Piarere to Tauranga

CORRIDOR MANAGEMENT PLAN

2 27 29 29A

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NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government

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Executive summary

The Piarere to Tauranga corridor provides a direct link between three strong economic regions of the north island of New Zealand. Auckland, the Waikato and the Bay of Plenty regions form what is colloquially termed the 'Golden Triangle', the area between Auckland, Hamilton, and Tauranga.

The corridor comprises SH29 commencing at the junction with SH1 at Piarere near lake Karapiro, and traversing the southern extents of the Hauraki plains, then climbing over the Kaimai range and descending into the Bay of Plenty to Tauranga. The corridor also traverses part of SH2 before terminating at the Port of Tauranga in Mt Maunganui. The corridor includes SH29A linking SH29 at Tauriko to SH2 at Baypark. It is also the through route for full high productivity motor vehicles (HPMVs) between the Bay of Plenty and areas to the north and west, including Auckland and the Waikato.

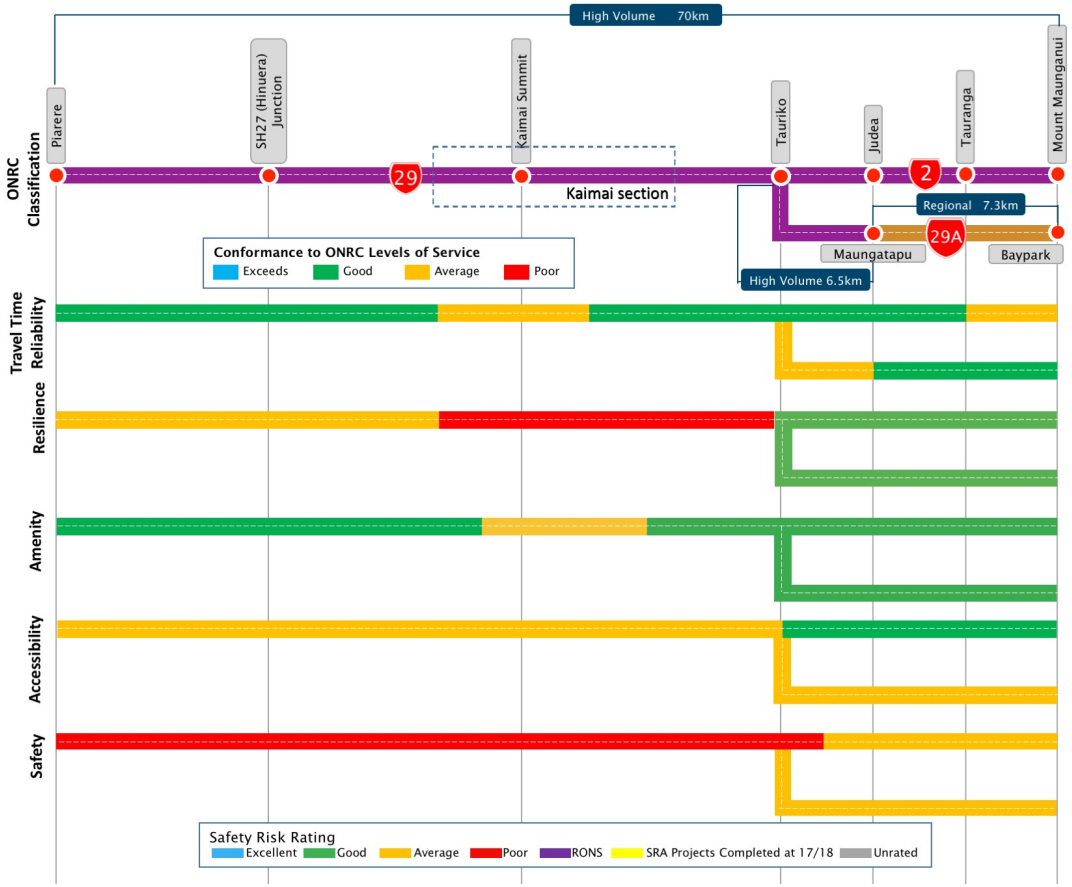
The corridor is approximately 94 km long (0.8% of the state highway network). The total value of assets along the corridor is $286M (1.2% of the total national asset value).

The key customers utilising the corridor differ along its length. At the eastern end of the corridor, commuters and local traffic are the majority of customers in the Tauranga urban area. On the rural western section between Piarere and Tauriko there are a large number of freight movements travelling between the Waikato and the Bay of Plenty, with the corridor providing a crucial link between the two regions. Importantly, Port of Tauranga is New Zealand's largest export port, a main origin and destination for much but not all of the freight demand on the corridor.

With a forecast increase in road freight across the upper North Island of 59% over the next 30 years, the state highway network, including this corridor, will come under significantly increased pressure. As the development of the Waikato Expressway extends between Cambridge and Piarere, the corridor will come under increasing pressure from heavy vehicle usage as the planned outcome of moving freight from the SH2 or SH27 alternatives is realised. Efficient freight movement management and route choice between origin and destination will become ever more important for all road users to maintain a safe and reliable network.

