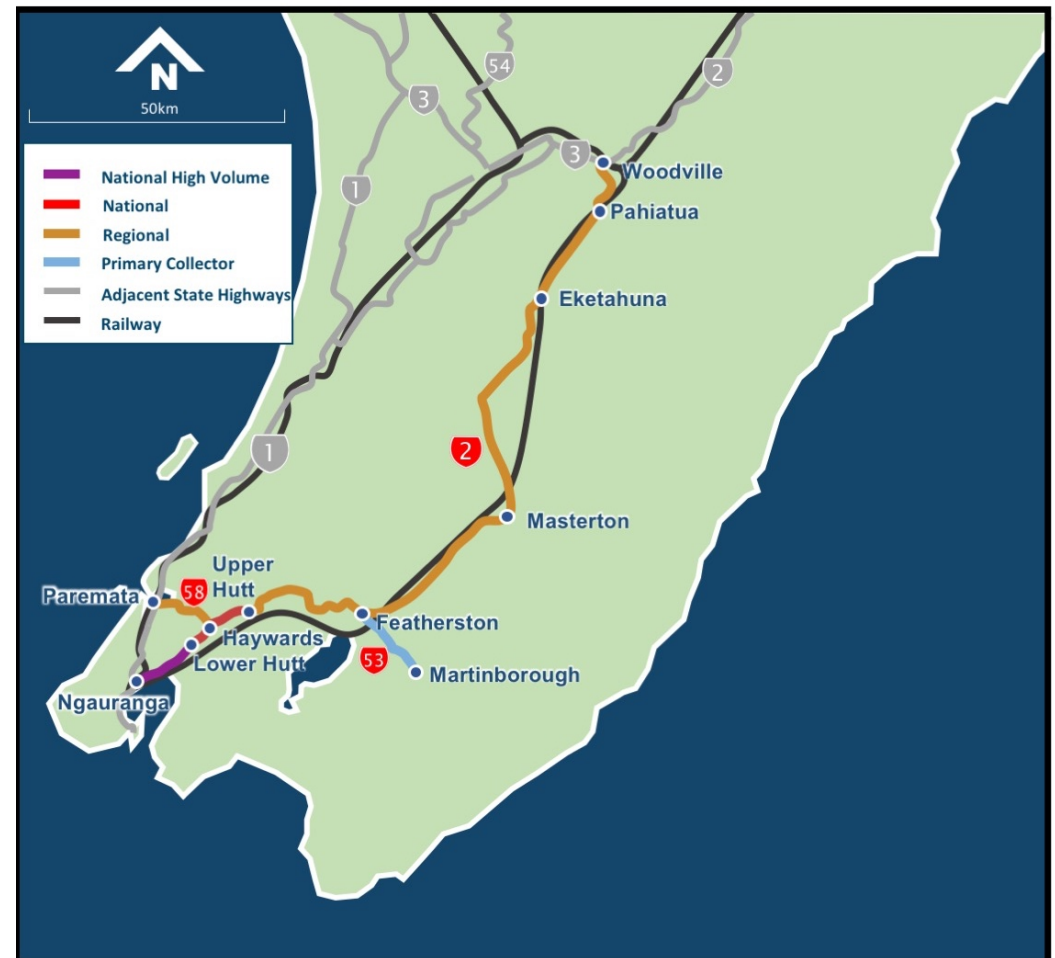
The regional economy

The Wellington region has experienced constrained economic and population growth for an extended period. The region is the second largest economy in New Zealand contributing 13.2% of GDP with 10.9% of the New Zealand population. The Wellington region has a population of 491,400, an employment rate of 67.7% with 5.7% unemployed.

The Wairarapa region primary industry sector accounts for 20.6% of employment. The key sectors are agriculture and forestry with industries focused around beef, sheep, grapes for winery and dairy cattle. The Wairarapa water use project has the potential to create over 1200 new jobs and add \$157M to GDP.

The northern end of the corridor provides freight access from the Manawatu region to the Fonterra distribution centre at Pahiatua. The Waingawa inland port south of Masterton provides rail and road distribution facilities for logs, wood products, wool and general freight.

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 commuter

There are four commutes along the corridor, the Hutt Valley to Wellington is the dominant flow. There are two other commutes on SH2 with lower volumes - Wairarapa to Wellington, and within Wairarapa to Masterton. A further commute is cross corridor between Porirua and Kapiti on SH1 and the Hutt Valley on SH2 via SH58.

The corridor is served by three rail lines, Wellington to Melling, Hutt Valley, and Wairarapa. There are also bus services to/from Wellington and the Hutt Valley. These services carry 12 million passengers per annum. Patronage growth was 5% between 2014-2015. Cyclists commute from the Hutt Valley to Wellington utilising SH2 and local roads. Cycle commuting occurs within the Wairarapa towns also.

Insights into daily commuter users:

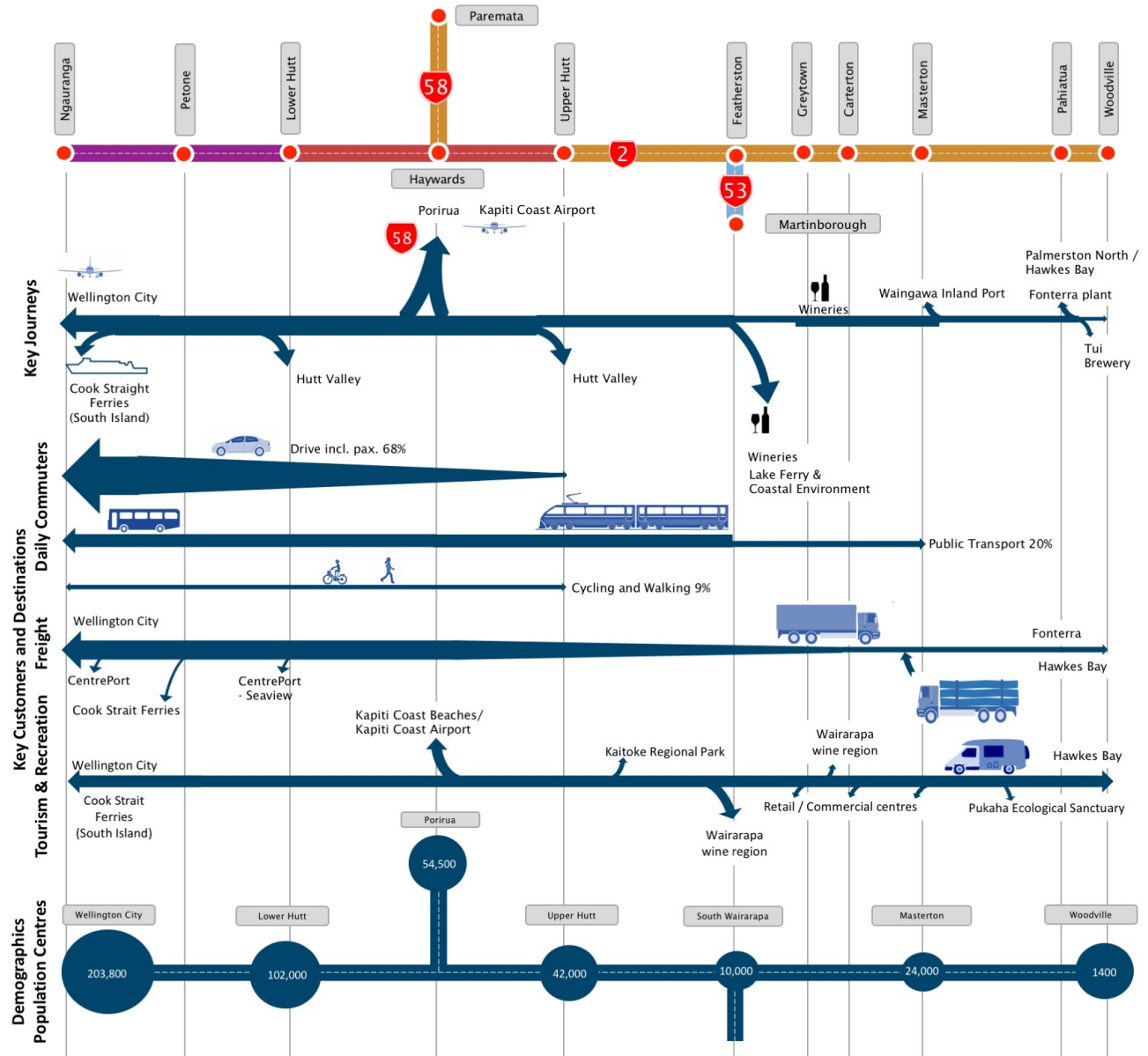
Road use: Commuters are experienced and have local knowledge. They will change their driving style and route to avoid stationery traffic. Cyclists get on SH2 as early as possible to avoid slower local road routes when heading to Wellington.

Road knowledge: Drivers have noticed an increase in peak period congestion between Hutt and Wellington since late 2015.

Pain points: Drivers experience an increased number of access points between Avalon and Petone. Cycling infrastructure is not seen as integrated along SH2 in general. Cyclists avoid the Petone to Ngauranga cycleway because of puncture-causing debris. Park and Ride facilities for the rail services are at capacity.

Daily commuters expect: Consistency in their journeys, including similar travel times, seeing the same number of cars on the road and passengers on the trains. Cyclists value a clean and clear road surface.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

Tourism contributes \$870m to the national economy annually. This is primarily domestic visitors spend. There were 3.4 million guest nights in 2016, with 75% domestic visitors. International visitor nights reduced between 2009 and 2014 and have since increased though remain below 2012 levels.

The corridor is used by people travelling between Wellington and the Wairarapa to maintain connections with family members and friends living in different parts of the region. People in Wellington visit the Wairarapa to enjoy outdoor activities, vineyards or other aspects of the rural lifestyle. Physical works are planned to avoid known events and peak holiday traffic.

The route is popular at weekends with motorcyclists and cyclists.


Insights into tourist and recreational users are as follows:

Road use: High numbers of recreational users at weekends to/from the Wairarapa for day trips from the Wellington region and Hawkes Bay. Higher number of tourism journeys during the summer months. Several regional events are held between November and March.

Road knowledge: Domestic visitors understand road conditions and expect variations in traffic volumes during event weekends and plan their journey accordingly. International visitors to the region or along the corridor have not typically experienced New Zealand roads and conditions. Travel times by international visitors can be underestimated due to limited knowledge of the road layout and winding roads.

Pain points: The inconsistent road environment on the Rimutaka hill can make less confident drivers feel uncomfortable especially when motorcyclists or groups of cyclists are on the route.

Tourist and recreational users expect: Good directional signage to destinations, regular current information on distance and travel times. Places to stop for refreshments, photo opportunities and toilet breaks.



“the Wairarapa is Wellington's natural hinterland, it's the kind of escape place to get away from things”

Freight operator

Freight movements include freight from within the region to the ports of Wellington or Napier, and the inland port at Masterton. The corridor provides HPMV access via a local road around Masterton and on the State Highway from south of Masterton to Ngauranga to link with CentrePort – Seaview, Petone and the Port of Wellington (CentrePort) south of the corridor.

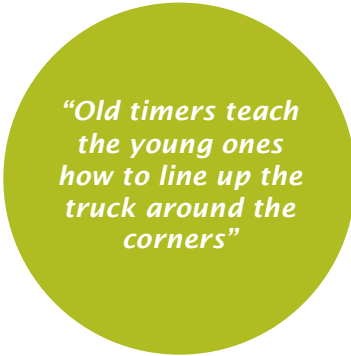
Insights into freight operators are as follows:

Road use: Access to Waingawa log hub and the distribution centre at Masterton is important, with additional short-term storage at CentrePort - Seaview, Petone. Journeys are made to coincide with interisland ferry departures. All just in time freight, such as that timed to arrive for ferry crossings, goes over the Rimutaka hills by truck with other less time dependent freight going by rail.

Road knowledge: Knowledge of road conditions is extremely high, verging on technical, confidence in managing difficult conditions is high.

Pain points: Roads are highly variable for the size of trucks, with carriageway widths narrow through the Rimutaka hills and in the northern section of the corridor. Through the towns speeds reduce to less than 50kph with alternative heavy vehicle routes only available through Masterton. Resilience of the corridor is a pressure as the only viable alternative route is via SH1, a diversion of over 250 km.

Freight operators expect: Infrastructure that supports commercial activity. This includes alternative routes that cater for freight trucks safely. Consistent carriageway width and visibility, convenient places for trucks to stop and drivers to have a rest, access services and facilities. They also expect information about road conditions at all times and particularly prior to journey commencement, to allow considered decision-making which enables confidence to keep their business operating efficiently.



“Old timers teach the young ones how to line up the truck around the corners”

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 we work with other network providers to provide a one network approach.

Working closely with the Territorial Local Authorities and Regional Councils along the corridor as shown in

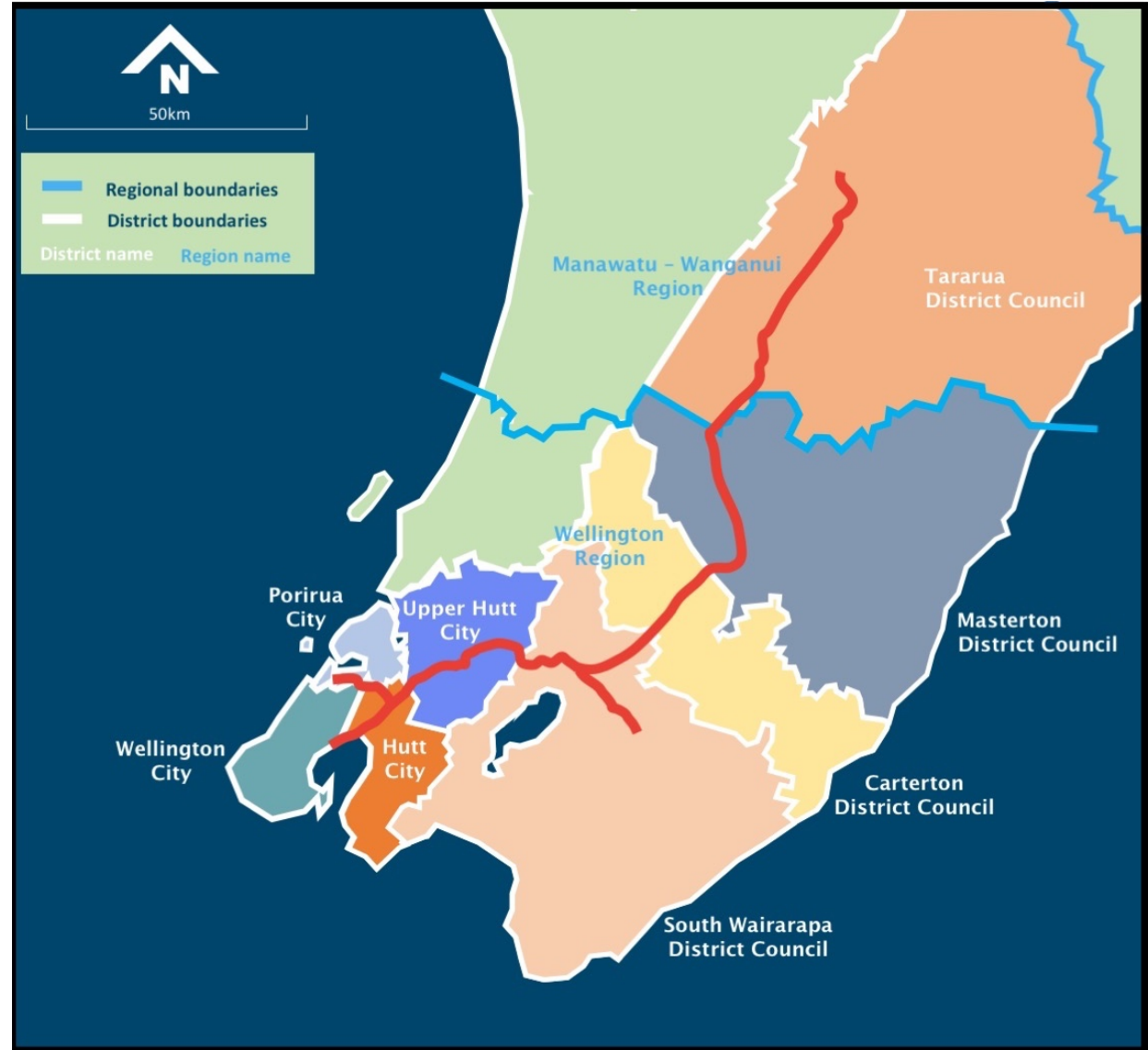
Figure 5. Additional partners include the NZ Police, Safe Roads Alliance, the Heavy Haulage Association, Kiwi Rail, automotive advocacy groups and other representative groups.

