

Wellington to Palmerston North

CORRIDOR MANAGEMENT PLAN

1 56 57

2018-2028



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Executive summary

The Wellington to Palmerston North corridor comprises SH1 from its southern most point on the North Island at the entrance to Wellington Airport, to its junction with SH57 just south of Levin; SH57 past the southern outskirts of Palmerston North to Ashhurst and the junction with SH3; and SH56 from where it intersects with SH57 north of Shannon, to the southwestern outskirts of Palmerston North at Awapuni. The North Island Main Trunk (NIMT) rail line runs alongside the corridor from Palmerston North, terminating at Wellington Railway Station, providing alternatives to road travel for freight, commuters and tourists.

The corridor is approximately 234 km long (2.1% of the state highway network). The total value of assets along the corridor is \$1,025M (4.4% of the total national asset value).

The corridor links the Manawatu region with Wellington providing the only significant road transport link between the two regions and further north. As such, the corridor is a significant enabler of both the Manawatu and national economy. Route accessibility and security is a primary concern – disruption of the route can bring Wellington and often the region to a virtual standstill.

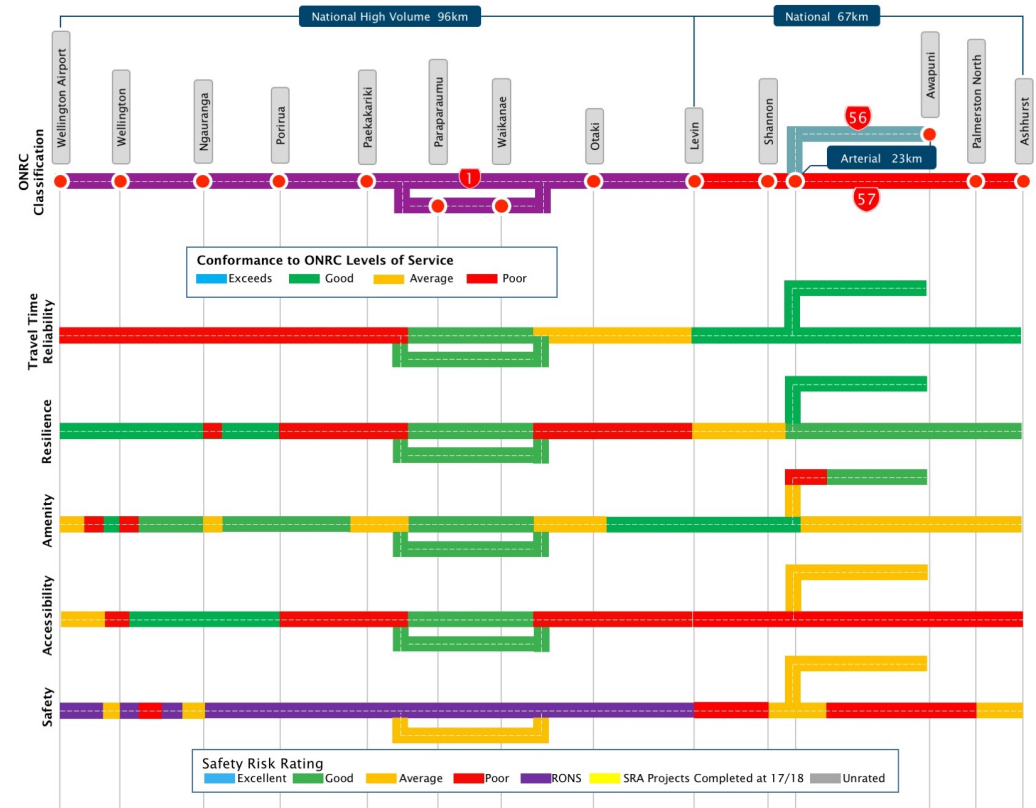
Customers along this corridor tend to be well-informed, have an expectation of continuous service, but accept that the quality of service may vary according to overall demand. Future considerations will need to include the balance between private and public benefit as well as between peak and off-peak travel.

This corridor is not duplicated by local road networks and in places this State Highway is the only vehicle access across significant watercourses.

The corridor provides the most reliable and primary land transport route to the nation’s capital city, Wellington and from the South Island to the freight hub of Palmerston North. It is a key freight route for commercial activity and individuals throughout both the Wellington and Manawatu regions and also carries SH2 traffic when the Rimutaka corridor is unavailable. Freight travelling along this corridor is inter-regional and national, servicing communities and businesses between the freight hubs at Palmerston North and the port at Wellington (markets of South Island, wider NZ and international destinations).

Resilience is a core premise of the management of the Wellington to Palmerston North corridor. The ability to manage disruption from unplanned events, such as significant natural activity or weather, is dependent upon having a forgiving and resilient network (planned), but this corridor currently has areas of low resilience and high vulnerability to service disruption. Weather events are an increasing contributor to service disruption.

Figure 1 - Performance of the corridor against ONRC outcomes



Future investment in the corridor over the next 10 years is heavily weighted towards completion of the Wellington Northern Corridor RONS projects that will see an expressway standard highway along the entire length of SH1 between Wellington and Levin when completed. Solutions to improve and maintain the southern, Wellington City, portion of this corridor remain unresolved. They are confined to a tight envelope with competing land uses in close proximity meaning a response is more likely to be dominated by improved “management” options and come at a higher ongoing operational cost.

Future scenarios for this corridor may require prioritised access and lane allocation such as by times of day and by transport modes to provide customers with certainty about when they or their product will safely reach its destination.

Introduction

Purpose

What is the Corridor Management Plan?

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

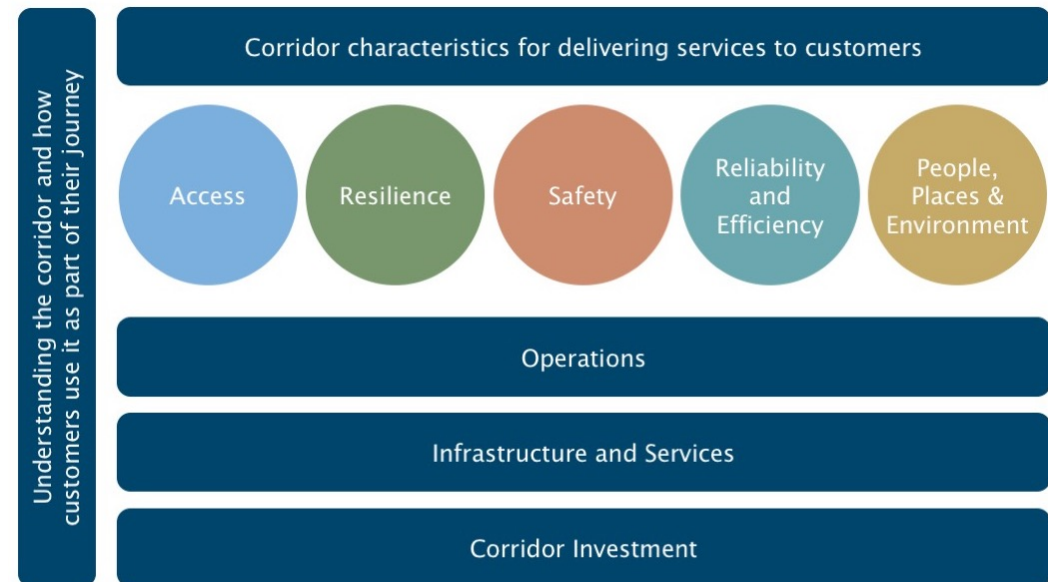
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on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

Figure 2 - Corridor Management Plan framework



The corridor at a glance

Corridor overview

The Wellington to Palmerston North corridor comprises SH1 from its southern most point on the North Island at the entrance to Wellington Airport, to its junction with SH57 just south of Levin; SH57 past the southern outskirts of Palmerston North to Ashhurst and the junction with SH3; and SH56 from where it intersects with SH57 north of Shannon, to the southwestern outskirts of Palmerston North at Awapuni. The North Island Main Trunk (NIMT) rail line runs alongside the corridor from Palmerston North, terminating at Wellington Railway Station, providing alternatives to road travel for freight, commuters and tourists.

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The regional economy

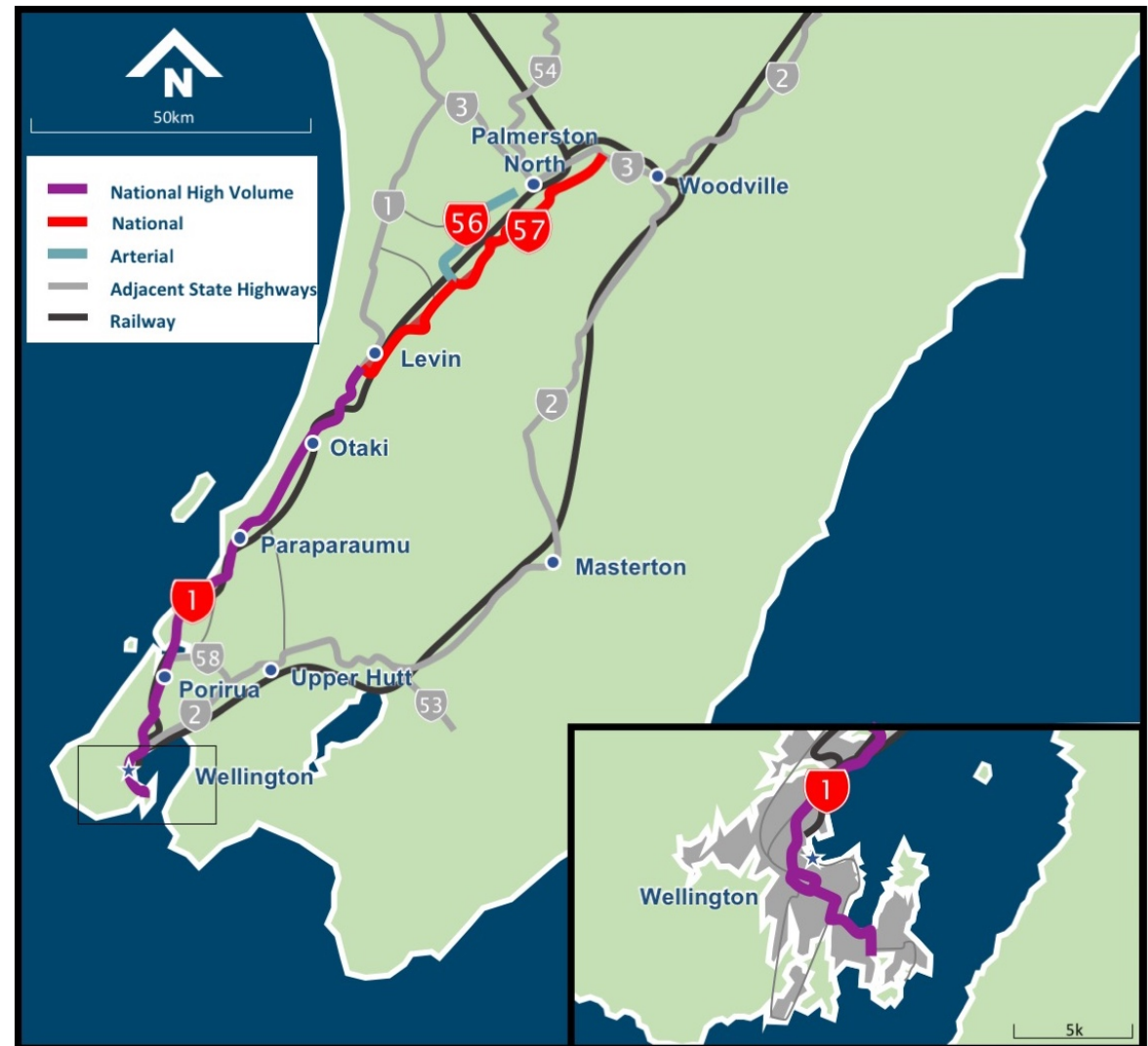
The Wellington region has nearly 500,000 residents (10.8% of New Zealand’s population), 11.4% of national employment, and generates 13.2% of New Zealand’s Gross Domestic Product (GDP). Wellington City as the national’s capital has a high representation of employment in public administration and safety, and other knowledge-intensive industries. It is also home to New Zealand’s film industry and has developed a cluster of post-production and visual effects technology sites.

Tertiary education is a major contributor to activity along the corridor with institutions and community based programs providing employment, higher education, research, and industry or workplace learning. University Campuses are located in both Wellington and Palmerston North and there are other tertiary institutions in other centres along the corridor

Palmerston North is a major agricultural service centre, with Fonterra operating a dairy processing plant at Longburn as well as producing ice-cream and fresh milk at its Palmerston North facility. Palmerston North is a site for significant agricultural research, and the Manawatu region supports a strong horticultural industry.

As urban development expands along the corridor north of Wellington through to Kapiti, corridor management and development will focus on providing capacity, resilience and travel time reliability.

Figure 3 - Corridor overview



Understanding our customers

Key customers

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

Daily commuter

While commuting by car is the predominant mode of transport for commuters into and out of Wellington, the percentage of public transport users is the highest of any region in the country. Suburban bus and trolley buses services the Rongotai to the CBD journeys. Active modes of transport are also increasing.

Insights into daily commuter users:

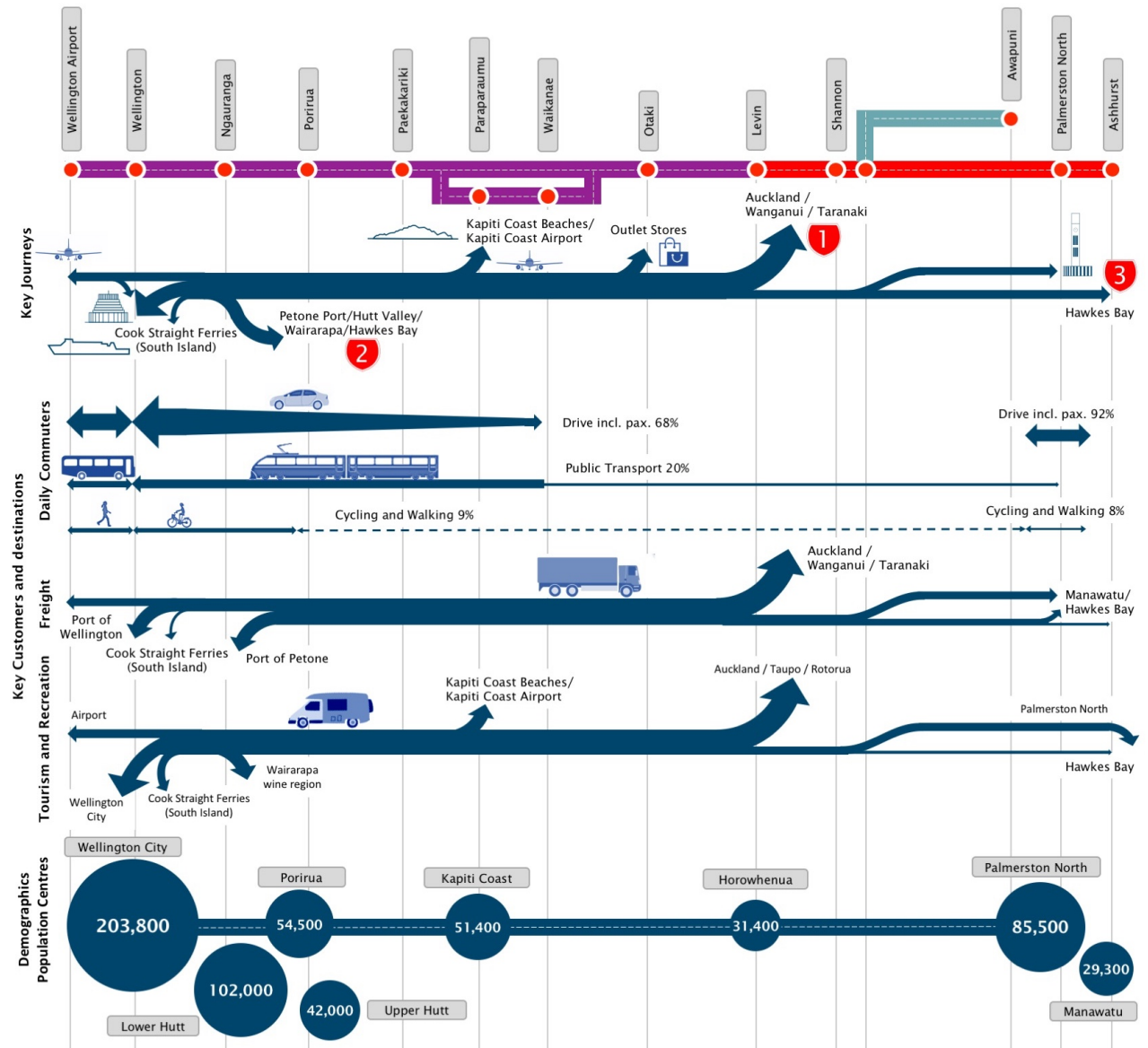
Road use: Wellington commuters have a good choice of transport modes and can make informed choice with sufficient notice of issues with any particular mode.

Road knowledge: Commuters are familiar with their route, and viable alternatives to avoid congestion. Journey times are relatively predictable considering time of day and day of week.

Pain points: Ngauranga to the airport is susceptible to heavy congestion, and is affected by the choke points around Mt Victoria Tunnel and Basin Reserve. Buses can be late, or too full during peak times and are limited outside of the urban centres. Having good information of when the bus will arrive, i.e. using real time bus information online and on bus stops in the city centre is important.

Daily commuters expect: Predictable journeys at peak times, accurate and up to date information about traffic (peak and off peak), weather, road conditions and hazards, a more holistic approach to transport—investment in public transport to make it more reliable and accessible, at a reasonable cost and a focus on city traffic and congestion management on the weekends.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

Tourism contributes \$1.4 billion to the Wellington economy annually with 1.4 million guest nights in 2014. Wellington has a number of significant attractions including Weta Workshops and Te Papa (National Museum of NZ), and hosts a number of major annual events including WOW (World of Wearable Art), and the Wellington Arts festival. Wellington regularly hosts significant sporting and cultural events at Westpac Stadium and the Basin Reserve.