Maintaining and developing a higher quality asset with greater resilience, longer life and lower maintenance. As a high-volume HGV route, the need to build a resilient network is imperative. Providing appropriate surfacing for this demand will reduce the regularity for which maintenance would need to take place.

Figure 1 - Performance of the corridor against ONRC outcomes



It is anticipated that approximately 45,000 homes will be built in Tauranga over the next 50 years. The traffic generating potential of the resultant population will likely impact on the existing State Highway network, particularly on intersections, unless appropriate travel demand management and other improvements to the network are made.

Introduction

Purpose

What is the corridor management plan?

This Corridor Management Plan describes the customer service delivery story for the Piarere to Tauranga 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.

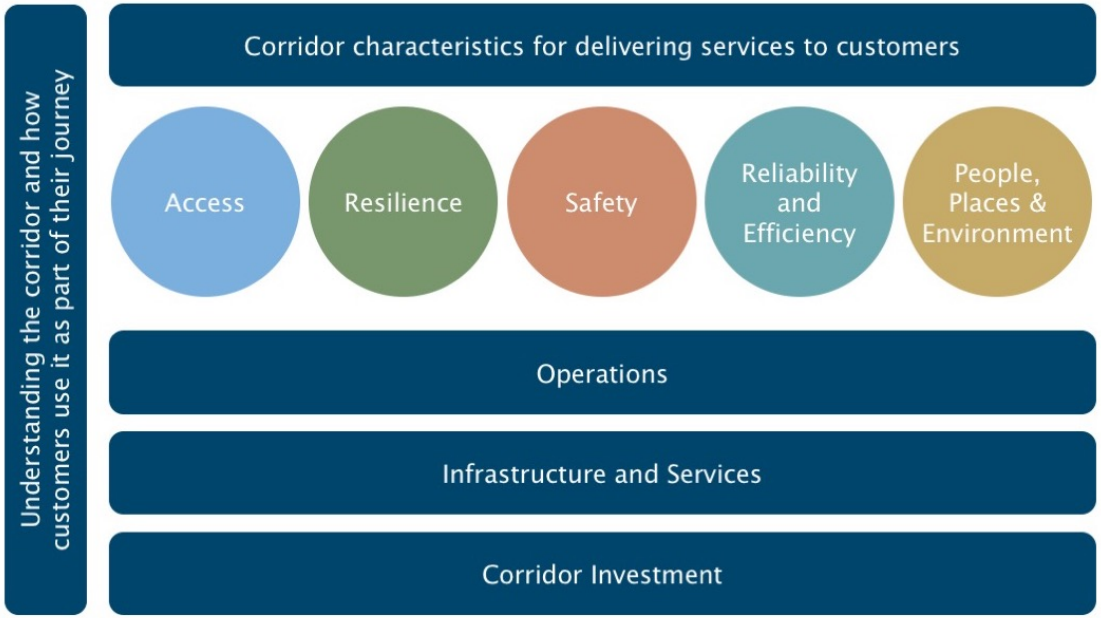
Planning is currently undertaken at the regional level, but typically significant journeys traverse more than one region. By considering the significant customer journeys and destinations, the corridor management plan is a vehicle to engage in regional and inter-regional conversations by focusing on 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 Piarere to Tauranga corridor is one of the key connections between Auckland, Hamilton, and Tauranga are critical to New Zealand's economic and social success. The corridor comprises SH29, part of SH2 and SH29A providing the strategically important link between SH1 and Tauranga including the Port of Tauranga (PoT). It is also the through route for full high productivity motor vehicles (HPMVs) between the Bay of Plenty and areas to the north and west, including Auckland and the Waikato.

With a forecast increase in road freight across the upper North Island of 59% over the next 30 years the road network, including this corridor, will come under significantly increased pressure. As the development of the Waikato Expressway extends between Cambridge and Piarere, the corridor will come under increasing pressure from heavy vehicles. Efficient freight movement management and route choice between origin and destination will become ever more important for all road users to maintain a safe and reliable network.

The regional economy

The SH29 corridor provides a direct link between two strong economic regions of the north island of New Zealand. The Waikato and the Bay of Plenty regions form the lower section of what is colloquially termed the 'Golden Triangle', the area between Auckland, Hamilton, and Tauranga.