Collaboration along the corridor

The NZ Transport Agency is collaborating with Hutt City Council and Greater Wellington Regional Council on the development of a Hutt City Network Operating Framework to agree and respond to gaps in levels of service for all travel modes based on an agreed future transport network and land use. The process also tests how well future improvements and operational changes address those gaps.

The NZ Transport Agency, Wellington City Council, CentrePort and Kiwi Rail are investigating options to improve freight efficiency to and from the port area.

Figure 5 - Map of associated local authorities



Network Outcomes Contract approach

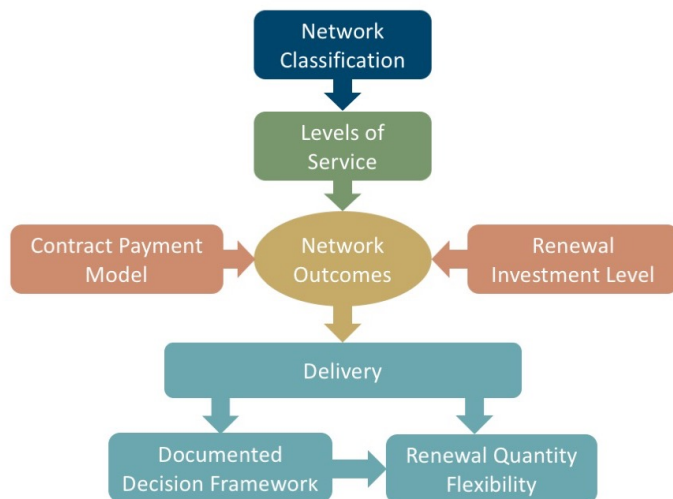
Network Outcome Contracts (NOC) are aimed at improving the effectiveness of service delivery for maintenance and operations of the state highway network. Elements of previous procurement methodologies (PSMC, Hybrid and Traditional models) have been integrated into the NOC contract model which delivers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

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

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

The contract process for the NOC is shown below:

Figure 6 - NOC process



Collaborative delivery of services

The Wellington to Woodville corridor crosses over two NOC contract areas. The boundary of the two contract areas occurs at the boundary between the Wellington region and the Manawatu-Whanganui region close to Mount Bruce.

Manawatu Network Outcomes Contract

Manawatu NOC (contract MW-NOC15) is undertaken by Higgins. The contract commenced on the 1 July 2015 for a 7-year period with the option for a further 2 years.

This contract is supported by the following specialist maintenance contracts:

- **Management of bridges and other structures Taranaki and Manawatu – Whanganui (PSWT25).** The contract commenced on the 1 November 2014 for a 3-year period with the option based on performance for a further 1+1 years.

Wellington Network Outcomes Contract

The Wellington NOC (contract 712N) is undertaken by Capital Journeys which is a joint venture between Fulton Hogan and Opus. The contract commenced on 1 October 2014 for a 5-year period with the option to extend the contract based on performance for up to a further 2 years on a 1+1 basis.

This contract is supported by the following specialist maintenance contracts:

- **Traffic signal maintenance (674N)** - The traffic signal contract 674N covers signal maintenances and renewals on state highways and local council roads in Upper Hutt, Lower Hutt and Porirua.
- **Traffic monitoring sites (859N)** - This contract is undertaken by HTS and commenced on 1 April 2016 for a period of 3 years with the option to extend the contract based on performance for up to a further two years on a 1+1 basis.
- **Wellington ITS field maintenance (733N)** - ITS assets (traffic signals, variable message signs, surveillance/CCTV cameras) undertaken Downer EDI and the contract started on 1 January 2017. The contract period of 733N is 3+1+1.
- **Regional bridge and structures (791N):** -Undertaken by Opus (professional service contract). This contract commenced on the 1 July 2015 for a 3-year period with the potential for extension of an additional 2 years.

Drivers for change

The Wellington - Woodville corridor caters for variable levels and types of customers and this demand is expected to grow into the future. The drivers for change associated with the corridor are briefly described below.

Regional growth and development

Manawatu-Whanganui

While most of this corridor is within the Wellington Region, there is a section of SH2 from the regional boundary to Woodville, therefore aspects of the Manawatu-Whanganui Regional Growth Programme are relevant.

The Manawatu-Whanganui Regional Growth Study was released in July 2015, with the subsequent Manawatu-Whanganui Economic Action Plan launched in August 2016. The plan is now being implemented by regional bodies, central government agencies, industry groups, and local businesses and iwi. Within the Horizons Regional the implementation programme is known as Accelerate25. Distribution and transport is one of the four identified enablers within Accelerate 25 aimed at unlocking economic growth and development opportunities.

There are elements of the action plan that will require input from The NZ Transport Agency. In particular, visitor access arrangement to current attractions, understanding of future demands on the network from unlocking land and connection to inland hubs.

Wellington

The SH2 corridor provides access to the edge of the Wellington Metro area.

The Wellington Regional Economic Development Agency (WREDA) is the regional economic development agency for the Wellington Region, combining the economic development activities of Wellington City Council and Greater Wellington Regional Council into one organisation.

The NZ Transport Agency is a partner in the 'Let's Get Wellington Moving' programme (along with Wellington City Council and Greater Wellington Regional Council) exploring how people wish to move around Wellington City and the future form and function of the transport network.

A forecast increase in freight from 17 million tonnes into, from and around the Wellington region in 2012, to 30 million tonnes by 2042 will put pressure on the efficiency and reliability of the network. Efficient, reliable and resilient links to inland hubs in Palmerston North, Whanganui and Waingawa in the Wairarapa will also be required.

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.

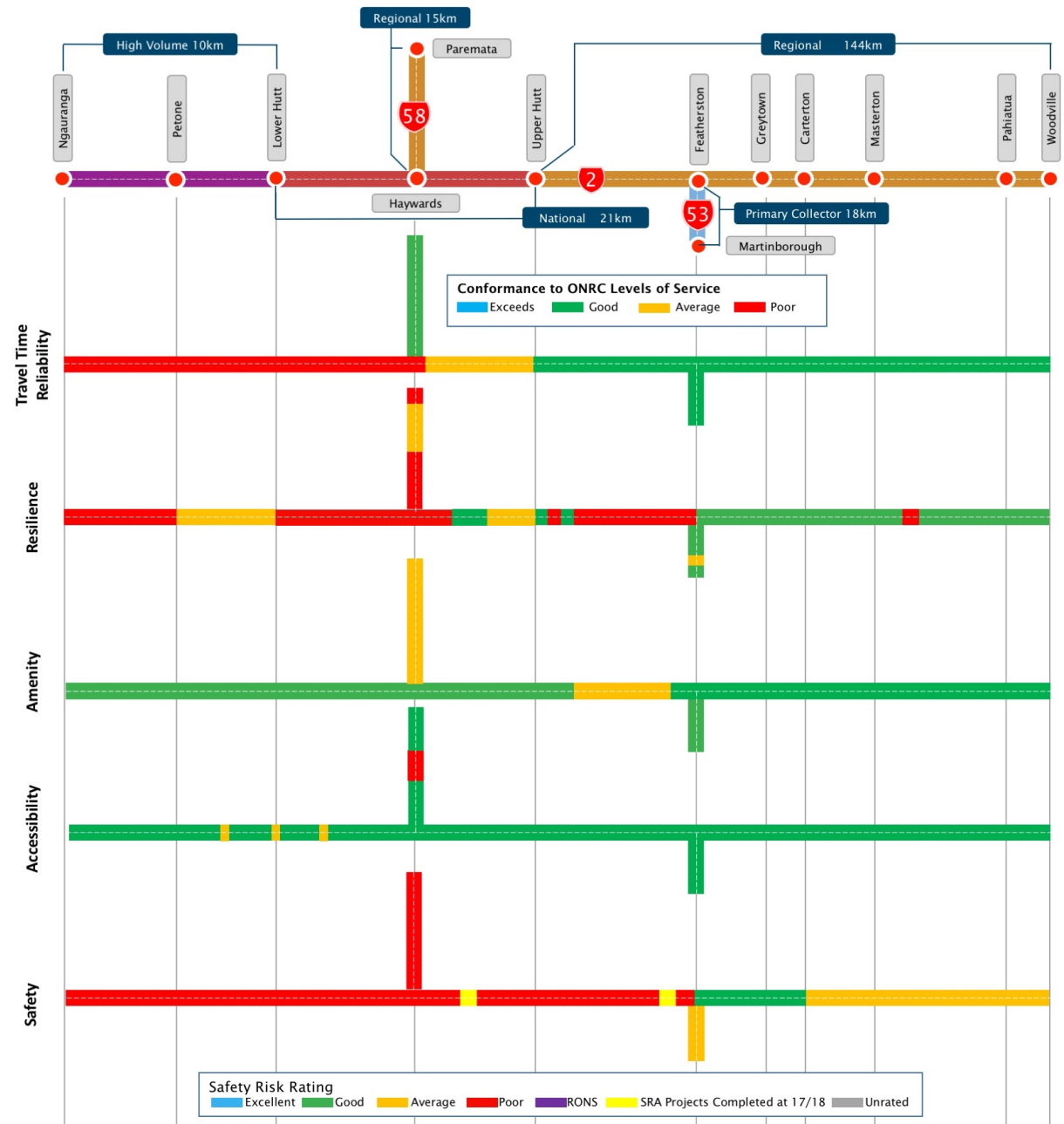
Road classification

The corridor from Ngauranga to Lower Hutt is classified as National High Volume as the major link from the north / east coast of the island to Wellington city, airport and port. From Lower Hutt to Upper Hutt it is classified as National. From Upper Hutt to Woodville the corridor is classified as Regional providing a secondary route from the Hawkes Bay to Wellington.

SH58 is classified as Regional, providing an alternative route between the Hutt Valley and the coastal towns on the west of the north island. SH53 is classified as a Primary Collector.

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

Figure 7 - Current ONRC customer levels of service performance







Summary of current performance

Figure 7 shows how the Wellington to Woodville 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

On the High-Volume section between Ngauranga and Petone the corridor experiences major congestion throughout the day making journey times unreliable. North of this section to the intersection with SH58 during the AM and PM peak periods travel time is unreliable.

Travel time reliability over the Rimutaka hills is relatively consistent due to the alignment of the road. From Featherston north, the route generally has good travel time reliability throughout the day due to the low traffic volumes.

Resilience

The corridor is at risk of flooding, landslides, tsunami, climate change impacts, earthquakes and liquefaction. In the last five years, the highway and rail lines have been closed on multiple occasions.

SH2 between Ngauranga and Petone has a high level of resilience risk due to flooding and slips. An alternative route for journeys between Ngauranga and Upper Hutt is available via SH1 and SH58, though sections of this corridor also have a low resilience level and typically are closed at the same time. Should slips or severe weather events occur on SH2 through the

Rimutaka hills there is no viable alternative route, although commuters have a public transport option as far as Masterton. SH53 has medium level of resilience with the road traversing a floodplain at Waihenga bridge. The road has been closed twice in the last 5 years due to rising waters. The corridor follows the Wellington fault line and crosses several other fault lines, making it susceptible to earthquake activity. SH58 is also susceptible to flooding and slips, particularly at its intersection with SH1. It has a low level of resilience.

Amenity

SH58 and the section of SH2 over the Rimutakas have an amenity level of average, with ride quality diminishing due to the winding and challenging nature of the highway.

Accessibility

SH2 has limited access points between Ngauranga and Upper Hutt, these are provided by grade separated or signal controlled intersections. Limited provision along the corridor is provided for pedestrians, though crossing facilities are available at points along the route. Further north access to the corridor increases.

SH58 has lower levels of service on its approach to the National and High-Volume corridors it joins. This is expected on a regional classification route.

Safety

For almost the entire segment between Ngauranga and Upper Hutt, the corridor has a 4-star rating.

Beyond Upper Hutt, the corridor is rated 2 or 3-star due to an increase in unprotected roadside hazards. A number of sharp bends along the Rimutaka Hill section are now protected by road side barriers. This has resulted in more reported strikes than previously, as noted in the maintenance contract data.

Cycle lanes are generally adjacent to the carriageway along the 4-star section where segregated cycleways would be considered normal and may lead to poor safety outcomes. North of the Dowse interchange there is a concentration of fatal and serious injury crashes at at-grade intersections.

SH58 is 3-star rated. The limited land available between the sea and carriageway prevents the installation of roadside protection along much of the route. Shoulders are narrow on the western end of the route from the Transmission Gully intersection location.

SH53 is 2 or 3-star rated along its length. There are unprotected power poles and other road side hazards as well as narrow shoulders along much of its length.

The Gap programme analysis has identified a very high potential to reduce fatal and serious injuries between Lower Hutt and Upper Hutt.

Improving the customer experience

In responding to Customer Levels of Service it is important to acknowledge that significant improvements to the corridor are planned or underway as part of the Safe Roads Alliance and ongoing discrete NZ Transport Agency capital works programme projects.

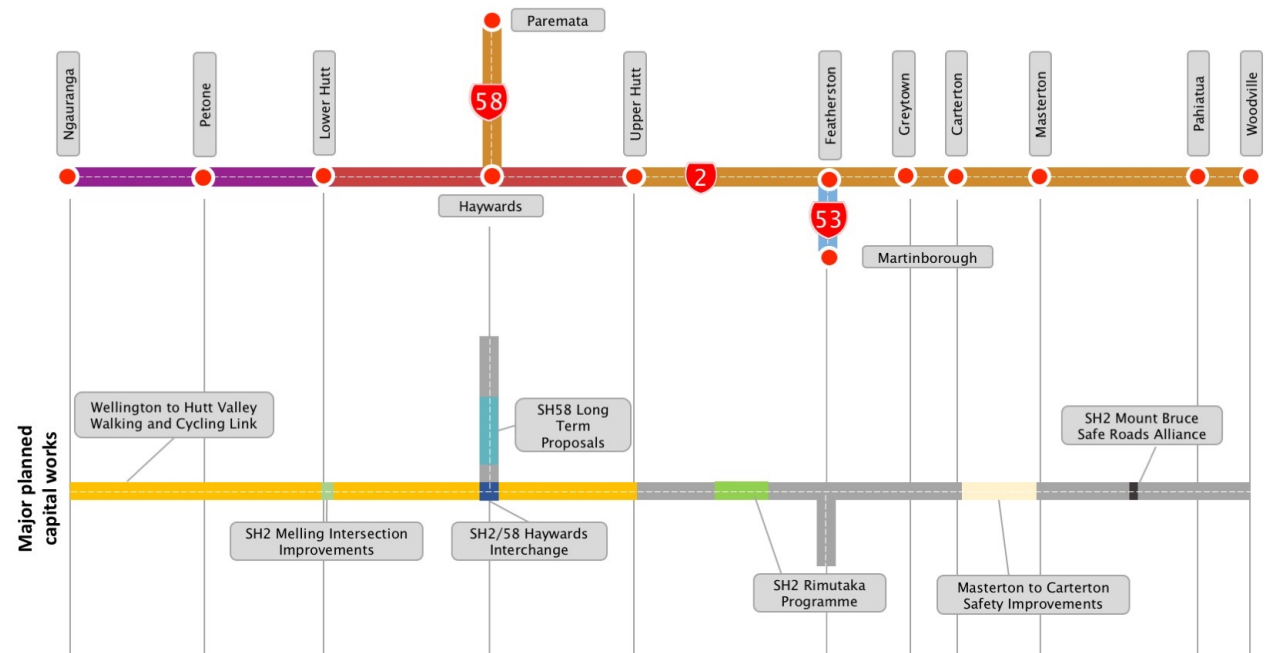
Projects currently in construction or in various stages of development have the potential to significantly impact future journeys along the corridor. These include Transmission Gully due for completion in 2020, SH2/58 Haywards interchange due for completion in 2018, and the Petone to Grenada link road currently under investigation. Improvements to the Wellington passenger rail network due for completion in 2020 are expected to deliver improved capacity, frequency and reliability of services. The programme business case for SH2 ties together all future proposals for SH2 up to Masterton in two packages, one Ngauranga to Te Maura and a second Te Maura to Masterton.

Improvements on the corridor include:

- Delivering travel time reliability between Ngauranga and Te Marua
- Public transport to the Hutt Valley
- Safety benefits through quality infrastructure design and higher KiwiRAP ratings
- Resilience measures to reduce the impact of closures caused by natural events and delays due to crashes.