The corridor forms part of the key tourist route connecting Auckland and Rotorua with the Cook Strait ferries and the South Island for those visitors choosing a fly/drive form of vacation in New Zealand. The corridor also provides the main route to and from Wellington airport for arriving and departing passengers, including an increasing number of international visitors. Journey time reliability is particularly important to customers with ferry connections and flights. There is high recreational peak demand travelling north of Wellington – particularly during public holiday periods and summer weekends, resulting in congestion and fewer maintenance opportunities.

Insights into tourist and recreational users

Road use: High numbers of recreational users every weekend to/from regions, to the city, or periodically for long weekends. If an international visitor, driving long distances to make a holiday destination schedule, and may drive late into the night.

Road knowledge: many international visitors have not experienced New Zealand roads and conditions, and tend to be focused on the landscape and the adventure (roads are a means to an end). Travel times can be underestimated, there is limited or no knowledge of places on the journey where the road narrows or becomes winding. Domestic recreational users are more familiar with the road and anticipated travel times.

Pain points: weekend traffic can be particularly busy going to cultural and recreational activities and visiting friends and family. Roadside parking in commercial areas of Mana and Otaki causes issues of safety and congestion.

Tourist and recreational users expect: no hassles—ease of getting around the country, including using complementary travel modes, good directional signage of tourist destinations, distances and cities. Places to stop for refreshments and toilet breaks when undertaking regional journeys.

“When people don’t have a choice of route they value early information to make informed decisions”

Freight operators

Freight movements include freight from north of Wellington to either the port at Petone in Lower Hutt, or the Port of Wellington. Inter-island freight is shipped on Cook Strait ferries, with a small proportion being shipped by air through Wellington Airport. Palmerston North is also a major freight distribution point for the lower North Island with a proposed new inland port planned for Longburn. The corridor provides the only HPMV route linking points north of Levin with Wellington.

Insights into freight operators

Road use: The ability to confidently undertake the round trip from Wellington to a swap point south of Taupo within a regulation work period is important. Many of the long-haul journeys are undertaken at night during off-peak periods.

Road knowledge: Knowledge of road conditions is extremely high, verging on technical, confidence of managing difficult conditions is high, willing to take calculated risks to keep business going.

Pain points: Roads can be highly variable for the size of trucks, with carriageway widths narrow at the northern end of the corridor. Alternative heavy transport routes are limited along the corridor, tend to be longer having an adverse effect on delivery times and therefore on business. Resilience of the corridor through the Kapiti Coast is an issue as the only viable alternative route is a >200km diversion.

Freight operators expect: Infrastructure that supports commercial activity. This includes alternative routes that cater for freight trucks safely and consistently with consistent width and visibility; convenient places for trucks to stop for drivers to have a rest, access services and facilities; and passing lanes for vehicles that want to go faster. They also expect information about road conditions allowing considered decision-making and confidence to keep their businesses operating efficiently.

“My time is valuable, if there is a delay I want to know about it so I can change my plans”

How we deliver services along the corridor

Transport partners

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

The Transport Agency works closely with the local authorities and regional councils along the corridor shown in Figure 5.

Collaboration along the corridor

Currently the Transport Agency is collaborating with Wellington City Council and Greater Wellington Regional Council on the 'Let's Get Wellington Moving' programme, considering the future form and function of the transport network within the Wellington area.

Figure 5 - Map of associated local authorities



Network Outcomes Contract approach

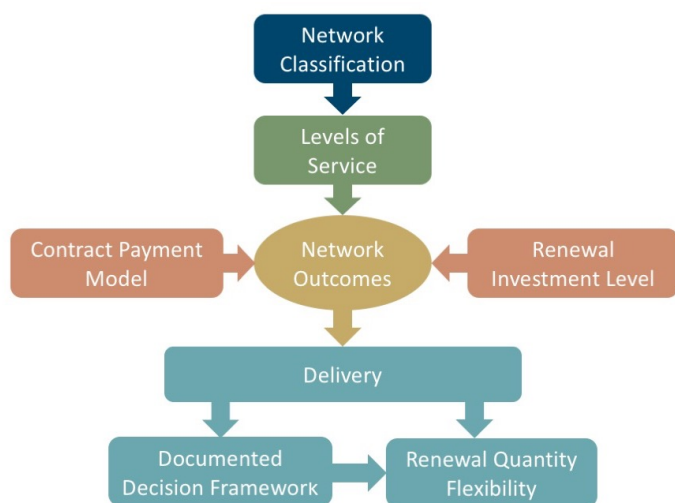
Maintenance and operations activities are managed through Network Outcomes Contracts (NOCs), which are relatively new. By capturing the best elements of previous procurement methodologies (PSMC, Hybrid and Traditional models), the NOC contract model will improve the effectiveness of service delivery with services managed through a primary supplier incorporating both professional services and physical works for all key maintenance activities.

To support this new contractual approach a central Governance and Management Group has been established to represent the interests of the Maintenance and Operations teams in the delivery of the NOCs. This group resolves issues, looks at opportunities for improvement, recommends changes to the national 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, bridges and other structures management and repairs.

The contract process for the Network Outcomes Contract is shown below:

Figure 6 - NOC contract process



Collaborative delivery of services

The Wellington to Palmerston North corridor crosses over two NOC contract areas as discussed below. The boundary of the two contract areas occurs at the junction of SH1 and SH57 just south of Levin. Therefore, the part of the corridor comprised of SH1 is within the Wellington NOC area, while SH56 and SH57 are entirely within the Manawatu-Whanganui NOC area.

Wellington Network Outcomes Contract

The Wellington NOC contract is undertaken by Capital Journeys which is a joint venture between Fulton Hogan and Opus. The contract commenced on the 1st October 2014 for a 5-year period with the option based on performance for a further 2 years. This contract is supported by the following specialist maintenance contracts:

- **Traffic signal maintenance region (674N)** - The traffic signal contract 674N covers signal maintenance and renewals on both state highways and local council roads in Lower Hutt, Kapiti Coast, Upper Hutt, Porirua and Horowhenua. It is undertaken by HTS and commenced on 1 December 2013 for a period of 2 years +1+1+1.
- **Traffic signal maintenance Wellington (675N)** - The traffic signal contract 675N covers signal maintenance and renewals on state highways and local roads in the Wellington City Council area. It is undertaken by Downers ITS and commenced on 1 December 2013 for a period of 2 years +1+1+1.
- **Traffic monitoring sites (859N)** - The traffic monitoring contract collecting traffic data is undertaken by HTS and commenced on 1 April 2016 for a period of 3 years with 1+1.
- **Traffic monitoring sites (676N)** - ITS assets (traffic signals, variable message signs, surveillance/CCTV cameras) undertaken by Downer EDI and expires on 31 December 2016. The new contract 733N is in the tender process. The contract period is 3+1+1.
- **Regional bridge and structures:** Undertaken by Opus (contract 791PN) which commenced on the 1 July 2015 for a 3-year period with the potential for extension of an additional 2 years.

Manawatu-Whanganui Network Outcomes Contract

The Manawatu Whanganui NOC contract is undertaken by Higgins and Beca. The contract commenced on the 1 July 2015 for a 5-year period with the option based on performance for a further 2 years.

- **Traffic Monitoring Sites** - The Manawatu/Whanganui/Taranaki traffic monitoring contract expires 31 December 2016. The Agency is in the process of preparing a new contract which will combine these three regions with Hawkes Bay and Gisborne for this work. This new contract will start 1 January 2017 for a 3-year term, with provision for extension for two additional one-year terms.
- **ITS and Traffic Signals** - Managed by staff at NZTA Wellington Regional Office.
- **Bridges and Structures** - This contract is held by Opus and commenced on 1 December 2014 and runs through to 30 June 2017, with the potential for extension of additional 2 years.

Drivers for change

The Transport Agency's 30-year view identifies a number of key journeys, metro areas, and regional economic development (RED) areas. These are considered either crucial for the continuing economic prosperity of the country, or are of particular focus within a programme to improve economic prosperity. The journeys, metro areas and RED areas associated with the corridor, and the 30-year view of these are briefly described below.

Wellington metro

The 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.

Growth in the CBD is likely to encourage higher pedestrian and cycling activity. Increased demand for commuter rail may result from increasing residential land use development on the Kapiti Coast.

A forecast increase in freight from 10.8 million tonnes into, from, and around the Wellington region in 2012, to 19 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.

Key journeys

Auckland to Wellington

Due to the challenging terrain, transport linkages between the upper and lower North Island are limited and result in journey times that are comparatively slow. While there are critical transport links between the upper and lower North Island areas (particularly for freight), traffic volumes drop significantly on the routes that link the two indicating that for the majority of transport users the upper and lower North Island areas are relatively self-contained.

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.

The Port of Wellington 'CentrePort' is a key destination for freight serviced by inland hubs in Palmerston North, Whanganui, and Waingawa in the Wairarapa. This is driven in part by the 'wall of wood' making its way from Waingawa near Masterton to Wellington but also by increased growth in general commodities and consumables.

New Plymouth to Palmerston North to Napier

Palmerston North is a key staging point for high value imported and domestic freight between Auckland and lower New Zealand and it has good access to the hinterlands that produce New Zealand export commodities, providing the staging point for the export of these products to the ports of Napier, New Plymouth, Wellington, Tauranga and Auckland. The Manawatu through flows are the second highest in the country after the Waikato.

Manawatu-Whanganui RED area

The Manawatu-Whanganui region (Horizons Region) is the second largest North Island region by land area with a diverse range of natural resources and economic activity. The region specialises in industries which tend to have lower pay rates and levels of employment.

The growth study published in July 2015 identified a number of advantages the region can build on, including its central North Island location (with good road and rail transport links) and its highly productive agricultural industries, particularly high-country beef and lamb, and notable institutions like Massey University and agricultural research facilities with an international reputation.

Within the Manawatu-Whanganui Economic Action Plan under the 'Enabler: Transport' priority area, a number of opportunities have been identified, including:

- Enabling flat country, vegetables, poultry, and Food-HQ opportunities by streamlining logistics capability for produce transport.
- Enabling tourism opportunities by supporting the Ruapehu District Council through technical advice and investment for safe cyclist routes up Mt Ruapehu and contributing to the Mountain to Sea Great Ride work programme nationally
- Enabling quality care and lifestyle for the aged - working with the local authorities on the transport aspects of the planning actions. There is potential for future co-funding of pedestrian and cycling facilities and public transport services, which would meet these residents' need.

Understanding customer levels of service on the corridor

Current levels of service performance

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

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

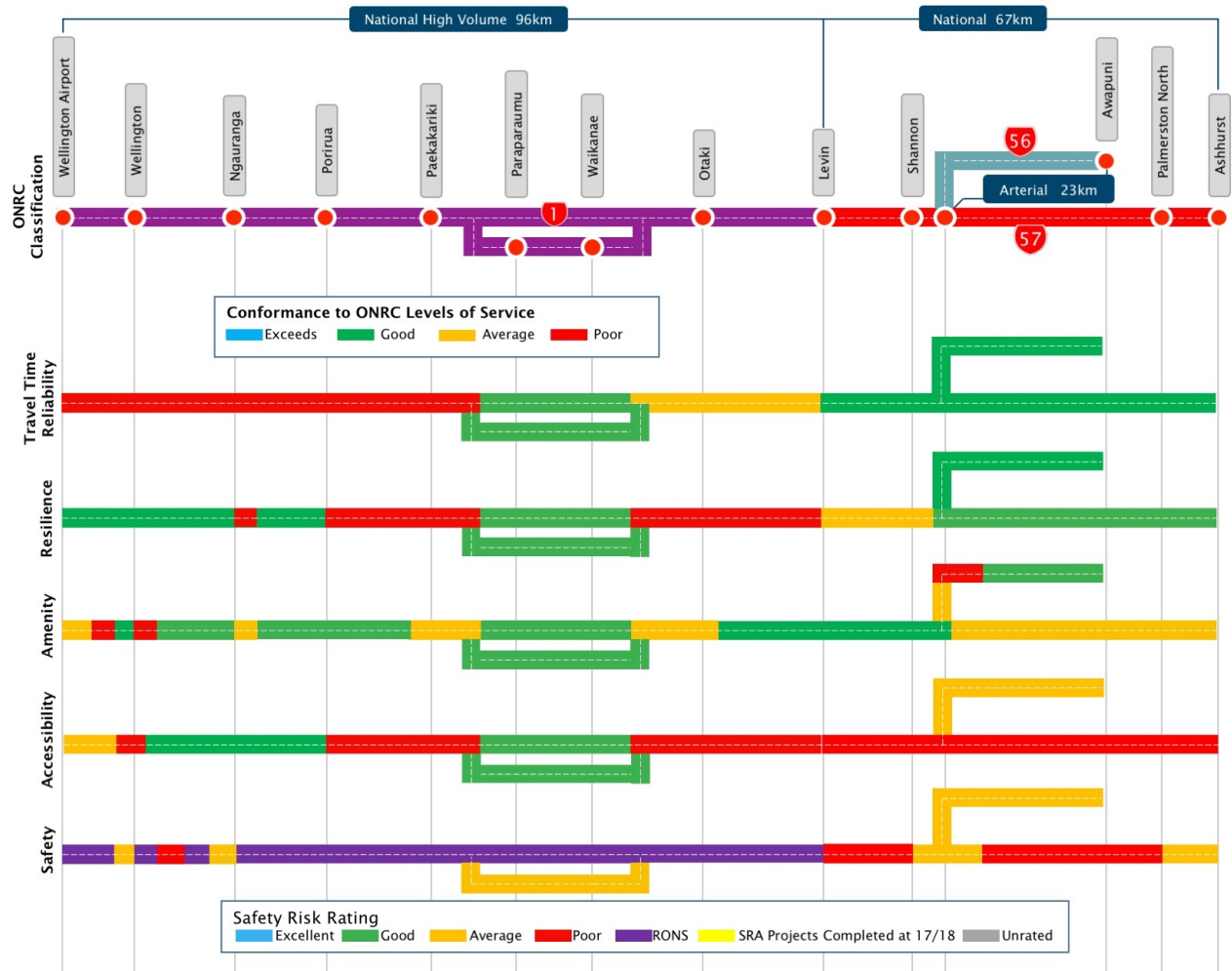
Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road Classification

The corridor from Wellington to Levin is classified as National High Volume as the major link from the north into both the sea port and airport in Wellington. From Levin through to Ashhurst on SH57 the corridor has a National classification providing the main route between Wellington and Hawkes Bay. SH56 is Arterial between the industrial area at Longburn and the junction with SH57 at Opiki.

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

Figure 7 - Current ONRC levels of service performance







Summary of current performance

Figure 7 shows how the Wellington to Palmerston North 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 urban arterial section from Wellington airport to the Terrace Tunnel, the corridor is experiences major congestion throughout the urban peak periods, but is otherwise relatively free-flowing. The motorway section generally provides for a reliable travel time. Due to a number of choke points along the route, the rural section from Porirua to Levin is susceptible to levels of congestion not generally expected on a National High-Volume highway. The rural Manawatu sections of SH56 and SH57 provide travel time reliability, mainly due to the comparatively lower traffic volumes on these sections.

Resilience

The section of corridor through the Kapiti Coast region has a high level of resilience risk. There are no viable alternative routes should critical assets such as the bridges over the Otaki and Waikanae Rivers fail, or a major blockage occur along the Paekakariki coastal section. The only alternative route into or out of southern sections of the corridor in the event of road closures in these areas is via SH2, a significant detour. SH57 is susceptible to flooding during major weather events, however there are viable alternative routes along the length of this section of corridor. While also at risk from flooding, the resilience risk of SH56 is appropriate to its ONRC classification.

Amenity

Parts of the urban arterial section in Wellington such as Vivian Street are starting to show the effects of deferred maintenance with pavements having discernible roughness. Travel quality along the Kapiti Coast section of the corridor is currently not what would be expected of a National High-Volume highway. Generally, the corridor is compatible with the urban/rural context.

Accessibility

The motorway sections from the Terrace Tunnel to Porirua conform to the expected standard for accessibility by providing limited access via ramps. The urban arterial section from Wellington airport to Terrace Tunnel, while generally providing only limited access at major intersections, has some adjacent properties with direct access to the corridor. SH1 from Porirua to Levin, and then SH57 onto Ashhurst demonstrate poor conformance to the LoS with frequent access to the corridor at farm gates in the rural environment, and driveways and shop frontages in the urban environment. Junctions such as SH1/SH57 do not provide priority to the National Road.

Safety

Large sections of the corridor have a perform poorly for safety performance. Specifically, a substantial proportion of the corridor fails to meet the target KiwiRAP 3-star rating.

A sizable proportion of the corridor is medium-high or high collective risk. Otaki to Levin has a 2-star rating due to narrow shoulder widths and increased levels of roadside hazards. SH57 is mostly 2-star rated due to narrow shoulder widths and a prevalence of roadside hazards.

A number of sharp bends along this section of corridor are a significant safety risk. The section of SH56 through Opiki features deep open drains below an elevated carriageway. Pressures on the corridor include roadside hazards and deep drainage ditches along much of its length.

The majority of the corridor is either high or medium-high collective risk. From Waikanae to Levin, the corridor is rated high personal risk. From Otaki to Ashhurst, the corridor is rated 3-star KiwiRAP. This rating denotes major deficiencies in some road features.

The Gap programme analysis has identified a high potential to reduce fatal and serious injuries between Wellington and Paekakariki where targeted medium-high cost improvements will be beneficial.

Investment in safety on the corridor is planned through management and maintenance and some treatment strategies. However, there are still areas where risk is high and no investment is planned. The challenging topography may constrain improvements.