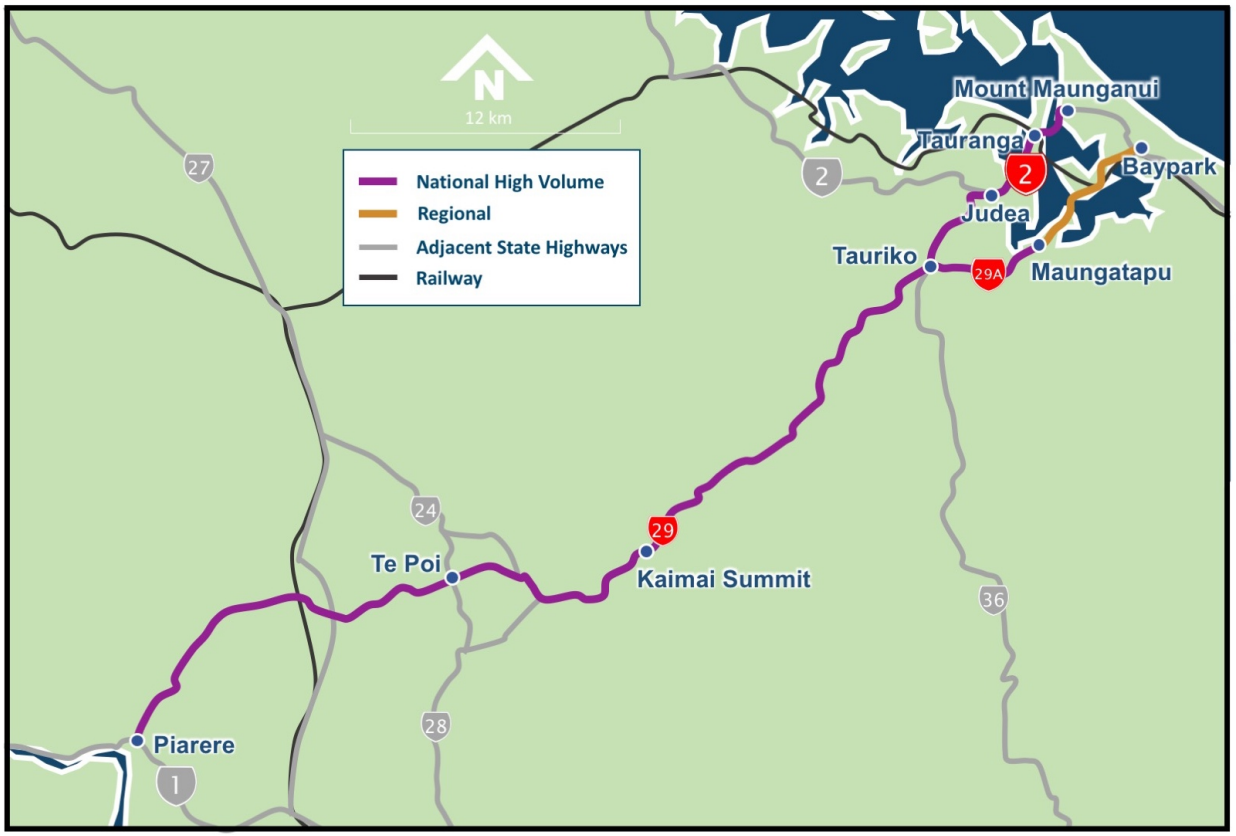
The Bay of Plenty Regional Economy is supported by large horticultural and agricultural activities, including forestry. The Port of Tauranga makes a significant contribution to the local economy, and is New Zealand's largest export port.

The Waikato Region is the fourth-largest regional economy in New Zealand and home to many of New Zealand's primary industries. This region hosts large agricultural and forestry activities, and Hamilton is where much of the product is warehoused and processed. One of the leading industries is dairy and Fonterra have a number of large facilities in the region including Te Rapa just north of Hamilton and Lichfield. The majority of the product generated at these sites is shipped either to Auckland or to the Port of Tauranga for export.

The Bay of Plenty economy accounts for 5.7% of New Zealand's Gross Domestic Product (GDP). Nominal GDP in the region increased by 2.9% per annum on average over the past five years, compared to the national average of 3.7%.

There are variations in GDP across the region, with Tauranga City and Mount Maunganui benefitting from stronger economic indicators generally. The Waikato Region accounts for 8.5% of New Zealand's Gross Domestic Product (GDP). Nominal GDP in the region increased by 2.7% per annum on average over the past five years, compared to the national average of 3.7%.

Figure 3 – Corridor overview



Understanding our customers

Key customers

At the eastern end of the corridor, commuters and local traffic are the customers in the Tauranga urban area. On the rural western section between Piarere and Tauriko there are a large number of freight movements travelling between the Waikato and the Bay of Plenty, with the corridor providing a crucial link between the two regions. Importantly, the Port of Tauranga is the largest export port, a main origin and destination for much of the freight demand on the corridor. Different customers have different needs, expectations, and personal circumstances for using the transport system.

Daily commuter

Travelling by car is almost exclusively the mode of choice for commuters on the corridor, with those who work in Tauranga reporting a 97% car mode share for their Journey to Work in the 2013 Census. There are no public transport bus services on SH29 between Piarere and Tauriko, with the exception of school bus services and intercity coaches. Local bus services operate within the Tauranga City Boundary.

