Access to Rotorua from N.S.E.W.

CORRIDOR MANAGEMENT PLAN

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NZ TRANSPORT AGENCY
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Executive summary

The Access to Rotorua from the N.S.E.W corridor is a collection of secondary highways that connect Tauranga, Taupo, Whakatane and South Waikato to Rotorua, thus providing key transport links in and around central and southern Bay of Plenty. The corridor comprises SH27 (from Matamata to Tirau), SH5 (from Tirau to Wairakei), SH28 between Putaruru and Te Poi, SH30 between Atiamuri and Whakatane, SH33, SH34 from Otariki through Te Teko and Kawarau, SH36 between Tauriko and Ngongotaha, and SH38 between Rainbow Mountain and Murupara. The Kinleith Branch, Mount Maunganui Branch, and Murupara Branch rail lines provide alternatives to road travel for freight, particularly for logs and wood products.

The corridor is approximately 435 km long (3.8% of the state highway network). The total value of assets along the corridor is $688M (3.0% of the total national asset value).

The corridor provides the main passenger and freight road link for the 70,000 residents of the Rotorua Lakes District and connection to 364,000 residents in Tauranga City and the other surrounding districts of south Waikato and wider Bay of Plenty. As such, the corridor is a significant enabler of the economy, particularly of forestry and tourism, in the area.

The corridor facilitates important links for Central North Island forestry which contributes $3.5B to New Zealand's exports earnings each year. The corridor also provides a link to the Port of Tauranga which is New Zealand's largest export port.

Rotorua is internationally renowned and New Zealand's 3rd most-important tourism destination. A high proportion of domestic and international tourists originate from Auckland and Waikato meaning the road corridor into Rotorua is a nationally important tourist route.

Safety is the biggest concern currently on this corridor. High numbers of deaths and serious injuries are occurring on the corridor due to road width and layout. The current layout struggles to support safe movement of the wide range in customers from walking and cycling through to agricultural vehicles and large HPMV trucks.

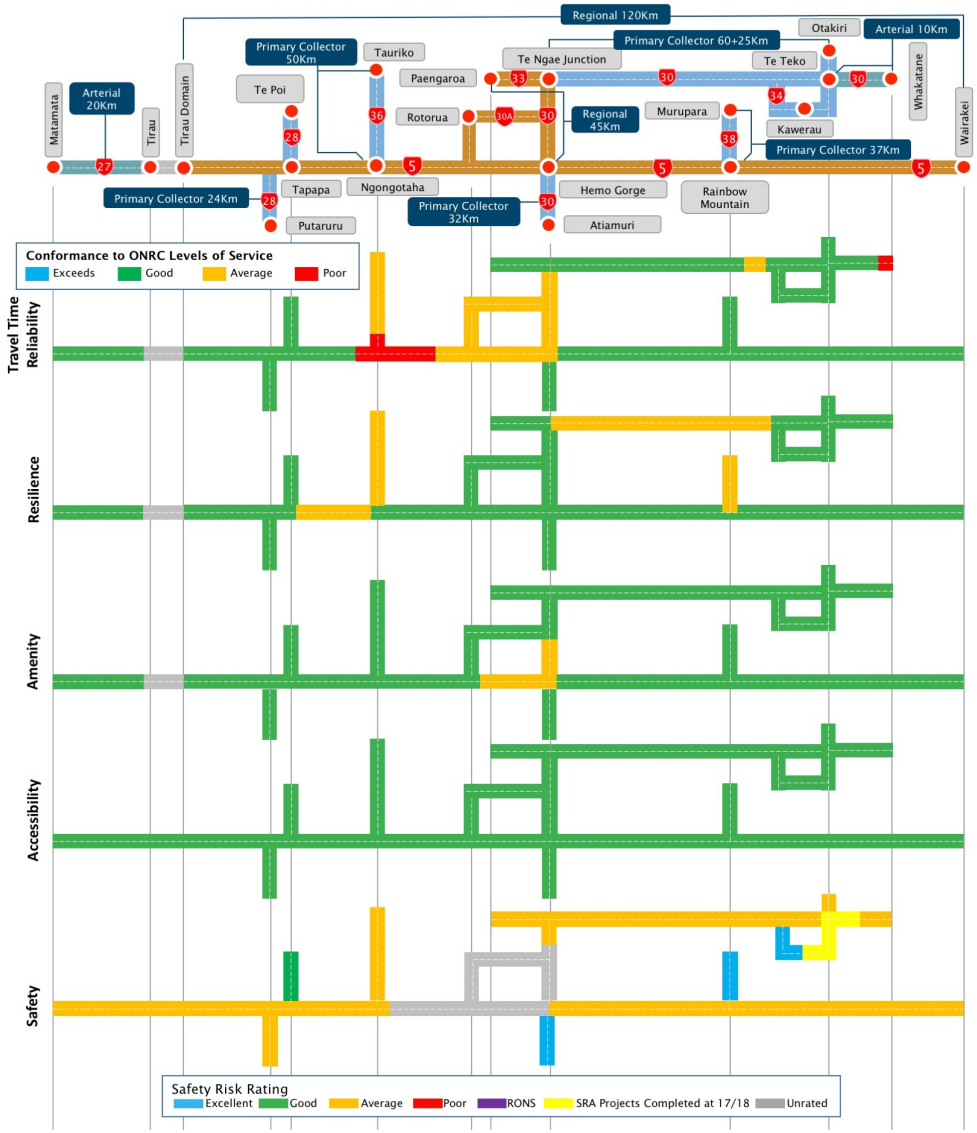
Residential and commercial growth in the urban area of Rotorua is creating additional traffic demand putting pressure on the current corridor configuration.

The majority of the rural parts of the corridor have minimal passing lanes leading to driver frustration and increased risk taking that can result in crashes.

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

Future investment is primarily targeted at improving the safety performance of the corridor, through the installation of additional safety assets such as rumble strips, median and side barriers, and shoulder widening.

Figure 1 - Performance of the corridor against ONRC outcomes



Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Access to Rotorua 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.

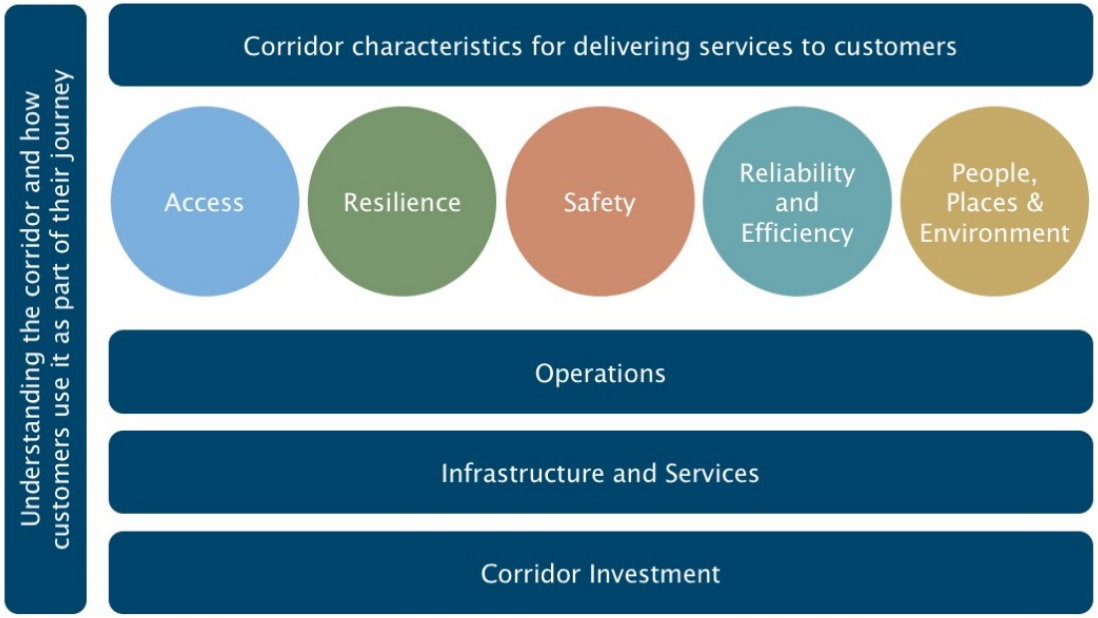
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on 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 Access to Rotorua from the N.S.E.W connects Tauranga, Taupo, Whakatane and the wider Waikato to Rotorua. The corridor comprises SH5 (from Tirau to Wairakei), SH27 (from Matamata to Tirau), SH28, SH38, SH30 (SH1 to Whakatane), SH33, SH34, and SH36. The Kinleith Branch, Mount Maunganui Branch, and Murupara Branch rail lines provide alternatives to road travel for freight, particularly for logs and wood products.

The corridor provides primary links to and around Rotorua and the surrounding Waikato and Bay of Plenty Regions. As such, the corridor is a significant enabler of the economy, particularly of forestry and tourism, in the area.

The regional economy

The corridor sits primarily in the Bay of Plenty region which in 2015 had a population of 271,000, growing by 4% between 2006 and 2013. The region currently produces 5.3% of national GDP and provides 6% of national employment. From 2007–2013, the region's GDP increased 25%, slightly more than the national average.

The Bay of Plenty economy has traditionally been centred on export industries with an estimated 30% of employment deriving from export based activity. Key national and regional industries located in the region include horticulture, agriculture, forestry and manufacturing. The Port of Tauranga is New Zealand's largest export port, handling 32% of the nation's exports by volume and value in 2014.

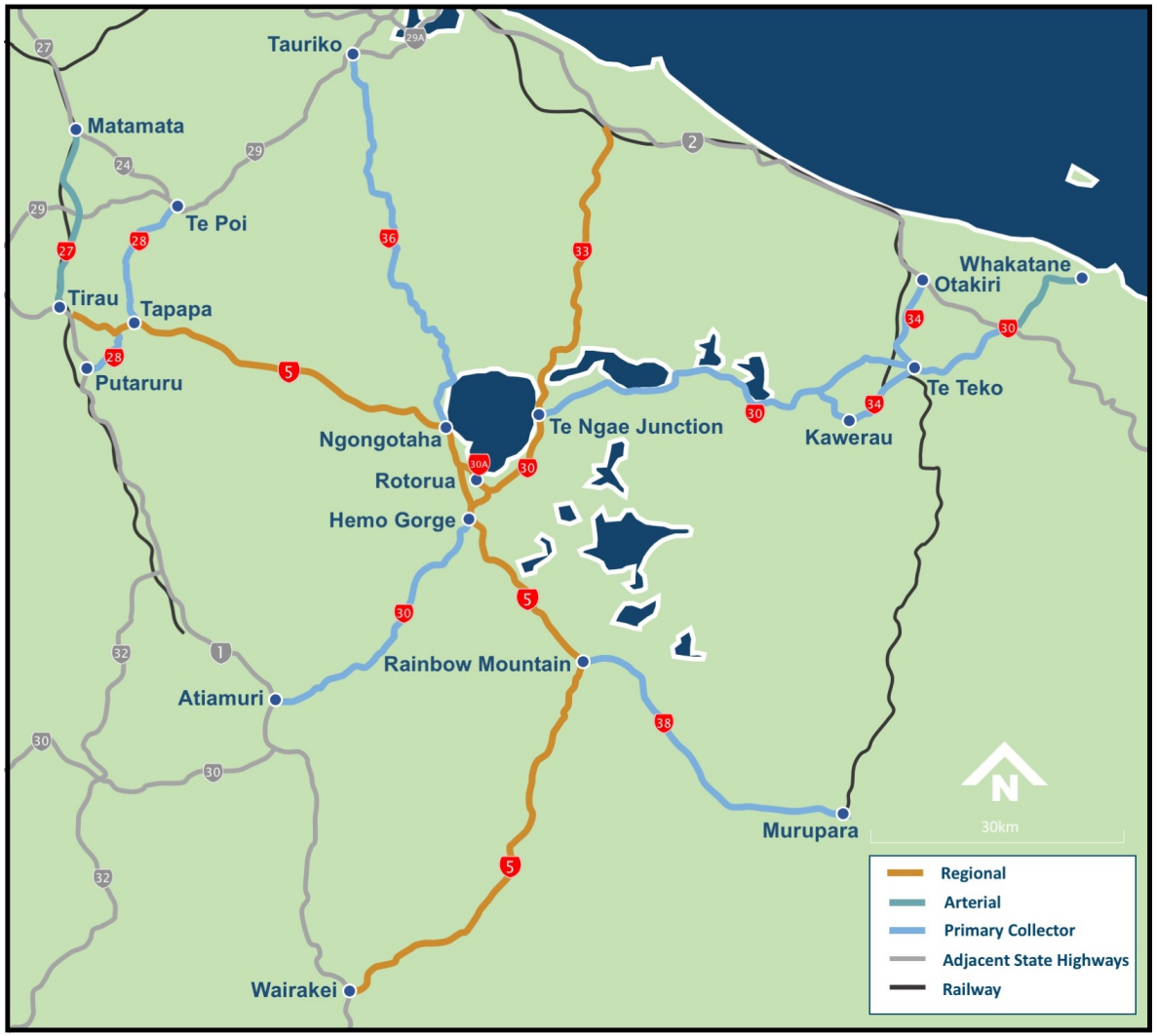
The Central North Island (including the Bay of Plenty) accounts for 30% of New Zealand's exotic plantation forest resources (545,000 hectares), contributing to the $3.5b New Zealand earns from forestry exports each year.

Tourism is a significant contributor to the regional economy. Rotorua is internationally renowned and New Zealand's 3rd most-important tourism destination. The tourism spend in Rotorua was estimated to be $501 million in 2013. A high proportion of domestic and international tourists originate from Auckland and Waikato.

Rotorua is well known as an event destination with established supporting infrastructure. For example, the Rotorua Marathon which has run for over 50 years.

Rotorua currently hosts numerous conferences with a goal of increasing visitor expenditure by 3 to 5% per annum. Beyond the various tourist attractions, Rotorua is also marketed as an international wellness centre which is likely to be attractive to the growing Asian market. Other strategies include linking Queenstown and Rotorua with direct flights.

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 things that customers' value from the transport network needs to be understood in the context of who the customers are.

Daily commuter

The corridor from Hamurana (SH36/ SH5), Mourea (SH33) and Tikitere (SH30) through to Rotorua provides a commuter route during weekday peaks and closer to Rotorua provides for journeys via active modes and public transport. A short length of commuting occurs between Pyes Pa and Tauranga. There is also some daily commuting between Tauranga and Rotorua.

Insights into daily commuter users:

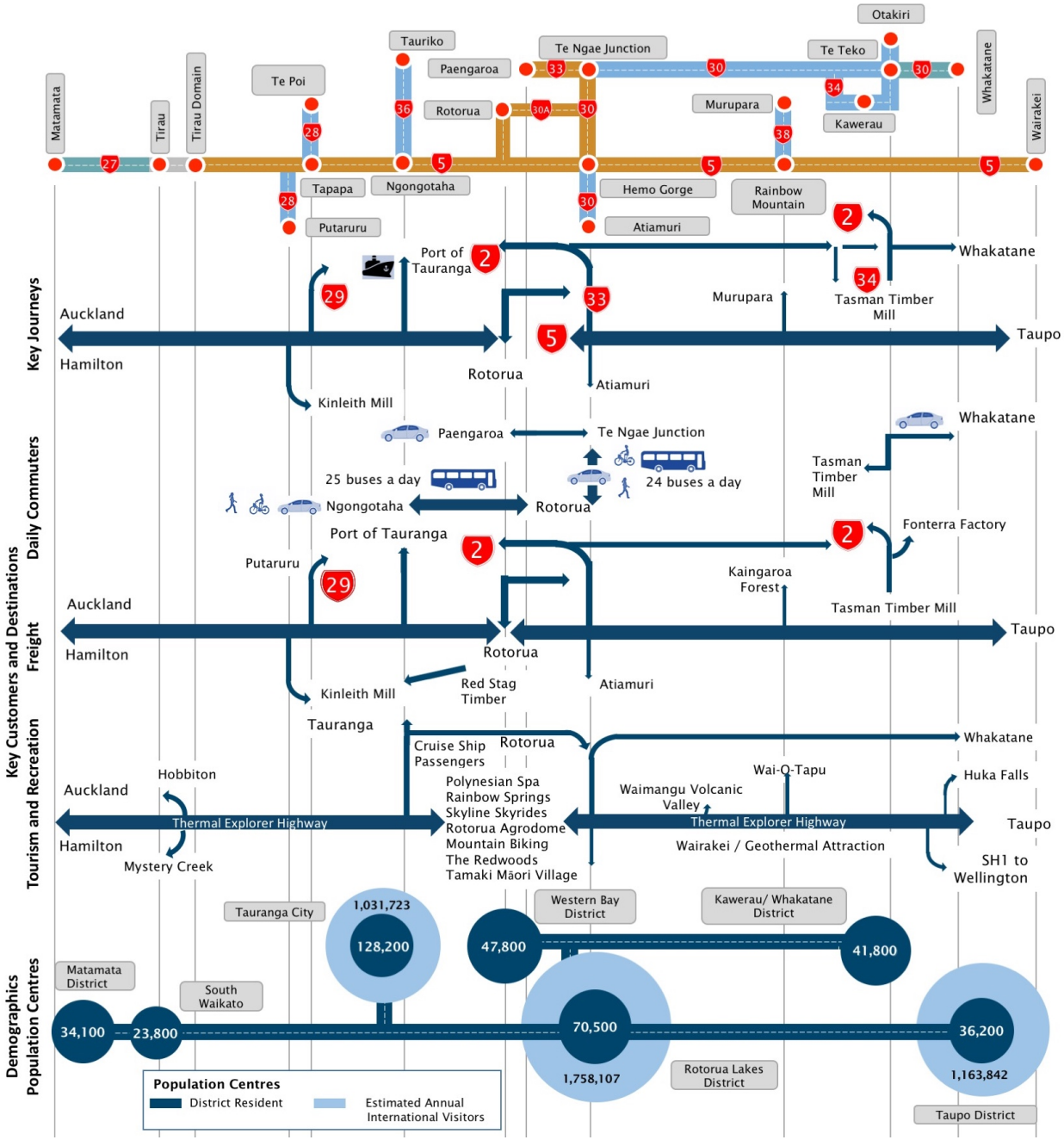
Road use: The predominant mode is private vehicle. Active modes (cycling and walking) are provided for from Ngongotaha and the Rotorua Airport into Rotorua. Half hourly buses are provided during the morning and evening peaks from Holden's Bay and Ngongotaha.

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 corridors from Ngongotaha (SH5) and the Rotorua Airport (SH30/ SH30a) into Rotorua face access issues arising from urban (residential and commercial) growth, as well as intersections and accesses along the route. The corridor from Pyes Pa to Tauriko is facing increasing pressure at its intersection due to increasing residential development surrounding the corridor.

Daily commuters expect: A predicable journey given time of day, 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

Tourism is a significant contributor to the BoP regional economy. Rotorua is internationally renowned and New Zealand's 3rd most-important tourism destination (including events) (8.3% of the country's total visitor nights), receiving 3.2M tourist visitors in 2016. The tourism spend in Rotorua was estimated to be $501 million in 2013. A high proportion of domestic and international tourists originate from Auckland and Waikato travelling down the Thermal Explorer Highway (SH5) to Rotorua and then on to Taupo and Wellington.

The corridor provides access to the wealth of tourist attractions in the Rotorua area including geothermal hot pools, adventure tourism, Maori cultural experiences, mountain biking on forest trails, national cycle trails, significant native forests, lakes and rivers.

Insights into tourist and recreational users are as follows:

Road use: Travel is made by mixed mode including passenger vehicle, campervan, and bus. Journeys tend to start from Auckland driving into and staying in Rotorua for a few nights, then driving on to Taupo and Wellington to head to the South Island. Inter-regional buses travel from Auckland, though the Waikato or Bay of Plenty and on to Rotorua.

Road knowledge: Many international visitors have not experienced New Zealand road conditions and tend to be focused on the landscape and adventure (roads are a means to an end). Travel times can be underestimated. These visitors have limited or no knowledge of intermediary localities on the journey and don't anticipate where the road environment changes or 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. This is worsened by freight volumes on the corridors.

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 safely for refreshments and toilet breaks.