Improving the customer experience

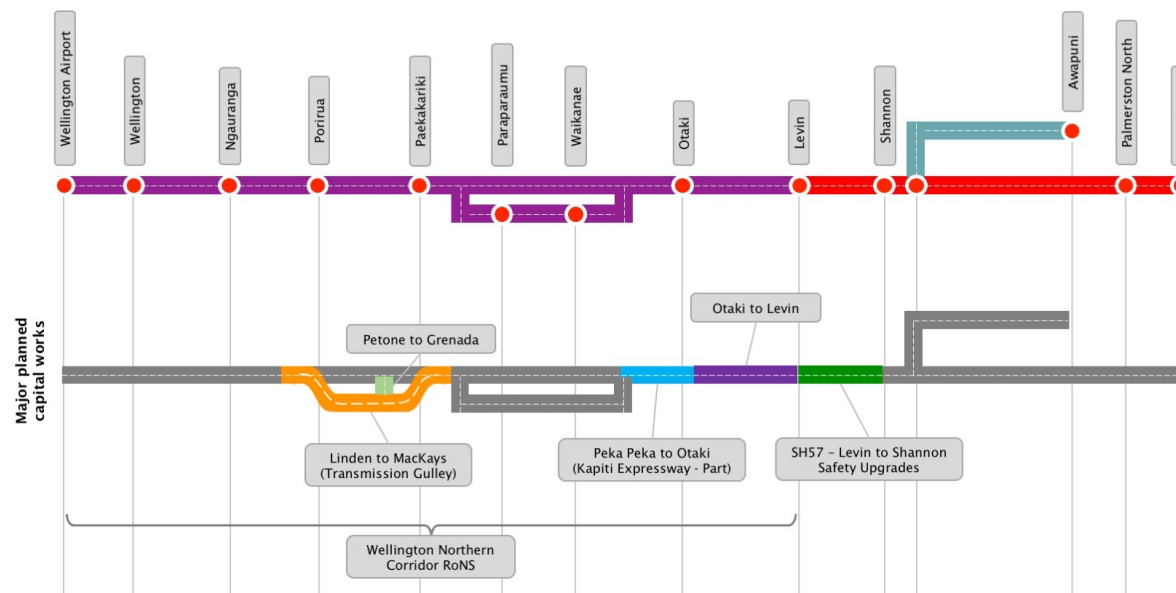
In responding to Customer Levels of Service it is important to acknowledge that significant improvements to the corridor are planned or underway as part of the Roads of National Significance, (RoNS) programme, including the much-anticipated Transmission Gully motorway extension. The Wellington Northern Corridor RoNS encompasses virtually the entire length of SH1 within the Wellington to Palmerston North corridor, and includes a number of discrete projects.

When completed, the planned improvements on the corridor will result in significant improvements to corridor performance as measured against ONRC outcomes. In particular, the section of corridor from Porirua north to Levin along SH1 will become fully compliant with expected outcomes for all activities.



'Big Dig' event at Raumatī Beach. Merania Taukiri, age 5 from Raumatī

Figure 8 – Significant corridor planned improvements



Access

Carriageway configuration

The corridor transitions through a vast array of carriageway configurations between the highly urbanised area of Wellington through peri urban and rural areas to Palmerston North. Between the Wellington airport and the city, it is predominantly four lanes supporting urban commuter traffic movement. It becomes a multiple lane motorway from Wellington to Porirua catering to greater traffic volumes. Once north of Porirua, the corridor is primarily two lanes. There are limited passing opportunities on the SH56 and SH57 lengths of the corridor.

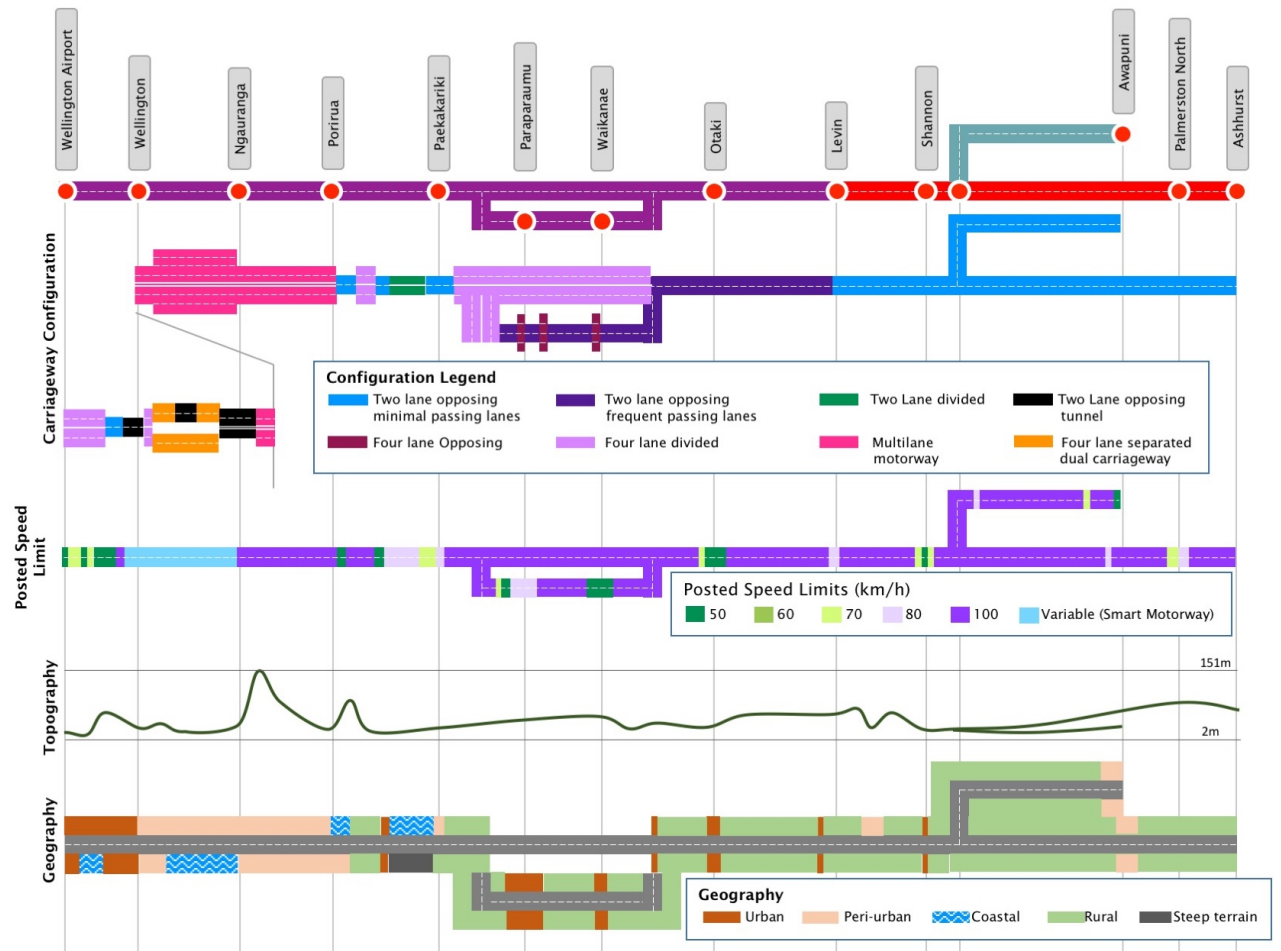
Speed limits

The section of the corridor from the airport to the Terrace Tunnel is a variable posted speed environment from 50km/h up to 70km/h. From Aotea to Ngauranga the corridor is managed as a variable speed environment. The rest of the corridor is generally 100km/h, with sections running through some areas and small communities having lower posted speeds appropriate for those environments.

Topography/geography

For most of the route the topography is relatively flat with only two significant hills being a steep climb up the Ngauranga Gorge and over to Porirua and the section between Mana and Pukerua Bay. Sections of corridor at Kilbirnie, Kaiwharawhara, and Paekakariki are coastal. The corridor transitions from high density urban environments in the south, to open rural landscapes in the north.

Figure 9 - Corridor characteristics



Horizontal alignment

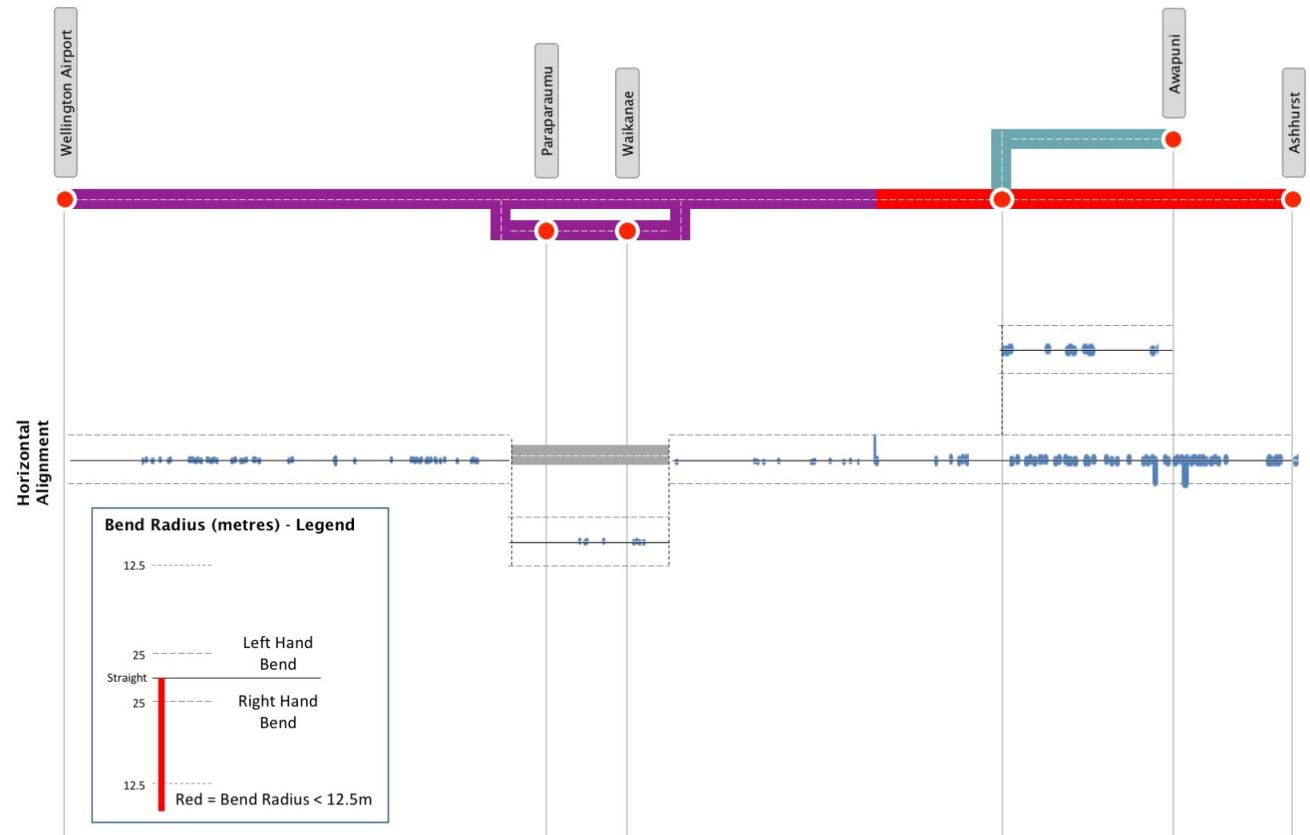
The infographic shows the location and extent of the out of context curves along the corridor. The height of the bar is an indication of the severity of the curve calculated as $\frac{1}{radius^2}$, meaning the taller the bar, the smaller the radius of the curve. Note: Unlike other infographics, the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

The corridor contains an irregular occurrence of larger radius curves predominantly out of the urban sections of corridor. SH57 has a higher concentration of out of context curves compared to the balance of the corridor. Sharper bends with a radius of 25m or less are all associated with signposted intersections.



Transmission Gully July 2017

Figure 10 - Horizontal alignment



Severe storm's Wellington, can cause significant damage and disruption to the region's transport system

Volumes

Traffic volumes vary significantly along the corridor, from the high commuter volumes on the Wellington motorways to the very low rural community volumes of the Manawatu area. The Ngauranga Gorge receives the heaviest volumes, both in terms of total vehicles per day per lane, and the number of heavy vehicles. The (three-lane) Terrace Tunnel is supporting significant volumes, as is the section of corridor along the Kapiti Coast between Paekakariki and Otaki. The restrictive nature of Pukerua Bay and Centennial highway (the two-lane coast road south of Paekakariki) is reflected in reduced network efficiency.

HPMV routes

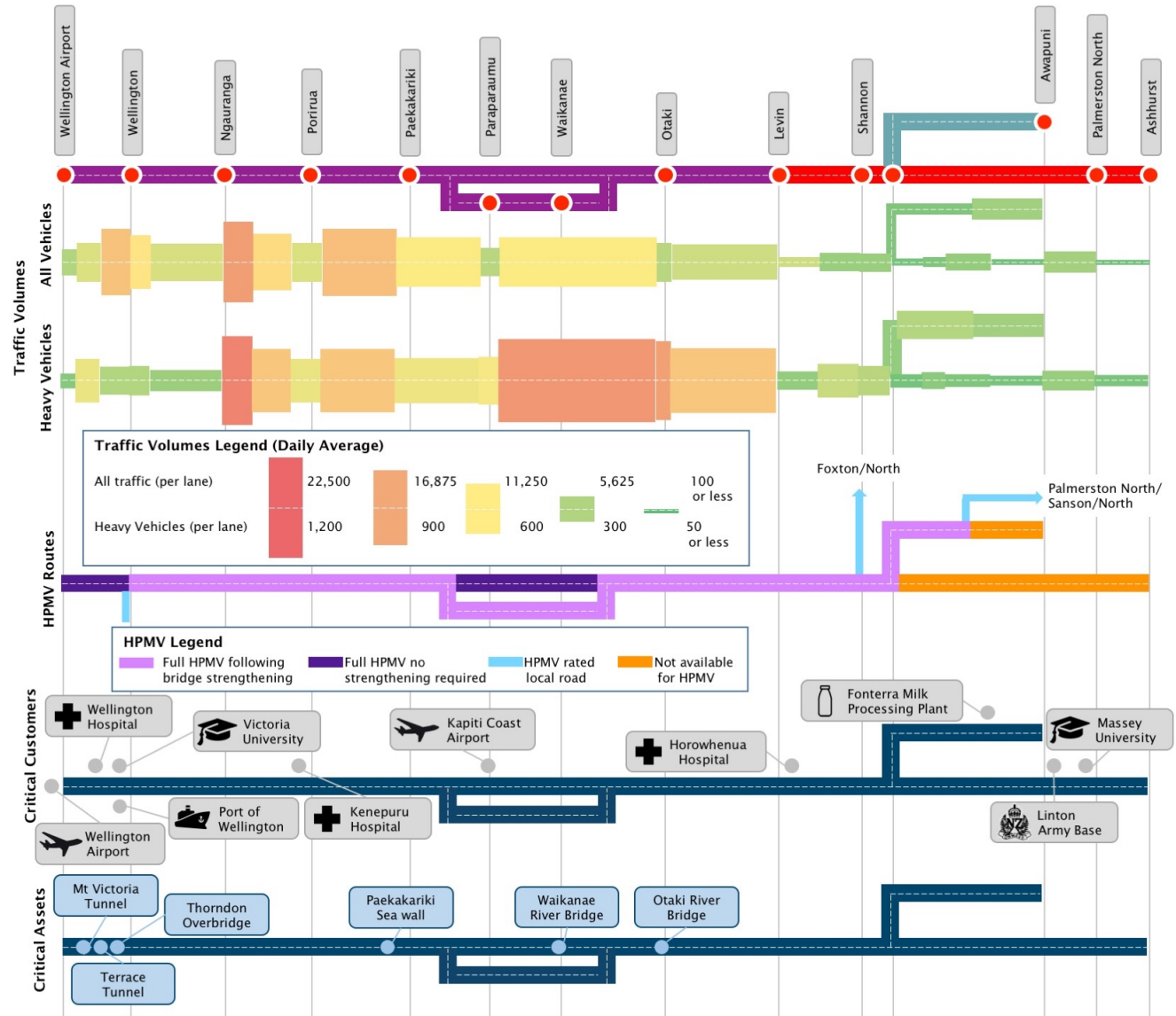
Parts of the corridor are not suitable as HMPV routes, particularly SH57 north of the SH56 junction at Opiki, and the section of SH56 through Longburn. Due to restrictions on SH1 north of Levin, HPMV traffic is required to use SH57 and the local road alternative from Shannon to Foxton as the north-south connection. HPMV traffic to Palmerston North is required to use SH56 to Longburn, then a local road alternative. A local road alternative provides the link from the Wellington motorway along Aotea Quay to the Port of Wellington.

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. Examples include timely access to hospitals impacting health care, and collections from dairy farms having economic impacts.

There are also critical assets along the route which need an enhanced maintenance focus to ensure they do not fail or significantly interrupt services along the network. The Waikanae River Bridge is not only a critical asset from a network perspective but it also carries other critical utilities such as water which large parts of the community depend on.

Figure 11 - Corridor capacity



Pressures

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

- **HPMV and Overdimension Access:** Physical constraints limiting HPMV and over dimension access impacting journey times. At present this is constrained by tunnel restrictions (size and safety) at the southern end of the corridor requiring vehicles to use local road options. At the northern end, structural restrictions at the soon to be replaced Whirokino Trestle require large and heavy vehicle diversion inland via SH57 onto local roads from Shannon and back onto SH1 at Foxton.
- **Limited alternative routes:** Much of the corridor between Paekakariki and Levin has limited alternative routes. This section of the corridor is susceptible to disruption from crashes and weather events. The MacKay's to Peka Peka project currently under construction will alleviate this issue at the northern end of this section of the corridor. The commuter rail parallels the SH, wedged between the sea and a steep sheer loose aggregate cliff, from Pukerua Bay up to Waikanae. This can be closed due to slips and debris which also affect the highway resulting in no viable alternatives for travel through this section.
- **Choke Points:** Carriageway configurations creating choke points which significantly impact journey times. Two lane sections of the corridor in Wellington City, such as along Wellington Road/Ruahine Street into Victoria Tunnel, can act as choke points and result in considerable congestion and motorist delay with extensive queueing on both the local road and state highway. Further north, at Pukerua Bay, the merge back to single lanes results in substantial northbound queueing on the state highway in the evening commuter peak.
- **Urban Growth:** Continued urban growth resulting in increased demand to access the corridor. The area between Churton Park and Granada through to, and including Whitby, is experiencing considerable residential growth which will place demands on existing access points. The Transmission Gully RoNS Project will meet some of this demand, however growth is occurring well in advance of the RoNS becoming operational. Developments in and around the Paraparamu including a new Polytechnic campus and a retirement village are also expected to increase pressure on current corridor access points.