Insights into daily commuter users:

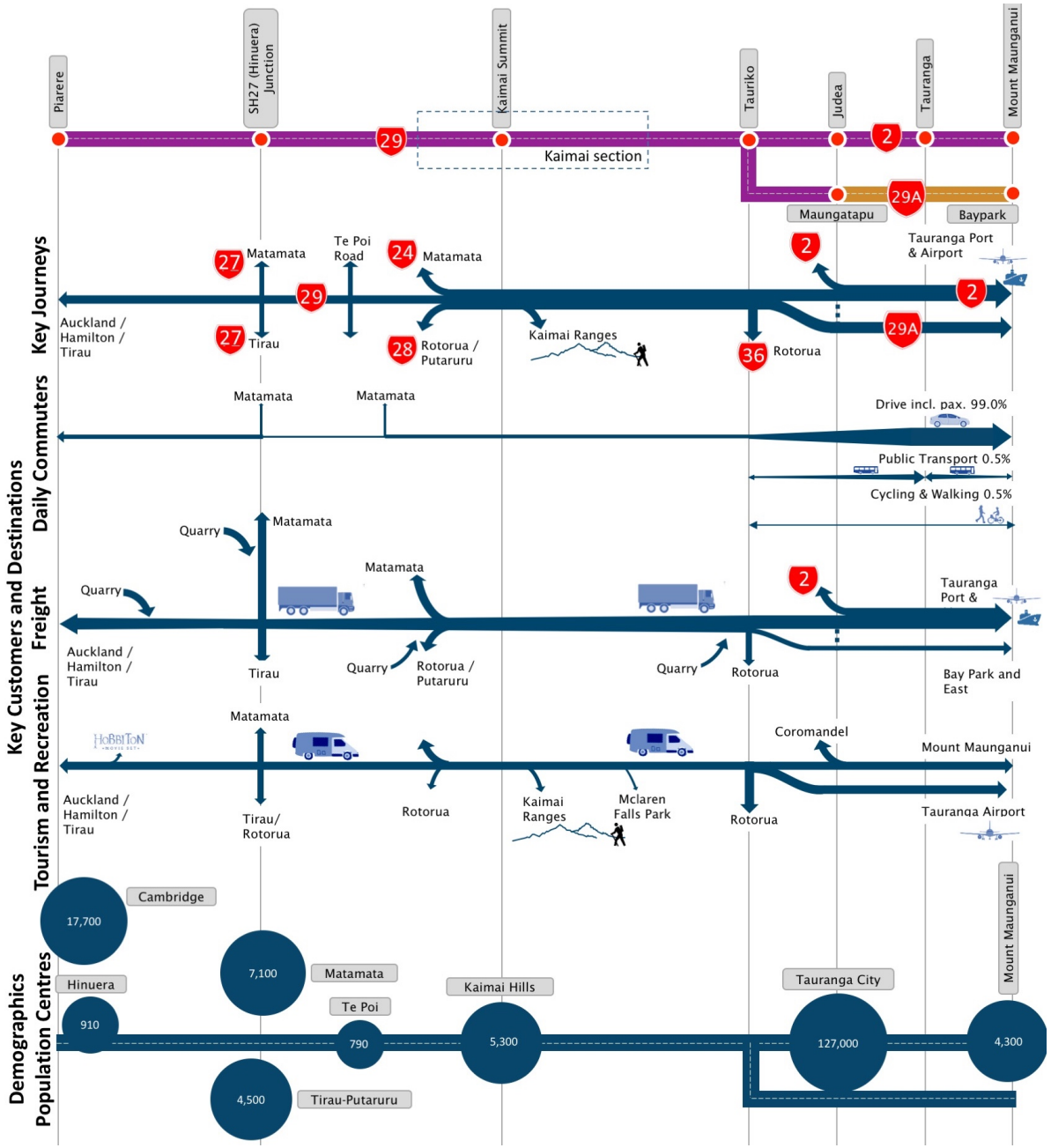
Road use: Commuters have limited choices besides road based options when accessing employment via the corridor.

Road knowledge: Commuters are familiar with the main routes into cities and towns. There are limited alternative routes however journey times are relatively predictable considering the flows on these routes.

Pain points: The main commuter pain points are on the approaches to Tauranga via SH29 and SH29A. Key interchanges with SH36, Cameron Road and SH2/SH2A on both SH29 and SH29A currently experience significant delays in both the morning and evening peak periods. The steep gradients and large proportion of heavy vehicles over the Kaimai Ranges creates differential speeds between commuters and trucks, with consequential impacts on safety, travel time reliability and operating costs between Tauranga and the Waikato. Crashes and unplanned closures cause significant issues as no viable alternatives are readily available. This is of particular concern between the Kaimai summit and Tauriko which experiences a higher than expected rate of serious crashes and weather-related closures.

Daily commuters expect: Predicable journeys at peak times, accurate and up to date information about traffic (peak and off peak), weather, road conditions and hazards.

Figure 4 - Key customers, journeys, and destinations



Tourist and recreational users

Many attractions are available on the corridor, appealing to both foreign and domestic visitors. The Hobbiton movie set, based on the 'Lord of the Rings' movie franchise, is accessed from SH29, west of the intersection of SH27. The site is a popular destination for tourists, with 240,000 visitors in 2013. Mount Maunganui, adjacent to Tauranga, is a seaside town popular with tourists from across the Upper North Island and beyond. Enhancement across the whole of the SH29 corridor could provide tourism linkages between the Bay of Plenty, Rotorua (via SH28) and the Waikato whilst simultaneously improving DoC walking opportunities in the Kaimai Ranges. SH29 is not currently considered the preferred route by tourists travelling between Auckland and Tauranga/Mount Maunganui, with SH2 Coastal Highway providing a more scenic option.