Freight operator

Freight movements include general freight across the upper north island and forestry between the Port of Tauranga and towns, mills and forests in the Waikato and Bay of Plenty Regions using SH5. Timber is cut from forests all around the corridor then taken either to the one of the three mills (Red Stag south of Rotorua, Kinleith Mill south of Tokoroa and Tasman Mill north of Kawerau) or the Port of Tauranga (SH30 and SH33). Significant traffic volumes also transfer materials between the mills (SH30).

Insights into freight operators are as follows:

Road use: Logs and general freight are moved by large standard and HPMV trucks along the corridor which provides the most direct and efficient route for the freight journey.

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 with consistent width and visibility with convenient places to stop for drivers to have a rest, access services and facilities; and passing lanes for vehicles that want to overtake. 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 with other network providers to provide a one network approach. We work closely with the TLAs and regional councils along the corridor shown in Figure 5.

Collaboration along the corridor

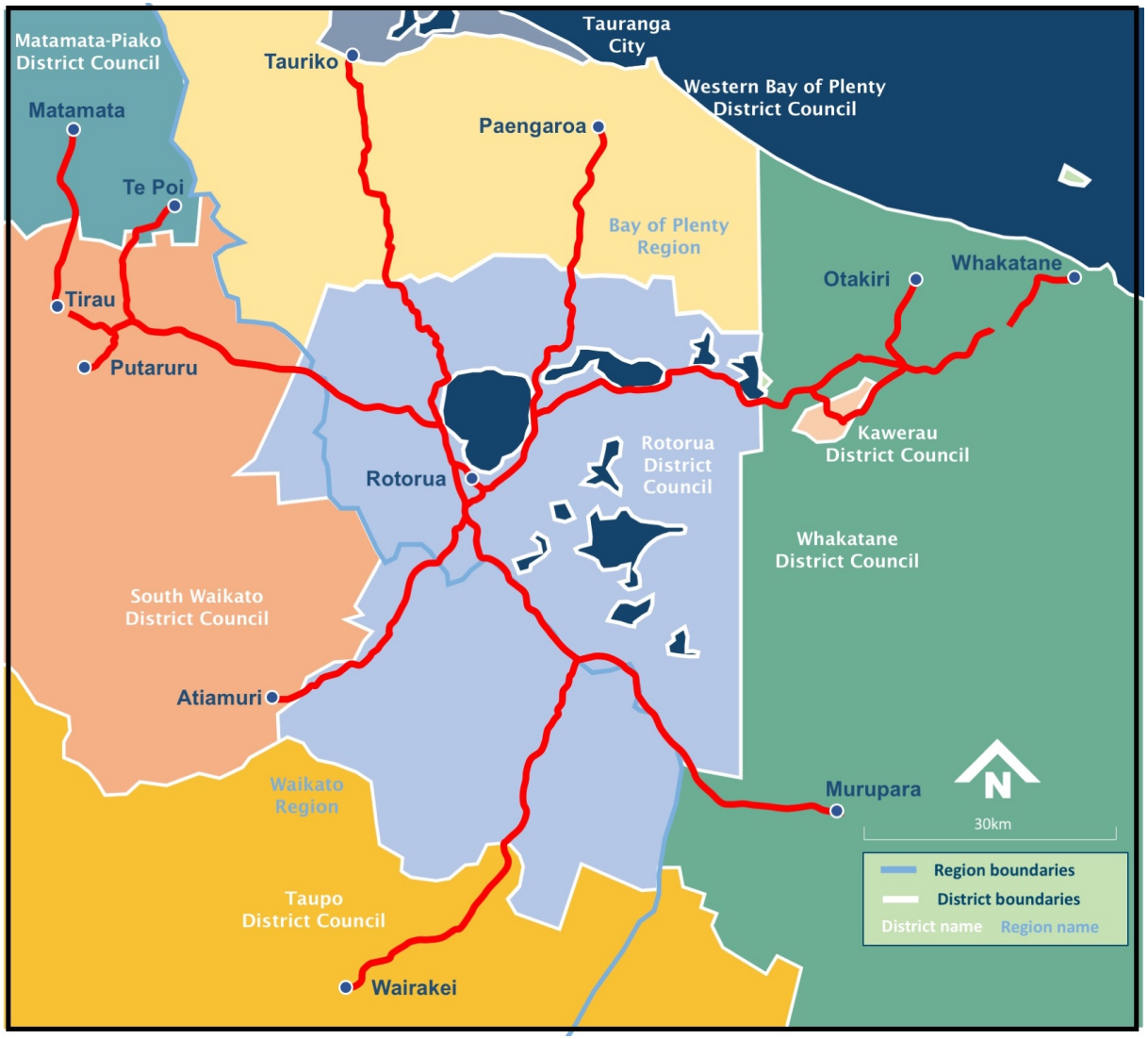
The NZ Transport Agency is collaborating with the Rotorua Lakes District Council on the Connect Rotorua programme that is considering the future form and function of the transport network within the Rotorua area. Other projects include the Urban Cycle programme to develop cycle ways through Rotorua, in particular at the Old Taupo Road / Hemo Road roundabout and on Sala Street.

Local authorities are actively planning to improve inter-regional connections through the Upper North Island Strategic Alliance (UNISA), which established a long-term collaboration between Auckland Council, Bay of Plenty Regional Council, Northland Regional Council, Waikato Regional Council, Hamilton City Council, Tauranga City Council and Whangarei District Council to respond to and manage a range of inter-regional and inter-metropolitan issues. UNISA is working with partner agencies, including the NZ Transport Agency, to develop a UNI Freight Accord and better target future investment in these critical inter-regional connections.

The NZ Transport Agency draws on local Councils to maintain and operate the corridor in the urban areas. There is a head of agreement with Whakatane District Council to run joint street lighting in Whakatane. There is also a delegation for Rotorua Lakes District Council to operate street lighting, parking enforcement, and sweeping on the corridor in Rotorua.

The NZ Transport Agency is currently working with Tauranga City Council on a Programme Business Case for development in Tauriko.

Figure 5 - Map of associated local authorities



Network Outcomes Contracts approach

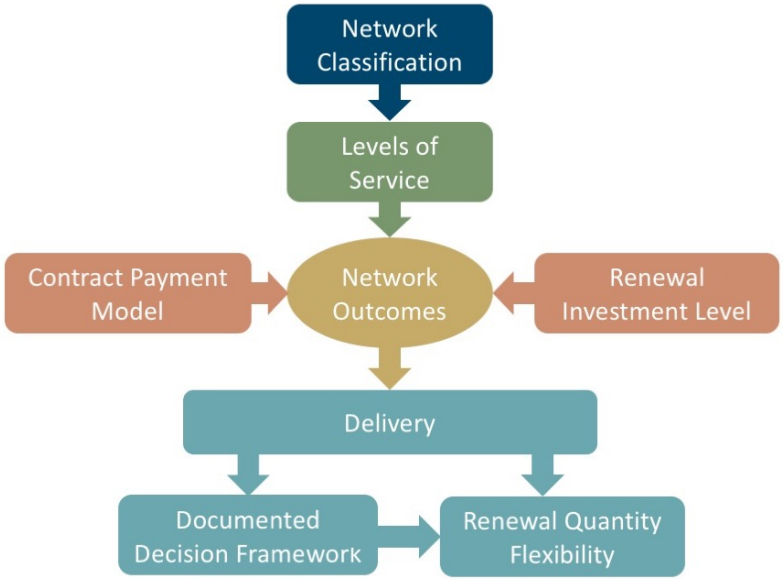
Network Outcome Contracts (NOC) are aimed at improving the effectiveness of service delivery for maintenance and operations of the state highway network. Elements of previous procurement methodologies (PSMC, Hybrid and Traditional models) have been integrated into the NOC contract model which delivers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

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

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

The contract process for the NOC's is shown below:

Figure 6 - NOC process



Collaborative delivery of services

The Access to Rotorua from N.S.E.W corridor crosses over four NOC contract areas. The majority of the corridor falls with the Bay of Plenty East NOC which includes the north end of SH36. The Central Waikato NOC includes SH5 south of the Waikato River and within and west of the Mamaku Ranges, SH27 and SH28 south of SH29. The East Waikato NOC includes SH27 north of SH29.

Bay of Plenty East Network Outcomes Contract

The Bay of Plenty East NOC is undertaken by Higgins. The contract commenced on 1 July 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 Bay of Plenty Region, awarded to Beca in November 2015 with a contract term of three years, plus two additional years (1+1) based on performance.
- **Traffic monitoring sites** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca on 1 November 2016 with a contract term of two years with the option based on performance for a further three (1+1+1) years.
- **Traffic signals** – The traffic signals in Rotorua and wider ITS assets are managed by the Tauranga Traffic Operations Centre (TTOC). Traffic Systems Ltd are responsible for the traffic signals maintenance and upgrades.
- **Lighting** – Rotorua Lakes District Council manage the lighting on the highways within Rotorua. Whakatane District Council manage the lighting on the highways within Whakatane.

Bay of Plenty West Network Outcomes Contract

The joint Western Bay of Plenty District Council / NZ Transport Agency One Network Maintenance Contract is undertaken by Westlink Bay of Plenty which is a Joint Venture between Opus International Consultants (lead), Downer NZ Limited and J.Swap. The contract commenced on 1 November 2014 for a seven-year period with the option based on performance for a further two years. The contract makes WestLink Bay of Plenty is responsible for the management and maintenance of Western Bay of Plenty District Council's local roads, Bay of Plenty state highways and Tauranga City state highways.

- **Regional bridge and structures** – Professional Services contract covering the wider Bay of Plenty Region, awarded to Beca in November 2015 with a contract term of three years, plus two additional years (1+1) based on performance.
- **Traffic monitoring sites** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca on 1 November 2016 with a contract term of two years with the option based on performance for a further three (1+1+1) years.

Roadside safety improvements are proposed from the outskirts of Rotorua near Te Ngae, along SH33 to Paengaroa

Central Waikato Network Outcomes Contract

The Central Waikato NOC is undertaken by Downer NZ Limited. The contract commenced on March 2015 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 on 1 November 2016 with a contract term of two years with the option based on performance for a further three (1+1+1) years.

East Waikato Network Outcomes Contract

The East Waikato NOC is undertaken by Broadspectrum. The contract commenced on 1 July 2015 for a five-year period with the option based on performance for a further two (1+1) years.

- **Regional bridge and structures** – Professional Services contract covering the wider Waikato Region, awarded to Beca in October 2015 with a contract term of three years, plus two (1+1) additional years based on performance.
- **Traffic monitoring sites** – Professional Services contract covering the wider Waikato and Bay of Plenty Regions, awarded to Beca on 1 November 2016 with a contract term of two years with the option based on performance for a further three (1+1+1) years.

Drivers for change

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

Regional growth and development

The Bay of Plenty region GDP was $11.17B in 2013, 5.3% of national GDP and provides 6% of national employment. The Bay of Plenty economy has traditionally been centred on export industries with an estimated 30% of employment deriving from export based activity. As the region grows, freight volumes will increase, principally on the western and southern parts of the corridor.

The key economic developments for the Bay of Plenty as identified by the Ministry of Business, Innovation and Employment, which will impact on the corridor, include;

- Forestry is looking to value added products with processing within the region, this would reduce the volumes of raw logs transported to the Port of Tauranga but would increase commercial traffic associated with the valued adding industries.
- Better use of disaggregated Maori land to improve forestry productivity could significantly increase logging truck movements from side road intersections and accesses which were not designed for such vehicles.
- A drive to improve yields in dairy and horticulture (kiwifruit and avocados in particular), will increase heavy vehicle volumes and commuter traffic. In addition, new and developing aquaculture industries in the east would increase commuter volumes on this corridor and commercial vehicles on adjacent corridors.

Growth in these industries will impact HCV volumes and a corresponding increase in future maintenance investment.

Rail has some capacity to take freight off roads, this will have a greater impact on adjacent corridors. Whilst upgrading the Kaimai Tunnel may facilitate a mode shift for bulk and heavy freight, road freight volumes will increase with increasing GDP. The modal balance will shift with the relative success and efficiencies of other regional ports. Changes in port contracts can be short term and may reverse in the short to medium term.

Rotorua will continue to be a significant Tourist destination. Growth in GDP will increase the number of domestic tourists, with Rotorua one of the top three domestic destinations. If Rotorua became a trans-Tasman airport tourist road traffic may decrease. The impact of increasing visitor nights on volumes.

The Rotorua Sustainable Economic Growth Strategy, 2011 identified a number of opportunities relevant to this corridor including;

- Establishment of Rotorua as the Australasian hub and ultimately the global centre for R&D and commercialisation of natural materials initiatives.
- Work with Tauranga and Hamilton to assess “twin” and “triple” city models
- Promote centrality for business location for servicing other neighbouring locations such as Eastern Bay of Plenty, South Waikato and Taupo.
- Upgrade the regional roading to allow greater mobility and capitalise on Rotorua’s affordable housing with an increase in Rotorua-Tauranga commuter traffic.

Tauranga metro

Tauranga is now New Zealand’s fifth largest city, overtaking Dunedin in 2016. Tauranga city grew by 48,400 between 1996 and 2016. The growth and changing land use around Tauranga will generate traffic and freight around the northern part of the corridor.

The Port of Tauranga is the largest port in New Zealand, handling 32% of the nation’s exports by volume and value in 2014 and contributes to 8.6% of national GDP. The pursuit of larger ships will change freight flows possibly concentrating flows. As the Region has one of the highest growth rates, commercial traffic growth will adversely impact the region and this corridor disproportionately.

The 2016 SmartGrowth Implementation Committee endorsed developments including a new Urban Growth Area in Tauriko. This will require the coordination of several roading programmes. Recent and planned developments in the Tauriko area include a 20 store shopping centre, a bulk retail centre and residential developments for over 5,000 people – all being significant traffic generators. This will impact SH36 traffic volumes and encourage residential and commercial developments along the corridor.

Key journeys

Auckland to Wellington:

The Auckland to Wellington Key Journey touches the eastern extremity of this corridor. This impacts the key nodes on SH1 and SH5 at Tirau, SH1/SH28 at Putaruru, SH1/SH30 at Atiamuri and SH1/SH5 at Wairakei. This corridor can be an alternative route for tourist who may see Rotorua as a side journey to the Key Journey. As Journeys increase on the adjacent corridors, growth in principally tourist numbers will increase.

Understanding customer levels of service on the corridor

Current levels of service performance

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

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

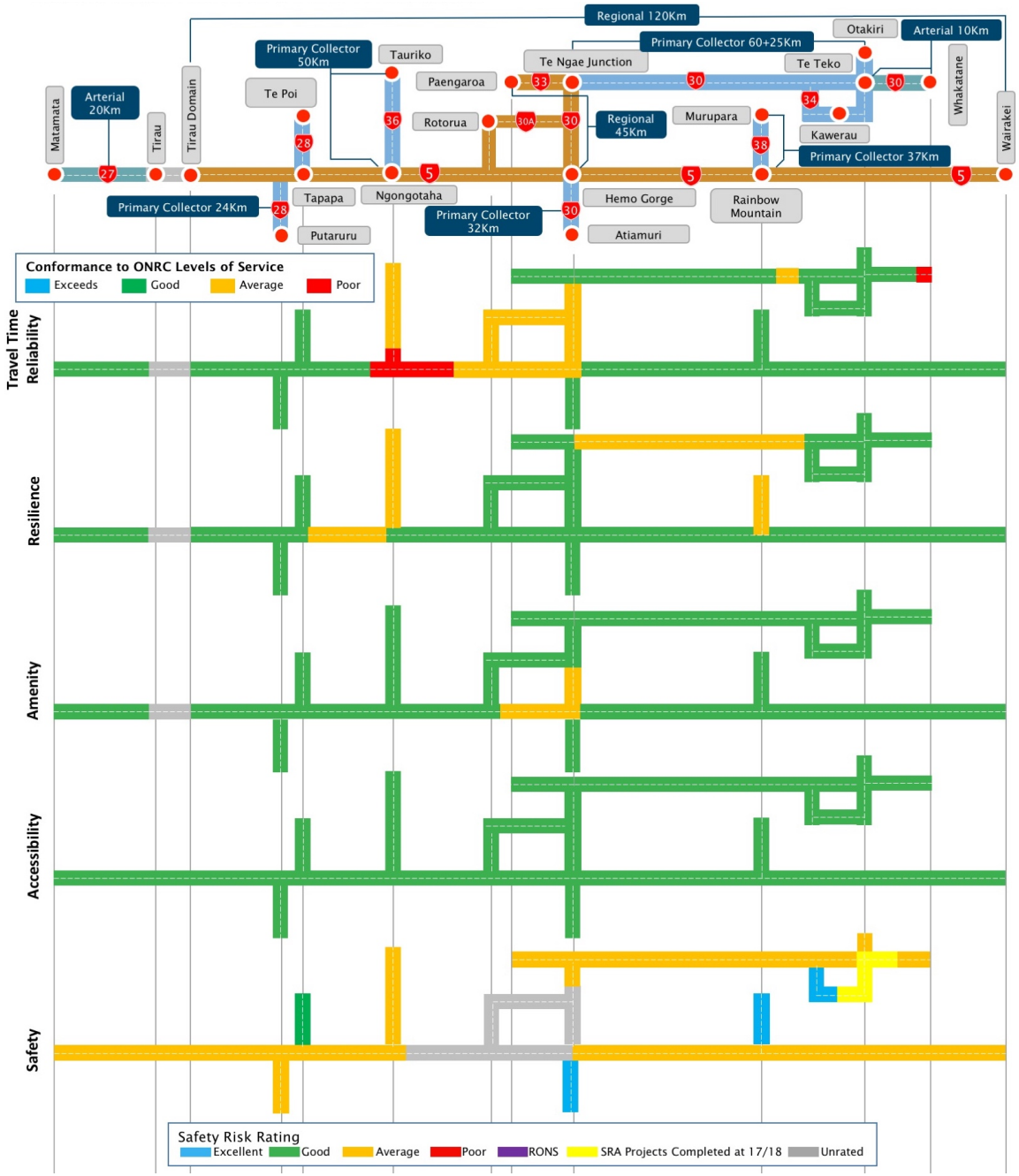
Overall, customers will be provided with the right level of road transport infrastructure where it is needed, determined by a robust, impartial, nationally consistent tool – the ONRC.

Road Classification

The corridor (SH5) from Wairakei to Tirau and SH30 and SH33 from Rotorua to Paengaroa is classified as Regional. The connections out to Matamata SH27 and Whakatane SH30 are classified as Arterial. The secondary routes off the corridor of SH28, SH30, SH30 and SH38 are classified as Primary Collector.

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

Figure 7 - Current ONRC levels of service performance



Summary of current performance

Figure 7 shows how the Access to Rotorua from N.S.E.W 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

Generally, the corridor is adequately free flowing outside of morning and evening peak periods through Rotorua. Commuter congestion leads to unreliable travel times between the Ngongotaha roundabout and Rotorua and on the approach to Whakatane. The Connect Rotorua Programme includes improvements to the eastern approach to Rotorua to deliver improved safety, connectivity, and capacity for vehicle movements. Limited passing opportunities and the winding/ rolling alignment through SH36 lead to reduced reliability.

Aging intersection signals infrastructure is affecting efficient movement of traffic through Rotorua. A programme of renewals is currently underway to address this.

Resilience

The majority of the corridor has either or both alternative routes and/or a low risk of unplanned closures giving it a good resilience rating. The sections of the corridor through the Mamaku Plateau SH5, out to Tauriko SH36, past the Rotoiti and Rotoma Lakes SH30, and out to Murupara SH38 have alternative routes which incur considerable additional travel time resulting in the average rating for these sections of the corridor.

Amenity

At a network level, the corridor is delivering the expected ride quality within both the urban and rural context. The corridor has an industrial feel through Rotorua between Fairy Springs and Mangakakahi, which is not aesthetically pleasing and not consistent as a gateway to Rotorua.

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.

Safety

The road geometry along the corridor is unforgiving, contributing to a high crash rate. There are multiple sections along the corridor that have a high collective and personal risk rating. Star rating along the corridor is rated 2 or 3-star.

The star rating along the corridor denotes major deficiencies in some road features. Future considerations for the corridor include implementation of low cost solutions such as delineation improvements and minor side barrier installation on SH5 and SH30.