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

Figure 8 – Significant corridor planned improvements



Access

Carriageway configuration

The corridor transitions through an array of carriageway configurations between the highly-urbanised areas at the southern end of the route to peri-urban and rural alignments. Between Ngauranga and SH58 it is predominantly four lanes divided carriageway with short sections of four lane opposing at intersections, some of which are being constructed to divided during 2017. North of SH58 it becomes two lane opposing with sections of frequent or opportunity for passing up to Masterton. SH58 is predominantly 2-lane with an additional lane on uphill and downhill sections to cater for slower moving vehicles. SH53 is two lane opposed along its length with opportunities for passing.

Speed limits

SH2 has a posted speed limit of 100kph along most of its length with reduced speed limits of 50-80kph approaching urban areas and through communities. At the southern end the corridor enters a variable speed limit zone, where speeds are between 60-100kph depending on traffic conditions.

SH58 is 100kph from SH2 to Pauatahanui where it reduces to 80kph. On the approach to Paremata the limit reduces to 50kph at Postgate Drive, Whitby until its intersection with SH1 at Paremata roundabout.

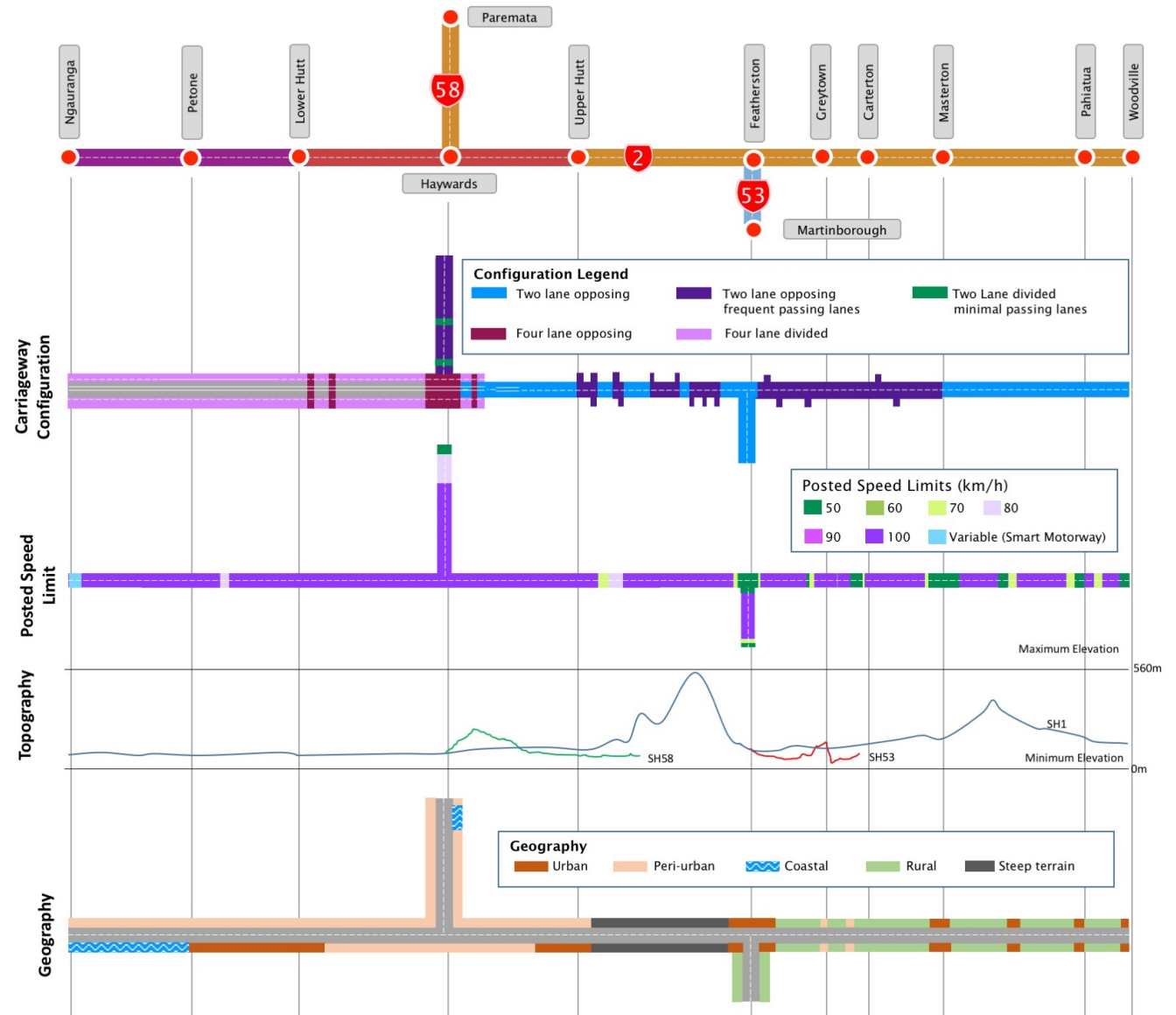
SH53 is predominantly 100kph, it reduces to 50kph on entering urban areas with a small 70kph section on the approach to Martinborough.

Topography/geography

The topography of the corridor includes a significant climb up and over the Rimutaka hills. The route is then generally flat with a gradual uphill climb to Mount Bruce. The route transitions north from peri-urban through a series of rural and urban environments.

SH58 climbs up and over Haywards hill. It is mainly peri-urban with a short coastal section on the northern side. SH53 is a relatively flat corridor through a rural environment.

Figure 9 - Corridor characteristics



Horizontal alignment

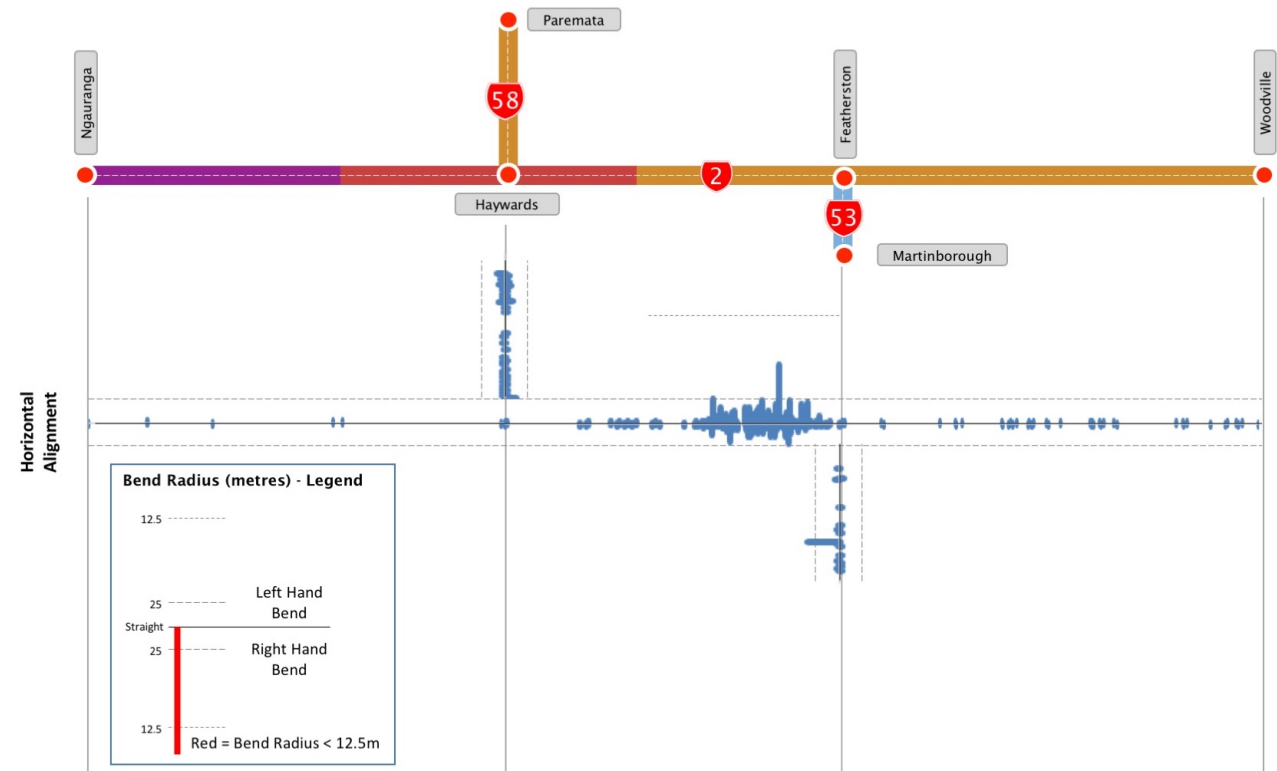
The infographic shows the location and extent of the out of context curves along the corridor. The height of the bar is an indication of the severity of the curve calculated as $\frac{1}{radius^2}$, meaning the taller the bar, the smaller the radius of the curve. Note: Unlike other infographics, the 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 concentrated clusters of larger radius curves, along SH58, and over the Rimutaka Hills. Sharper bends with a radius below 25m occur over the Rimutaka Hills. The sharp bend on SH53 is a signposted intersection.



Rimutaka hill summit carpark

Figure 10 - Horizontal alignment



Volumes

Traffic volumes vary along the corridor, with the highest volumes between Upper Hutt and Ngauranga and lower volumes in the rural sections north of Masterton. The heaviest per lane flows occur in the section just north of SH58 to Upper Hutt where the carriageway reduces from four lanes divided to 2 lane opposing.

Through the Wairarapa towns, traffic volumes increase with the highest heavy vehicle volumes in Carterton. The HPMV rated local road removes the heavy vehicle flow through Masterton.

HPMV routes

The SH2 corridor is suitable for HPMV between Ngauranga and Ngaumutawa Road, Masterton where a local road full HPMV route starts. There is no HPMV route on the corridor north of Paierau Road in the rural section north of Masterton. The local road alternative route has a posted speed limit of 70kph, providing a faster route than SH2.

All of SH53 is an HPMV route, as is SH58.

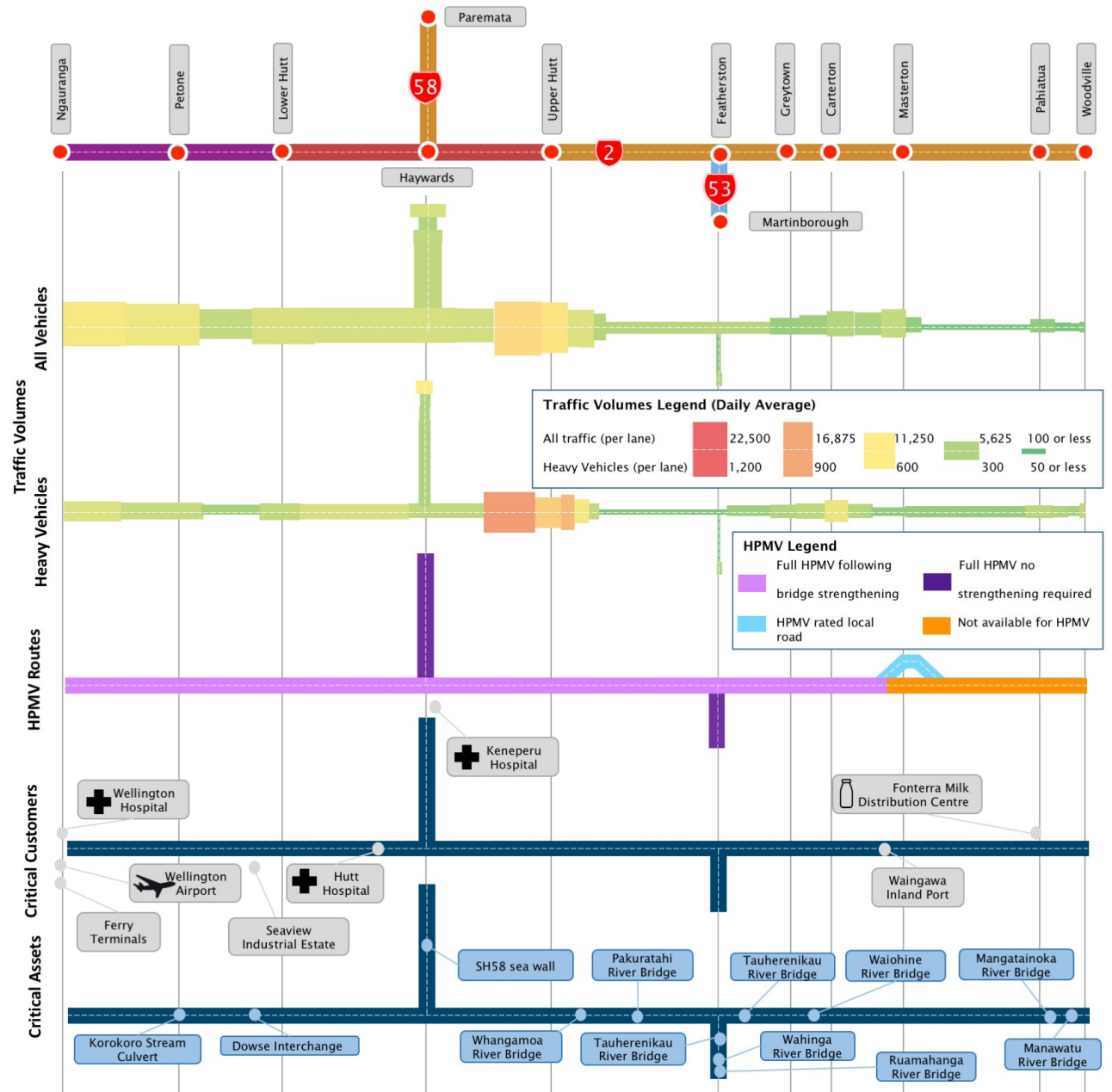
Critical customers and assets

There are a number of critical customers adjacent or close to the corridor which rely on the corridor to be open 24/7 and are vulnerable to having short term interruptions which impact productivity. This includes the Wellington and Hutt City hospitals which provide services to the region, and the Fonterra milk distribution centre in Pahiatua which requires access to receive time sensitive deliveries.

Twelve critical assets exist on the route. These assets require enhanced maintenance compared to other assets along the corridor to ensure they do not fail and significantly interrupt services along the network. Extreme weather events create the largest impact on these critical assets, through scour and greater maintenance requirements to minimise this or through rising water levels that result in bridges being closed for safety.

Oversized vehicles are not able to pass under the Dowse interchange and must travel over the top of the intersection to avoid striking the overbridge.

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:

- **Carriageway constraints impacting Levels of Service:** The two signalised intersections at Lower Hutt adjacent to Melling station impact journey times, as do lane configurations between SH58 and Upper Hutt. A minor event on the corridor can create a significantly reduced level of service. SH58 has limited opportunities to pass slow moving vehicles which can result in frustration.
- **Provision for vulnerable users:** Cyclists mix with general traffic on the National High-Volume section. No alternative route is available.
- **Critical customers:** Fonterra site accesses do not provide stacking room if vehicles arrive together. This creates both an access and safety pressure.
- **Maintain existing assets:** In the northern section of the corridor there will be continued pressure to extend the life of the asset given low traffic volumes.
- **Limited redundancy on the corridor:** This means that relatively minor incidents on the corridor particularly on the southern end can result in disproportionate delays and significant traffic queues.

Future considerations

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

- **Maintain appropriate level of service on the corridor following the opening of Transmission Gully:** There is also potential for the Petone to Grenada link road to affect patterns of travel within the corridor which will require monitoring and review to maintain levels of service.
- **Monitoring of changes in traffic patterns:** Transmission Gully currently underway will result in changes to traffic patterns in the area and the impact at SH1/SH58 which should be monitored as part of the future considerations on the corridor.
- **Improved asset resilience:** Maintain and develop a high-quality asset with greater resilience, particularly for the section of the corridor that is National High Volume. These roads are expected to have high levels of availability with fast emergency response time. Consideration of asset upgrades to reduce the impact of flooding in the southern section of the corridor is already underway.
- **Fonterra vehicle access:** Tararua District Council and Fonterra are working together to determine where on the network vehicles can be held for access to their sites. The solution selected will need to be implemented in a manner that is acceptable to the wider community and involve the NZ Transport Agency in the planning to ensure appropriate access to the corridor.
- **Segregated shared cycle and pedestrian path:** The proposed Wellington to Hutt Valley segregated shared path between Ngauranga and Petone will improve facilities for all cyclists and pedestrians in the National High-Volume section of the corridor.
- **Land use development:** Continuing to work with local authorities to ensure land use development is undertaken appropriately to maintain appropriate access provisions along the corridor. This includes significant changes to land use away from the corridor which could impact the corridor.

