Te Kuiti to Whanganui

CORRIDOR MANAGEMENT PLAN

4

2018-2028

NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

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Executive summary

The Te Kuiti to Whanganui corridor comprises SH4 from 8 Mile Junction near Te Kuiti to Whanganui. The section of SH4 between National Park and Tohanga junction forms part of the Auckland to Levin corridor and so is excluded from consideration in this Corridor Management Plan. The North Island Main Trunk and Marton - New Plymouth rail lines provide alternatives to road travel for freight.

The corridor is approximately 210km long (1.8% of the state highway network). The total value of assets along the corridor is $297M (1.3% of the total national asset value).

The corridor provides resilience to, and secondary routes for, the main north-south SH1 and SH3 corridors through the Waikato, Ruapehu, and Whanganui Districts. Whilst other corridors provide the primary linkages between Taranaki, the Waikato, and Whanganui-Manawatu, this corridor provides important secondary linkages adding resilience. It also provides connection to the Tongariro National Park.

The corridor is a significant enabler of the economy in the area, particularly of forestry and tourism. The main customers of the corridor are freight operators, particularly in the northern section of corridor, local journeys, and seasonally, recreational users accessing the natural amenities of the central plateau, for skiing in winter, and hiking in summer.

Key tourist attractions in the Tongariro National Park include the Tongariro Alpine Crossing which forms part of the Tongariro Northern Circuit, one of New Zealand's nine Great Walks. The Whakapapa ski field contributes an estimated $15m to the local economy annually. The ski field creates a short but intense demand on the corridor during the ski season along SH4 from 8 Mile Junction (Te Kuiti)

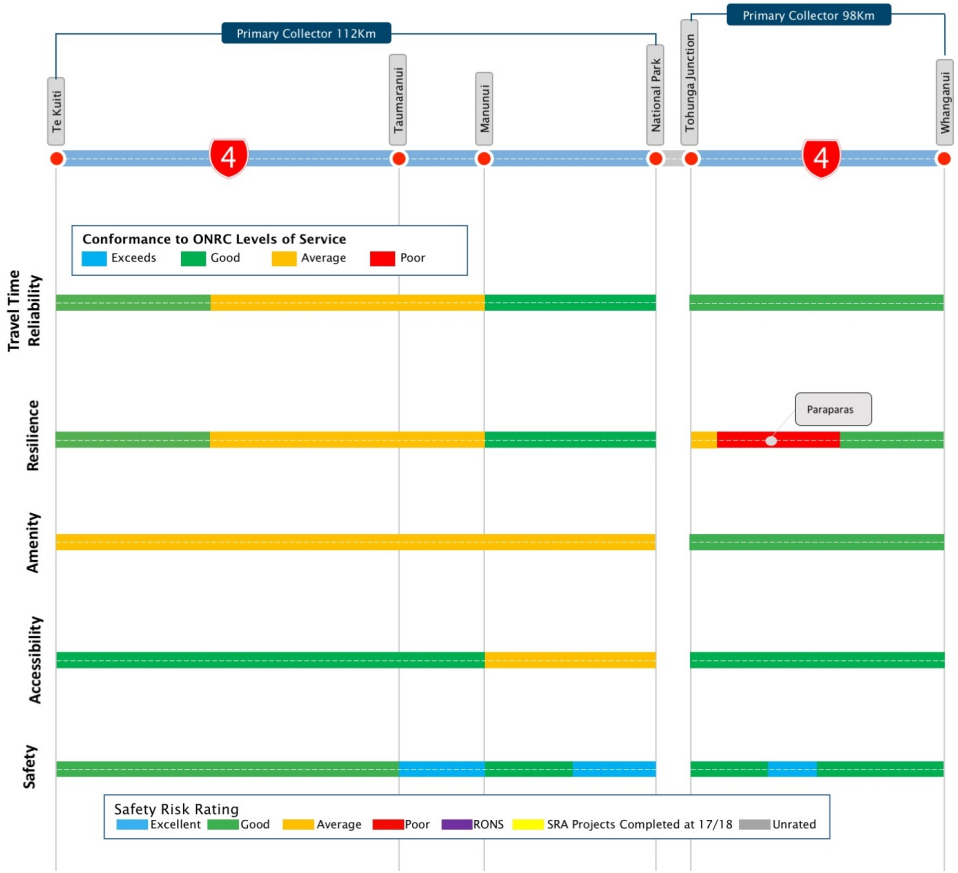
Safety and resilience are the two biggest concerns on this corridor. The rate of deaths and serious injuries occurring on the corridor is high given the low traffic volume. This corridor is also vulnerable to closure from crashes and environmental factors which can have a negative impact on the regional and national economy.

High numbers of death and serious injuries are occurring on the corridor due to the road width and layout. The current layout struggles to support safe movement of customers, including cycling, private cars through to large HPMV trucks. Frequent rock falls and slips combined with snow events in winter mean customer movements are frequently restricted on the corridor.

Lack of real time information limits the ability for customers to make informed decisions on travel along the corridor and inhibits planning efficient journeys.

The change of adjacent land use from forestry to more intensive dairying will continue to increase the maintenance pressure on the corridor, as will increasing tourism demand.

Figure 1 - Performance of the corridor against ONRC outcomes



Priority for investment on the corridor are ensuring the availability of the route as an alternative to the other higher classification highways through the central North Island. This means making sure the corridor supports a safe and efficient journey, through targeted safety improvements, improved real-time information, and enhanced amenity.

Introduction

Purpose

What is the corridor management plan?

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

The corridor management plan considers a combination of:

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

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

Why is it needed?

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

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

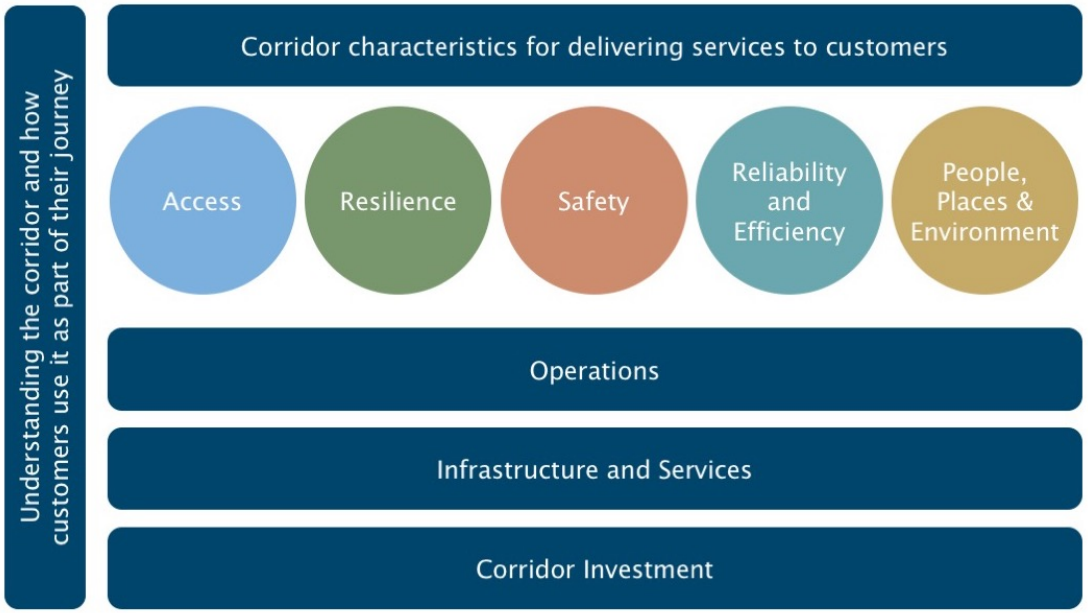
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on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

How will we use it?

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

In conjunction with the long-term view, the corridor management plan will provide for engagement with key stakeholders and partners to shape the future of the corridor. It responds to the needs of the users of the corridor to shape the future service levels.

Figure 2 - Corridor management plan framework



The corridor at a glance

Corridor overview

The Te Kuiti to Whanganui corridor comprises SH4 from 8 Mile Junction near Te Kuiti to Whanganui. The section of SH4 between National Park and Tohanga junction forms part of the Auckland to Levin corridor and so is excluded from consideration in this Corridor Management Plan. The North Island Main Trunk and Marton - New Plymouth rail lines provide alternatives to road travel for freight.

The Te Kuiti to Whanganui corridor provides resilience to, and secondary routes for, the main north-south SH1 and SH3 corridors through the Waikato, Ruapehu, and Whanganui Districts. It also provides connection to the Tongariro National Park.

The corridor is a significant enabler of the economy in the area, particularly of forestry and tourism.

The regional economy

The Manawatu-Wanganui Region is a predominantly rural region with a few main centres of population with around 5% of New Zealand's population (222,672 people in 2013), generating 4% of national GDP and 4.9% of national employment. Agriculture, forestry and fishing are important industries to the region, making a significant contribution to the regional economy. The Tongariro and Whanganui National Parks are significant attractors of international tourists to the region.

The Waikato Region is home to almost 10% of New Zealand's population. The region has considerable economic diversity generating 9% of New Zealand's GDP. The Waikato region is one of the most productive agricultural regions in New Zealand. Dairy plays a prominent role, with 25% of New Zealand's milk supply originating in the region. Dairy contributes 5.1% of Waikato's total employment (compared to the national average of 1.7%), however in some districts the dairy industry provides up to 15% of employment. Forestry, aggregates and minerals play an important role for the regional economy

Figure 3 – Corridor overview

Understanding our customers

Key customers

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

Daily commuter

The corridor provides a commuter route during weekday peaks into Whanganui (SH4).

Insights into daily commuter users:

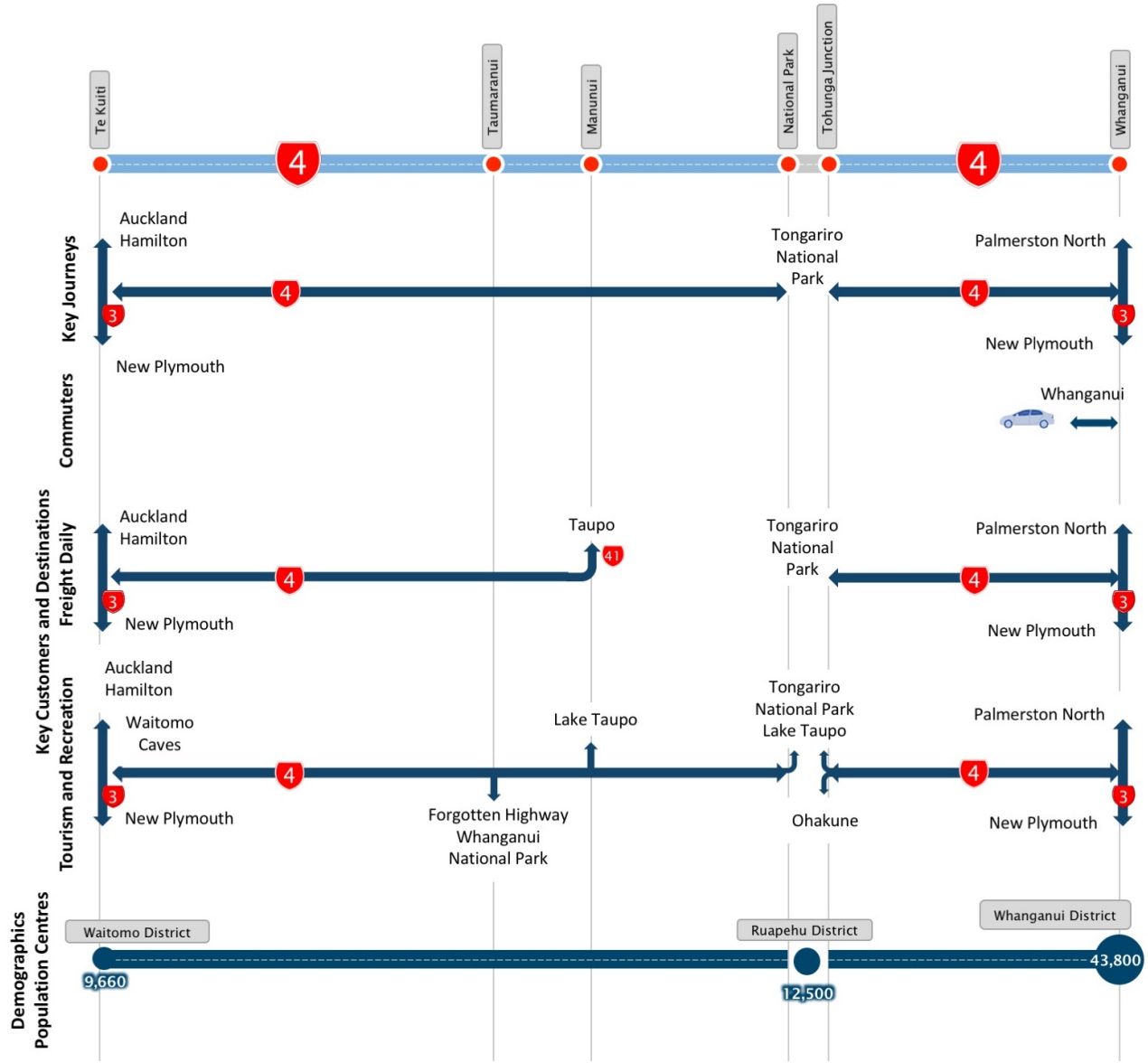
Road use: The predominant mode is private vehicle.

Road knowledge: Commuters are familiar with the route and the viable alternatives to avoid congestion when required. Journey times for daily commuters on the corridor are relatively predictable considering time and day of week.

Pain points: The urban areas of Whanganui face (to some extent) access and efficiency issues arising from urban (residential and commercial) growth, as well as intersections and accesses along the corridor.