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 Safer Roads and Roadsides Programme. These include;

- SH5 - SH38 to Wairakei Safety Improvements
- SH5 - Tarukenga to Ngongotaha Safety Improvements
- SH30 - Owhata to Te Ngae Junction Safety Improvements
- SH30 - Te Teko to Awakeri Safety Improvements
- SH33 - Te Ngae to Paengaroa Safety Improvements
- SH34 - SH30 to Kawerau Safety Improvements

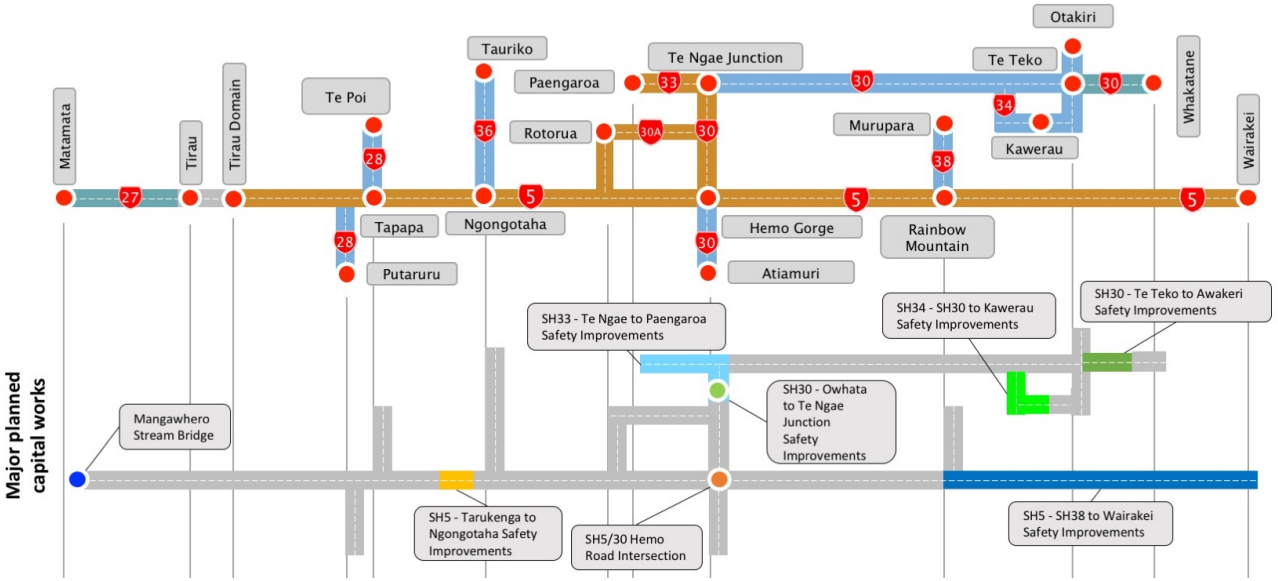
When completed, the planned improvements on the corridor will result in significant reductions in death and serious injuries that are currently occurring on the corridor. This includes progressing the community's request to lower the speed through the Wai-o-tapu settlement.

The Connect Rotorua Programme of improvements is also underway to deliver improved safety, and connectivity to support economic and population growth of Rotorua. The improvements will support tourism by providing a more attractive entranceway into Rotorua from the east and support freight by providing more capacity for vehicle movements.

There are also minor improvements and targeted programmes being undertaken along the corridor as part of nationally coordinated programmes.

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

Figure 8 – Significant corridor planned improvements



Access

Carriageway configuration

The corridor is mostly two opposing lanes with minimal passing lanes and narrow shoulders. Four lanes are provided through Rotorua supporting urban commuter traffic. Passing lanes are more frequent on SH5 between Rotorua and SH38 reflecting the high heavy vehicle volumes on this section of SH5.

Posted speed limits

The corridor is mostly posted at 100 km/h except in the urban area of Rotorua and the smaller communities where the speed environment ranges from 50 to 80 km/h.

Topography/geography

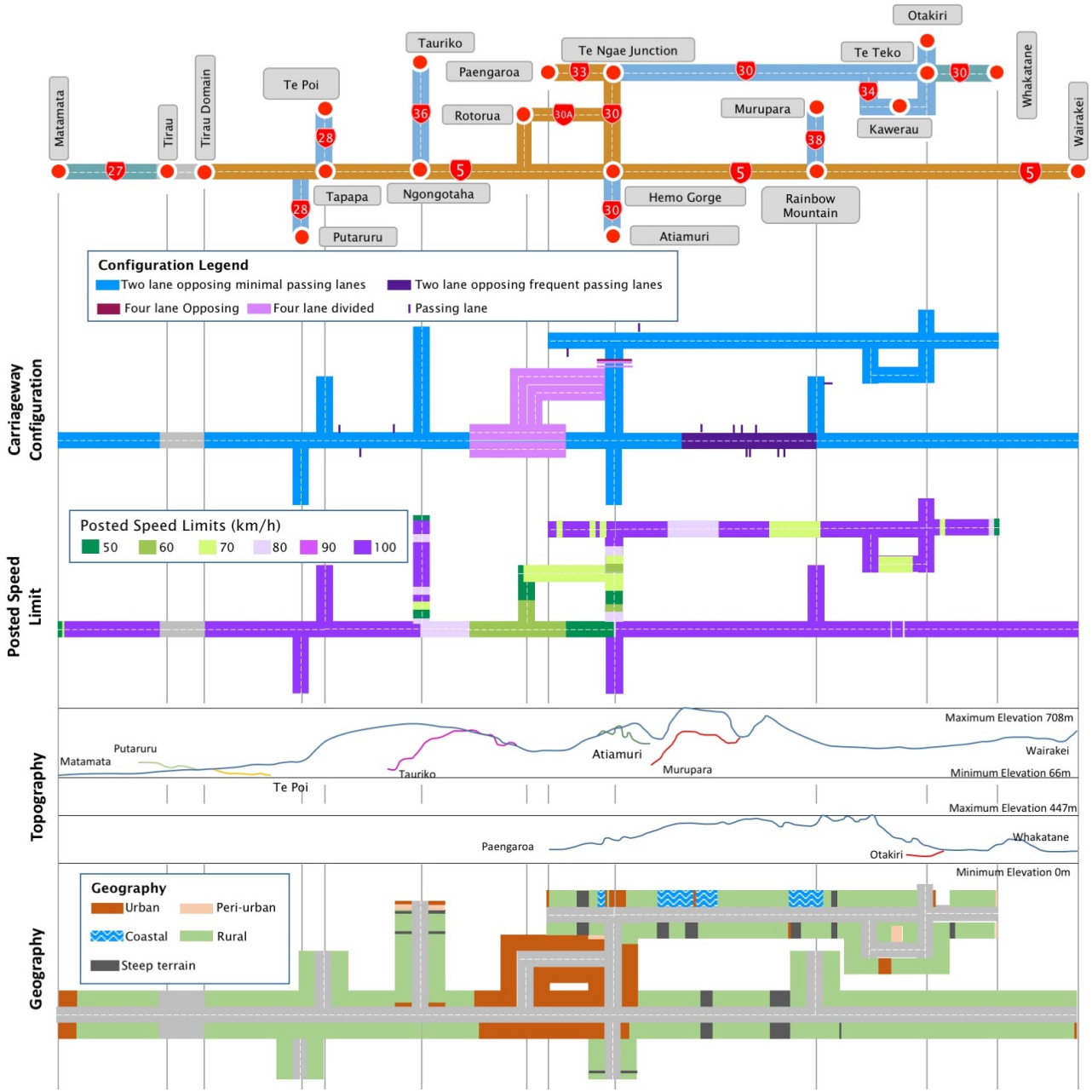
For most of the corridor the topography is relatively flat to moderate inclines. However, the corridor is quite winding and steep through the Mangorewa and Mangapouri Gorges (SH36), and Rotoma Forest (SH30).

SH5 through the Mamaku Ranges is also winding and steep in places. Generally passing opportunities are provided at appropriate spacing on the uphill gradients.

The topography of SH36 in particular is unsuitable for heavy commercial vehicles, which generally favour the SH33 route from Rotorua to Tauranga. However, improvements on adjacent corridors to the north of SH36 may encourage greater heavy vehicle usage in future.

The corridor passes through a range of open rural landscapes, planted forests, the urban environment of Rotorua and smaller communities, several lakes around and to the east of Rotorua, and through the Mamaku Plateau.

Figure 9 - Corridor characteristics

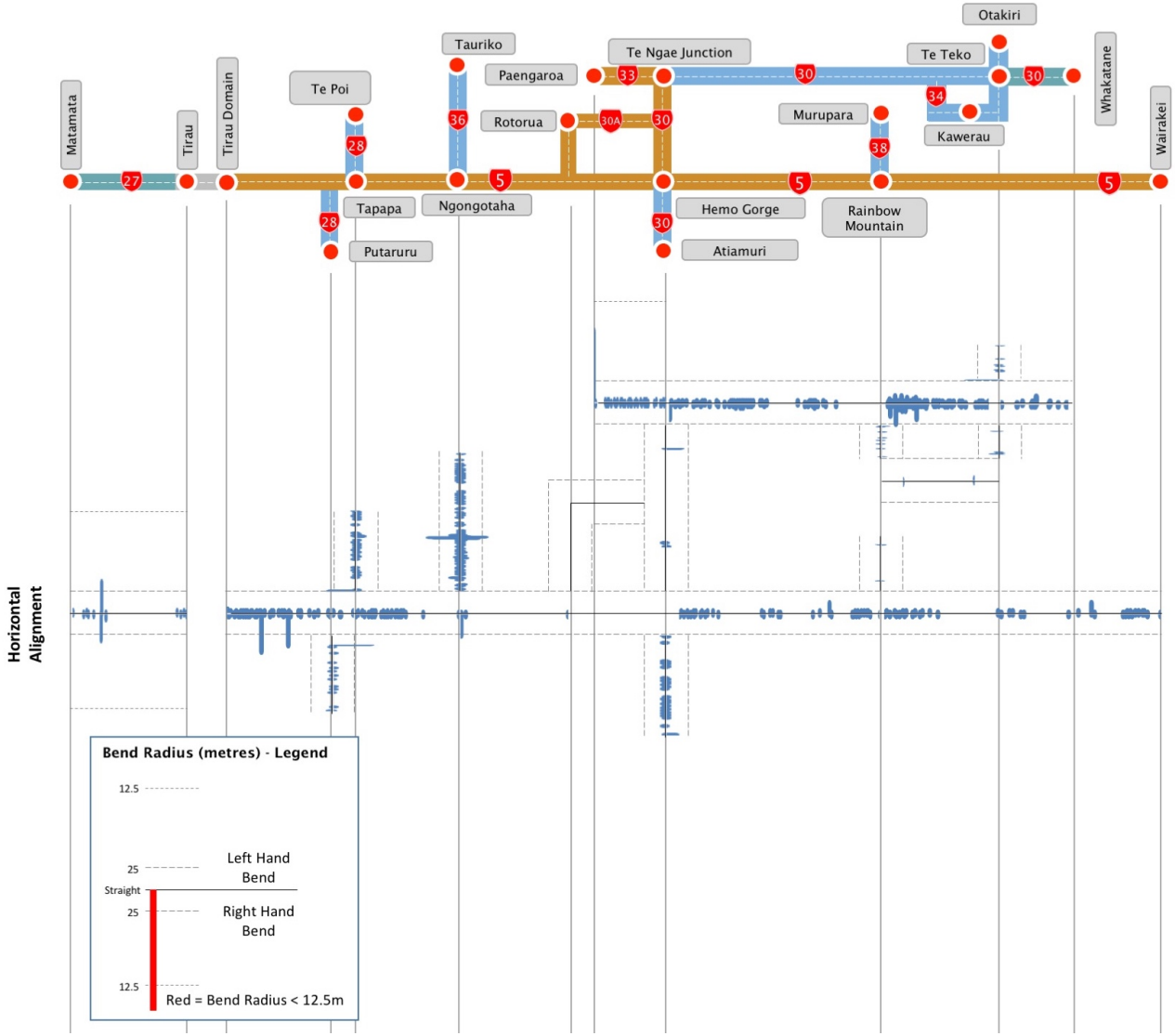


Horizontal alignment

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 isolated areas of larger radius curves, with higher concentrations occurring on the Mamaku Plateau SH5, Along SH36 between Tauriko and Ngongotaha, and on SH30 through the Rotomas. Sharper bends with a radius below 25m occur on SH36 south of Ngawaro., on the Mamaku Plateau SH5, and on SH27 at the SH29 junction in Hinuera.

Figure 10 – Horizontal alignment



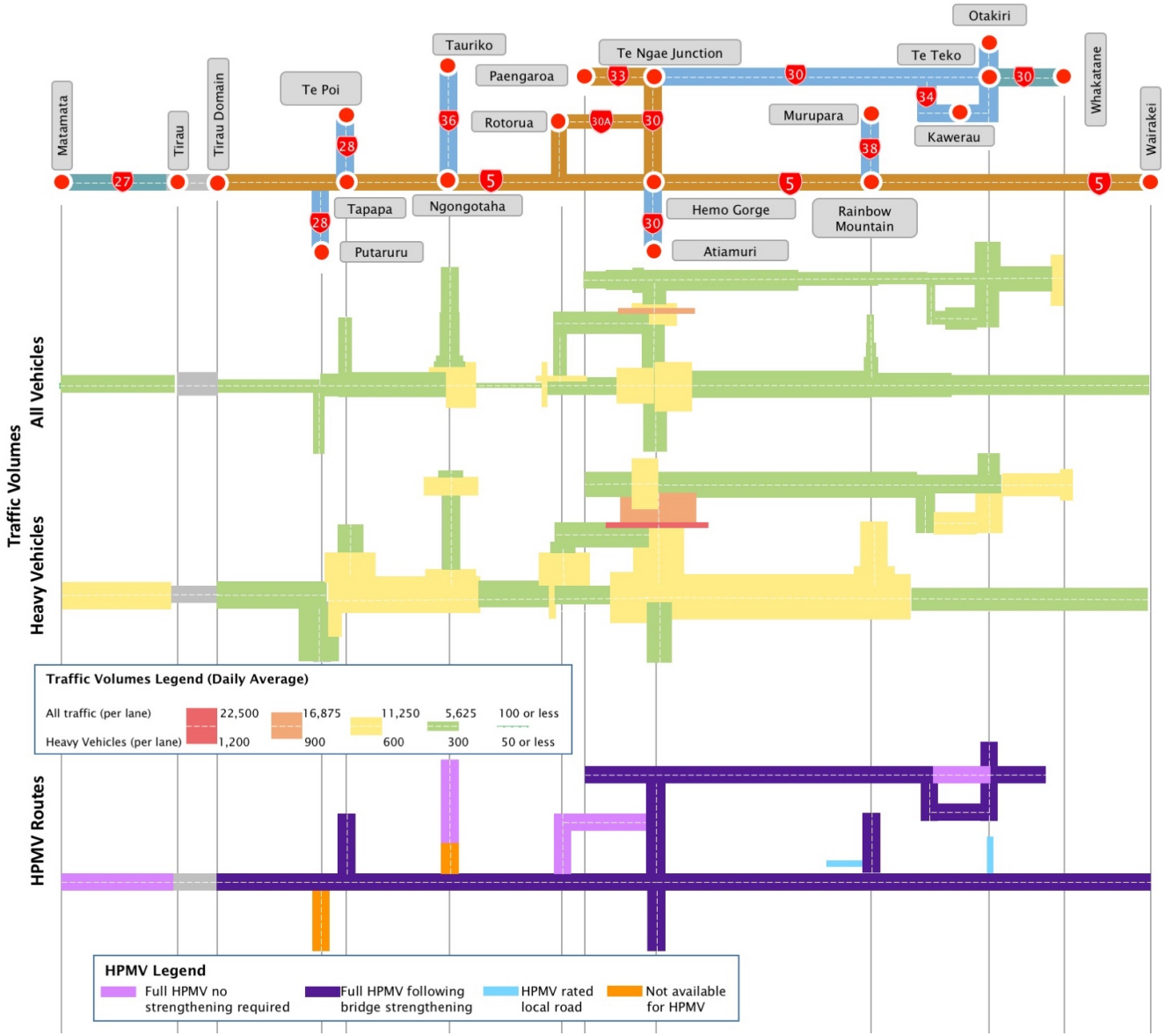
Volumes

Traffic volumes outside the urban areas along the corridor are mostly between 3,000 and 6,000 vehicles per day with heavy vehicle ranging from 200 to 700 vehicles per day. Traffic volumes in the Rotorua urban area range from 8,000 to 36,000 vehicles per day with heavy vehicle ranging from 800 to 2,000 vehicles per day. Traffic volumes are particularly lower (less than 2,000 vehicles per day) out to Murupara (SH38) and on the north and western end of SH34.

HPMV routes

The majority of the corridor has been assessed and/ or upgraded to be able to carry all legal combinations of HPMV. Work is currently underway to bring SH27, SH30, and the northern 30km of SH36 up to full HPMV capability. Broadlands Road provides a local road which is fully HPMV capable at the southern end of the corridor between Reparoa and Taupo. Te Matai Road through to Te Puke is also known to be used by HPMV vehicles.

Figure 11 - Corridor capacity

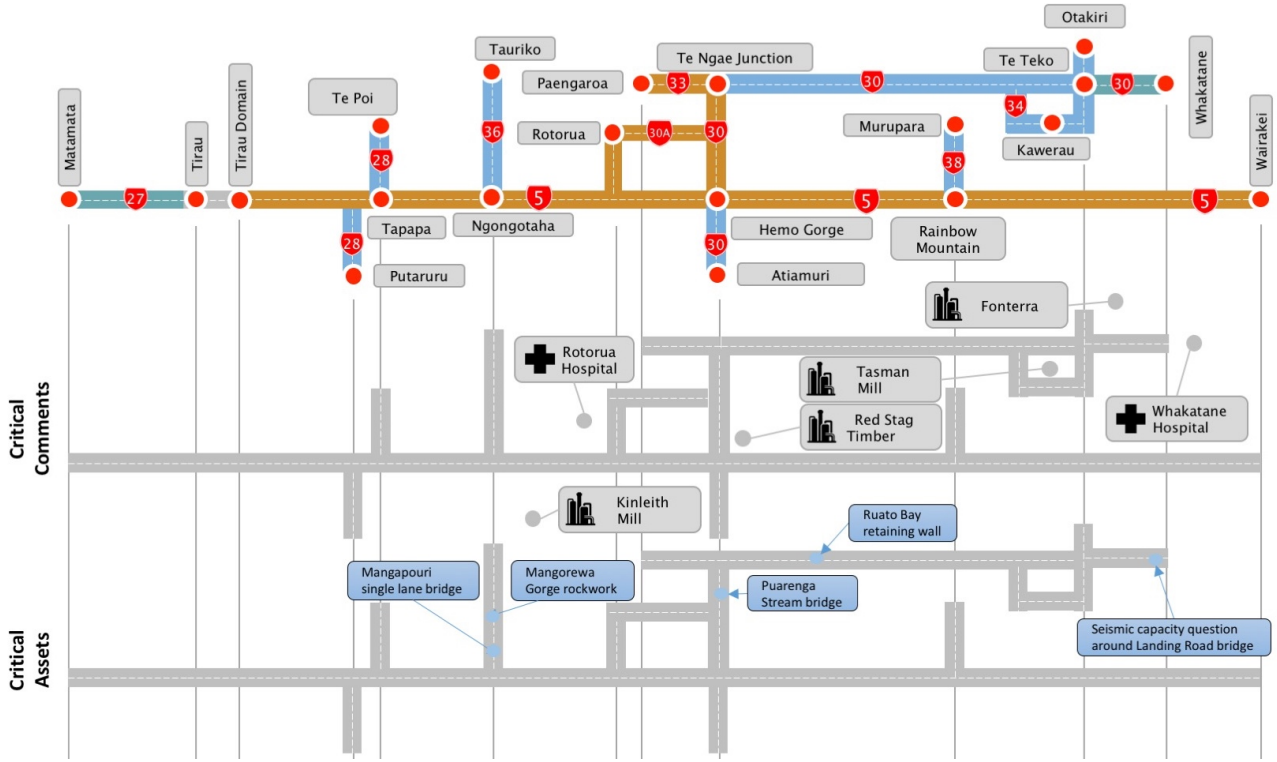


Critical customers and assets

There are a number of critical customers adjacent or close to the corridor which rely on the corridor open 24/ 7 and are vulnerable to interruptions. Examples include the local hospitals, the major forestry mills and milk factories.