Resilience

The corridor is one of only two major routes into and out of Wellington City (the other being SH1). There are parts of the corridor with a significant resilience risk profile. If key sections become impassable, there are few viable alternatives, especially for HPMV's and during closure of the parallel Manawatu Gorge route.

Vulnerabilities

Coastal portions of the corridor are susceptible to inundation and include SH2 from Ngauranga Gorge to Petone and the Paremata inlet along SH58. The Rimutaka hills also have a significant resilience risk, being closed by wind, snow and slips as well as crashes.

The SH2 corridor is susceptible to flooding on the low-lying sections from Ngauranga to Upper Hutt and from Masterton to Pahiatua, as well as on SH58 near Paremata. Slips and rock fall present hazards on SH2 between Ngauranga and Melling, and through the Rimutaka hills. SH58 is vulnerable to slips at both the ends of the route. SH2 runs along a fault line and is built on land created during an earthquake. Seismic activity can aggravate all of the above, destabilising steep slopes and prompting Tsunami.

Alternative routes and diversion lengths

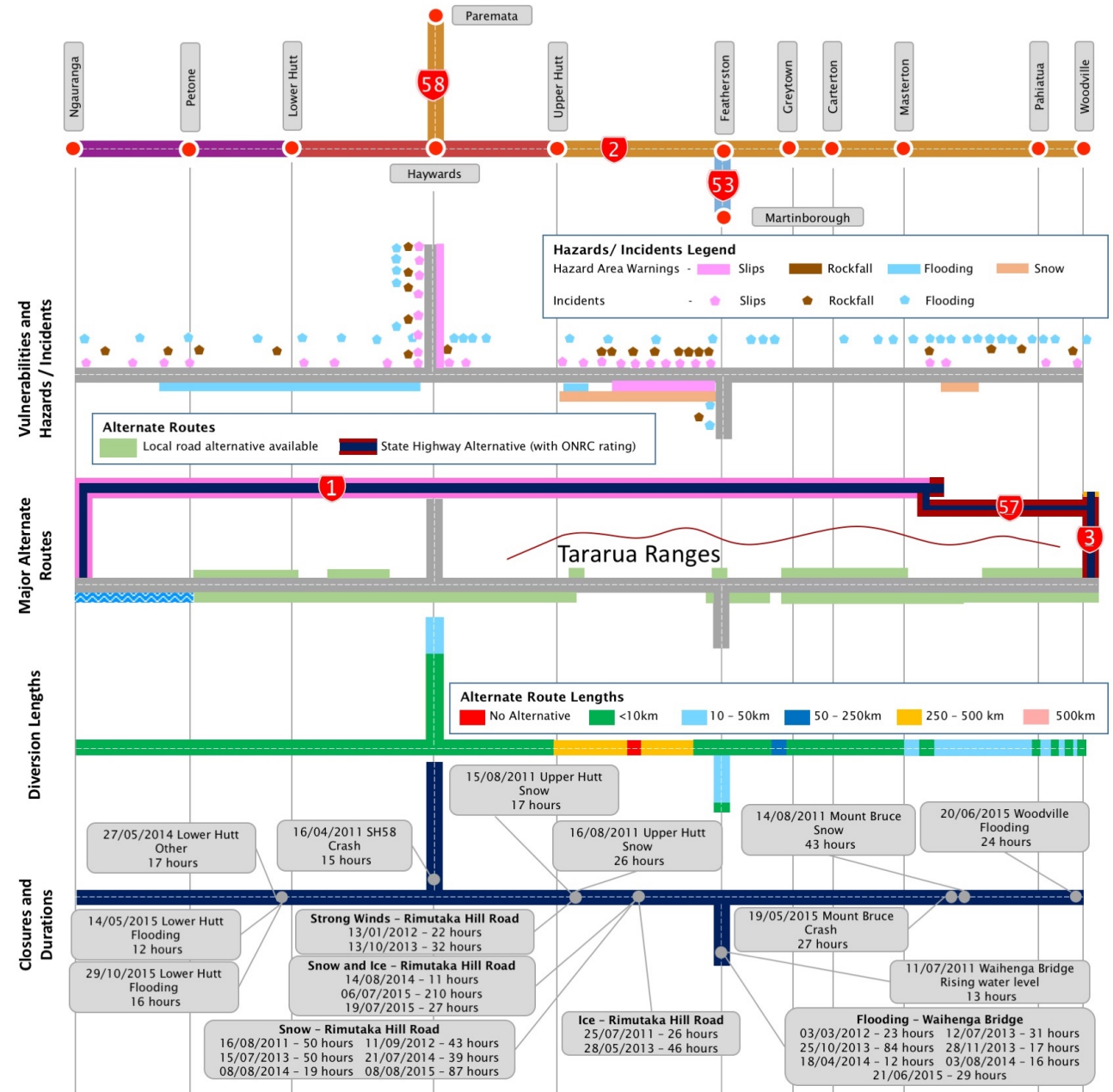
As one of two routes into and out of Wellington, the corridor is a crucial link should a catastrophic event such as a major earthquake occur. Natural obstructions such as the Rimutaka hills mean no viable alternative routes for long distance journeys, other than a more than 200km diversion, are available. Alternative routes and diversions are available for shorter distance journeys through the Hutt Valley and between towns in the Wairarapa and suburbs along SH58.

Closures and duration

Over the past five years, there have been numerous unplanned road closures. The Rimutaka hill is subject to closure due to strong wind, snow and ice during winter and spring. Flooding along SH53 due to road crossing low lying land results in lengthy closures.

The major unplanned road closures and duration of interruption along the corridor in the last 5 years are shown in Figure 12.

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:** Weakened slopes between Ngauranga and Lower Hutt, through the Rimutaka hills and along SH58 has resulted in more slips and lane closures. This reduced capacity in an already fragile network resulting in increased journey times.
- **Climate change impacts:** Flood events on SH2 between Ngauranga and Melling in 2015 and resulted in both road and rail networks being closed until waters had receded. The alternate SH58 route was also closed due to flooding.
- **Network capacity:** A lack of agility in the corridor in the southern section of the route means that minor incidents particularly between Ngauranga and Lower Hutt result in breakdown of the fragile traffic flow. The network experiences a lag in returning to normal flows after these events.
- **Addition demands on maintenance budget following capital investment:** The addition of barriers along the roadside through the Rimutaka hills has resulted in reporting of more strikes. Repairs to barriers requires traffic management and impacts available corridor capacity.
- **Failure of critical assets:** The Whangamoia river bridge carries utilities across the river as well as traffic, failure of the bridge structure would impact other critical services to the community.
- **Limited or no alternative route:** Rimutaka hills are susceptible to disruption from weather events. For commuters north of Upper Hutt, rail provides a limited alternative option. Weather events, particularly along the coastal section of SH2, can result in road closures with lengthy detours required. The alternative route is also susceptible to slips and flooding which can result in no access between the Hutt Valley, Wairarapa and Wellington in extreme events.
- **Significant Seismic risk:** high risk liquefaction, major fault line and other assets/water supply
- **Rail:** There is a high dependency between the road and public transport along this corridor, particularly during adverse weather conditions where each is vulnerable to coastal wash and earthquake effects.
- **Lifelines:** SH2 has regional significance for emergency event response and recovery providing access to hospitals, regional water supply at Te Marua, and access to fuel mooring and tank farms in Seaview.

Future considerations

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

- **Stopbank improvements:** Improvements to the Hutt river stopbanks around Melling to reduce the impact of flood events on the State Highway traffic flows.
- **Enhanced monitoring of moving slips:** Coupled with preventative maintenance to manage movement to reduce number of occurrences of lane closures and full closures.
- **Improved collaboration with local authorities:** Work together and enhance practices by contractors in pre-weather events to minimise risk of flooding and asset damage and maximise efficiency in recover phases.
- **Increased investment in the readiness of first responder personnel:** Location of equipment and strategic stockpiling of materials to improve response times to events which close or have potential to close or cause significant delays on the corridor.
- **Continued improvements to real-time and other customer communications:** about network conditions enabling informed journey decisions by customers. Rapid response to the opening of the southern section of the route after an event.
- **Rail corridor availability:** Maintaining the availability of the rail corridor as this impacts the number of heavy vehicles on the network as well as commuter access to Wellington. Additional development in Upper Hutt will place increased demand on rail and consequently the need to have rapid response to any events.

Reliability and efficiency

Efficiency

Ngauranga to Petone performs poorly in terms of efficiency throughout the day. The intersection of SH2 and SH58 has poor efficiency rating at peak times as has the Melling signals in the PM peak. The SH2/58 intersection should improve when the grade separated interchange opens in 2017.

Efficiency through the Rimutaka hills, particularly the northern section from the highest point to Featherston is poor throughout the day due to the alignment and narrow carriageway widths. North of Masterton the corridor performs well throughout the day, with a short decrease in LOS passing through Carterton. There are several sections of SH2 that have no EfficiencyNet data.

Variability

There is a high level of variability between Ngauranga and Upper Hutt due to lanes being at or above capacity. There is low variability between Upper Hutt and Masterton due to the terrain and urban settlements on the route which limit the upper range of speed vehicles can travel. SH58 has moderate variability, this corridor's speed range is also limited by topography. No data exists for SH53.

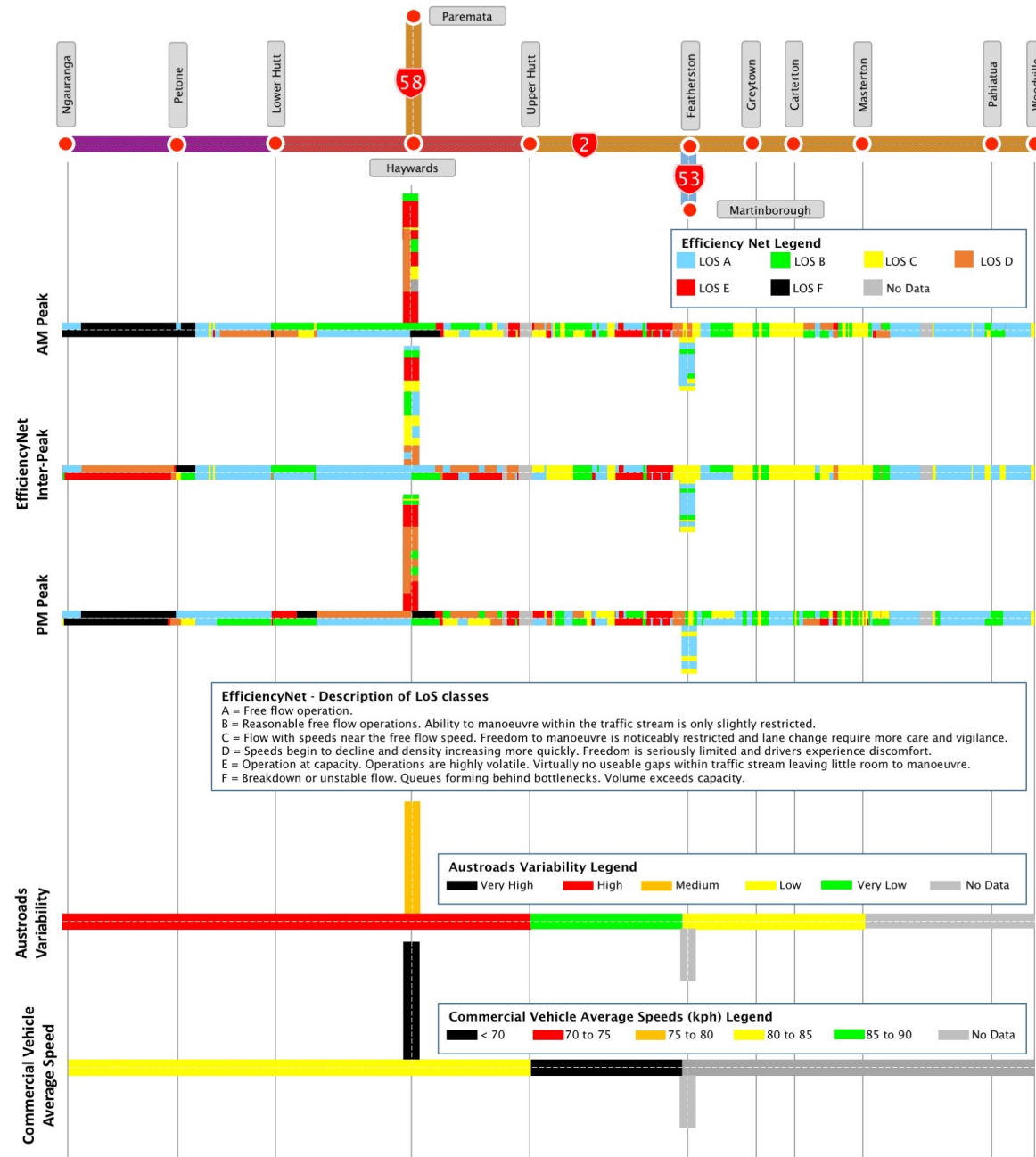
Commercial vehicle average speed

Average speeds for commercial vehicles are 80-85km/h between Ngauranga and Upper Hutt. Due to the terrain from Upper Hutt to Featherston, and on SH58, speeds are less than 70km/h. The programme business case used ERUC data which showed average travel times between Te Mahua and Masterton to be 53kph.

Current constraints (over leaf)

The major current constraints on the network affecting journey reliability and efficiency are shown in Figure 14. There are two height restricted bridges which require over-dimension vehicles to seek alternative routes. The main constraints are capacity south of Upper Hutt.

Figure 13 - Reliability and efficiency



Pressures

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

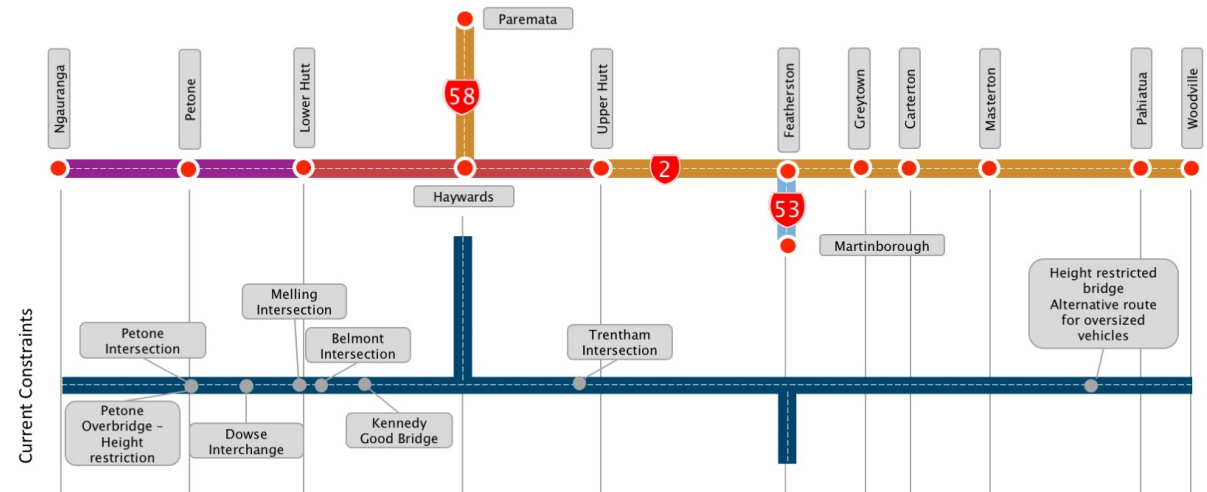
- **Limited corridor capacity:** Travel time reliability is reduced at peak times due to corridor capacity constraints. The section from Upper Hutt to Ngauranga is at or near capacity during peak periods delivering poor levels of service. Efficiency is fragile and sensitive to minor changes in speeds. The merge at Ngauranga onto SH1 is restricted by SH1 traffic and the rate of absorption of vehicles into Wellington CBD to the south. Commuters on the route will seek free flowing local roads where they are available in the Hutt prior to accessing the SH2 corridor at the latest possible intersection.
- **Different user expectations:** Townships in the Wairarapa require an appropriate reduction in travel speed to suit the surrounding environment and users. The speed change results in travel time delay particularly in the PM peak, weekends and holiday periods. Commercial vehicles experience reliability issues between Featherston and Masterton where no alternative HPMV route exists and vehicles must slow to lower speed limits through the town centres.
- **Changes in land use:** Land use changes along the corridor and monitoring existing consent conditions require ongoing resource and process reviews and corridor improvements.