Future considerations

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

- **Intervention choice:** Choice of intervention needs to consider what level of service is a priority, such as greater resilience, longer life, and lower maintenance requirements. The SH1 section of the corridor is National High Volume, with an expectation of high levels of availability and accessibility. As such undertaking maintenance, even in relatively low volume periods overnight, has a significant impact, particularly on freight movement which is high during night time hours. Added to this is the sensitivity of residents in urban areas to noise and vibration from night works.
- **Access for maintenance:** Access for maintenance to some sections of the corridor require high levels of planning and co-ordination, often at a higher establishment and implementation cost, even requiring full closure, such as for works in the Victoria Tunnel and Wellington Road, or for the Terrace Tunnel. The choice of treatment applied is increasingly dictated by the constraint of time on the network – how rapidly can we get in and out, how often we need to revisit, how quickly we can remediate, and how robust is the treatment.
- **SH Revocations:** Balancing the need to maintain a high-quality asset with a short-term investment timeframe for sections of the corridor which will ultimately no longer be NZTA assets once specific RoNS projects are completed (and they are revoked to become local roads under the management of local authorities).
- **HMPV access:** At least one bridge on SH56 may be HMPV restricted due to narrow width. HMPV access along SH56 needs to be considered and access to the planned major inland port at Longburn.
- **Limited redundancy on the corridor:** This means that relatively minor maintenance items can be burdensome – small slips or minor traffic incidents or mechanical breakdowns can create disproportionate delays and significant traffic queues that warrant additional investment in both response and prevention.
- **ONRC rating:** SH57 north of Shannon has an ONRC rating of “National” for SH57 north of Shannon. Current performance of this section of the corridor is closer to an Arterial as reflected in the low volumes of traffic, the absence of an HMPV rated, and the relative condition and configuration of the corridor. In its current state, the section of corridor between the SH56 junction at Opiki and Ashhurst along SH57 would fail to meet most of the ONRC customer levels of service criteria for a National route without significant investment in improvements.

Resilience

The corridor is one of only two alternative major routes into and out of Wellington City (the other being SH2) and there are critical parts of the corridor with a significant resilience risk profile. This includes the coastal portion of highway between Pukerua Bay and Paekakariki, and the bridges over the Waikanae and Otaki Rivers. There is a lack of viable alternative routes, especially for heavy vehicles.

Vulnerabilities

The corridor is susceptible to flooding for a significant proportion of its length, especially on the coastal sections, and through the low-lying sections of Kapiti, Horowhenua and Manawatu. Slips and rock falls present an issue mainly in the northern section of SH57, through the coastal section of SH1 south of Paekakariki, and through the Ngauranga Gorge.

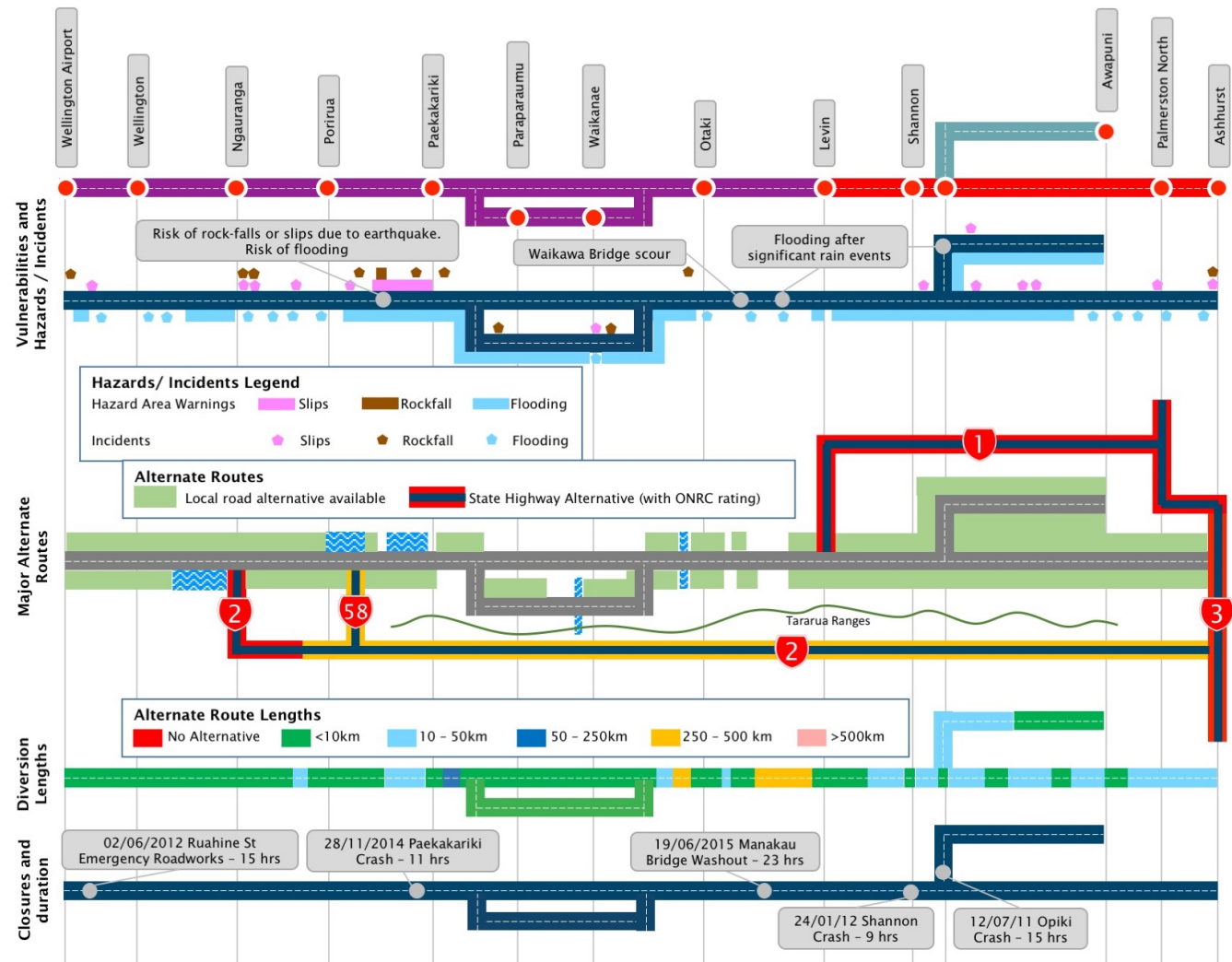
Alternative routes and diversion lengths

As one of other 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 Tararua ranges, and the Waikanae and Otaki rivers mean some sections of the corridor have no viable alternative routes other than a more than 250km diversion, particularly around Otaki.

Closures and duration

Over the past five years, there have been five major unplanned road closures with the shortest being 9 hours as a result of a crash, and the longest being 23 hours as a result of the Manukau Bridge being washed out.

Figure 12 - Resilience



Pressures

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

- **Urban Motorway:** Dependence on SH1 for access to and from Wellington City. The urban motorway portion of SH1 adjacent to the harbour is a high resilience risk section of the corridor – with the potential to disrupt not just the travelling public, but also the ability for emergency services and utility operators to respond and reinstate.
- **Susceptible to flooding:** Increasing flood events on sections of the corridor, susceptibility to flooding from either tidal storm surge or localised flooding, as well as slips from significant rain events. In May and June 2015, two separate storms hit Wellington and caused widespread surface flooding and significant damage to state highway assets. In the June event, the Waikawa Stream Bridge abutment was washed out which closed SH1 between Levin and Otaki for nearly 24 hours.
- **Slope stability:** Slopes in areas such as Pukerua Bay and Ngauranga Gorge are unstable. Several slip sites in Pukerua Bay have been repaired over the last few years, but this section of SH1 is still vulnerable to slips and flooding.
- **Earthquake risk:** Earthquake risk which can result in the most extreme tsunami events and uplift to more localised land movement and debris. The coastal road north of Paekakariki is one area identified as vulnerable to such slips and rock-falls.
- **Network redundancy:** The lack of network redundancy for both commuter and commercial vehicles and reliance on vulnerable choke points such as the Ngauranga Interchange. It services all SH1 and SH2 traffic (and local Hutt Road traffic) and is located at the lowest point of the valley vulnerable to flooding from both rainfall and tidal effects. Consequently, it effectively holds each of the corridors to ransom in the event of traffic incidents. Equally this section of the corridor is vulnerable to deficiencies on the adjacent local roads or SH2 and can quickly become heavily congested and at times represent a car and truck park. The sole after hours' veterinary service for the Wellington region is located at the bottom of the Ngauranga Gorge.
- **Fragile Flow:** The highly urbanised southern lengths of the corridor have no spare capacity meaning minor incidents can cause rapid disruption and breakdown of the fragile traffic flow. When this occurs during the morning peak it can at times endure throughout the day and continue to influence the evening peak flows. The network is very slow to recover to normal flows after these events.

Future considerations

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

- **Monitoring:** A higher level of monitoring or increased levels of preventative maintenance may be needed to mitigate the resilience risk on sections of the corridor where there are no or poor viable alternatives.
- **Role of Public Transport:** Maintaining the availability of the public transport and the NIMT rail corridor, as the cancellation of train services has a significant impact on the road network.
- **Drainage:** Significant drainage maintenance or improvement may be required to improve the resilience risk, and reduce the level of pavement maintenance and renewal, of flooding on the Kapiti Coast and Manawatu plains sections of the corridor.
- **Recovery Response Times;** Increased investment in the readiness of first responder personal, location and access to equipment or stockpiled materials to improve response times to events which close or cause significant delays on the corridor.
- **Real Time Communication:** Real-time or quicker communications about network conditions enabling more informed journey decisions by customers. This might include more extensive camera surveillance in high priority areas combined with strong maintenance inspection regimes (catchment awareness) and reliable communications (mobile phone coverage). This heightened vigilance is rewarded on the southern section of the corridor where issues are identified and addressed rapidly - be they culvert blockages (Paekakariki) or immobilised vehicles (Wellington Road, or almost anywhere in the urban network).



Rural traffic on the corridor

Reliability and efficiency

Efficiency

Some sections of the corridor perform poorly in terms of highway capacity. Thorndon overbridge displays a low level of service in terms of efficiency during both morning and afternoon peaks. The first section of Ngauranga Gorge rates poorly during all three periods of the day. Further north, the corridor from Raumati north to Otaki experiences some speed reductions during peak times. Both SH56 and SH57 are generally free-flowing at all times with the exception of the section of SH57 near Massey University.

Variability

Overall the corridor performs well for variability, except for moderate levels of variability in Ngauranga Gorge, and high levels of variability between Ngauranga and Wellington CBD.

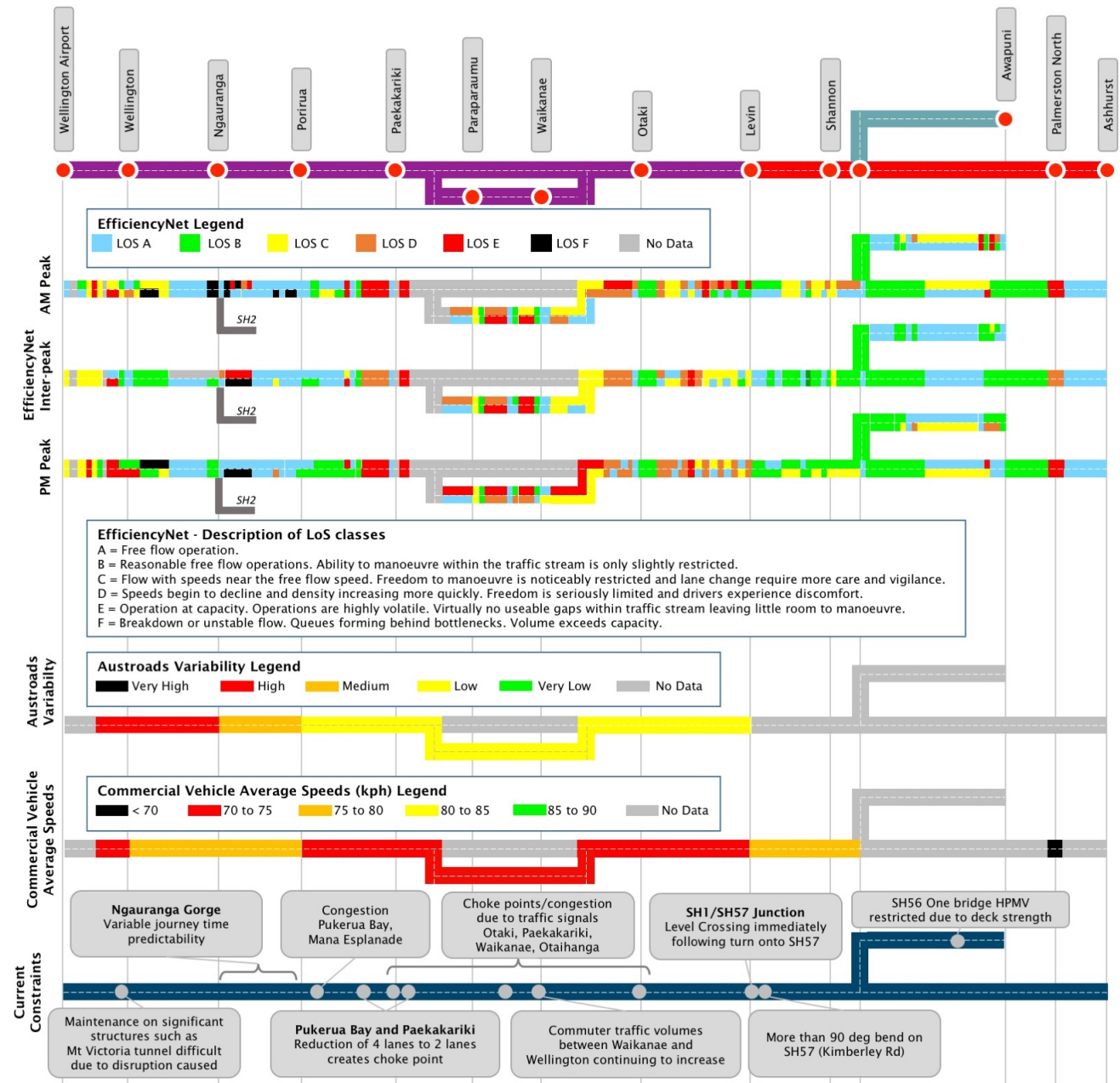
Commercial vehicle average speed

Average speeds for commercial vehicles are relatively low for the SH1 section of the corridor for which data exists. The Kapiti Coast section of corridor only achieving 70 to 75 km/h is an indication of the traffic volumes along this section as well as the requirement to regularly reduce speed in townships.

Current constraints

The major constraints on the network affecting journey reliability and efficiency tend to be due to lane configuration, corridor access, and traffic volumes for the southern section of the corridor. On the northern end, the constraints tend to be more to do with the alignment or limitations of existing structures.

Figure 13 - Reliability and efficiency



Pressures

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

- **Congestion:** Many of the two-lane corridor sections south of Levin are at or near capacity during peak periods and are delivering poor levels of service. Efficiency is incredibly fragile and overly sensitive to relatively minor changes such as occurs with the necessary merge and diverge at either end of the two-lane sections – it can create considerable queuing through peak periods – flow breakdown occurs.
- **Choke Points:** Morning peak periods at the Wellington end are reliant on the rate at which the City can absorb the arriving traffic. Both the Terrace off ramp and Terrace Tunnel are constrained by traffic signals and are prone to queuing along the motorway (where there is often a need to change lanes – cross increasing numbers of lanes).
- **Urban Speeds:** Townships generally require an appropriate reduction in travel speed to suit the surrounding environment and users. This speed change results in travel time delay and at peak periods, can produce extensive queues (such as through Pukerua Bay, Otaki and Paremata roundabouts).
- **Variable Travel Time:** Travel time reliability in commuter peak periods is highly variable along the corridor between Wellington and Levin. It is sensitive to slight changes in weather, public transport delays, adjacent land use activity and school holidays as well as crashes, breakdowns or roadside distractions.
- **Reliable Journeys:** Journey predictability through the Ngauranga Gorge is variable, and has had a noticeable recent increase. This has likely been influenced by lower fuel prices encouraging greater use of private motor vehicles, and the amount of road works being undertaken.
- **Vehicle Operating Costs:** Commercial vehicle effectiveness, efficiency and operating costs increase rapidly with stop start flow such as occurs during congestion. Shifting to less congested time periods is not always an option, and can have additional costs and be less safe. Excessive business disruption can lead to relocation and economic loss to a community.
- **Market Pricing:** The economic efficiency of maintenance of this corridor is subject to competitive pressure from capital works projects and significant land use change – competition for quantity and quality of resources, such as aggregate and also suitably experienced practitioners.