Daily commuters expect: A predicable journey time, ease of access on and off the corridor, up to date information about traffic road conditions and activities which may impact their commute.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

The corridor provides access to several key attractions in the Tongariro and Whanganui area, including the Tongariro National Park and Whanganui National Park.

Key tourist attractions in the Tongariro National Park include the Tongariro Alpine Crossing which forms part of the Tongariro Northern Circuit, one of New Zealand's nine Great Walks. The Whakapapa ski field contributes an estimated $15m to the local economy annually. The ski field creates a short but intense demand on the corridor during the ski season along SH4 from 8 Mile Junction (Te Kuiti). Ruapehu offers two of New Zealand Cycleways Great Rides and many other scenic trails drawing local and international tourists.

Key tourist attractions in the Whanganui area include the Whanganui River Journey (another Great Walk) and the Bridge to Nowhere Walk.

Insights into tourist and recreational users are as follows:

Road use: Travel is made by mixed mode including passenger vehicle, campervan, and bus. Journeys start from all over the North Island.

Road knowledge: Many international visitors unfamiliar with rural driving have limited experience of New Zealand roads and conditions and tend to be focused on the landscape and 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 environment changes and the road narrows, becomes rolling and/or winding. Domestic recreational users are more familiar with the road and anticipated journey times.

Pain points: Narrow, rolling, and windy sections of road, high speed priority intersections and general lack of passing lanes can cause issues for tourists unfamiliar with the corridor, exacerbating problems around efficiency and safety.

Tourist and recreational users expect: Ease of getting around the country, including the use of alternative travel modes, reliability of routes and predictable destination arrival, scenic route with good directional signage, good road surface and plenty of places to pull over safety for refreshments and toilet breaks and take photographs

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Freight operator

Freight movements include general freight supplying the local districts, along with forestry to the Kinleith Mill, Karioi Forest Pulp Mill, Tangiwai Saw Mill and the Port of Tauranga. Timber is cut from forests to the west and south of Lake Taupo and taken East.

Freight can use SH4 as an alternative to SH1 from time to time, when SH1 is closed for extended periods of time (generally weather related).

Insights into freight operators are as follows:

Road use: Logs and general freight is moved by heavy vehicles along the corridor which provides the most direct and efficient route for the freight journey. Milk is transported in truck and trailer tankers. General freight is moved in a range of heavy vehicles from B-trains through to fixed unit trucks.

Road knowledge: Knowledge of the corridor is extremely high among most truck drivers, verging on technical. This includes road alignment and cross-section, appropriate route choice, and journey time expectations and the best places to stop for refreshments and conveniences.

Pain points: The corridor includes rolling and winding sections slowing truck speeds. Alternative heavy transport routes are available for most of the corridor but do have an adverse effect on delivery times and therefore on business.

Freight operators expect: Infrastructure that supports commercial activity. This includes alternative routes that cater for freight trucks safety and consistently with consistent width and visibility convenient places for 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 business operating efficiently.

How we deliver services along the corridor

Transport partners

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

Figure 5 - Map of associated local authorities

Network Outcomes Contracts approach

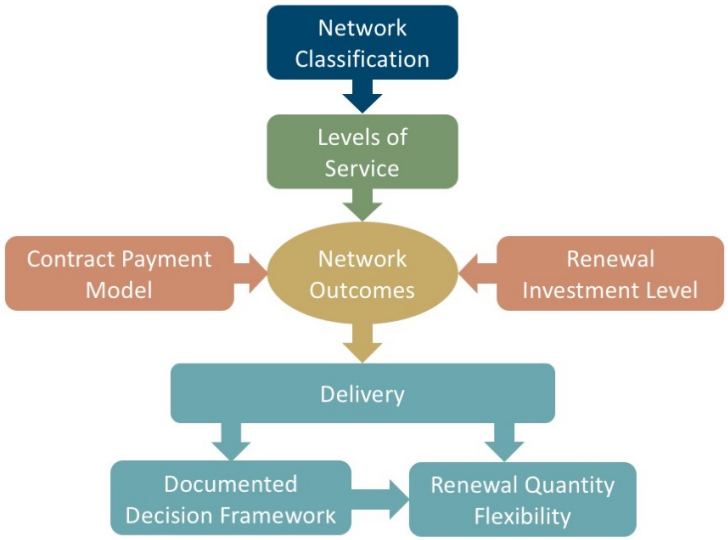
The Network Outcome Contracts (NOC) are aimed at improving the effectiveness of service delivery for maintenance and operations of the state highway network. Elements of previous procurement methodologies (PSMC, Hybrid and Traditional models) have been integrated into the NOC contract model that delivers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

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

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

The contract process for the NOC is shown below:

Figure 6 - NOC process



Collaborative delivery of services

The Te Kuiti to Whanganui corridor crosses over four NOC contract areas as discussed below. The Central Waikato NOC includes SH4 between Manunui and National Park. The West Waikato South NOC includes the north end of SH4. The Taranaki NOC includes SH4 between the Waikato Region and Manunui. The Manawatu Whanganui NOC includes the southern part of SH4.

Central Waikato Network Outcomes Contract

The Central Waikato NOC is undertaken by Downer NZ Limited commencing on November 2014 for a seven-year period, with the option based on performance for a further two years. This contract is supported by the following specialist maintenance contracts:

- **Regional Bridge and Structures** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca in October 2015 with a contract term of three years, plus two additional years based on performance.
- **Traffic Monitoring Sites** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca in October 2016 with a contract term of two years with the option based on performance for a further three years.

West Waikato South Network Outcomes Contract (PSMC007)

The West Waikato South NOC is undertaken by Fulton Hogan. The contract was converted from PSMC007 to a NOC on 1 July 2015 for a two-year period with the option based on performance for a further three years. It is supported by the following specialist maintenance contracts:

- **Regional Bridge and Structures** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca in October 2015 with a contract term of three years, plus two additional years based on performance.
- **Traffic Monitoring Sites** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca in October 2016 with a contract term of two years with the option based on performance for a further three years.

Taranaki Network Outcomes Contract (TNOC 14)

The Taranaki NOC is undertaken by Downer NZ Limited. The contract commenced on 1 July 2014 for a term of five years, plus additional one year based on performance. The contract covers road maintenance of over 527km. This contract is supported by the following specialist maintenance contracts:

Manawatu-Whanganui Network Outcomes Contract (MWNOC15)

The Manawatu-Whanganui NOC is delivered by Higgins (contractor) in partnership with Beca (professional service consultant). The contract commenced July 2015 for a five-year period with the option to extend for two years based on performance.

The NOC's are supported by the following specialist maintenance contracts and supply arrangements:

- **Traffic counting contract –** Currently there are separate traffic monitoring contracts for the Manawatu/Whanganui/Taranaki and Gisborne/Hawke's Bay regions that expire in mid-2017. A new contract combining these regions with Wellington will be tendered in 2017 and include traffic counting, installing new count sites, repairs, maintenance and upgrades of assets and carrying out special counts or speed surveys.
- **Manawatu/Whanganui/Taranaki regional bridge and structures [PSWT 25] -** Undertaken by Opus since December 2014, this contract runs to June 2017 with the option to extend for two years (3+1+1). This contract is managed by the NZ Transport Agency Palmerston North Regional Office and includes all bridge and structure inspections and engineering and HPMV permitting.
- **ITS and traffic signals –** Excluded from the NOCs, ITS and traffic signals are managed by staff at the NZTA Wellington Regional Office and supported by local authorities.
- **Urban street cleaning, lighting and catchpit cleaning –** Excluded from the NOCs, the NZ Transport Agency has a 'Memorandum of Understanding' with Local Authorities for management of street cleaning, lighting and catchpit cleaning in urban areas.

Slip north of Fields Track at the Hapokopoko Bluffs, dumped approximately 500m3 of material onto the road.

Drivers for change

The Te Kuiti to Whanganui corridor caters for variable levels and types of customers and this demand is expected to increase commensurate to variable growth. Some sections will remain static or experience declining demand. The drivers for change associated with the corridor are briefly described below.

Regional growth and development

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 population in 2016 was estimated at 236,900 but is currently understood to be in decline.

Growth studies such as the Manawatu-Whanganui Economic Action Plan (August 2016) identified several advantages the region can build on, centring on the Region's highly productive agricultural industries, particularly high-country beef and lamb, and expansion of fresh vegetable production for export. These drivers for growth are common to the northern area of the corridor, the Ruapehu and Otorohonga Districts, as well as the Taranaki Region.

Agricultural has experience strong growth, with the intensification of land use seen as desirable by many farmers. Intensification is supported by the District Plans and will leverage land usage with an increase in vehicle movements and an increase in maintenance expenditure. There is a desire to diversify into other types of agriculture including poultry and Manuka honey production. This is likely to result in traffic growth in general and a change in the number and type of vehicle movements.

Forestry is a strong driver of economic growth at the northern extent of the corridor but traffic is not expected to change significantly. However exotic forests have been increasingly developed in both Taranaki and Whanganui. A modest tonnage of logs is exported out of Port Taranaki which will increase over the next 10 to 20 years.

The Whakapapa Ski Field and Tongariro National Park is access by SH48 via SH4. As tourism grows, vehicle volumes will increase. The operator of the ski field is looking to increase the number of days per year of operation but is not looking to increase the capacity of the field in recognition of the environmental impacts of any daily increase in skiers.

Within the Manawatu-Whanganui Economic Action Plan (Aug 2016) several emerging opportunities have been identified, including:

- Scalability of operations. The region needs the capacity to expedite road infrastructure investment decision-making when the contributions to the economy justify this. This includes the potential to take advantage of the interest in 'rail tourism' to convey an increased number of tourists to the Tongariro Whanganui area. This may reduce road trips to the region.

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 long. While there are critical transport links between the upper and lower North Island areas (particularly for freight), traffic volumes reduce over the Volcanic Plateau.

As volumes increase on the SH1corridor, traffic may divert onto SH4. Currently, some transport operators are noted as using this route for small to medium sized loads.

SH4 provides an alternative north-south route when SH1 is impassable.

Understanding customer levels of service on the corridor

Current levels of service performance

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

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

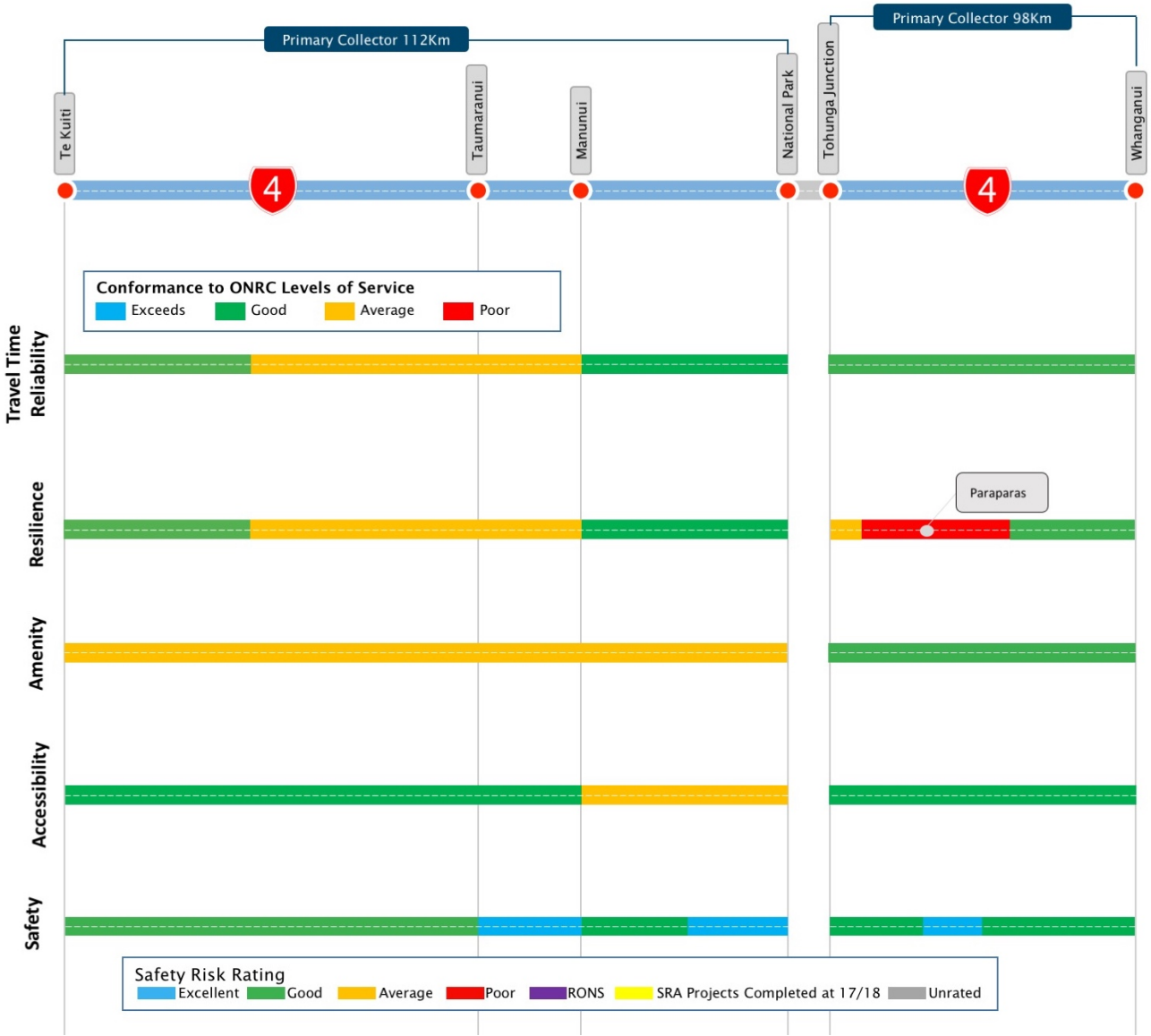
Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road classification

The entire corridor is classified as Primary Collector.