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. These include bridges and retaining works. The Puarenga Stream Bridge is particularly important providing a key link to the eastern suburbs of Rotorua.

Figure 12 - Critical customers and assets



Pressures

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

- **Residential and commercial growth:** Urban growth between Pyes Pa and Tauriko on SH36 and in and around Rotorua generally is expected to continue to put pressure on the corridor. The access demands of this growth will reduce the ability of the corridor to facilitate efficient, reliable and safe journeys.
- **Choke points:** Residential and commercial growth will continue to put pressure on intersections leading into Tauriko and Whakatane. Two lane sections within the Rotorua urban area create choke points such as south of Malfroy Road to SH5 and east of Ngapuna. These issues will result in increasing congestion, motorist delay with extensive queuing as growth continues increasing trip unreliability.
- **Limited passing opportunities:** This can lead to reduced travel time, reliability and inappropriate driver behaviour. Regular passing lanes on SH5 between Rotorua and the SH38 intersection and long sight distance in the Tahorakuri area allow for overtaking where the remainder of the SH5 around the SH38 junction has limited opportunities outside the Rotorua urban area. This is exacerbated by good passing opportunities further south on SH5.
- **Narrow carriageway and slow alignment:** Travel speeds are impacted by narrower width and slower alignments through to Tauriko (SH36) and the Rotoma Forest (SH30).
- **Limitations on HPMV access:** Physical constraints on HPMV limit the efficient movement of freight. A number of bridges do not allow full HPMV capability such as Tautau Bridge (SH36).

Future considerations

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

- **Public transport:** As the urban population grows and development expands, the role of public transport in facilitating travel and replacing car journeys within Rotorua will become an increasingly important travel mode to enable more sustainable travel.
- **HPMV access to the port:** HPMV along the corridor leading to the Port of Tauranga is key to enabling efficient freight movements and keeping freight movements on appropriate routes.
- **Redundant sections of the corridor:** Various State highway reviews have changed the function of road sections with the commercial centre of Rotorua. It is possible that the section of SH30A/Amohau Street could be revoked if this link were considered to primarily service local traffic and property access. This would then transfer to Rotorua Lakes Council.

Utuhina Stream and a nearby storm water drain caused significant damage to the pavement on SH5 Rotorua in 2014/15

Resilience

This corridor is vulnerable to closure from crashes and environmental factors which can have a negative impact on the regional economy. The parts of the corridor with a resilience risk include Te Ngae to Kawerau which has experienced a number of slips and rock falls. Flooding has also occurred at various points on the corridor (e.g. south of Hamurana). Alternative routes exist in most parts of the corridor but, are reasonably longer.

Vulnerabilities

The corridor experiences a moderate to low level of slips, rock falls and flooding. Known areas of concern are; rock falls and slips in the Mangorewa Gorge, and between Te Ngae and Kawerau; flooding south of Hamurana; tomos or sinkholes forming at Tuminui Gorge and Earthquake Flat (SH5); and scouring of banks during heavy rainfall at Atiamuri and Te Pu.

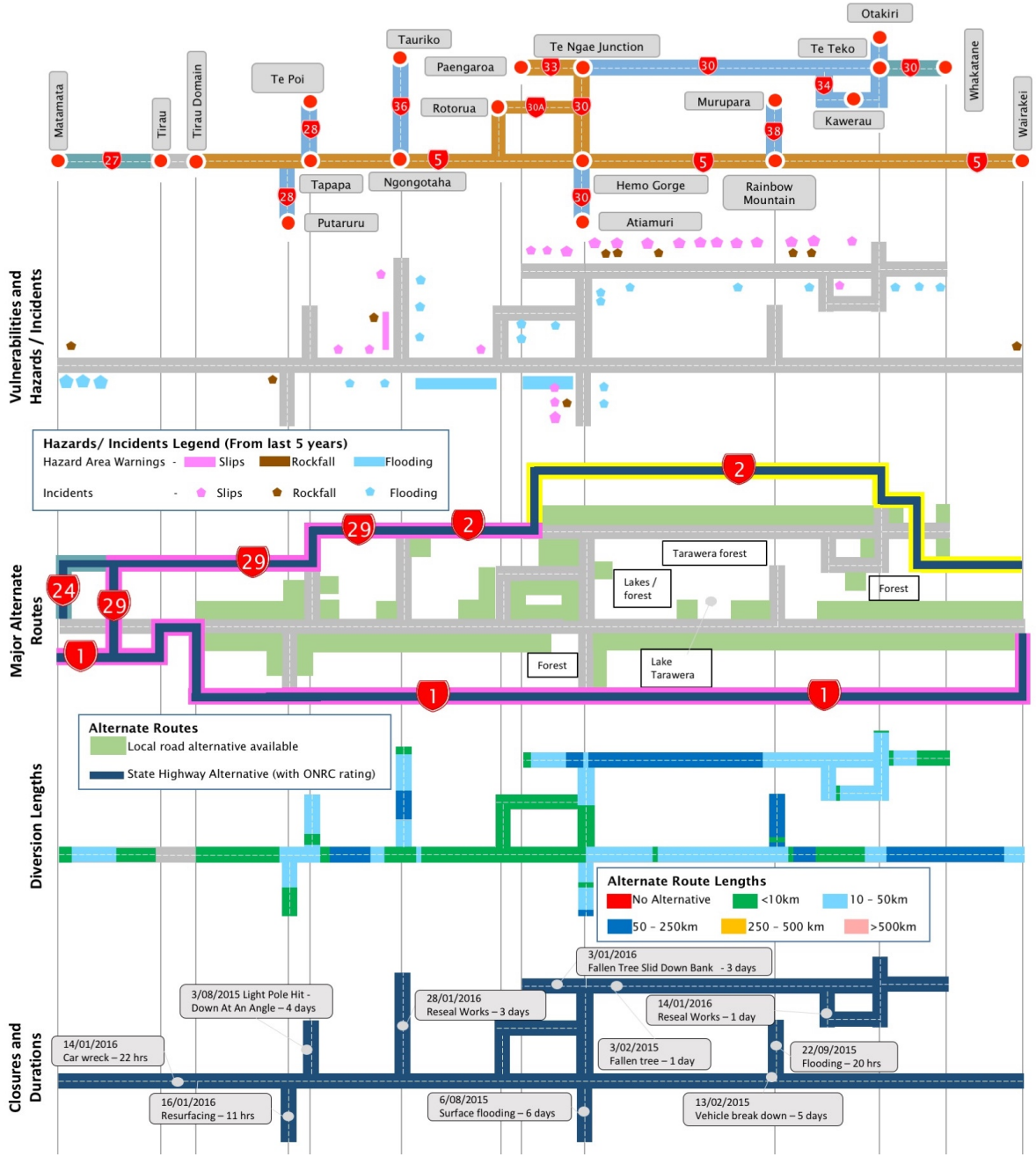
Alternative routes and diversion lengths

Alternative routes exist for a large proportion of the corridor both by state highway (SH1, SH2, SH29) and local road. The multiple lakes, hill ranges and forests surrounding the corridor obstruct potential of some detour routes. The majority of 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 10.

Figure 13 – 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:** The corridor experiences slips and flooding during extreme weather events annually, particularly along SH30, SH36, and the west end of SH5. These events result in mostly partial road closures which have a negative effect on journey times and an adverse economic impact by slowing movement of people and freight. Alternative routes present a moderate increase in travel times. Generally, slips on SH30 are cleared within the day with only severe events causing closures greater than one day.
- **Road closure events:** Lack of advanced and real-time warning of full and partial road closure events means journeys are less adaptable to changing road conditions with some sections of the route having mobile phone coverage.
- **Long detour routes:** Alternative highway and some local road routes on SH30 between Te Ngae Junction and SH34, SH5 through the Mamaku Plateau. Alternative routes for closures on SH38 can add an extra one to two hours of journey time due to the remote nature of this section.
- **Targeted investment:** There are no plans to upgrade alternative routes, due to topology of this corridor, many of the arms of the corridor provide alternative route to those others. The primary focus is on reducing crashes through safety improvements and environmental incidents through prioritised investment in preventative measures to ensure the corridor disruptions are minimised.

Future considerations

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

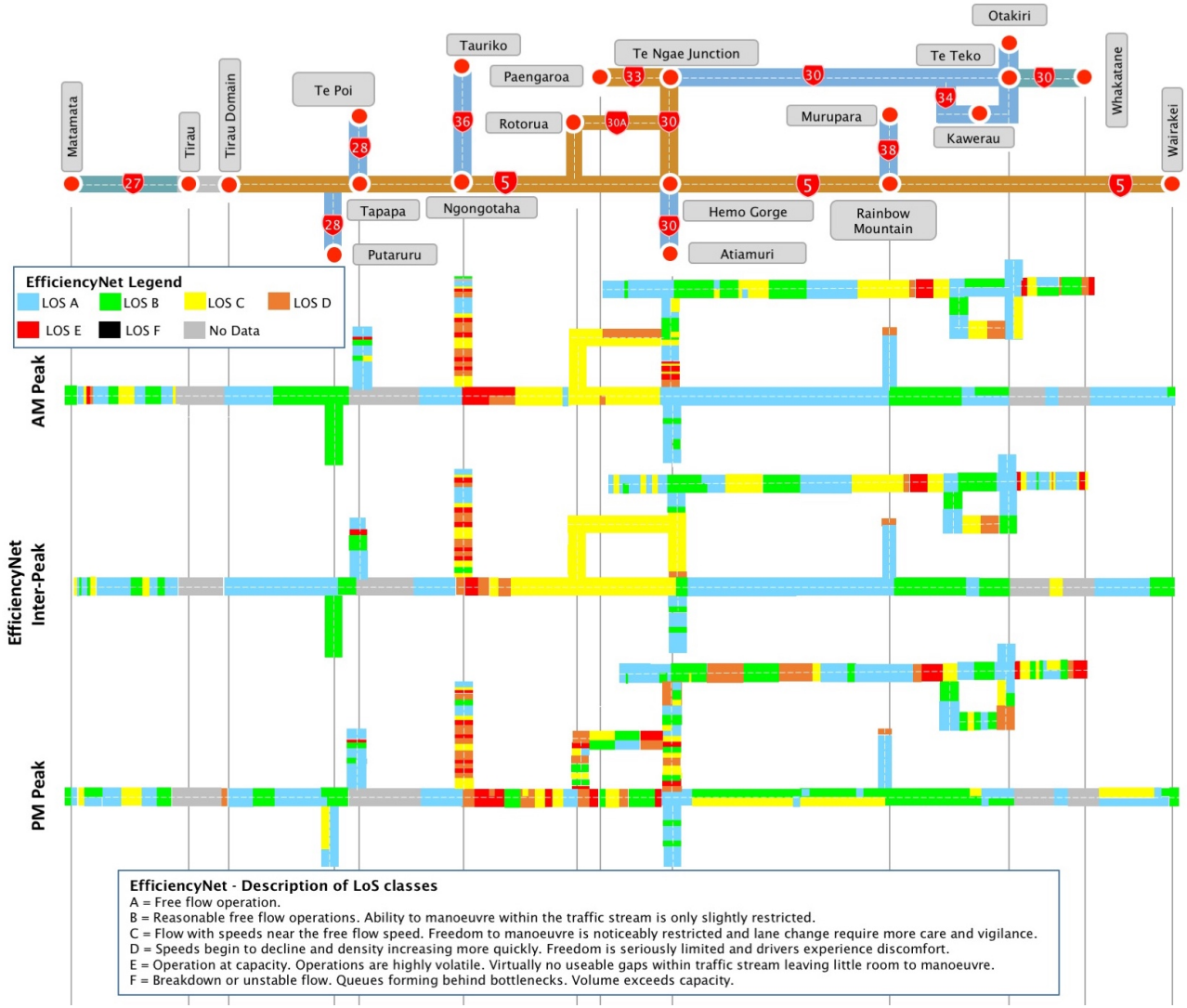
- **ITS Systems:** Investment in real time information is critical for planning and diverting journeys. VMS boards are located on only two of the four approaches to the SH1/ SH5 roundabout at Wairakei. Future locations could service; the Mamaku section of SH5 that carries significant tourist and heavy traffic volumes, the Rotoma section of SH30 that is impacted by slips with both of these sections impacted by poor mobile phone coverage.
- **Monitoring of effects of weather events:** Mitigating slope instability issues 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. This issue impacts the Mamaku section of SH5, the Rotoma section of SH30 and SH36. Continued Slope monitoring should be used to assess and identify candidate sites.
- **Continued support of Transport Partners:** Our partners providing use of local roads as detours for maintenance activities and incidents is critical, as a number of various routes are used and there are no identifiable candidate upgrades that would conclusively mitigate this issue.

Reliability and efficiency

Efficiency

The majority of the corridor performs well against the EfficiencyNet LoS. High volumes around Rotorua and at the Ngongotaha roundabout result in periods of poor LoS. The winding and rolling geography and resulting poor alignment between Hamurana and Tauriko (SH36) and Rotoma Forest results in poor LoS.

Figure 14 - Reliability and efficiency



Variability

The corridor has medium variability between Te Ngae Junction through Rotorua to Ngongotaha due largely to the morning and evening peak flows.

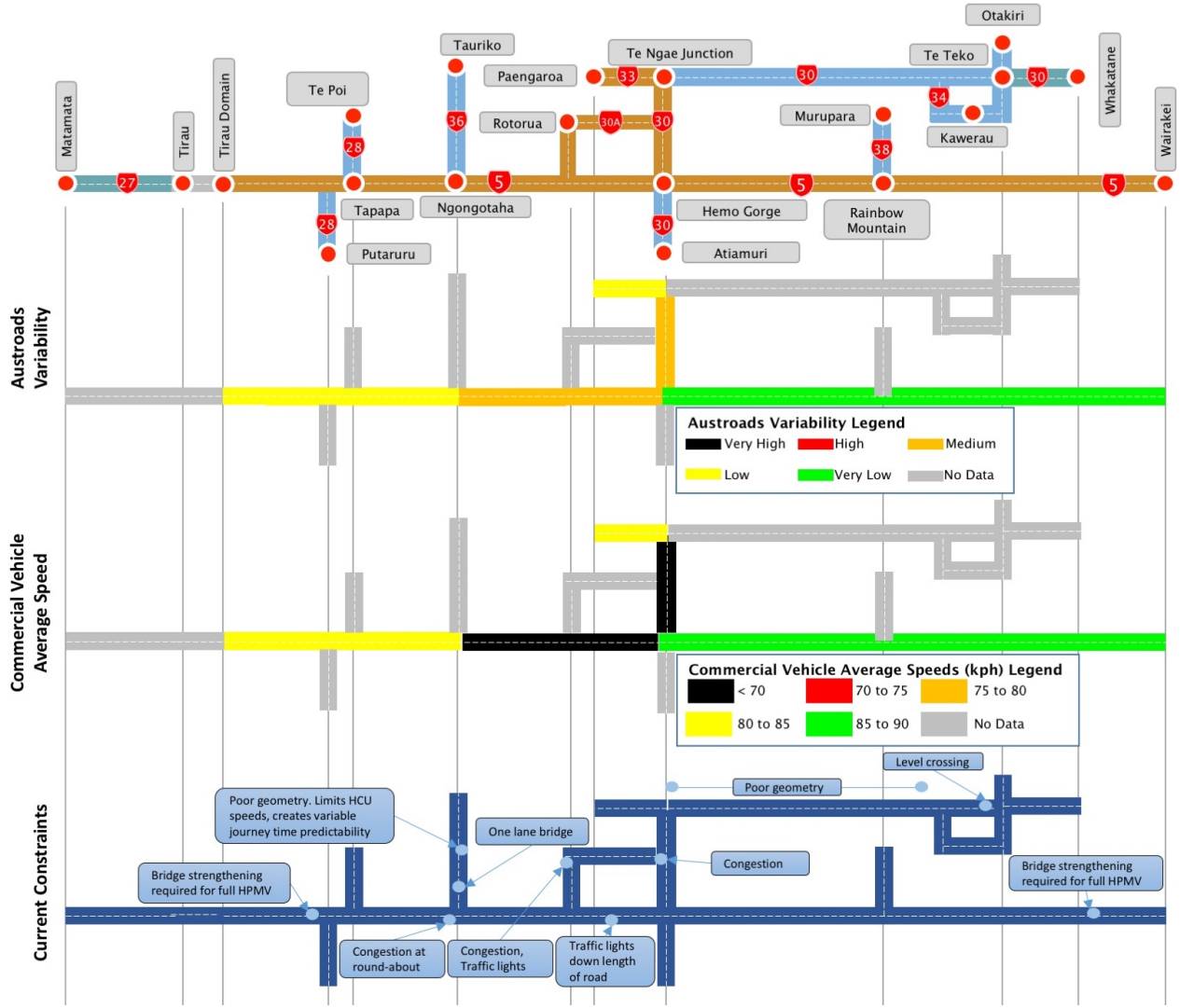
Commercial vehicle average speed

Average speeds for commercial vehicles are relatively low between Te Ngae Junction through Rotorua to Ngongotaha largely due to the increasingly urban environment along this part of the corridor.

Current constraints

The major current constraints on the network affecting journey reliability and efficiency are shown in Figure 12. These tend to be due to peri-urban/ urban environments (particularly in Rotorua), sections of winding/ rolling road alignment, railway crossings and at-grade intersection arrangements (particularly the Ngongotaha roundabout).

Figure 15 - Reliability and efficiency 2



Pressures

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

- **Limited capacity:** Intersection efficiency and highway capacity issues exist within the urban areas of Rotorua and at the Ngongotaha roundabout.
- **Limited passing opportunities:** A lack of passing opportunities can lead to increased driver frustration, risk taking, an unreliable travel time and an overall poor journey experience. Passing lanes are infrequent outside of SH5 between Rotorua and SH38.
- **Choke points:** Two lane sections and intersections within the Rotorua urban area create choke points such as south of Malfroy Road to SH5 and east of Ngapuna. These issues will result in increasing congestion, motorist delay with extensive queuing as growth continues.
- **Residential and commercial growth**: Residential and commercial growth will continue to put pressure on intersections leading into Tauriko and Whakatane.

Future considerations

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

- **Planned corridor improvements:** Four-laning and intersection improvements on the Rotorua Eastern Corridor aims to improve customer experience by decreasing the time drivers are delayed by other users and targeting average speeds appropriate for the route. This project has yet to be funded past the investigation phase.
- **Management of the journey experience:** Using a variety of leavers such as speed management, enforcement and driver information to enhance the journey experience. Real time information will enable the customer to make more informed decisions making around travel along the corridor, particularly planned delays. This would benefit the Mamaku section of SH5.

SH30 Te Teko to Awakeri side barriers have been installed in locations where there are roadside hazards and a wide centreline along some of the route to reduce the risk of head-on crashes

Safety

Collective risk

SH27 has a high collective risk rating from Tirau to Tirau Domain. Additionally, there are several smaller sections of corridor with a high-risk rating near Ngongotaha, Hemo Gorge, Te Ngae Junction and Whakatane. The corridor has a medium-high risk rating in sections near Matamata, Tapapa, Tauriko, Wairakei and from Kawerau to Te Teko. From Tirau Domain to Tapapa, most of the corridor has a medium risk rating.

Personal risk

The corridor has several small sections of high personal risk near Matamata, Tauriko, Hemo Gorge and Otakiri. Sections of corridor near Rainbow Mountain, Wairakei, Te Teko and Kawerau have a medium-high risk rating. From Tirau to Tapapa the corridor generally has a medium risk rating.