Future considerations

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

- **Rapid Response:** Being able to respond quickly and efficiently to incidents on the network is important to maintaining reliable and efficient journeys for customers requiring a higher level of response.
- **ITS & Real-time Information:** Use of ITS to manage flow is increasing, for example the Wellington to Ngauranga ‘Smart’ motorway coming on-stream. Reliance on real-time information dissemination to customers will become even more important as traffic volumes continue to grow and journey patterns change as the RoNS come on-stream. The supporting infrastructure will need to be maintained and grow with public acceptance and increasing expectations (coverage and quality).
- **Maintenance Access:** Limited accessibility opportunities (for maintenance works) and the fragility of the corridor, on the southern (Wellington) half of this network, dictate that more robust treatments are applied to ensure continuity of service. This heightened risk is reflected in both the choices of treatments or management and in the way that they are applied – programmed full closure of a portion, such as Wellington Road, Terrace Tunnel, Victoria Tunnel, relocation of inner city residents during renewal operations, and rolling partial closures with much reduced operating speed on the motorway, noise reducing surfacing, longer life treatments, or less maintenance and acceptance of lower quality/more faults during the life-cycle.
- **Resource Planning:** Competition for resources may require earlier commitment to or even longer-term supply agreements, or simply paying the increased market rate or accepting a lower quality product to fit the given budget as well as greater co-ordination with the market.
- **Maintenance Budget:** As capital works and safety improvements come on stream there is a risk of additional maintenance burden from the cumulative costs, either from the unknown maintenance costs associated with new technologies, from replacement of sacrificial elements, or simply from under-estimation of operational costs.

Safety

Overall the corridor performs poorly for KiwiRAP collective risk with an overall average rating of 0.17, placing it at the upper end of the “Medium-High” rating. The section of corridor between Paraparaumu and Levin rates “High” for collective risk. Comparatively, the section of the corridor from Levin south on SH1 rates as low for personal risk, this result being a factor of the high-volume nature of that section. An area of concern is SH57, which rates “Medium-High” for both collective and personal risk. This is likely to be influenced by the relatively low KiwiRAP star rating for this section of corridor.

Collective risk

Collective risk along the corridor is generally rated medium-high to high. SH56 is rated medium-high risk, and Wellington Airport to Ngauranga is also rated medium-high risk along SH1. There is a section of the corridor between Paekakariki and Otaki that is unrated for collective risk. Waikanae to Levin and the Ngauranga to Porirua sections of SH1 are predominantly rated high risk. Between Shannon and Ashhurst, the risk varies from medium to low.

Personal risk

Personal risk along the corridor is generally low. The only high personal risk section along the corridor is located between Levin and Shannon. There is a medium-high personal risk section between Linton and Palmerston North. Personal risk rating between Wellington Airport and Porirua is low risk.

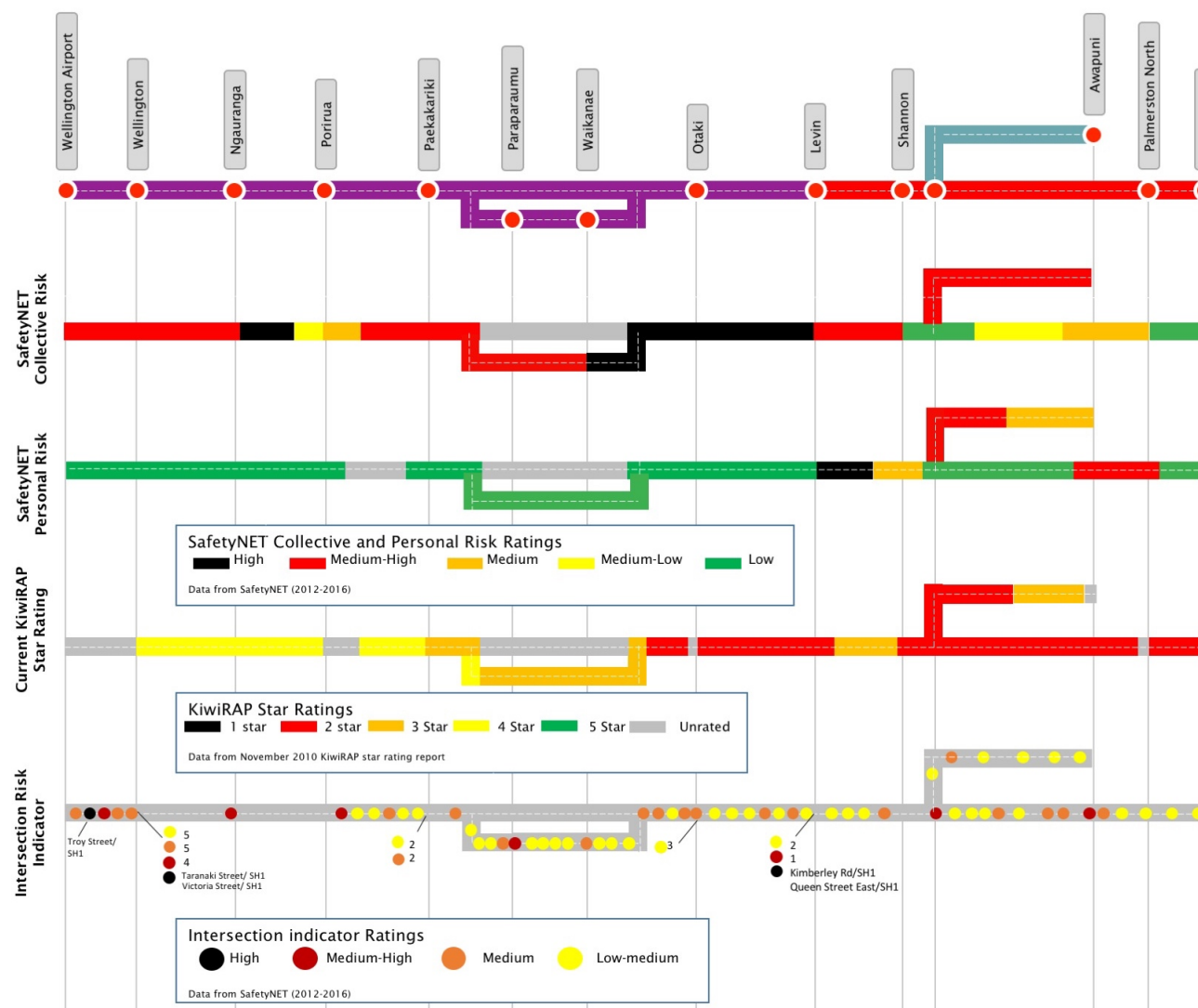
Star rating

Most of the corridor has a 2 or 3-star rating. Small localised sections of the corridor are unrated. Wellington to Porirua and a section of the road between Porirua and Paekakariki have a 4-star rating thus meeting the target standard for a national high-volume road. Otaki to Ashhurst is rated 2-star apart from one small section between Levin and Shannon.

Intersection risk indicators

There are five high risk intersections along the corridor. Three of these intersections are centred around Wellington while two are located near Levin.

Figure 14 - Safety



Pressures

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

- **KiwiRAP:** Much of the corridor fails to meet the target KiwiRAP star rating. The low KiwiRAP Star rating for the corridor north of Paekakariki reflects presence of more roadside hazards. The pressure is how to improve safety in the face of competing customer needs, such as maintaining access, providing space for active users or preserving motorcyclist safety.
- **Deep drains:** There are unprotected deep drains and drop offs close to the road along parts of both SH56 and SH57.
- **Intersections:** There are multiple “at grade” intersections on this corridor that create higher safety risk. These include traffic signals through the lower speed urban mixed Airport to Terrace Tunnel portion (Kilbirnie Road, Vivian Street), signals in high speed environment at Whitford Brown, Porirua, and “rural side” roads to the north that require filter through high speed and high-volume traffic flows (with few pedestrian amenities) such as at Waikanae, Otaki, Manukau. The roundabouts are multi-laned and some provide only a low level of service for pedestrians, such as at Basin Reserve, Cobham Drive, Paremata or Otaki.
- **Pedestrian Facilities:** abilities and expectations of pedestrians/vulnerable users along the corridor vary, as does the level of service provided. The absence or presence of pedestrian facilities may require pedestrians to mix freely with dense, multi-lane and high-speed traffic such as at Cobham Drive, Pukerua Bay, Waianae and Otaki.
- **Road Design:** the design of some parts of the corridor are no longer suitable to safely accommodate the mix and volume of traffic and landuse. The effect is inconsistency along the corridor and increased road safety risk. Examples include the narrow Rail overbridges and their approaches, along SH1; narrow pinch points such as the coastal stretch north of Pukerua Bay or parts of SH57; or undivided high-speed areas.
- **Speed:** High differences in speed between users along the corridor is not forgiving and increases safety risk and crash severity. Pressure points on this corridor include motorway queues, high speed traffic signals, complicated or congested intersections, peri-urban and transition areas such as on and off-ramps, unmanaged rural access points and schools or community facilities as well as areas with frequent intersections. The pressure is how best to ensure that motorists appropriately adjust their speeds to the hazards and risks present on the corridor, some of which may not be immediately obvious.

Future considerations

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

- **Improvement to high risk intersections,** In the Wellington urban environment and in the Manawatu rural sections e.g. presence detection and advice at remote intersections, lowered speeds at signalised intersections, grade and mode separation at busy/complex intersections.
- **Maintain relationships with utility and third-party providers** to maximise opportunities to minimise or remove and prevent any additional roadside hazards.
- **Providing a smooth and consistent experience,** transition between areas of different design standards (e.g. project safety audits) and how to manage substandard areas until improvements can be delivered. Examples – SH1 rail overbridges, SH56 Opiki Straight.
- **Work with local authorities** to ensure a co-ordinated approach to safety between adjoining road networks, particularly at intersections and where there are competing activities. Maintain highway and local road safety and support function.
- **Speed management tools:** What tools are required to encourage and ensure speeds that are appropriate to the surrounding environment.
- **Aging population:** The needs and implications of an aging population in complex and congested driving environments – both as motorist and non-motorist. Tools for planning ahead, simple forgiving designs, good land use planning, clear signage.



Works on Otaihangā roundabout

People, places and environment

Natural environment

The Wellington and Porirua Harbours are the key natural environmental features between Wellington and the Kapiti Coast being sensitive receiving environments and providing harbour views. Terrestrial flora and fauna is not unique and generally reflective of most urban and peri-urban areas. The coastal sections along the corridor leading to Paekakariki provide exceptional views, but are also susceptible to erosion and slips.

From Paekakariki north valley streams from the foothills of the Tararua ranges contribute to flooding along the corridor, particularly along the Otaki flats, as well as providing sensitive ecological connections from the foothills to the coast. The Waikanae, Otaki and Manawatu Rivers are significant waterways both as sensitive receiving environments, and contributors to flooding in areas. Fauna is more native and reflective of a rural environment.

Noise, vibration and air quality

Residential development abuts the corridor within the Wellington urban area, particularly through Hatatai, the CBD and Thorndon, making these areas more sensitive to noise. Congestion around the Basin Reserve and constrained air movement in and around the three inner city tunnels create air quality issues. Specific mitigation has been undertaken on adjacent properties through the Mana area to manage noise effects. The Mackay's to Peka Peka project will help to reduce noise currently experienced through Paraparaumu and Waikanae.

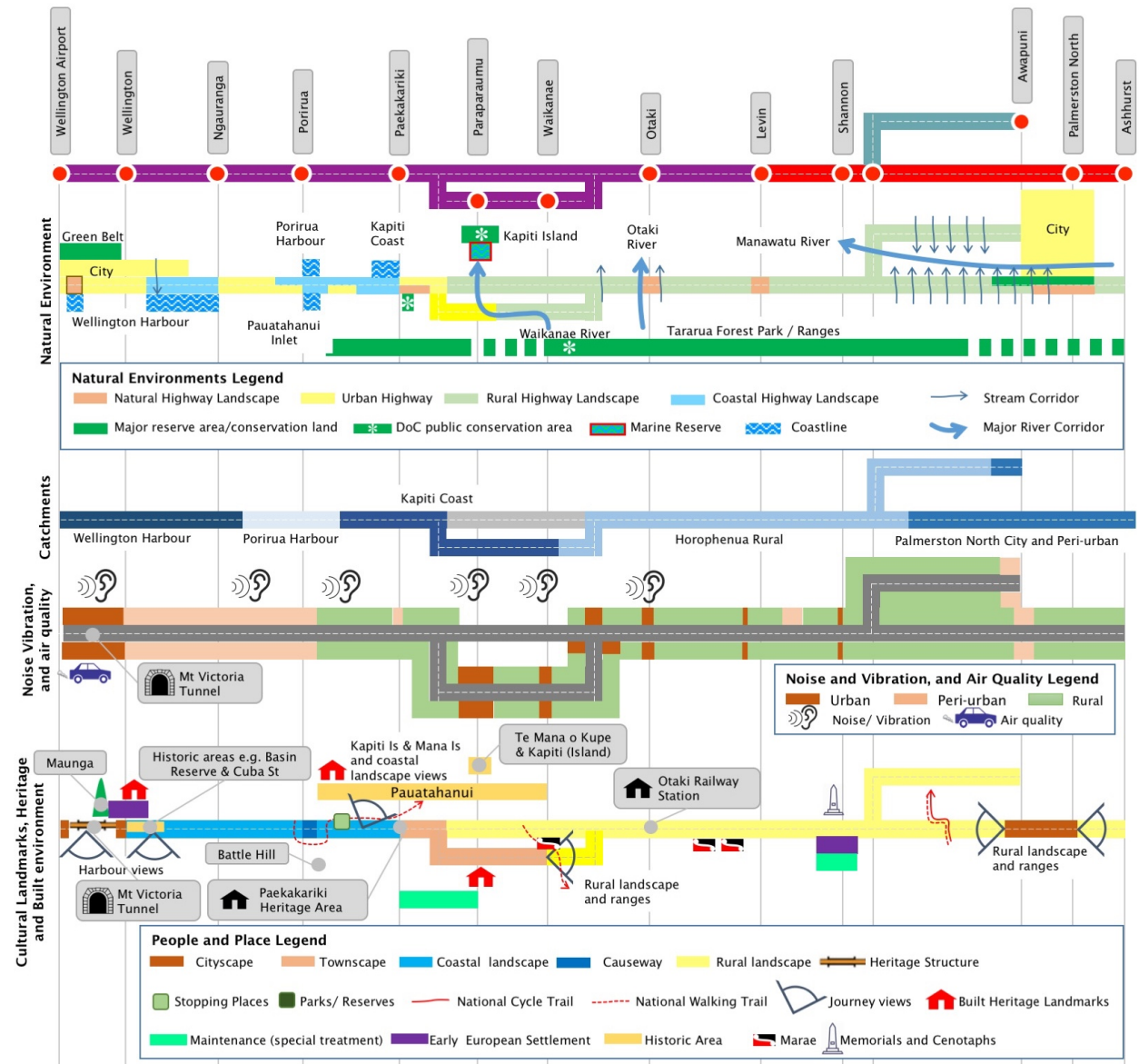
Cultural landmarks, heritage and built environment

The visual character of the corridor provides vibrancy and attractiveness to journeys, with a range of urban, peri-urban and rural areas, areas of intensive urban development and small towns.

The Wellington urban area has a high concentration of cultural and heritage features such as the Mt Victoria tunnel and areas around the Basin Reserve and Cuba St. The area from Porirua through to Waikanae is a historic area.

There are three marae that face onto the corridor.

Figure 15 – People, places and environment



Pressures

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

Natural environment

- **Climate change:** Changes in the climate are resulting in warmer temperatures and more intensive rainfall patterns, with increased erosion of the rocks, soils and slopes within and alongside the corridor, particularly in already susceptible coastal sections.
- **Highway flooding:** Highway flooding is currently an issue in a number of locations, including the upstream catchments of the Opiki floodplain, some rail culverts, and the Aotea block drainage via SH1 (an unmanaged private property drainage system). It is expected that more efforts will be required in the future to protect the corridor functionality from inundation.
- **Stormwater Management:** Higher stormwater water quality discharge standards are being sought, particularly those close to sensitive receiving environments. In the highly urbanised area between Wellington and Porirua space is constrained and systems tend to be piped. The Transport Agency is a signatory to the Porirua Harbour Catchment Management Strategy which also brings with it a range of obligations. In peri-urban and rural areas north of Porirua, use of more natural treatment features such as wetlands both increase the corridor footprint and require ongoing maintenance, including compliance monitoring and reporting with associated impacts on operational costs. The MacKay's Crossing to Peka Peka section is an example of the type of new projects with significantly greater environmental management controls resulting in greater operational management requirements.
- **Vegetation management:** Vegetation management requirements, including biosecurity compliance, along the entire corridor are likely to increase as urban growth expands and the community expectations of visual quality and control of pest plants. As the corridor develops the area of vegetation (including landscape areas) is expected to increase and with it, operational costs. Ecological connectivity across the corridor between habitat areas is an outcome increasingly sought by Councils and the Department of Conservation to assist in biodiversity maintenance and will need to be considered in vegetation management programs.

Noise, vibration and air quality

- **Noise Sensitivity:** As urban growth continues along the corridor, the need to manage impacts is increasing. Receptors closest to the state highway are more likely to be potentially impacted, nominally within 40 metres of the state highway for vibration, and within 100 metres for air quality and noise. Mitigation can include separation of the state highway from receptors (people/buildings), maintaining free-flowing traffic and appropriate road surface conditions. In some cases, special pavements and/or barriers, such as walls or bunds, are used to mitigate noise effects.

Cultural landmarks, heritage and built environment

- **Place Management Plans:** The complex range of cultural heritage places and landmarks are subject to incremental damage through both corridor management activities and environmental changes. Some of these places and landmarks may require management plans with ongoing compliance obligations, such as in Wellington City. Additional investigations and management of impacts on these features may also be required.
- **Mana Whenua:** Acknowledgement of iwi/mana whenua relationships is increasing along with their input to the management of heritage assets and landscapes. The number of features and locations along the corridor of importance to iwi is expected to increase and these will need to be considered in corridor management and development activities.