SH4 Parapara droving on the state highway

Figure 7 - Current ONRC levels of service performance



Summary of current performance

Figure 7 shows how the Te Kuiti to Whanganui 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

Ice and snow can sometimes lead to unreliable travel times on the section of corridor on the central plateau. Otherwise travel times on the corridor are generally reliable.

Resilience

The majority of the corridor can either provide alternative routes and/or has a low risk of unplanned closures. The Paraparas (SH4 along the Mangawhero River), and between Manunui and National Park are prone to slips and rock falls.

Amenity

The corridor is delivering the expected ride quality mostly due to low traffic volumes. There is a lack of out of hours facilities in the higher HV trafficked section between 8 Mile Junction and National Park.

Accessibility

The corridor generally provides an appropriate level of access along the corridor. Accesses and intersections are infrequently dispersed along the rural sections of the corridor. SH4 is considered an alternative route to SH1, particularly for freight but currently isn't able to take full HPMV vehicles.

Safety

The corridor is rated either 2 or 3-star KiwiRAP. This rating denotes that there are major deficiencies in some road features.

The corridor has varied collective and personal risk rating. There are three sections along SH4 that have a high personal risk rating. There are no sections of the corridor rated high collective risk.

There is only one high risk intersection along the corridor; the intersection of SH3 and SH4.

There are some sections of the corridor that have a poor safety LoS. This includes SH4 between Tohunga Junction and Whangarei, where personal risk is high and KiwiRAP star rating is only 2-star.

Improving the customer experience

There is a limited amount of work beyond minor improvements planned or occurring on this corridor. The Safe Roads programme is developing minor safety improvements for the Te Kuiti to Taumaranui section. Improvements are likely to include resurfacing, signage, traffic islands and pavement marking.

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

Access

Carriageway configuration

The corridor is mostly two opposing lanes with minimal passing lanes and narrow shoulders. Few areas have dedicated passing lanes and there is a two-lane divided configuration for daily commuters north of Whanganui.

Speed limits

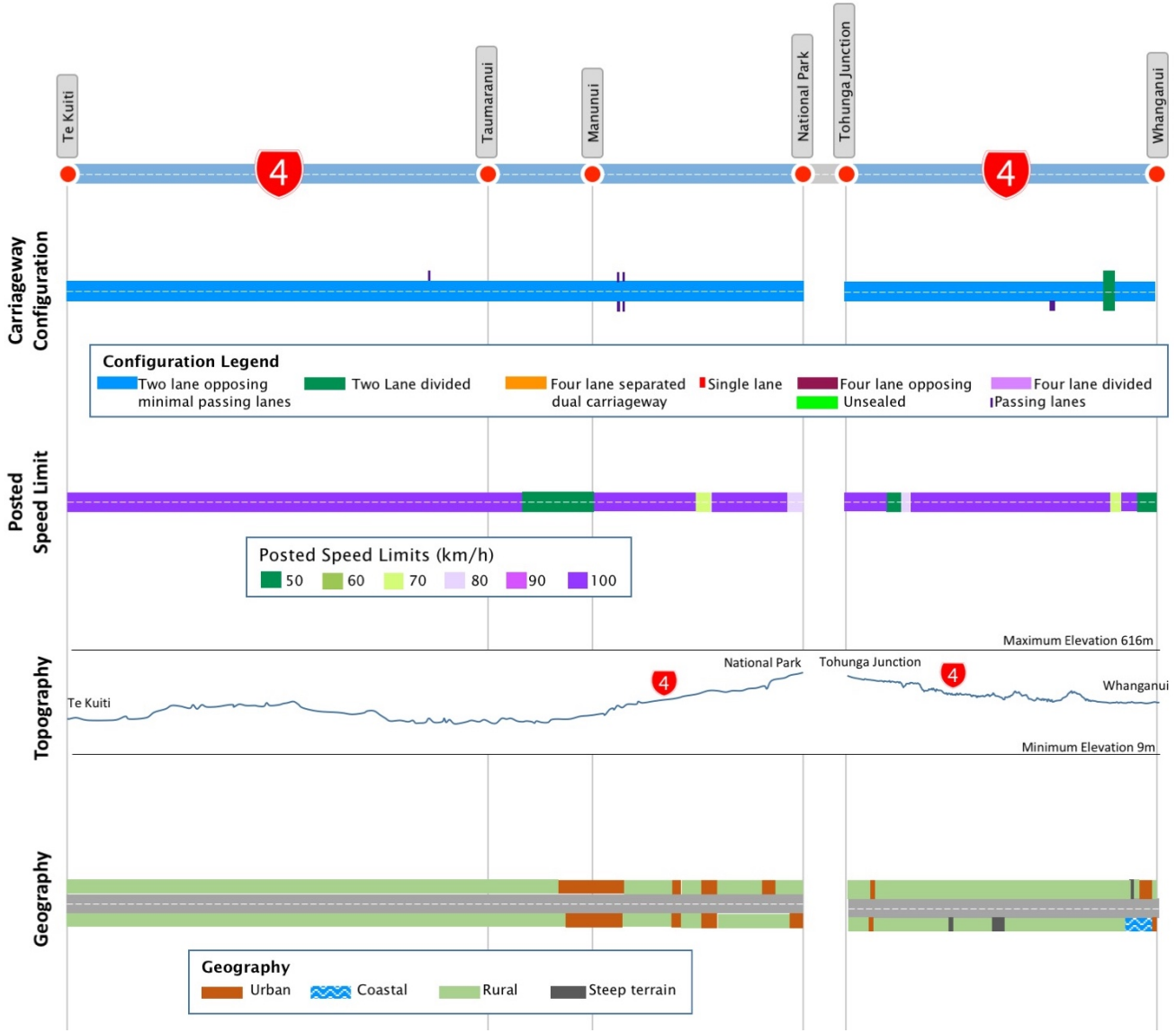
The corridor is mostly posted at 100 km/h except in the urban areas of Manunui, Whanganui and rural settlements where the posted speed ranges from 50 to 80 km/h.

Topography/geography

The topography of the corridor is variable, depending upon the section of the corridor. The corridor passes through a range of open rural landscapes, planted forests, and smaller communities, with some urban environments on the fringes.

SH 4 at RP 158, rip and remake slow slip movement site

Figure 8 - Corridor characteristics



Horizontal alignment

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

The corridor contains a regular occurrence of larger radius curves. The section of corridor between Raetihi and Upokongaro has a higher concentration of tighter bends.

SH4 Cyclone Debbie flooding 3km south of Raetihi

Figure 9 – Horizontal alignment

Volumes

Traffic volumes outside the urban areas along the corridor are mostly between 100 and 1,500 vehicles per day with heavy vehicles ranging from 150 to 400 vehicles per day. Heavy vehicle traffic is higher in the northern section of the corridor between Te Kuiti and National Park, with the greatest volume being between Taumaranui and Manunui with 400 heavy vehicles per day.

HPMV routes

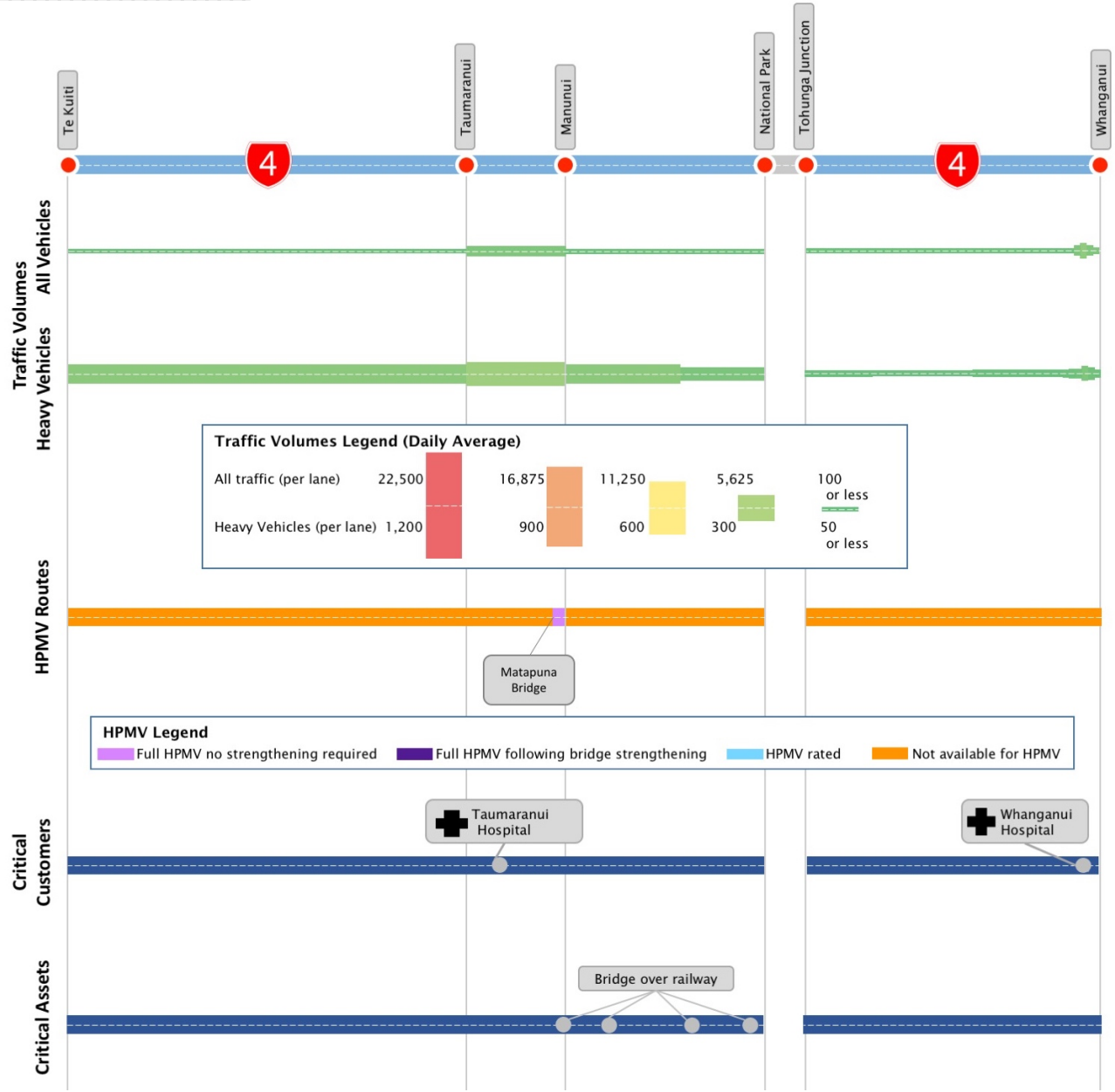
The entire length of the corridor is not rated for HPMV vehicles. The exception to this is a short section through Manunui to Matapuna bridge.

Critical customers and assets

Critical customers adjacent or close to the corridor that rely on the corridor to be open 24/7 and are vulnerable to interruptions include both Whanganui and Taumaranui Hospitals.

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. This includes a number of rail overbridges between Manunui and National Park.

Figure 10 - Corridor capacity



Pressures

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

- **Constraints to HPMV access:** Physical constraints on HPMV limit the efficient movement of freight. Several bridges do not allow full HPMV capability such as the Matapuna Bridge.
- **Changes in land use:** Farm conversion to lifestyle residential areas, forestry to dairy and intensification of rural areas are leading to the increased pressure on accesses onto the corridor.
- **Limited passing opportunities:** This leads to reduced travel time reliability and inappropriate driver behaviour. Whilst the corridor has relatively low volumes the targeted of passing lanes should focus on the sections likely to carry higher freight volumes. These should focus on sites where costs are economic at reasonable extended frequencies.
- **Tourism:** Increasing tourist activity and awareness of recreational areas is creating increasing demand for parking and access to recreational sites.

Future considerations

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

- **Integrated landuse and transport planning**: As land use intensifies (including recreational activity) and more accesses are requested or become more heavily trafficked, planning and foresight is needed so the appropriate site and form of access is provided for immediate and potential future use. Working with local authorities to consider land use development and impacts on the transport network will help maintain ONRC levels of service along the corridor.
- **Recreational access strategy**: Working with partners and other agencies such as mana whenua, local councils and DoC to develop strategies around access to recreational areas will enable consideration of appropriate intersection form and location, sight distance, and queueing areas in these locations.

SH4 Pahihi Culvert, RP188

Resilience

This corridor is vulnerable to closure from crashes and environmental factors which can have a negative impact on the regional and national economy. Alternative routes exist in most parts of the corridor but are reasonably longer in length.

Vulnerabilities

The corridor experiences a moderate to high level of slips, rock falls and flooding. Known areas of concern are:

- Slips through the Paraparas between Raetihi and Upokongaro.
- Flooding, particularly on the lower reaches of the Whanganui River through Wanganui.

Alternative routes and diversion lengths

Alternative routes exist for a large proportion of the corridor both via state highways (SH1 and SH3) and local roads. The multiple park reserves, hill ranges and forests surrounding the corridor obstruct potential for some detour routes. Most the alternative routes for the corridor are less than 50km in length.