Future considerations

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

- The ability to respond quickly and efficiently to incidents on the southern section of the corridor from SH58 and on SH58 is important to maintaining reliable and efficient journeys for customers. Provide quick response teams and develop methods to reduce delays and open the road quicker after unplanned events without compromising safety or information collection.

Figure 14 - Reliability and efficiency



- Delivering the improvements identified in the Programme Business Case, which include grade separation of interchanges at Melling, Kennedy Good and Silverstream, the removal of grade right turns south of Upper Hutt, improvements at grade intersections in rural areas through and north of Upper Hutt to improve reliability and efficiency throughout the corridor.
- Additional investment in travel behaviour change programmes to limit traffic growth to within capacity of corridor utilising existing investment in walking, cycle and public transport networks to support efficient journey times.
- Develop detailed business case for Grenada to Petone link road to improve resilience of network particularly for trips between the Hutt and the west coast communities.
- Ramp metering at pain points along the route such as Ngauranga, Petone and other interchanges.
- Extension of the SMART motorway from Petone to Upper Hutt in three stages.
- Work collaboratively with local authorities to ensure residential and retail development to occur near town centres and public transport corridors to provide transport choice, and district plans facilitate safe and efficient access to new developments.
- Continue to invest in supporting infrastructure for rail to meet increasing demand from urban intensification and consumer choice.
- As capital works and safety improvements are constructed there is a risk of additional maintenance costs on already constrained budgets. Review additional costs incurred as a result of recent capital investments. Develop action plan based on findings.

Safety

Collective risk

Ngauranga to Featherston is predominantly rated medium-high or high collective risk as well as SH58 to Paremata. The only exception is a small segment of medium risk between Upper Hutt and Featherston. Between Featherston and Woodville the risk level alternates between low and medium risk except for the section between Carterton and Masterton which is medium-high.

Personal risk

Personal risk along the corridor is largely rated low. A high-risk rating is only seen on SH53 towards Martinborough and a small section between Masterton to Pahiatua. SH58 has a medium-low personal risk rating with a small section close to Paremata that is medium-high personal risk.

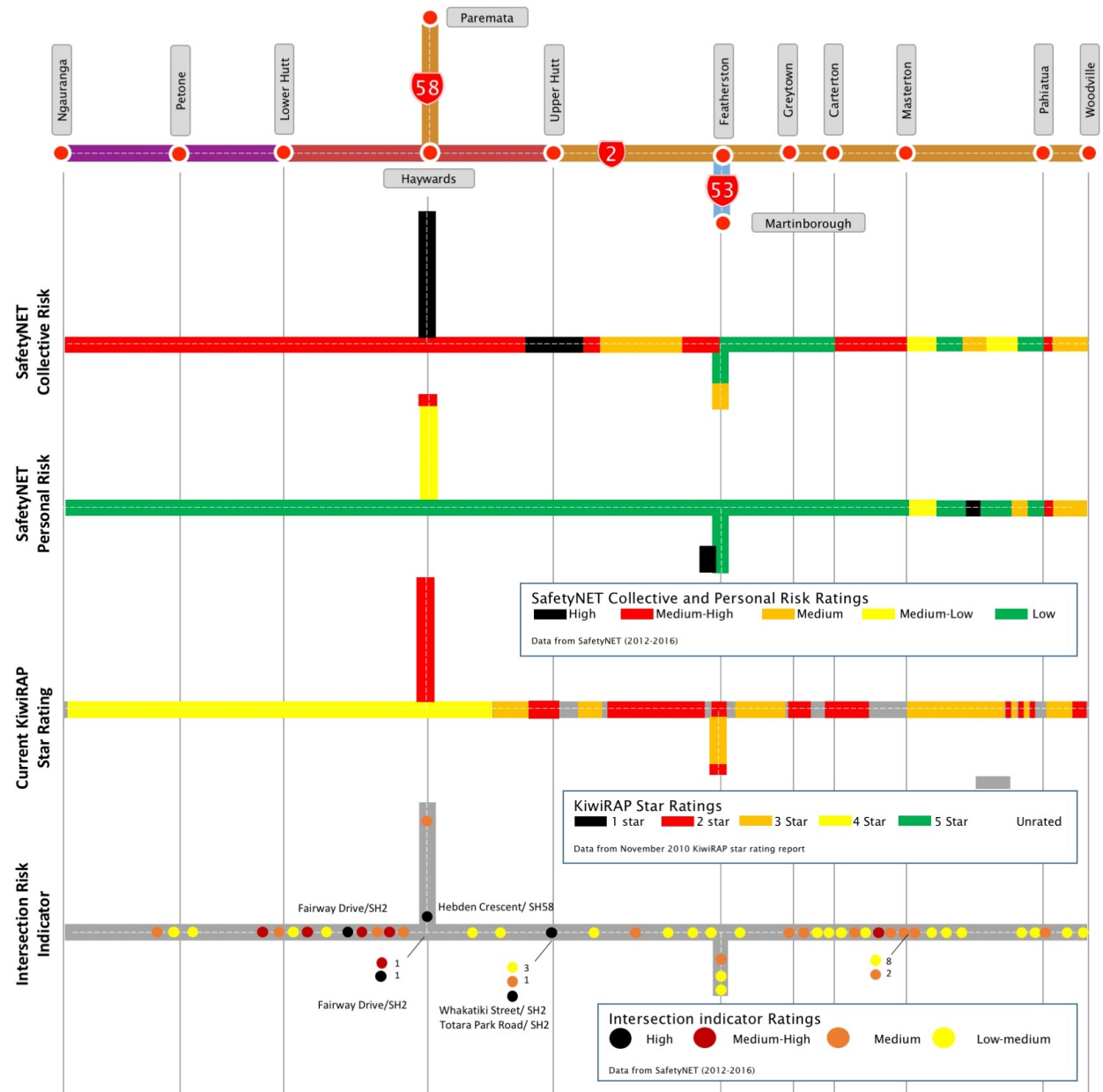
Star rating

SH58 from Haywards to Paremata has a 2-star rating, falling below the target three-star for a Regional road. SH2 from Ngauranga to Upper Hutt encompasses a 4-star rating. The remainder of the corridor along SH2 from Upper Hutt to Woodville is rated either 2-star or 3-star. There are four small sections that are unrated along SH2.

Intersection risk indicator

There are five high risk intersections along the corridor. The intersections are in urban areas between Lower Hutt and Upper Hutt. There is a concentrated number of low-medium risk intersections in Masterton.

Figure 15 - Safety



Pressures

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

- **Unprotected roadside hazards:** Power poles, deep drainage channels and other hazards lower the KiwiRAP star rating north of Eketahuna.
- **Steep terrain and tight geometric layouts:** Existing alignment reduces the star rating through the Rimutaka hills section of the corridor in particular.
- **High traffic volumes on two lanes opposing sections of the corridor:** This is evident between Moonshine and Upper Hutt resulting in a low star rating, and is expected to increase as urban development continues with a corresponding increase in traffic volumes.
- **Older safety barriers no longer meet correct installation guidelines:** This makes them ineffective should they be struck by a vehicle.



The NZ Transport Agency is investigating options to deliver a safe and efficient route for cyclists and pedestrians traveling between Wellington and the Hutt Valley and to extend the region's cycling network by connecting with local paths along the route.

Future considerations

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

- **Speed management guidelines:** Safe and appropriate speeds throughout the corridor consistent with the Speed Management Guidelines.
- **Four laning Moonshine to Silverstream:** Bring the corridor configuration to ONRC and KiwiRAP standards.
- **Safe road alliance projects:** Improved barriers and barrier protectors on the Rimutaka hills and implementation of identified projects between Carterton and Masterton.
- **Renewal of barriers:** To provide appropriate safety levels consistent with KiwiRAP star ratings. Along the four lane divided carriageway sections crash barriers are incorrectly installed or too low to provide suitable protection against road side hazards. Concrete barriers on SH2 adjacent to the railway are not appropriately secured to provide adequate protection.

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People, places and environment

Natural environment

The corridor from Ngauranga to Petone sits within a largely natural coastal environment with limited development and access. It is highly urban from Petone to Lower Hutt and predominantly rural from then on.

There are several major river corridors that traverse the corridor as they make their way to the sea. The catchments from Upper Hutt south feed into the Hutt River, whilst in the Wairarapa the rivers flow across the road corridor from the Tararua Range before approaching water courses.

Noise, vibration and air quality

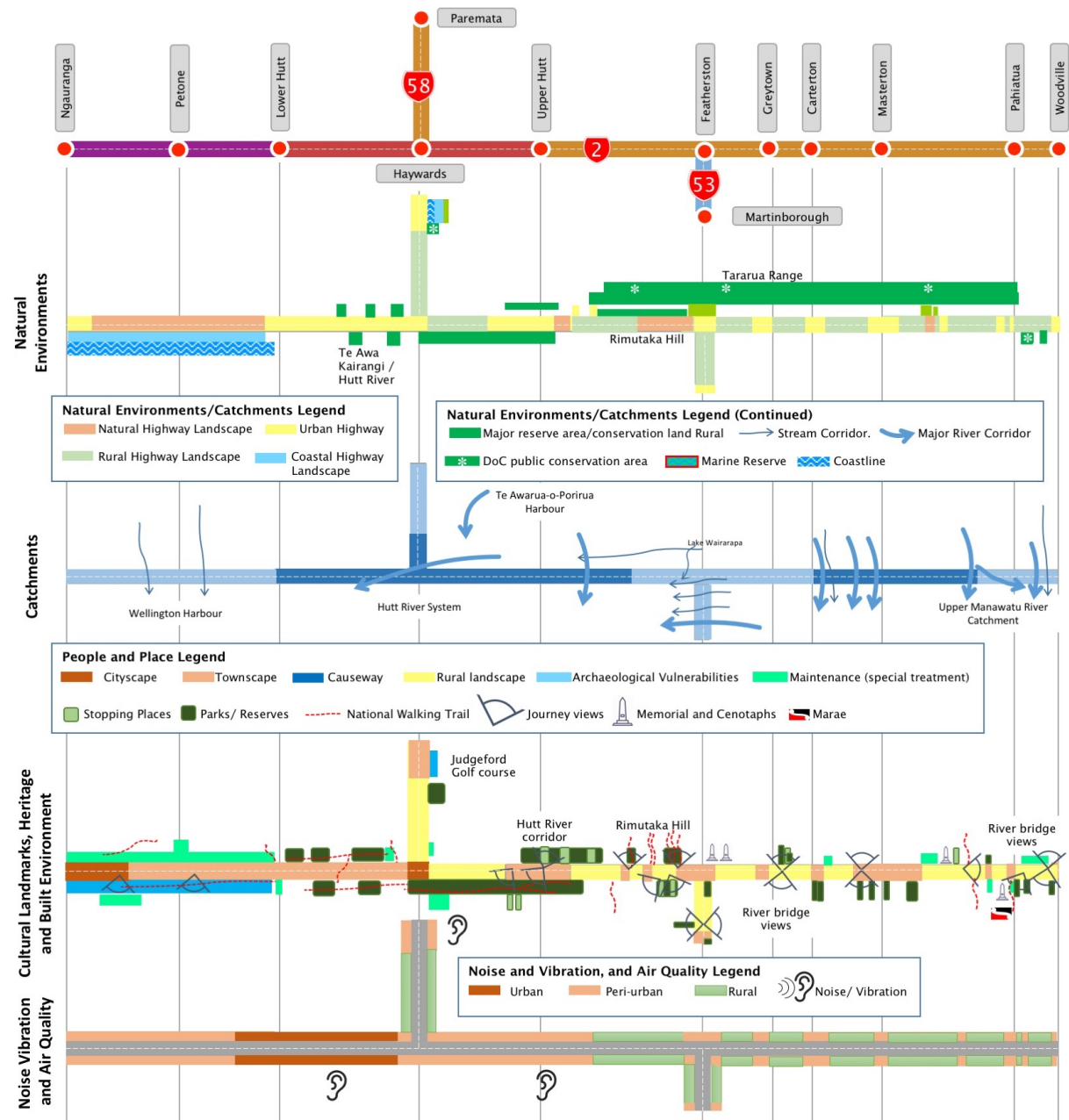
Noise sensitive areas (intersections) exist at Paremata, Melling, Upper Hutt and Fergusson Drive (north) where residential properties about the road corridor. Air quality is not a significant issue along the corridor.

Cultural landmarks, heritage and built environment

The corridor includes a number of landscapes along its length which provides a range of different views including coastal, urban and rural environments. There are sections of the corridor that have significant environmental. Numerous places have been provided for people to stop and rest or to observe the surrounding natural and manmade features.

Cycle and walkways are a feature of the route. Limited designated crossing points have been provided throughout the route. Walking trails generally move away from the road corridor rather than crossing the corridor, creating severance. This is particularly noticeable at the southern end of the corridor where limited crossing facilities for pedestrians exist.

Figure 16 - People, places and environment



Pressures

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

Natural environment

- **Environmental standards:** The highway traverses' significant natural reserves and coastal areas. The effect of highway maintenance works on the natural features requires environmental sensitive management. In addition, some works require resource consent or have consent conditions that must be complied with on a continual basis, particularly around watercourses.
- **Natural vegetation control:** Control of vegetation off the pavement requires regular treatment to maintain the asset. A number of pest plants exist along this corridor and have to be managed in line with the regional pest management plan.
- **Natural drainage:** Roadside drains in the northern section of the corridor require regular clearing and control of growth to minimise likelihood of flooding during winter and spring due to the flat terrain. This impacts pavement integrity if not maintained.

Noise, vibration and air quality

- **Increasing noise, vibration and air quality issues:** Additional development on the corridor will lead to higher traffic volumes and impact on the quality of environment receptors adjacent to it, particularly in areas where urban development is intensifying adjacent to the corridor.

Cultural landmarks, heritage and built environment

- **Locations of stopping areas and amenities:** There are a number of historic locations along the corridor that are stopping points for tourists. These require parking, information and toilets which require frequent maintenance and operation to meet customer levels of service. The level of maintenance is on a more frequent basis than for other assets.
- **Provision of parking and crossing points in town centres:** Towns along the route provide destinations that support economic growth. They also require parking, crossing facilities and information. High turnover of parking along a corridor impacts on level of service for journeys passing through the town.
- **Pedestrian and cyclist connections:** Pedestrian and cycle facilities in urban areas and at locations where national walking or cycling trails connect with the highway require connecting facilities to provide a one network journey experience.

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:

- **Customer amenity:** The major reserves adjacent to the corridor provide quality environments that can enhance amenity for the driver. Control of roadside vegetation control coupled with provision of stopping areas at appropriate locations and with facilities that are required by the customer will provide greater amenity, improve the journey experience and support other government investments (i.e. Department of Conservation sites)
- **Significant environments:** Preparation of bespoke management plans to meet customer expectation and resource consent conditions for significant environments to enable more efficient operational maintenance.
- **Ensuring noise, air quality and vibration:** expectations of residents and business along the existing corridor are considered and that future developments can be appropriately catered for on the transport network to minimise negative impacts of road user effects on other groups in the community.
- **Engagement with community groups:** To understand their expectations of users living and working along the corridor and develop working arrangements with community groups to enable closer working and improved local outcomes.



SH58 Safety improvements

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 236 km of road network which reflects 2.1% nationally. The total value of the assets along the corridor is \$372M (excluding ITS, and, heritage and green assets).

The corridor assets have been divided into eight groups as shown in Figure 17 which directly support the access, reliability and efficiency, safety, resilience and people, places and environment outcomes on the network.

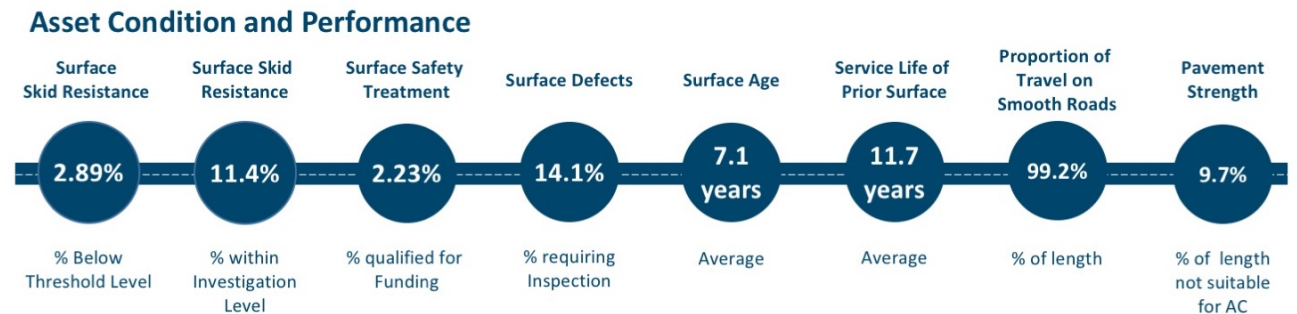
Asset condition and performance summary

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 17 – Corridor asset base



Figure 18 - Asset condition and performance



Asset condition and performance

Surface skid resistance

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

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

The southernmost Hutt Expressway section of the corridor, RS962, is in generally good condition with minimal lengths below the threshold level or within the investigation level. Further north through the Rimutaka Hills and in Wairarapa between Carterton and Masterton greater lengths of surfacing fall below the surface skid resistance threshold level and within the investigation levels, especially RS 883 and RS 858.