Future considerations

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

- **Climate change:** The frequency, variability and intensity of rainfall, flooding and extreme weather events could increase. The management of these risks is likely to require engineered controls and use of vegetation, particularly in highly exposed areas such as coastal sections.
- **Stormwater Management:** Regulatory requirements for improved stormwater management are becoming tighter and more rigid with adequate management of stormwater a higher priority.
- **Environmental Management:** environmental management requirements and compliance for the corridor is very high. There is a drive for an increased level of environmental monitoring and compliance for capital projects in particular, and more robust evidence to support compliance for all activities, including maintenance.
- **Consent Consolidation:** Opportunities for consolidation/rationalisation of resource consents, particularly for regular maintenance activities
- **Places of Significance:** Corridor development and management activities in proximity to cultural and heritage features and landmarks particularly between Hataitai and Thorndon in Wellington and smaller urban areas such as Otaki and Shannon
- **Increasing Environmental Expectations:** Increasing urban development along the Wellington to Porirua corridor resulting in a need to manage noise, vibration and air quality and meet community expectations about visual appearance and vegetation management
- **Viewshaft Protection:** The impact of activities on the maintenance and enhancement of the current journey experience in relation to significant views such as those of the Wellington and Porirua Harbours, and coastal areas, and rural ranges.

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 234 km of road network which reflects 2.1% nationally. The total value of the assets along the corridor is \$1,025M.

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

Asset condition and performance summary

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

Figure 16 – Corridor asset base

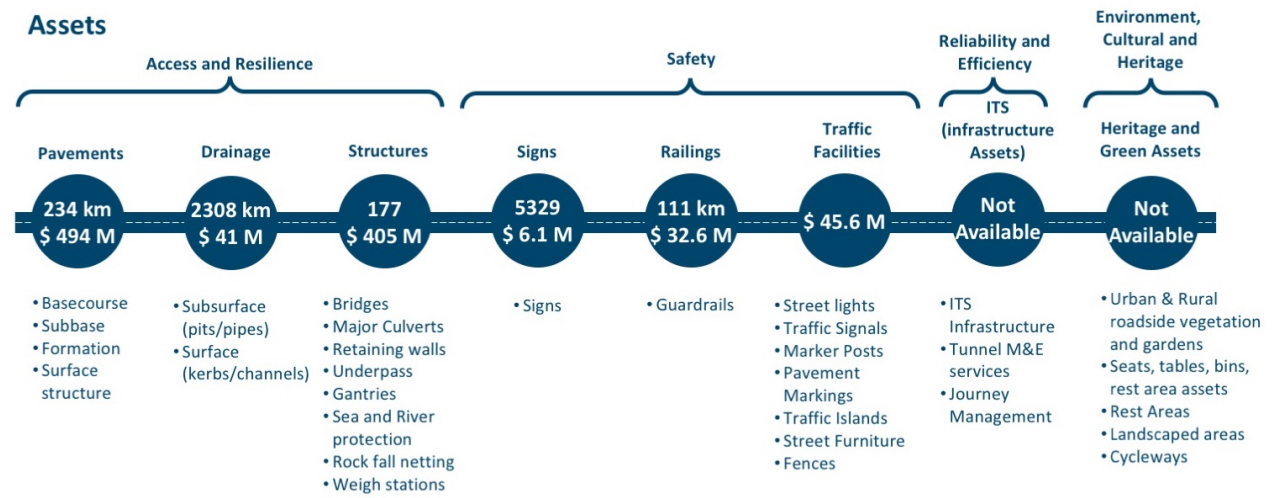


Figure 17 - Asset condition and performance



Asset condition and performance

Surface skid resistance

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

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

Generally, this corridor has a limited length of skid resistance beyond the threshold limit and a larger portion within the investigation levels, as can be expected where surfacings are aging. The worst locations with skid resistance below the threshold levels were along SH56, but have shown marked improvement. Outstanding areas of excessive skid resistance showing degradation are located on SH1, between Wellington City and Airport, and between Porirua and Paekakariki and SH57 between Levin and SH56.

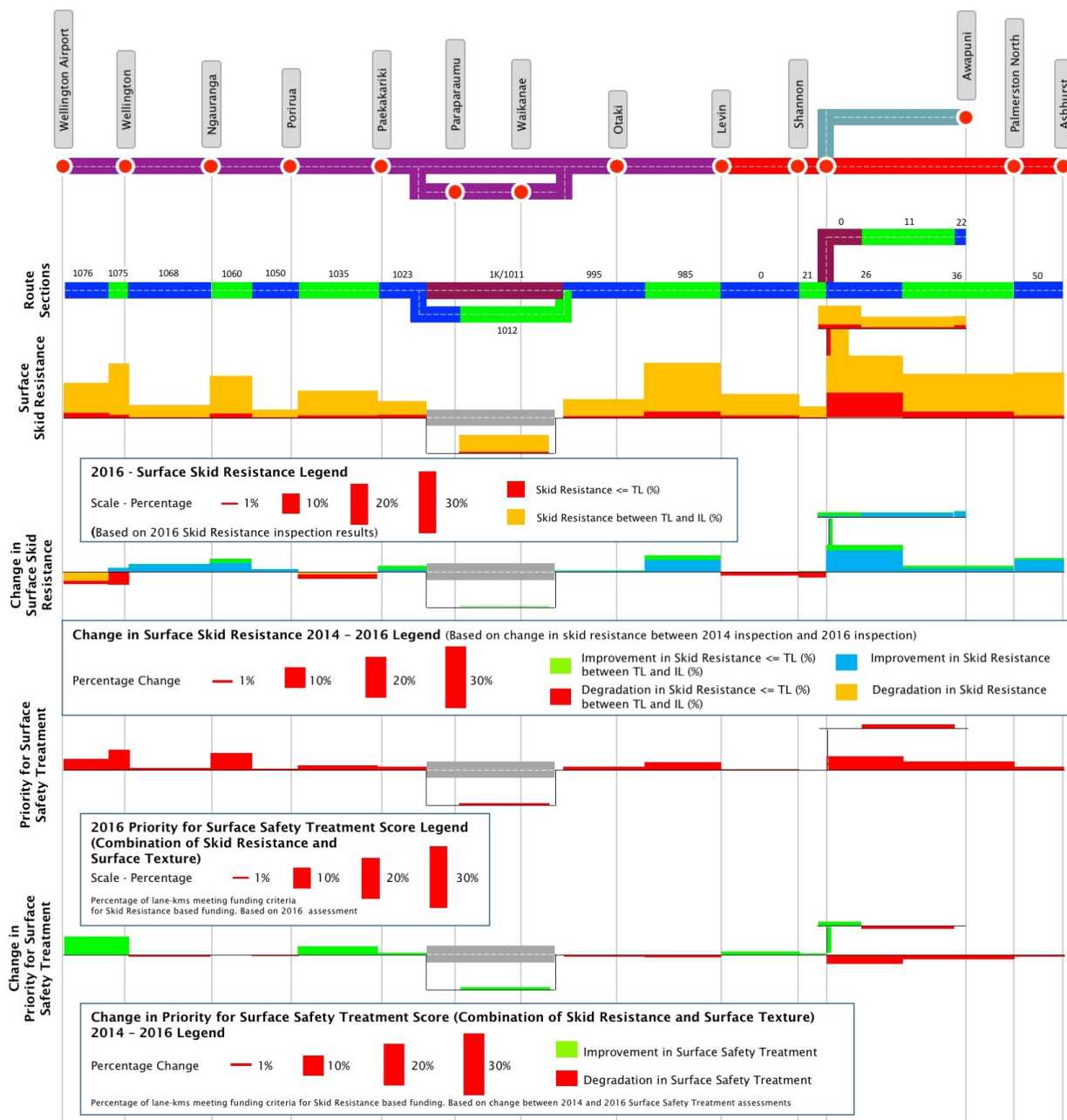
Priority for surface safety treatment

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 eligible for 11km, 2.5%, of this corridor. The priority for surface safety treatment score results have shown improvement across much of the corridor with degradation noted on SH57 east of SH56 through to Ashhurst. The qualifying areas within Wellington City (Vivian Street and Kent Terrace) reflect

Figure 18 – Asset condition



the increase in traffic volume as the State Highway passes through the inner City. They are not represented in the future resurfacing programme as they were captured as a priority within the current programme.

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, 21.7% of the corridor achieves a score above which investigation is required. Sections with significant lengths of surface requiring inspection include: 1N/995 through Otaki, 56/0 through Opiki, 57/36 and 57/50 between Linton and Ashhurst. These sections also show a significant level of degradation in score over the last three years.

Surface age

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

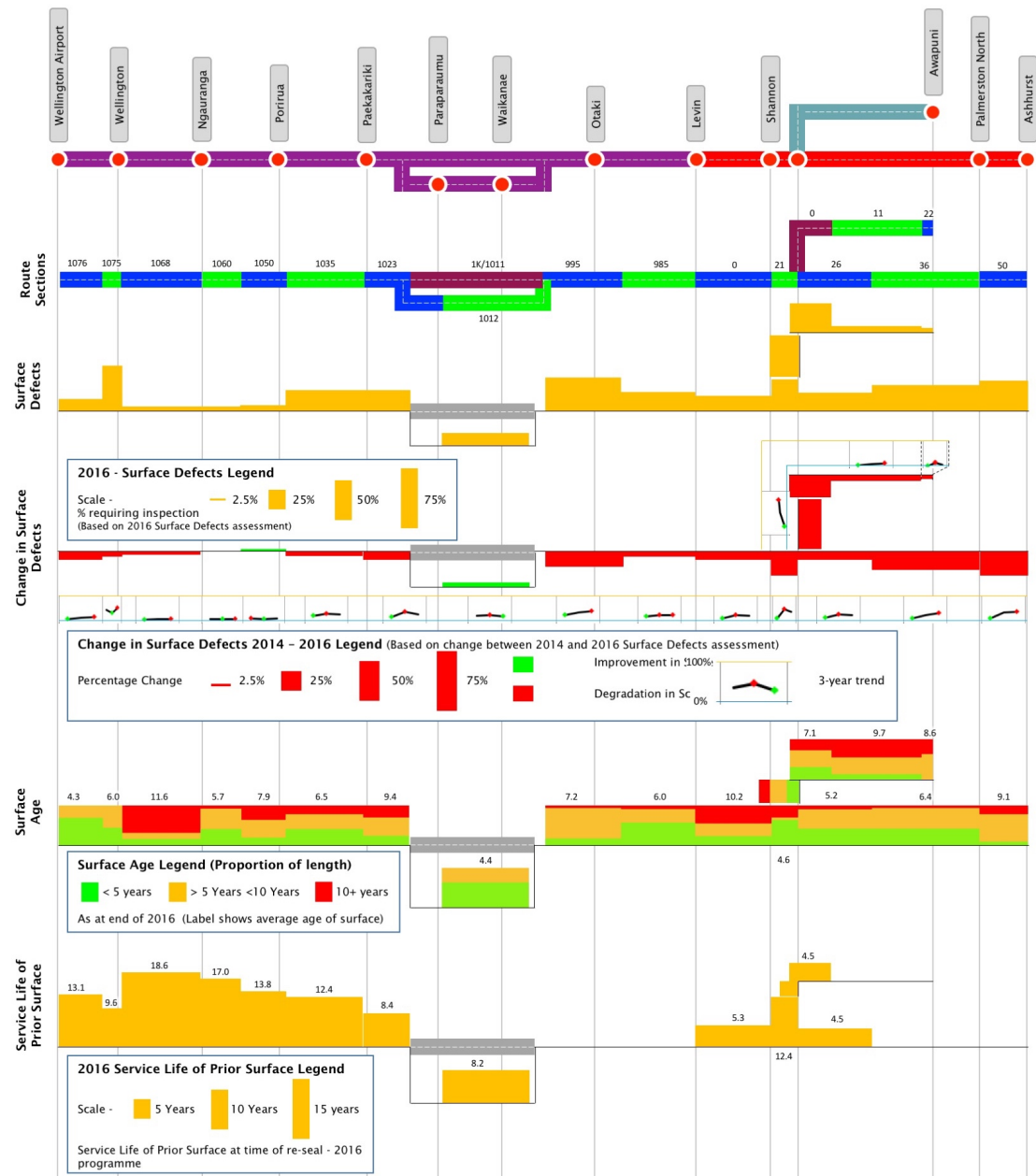
The base data is all the seal lengths and their age from RAMM. Then a weighted average is then calculated. Overall, all sections add up to 100%. The proportion is the length of corridor in a particular age band as a percentage of the total length of that section.

The sections of corridor with the oldest age profile are 57/0 between Levin and Shannon, and the Motorway between Wellington and Ngauranga.

Service life of prior surface

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

Figure 19 – Asset condition 2



Overall the re-surfaced sections achieved a service life of 11.1 years, with sections 1N/1035, 1N/1050, 1N/1060 and 1N/1068 between Paekakariki and Wellington, and, 1/1076 near Wellington Airport achieving an age in excess of 10 years.

Resurfacing

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

The major resurfacing works are planned for sections 1N/995 and 1N/1012 between north of Otaki and Paraparumu and then ownership of these sections will revert to Kapiti Coast District Council as completion of the Kapiti Expressway project. Rehabilitation works are also planned for SH56 through the Opiki Flood plain area, and at Awapuni SH56/11, the approach to Palmerston north City.

Proportion of travel on smooth roads

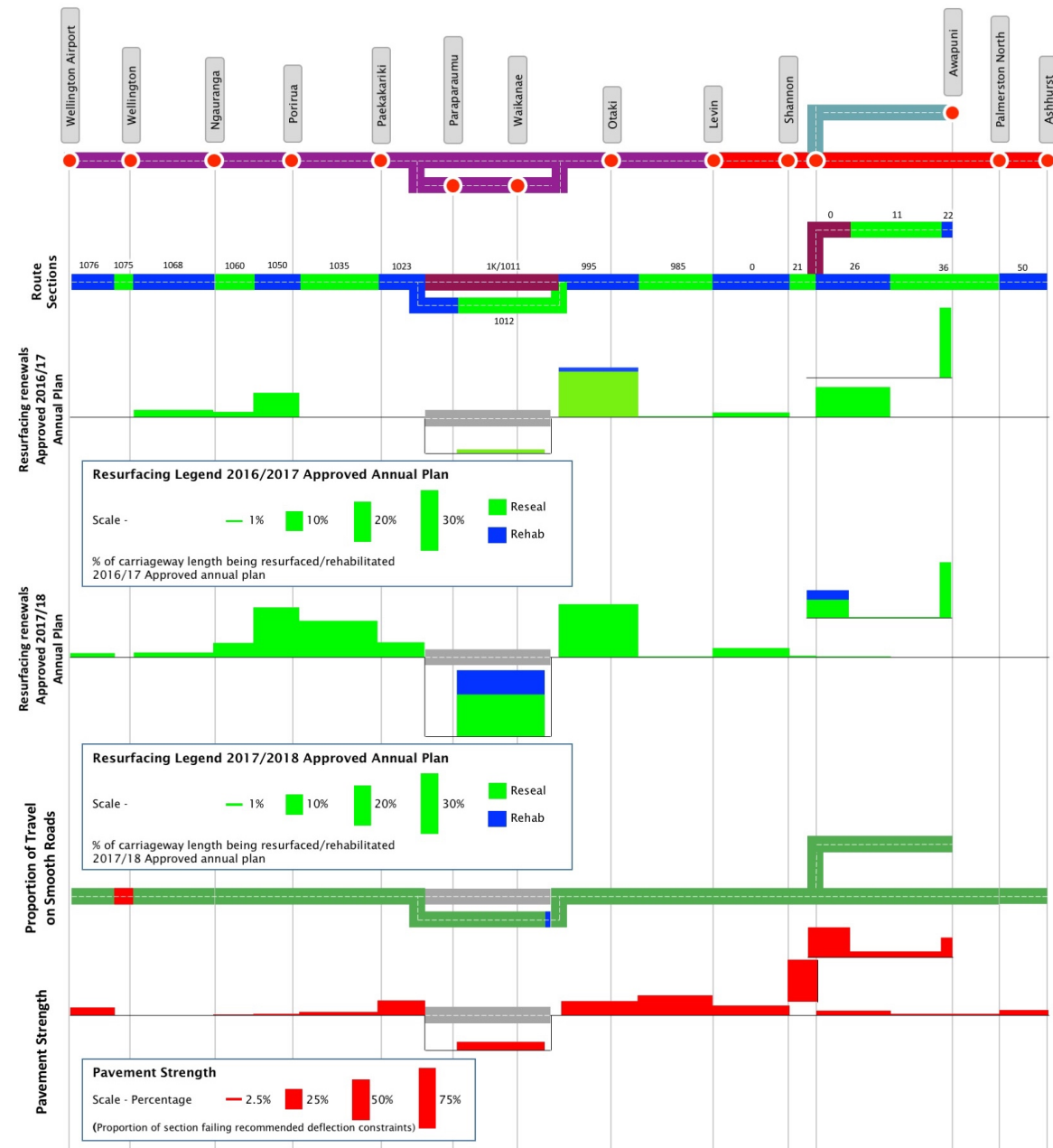
The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not.

Pavement strength

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

The sections of corridor with the highest proportion of pavement failing to meet the deflection constraints occur at SH56/0 between the SH57 junction and Opiki.

Figure 20 – Asset condition 3



Asset condition and performance pressures

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

- **Maintaining SH56 surface:** there are settlement issues along SH56, as is built over swamp. It is an ongoing challenge to maintain a reliable performance and structural integrity due to ongoing movement and roughness. Ongoing need to seek most effective management.
- **SH57 (north of SH56):** It is a challenge to maintain the SH57 (north of SH56) pavement under heavy loading because the current narrow form has limited edge support and there is a build-up of surfacing layers.
- **SH57, south of Shannon:** Safe Road projects have installed more guardrail on SH57. It has an additional ongoing maintenance cost, this creates a cost pressure i.e. cost per km to maintain corridor greater. Some improvements compromise ability to safely and cost effectively maintain the corridor and create concerns for utility operators about access. In the Manawatu-Whanganui area there are issues about maintaining behind and around guardrail installations.
- **Wellington segment:** The Wellington end of corridor is a dynamic and challenging environment. Responses are less about asset based solutions and more focussed on optimising and managing performance, particularly where sections are at or approaching capacity. It is a more dynamic traffic environment, whether in commuter peak, or recreational holiday periods. Priorities and pressures through these sections are response times, accurate and timely communication, real time information and the role of the Traffic Operations Centre.
- **Wellington Traffic Profile:** At Wellington end the traffic profile is changing (continuously), with further change anticipated. The traffic profile responds to changes on both this and adjacent corridors and in direct response to the performance of the public transport system. The Wellington end is an actively managed Corridor, particularly at Ngauranga Gorge where SH1 and SH2 meet.
- **Motorway Standard:** Much of the south end of the corridor is to motorway standard, including structures such as tunnels, gantries and ITS, which have higher maintenance and operating costs. In addition, some of these are in coastal and marine environments and subject to more rapid aging/deterioration due to the harsher conditions.
- **Surface skid resistance:** Surface skid resistance is an issue near Otaki as it was impacted by a large capital works programme and is now end of life - anticipating that works will be required in association with the tidy up of the capital works programmes and revocation details. Similarly affected are areas like Mana and Pukerua Bay where there are older pavements and surfacings.