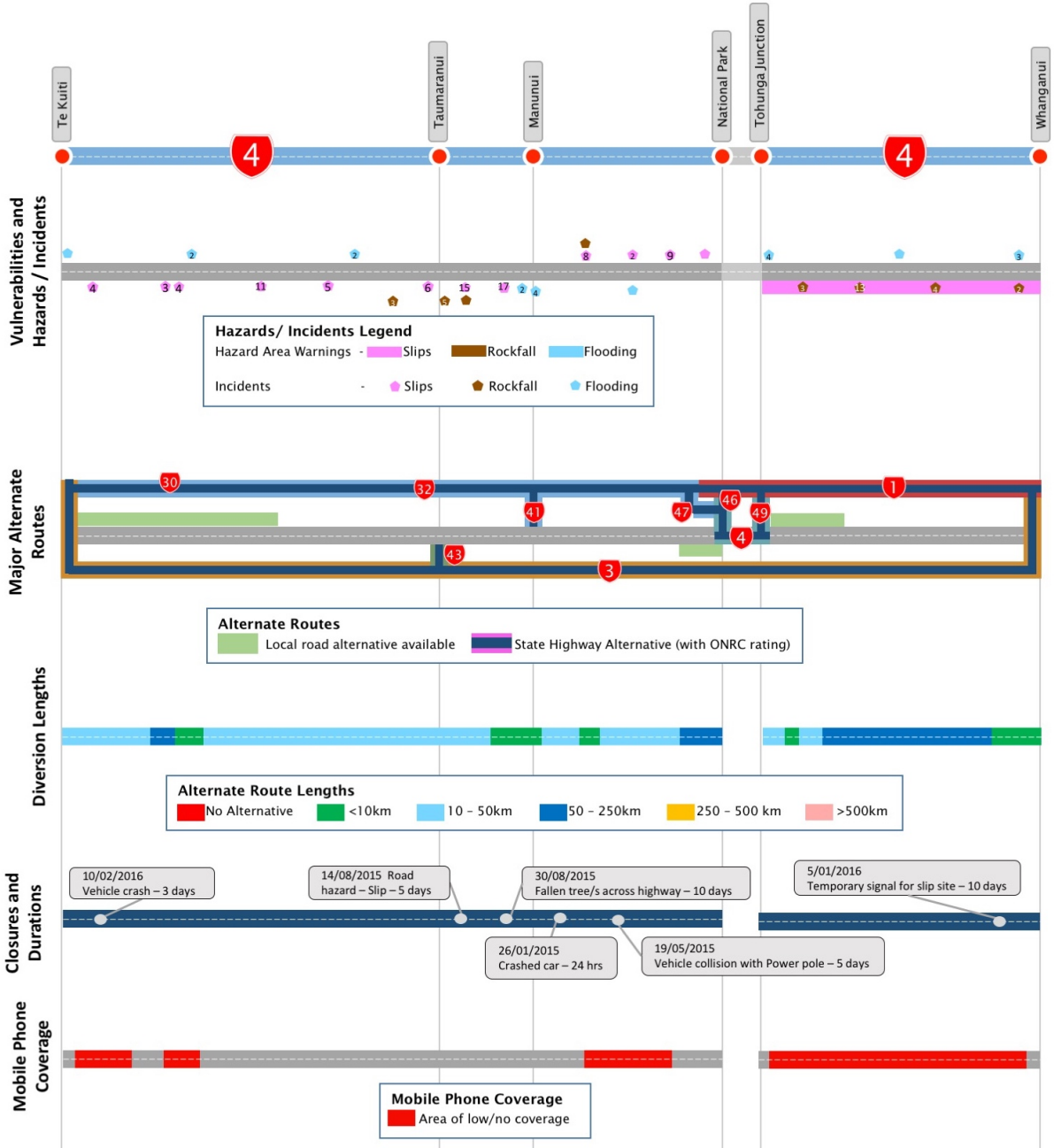
Closures and duration

The major unplanned road closures and duration of interruption along the corridor in the last 5 years are shown in Figure 11. Slips and fallen trees are the main cause of lengthy closures on the corridor.

Mobile Phone Coverage

Significant lengths of the corridor have little or no mobile phone coverage. This is particularly an issue through the Paraparas between Raetihi and Upokongaro. This limits the ability to quickly report and respond to incidents.

Figure 11 – Resilience



Pressures

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

- **Slips and flooding:** Annual severe weather events result in partial and full road closures which have a negative effect on journey time and an adverse economic impact. The narrow width of the corridor makes it difficult to manage these events and the subsequent clean up around live traffic. Harvesting of forests and conversion to pasture land also means water is no longer being held within forest lands and resulting in increased flooding on the corridor. This is exacerbated by under capacity culverts, shallow swales and silting of the stormwater system.
- **Volcanic activity:** The proximity of the corridor to the volcanically active mountains within Tongariro National Park create a risk of volcanic ash.
- **Suitability of roading materials:** The pumice subgrade that the northern parts of the corridor are built on, along with a high-water table in some areas results in increased pavement rutting issues. This leaves the pavement vulnerable to the periodic loadings from heavy forestry vehicle movements.
- **Poor communication:** There are significant mobile phone black spots along the corridor. A lack of advanced and real-time warning of full and partial road closure events means journeys are less adaptable to changing road conditions.

SH 4 at RP148 slip and guardrail storm damage

Future considerations

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

- **Communications:** ITS system investment is important as real-time information is critical in planning and diverting journeys. ITS can convey important information around the location of snow and ice issues, slips, rock falls, flooding, and crashes and convey available routes that customers can still use. Consideration should also be given to supplementing this information with real-time journey times. This will require working with telecommunications companies to improve mobile phone coverage throughout the corridor.
- **Further investigations into resilience:** A resilience study would provide a better understanding of the risks and issues within this corridor and enable the development of a more informed strategy to manage and mitigate risks.
- **Monitoring high risk areas:** Mitigating slope on a priority basis by actively monitoring prone areas and investigating preventive maintenance options. Climate change with projections of increased severity of storm events and rainfall will impact future maintenance and risk assessment around slips and rock fall along the corridor.

Reliability and efficiency

Efficiency

Most the corridor performs well against the EfficiencyNet Level of Service. The winding and rolling geography through the Paraparas between Raetihi and Upokongaro results in a lower level of service.

Variability

There is no variability data for this corridor.

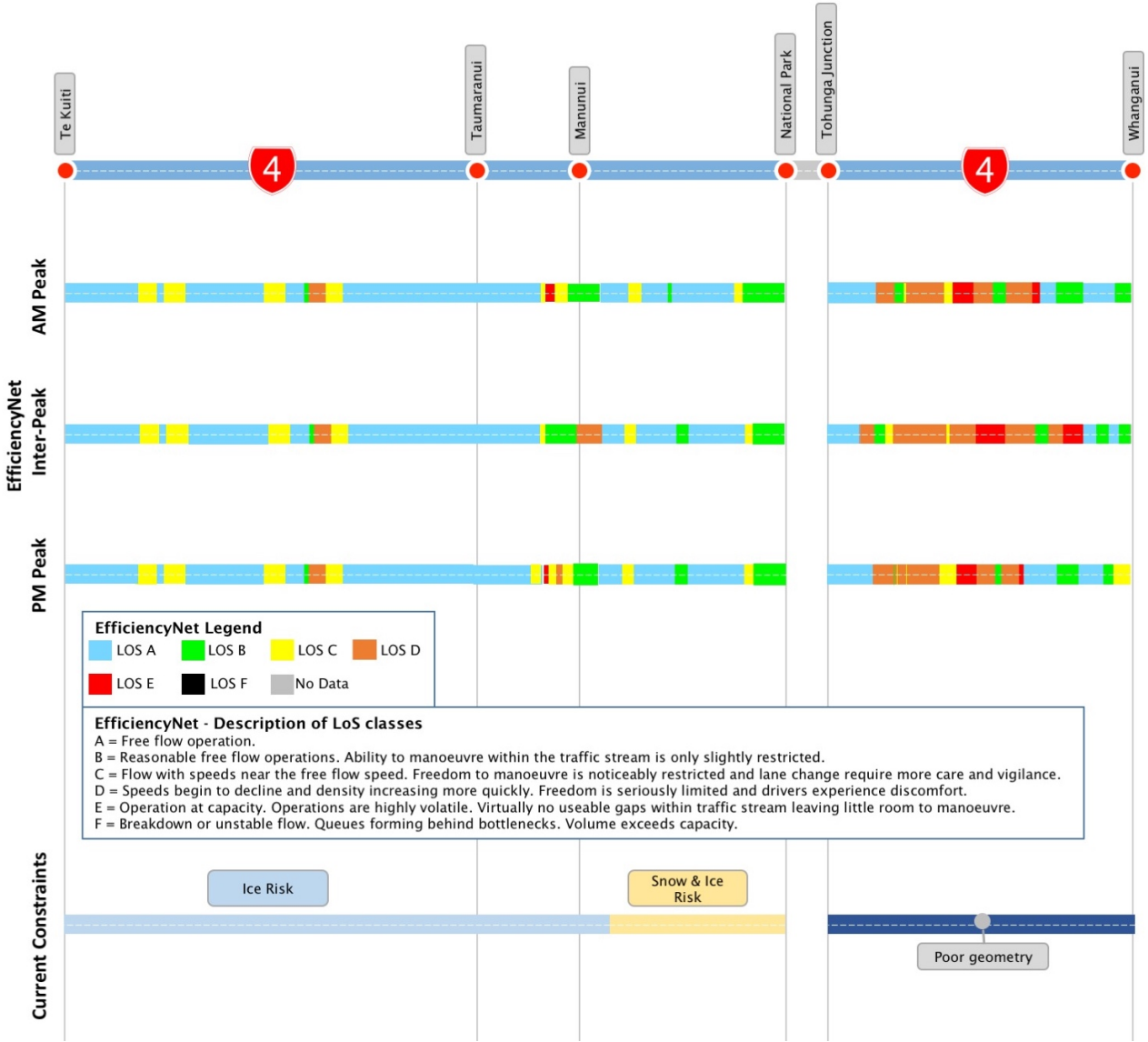
Commercial vehicle average speed

There is no commercial vehicle speed data for this corridor.

Current constraints

The major current constraints on the network affecting journey reliability and efficiency are shown in Figure 12. These largely due to snow and ice issues between SH41 and Tongariro National Park, and the risk of ice on the northern section between Te Kuiti and Manunui in more sheltered areas. Other constraints include sections of poor geometry through the Paraparas.

Figure 12 - Reliability and efficiency



Pressures

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

- **Climatic conditions:** The alpine climate around the corridor results in snow events and ice forming on the pavement in winter. These issues result in uncertain route options, unreliable travel times and safety risks. The rural inland nature of the corridor leads to mist forming over the road during evening driving at sometimes during the year. This can limit forward visibility, making driving hazardous and lead to unreliable travel times.
- **Topography:** The winding and rolling geography and resulting poor alignment through the Paraparas between Raetihi and Upokongaro results in unreliable travel times and overall poor journey experience.

SH4 Storm Damage reinstatement works

Future considerations

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

- **Monitoring:** Investment in electronic weather stations and warning devices will provide real time information critical for planning and diverting journeys. This would require upgrading the existing manual signs and coordination with mobile network suppliers to ensure adequate coverage.
- **Active journey management:** Better management of the journey experience through speed management, enforcement and driver information. Real time information will enable the customer to make more informed decisions around travel along the corridor, particularly planned delays through application of the Speed Management Guide.

SH4, RP176. 2015 site 16 Storm Damage reinstatement works

Safety

Collective risk

Collective risk along the corridor varies from low to medium risk. It is low risk from Manunui to the National Park and predominantly low risk between Tohunga Junction to Whanganui, with one medium-low and medium risk segments.

Between Te Kuiti and Manunui there are multiple low and medium-low risk segments and one medium risk segment.

Personal risk

There are three sections of the corridor that are rated high personal risk. Two sections are located between Tohunga Junction and Whanganui and one is halfway between Te Kuiti and Taumaranui. From Manunui to the National Park the corridor is rated medium personal risk. There is one small medium-high section located just south of Tohunga Junction.

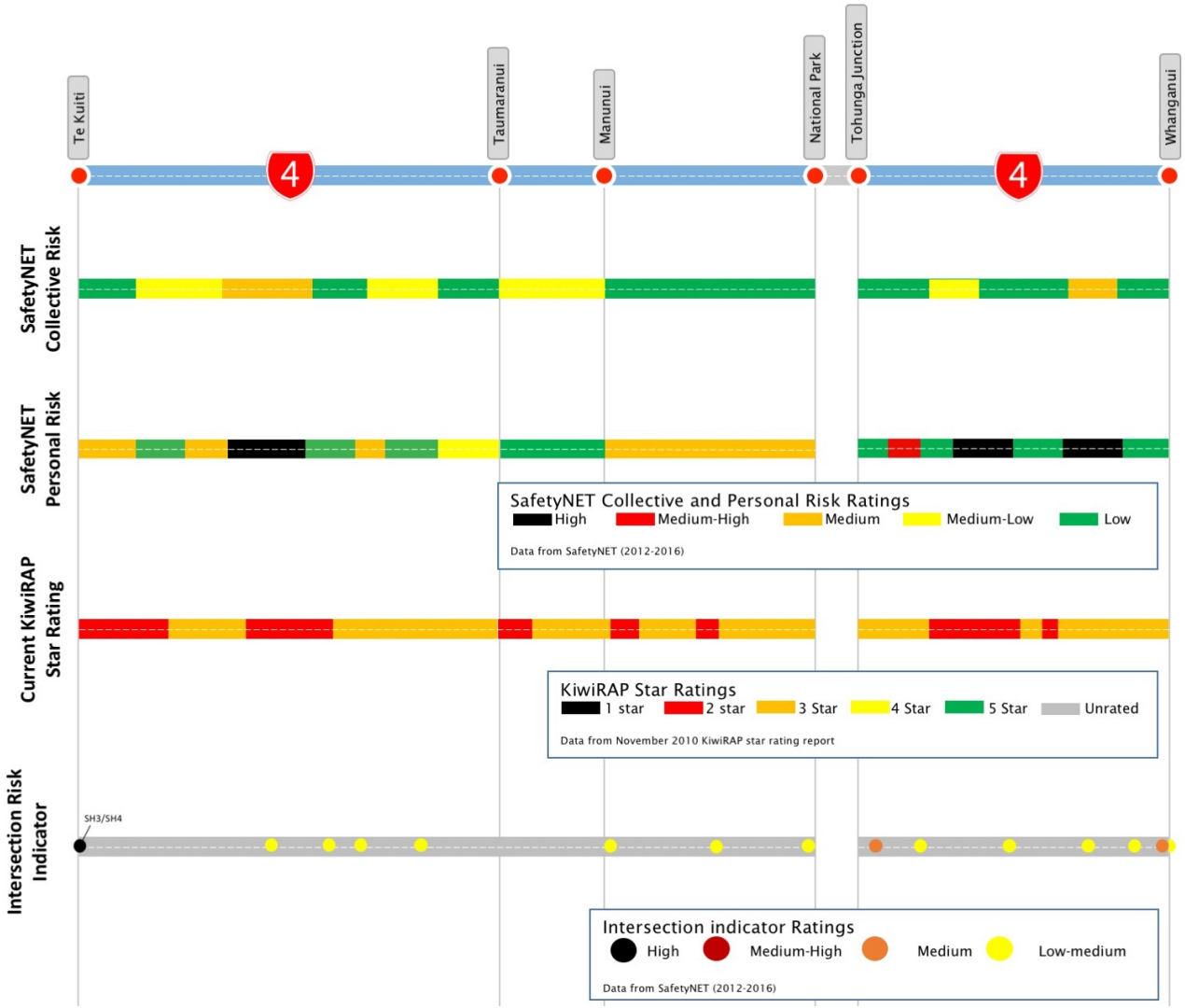
Star rating

The corridor is rated either 2 or 3-star KiwiRAP denoting there are major deficiencies in some road features. There are 2-star segments on the approach to Te Kuiti, Taumaranui and Manunui, and also between Manunui and National Park and Tohunga Junction to Whanganui.