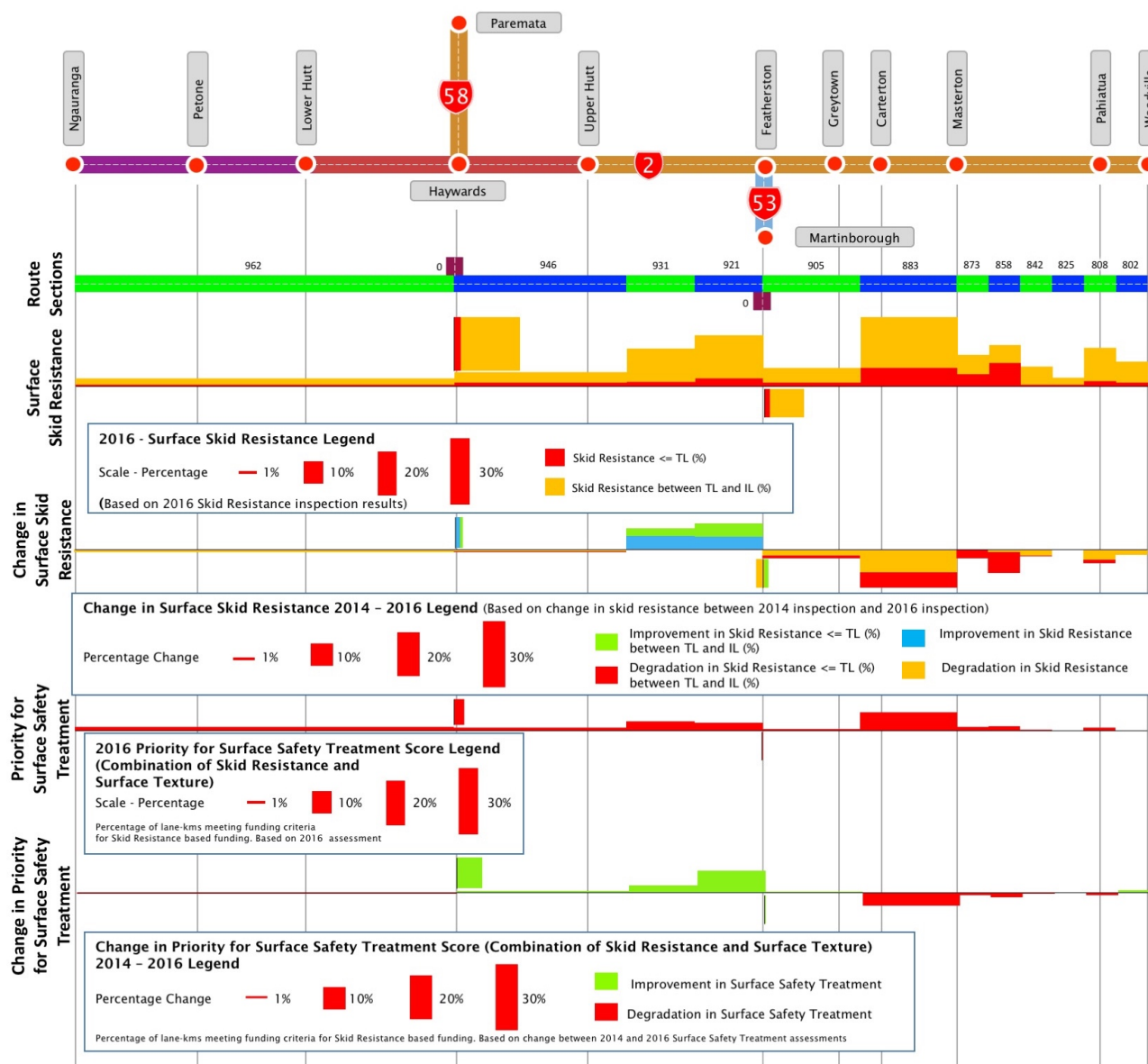
Priority for surface safety treatment

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

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

Surface skid resistance funding is justified for 10km, just over 2%, of this corridor. Generally, there has been an improvement across the corridor with areas of degradation predominantly found north of Carterton, RS883 to RS858.

Figure 19 – Asset condition



Surface defects

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

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

Overall, 14.1% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: SH2 RS921 South of Featherston, and SH2 RS931 over Rimutaka Hill.

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.

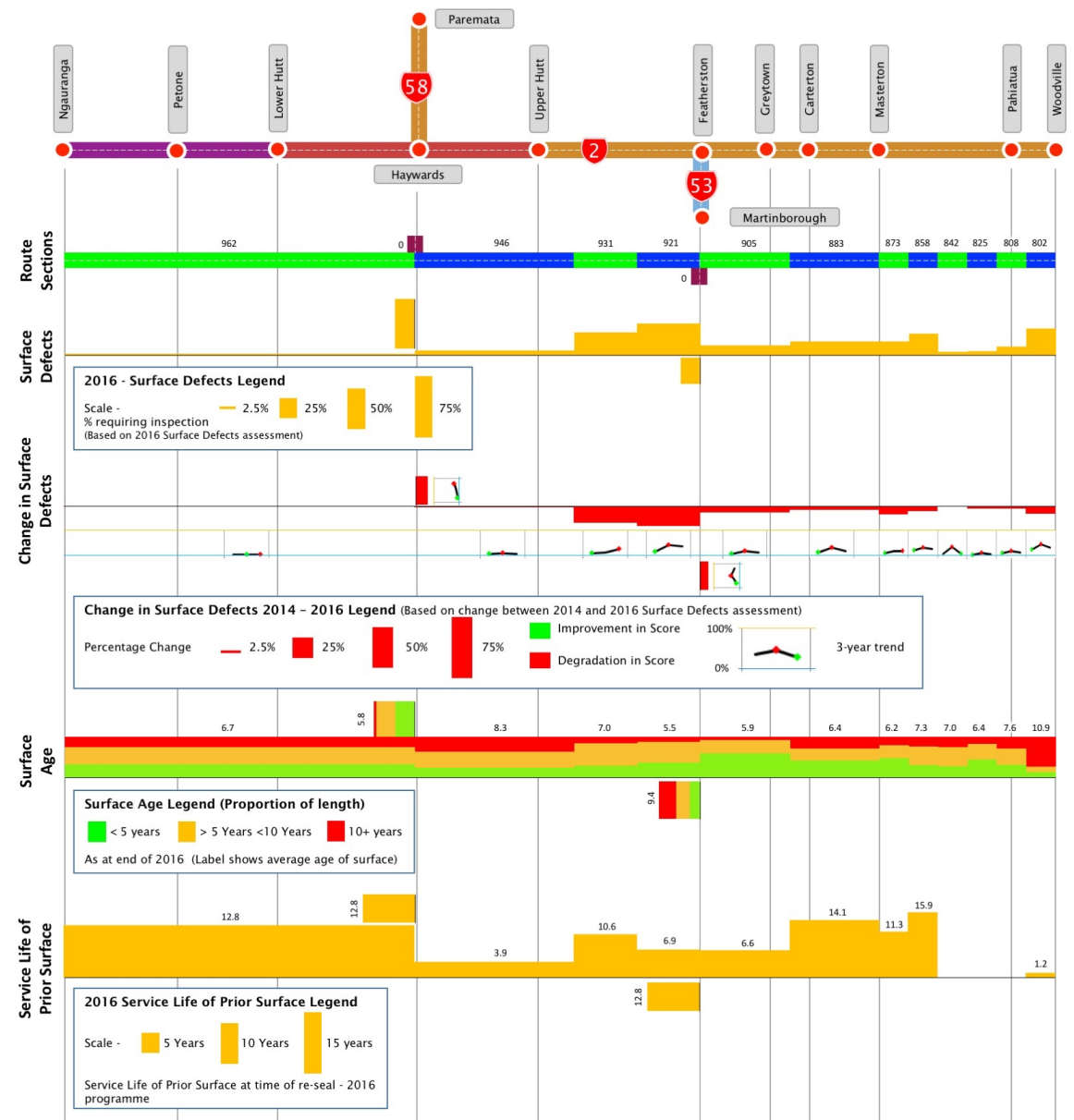
The sections of corridor with the oldest age profile are SH2 RS802 in Woodville, SH 53 Between Featherston and Martinborough, and, SH2 RS946 through the Hutt Valley.

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 age of 11.7 years, with sections SH2 RS858, RS873, RS883 through the Wairarapa, SH53/0 Between Featherston and Martinborough, SH2 RS931 over Rimutaka Hill, SH58/0 between Haywards and Paremata, and SH2 RS962 between Haywards and Ngauranga achieving an age in excess of 10 years.

Figure 20 – Asset condition 2



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 2/802 in Woodville, and 2/962 between Haywards and Ngauranga.

Proportion of travel on smooth roads

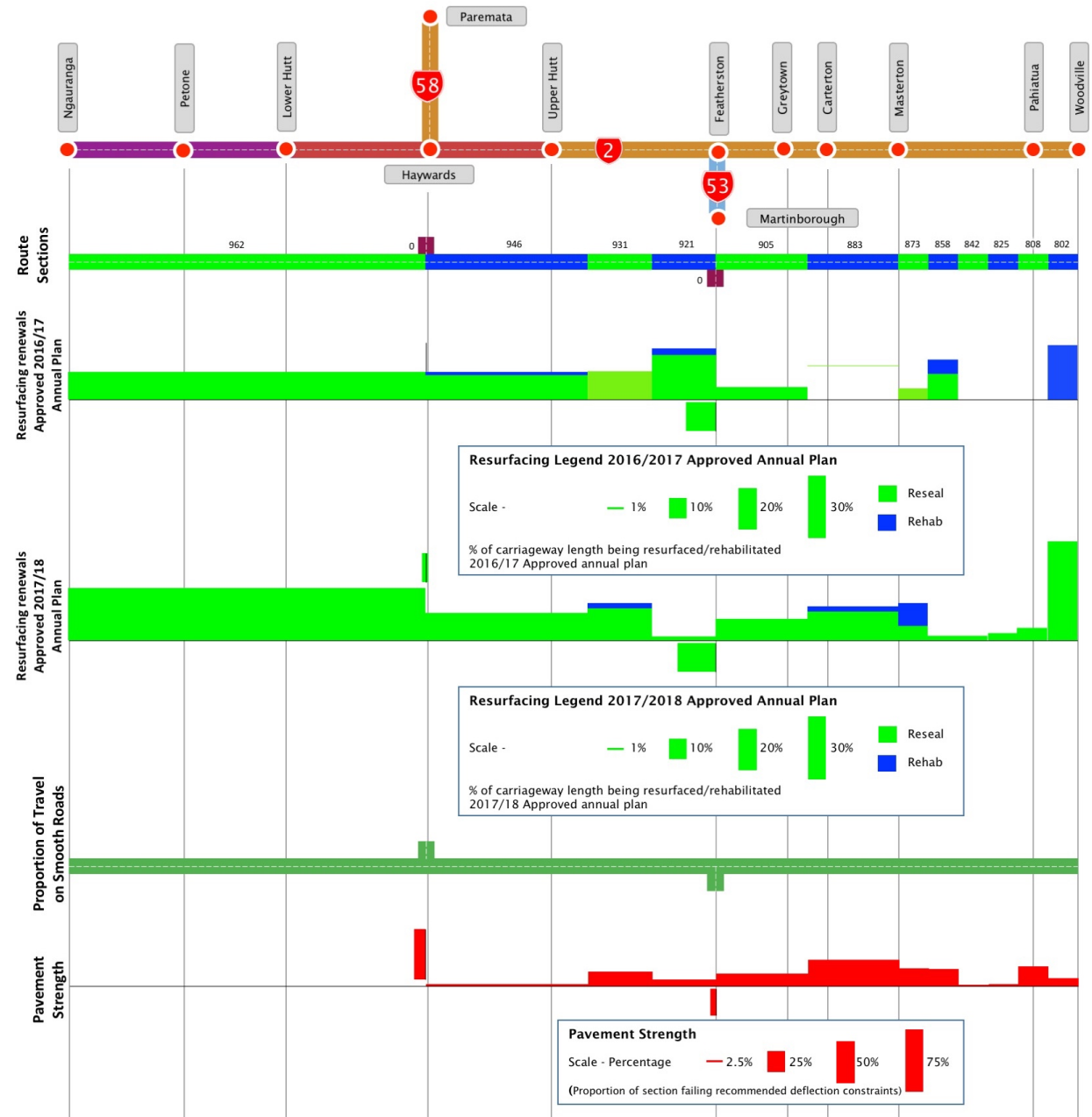
The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not.

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 section of corridor with the highest proportion of pavement failing to meet the deflection constraints occur at SH2/883 between Ahikouka and Masterton.

Figure 21 - Asset condition 3



Asset condition and performance pressures

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

- **Specialised materials** that provide superior skid resistance performance (GMA) have limited availability (quantity and timing). This constraint places pressure on scheduling and logistics, such as on the Rimutaka Hill, where there is limited access and a need for a safe operating and higher skid resistance treatment.
- **Resource pressure (time, cost and availability)** - major capital projects in the region create pressures on delivery of the maintenance programme, with competition for traffic management, aggregate and pressure on non-fixed price items. This effect is further exaggerated because the flow of work through Wellington had been constrained, limiting the sustainability and number of operators.
- **Increased heavy vehicle loading:** Laden vehicles supporting large infrastructure projects are exposing weaker formations with short term but very high loadings e.g. - materials from CBD earthquake demolition, carting to SH58, Transmission Gully and McKays to Pekapeka projects.
- **Maximising the life of pavements** and surfacing through the low traffic areas of the Wairarapa has resulted in lower LOS requiring use of innovative programming and good public communication. The programmed resurfacing in the pending period should provide some relief.
- **Rimutaka Hill** is a pressure both in terms of access to the corridor for works and in terms of treatments that will perform well in the environment. This results in predominantly short-life treatments.

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:

- **Management of end of life assets**, especially pavements and surfacing in Wairarapa - taking assets to the end of their lives maximises the investment, but can result in lowered LOS to customers. Future consideration needs to balance treatment costs and customer experience to manage LOS at end of life- as per the experience of Woodville and Pahiatua.
- **Monitoring of pavement/traffic loading** - need to improve access to more real time and accurate profile of heavy vehicles and their loading. Nil/Limited Weigh in Motion (WIM) options available E.g. truck off of ship in Wellington won't cross WIM until Tokoroa. (Weigh right project not progressed)
- **Management of future revocation areas** will need consideration, such as from the Transmission Gully project and the rebuild of the intersection of SH58 and SH2.