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:

- **SH56** across the Opiki swamp is an ongoing challenge that requires future planning.
- **SH57 age profile** - performance issue looming with aged pavements that will soon require resolution.
- **SH57 north of SH56** - has a gap between ONRC and the existing levels of service and condition. There is no capital programme to enable improvement of form to meet ONRC classification of "National" or bring up to operating level that is now expected. Needs consideration about how to close this gap.
- **Route choice:** Need consideration about how current capital works will impact route choice particularly the journey from the East Coast to Wellington (via SH1 or SH2), once SH1 reliability and efficiency improvements take effect.
- **State Highway alignment and form around townships** - future options around Levin are yet to be finalised and will influence corridor treatment options and timing (Otaki to North Levin straddles two corridors - Wellington to Palmerston North and Levin to Auckland) and freight routes in and around Palmerston North City.
- **Management of end of life/intervention works in heavily populated and or trafficked areas** - such as delays/problems accessing corridor for works through Vivian Street because of continuous traffic flow and noise concerns from inner city residents. Likely to influence treatment choice and or cost.
- **LOS and demand can be compromised** in the build up to and during delivery of capital projects. Maintaining condition and performance can be problematic during these intense periods and needs further consideration. Travel times can be reduced by the need for additional traffic management or diversions and surfacing quality may be reduced.
- **Holding strategies** are required for routes linked to or supporting the capital programme - such as central Wellington where Inner-City Bypass options are unresolved; SH56 during O2NL development and implementation; SH57 in support of use of the Pahiatua Track when acting as Gorge Alternate and its future usage.

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 determine 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 & Operations	\$20,901	\$19,386	\$29,080
	Renewals	\$37,050	\$37,104	\$49,849
	Improvements	\$248,100	\$818,900	\$40,000
Reliability and Efficiency	Maintenance & Operations	\$11,369	\$11,985	\$17,890
	Renewals	\$1,194	\$1,085	\$1,943
	Improvements	\$556,520	\$1,478,690	\$1,439,516
Safety	Maintenance & Operations	\$15,951	\$14,741	\$22,205
	Renewals	\$6,285	\$5,044	\$7,576
	Improvements	\$31,076	\$0	\$0
People, places and Environment	Maintenance & Operations	\$5,546	\$5,716	\$8,587
	Renewals	\$288	\$216	\$324
	Improvements	\$0	\$0	\$0
Total		\$934,280	\$2,392,867	\$1,616,969

Figure 21 – Corridor investment

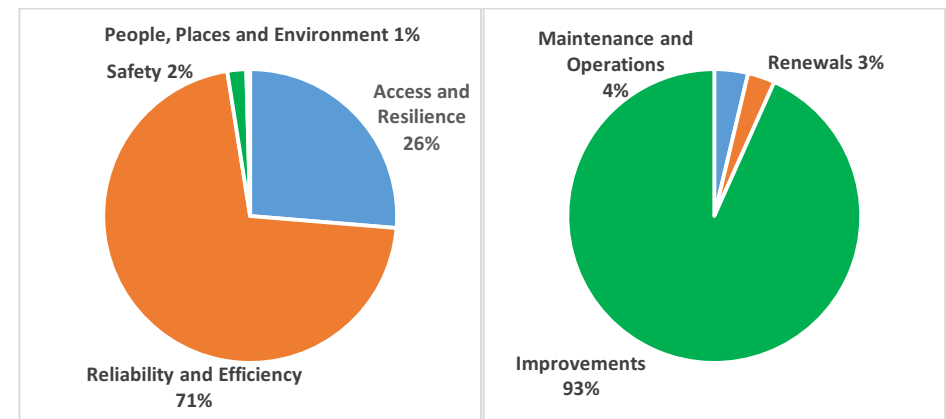


Table 2 - Summary investment by work category (\$000)

Outcome	Work Category	2018-2021	2021-2024	2024-2027
Access and Resilience	111 Sealed Pavement Maintenance	\$3,953	\$2,402	\$3,636
	112 Unsealed Roads	\$6	\$7	\$10
	113 Drainage Maintenance	\$766	\$813	\$1,230
	114 Structures Maintenance	\$6,128	\$6,315	\$9,413
	121 Environmental Maintenance	\$2,769	\$2,767	\$4,154
	122 Traffic Services Maintenance	\$133	\$214	\$321
	124 Cycle Path Maintenance	\$484	\$511	\$767
	151 Network & Asset Management	\$5,347	\$5,104	\$7,666
	161 Property	\$1,315	\$1,254	\$1,883
	211 Unsealed Road Metalling	\$18	\$18	\$27
	212 Sealed Road Resurfacing (excl. surface skid resistance)	\$20,449	\$17,903	\$23,258
	213 Drainage Renewals	\$1,322	\$314	\$471
	214 Pavement Rehabilitation	\$9,401	\$9,646	\$13,993
	215 Structures Component Replacements	\$5,773	\$9,094	\$11,906
	222 Traffic Services Renewals	\$86	\$128	\$193
	321 - 341 Improvements	\$248,100	\$818,900	\$40,000
	Reliability and Efficiency	121 Environmental Maintenance	\$1,817	\$1,905
123 Operational Traffic Management		\$7,280	\$7,841	\$11,751
151 Network & Asset Management		\$2,032	\$2,011	\$2,933
161 Property		\$241	\$228	\$342
221 Environmental Renewals		\$1,194	\$1,085	\$1,943
321 - 341 Improvements		\$556,520	\$1,478,690	\$1,439,516

Outcome	Work Category	2018-2021	2021-2024	2024-2027
Safety	111 Sealed Pavement Maintenance	\$4,116	\$2,527	\$3,824
	112 Unsealed Roads	\$5	\$5	\$8
	113 Drainage Maintenance	\$200	\$208	\$312
	114 Structures Maintenance	\$576	\$595	\$894
	121 Environmental Maintenance	\$413	\$496	\$745
	122 Traffic Services Maintenance	\$6,473	\$6,762	\$10,192
	124 Cycle Path Maintenance	\$0	\$0	\$0
	151 Network & Asset Management	\$3,606	\$3,599	\$5,405
	161 Property	\$562	\$549	\$825
	212 Surface Skid Resistance	\$2,078	\$2,254	\$3,385
	214 Pavement Rehabilitation	\$40	\$80	\$120
	215 Structures Component Replacements	\$405	\$442	\$663
	222 Traffic Services Renewals	\$3,762	\$2,269	\$3,408
	321 - 341 Improvements	\$31,076	\$0	\$0
	People, places and Environment	111 Sealed Pavement Maintenance	\$207	\$219
121 Environmental Maintenance		\$4,627	\$4,821	\$7,243
151 Network & Asset Management		\$571	\$543	\$815
161 Property		\$141	\$134	\$201
221 Environmental Renewals		\$288	\$216	\$324
	321 - 341 Improvements	\$0	\$0	\$0
	Total	\$934,280	\$2,392,867	\$1,616,969

To be confirmed through the RLTP

Investing in access and resilience

Operations and maintenance

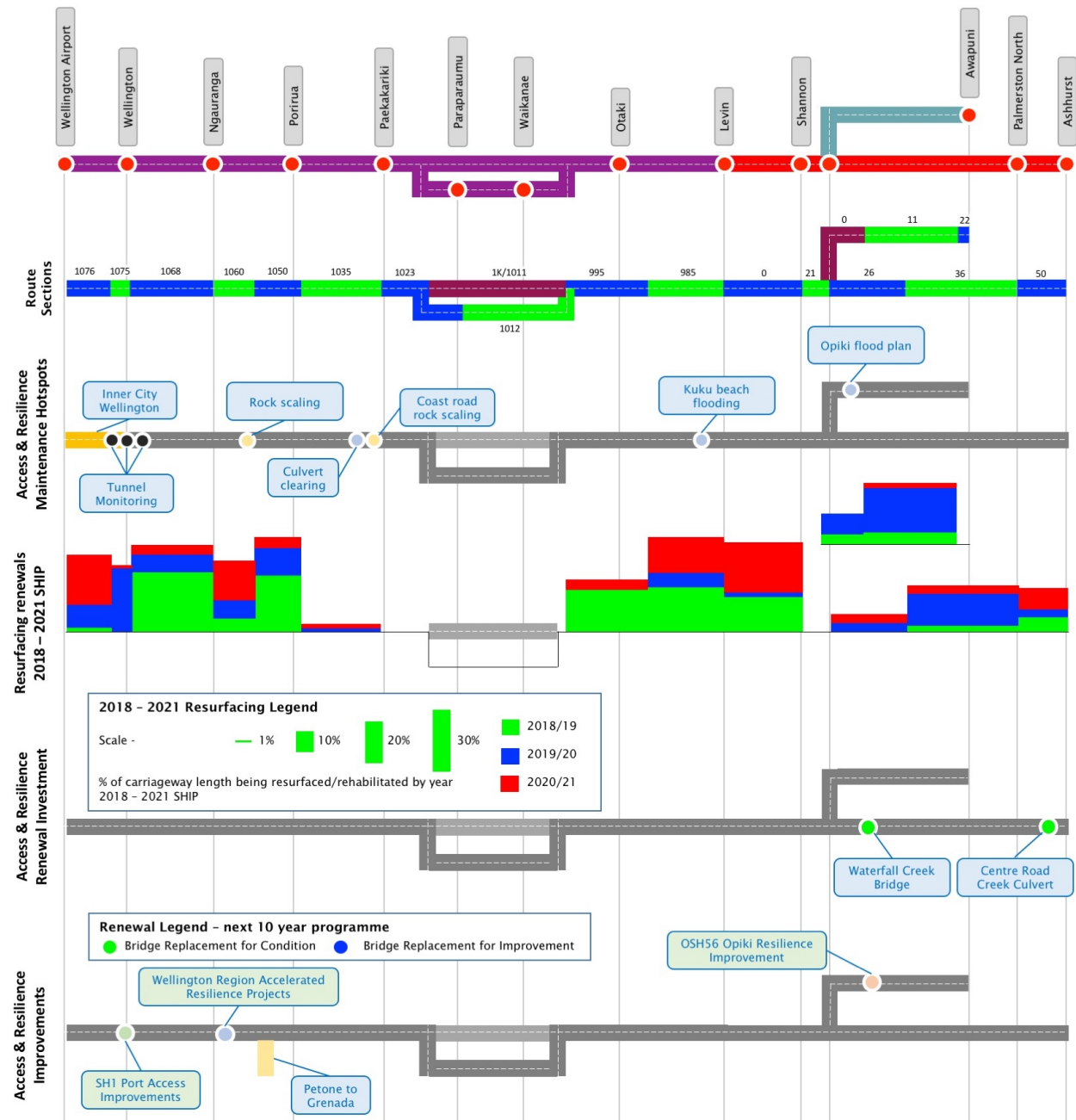
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing and structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement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

Maintenance hot spots

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

- **Wellington Tunnels:** –continuous observation by WTOC of tunnel management systems, be that the fire, deluge or ventilation systems or the over height detection mechanisms.
- **Wellington Inner City:** – focus is on minimal disruption to adjacent community and to through traffic often resulting in higher cost responses.
- **Ngauranga Gorge** - Cliff and retaining walls, exposed rock face areas requiring rock scaling.
- **Pukerua Bay through to Paekakariki:** – wire rope guardrail monitoring & maintenance, rock scaling and clearance of rail stormwater channels and flooding.
- **Kuku Beach Rd, Ohau:** – regular flooding, but solution constrained by private property drainage.
- **Opiki flood plain, SH56** – about three closures per annum (regional council decision).

Figure 22 – Access and resilience investment



Renewals

Resurfacing

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

Significant investment in resurfacing is planned for sections: 1N/985 south of Levin, 1N/1050 to 1N/1076 between Porirua and Wellington Airport, and 57/0 between Levin and Shannon.

Structure renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. Two bridges are planned for replacement due to asset condition, at a total estimated cost of \$0.75M.

Longburn Bridge - a new VDAM rule (effective 1 February 2017) increases legal vehicle weights, and effectively the class one criteria, beyond the capability of the Longburn Bridge. The bridge will need addition of a "Heavy Vehicle Bridge Limit" restriction and consideration of its future, as it is now below the "Class 1" criteria.

Improvements

Structure improvement

Five bridges are scheduled to be replaced for improvements reasons, at an estimated cost of \$6.9M.

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/SH1 – Petone to Grenada Link Road (P2G Link Road)

Description: Road Management Project, estimate \$250-270 million, new road linkage between SH1 Grenada/Tawa and SH2 Petone. Timeframe within ten years, but subject to outcomes of resilience programme business cases and NLTP funding allocations.

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
SH56 Opiki Resilience Improvements		Targeted resilience improvements at Opiki to reduce the flooding/storm risk.
Wellington Region Accelerated Resilience Projects		Resilience risks that were identified in the PBC and have accelerated investigation in order to meet WRRAG obligations. This includes SH58 Slop Stabilisation and SH1 Ngauranga Gorge. Smaller scale risks may also be accelerated pending investigation including southern rail overbridge and Shell Gully Overbridge.
SH1 Port Access Improvements		The Port Access identified freight priority measures including the potential for a freight bypass / HOV lane on the Aotea Quay onramp. In addition, ongoing planning with Centreport may identify further improvements.

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

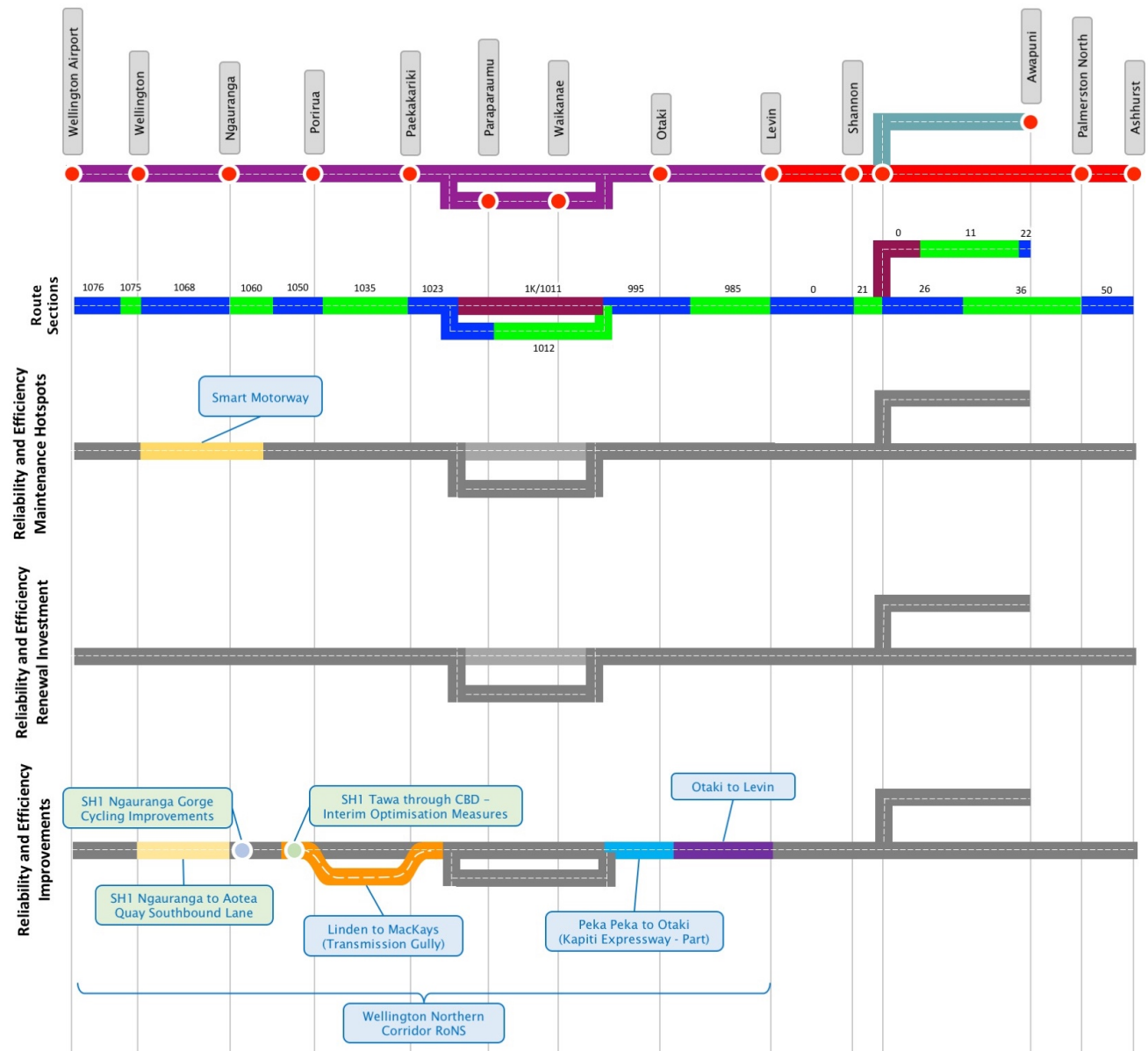
The following maintenance ‘hotspots’ require additional monitoring or cause an increased maintenance burden along the corridor:

- **Smart motorway** is actively managed, SH1 Johnsonville to Terrace Tunnel



SH1 between Johnsonville and the Terrace Tunnel in Wellington is NZ's first 'smart motorway'

Figure 23 – Reliability and efficiency investment



Renewals

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

Improvements

Planned

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

SH1 – Transmission Gully (TG)

Description: The project is to build a 27km four-lane (two in each direction) median-divided motorway from MacKay’s to Linden (through Transmission Gully), with interchanges connecting the route to MacKay’s, SH58, eastern Porirua and Kenepuru. Commenced September 2014 and scheduled for completion in 2020.