Intersection risk indicator

There is one high risk intersection along the corridor where SH3 and SH4 meet at 8 Mile Junction. There are two medium risk intersections located south of Tohunga Junction and in Whanganui.

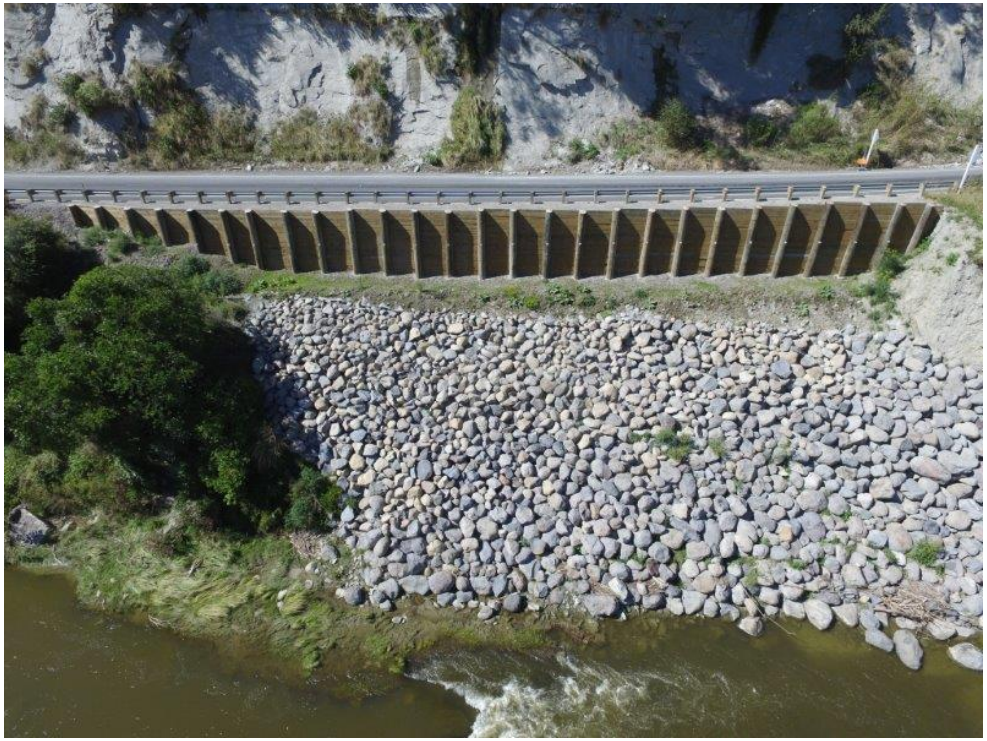
Figure 13 – Safety



Pressures

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

- **Disproportional DSI rates:** The significant rate of death and serious injuries considering the low traffic volumes can be attributed to inconsistent and narrow road alignments, limited separation between opposing traffic, and hazardous roadside environments on a number of highway sections.
- **Out of context environments:** There are moderate to high speed out of context curves on the northern section which create a high risk of loss of control crashes, particularly for trucks.



SH4, RP176, reinstatement post storm damage

Future consideration

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

- **Widening and protection:** Safety improvements creating recovery space outside of traffic lanes, and protection from or removal of roadside hazards, including hazardous bridge arrangements and level crossings.
- **Speed management:** Consideration of the safe and appropriate speed for each part of the corridor given its level of risk to road users and level of importance in accordance with the Speed Management Guide framework.
- **Minor safety improvements:** Continued implementation of low cost solutions such as; delineation improvements (i.e. line markings, edge marker posts, RRPMs, ATP, curve signs), sight distance improvements, and side barrier installation.

People, places and environment

Natural environment

The corridor is characterised by predominantly rural landscapes and park reserves, with some urban areas on the fringes of the corridor. The corridor touches Tongariro National Park. It follows and crosses rivers in many locations, including the Mangawhero River and Whanganui River and numerous other rivers and minor streams.

Noise, vibration and air quality

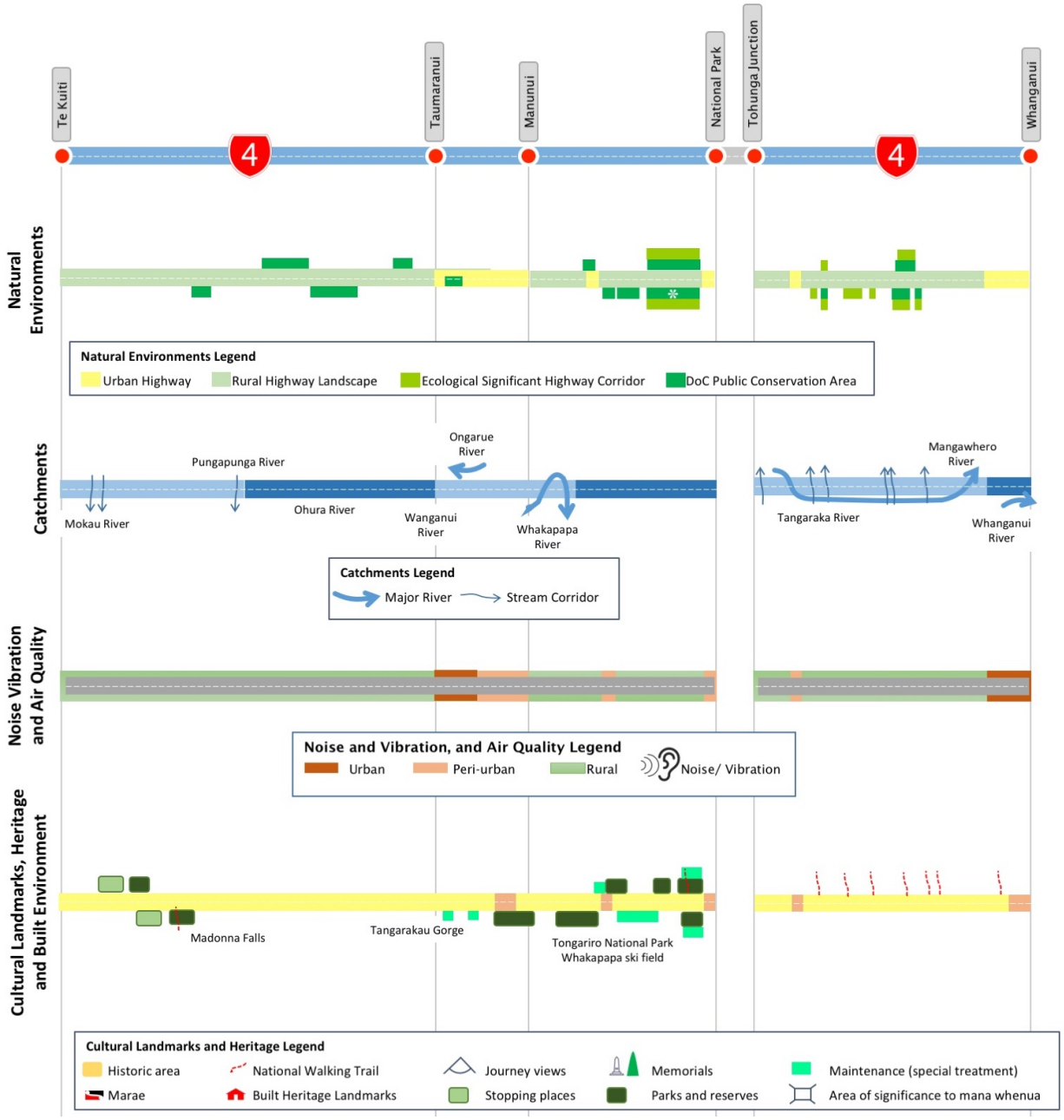
There are no significant noise or vibration issues along the corridor.

Cultural landmarks, heritage and built environment

The visual character of the corridor provides vibrancy and attractiveness to journeys, with a range of reserves, rural areas, and rural settlements.

The mountains surrounding the corridor are of significant importance to iwi and all New Zealand. They are considered sacred ground by iwi. Tongariro was the first national park in the country. These mountains draw significant visitors and tourists each year placing pressure on the corridor for access and facilities associated with walking trails, ski fields and vistas.

Figure 14 – 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:

- **Weather:** Increasing frequency and severity of weather events is accelerating flood frequency and intensity, and erosion and slope degradation within and alongside the corridor. The management of these risks are likely to require greater engineering control.
- **Vegetation management:** Particularly near sensitive ecological and protected conservation lands. As the corridor develops and expands, community expectations (e.g. visual quality, control of pest plants) will lead to areas of managed vegetation being increased as well as operational costs which will require management plans with ongoing obligations.
- **Increasing environmental standards:** The sensitive ecological and protected conservation lands near the corridor will result in more intensive resource consent requirements when corridor activities need to change, including consideration of water quality issues.
- **Stormwater management:** Harvesting of forests and conversion to pasture land means water is no longer being held within forest lands and resulting in increased flooding on the corridor. This is exacerbated by under capacity culverts, shallow swales and silting of the stormwater system.
- **Noise, Vibration and Air Quality:** Heavy vehicle movements through residential areas of the corridor will continue to result in noise and vibration impacts. Receptors close to the state highway are more likely to be potentially impacted. Balancing community expectation around noise and vibration with sensible maintenance solutions in established areas will remain an ongoing maintenance consideration.
- **Management of cultural landmarks and heritage buildings:** The 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 obligations. Additional investigations and management of impacts on these features may also be required.
- **Improved relationships:** 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. This includes the placement of Pou or land symbol posts around the national parks.

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:

- **Relationships:** Effective relationships between iwi and associated councils to work together and maximise access to cultural and heritage places to support economic and social growth. This may require safety and journey management programmes to ensure the corridor continues to meet its transport responsibilities.
- **Noise management measures in urban areas:** Consideration of surface type, or heavy vehicle bypasses through or around some centre could address existing concerns in some areas.
- **Review of stopping areas and development of a stopping area strategy:** Suitable stopping places are needed in places to provide, among other things, safe areas where tourists can pull off the road to view the mountains and other notable sights and avoid them parking in dangerous areas. Consideration could be given to maintaining less stopping areas but to a higher, more effective standard.
- **Rationalise resource consents:** Consider opportunities to consolidate/rationalise resource consents, particularly for regular maintenance activities.

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 210 km of road network which reflects 1.8% nationally. The total value of the assets along the corridor is $298M (excluding ITS, and, heritage and green assets).

The corridor assets have been divided into eight groups as shown in Figure 15 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 15 – Corridor asset base

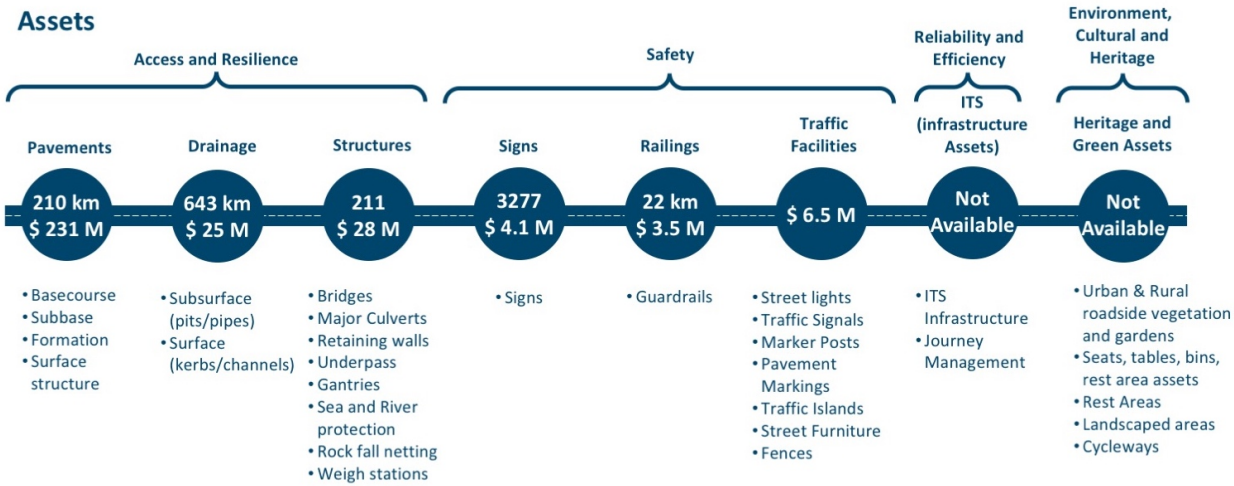


Figure 16 – Summary asset condition and performance

Asset condition and performance

Surface skid resistance

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

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

Surface skid resistance results below the threshold level is highest on SH4/35 north of Ongarue, and, SH4/176 between Raukawa Falls and Kakatahi. Surface skid resistance has been improved markedly along the length of the corridor.