Insights into tourist and recreational users are as follows:

Road use: Tourist activities are mainly focused at the eastern and western ends of the corridor with the Hobbiton site, SH2 destinations and Mount Maunganui. Tourist numbers tend to increase around school holidays and summer weekends. Increased number of coaches can be found on the corridor due to excursion trips to Hobbiton from nearby major centres and visiting cruise ships, as well as growing demand from independent travellers. DoC walkways and trails assessed from SH29 are seeing increased use. The eastern end of the corridor represents part of the key tourism route between Mount Maunganui and Rotorua.

Road knowledge: Many international visitors have not experienced New Zealand roads and conditions, and tend to be focused on the landscape and their destination. Travel times can be underestimated and frequently there is limited or no knowledge of places on the journey where the road configuration suddenly changes. Domestic recreational users are more familiar with the road and anticipated travel times.

"Safety and travel time reliability are valued more highly than travel time savings"

Pain points: Improved signage to key attractions and at intersections will help with decision making along the corridor.

Tourist and recreational users expect: Clear signage for key tourism routes and destinations, accurate and up to date information about traffic, weather, road conditions and hazards. Quality rest areas and locations to park near known vistas or tourist spots are also highly sought after by tourists.

Freight operators

Freight movements are primarily focused on accessing the Port of Tauranga, which is New Zealand's largest export port. The port provides a key link from the Waikato Region to global markets. The corridor is a key component of the Upper North Island Freight picture. Some primary industries activities (agriculture and quarrying) take place adjacent to SH29.

"…good visibility is the key to everyone being safe"

Insights into freight operators are as follows:

Road use: SH29 is used by freight operators to move goods between the Waikato and Bay of Plenty Regions and Port of Tauranga. Availability and reliability of the route is important as there are limited viable alternatives available to freight vehicles. Travel time reliability is also a critical desire of the freight industry. Whilst many long-haul journeys are undertaken at night, when traffic flows are lower, the time critical nature of commercial traffic means the road has to be available throughout the day. A significant volume of freight from the PoT leaves by rail. If for any reason, such as maintenance in the Kaimai Rail Tunnel, the rail route is unavailable, SH29 is an important alternative route.

Road knowledge: Due to the high number of users and the strategic importance of the route, knowledge of the road is extremely high with freight operators confident in understanding the network and managing difficult conditions.

Pain points: The State Highway Network is susceptible to closure due to unplanned events resulting from weather events or accidents. Alternative heavy transport routes are limited along the corridor and are significantly longer, affecting delivery times and therefore business operations. The steeper sections of SH29 over the Kaimai Ranges are areas where speeds drop and the cost of operation for freight vehicles increases.

Freight operators expect: Availability of the route is the critical expectation of freight operators. Reliability of travel time is also important, followed by accurate and up to date information about traffic, weather, road conditions and hazards. Quality rest areas and parking for large vehicles in town centres is also valued and has been identified as being absent along the corridor.