SH1 – Peka Peka to Otaki (PP2O)

Description: An expressway bypass of Otaki, and the provision of a high standard four-lane expressway through the area will increase the efficiency of freight and people movements between Wellington and the North. It will ease local trip congestion, and will assist in facilitating economic development in the area. Commenced July 2017 and scheduled for completion in 2020.

SH1 – Otaki to North of Levin (O2NL)

Description: The Otaki to North of Levin project aims to provide a modern state highway network that can accommodate expected future traffic volumes. We are taking a staged approach to this work, concentrating on safety and/or efficiency improvements as a first priority. Currently under consultation with a construction projected for 2021.

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
Palmerston North Integrated Transport Improvements		Placeholder activity for a suite of optimisation and minor improvement activities that will be informed by the NOF/NOP.
Region 8 Stock Effluent Disposal Facilities		Three sites have been recommended in the North Island Stock Effluent Strategy Study. Construction to be completed as individual projects.
SH1 Tawa through CBD – Interim Optimisation Measures		Interim measures to partially address a significant gap in mismatched demand and capacity and journey time reliability in a major urban area. Medium effectiveness reflects reduced benefits period as LGWM may provide a different long-term solution. The activities include optimisation of the signalised intersections through the inner city, off and on ramp merges, and other activities to improve traffic flow.
SH1 Ngauranga Gorge Cycling Improvements		Cycling in Wellington has become more accessible with more investment in cycling routes and innovations in electric bikes overcoming gradients. The Ngauranga Gorge is a key link for cyclists and in anticipation of improvements for these users should be developed.
SH1 Ngauranga to Aotea Quay – Southbound lane		Widening of the southbound carriageway between Ngauranga and the Aotea Quay off ramp, with associated reclamation and seawall reconstruction.

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:

- **SH56 through Opiki** – requires ongoing attention to roughness due to movement of underlying swampy ground.
- **Slip faces** from time to time require proactive removal of loose material and rockfall fence maintenance, such as along the Coastal Centennial highway and through Ngauranga Gorge.
- **Side drains** – There are issues with side drains creating dangerous roadsides along SH57

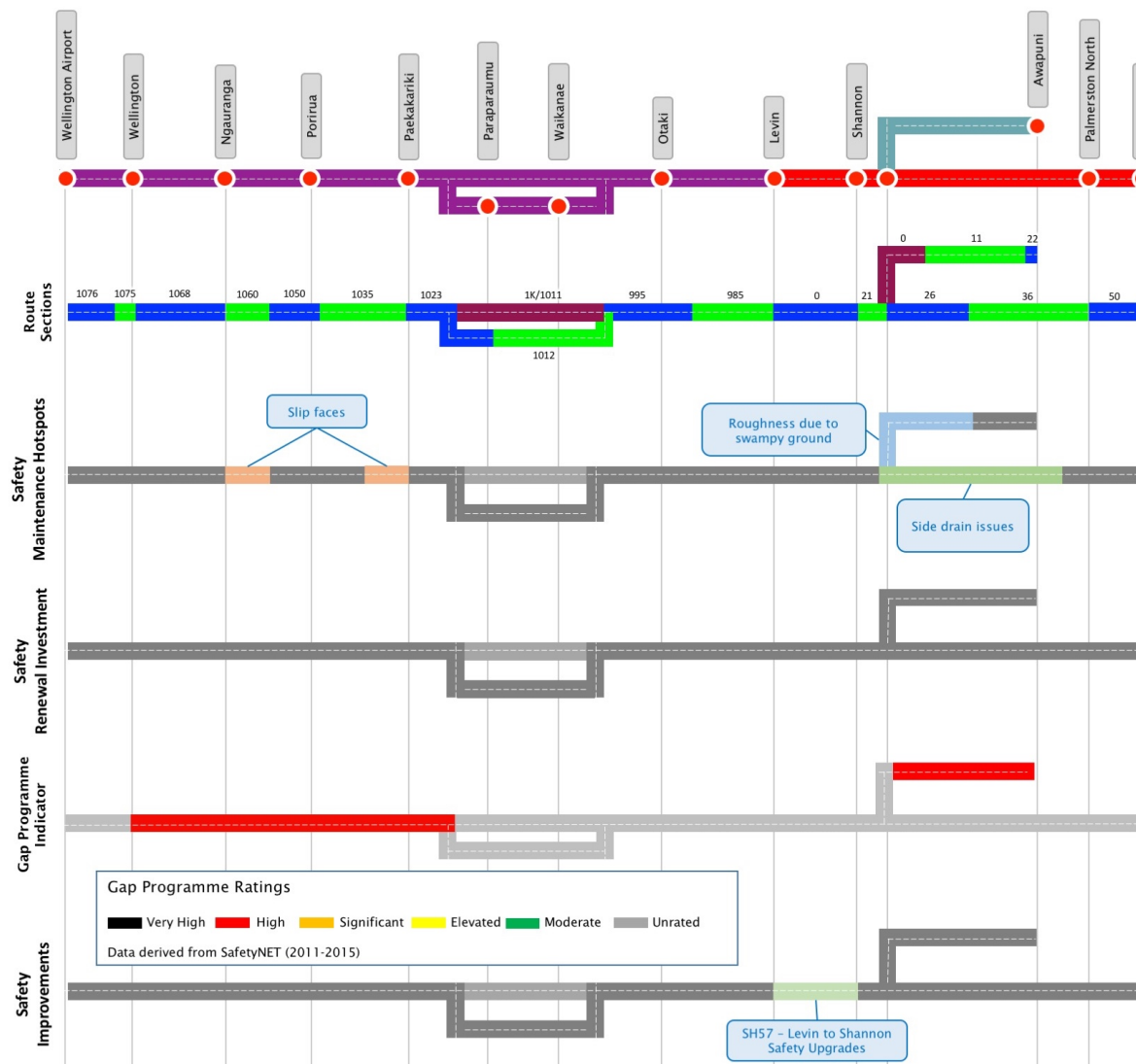
Gap programme indicators

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.

Between Wellington and the Paraparaumu turnoff and SH56 to Awapuni, there is a high potential to reduce fatal and serious injuries with the application of targeted medium-high cost improvements.

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

Figure 24 – Safety investment



Renewals

There are no safety related renewals planned for the corridor.



The Ōtaki to north of Levin section of the corridor will provide a modern and safe state highway network that can accommodate future traffic volumes and enhance inter-regional and national economic growth and productivity

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/>

SH57 – Levin to Shannon

Description: This project will improve road and roadside safety on State Highway 57 between State Highway 1 and Shannon. Improved safety features will include safety barriers, rumble strips, wider centre lines and wider shoulders.

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

Investing in people, places and environment

Operations and maintenance

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

Maintenance hot spots

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

- **Mana residential area** – heightened sensitivity of residents through this area to disruption from the highway.
- **Otaki** – outlet demand/strip shopping. Adjust traffic control during holidays because of changing beach demand.

Renewals

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

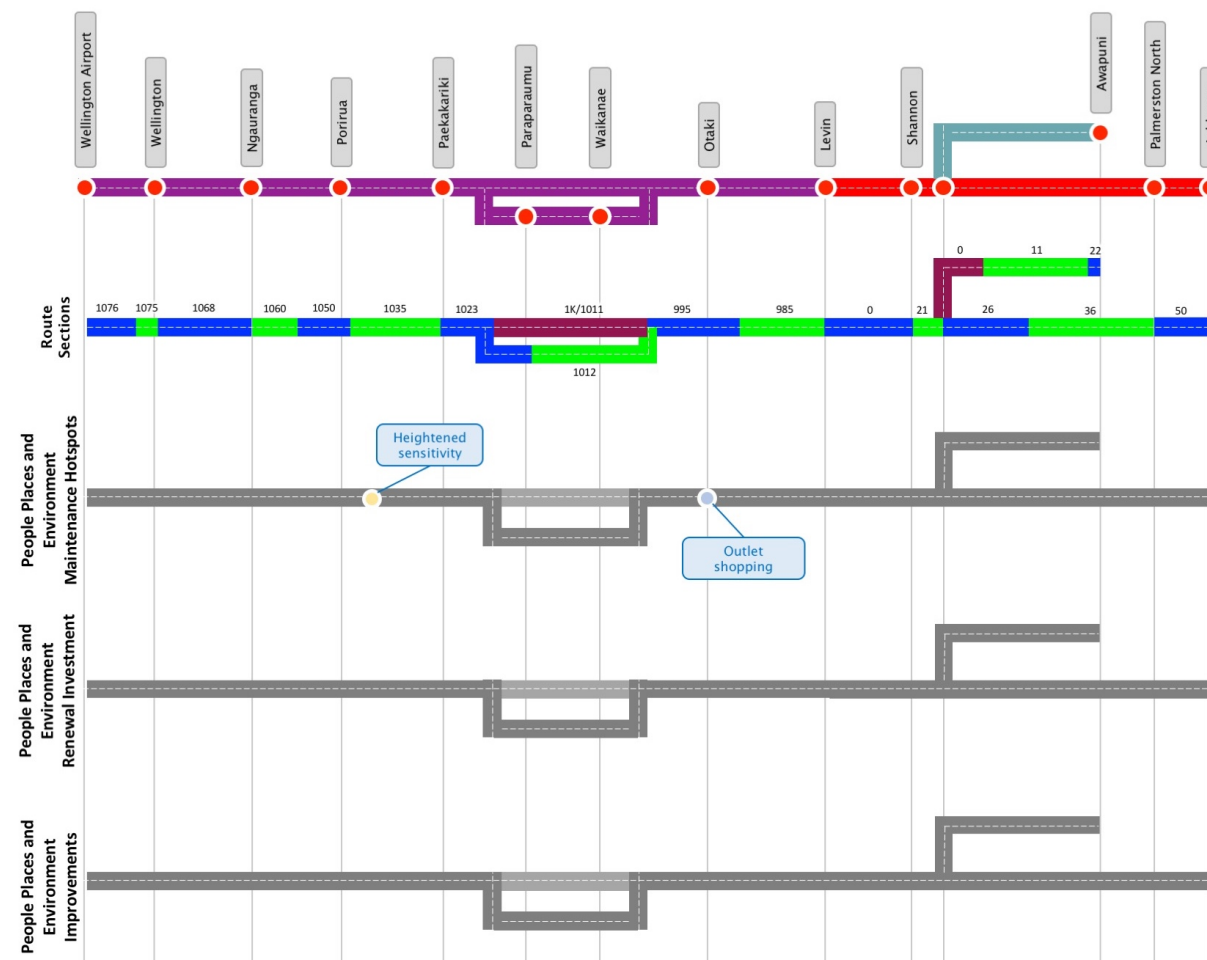
Improvements

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



Fish capture and relocation as part of Muaupoko Stream Diversion.

Figure 25 – 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.

- **Resilience** is a high-risk issue for the Wellington end of this corridor. Operations & Maintenance focus is on proactive action; rapid response and reinstatement of service; and accurate advice and guidance to corridor users.
- **Incidents and activities on adjacent corridors** require consideration, such as closures of SH3 Manawatu Gorge, or SH2 Rimutaka Hill or disruptions to commuter rail servicing Wellington. Requires close ties between the Wellington Transport Operations Centre WTOC and the contractor.
- **Resilience at the Manawatu end of corridor** is mitigated to some extent by availability of alternative routes, although HPMV options may be limited. Further south, pinch points such as Pukerua Bay and Ngauranga Gorge, currently have no viable alternatives.
- **Through the Wellington Inner City**, the state highway needs compete with local needs for pedestrians, parking and property access and can increase and complicate operating costs and effectiveness.
- **Tunnel management systems and ITS obsolescence** are of increasing cost and importance on the congested parts of this corridor.
- **Increased operating costs of basic maintenance works** – temporary traffic management for protection of those engaged on the highway as well as the road users or passing public.



Peka Peka to Ōtaki Expressway

Reliability and efficiency

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

- **SH57 northern end:** The region is not currently focussed on the portion of SH57 north from SH56 towards the Manawatu Gorge and Hawkes Bay (an ONRC national level route). It is readily noticeable to a traveller that the level of service is lower. Maintenance and operations responses are constrained by the current narrow and outmoded formation. Future form changes could be achieved in coordination with any rehabilitation works if they are economically justified.
- **SH56 through and about Opiki**, traverses a swampy area that provides an uncomfortable ride and is a challenge to maintain as it easily loses its shape and is continuously moving.
- **Social media services** are an important part of communicating with the travelling public and businesses about progress on this corridor – facebook and websites, twitter, radio, public notifications and information updates. Much of the more immediate notification is managed through WTOC.
- **Night works:** South of Levin through to Wellington airport, all planned maintenance must be performed as night works, to minimise disruption.
- **Active management** includes planned closures and supporting temporary traffic management (closure) of passing lane areas along SH1 north of Wellington during holiday and peak activity weekends. (Easter, Wellington Anniversary weekend, Labour weekend, Christmas)
- **Known hazard sites** along the corridor are identified, prioritised and then continuously monitored through the WTOC and contractor co-operation and co-ordination.
- **Wellington Tunnels** – Victoria and Terrace Tunnels are subject to regular overnight closures to enable basic maintenance safely and effectively.

Safety

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

- **Major works:** Along this corridor significant safety improvements may be delayed and delivered through alignment with major capital works programmes, such as those designed to provide additional capacity or congestion relief. A safety audit of Wellington to Levin produced a big list of jobs relating to maintenance programme (getting it right) and identified interim treatments for sites likely to be influenced by the proposed Otaki to Levin improvement (5-10yr timeframe), including guardrail and signage.
- **High Risk Intersections** – three of NZ top 100 worst safety intersections (2014)
 - #32 – SH1 (Karo Drive) and Victoria Street, influenced by the alignment decision of O2NL
 - #39 – SH1/SH57 (Kimberley Road) Intersection “is seen as nationally poor” intersection and future configuration is likely to be influenced by the O2NL capital project proposed for construction in 2021.
 - #75 – SH57 (Arapaepae Road)/Queen Street intersection, possibly also influenced by the alignment decision of O2NL.

Palmerston North City Council is concerned about: rural local road and SH56 intersections with Shirriffs Road, and with No.1 Line Tiakitahuna (Rocket corner); SH57 interaction with Turitea and Massey campus, and speeds through Longburn.

People, places and environment

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

- **Environmental impact:** The corridor has an influence on people places and environments such as the Ara Harakeke wetlands, the Wellington inner city or rural strip shopping such as at Shannon or through Otaki. Maintenance management plans generally outline how these matters should be managed. Issues that require particular care include:
 - Aokautere – have had noise complaints in this area.
 - Wellington Inner City Apartment residents - night works limit but has implications in choice of treatment. A key consideration is timing and type of work, because noise may travel well beyond the work site.
 - Air Quality – more of a concern within around the Wellington tunnels, which are monitored through the WTOC of tunnels management systems (ventilation).

- Water Quality – especially Taupo Swamp/Ara Harakeke area and general consent provisions around the recent capital works at McKays to Pekapeka and the Kapiti Expressway.
- Reverse sensitivity – housing in Grenada North and potentially Aokautere, where land use changes occur or a new effect arises with installation of new infrastructure. Watch the changing demand patterns.
- Integration with other transport modes such as public transport, bus and rail systems, including parking and pedestrian provisions.
- **Rest Areas** – have limited amenities but are prone to excessive rubbish dumping.
- **Wellington Smart Motorway** – noise sensitivity of houses above motorway means that treatments that selected for speed of implementation and to minimise disruption. Communication with local residents is also essential.
- **Separation of and facilities for pedestrians, cyclists and mixed ability users** of the corridor, such as pedestrian crossings, pedestrian refuges, underpasses and overbridges and separate cycle paths.



Ecologists relocating fish from the Te Puka Stream

Investment future considerations

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

- **Opportunities for co-operation between WCC and NZTA for operations.** Areas to consider are operation and planning of traffic signals; planning, maintenance and co-ordination of all works (including third parties), such as with temporary Tunnel closures.
- **Intersection of SH56 and No.1 Line Tiakitahuna** (referred to as Rocket Corner) – trucks divert to local road to access Tremaine Ave via narrow rural road network. The intersection is not functioning as expected or in accord with current usage and there are implications for other parts of the transport network/region.
- **SH57 classification:** How to address the gap between existing provision and ONRC classification of SH57, particularly north of SH56.
- **Uncertainty about ongoing maintenance costs** of capital works coming online and implications for management of parallel or superseded portions of the corridor.
- **Investigation of inner city options for improved connectivity to Wellington International Airport** remain unresolved. The area is increasingly congested but has only limited “eyes-on” opportunities to enable more effective management and real-time advice.
- **Alignment constrains:** Some safety solutions proposed for the Wellington Northern Corridor are constrained by limitations of the current alignment such as the presence of deep side drains and absence of structural shoulder through parts of SH56 and SH57. Resolution of these areas is likely to be beyond the maintenance programme, although guardrail and barrier solutions would be suitable safety improvements for these primarily 2-star corridor segments.
- **Traffic management and signals co-ordination** – WTOC have own operators and can alter timings and warnings of outages on SH, but not on local roads. There is an opportunity to better manage “unplanned” events if better integration between the highway and local roads, of either practices, systems or people.
- **Land use growth and state highway impacts need further consideration** - Kimberley hospital land at Levin (SH57) is now zoned for residential expansion; Massey university accesses and residential expansion in Turitea are under consideration for east of Palmerston North in Aokautere (SH57). Second/Another Bridge Crossing options in Palmerston North will impact commercial and private journeys connecting with this corridor.



Engaging with the community early ensures all the information is available



Peka Peka to Otaki expressway

Appendix A – Information sources

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

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

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

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

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



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