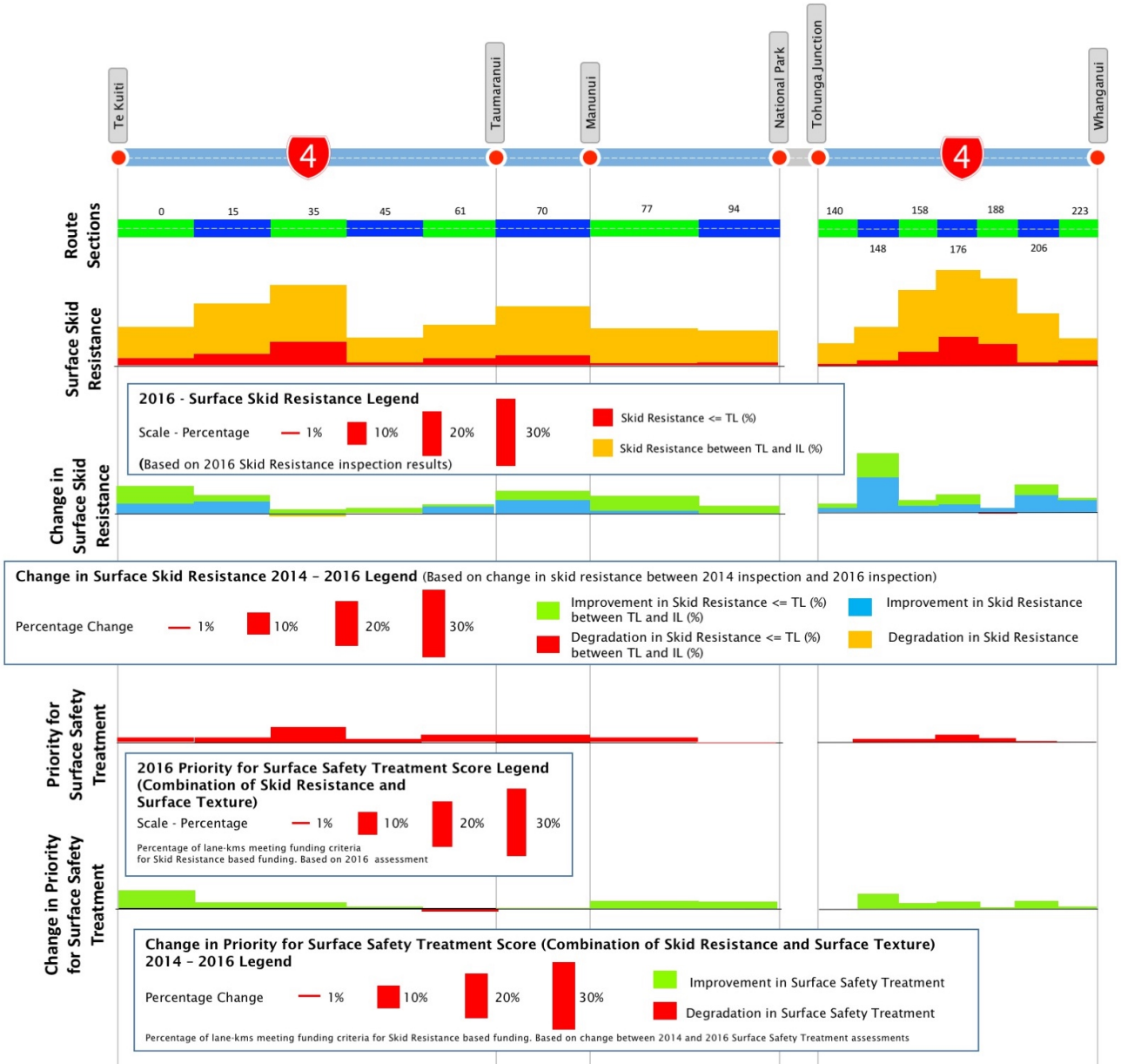
Priority for surface safety treatment

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.

Just 1.85 percent, or 7.7 lane-km of the corridor has a surface safety treatment score that meets the funding qualification, being primarily along the northern section of the corridor. Overall there has been a marked improvement in priority for surface safety treatment across the bulk of the corridor.

Figure 17 – Asset condition



Surface defects

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

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

Overall, 15.9% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: SH4/70 between Taumaranui and Manunui, and, SH4/148 to SH4/188 through the Paraparas.

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.

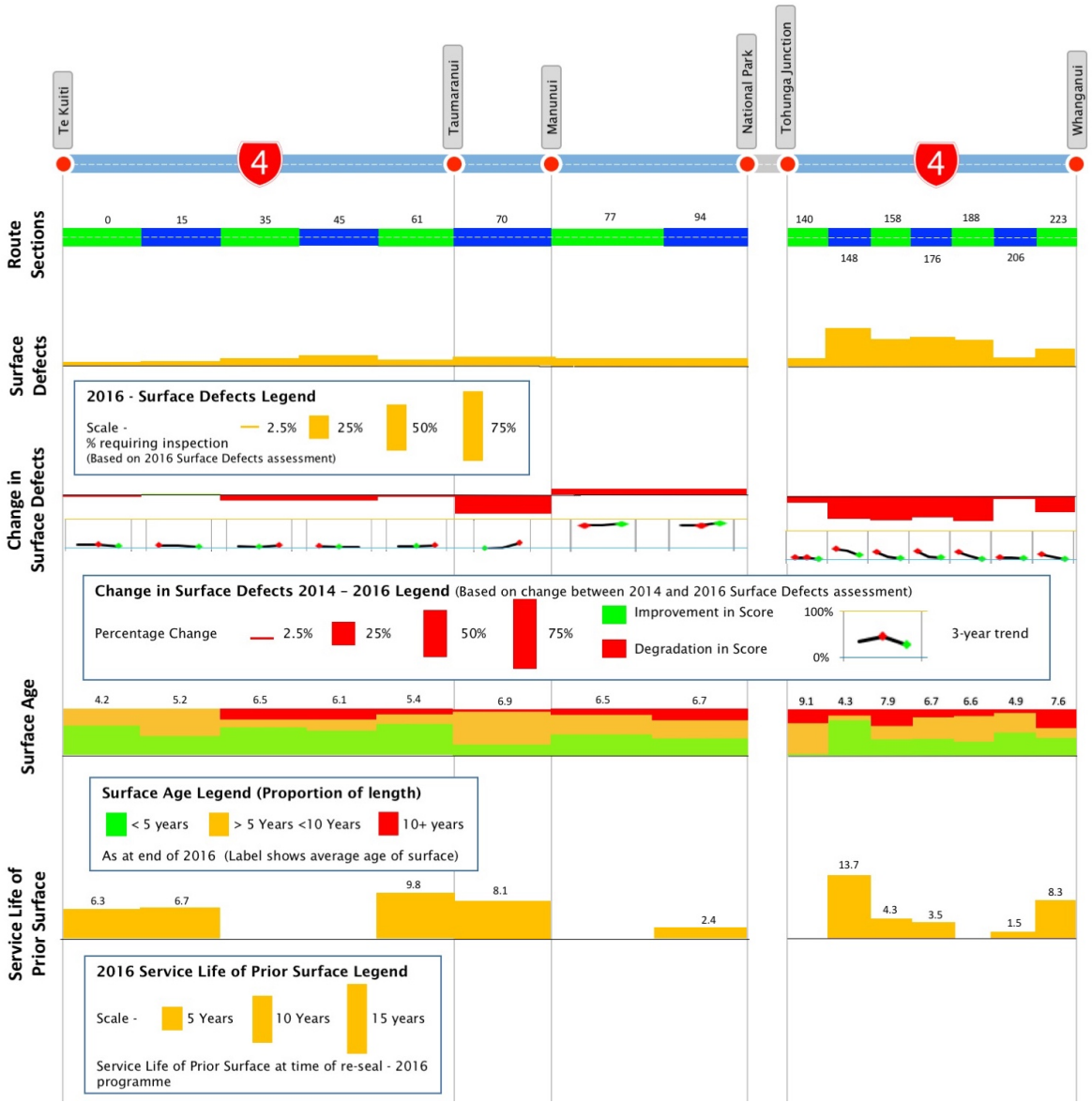
The section of corridor with the oldest age profile is SH4/140 between Tohanga Junction and Raetihi with and average surface age of 9.1 years.

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.

ON average an age of 7.7 years was achieved across the corridor, with section SH4/148 south of Raetihi achieving an average age of 13.7 years.

Figure 18 – Asset condition 2



Resurfacing

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

The major resurfacing works are planned for section SH4/70 between Taumaranui and Manunui, and SH4/148 south of Raetihi.

Proportion of travel on smooth roads

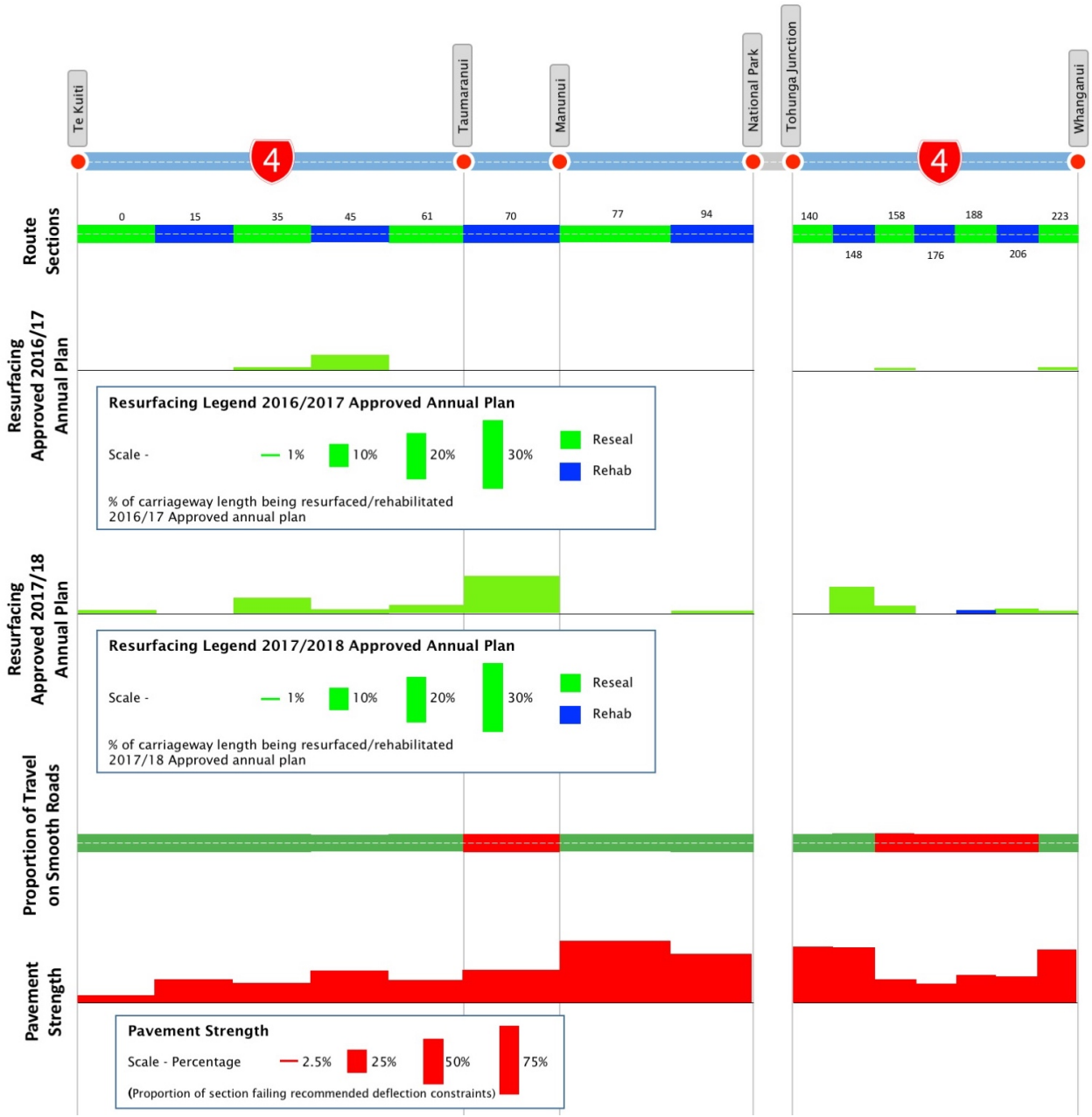
The infographic shows whether the route section passes the ONRC standard for Proportion of Travel on Smooth Roads (Smooth Travel Exposure). 97% is the ONRC target for proportion of travel on smooth roads. The infographic simply shows whether the route section achieves this level or not.

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 on sections SH4/77 and SH4/94 between Manunui and National Park, SH4/140 between Tohanga Junction and Raetihi, and, SH4/223 between Upokongaro and Whanganui.

Figure 19 - 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:

- **Resurfacing priority:** The priority for resurfacing along the corridor will be driven mostly by Surface skid resistance levels.
- **Pavement life:** The cold and wet conditions experienced along the corridor may mean that pavement lives will be shorter than normal, due to moisture ingress.
- **Poor aggregate:** Historically, the poor standard of aggregate used along the corridor has resulted in polishing occurring, resulting in frequent revisits with surface skid resistance treatments.