Looking at ways to reduce congestion and improve access and safety on State Highway 2 at the Melling & Block Road intersections

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	\$11,787	\$10,905	\$16,350
	Renewals	\$20,847	\$20,853	\$27,977
	Improvements	\$60,000	\$0	\$0
Reliability and Efficiency	Maintenance and Operations	\$6,367	\$6,707	\$10,011
	Renewals	\$669	\$609	\$1,089
	Improvements	\$33,800	\$160,800	\$50,000
Safety	Maintenance and Operations	\$8,906	\$8,192	\$12,328
	Renewals	\$4,247	\$3,579	\$5,375
	Improvements	\$99,500	\$33,000	\$75,500
People, places and Environment	Maintenance and Operations	\$3,127	\$3,220	\$4,838
	Renewals	\$163	\$121	\$182
	Improvements	\$0	\$0	\$0
Total		\$249,412	\$247,985	\$203,651

Figure 22 – Corridor investment

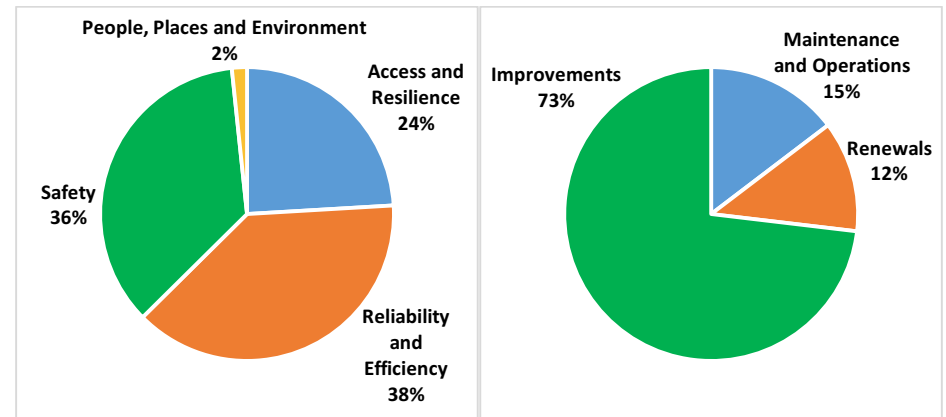


Table 2 - Summary investment by work category (\$000)

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Access and Resilience	111 Sealed Pavement Maintenance	\$2,210	\$1,317	\$1,989
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$423	\$448	\$675
	114 Structures Maintenance	\$3,458	\$3,562	\$5,308
	121 Environmental Maintenance	\$1,560	\$1,558	\$2,340
	122 Traffic Services Maintenance	\$72	\$117	\$176
	124 Cycle Path Maintenance	\$275	\$291	\$437
	151 Network & Asset Management	\$3,040	\$2,900	\$4,355
	161 Property	\$748	\$712	\$1,070
	211 Unsealed Road Metalling	\$10	\$10	\$16
	212 Sealed Road Resurfacing (excl. surface skid resistance)	\$11,522	\$10,045	\$12,986
	213 Drainage Renewals	\$746	\$172	\$258
	214 Pavement Rehabilitation	\$5,292	\$5,437	\$7,923
	215 Structures Component Replacements	\$3,230	\$5,117	\$6,688
	222 Traffic Services Renewals	\$47	\$71	\$106
321 - 341 Improvements	\$60,000	\$0	\$0	
Reliability and Efficiency	121 Environmental Maintenance	\$1,008	\$1,056	\$1,587
	123 Operational Traffic Management	\$4,075	\$4,387	\$6,575
	151 Network & Asset Management	\$1,146	\$1,134	\$1,654
	161 Property	\$137	\$129	\$194
	222 Traffic Services Renewals	\$669	\$609	\$1,089
	321 - 341 Improvements	\$33,800	\$160,800	\$50,000

Outcome	Work Category	2018-2021	2021-2024	2024-2028
Safety	111 Sealed Pavement Maintenance	\$2,300	\$1,386	\$2,092
	112 Unsealed Roads	\$0	\$0	\$0
	113 Drainage Maintenance	\$109	\$116	\$175
	114 Structures Maintenance	\$322	\$333	\$500
	121 Environmental Maintenance	\$230	\$277	\$416
	122 Traffic Services Maintenance	\$3,594	\$3,744	\$5,637
	124 Cycle Path Maintenance	\$0	\$0	\$0
	151 Network & Asset Management	\$2,030	\$2,024	\$3,040
	161 Property	\$319	\$312	\$469
	212 Surface Skid Resistance	\$1,865	\$2,004	\$3,010
	214 Pavement Rehabilitation	\$23	\$45	\$68
	215 Structures Component Replacements	\$225	\$246	\$369
	222 Traffic Services Renewals	\$2,134	\$1,283	\$1,927
	321 - 341 Improvements	\$99,500	\$33,000	\$75,500
	People, places and Environment	111 Sealed Pavement Maintenance	\$112	\$119
121 Environmental Maintenance		\$2,610	\$2,717	\$4,082
151 Network & Asset Management		\$325	\$308	\$463
161 Property		\$80	\$76	\$114
221 Environmental Renewals		\$163	\$121	\$182
321 - 341 Improvements	\$0	\$0	\$0	
	Total	\$249,412	\$247,985	\$203,651

To be confirmed through the RLTP process

Investing in access and resilience

Operations and maintenance

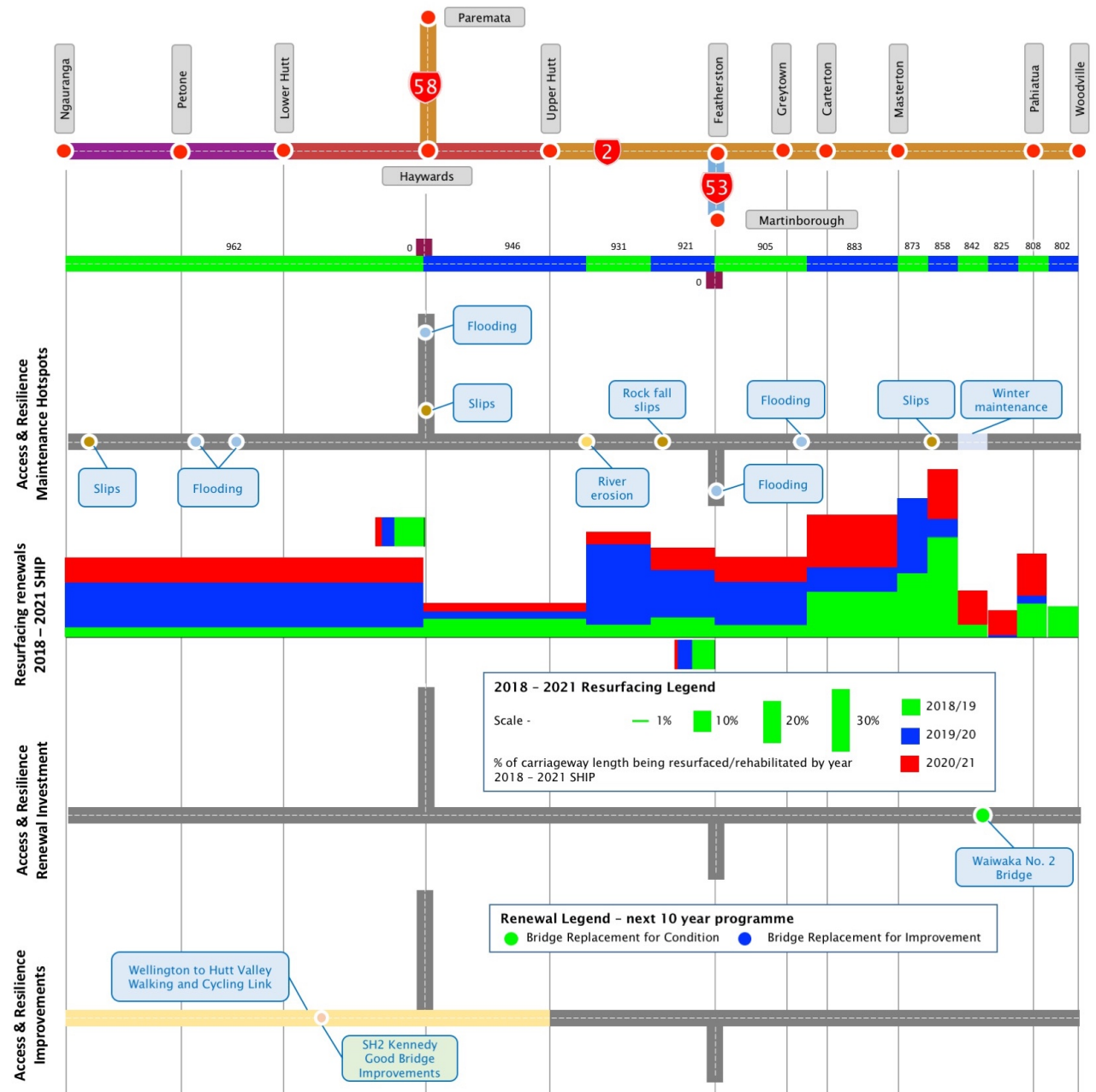
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing and structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement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

Maintenance hot spots

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

- **Congestion** - Southern SH2 end requires a high focus to keep traffic moving during commuter/high demand periods. There are specialised maintenance and incident response crews based at Ngauranga Gorge during these periods, including a tow truck. Comprehensive ITS infrastructure and the input of the TOC is essential to effective management of peak periods.
- **Higher Elevation Areas** - Mt Bruce and Rimutakas – challenges with winter weather (not a specific winter maintenance regime). Would benefit from additional real-time signage.
- **Flooding** - GWRC and Metservice provide alerts that trigger proactive notifications and responses. Flooding can be associated with local or distant freshwater catchments as well as coastal environments. Korokoro Stream, Petone SH2/962:11.9 – 1950s culvert overflows across SH2 regularly in high rainfall events.
- **Runoff/Slips/Rockfall** – debris requires constant attention in areas closely adjacent to steep or unstable terrain such as below the Western Hills of Hutt Valley and through Rimutaka Hills.

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 into the individual years to indicate the timing of expenditure over the three-year period.

These works complement those in the 2016/17 programme, where there was extensive tidy up around the areas of the SH58 Haywards capital works project.

Significant investment in resurfacing is planned for sections: SH2 RS858, RS873, RS883 RS905, and RS921 through the Wairarapa, SH2 RS931 over Rimutaka Hill, and SH2 RS962 between Haywards and Ngauranga.

The works in the Wairarapa are extensive as aged and held pavements are refreshed and second coat seals applied. Treatment through Pahiatua involves asphaltting one side of the dual carriageway through the township.

Structure renewal

The high value assets along this corridor include gantries, retaining walls, barriers and ITS, many of which are in an exposed coastal environment that can accelerate degradation and corrosion.

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 \$0.6M.

A resilience project proposed for short term relief is installation of contraflow median gates for SH2 between Ngauranga and Petone.

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/>

Wellington to Hutt Valley Walking and Cycling Link

Description: The NZ Transport Agency is investigating options to deliver a safe and efficient route for cyclists and pedestrians traveling between Wellington and the Hutt Valley and to extend the region's cycling network by connecting with local paths along the route.



Draft Regional Land Transport Programme considered for the SHIP

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

Table 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH2 Kennedy Good Bridge Improvements		SH2 Kennedy Good intersection improvement options, including grade separation. Identified in the SH2 Ngauranga to Te Marua PBC.

Investing in reliability and efficiency

Operations and maintenance

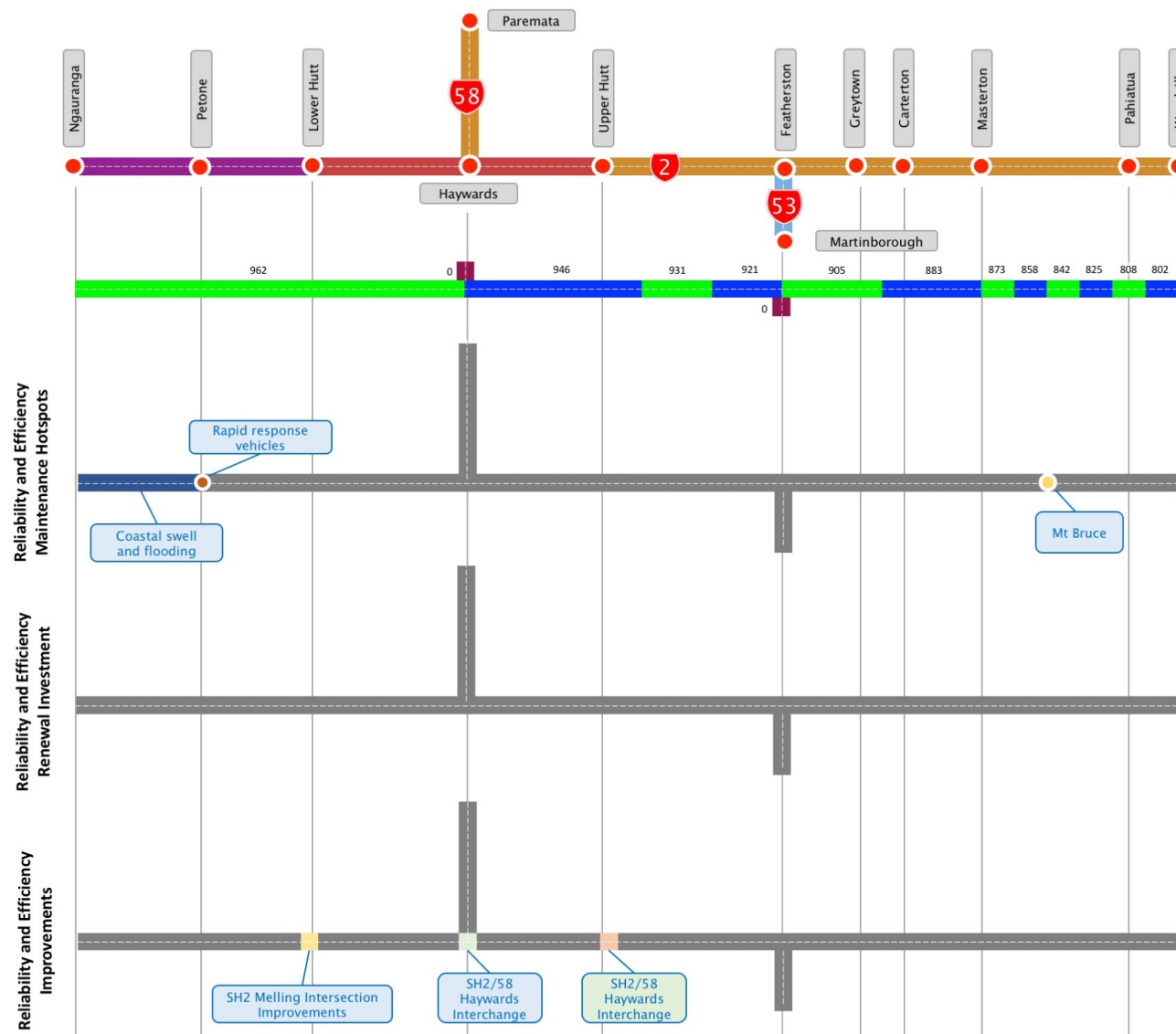
The main areas of investment to provide and preserve reliability and efficiency are environmental maintenance through keeping potential obstructions clear of the highway, wayfinding signage, and operational traffic management.

Maintenance hot spots

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

- **Weather events:** Much of the corridor between Ngauranga and Upper Hutt is susceptible to delays from weather events, particularly south of Petone with exposure to coastal swell and flooding that can extend across multiple lanes.
- **Mt Bruce** – care is required, but no real issues with winter closures and if needed then CMA would come from the Wellington (Rimutakas) portion of the corridor.
- **Rapid response to incidents** and delays to maintain service. Service vehicle and two trucks based at Ngauranga Gorge during and around peak periods.

Figure 24 – Reliability and efficiency investment



Renewals

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



A new interchange at the Western Hutt/Haywards Hill roads (State Highway 2/State Highway 58)

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/>

SH2 – Haywards Interchange

Description: A new interchange at the Western Hutt/Haywards Hill roads (State Highway 2/State Highway 58) intersection, and also includes realignment of the Manor Park highway connection, McDougall Grove and Hebden Crescent, a park and-ride car park and a pedestrian bridge to Manor Park Rail Station.

SH2 – Melling Intersection Improvements

Description: Looking at ways to reduce congestion and improve access and safety on State Highway 2 at the Melling & Block Road intersections - and consider how this links to the flood management and urban design development being investigated by the Greater Wellington Regional Council and Hutt City Council.

Draft Regional Land Transport Programme considered for the SHIP

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

Table 4- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH2 Totara Park Road IS walking and cycling improvements		Walking and cycling improvements at the SH1/Totara Park Road intersection to provide safe connected journeys, and improve flow on SH2. Potential solutions include an underpass.

Investing in safety

Operations and maintenance

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

Maintenance hot spots

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

- **Wairarapa townships** – end of life pavements require attention to skid resistance, formation.
- **Signalised intersections through the Hutt Valley** require attention to skid resistance on high speed approaches and are monitored.
- **Rimutaka Hill** – lane regime is compromised by tight curves – trucks cannot physically manoeuvre and remain within their lane on many curves creating high risk of head-on and loss of control crashes.