How we deliver services along the corridor

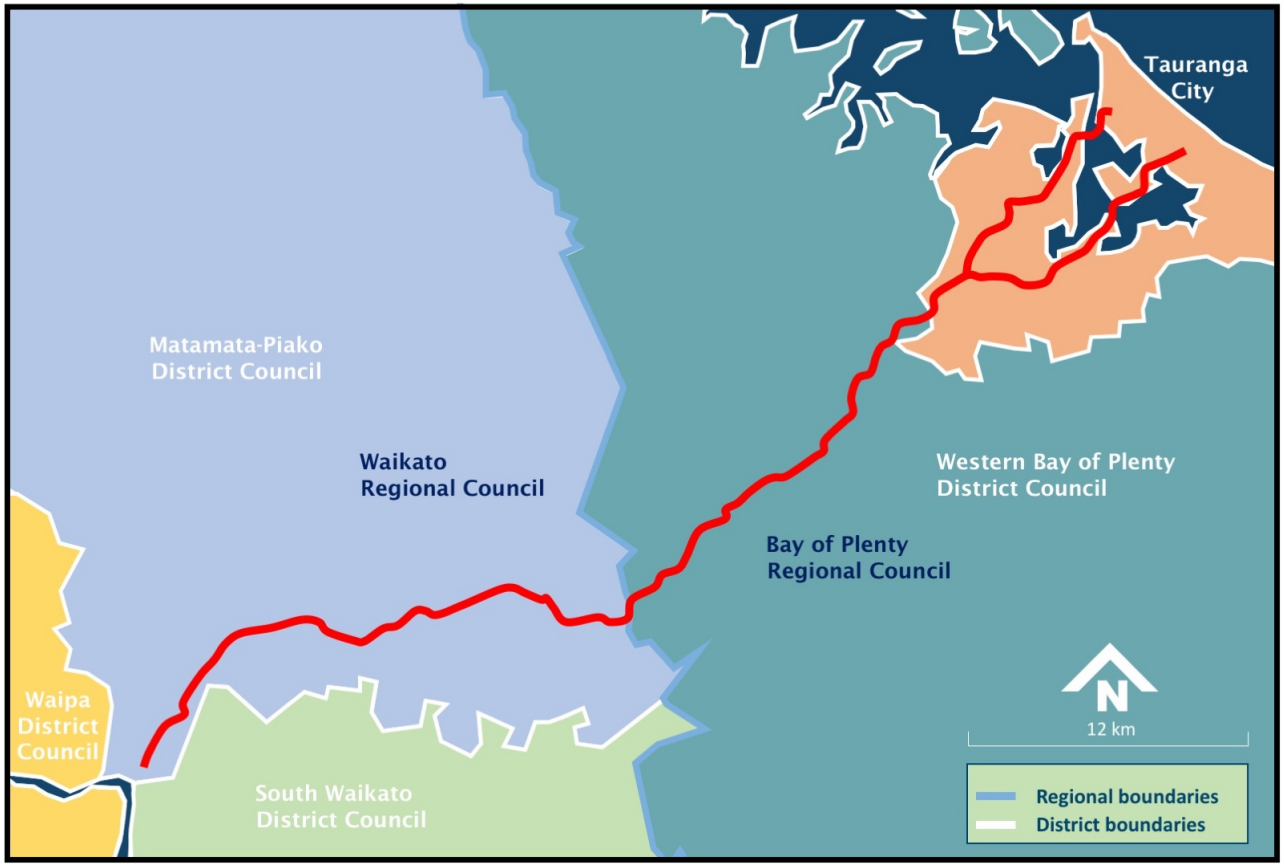
Transport partners

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

We work closely with the TLAs, KiwiRail and regional councils along the corridor as shown in Figure 5.

In addition, we work with our customers and their representative groups such as the Road Transport Authority, the AA and others. The constant review of potential partners is necessary to ensure the best channels are in place to communicate effectively with users of our network.

Figure 5 - Map of associated local authorities



Network Outcomes Contracts Approach

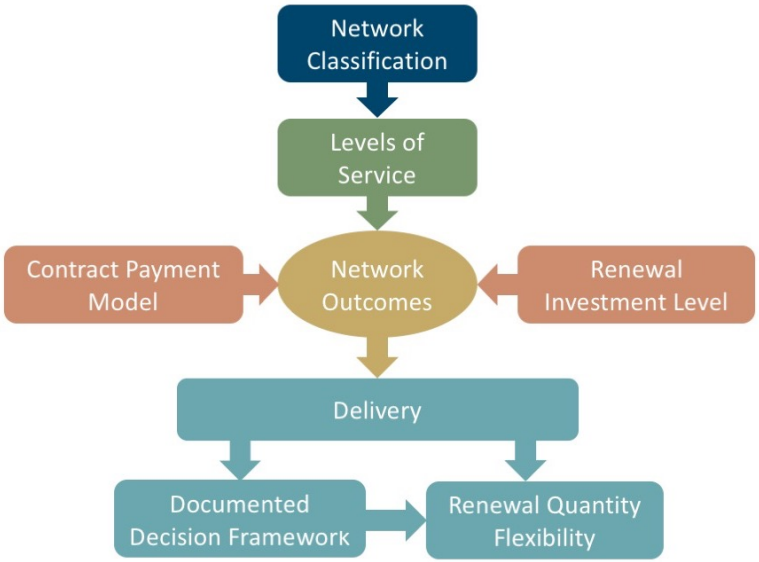
A new approach has been introduced for maintenance and operations through the introduction of Network Outcome Contracts (NOC) aimed at improving the effectiveness of service delivery. By capturing the best elements of the three historic procurement methodologies (PSMC, Hybrid and Traditional models) into this new contract model will deliver services through a primary supplier incorporating both professional services and physical works for all key maintenance activities.

To support this a central Governance and Management Group is in place to represent the interests of the Maintenance and Operations teams in the delivery of the NOCs. This group resolves issues, looks at opportunities for improvement, recommends changes to the national contact documentation, and ensures a consistent application, understanding and implementation of the Network Outcomes Contract 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 Network Outcomes Contracts is shown below:

Figure 6 - NOC contract process



Collaborative delivery of services

The Piarere to Tauranga corridor crosses over two NOC contract areas as discussed below. The boundary of the two contract areas occurs at the summit of the Kaimai ranges.

BoP West Network Outcomes contract

The BoP West One Network Maintenance contract is undertaken by WestLink, an Opus led contract supported by Downer. The contract commenced on the 1st of November 2014 for a 7-year period with the option based on performance for a further 2 years. It covers all Western Bay of Plenty local roads (over 1000km) and all state highways (257km) within the Western Bay of Plenty and Tauranga City, with the state highway component being operated under the NOC format. This corridor incorporates 74km of state highways within this NOC area.

This contract is supported by the following specialist maintenance contracts:

- **Regional bridge and structures:** Professional Services contract covering the wider Waikato and BoP regions, awarded to Beca in September 2015 with a contract term from 1 November 2015 to 31 October 2018.
- **Traffic monitoring sites:** Professional Services contract covering the wider Waikato and BoP regions, awarded to Beca in October 2016 with a contract term of two years with the option based on performance for a further three years.

East Waikato Network Outcomes contract

The East Waikato NOC contract is undertaken by Broadspectrum (formerly Transfield Services). The contract commenced on the 1st of July 2015 for a 5-year period with the option based on performance for a further 2 years. The contract covers 565km of which 188km are within this corridor.