Ongarue River Bridge exposed abutments

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:

- **Low volumes:** Due to the low volumes of vehicles on this corridor, no exceptional increases in the maintenance requirement is expected on this corridor. As more of the Waikato Expressway is completed, traffic patterns may change that make the SH1 route the preference for access to the central plateau mountains over the current SH3/SH4 route. This would result in a decrease in recreational/tourist traffic along the northern part of the corridor.
- **Dairy conversion** from forestry on parts of the corridor may have a minor future impact on maintenance. As land use intensifies and more access is required, planning and foresight is needed so the appropriate site and form of access is provided for immediate and potential future use.

SH4 Steel culvert

Investing in the corridor

The **Customer Levels of Service** shapes our response to our investment in maintenance, renewals and improvements. The NZ Transport Agency must consider the impact we have on our customers, the environment, communities, iwi, and the NZ economy in everything we do.

Decisions must be evidence based, informed and transparent with investment targeted to the right treatment, in the right place, at the right time while considering a range of competing priorities for investment. This requires significant analysis of various alternatives and options and expertise in applying appropriate judgement in collaboration with our service delivery partners.

Right treatment, right place, right time

A range of factors have been considered to determine the best point at which to intervene with maintenance and/or renewal treatments and improvements along the corridor.

Intervention works will be programmed to ensure:

- The right treatment,
- At the right place, and,
- At the right time.

Interventions will:

- Be based on minimising whole of life, whole of system costs and be underpinned by facts derived from enhanced asset information and modelling
- Define the most appropriate approach to asset maintenance, inspection and renewal, supported by reliability, availability, maintainability and safety specifications
- Use a risk-based approach to determining intervention requirements to specified levels of reliability
- Use resilience requirements to a specified range of weather conditions, considering climate change
- Define how sustainable development requirements are to be addressed

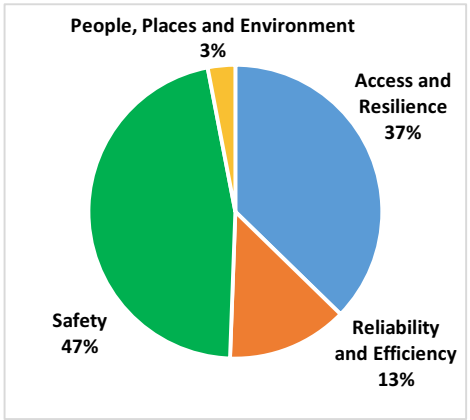
Summary investment

The proposed investment in the corridor is as follows:

Table 1- Summary corridor investment ($000)

Outcome	Expenditure Category	2018-2021	2021-2024	2024-2028
Access and Resilience	Maintenance and Operations	$1,774	$1,959	$2,979
	Renewals	$3,142	$3,479	$5,088
	Improvements	$0	$0	$0
Reliability and Efficiency	Maintenance and Operations	$943	$1,015	$1,521
	Renewals	$81	$74	$130
	Improvements	$2,800	$0	$0
Safety	Maintenance and Operations	$1,851	$2,047	$3,142
	Renewals	$1,078	$1,154	$1,732
	Improvements	$9,813	$0	$2,098
People, places and Environment	Maintenance and Operations	$389	$416	$626
	Renewals	$22	$18	$27
	Improvements	$0	$0	$0
	Total	**$21,893**	**$10,162**	**$17,343**

Figure 20 – Corridor investment



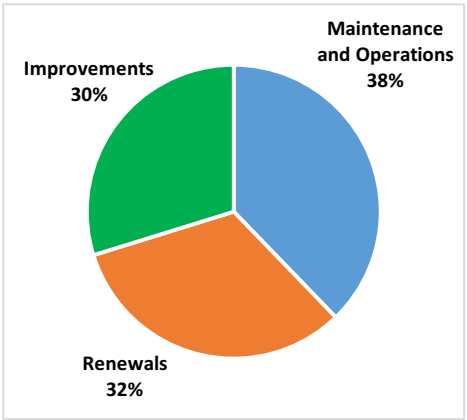


Table 2 - Summary investment by work category ($000)

Outcome	Work Category		2018-2021	2021-2024	2024-2028
Access and Resilience	111	Sealed Pavement Maintenance	$405	$475	$743
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$152	$172	$265
	114	Structures Maintenance	$340	$368	$557
	121	Environmental Maintenance	$231	$252	$375
	122	Traffic Services Maintenance	$21	$30	$45
	124	Cycle Path Maintenance	$0	$0	$0
	151	Network & Asset Management	$502	$531	$798
	161	Property	$123	$130	$196
	211	Unsealed Road Metalling	$21	$13	$11
	212	Sealed Road Resurfacing (excl. surface skid resistance)	$1,436	$1,688	$2,648
	213	Drainage Renewals	$98	$98	$148
	214	Pavement Rehabilitation	$1,083	$1,154	$1,491
	215	Structures Component Replacements	$482	$505	$758
	222	Traffic Services Renewals	$21	$21	$32
	321 - 341	Improvements	$0	$0	$0
Reliability and Efficiency	121	Environmental Maintenance	$208	$224	$338
	123	Operational Traffic Management	$541	$589	$883
	151	Network & Asset Management	$172	$179	$264
	161	Property	$23	$24	$36
	222	Traffic Services Renewals	$81	$74	$130
	321 - 341	Improvements	$2,800	$0	$0
Safety	111	Sealed Pavement Maintenance	$435	$502	$784
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$45	$39	$59
	114	Structures Maintenance	$68	$71	$109
	121	Environmental Maintenance	$65	$76	$114
	122	Traffic Services Maintenance	$791	$881	$1,355
	124	Cycle Path Maintenance	$0	$0	$0
	151	Network & Asset Management	$394	$422	$634
	161	Property	$53	$57	$86
	212	Surface Skid Resistance	$919	$983	$1,476
	214	Pavement Rehabilitation	$6	$8	$12
	215	Structures Component Replacements	$55	$57	$85
	222	Traffic Services Renewals	$98	$106	$158
	321 - 341	Improvements	$9,813	$0	$2,098
People, places and Environment	111	Sealed Pavement Maintenance	$50	$54	$81
	121	Environmental Maintenance	$272	$291	$439
	151	Network & Asset Management	$54	$56	$85
	161	Property	$13	$14	$21
	221	Environmental Renewals	$22	$18	$27
	321 - 341	Improvements	$0	$0	$0
		Total	**$21,893**	**$10,162**	**$17,343**

To be confirmed through RLTP process

Investing in access and resilience

Operations and maintenance

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

Maintenance hot spots

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

- **Rock fall:** Monitoring and maintenance due to rockfall is an issue at the northern end of the corridor south of 8 Mile Junction.

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 SH4/15 through the Mapiu area, SH4/70 between Taumaranui and Manunui, SH4/94 north of National Park, SH4/140 between Tohanga Junction and Raetihi, and, SH4/223 from Upokongaro and Whanganui.

Structure Renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. No bridges are planned for replacement.

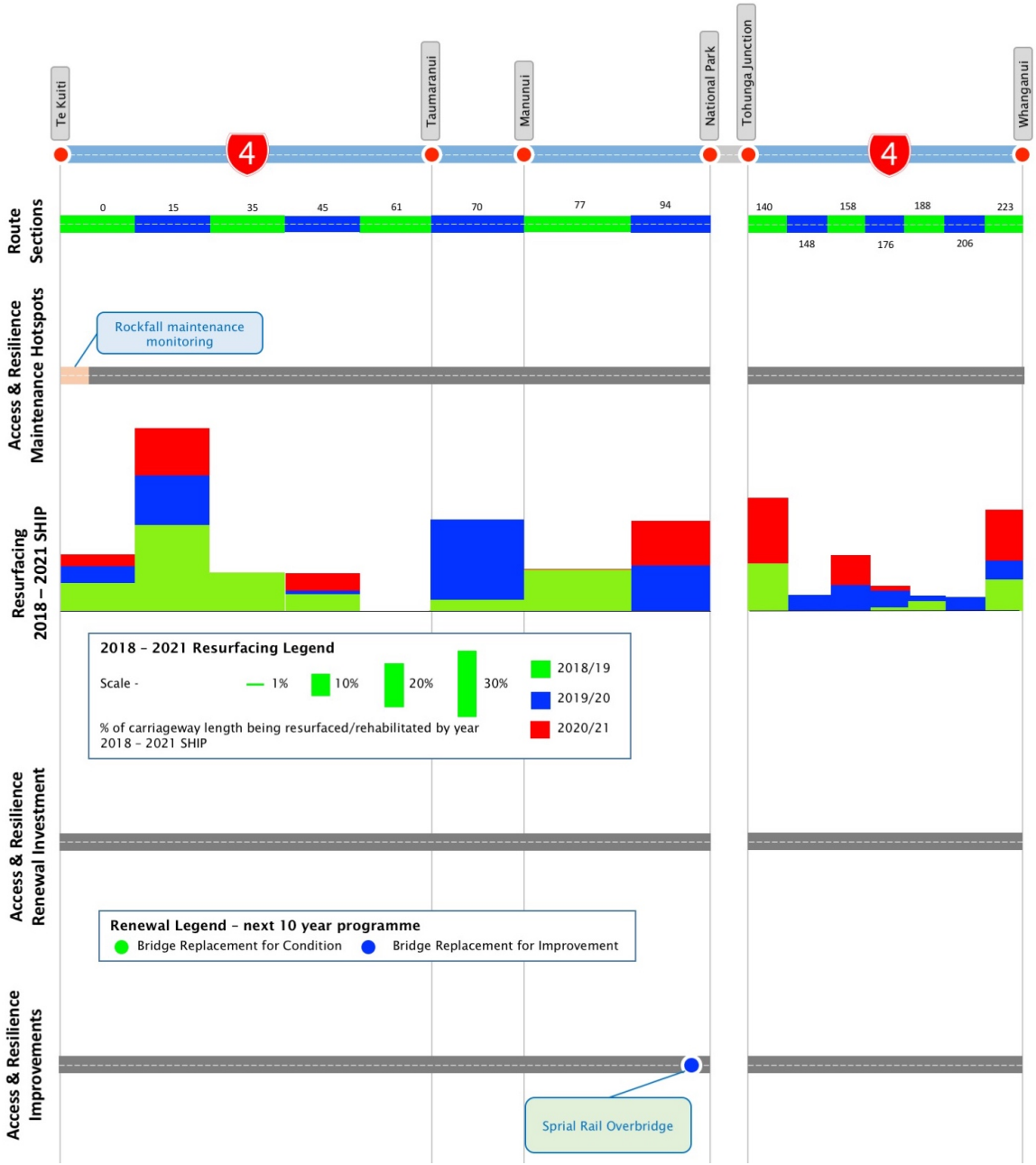
Improvements

Planned

Structure Improvement

One bridge is scheduled to be replaced for improvements reasons, at an estimated cost of $1.4M.

Figure 21 – Access and resilience investment



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

No significant reliability and efficiency related maintenance hotspots were identified along the corridor.

Renewals

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

Improvements

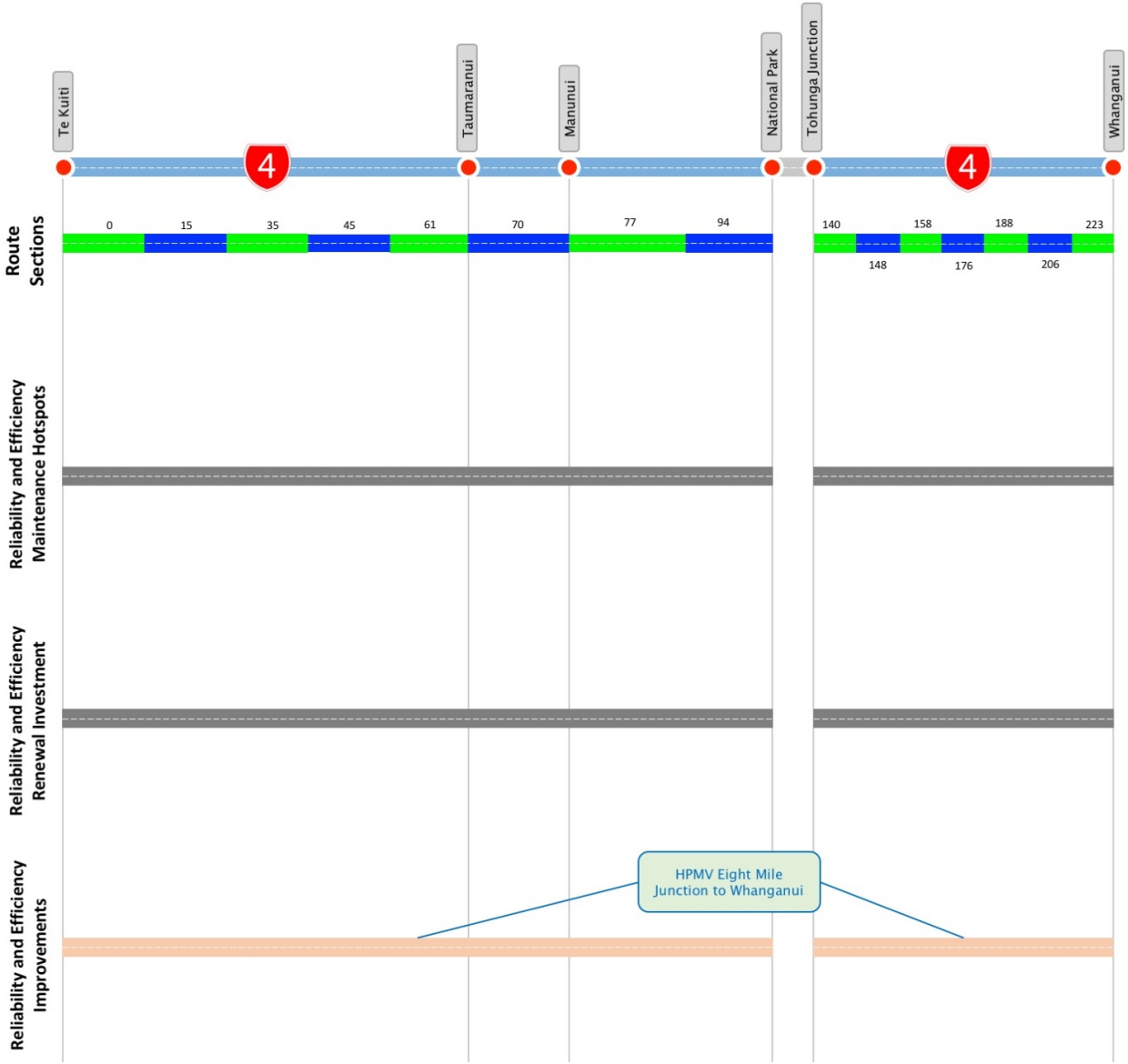
Draft Regional Land Transport Programme considered for the SHIP

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

Table 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
HPMV - 8 mile Junction to Whanganui		Improvements to enable HPMV to use SH4 (as often alternative route for SH1).