Gap programme indicators

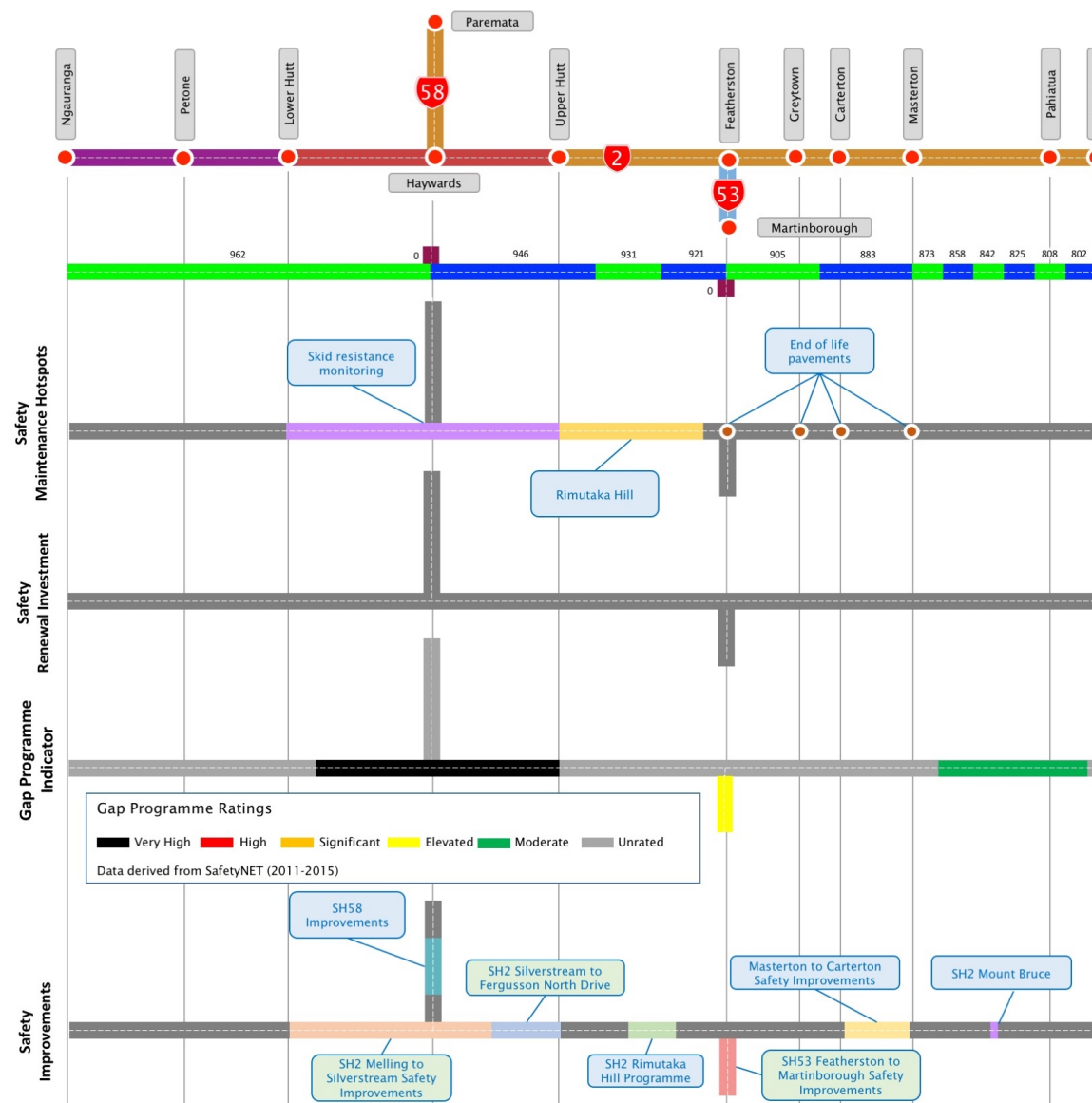
The potential for reducing fatal and serious injuries across the corridor has been assessed under the Gap programme. The Gap programme looks at the collective risk rating, likely level of intervention and the potential reduction in death and serious injury that may be achieved to determine a possible treatment approach. For instance, a road segment rated ‘Very High’ could potentially achieve a 50-70% reduction in fatal and serious injuries with the application of high cost improvements. Alternatively, if the risk level is ‘Elevated’ a 10-20% reduction may be realised through targeted low cost, high coverage treatment improvements.

While most of SH2 is unrated, there is a very high potential to reduce fatal and serious injuries for a section of the corridor between Lower and Upper Hutt through the application of high cost improvements.

SH53 has an elevated Gap rating, which along with the corridor between Masterton and Woodville, would benefit from low cost, high coverage improvements to reduce fatal and serious injuries.

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

Figure 25 – Safety investment



Renewals

Renewals have a focus on maintaining good skid resistance and visibility.

There are no safety 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/>

SH2 – Mt Bruce

Description: Targeted safety improvements to reduce risk at SH2 Mt Bruce. Safer Roads and Roadside Project.

SH2 – Masterton to Carterton

Description: General treatments for the corridor could consist of side barriers at high risk locations and wider shoulders to allow for median treatment. The introduction of two new potential roundabouts has been identified. Treatments to be confirmed following completion of the investigation phase.

SH2 – Rimutaka Hill

Description: Treatments will include rumble strips along edge lines, wide shoulders and improved signage.

SH58 – Safety Improvements

Description: The NZ Transport Agency and its council partners are investigating ways to make State Highway 58 (from Haywards Hill towards Pauatahanui) safer for everyone who uses it.

Draft Regional Land Transport Programme considered for the SHIP

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

Table 5- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH2 Melling to Silverstream Safety Improvements.		Corridor safety improvements on the SH2 mainline including intersection rationalisation and consistent shoulder widths.
SH2 Silverstream to Fergusson Drive North Safety Improvements.		Corridor safety improvements on the SH2 mainline with a focus on safer roads and roadsides and intersection improvements. Including investigation of the Moonshine bridge realignment.
SH53 Featherston to Martinborough Safety Improvements		Safety Management improvements which may include: Barrier at high risk locations, ATP.

Investing in people, places and environment

Operations and maintenance

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

Maintenance hot spots

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

- **Rest areas** - Te Marua Lookout and top of Rimutaka Hill.

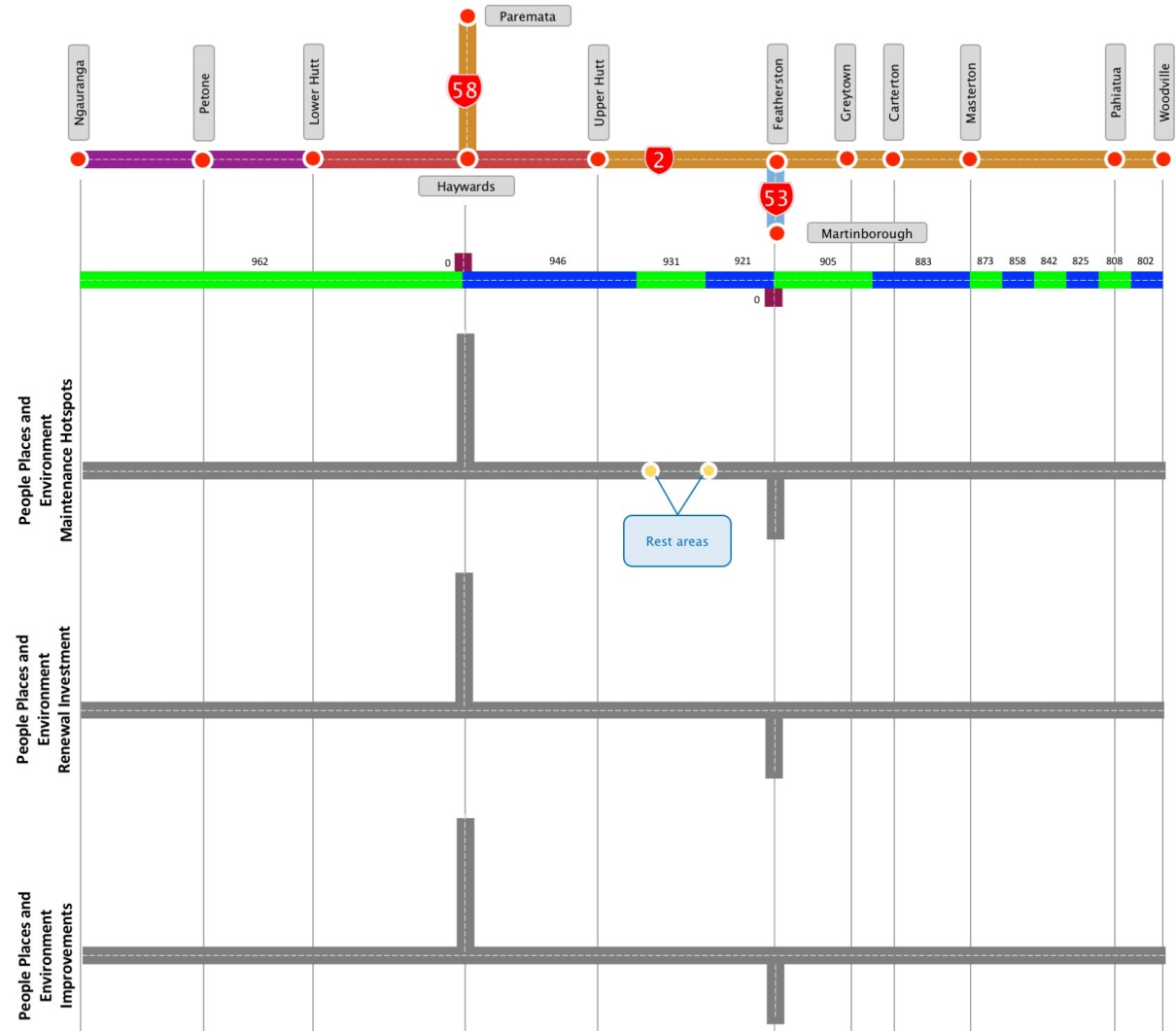
Renewals

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.

- **Low Resilience:** This corridor has low resilience and even small events can have a significant impact (be that weather events or traffic incidents). The resilience risk criticality of SH2 between Ngauranga and Petone is rated highest of the Wellington region at “extreme”. From and south of Upper Hutt maintenance and operations requires a high focus to best manage the relatively weak robustness of the corridor. This is both in terms of transport resilience and lifelines priorities, with high seismic & tsunami risk, demand at capacity, and presence of regionally significant assets such as water supply.
- **Weather related response** - GWRC monitors rainfall and regional river levels with automated alarms that trigger proactive notifications and responses. Overland flows, rainfall, entrained mud and debris and slips are frequent unplanned events along this corridor requiring a maintenance response to ensure access is maintained. There is also flood monitoring of SH53, Rimutaka Hill, and, if a strong northerly, SH58. Mt Bruce and Rimutakas – challenges with maintaining access during winter weather as there is not a winter maintenance regime within the NOC contract as such.
- **Rimutaka Hill:** While traffic volumes are lower, the geometry constrains the ability to concurrently provide a safe working and travelling environment. In and through the Wairarapa the focus is to maintain access for the largely private transport. The Wairarapa train service follows a separate alignment via a tunnel beneath the Rimutaka hills.
- **Heightened Maintenance:** The known vulnerabilities of this corridor are considered in planned major capital works for the Wellington region to be completed within ten years. In the interim, maintenance is heightened and includes attendance to corridor management through such measures as TOC monitoring and contractor response – incident response units based at Ngauranga Gorge during commuter peaks and higher frequency slip clearing of Rimutaka Hill. The effective operation and efficiency of the corridor is reliant on the close co-operation between the NOC contractor and the oversight of the Wellington TOC.

Reliability and efficiency

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

- **Keeping traffic moving** during commuter/high demand periods and advising of delays is the major pressure at the southern end of this corridor (SH2 RS962 & 946). For heightened maintenance response, a unit is based at Ngauranga Gorge and includes a tow truck. TOC provide tweet service to the likes of RTA to enable notification of delays to their members (freight).
- **Southern end reliability:** The reliability and efficiency of the southern end of this corridor is fragile. During commuter peak periods it is closely linked to the efficiency of public transport – delays or cancellation of trains or bus services results in greater private vehicle usage and more SH2 traffic. South of Upper Hutt much of the corridor is at capacity with delays and unreliable travel commonplace. Current initiatives such as the Smart motorway implementation are aimed at improving peak period flows. Maintenance responses are around removing any impediment and restoring flow as quickly as is practicable as well as providing motorists with accurate and timely advice about route choices and travel times. The maintenance response to maintaining reliability and efficiency through the southern end of this corridor, requires that works be carried out at night for all but the most urgent of works. Works require a high level of planning, communication and co-ordination to fit the narrow timeframes available for site setup and breakdown.
- **Efficiency is compromised** between SH2 and some Hutt Valley roads, such as The Esplanade/Petone onramp, Dowse Interchange onramp from Hutt Road and Melling Interchange into Hutt City.
- **Rimutaka Hill:** Works required on the Rimutaka Hill can be incredibly disruptive due to the tight alignment and limited space, often requiring partial closure.
- **Delay accessing SH2 through the Hutt Valley** creates peak period queuing and congestion on the local network (Petone Onramp, Melling Gateway and to a lesser extent Dowse Interchange)

Safety

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

- **Rimutaka Hill:** Achieving reliable and long-life skid resistance on Rimutaka Hill is a challenge– standard treatments are unable to withstand the stresses and do not perform. Rimutaka Hill has no space for safety zones– significant maintenance requires closure – tight working windows and environment. Single travel lane options. Lots of patches, short life treatments, corners fall apart. Few materials perform well.
- **Cyclists and pedestrians** share the corridor at high speed signalised intersections and through pinch-point areas such as the base of the Western hills, through the Rimutakas and contra flow along parts of the Hutt expressway, as well as mixing with the slower speed traffic through the Wairarapa townships.
- **Signalised intersections** are operating in both high speed and often congested environments with a range of user abilities present, such as school children, train commuters and recreational users of the Hutt River corridor. These are monitored via cameras.
- **SH2 River Road and Whakatiki Street intersection:** The priority controlled intersection of SH2 River Road and Whakatiki Street is included in the NZ top 100 of high risk intersections.

People, places and environment

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

- **Severance:** This corridor severs and travels very close to established communities creating concerns about connectivity, safety of vulnerable users, night time noise and access to recreational activities.
- **Community expectations** can be at odds with highway outcomes and areas of influence which may require additional investment at the operations and maintenance level. Examples include: noise considerations working along highway at night when the noise travels up into hillside homes; providing adequate night time stopping areas or signage to off highway options; managing travel speeds and vehicles effects to minimise the impact on adjoining land users.
- **Pedestrian crossings** and pedestrian amenity through Wairarapa townships and the Hutt Valley.
- **Road noise** thorough and on the edge of townships, particularly night-time noise – noise minimising surfacings and vehicle bypasses, such as via Masterton. Acceleration and deceleration for signalised intersections through Hutt Valley.

Investment future considerations

- **Further understanding and improving the resilience** of this corridor, addressing those areas vulnerable to weather events/flooding, coastal effect/tsunami, seismic activity and with the potential to compromise wider regional resilience – potable water supply and access to fuel depots east of SH2 at Petone.
- **Southern end of corridor:** Managing demand and capacity at the southern end of SH2 – multiple merge areas with potential to back up local network; interdependence of road and rail commuter service (and park and ride or ride share facilities).
- **Woodville** – potential extra demand from trucks associated with new rail marshalling area, particularly considering how sensitive route choice may be to travel along either SH2 or SH1.
- **Mt Bruce** – potential for conflict between peak tourist season and visitor centre and the reseal programme for this section of SH2.
- **Speed management** is a key control with the use of variable speed limits and permanent and temporary speed reductions targeted at higher risk areas. The review of speeds along SH58 is a high priority.
- **Motorcyclist use** is common in congested traffic and recreationally through the Wairarapa, Rimutaka Hills and SH58. Their presence needs to be considered in lane configurations and barrier design.
- **Severance:** Through the Hutt Valley the highway is a point of severance for the community and provides a disconnect that undermines both safety and the highway status. Constraints and pinch-points require longer term co-ordinated investment such as identified in the Business case for the Melling Gateway,
- **Potential flood plain** issue south of Woodville due to raising road and interfering with secondary flood plain and flowpaths – response makes reseal costs higher, impact being that may need to hold seals longer/lower level of service before renewal is economically justified. All of which has a net effect on achieving an acceptable NPV.
- **Cycle destination of Wairarapa** is increasing demand for smooth cycling surfaces, wide shoulders and litter or detritus free roadsides.
- **Progressing business cases** for the identified corridor weaknesses of between the Hutt River and the Western Hills (Grenada Link and Melling Gateway).

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
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

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

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

Section	Infographic	Information Source	Date
	Improvements	Network Manager and Regional Staff NZTA Projects web page: https://www.nzta.govt.nz/projects/ Submitted Regional SHIP programmes	



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

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