This contract is supported by the following specialist maintenance contracts:

- **Regional bridge and structures –** Professional Services contract covering the wider Waikato and BoP regions, awarded to Beca in September 2015 with a contract term from 1 November 2015 to 31 October 2018.
- **Traffic monitoring sites –** Professional Services contract covering the wider Waikato and BoP regions, awarded to Beca in October 2016 with a contract term of two years with the option based on performance for a further three years.

In mutual agreement with the NOC contractor, the current contract for East Waikato will be terminating early on 31 October 2017, with new supplier of services to be in place from 1 Nov 17. There will also be a reduced length of network within the contract area to 550km.

Drivers for change

The Piarere to Tauranga corridor caters for a variety of customers. The main driver for change is that demand for a reliable and resilient corridor is expected to grow into the future, driven by continued development at the Port of Tauranga, population growth in Tauranga and economic growth in Aucklnad, Waikato, and the Bay of Plenty requiring strong transport corridors.

State Highway 1 investment

The NZ Transport Agency is investigating long-term improvements in the safety and efficiency of SH1 between Cambridge (where the four-lane Waikato Expressway ends) and Piarere (at the SH1 and SH29 intersection). This will provide a four-lane expressway, effectively extending the southern end of the Waikato Expressway.

With this four-laning, and having HPMV access, it is expected that SH29 will come under increasing pressure from heavy vehicles travelling between Auckland and Tauranga and the Bay of Plenty.

Freight growth

The SH29 corridor is a key gateway between Auckland, Hamilton and Tauranga. The route is vital for the delivery of efficient freight supply chains across the Upper North Island. Investment on the SH29 Corridor between Piarere and Tauriko is planned to reduce the journey time for trucks by 5 minutes (contributing to an overall time saving of 35 minutes between Pokeno and Tauranga), removing all route closures longer than 2 hours and preventing 24 deaths and serious injuries over 5 years, all by 2030.

The growth at Port of Tauranga is increasing the number of freight vehicles on SH29. Recent and ongoing expansion at the port will see 40 per cent larger ships being accommodated which will increase the pressure on existing land transport corridors. Currently, at its peak, 1,500 heavy vehicles per day use the corridor and this number is growing at a rapid rate. The corridor forms part of the Upper North Island Freight Story and will continue to support the delivery of goods across the wider region.

Tauranga city growth

Tauranga has been one of New Zealand's fastest growing cities for 30 years and is one of the few still growing, and expected to continue to grow. It is predicted another 50,000 people will be living in Tauranga by 2043, an increase of over 40% from 2013. This growth is primarily to be accommodated within the existing urban land use boundary, with much of the increase in the over 65-year age groups. In response to this expected growth, SmartGrowth, a 50-year strategy developed in 2004, sets a framework to guide planning decisions in areas for development out to 2065.

With the framework of SmartGrowth, Tauranga City Council (TCC) has developed the 2015-2025 Long Term Plan (LTP) to 'Manage Tauranga's growth into the future'. The jointly developed Tauranga Transport Strategy 2012-2042, taking into consideration SmartGrowth, includes the completion of NZ Transport Agency projects including: the Tauranga Eastern Link (TEL), upgrade of Maunganui/Girven intersection, upgrade of the Te Maunga SH2/SH29 intersection, Hairini Link, the Tauranga Northern Link, and improvements at Tauriko. This is supported by local Capital Expenditure (CAPEX) of approximately $40m per year rising to approximately $60m per year by 2045.

The western section of SH2, including the TEL, has been expanded to accommodate Tauranga's growth, improve safety for commuters and connections to Rotorua and the Eastern BoP for freight. Further operational efficiency measures including intersection upgrades, rail separation and local improvements will be required to accommodate the continued growth in the area.

The vision for Tauriko for Tomorrow is to create a thriving community for locals to live, learn, work and play locally. This means the community will have amenities such as schools, parks, cycle and walkways, access to shopping and community facilities, and transport infrastructure.

Tauriko Tomorrow

Tauriko West, on the edge of Tauranga City, is set to become one of the western Bay of Plenty's next growth areas. A long-term plan is underway that looks at how best to develop the new community, improve transport links and open up the area for urban development. The NZ Transport Agency is working collaboratively with Western Bay of Plenty District Council, Bay of Plenty Regional Council, and Tauranga City Council to plan for growth in the area. This may include realignment of SH29 away from the built up area, improving the efficiency of the State Highway.