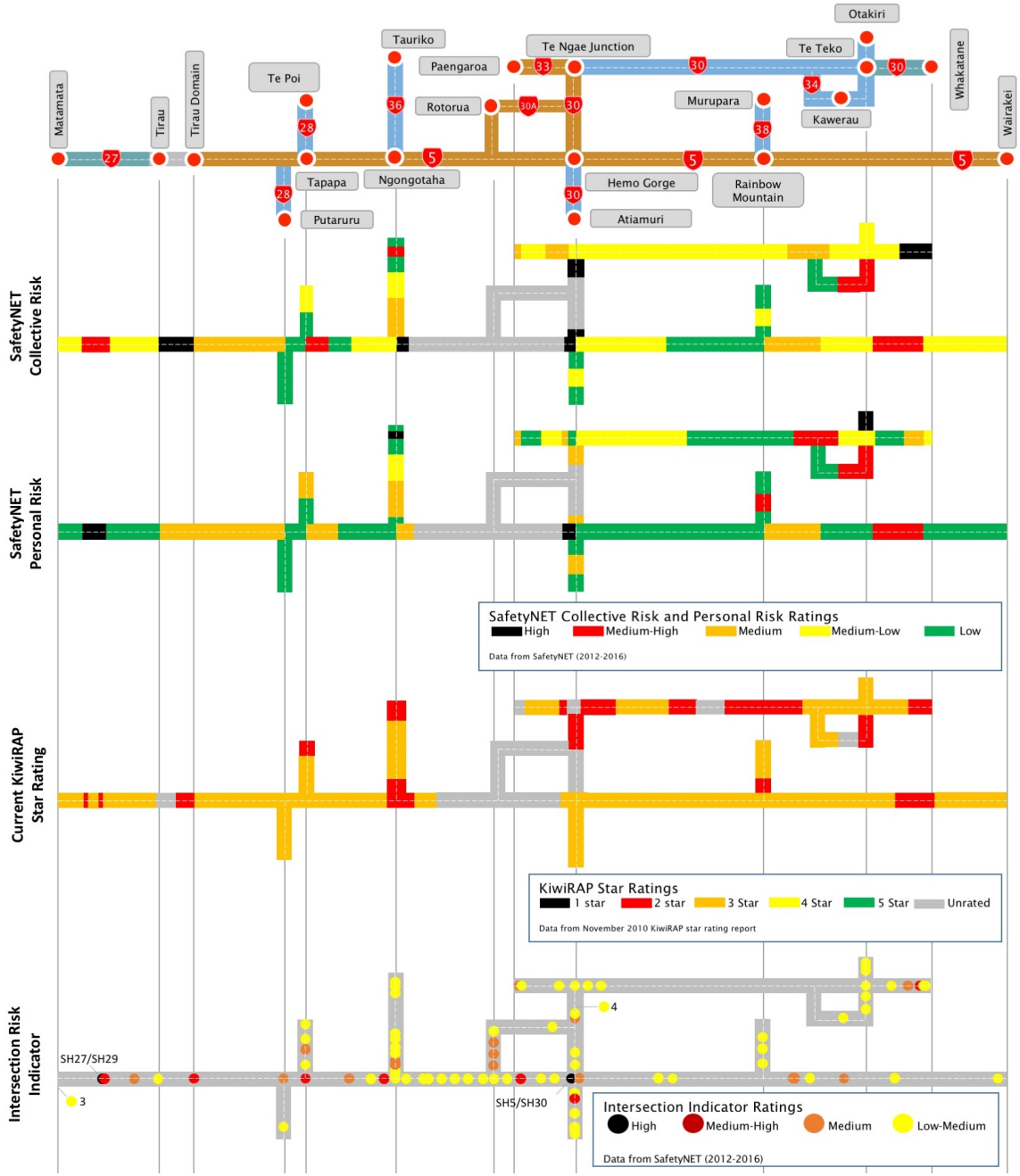
Star rating

The SH5, SH27, SH28, SH36 and SH38 corridors generally achieve a 3-star rating with several sections near Matamata, Te Poi, Tauriko, Ngongotaha, Rainbow Mountain and Wairakei achieving a 2-star rating. There is no data available for a large section of SH5 between Ngongotaha and Hemo, the entire length of SH30A and on SH30 between Hemo Gorge and the SH30A intersection. The star rating on SH33 and SH30 varies frequently between a 2-star and 3-star rating and includes several unrated areas.

Intersection risk indicator

Two high risk intersections have been identified at the junctions of SH27/SH29 and SH5/SH30. Large sections of the corridor near urban centres have a significant amount of risk intersections, the majority of which have a low-medium rating.

Figure 16 - 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:

- **High crash rate:** High numbers of death and serious injuries attributed to inconsistent road alignments, limited separation between opposing traffic and hazardous roadside environments, at a number of highway sections (such as SH33/SH30 into Rotorua, SH34 and SH36) and high levels of conflicting traffic at high speed intersections (such as SH5/SH30 Hemo Road intersection).
- **Poor road configurations:** Carriageway lane and shoulder configurations on the corridor are variable for the variety of corridor users (cars, trucks, agricultural vehicles, cyclists and pedestrians). This creates friction between users and an unsafe environment leading to road trauma. An example of this is SH30 between Rotorua and SH34.
- **At grade level crossings:** At grade level crossings across active rail lines south of Matamata and north of Kawerau (SH34 and SH30) are road hazards which have a low probability but high severity outcome (fatal or serious injury crash).
- **Limited passing opportunities:** The majority of the rural parts of the corridor have minimal formal passing opportunities leading to driver frustration and increased risk taking which can result in crashes.
- **Major events:** Events in Rotorua impact on the safe and efficient flow for day to day road users and event participants. Appropriate traffic management needs to be planned and implemented to allow community events to proceed while not significantly impacting other users.

Future considerations

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

- **Safety improvements:** Using a Safe Systems approach creating better separation between opposing traffic, recovery space outside of traffic lanes, and protection from roadside hazards on SH33/SH30 into Rotorua, SH34 and SH36.
- **Speed management guide:** Review 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.
- **Cycling:** Consideration must be made for the safety of cyclists, particularly tourist cyclists accessing the corridor, by providing a consistent shoulder width.
- **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 minor side barrier installation on SH5 and SH30.
- **Safety initiatives:** such as the Safer Roads and Roadsides Programme are resulting in a significant increase in asset solutions, primarily wire rope barriers, the maintenance of which must be considered in the long term on SH5, SH30, SH33 and SH34. The wider impact of side barrier protection on maintenance extends to considerations of activities behind the barrier; mowing, drainage tree work, and utilities.
- **Communication with key stakeholders:** Early engagement with key stakeholders – like freight operators and large tourism operators will allow them to make their own plans around events.

People, places and environment

Natural environment

The corridor is characterised by predominantly rural landscapes with more urban areas around Lake Rotorua. Sections of SH5, SH30 and SH33 follow all but the northern side of Lake Rotorua. SH30 follows the southern sides of Lake Rotoiti, Lake Rotoehu, and Lake Rotoma. SH36 traverses the Mangorewa and Mangapouri Gorges (SH36), and SH30 also has challenging topography through the Rotoma Forest (SH30).

A section of SH5 passes through the Fitzgerald Glade near Tapapa with native vegetation and trees overhang the road. The Mamaku Plateau features several ignimbrite outcrops created by erosion.

There are significant reserves adjacent to the corridor including; the Whirinaki Te Pua-a-Tāne Conservation Park near Murupara and Te Urewera National Park on SH38. The Blue Spring at Te Waihou Walkway (off SH28) supplies around 70% of New Zealand's bottled water. Trout fisheries are an important asset on sections of the corridor which gives greater importance to stormwater treatment.

Geothermal areas provide environments for unusual vegetation and rare plant species of high conservation value. These ecosystems are vulnerable to impacts such as energy extraction and weed invasion.

Noise, vibration and air quality

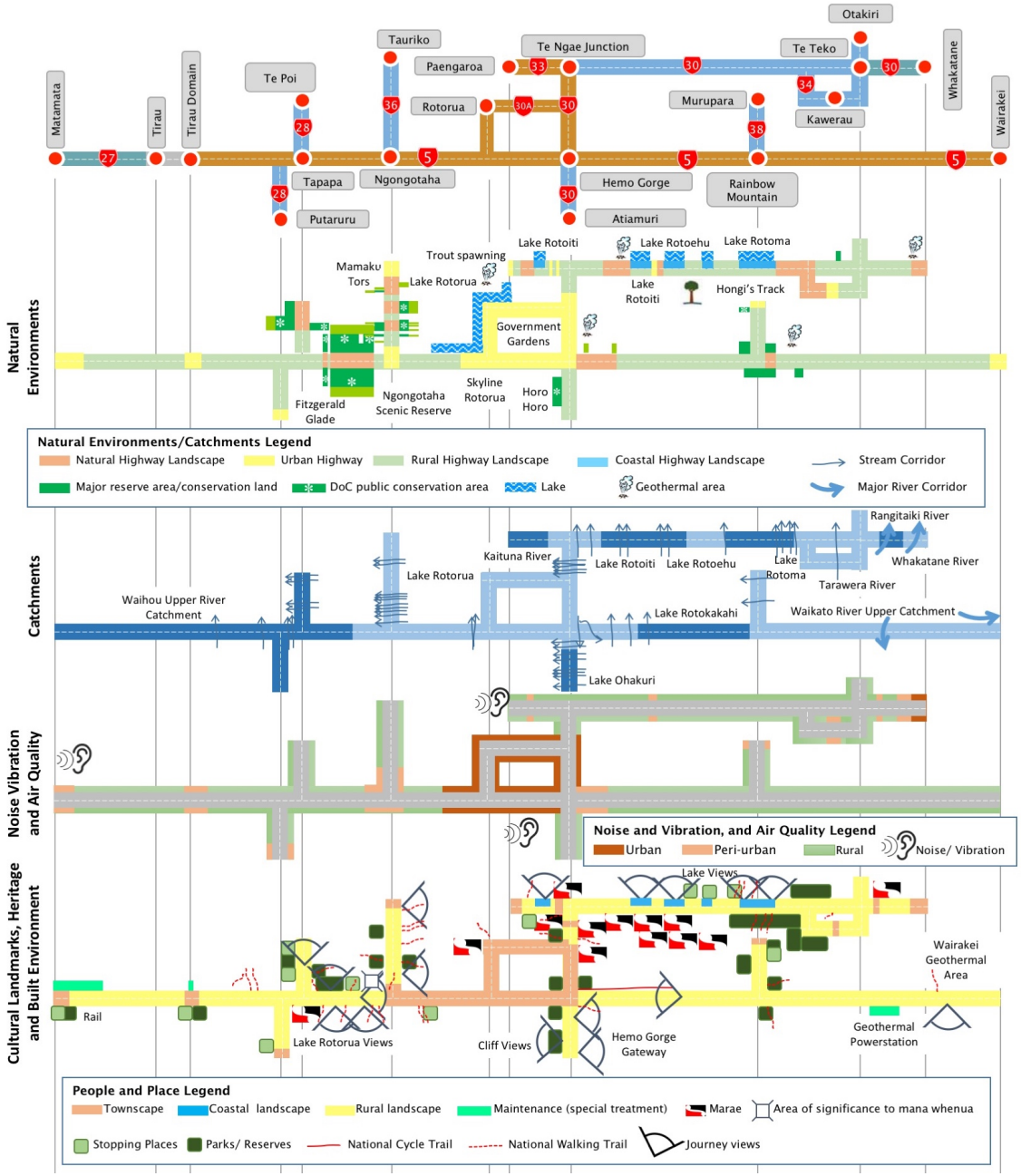
Residential development abuts the corridor within Rotorua, making this area more sensitive to noise and vibration. This sensitivity will increase with traffic growth, particularly large vehicles. A number of customer complaints have been received about vibration on SH27 in Matamata.

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 corridor passes a significant number of marae around Lake Rotorua and Lake Rotoiti. Rotorua will have two cultural gateways on SH5 at Fairy Springs and the Hemo Road roundabout. Culturally significant sites include the Wishing Tree of Ngati Pikiao adjacent to SH30 at the end of Hinehopu/Hongi's Track.

Figure 17 - People, places and environment



Pressures

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

- **Climate change:** Higher temperatures and more intensive rainfall will accelerate erosion and degrade slopes within and alongside the corridor, particularly in the Mangorewa and Mangapouri Gorges (SH36), adjacent Lake Rotoiti, and through the Rotoma Forest (SH30). The effect of this will also include flooding frequency and intensity. The management of these risks will require greater engineering control.
- **Monitoring:** Tomos or sinkholes are known to form along the corridor and are of concern at Tumihui Gorge and Earthquake Flat (SH5). There is an ongoing need to monitor these and allow for future engineering intervention, potentially including bridge structures.
- **Native vegetation in sensitive areas:** Fitzgerald Glade (Tukorehe Scenic Reserve) near Tapapa which has native vegetation and trees close to and overhanging the road is difficult to maintain without significantly affecting efficiency. Vegetation management requirements (particularly near sensitive ecological and protected conservation lands) along the corridor are likely to increase. 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. Also, plants may start to occupy places they didn't used to due to climate change.
- **Urban growth:** The need to manage noise and vibration impacts will increase around the Rotorua urban area and in future along SH36 between Tauriko and Pyes Pa. Receptors closes to the state highway are more likely to be potentially impacted.
- **Incremental impacts:** 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, particularly for areas within Rotorua and on SH30 between Te Ngae Junction and SH34. Additional investigations and management of impacts on these features may also be required.
- **Iwi/ mana whenua relationships:** Input into the management of heritage assets and landscapes and 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. One specific example of this is the request by local iwi for pou to be placed on the entrance to Rotoiti.

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:

- **Transport partner 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.
- **Resource consents:** Opportunities for consolidation/ rationalisation of resource consents, particularly for regular maintenance activities.
- Wider flooding problems developing with climate change effects, in particular through rainfall intensity and variability. This should be considered in a regional strategy context.
- **Stopping areas:** These are needed in places to provide, among other things, safe areas where tourist can pull off the road to view the natural environment and avoid them parking in dangerous areas. This is particularly of concern next to Lake Rotoiti and Lake Rotoma. Stopping areas are also needed on the corridor to allow truck drivers to take breaks, check their loads and use facilities. Consider reviewing existing stopping places and develop a strategy to ensure they are in the right place and have appropriate facilities.

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 435 km of road network which reflects 3.8% nationally. The total value of the assets along the corridor is $688M.

The corridor assets have been divided into eight groups as shown in Figure 18 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 18 – Corridor asset base

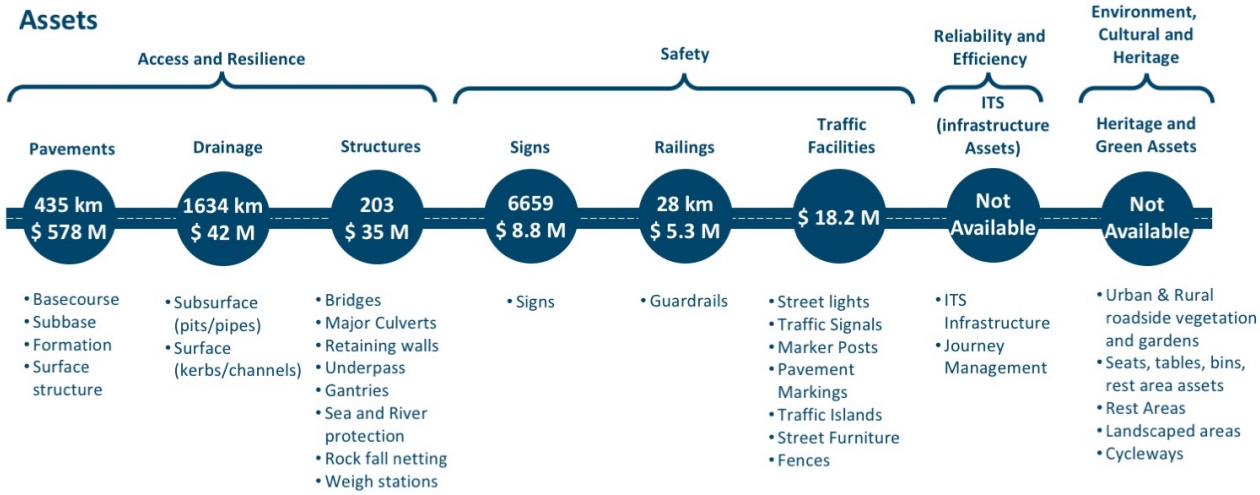


Figure 19 – Summary asset condition and performance

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.

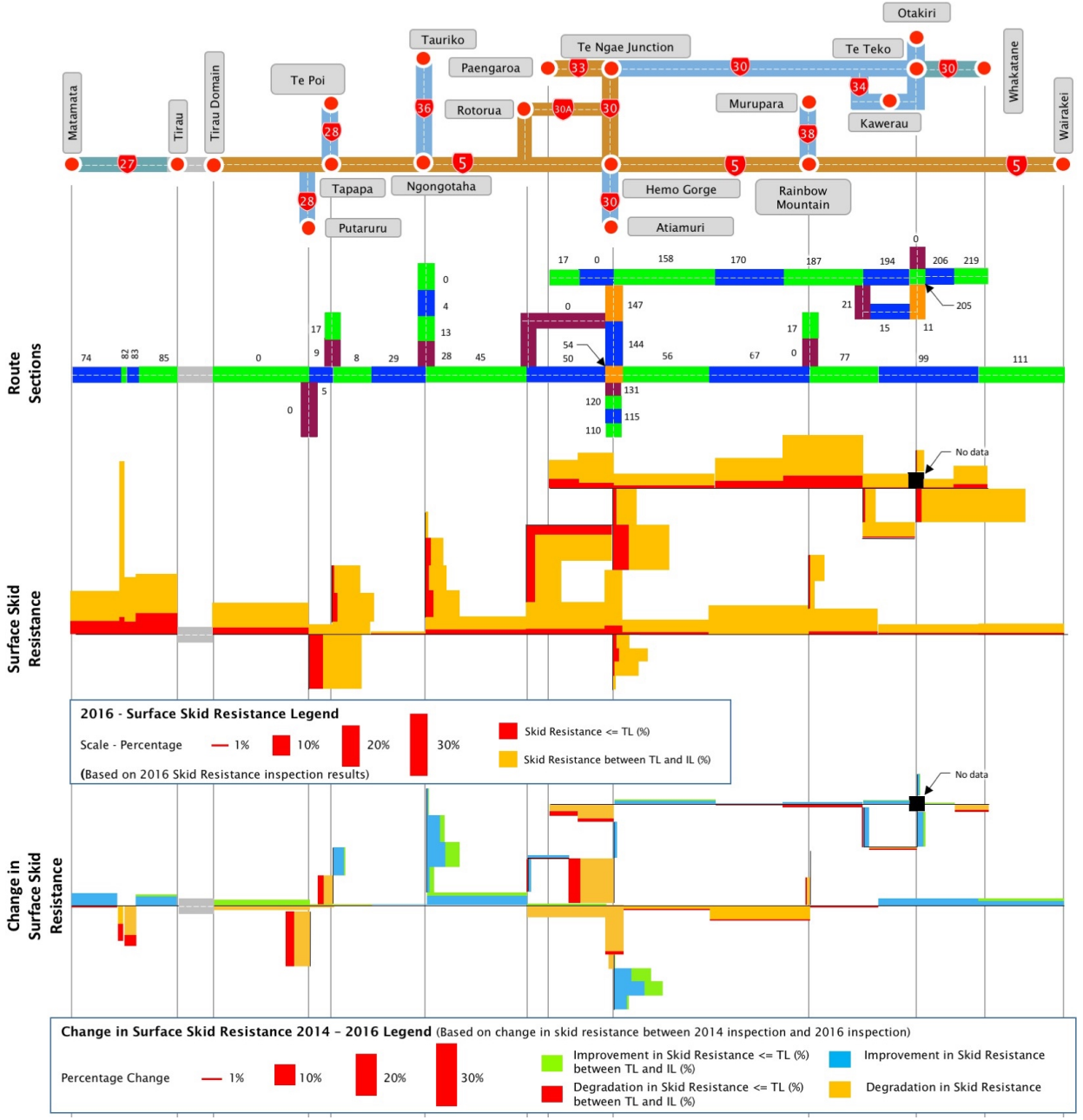
Four open road sections of the corridor: SH27 RS82 &83; SH28 RS0; SH28 RS9; and SH5 RS67 show continued surface degradation with a high proportion of surface skid resistance below the threshold level. A fifth section of lowered surface skid resistance is, the busiest part of this corridor, the urban area around Whakarewarewa and the intersection of SH5 and SH30.