Figure 22 – Reliability and efficiency investment



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

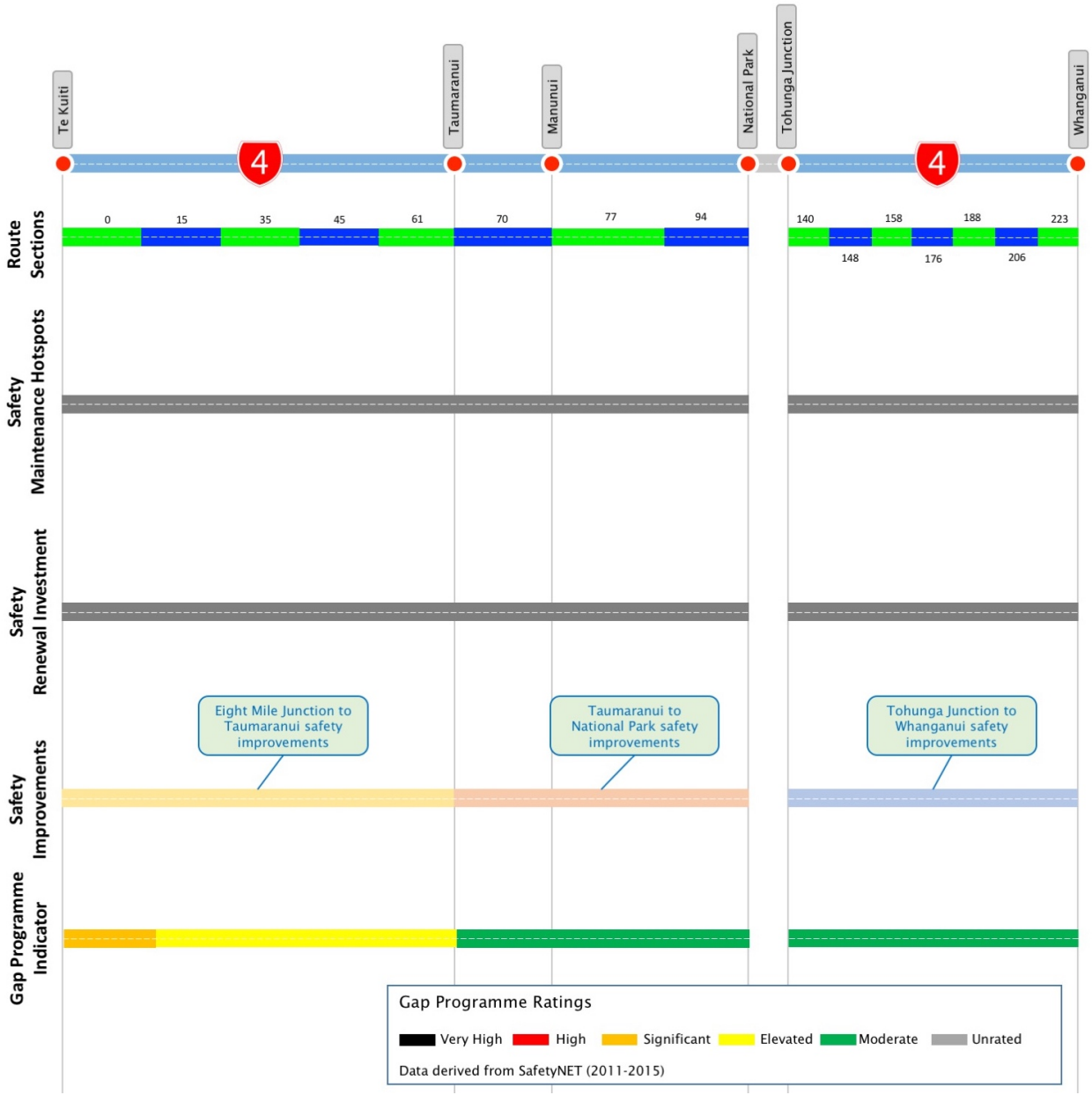
No significant safety related maintenance hotspots were identified along the corridor.

Gap programme indicator

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

Between Taumaranui and National Park, and Tohunga Junction and Whanganui there is a moderate potential for reducing fatal and serious injuries through targeted low cost, high coverage improvements to the corridor. From Taumaranui to Te Kuiti there is an elevated and significant potential to reduce injuries through the application of targeted low-medium and medium-high cost improvements.

Figure 23 – Safety investment



Renewals

There are no safety related renewals planned for the corridor.

SH4 Ongarue trees encroaching on the highway have a detrimental effect on the pavement and pose a safety risk.

Improvements

Planned

There are no currently planned safety related improvements underway on this corridor.

Draft Regional Land Transport Programme considered for the SHIP

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

Table 4- Draft regional programme considered for the SHIP

Project	Funding Status	Description
SH4 Eight Mile Junction to Taumaranui Safety Improvements		Safety improvements to SH4 from Eight Mile Jct through to Taumaranui as identified in the NSRRP Review
SH4 Taumarunui to National Park Safety Improvements		Safety improvements on SH4 from Taumarunui to National Park as identified in the NSRRP Review
SH4 Tohunga Junction to Whanganui Safety Improvements		Safety Maintenance improvements which may include: ATP, seal widening on curves, some barrier at high risk locations

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

No significant people, places and environment related maintenance hotspots were identified along the corridor.

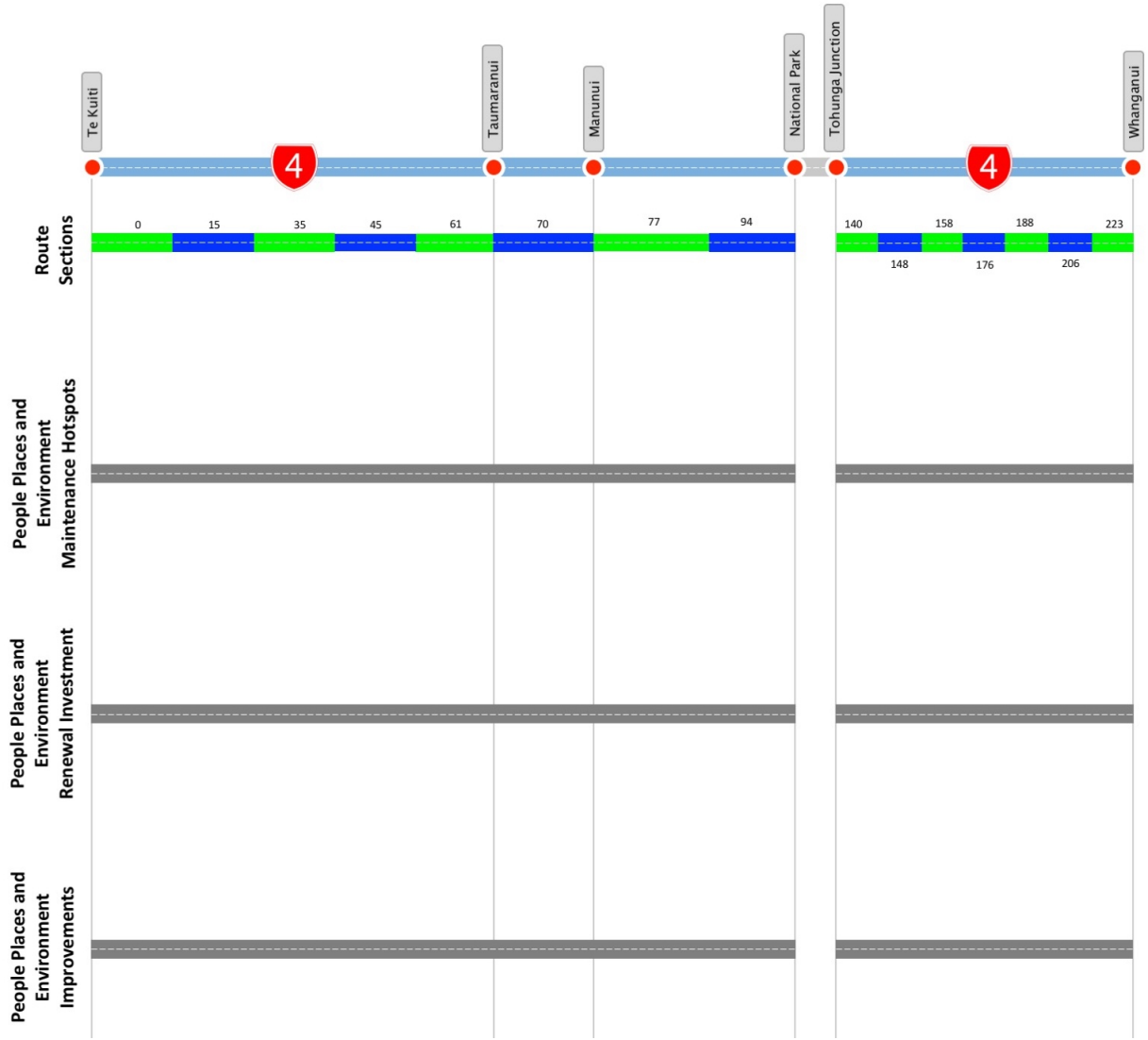
Renewals

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

Improvements

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

Figure 24 – 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.

- **Resurfacing priority:** The priority for resurfacing along the corridor will be driven mostly by Surface skid resistance levels.
- **Pavement life:** The cold and wet conditions experienced along the corridor may mean that pavement lives will be shorter than normal, due to moisture ingress.
- **Volcanic activity:** The proximity of the corridor to the volcanically active mountains within Tongariro National Park create a risk of volcanic ash.
- **Constraints to HPMV access:** Physical constraints on HPMV limit the efficient movement of freight. Several bridges do not allow full HPMV capability.
- **Volcanic activity:** The proximity of the corridor to the volcanically active mountains within Tongariro National Park create a risk of volcanic ash.

Reliability and efficiency

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

- **Crashes causing significant delays:** Due to the narrow nature of the corridor, and in some places a lack of alternative routes, any crashes along the corridor have the potential to close the road for significant periods of time, albeit to the relatively low volume of traffic.
- **Climatic conditions:** The alpine climate around the corridor results in snow events and ice forming on the pavement in winter. These issues result in uncertain route options, unreliable travel times and safety risks.

Safety

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

- **Safe use:** The challenge on this corridor to ensure safe use of the highway when this corridor is not a priority for safety investment.
- **Out of context environments:** There are moderate to high speed out of context curves on the northern section which create a high risk of loss of control crashes, particularly for trucks.

People, places and environment

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

- **After-hours access to facilities:** There is a lack of out of hours facilities in the higher Heavy Vehicle trafficked section between 8 Mile Junction and National Park.
- **Stormwater management:** Harvesting of forests and conversion to pasture land means water is no longer being held within forest lands and resulting in increased flooding on the corridor. This is exacerbated by under capacity culverts, shallow swales and silting of the stormwater system.
-

Investment future considerations

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

- **Dairy conversion** from forestry on parts of the corridor may have a minor future impact on maintenance. As land use intensifies and more access is required, planning and foresight is needed so the appropriate site and form of access is provided for immediate and potential future use.
- **Limited passing opportunities:** This leads to reduced travel time reliability and inappropriate driver behaviour. Whilst the corridor has relatively low volumes the targeted of passing lanes should focus on the sections likely to carry higher freight volumes.
- **Further investigations into resilience:** A resilience study would provide a better understanding of the risks and issues within this corridor and enable the development of a more informed strategy to manage and mitigate risks.
- **Communications:** Better management of the journey experience through speed management, enforcement and driver information. ITS system investment is important as real-time information is critical in planning and diverting journeys. ITS can convey important information around the location of snow and ice issues, slips, rock falls, flooding, and crashes and convey available routes that customers can still use.
- **Monitoring high risk areas:** Mitigating slope on a priority basis by actively monitoring prone areas and investigating preventive maintenance options. Climate change with projections of increased severity of storm events and rainfall will impact future maintenance and risk assessment around slips and rock fall along the corridor.
- **Widening and protection:** Safety improvements creating recovery space outside of traffic lanes, and protection from or removal of roadside hazards, including hazardous bridge arrangements and level crossings.
- **Relationships:** Effective relationships between iwi and associated councils to work together and maximise access to cultural and heritage places to support economic and social growth. This may require safety and journey management programmes to ensure the corridor continues to meet its transport responsibilities.
- **Review of stopping areas and development of a stopping area strategy:** Suitable stopping places are needed in places to provide, among other things, safe areas where tourists can pull off the road to view the mountains and other notable sights and avoid them parking in dangerous areas. Consideration could be given to maintaining less stopping areas but to a higher, more effective standard.
- **Low volumes:** Due to the low volumes of vehicles on this corridor, no exceptional increases in the maintenance requirement is expected on this corridor.

SH4 prone to erosion and undercut, particularly during storm events

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

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