Improvements in surface skid resistance are greatest across the primary sections of SH36, SH30 and SH5 south of Lake Ngahewa to Wairakei.

SH27/82 is the short section of highway that forms the dogleg junction with SH29 and has an unusually high level of surface skid resistance.

It should be noted that the surface skid resistance inspection displayed in the infographic was undertaken before water cutting remediation was carried out for parts of the corridor.

Figure 20 – Asset condition 1



Priority for surface safety treatment

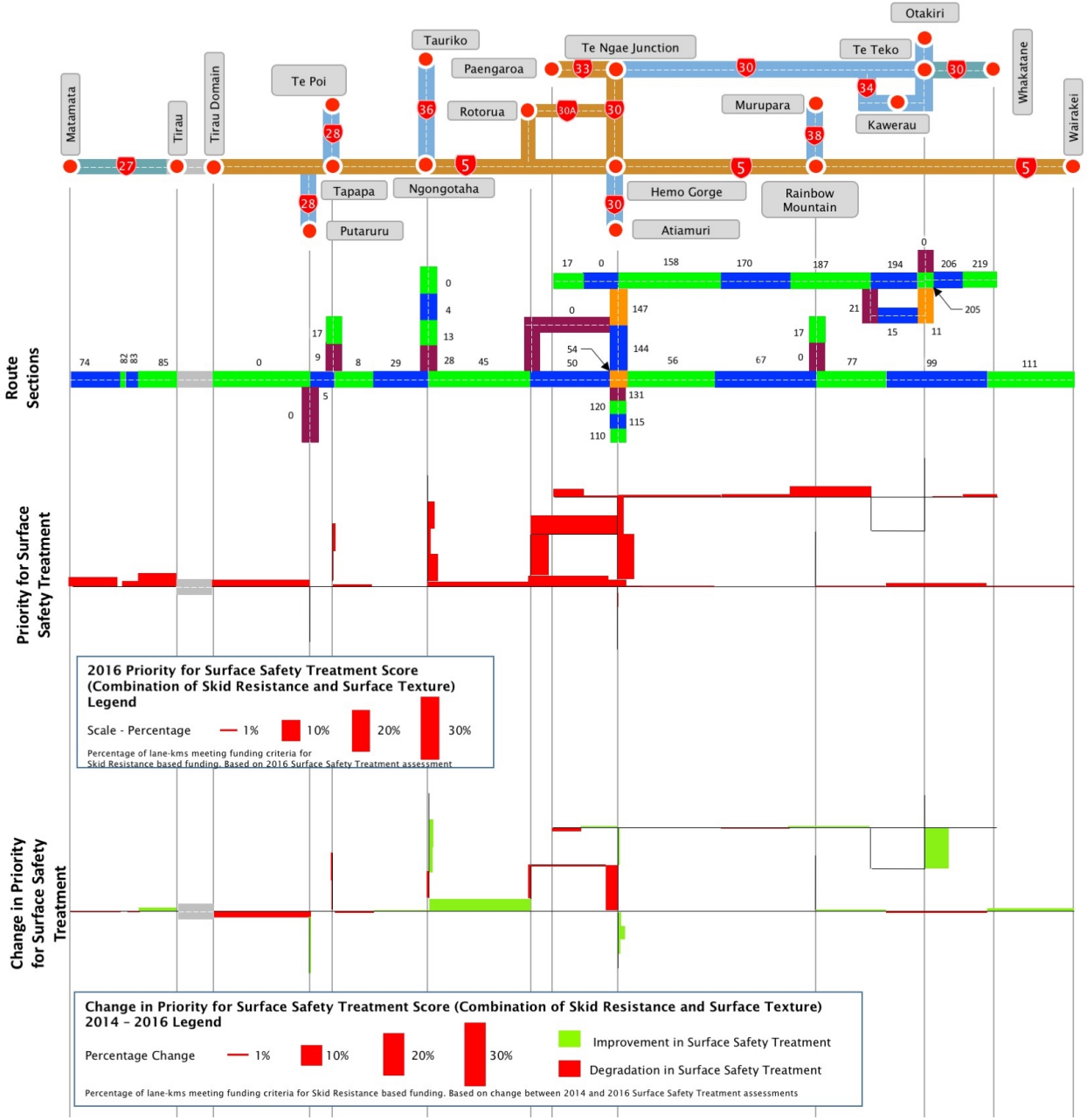
The infographics show the proportion of the Route Section that has a Priority for Surface Safety Treatment (Skid Assessment Length) that would qualify for funding, i.e. a score >140. The second infographic shows the change in these levels from the 2014 survey to the 2016 survey, as either an improvement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

The greatest percentage of corridor meeting the criteria for surface skid resistance funding is in the urban portion around/approaching Rotorua including SH30A, SH30 and SH5.

The change in priority for surface safety treatment scores show a general corridor wide improvement across the period 2014-2016. However, there is a marked increase in priority for surface safety treatment scores along SH5 south of Tirau and on SH30, between SH30A and SH5.

Figure 21 - Asset condition 2



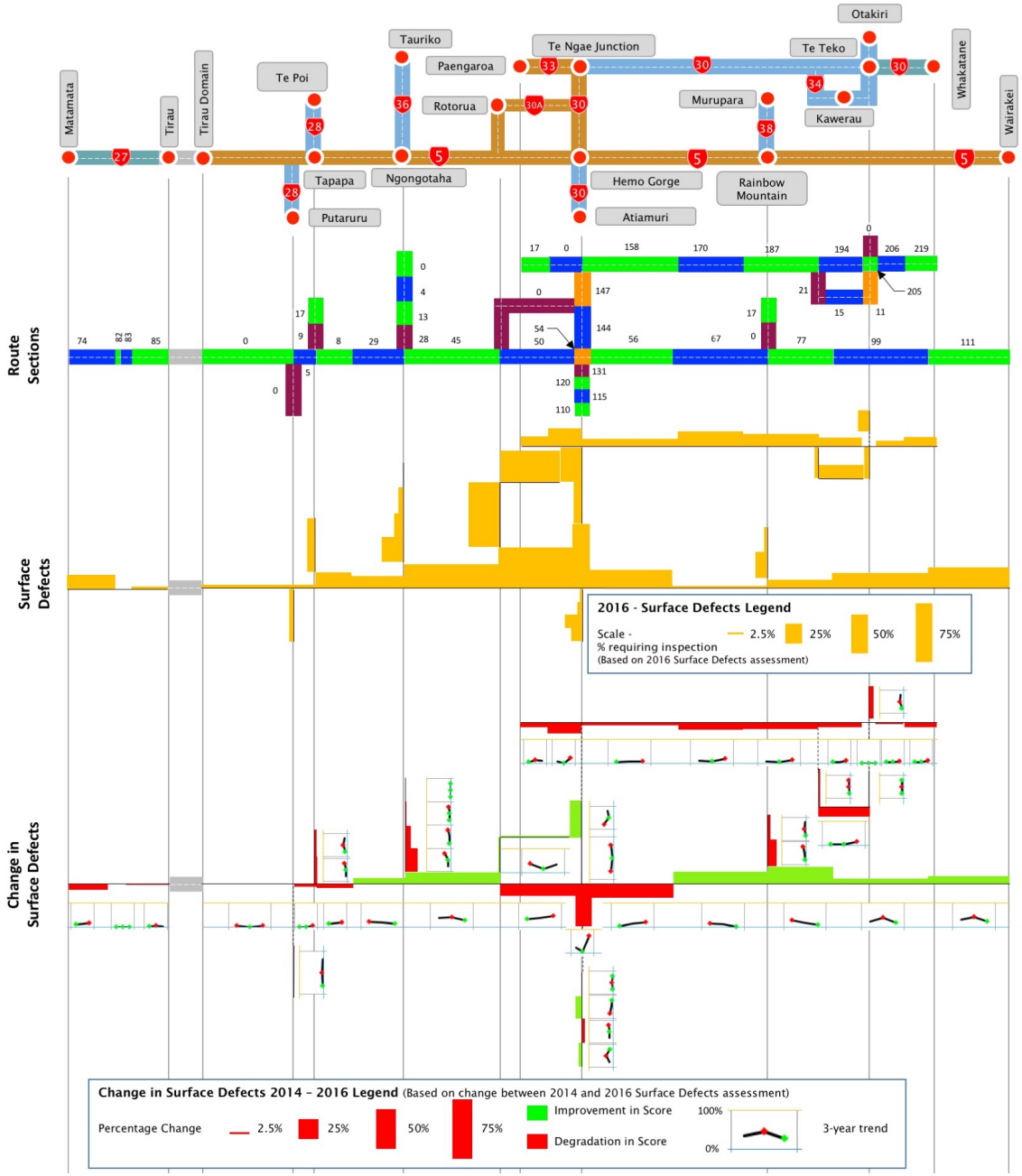
Surface defects

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

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

Overall, 14.8% of the corridor achieves a score above which inspection is required. Sections with significant lengths of surface requiring inspection include: the urban portion around/approaching Rotorua including SH30A, SH30 and SH5. Sections SH/5/50, SH5/54, and SH5/56 also show a significant level of degradation in score over the last three years.

Figure 22 – Asset condition 3



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.

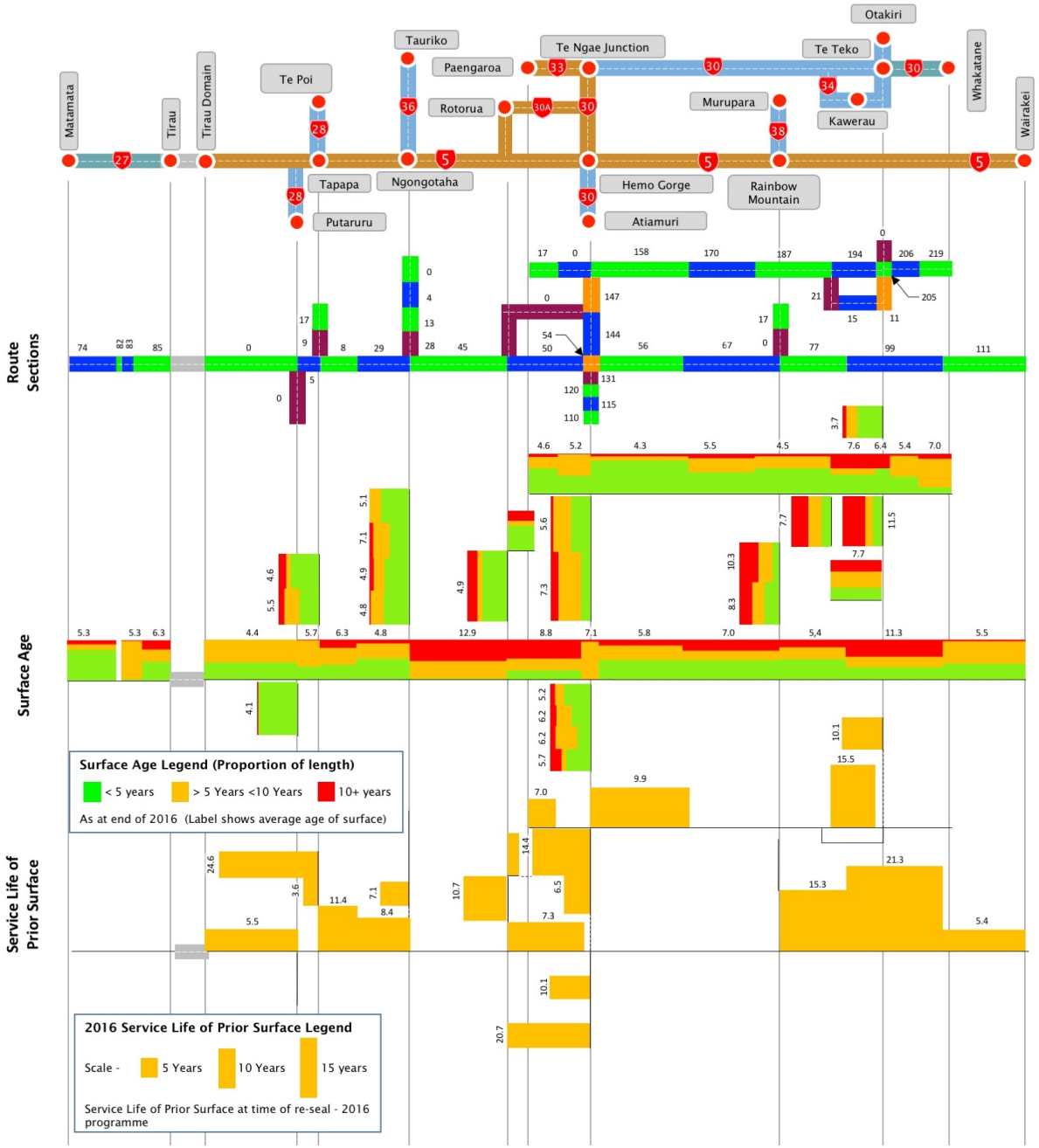
The sections of corridor with the oldest age profile are SH5/45 between Ngongotaha and SH30A, and, SH5/99 between Broadlands and Tahorakuri.

Service life of prior surface

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

Overall the re-surfaced sections achieved an average service life of 12.3 years, with sections SH5/77 and SH5/99 between Rainbow Mountain and Tahorakuri, SH28/17 south of Te Poi, SH30/110 east of Upper Atiamuri, and, SH30/194 west of Te Teko achieving a service life in excess of 15 years.

Figure 23 – Asset condition 4



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.

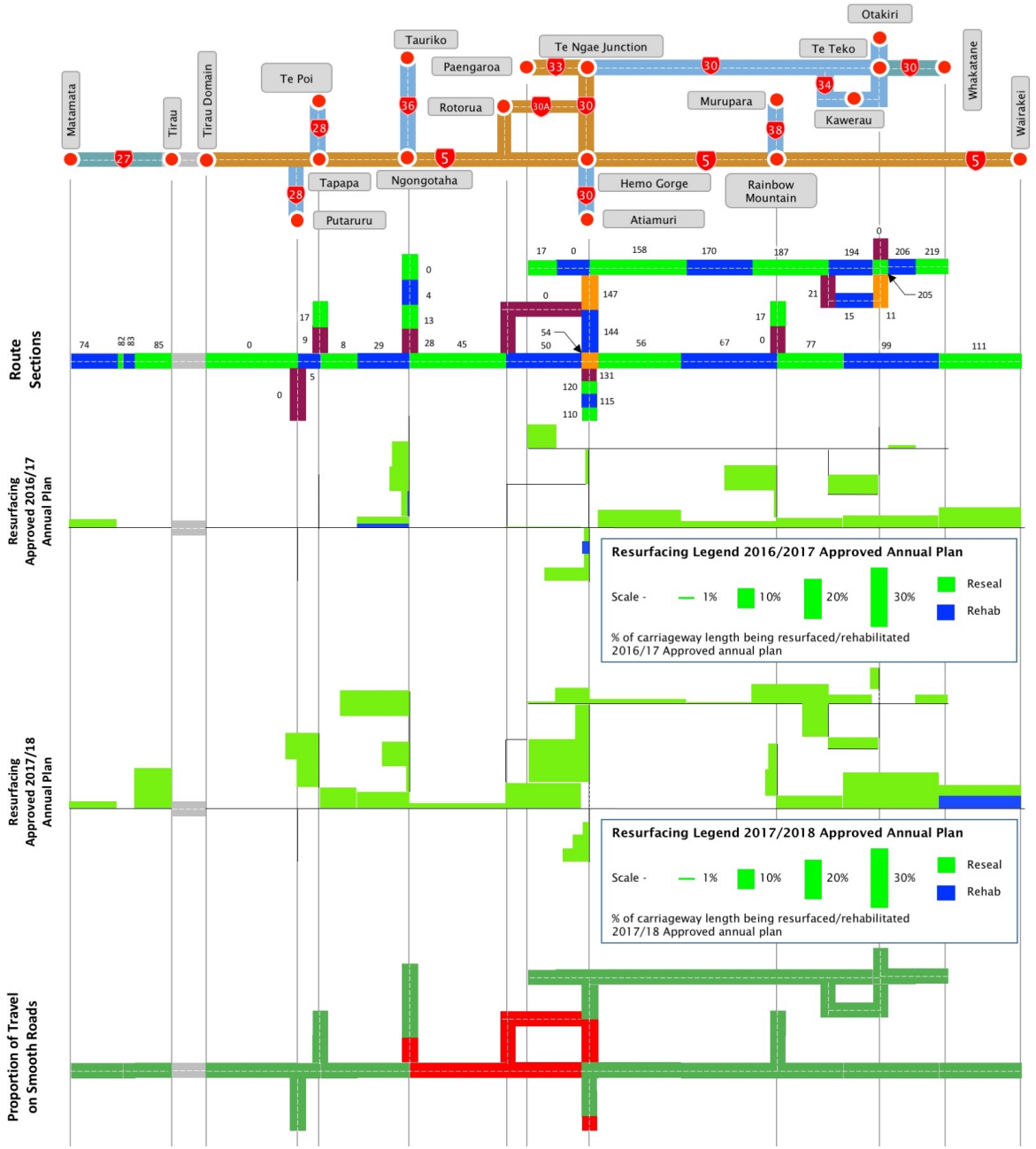
The major resurfacing works are planned for sections SH27/85 north of Tirau, SH30/144 in Rotorua, and SH36/0 south of Tauriko.

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.

The sections of corridor performing poorly in terms of p=the proportion of travel on smooth roads are: Urban Rotorua – SH5/45 and 50, all of SH30A, and SH30/144, SH36/28 north of Ngongotaha, and SH30/110 east of Atiamuri

Figure 24 – Asset condition 5

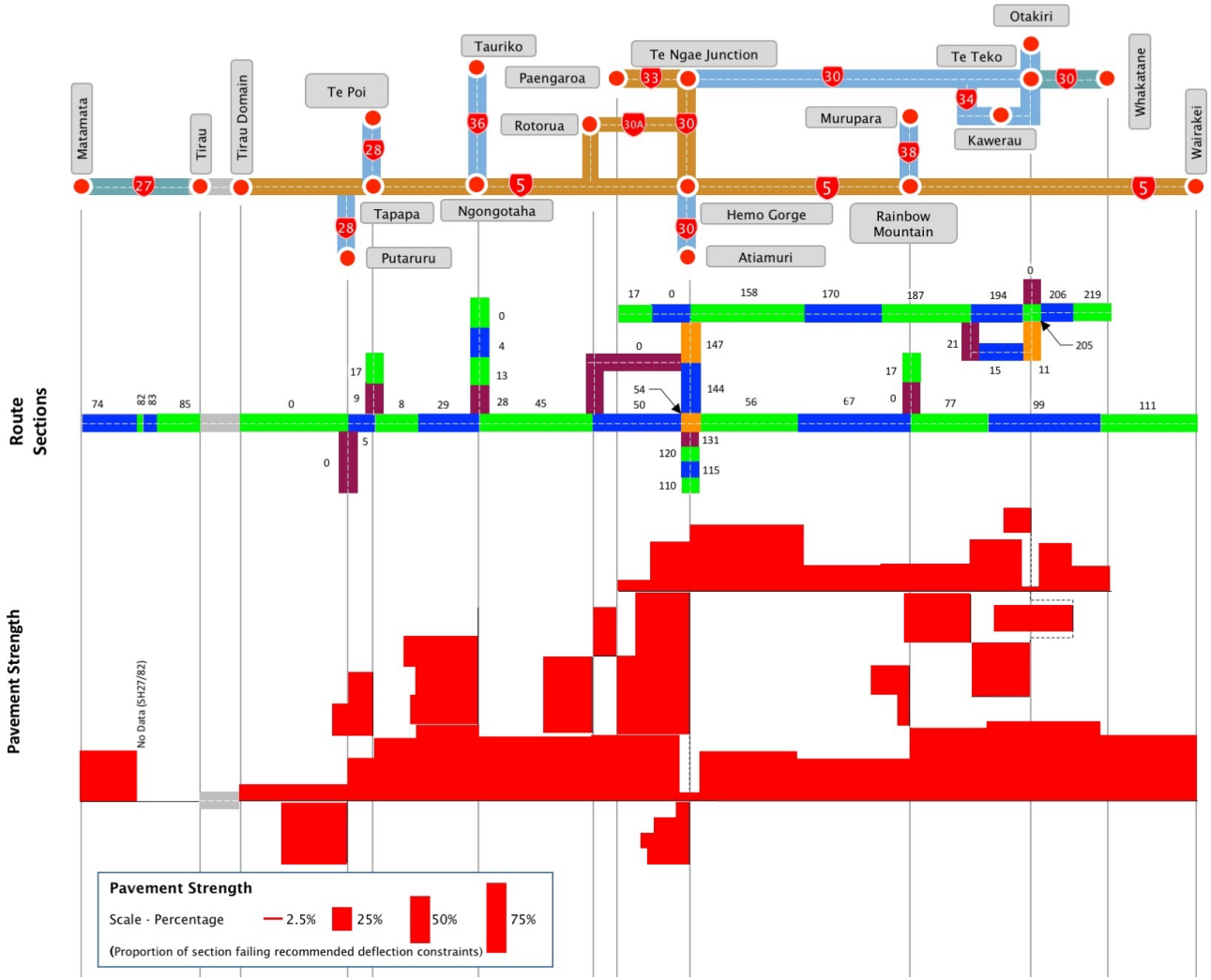


Pavement strength

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 Access to Rotorua from N.S.E.W corridor is the worst performing of the state highways network in terms of pavement strength, with a total of 49% of the corridor failing to meet the deflection constraints. As shown in the infographic, the majority of the corridor sits between 25% and 70% failure rate, with sections SH5/29 and SH5/99 being above 80%.

Figure 25 – Asset condition 6



Asset condition and performance pressures

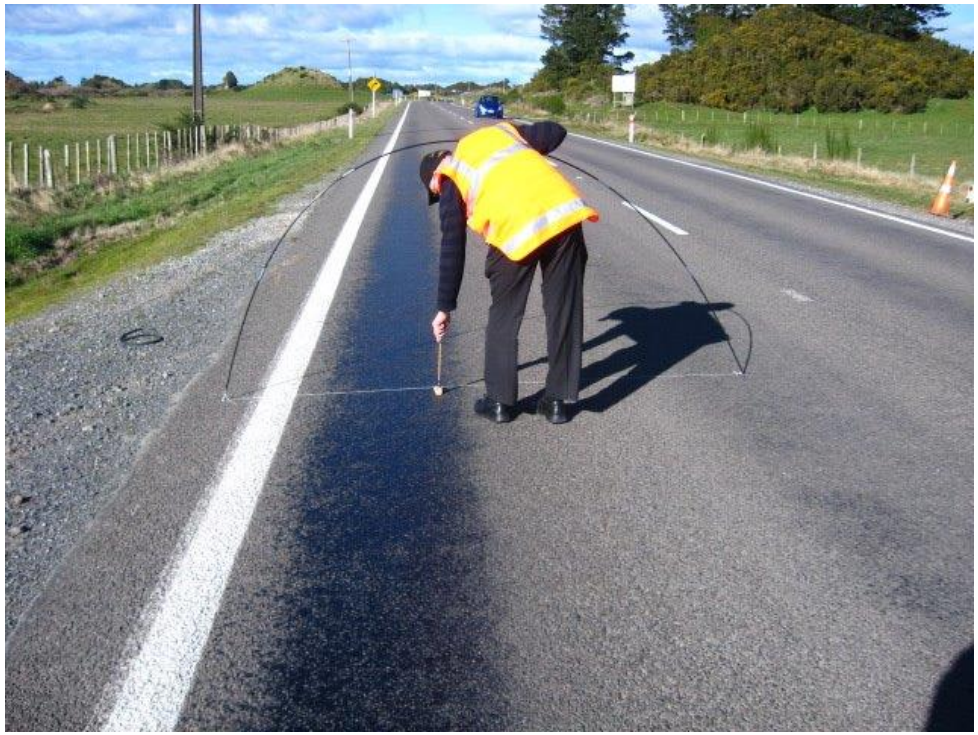
The pressures on the corridor that are resulting in increased demand or a reduction in levels of service for **Asset Condition and Performance** are as follows:

- **SH5/99:** – There are discrete sections of flushing that coincide with bends, and multiple seal layers. Also in this section, conversion from forestry to farmland means pavement reacts differently now that roads are not shaded, i.e. all-day sun is causing more flushing issues.
- **SH27 and SH28 northern end:** – Swampy section through Hauraki Plains, issues with pavement depth in places and surfacing issues relating to early failure of pavement, flushing and rutting.
- **SH28/0**: Issues with flushing (loss of surface texture). Old pavements in this section of highway.
- **AC issues:** AC across the corridor is getting to the point where it needs to be replaced, particularly SH5/45,50,54,56, SH30/144,147, and SH30A/0. This also occurs on weak pavements. May have to accept shorter lives and more regular interventions, including localised strengthening, or structural AC lane by lane.
- **Pavement moisture:** Pavement moisture is an issue around sections SH36/13 and 28, which is in the bottom of a canyon, which is damp, suffers frost, and has difficult terrain.
- **Dacite:** A moisture susceptible igneous rock, is present in the pavement of section SH5/111, which is causing ongoing rutting and flushing issues that are being monitored and rehabilitated as required.
- **Pavement Shape:** The pavement has gone out of shape producing a bumpy ride due to swampy conditions. Deep side drains with steep sides compromise shoulders and constrain the highway.

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:

- **Asset growth:** Capacity and safety improvements on the corridor will result in growth of assets requiring on-going maintenance (i.e. pavement widening, shared pathways, lighting, roadside barriers, signs, markings) requiring additional investment for maintenance and renewal.



SH5 NW of Rotorua

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	$13,810	$16,034	$25,220
	Renewals	$23,005	$28,063	$32,989
	Improvements	$0	$0	$0
Reliability and Efficiency	Maintenance and Operations	$6,359	$6,825	$10,354
	Renewals	$302	$413	$770
	Improvements	$66,968	$0	$0
Safety	Maintenance and Operations	$13,972	$15,195	$23,118
	Renewals	$2,888	$3,038	$4,568
	Improvements	$56,452	$58,420	$37,910
People, places and Environment	Maintenance and Operations	$3,775	$4,192	$6,494
	Renewals	$113	$372	$558
	Improvements	$0	$0	$0
	Total	**$187,644**	**$132,551**	**$141,981**

Figure 26 – Corridor investment

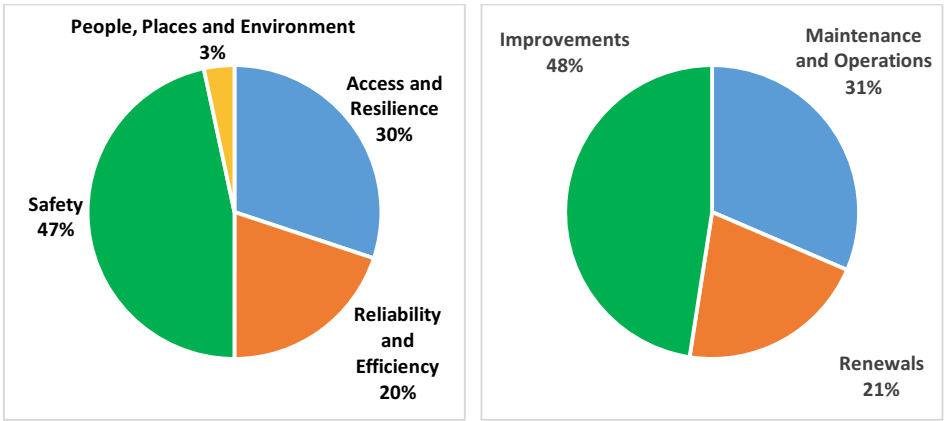


Table 2- Summary investment by work category ($000)

Outcome	Work Category		2018-2021	2021-2024	2024-2028
Access and Resilience	111	Sealed Pavement Maintenance	$4,149	$4,607	$7,346
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$866	$955	$1,498
	114	Structures Maintenance	$1,963	$2,983	$5,033
	121	Environmental Maintenance	$2,259	$2,514	$3,861
	122	Traffic Services Maintenance	$87	$147	$227
	124	Cycle Path Maintenance	$22	$25	$41
	151	Network & Asset Management	$3,584	$3,856	$5,791
	161	Property	$882	$947	$1,422
	211	Unsealed Road Metalling	$12	$14	$21
	212	Sealed Road Resurfacing (excl. surface skid resistance)	$13,357	$15,302	$16,136
	213	Drainage Renewals	$812	$835	$1,253
	214	Pavement Rehabilitation	$5,380	$8,176	$9,923
	215	Structures Component Replacements	$3,370	$3,643	$5,514
	222	Traffic Services Renewals	$73	$94	$141
	321 - 341	Improvements	$0	$0	$0
Reliability and Efficiency	121	Environmental Maintenance	$1,563	$1,698	$2,603
	123	Operational Traffic Management	$3,196	$3,488	$5,292
	151	Network & Asset Management	$1,438	$1,467	$2,202
	161	Property	$162	$172	$258
	222	Traffic Services Renewals	$302	$413	$770
	321 - 341	Improvements	$66,968	$0	$0
Safety	111	Sealed Pavement Maintenance	$4,460	$4,880	$7,756
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$583	$633	$978
	114	Structures Maintenance	$761	$823	$955
	121	Environmental Maintenance	$295	$366	$564
	122	Traffic Services Maintenance	$4,744	$5,078	$7,740
	124	Cycle Path Maintenance	$8	$11	$19
	151	Network & Asset Management	$2,743	$2,990	$4,484
	161	Property	$377	$415	$623
	212	Surface Skid Resistance	$1,380	$1,550	$2,327
	214	Pavement Rehabilitation	$46	$60	$90
	215	Structures Component Replacements	$313	$356	$534
	222	Traffic Services Renewals	$1,149	$1,072	$1,616
	321 - 341	Improvements	$56,452	$58,420	$37,910
People, places and Environment	111	Sealed Pavement Maintenance	$610	$747	$1,122
	121	Environmental Maintenance	$2,688	$2,934	$4,604
	151	Network & Asset Management	$383	$410	$616
	161	Property	$94	$101	$152
	221	Environmental Renewals	$113	$372	$558
	321 - 341	Improvements	$0	$0	$0
		Total	**$187,644**	**$132,551**	**$141,981**

To be confirmed through the RLTP

Investing in access and resilience

Operations and maintenance

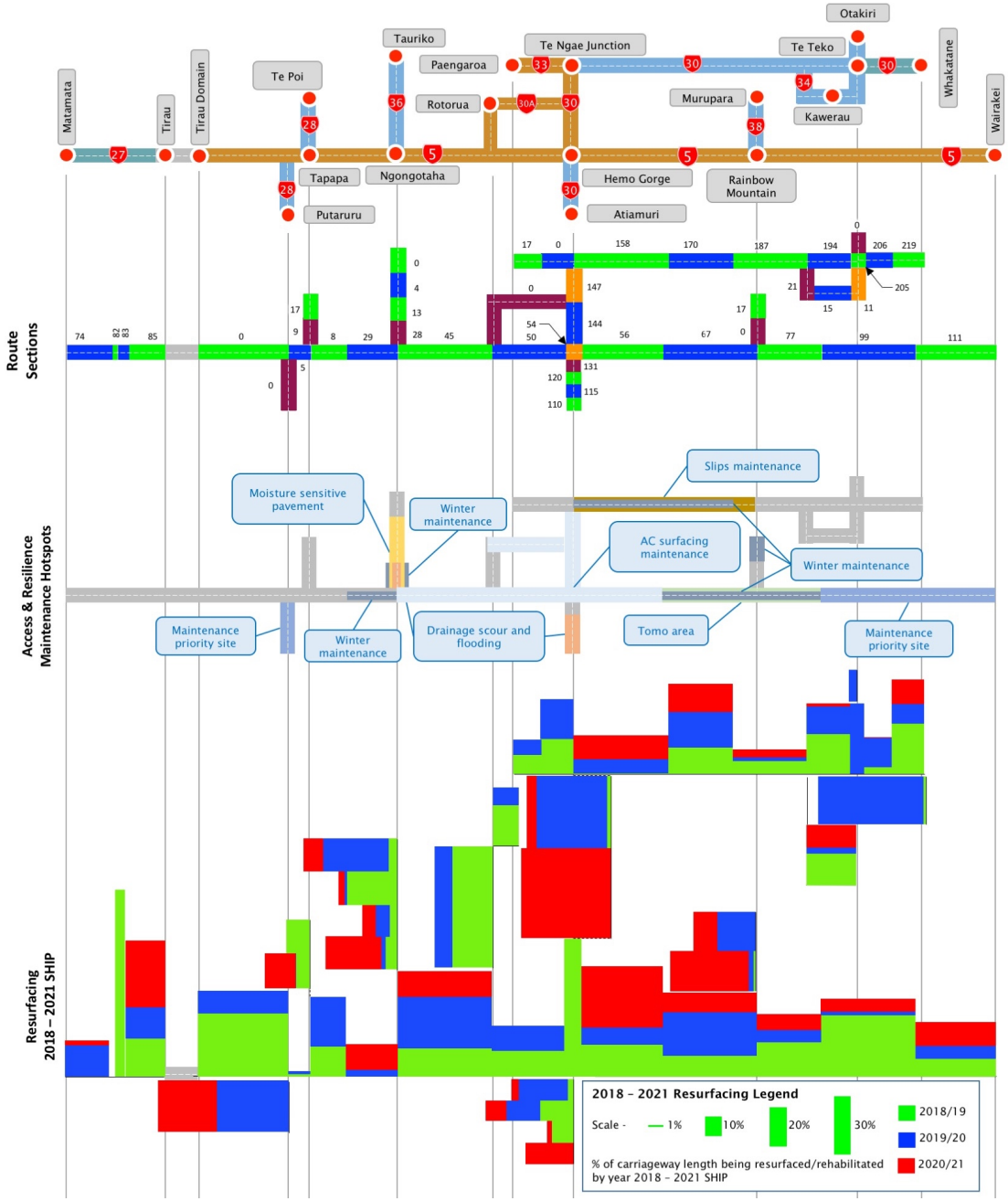
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing and structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement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

Maintenance hot spots

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

- **Priority maintenance sites:** SH5/99 and SH5/111 between Mihi and Wairakei, and SH28/0 North of Putaruru are priority maintenance sites
- **Flushing** occurs on sections SH28/0 north of Putaruru, and SH5/99 between Mihi and Tahorakuri
- **AC Issues:** There are issues with the AC around Rotorua (See asset condition pressures)
- **Slips:** In sections SH30/158 and SH30/170 between Te Ngae junction and Rotoma suffers from slips during storm events.
- **Drainage scour** occurs on sections SH30/110 SH30/115, and SH30/120 between Atiamuri and Guthrie.
- **Flooding and Drainage Scour:** Section SH36/28 between Ngawaro and Ngongotaha has drainage scour and flooding issues– mostly during severe weather events.
- **Geothermal activity:** SH5/67 between Tumunui and Rainbow Mountain is in a Tomo susceptible area caused by geothermal activity.
- **Winter maintenance** is required in the Ngongotaha area on SH5/29 and SH36/28, also through Rainbow mountain, SH5/67 and SH5/77, near Murupara SH38/17, and the Rotomas SH30/158 and 170.

Figure 27 – Access and resilience investment 1



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: SH5/45 between Ngongotaha and Rotorua, SH27/85 north of Tirau, and, SH28/0 between Putaruru and Tapapa.

Structure renewal

The renewal investment infographic shows the planned bridge replacements along the corridor. One bridge is planned for replacement due to asset condition, at a total estimated cost of $3M. In addition, one bridge is scheduled to be replaced for improvements reasons, at an estimated cost of $3M.

Improvements

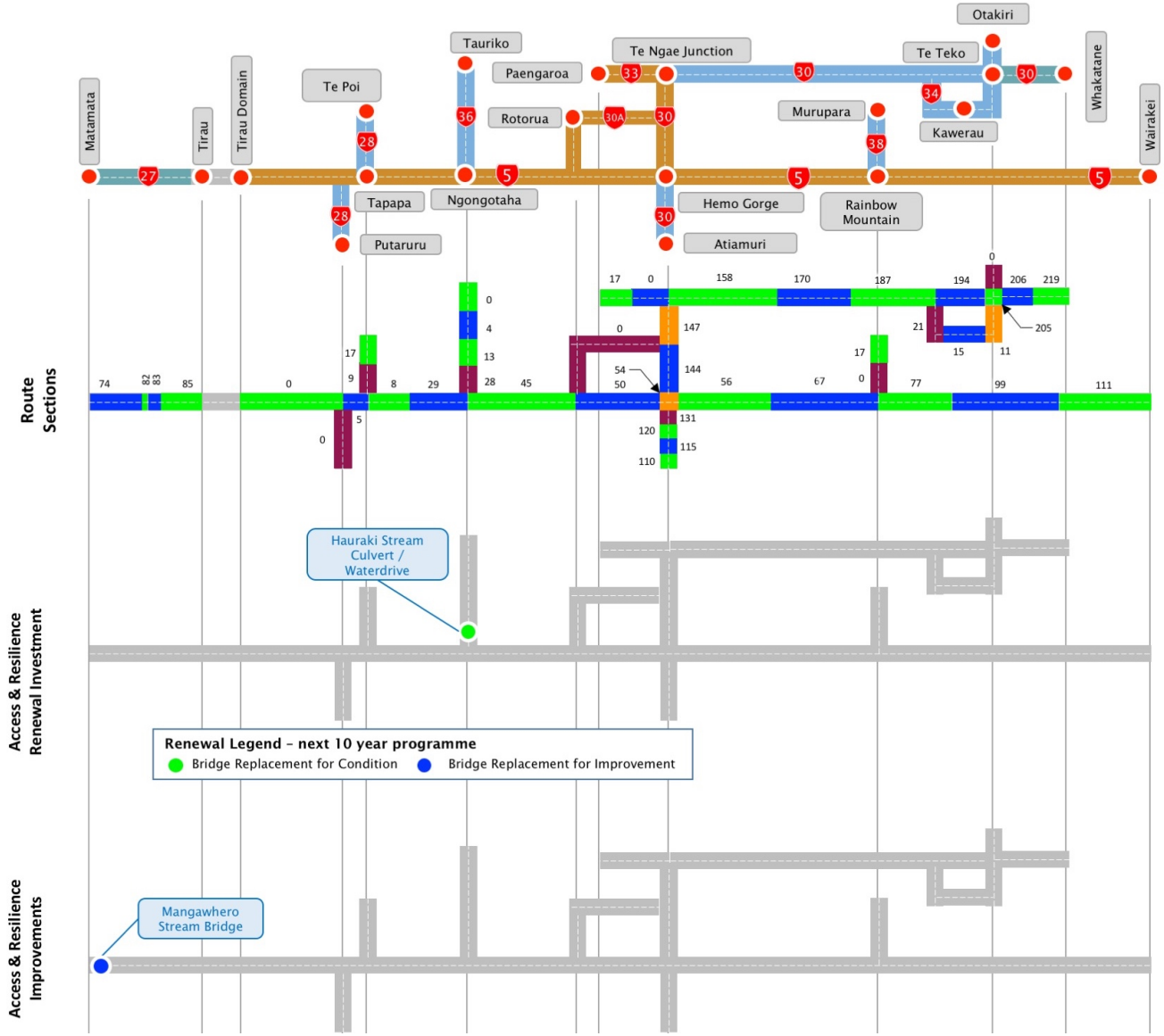
Planned

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/

Mangawhero Stream Bridge

Description: Access and safety improvement investigation (SRA).

Figure 28 – Access and resilience investment 2



Investing in reliability and efficiency

Operations and maintenance

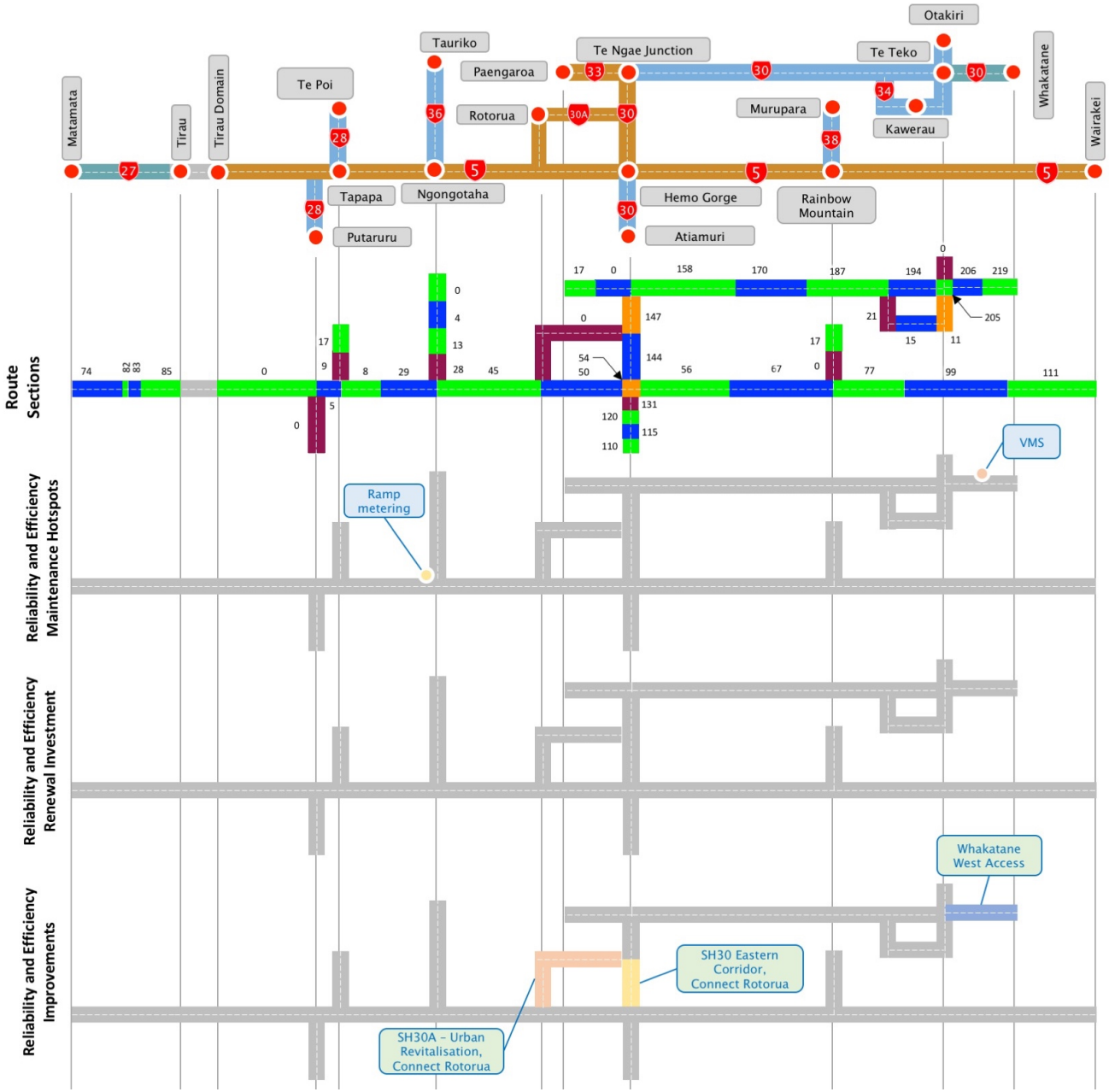
The main areas of investment to provide and preserve reliability and efficiency are environmental maintenance through keeping potential obstructions clear of the highway, wayfinding signage, and operational traffic management.

Maintenance hot spots

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

- **Tourist Traffic:** SH27 between Matamata and Tirau is affected by traffic with Hobbiton as a destination.
- **VMS:** There is Variable Message signage in place at Awakeri
- **Ramp Signals:** At the Ngongotaha Roundabout ramp signals are in place on SH5 heading east to ease congestion at the intersection.

Figure 29 – Reliability and efficiency investment



Renewals

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

Improve road and roadside safety on State Highway 30 between Owhata and Te Ngae Junction, Rotorua.

Improvements

Planned

There are no currently planned reliability and efficiency 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 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
SH30 Eastern Corridor, Connect Rotorua		Link and intersection capacity upgrades, incorporating local access improvements
SH30A Urban Revitalisation, Connect Rotorua		Changing the form and function of SH30a Amahou Street through Rotorua's CBD, prior to revocation
SH30 Whakatane West Access		Peri-urban link and intersection upgrades to support planned growth & improve safety

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:

- **Grass Cutting** throughout corridor creates a safety issue where there are side barriers

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.

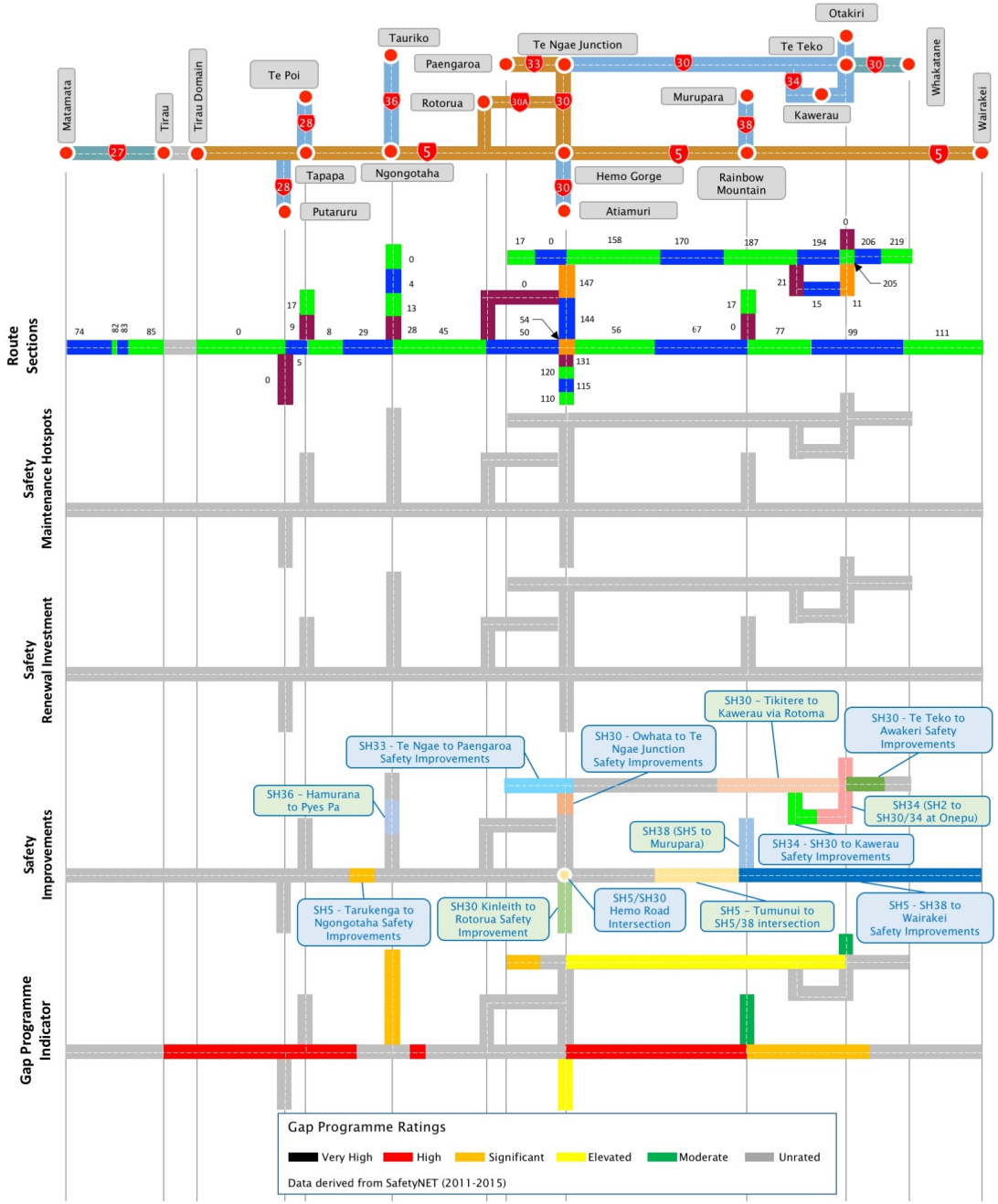
There is a high potential for reducing fatal and serious injuries from Tirau to Ngongotaha and Hemo Gorge to Rainbow Mountain through comprehensive, targeted, medium-high cost improvements.

Half of the corridor from Rainbow Mountain to Wairakei, Te Ngae Junction to Paengaroa and the whole length of SH36 from Ngongotaha to Tauriko has a significant potential for preventing fatal and serious injuries through targeted low-medium cost improvements.

SH30 from Hemo Gorge to Atiamuri and Te Ngae Junction to Te Teko has an elevated potential and would benefit from targeted, low cost, high coverage improvements.

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

Figure 30 – Safety investment



Renewals

The following describes the approach to asset renewals related to safety, for assets at or near the end of their useful life.

- **Asset Growth:** Safety initiatives, such as the Safe Roads Programme are resulting in a significant increase in asset solutions, primarily wire rope barriers, the maintenance of which must be considered in the long term on SH5, SH30, SH33 and SH34. The wider impact of side barrier protection on maintenance extends to considerations of activities behind the barrier; mowing, drainage tree work, and utilities.

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/

SH5 – Tarukenga to Ngongotaha Safety Improvements

Description: Over the past 10 years, four people have lost their lives and 10 people have suffered serious injuries in crashes on this stretch of road. Improved safety features may include roadside and median barriers, rumble strips and better signage.

SH33 – Te Ngae to Paengaroa Safety Improvements

Description: This road has been identified as high risk rural road, and these safety improvements are part of the nationwide Safe Roads program. Improved safety features may include roadside and median barriers, wider centrelines, rumble strips and improved signage

SH30 – Owhata to Te Ngae Safety Improvements

Description: Improved safety features will include roadside and median barriers, wider centrelines, rumble strips and improved signage.

SH34 – SH30 to Kawerau Safety Improvements

Description: short sections of side barriers installed where there is a high risk of run-off-road crashes. Rumble strips will be applied to centrelines and edgelines.

SH30 – Te Teko to Awakeri Safety Improvements

Description: side barriers installed in locations where there are roadside hazards and a wide centreline installed along some of the route to reduce the risk of head-on crashes.

SH5 – SH38 to Wairakei Safety Improvements

Description: make the 47km section of SH5, beginning at Wairakei in the south through to the SH5/SH38 intersection at Rainbow Mountain in the north, safer for everyone who uses it. safety improvements include flexible road safety side barriers, widened shoulders, widened centrelines and minor intersection improvements.

SH5/SH30 Hemo Road Intersection

Description: The purpose of this project is to replace a high-risk intersection, ranked as the fourth riskiest in the country due to the high crash rate, with a new roundabout, reducing the risk of death and serious injury crashes.

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
SH30 – Tikitere to Kawerau via Rotoma		Safer Corridor treatments
SH5 – Tumunui to SH5/38 intersection		Safer corridor treatments
SH36 – Hamurana to Pyes Pa		Safer Corridor treatments
SH38 (SH5 to Murupara)		Safety improvements identified from the Safety GAP analysis and Speed Management review
SH34 (SH2 to SH30/34 at Onepu)		Safety improvements identified from the Safety GAP analysis and Speed Management review
SH30 Kinleith to Rotorua Safety Improvements		Safety improvements on SH30 from SH1 at Kinleith to SH5 south of Rotorua as identified in the NSRRP Review

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:

- The first 3 km of SH27/74 generates vibration complaints due to different rock formations that transmit vibration.
- Fitzgerald glade at SH5/8 is a no- spray area.
- Noise, particularly engine braking is an issue in urban areas at the Tauriko end of SH36.
- Vibration issues are prevalent on sections SH33/0, SH5/54, and, SH30/144, 147

Renewals

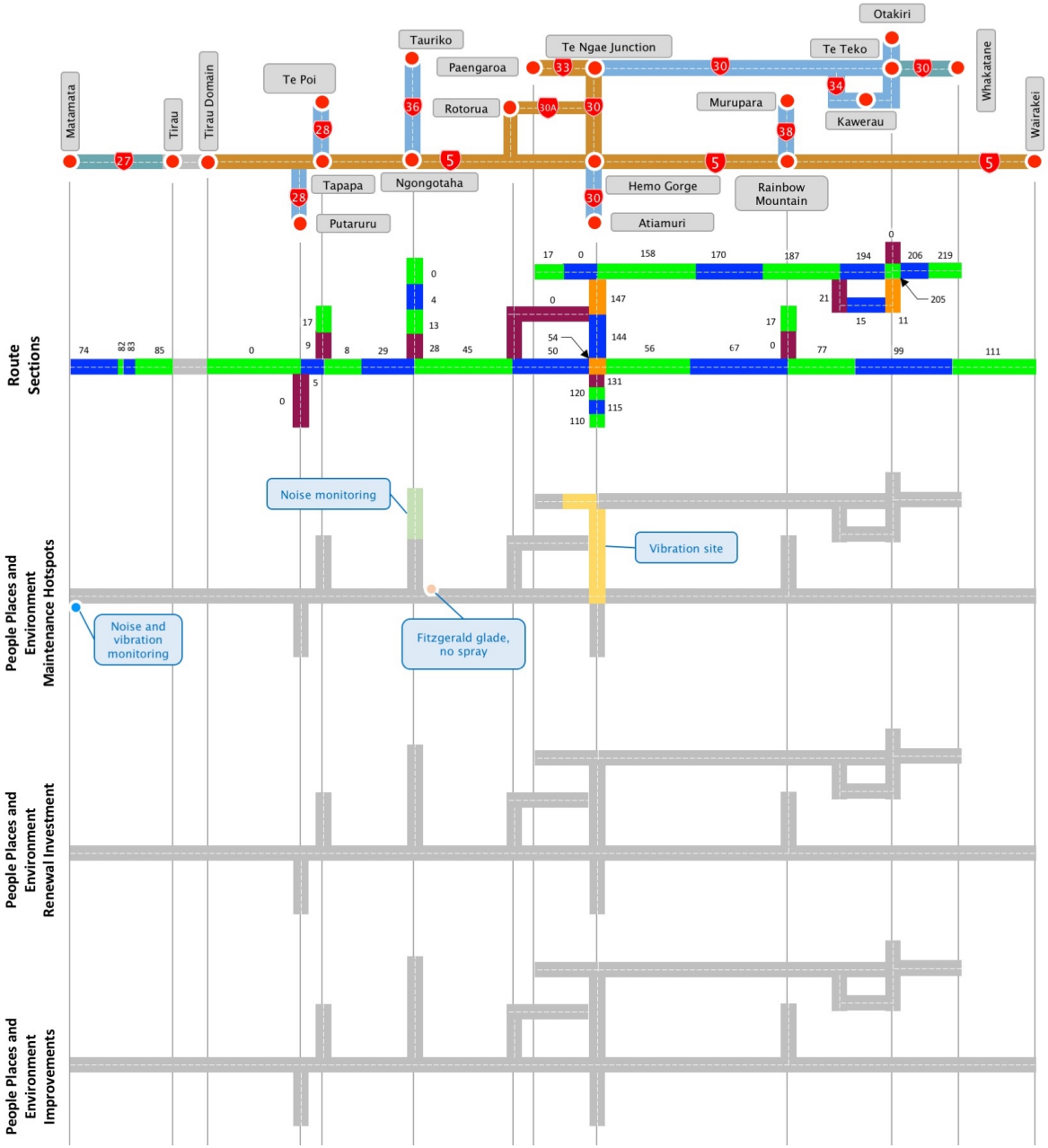
There are no people, places and environment related renewals planned for the corridor.

Improvements

Planned

There are no currently planned people, places and environment related improvements underway on this corridor.

Figure 31 – 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.

- **Residential and commercial growth:** Urban growth between Pyes Pa and Tauriko on SH36 and in and around Rotorua generally is expected to continue to put pressure on the corridor. The access demands of this growth will reduce the ability of the corridor to facilitate efficient, reliable and safe journeys.
- **Slips and flooding:** The corridor experiences slips and flooding during extreme weather events annually, particularly along SH30, SH36, and the west end of SH5. These events result in mostly partial road closures which have a negative effect on journey times and an adverse economic impact by slowing movement of people and freight.
- **Targeted investment:** There are no plans to upgrade alternative routes, due to topology of this corridor, many of the arms of the corridor provide alternative route to those others. The primary focus is on reducing crashes through safety improvements and environmental incidents through prioritised investment in preventative measures to ensure the corridor disruptions are minimised.
- **AC issues:** AC across the corridor is getting to the point where it needs to be replaced, particularly SH5/45,50,54,56, SH30/144,147, and SH30A/0. This also occurs on weak pavements. May have to accept shorter lives and more regular interventions, including localised strengthening, or structural AC lane by lane.

Reliability and efficiency

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

- **Limited capacity:** Intersection efficiency and highway capacity issues exist within the urban areas of Rotorua and at the Ngongotaha roundabout.
- **Choke points:** Two lane sections and intersections within the Rotorua urban area create choke points such as south of Malfroy Road to SH5 and east of Ngapuna. These issues will result in increasing congestion, motorist delay with extensive queuing as growth continues.

Safety

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

- **Additional asset maintenance burden:** Safety initiatives, such as the Safer Roads and Roadsides Programme are resulting in a significant increase in asset solutions, primarily wire rope barriers, the maintenance of which must be considered in the long term on SH5, SH30, SH33 and SH34. The wider impact of side barrier protection on maintenance extends to considerations of activities behind the barrier; mowing, drainage tree work, and utilities.
- **Major events:** Events in Rotorua impact on the safe and efficient flow for day to day road users and event participants. Appropriate traffic management needs to be planned and implemented to allow community events to proceed while not significantly impacting other users.

People, places and environment

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

- **Increasing traffic demands** in the growing residential urban areas of Tauriko and Rotorua are resulting in a need to manage noise and potential vibration potentially through low noise surfacing. Balancing community expectation around noise and vibration with sensible maintenance solutions in established areas will remain an ongoing maintenance consideration.
- **Native vegetation in sensitive areas:** Fitzgerald Glade (Tukorehe Scenic Reserve) near Tapapa which has native vegetation and trees close to and overhanging the road is difficult to maintain without significantly affecting efficiency.

Investment future considerations

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

- **Public transport:** As the urban population grows and development expands, the role of public transport in facilitating travel and replacing car journeys within Rotorua will become an increasingly important travel mode.
- **HPMV access to the port:** HPMV along the corridor leading to the Port of Tauranga is key to enabling efficient freight movements and keeping freight movements on appropriate routes.
- **ITS Systems:** Investment in real time information is critical for planning and diverting journeys. VMS boards are located on only two of the four approaches to the SH1/ SH5 roundabout at Wairakei. Future locations could service; the Mamaku section of SH5 that carries significant tourist and heavy traffic volumes, the Rotoma section of SH30 that is impacted by slips with both of these sections impacted by poor mobile phone coverage.
- **Monitoring of effects of weather events:** Mitigating slope instability issues 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.
- **Management of the journey experience:** Using a variety of leavers such as speed management, enforcement and driver information to enhance the journey experience.
- **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 minor side barrier installation on SH5 and SH30.
- **Speed management guide:** Review 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.
- **Cycling:** Consideration must be made for the safety of cyclists, particularly tourist cyclists accessing the corridor, by providing a consistent shoulder width.
- **Resource consents:** Opportunities for consolidation/ rationalisation of resource consents, particularly for regular maintenance activities.
- **Stopping areas:** These are needed in places to provide, among other things, safe areas where tourist can pull off the road to view the natural environment and avoid them parking in dangerous areas. This is particularly of concern next to Lake Rotoiti and Lake Rotoma. Stopping areas are also needed on the corridor to allow truck drivers to take breaks, check their loads and use facilities. Consider reviewing existing stopping places and develop a strategy to ensure they are in the right place and have appropriate facilities.
- **Iwi/ mana whenua relationships:** Input into the management of heritage assets and landscapes and 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. One specific example of this is the request by local iwi for pou to be placed on the entrance to Rotoiti.

SH5 north of Rotorua

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
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

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