Understanding customer levels of service on the corridor

Current levels of service performance

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

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

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

Road classification

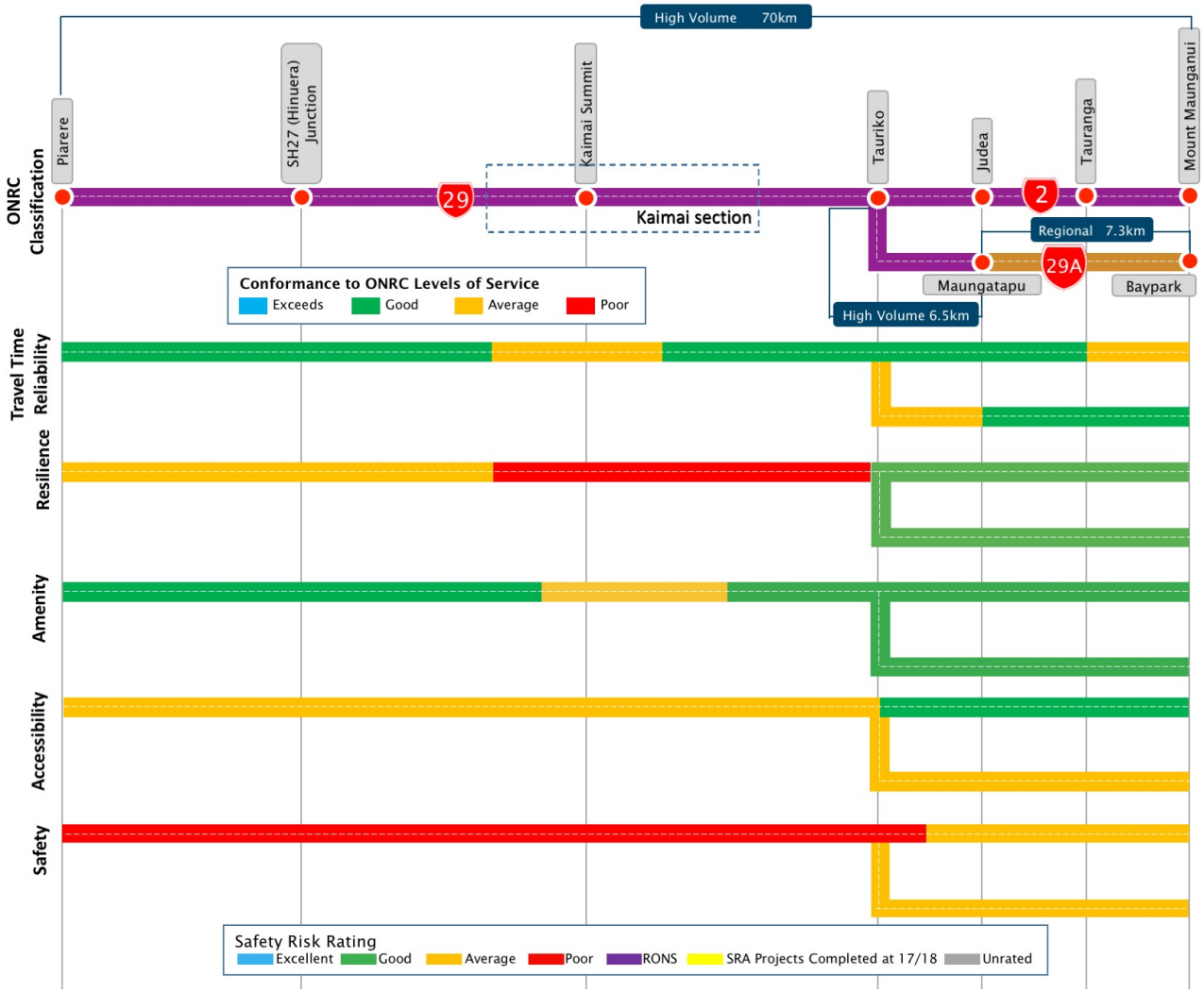
The SH29 corridor from Piarere to Tauranga is classified as National (High Volume). SH29A between Maungatapu and SH2 is classified as Regional. This is primarily in acknowledgement of the large volumes of heavy goods vehicles which use this route

Figure 6 shows how the 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 Management Plan. It is not based upon consolidated evidence from the ONRC technical measures. Overleaf provides additional context to explain the current levels of service along the corridor based on the road classification.

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 Piarere to Tauranga corridor is currently performing against the ONRC Levels of Service expected for the relevant classification of each section.

Levels of service performance has been determined by workshop participants in the development of this corridor plan and is therefore not solely based upon consolidated evidence from the ONRC technical measures.

A simple four-point assessment has been utilised as follows:

Exceeds	The level of service provided by the section of corridor for the activity under consideration exceeds what is required for a highway of that classification
Good	The section of corridor generally meets the LOS requirements for the activity and ONRC
Average	The section of corridor meets some but not all of the LOS requirements for the activity and ONRC classification
Poor	The section of corridor generally fails the LOS requirements for the activity and ONRC classification, or there is a significant gap in the LOS for some aspects of the activity.

Travel time reliability

Travel time reliability is generally acceptable across the corridor, with increases in traffic volumes during peak times on urban sections of SH29/29A having a greater, albeit localised, impact in these areas. The highway configuration over the Kaimai Ranges requires more cautious driving, generally slower than the rest of the corridor. Journey times over the Kaimai Ranges are generally consistent, however, the slow movement of heavy goods vehicles and limited safe passing opportunities can increase journey times for lighter vehicles.

Resilience

Generally, the corridor is considered poor or average for resilience, particularly west of the urban areas of Tauranga. The Kaimai Ranges experience both planned and unplanned disruptive events resulting from weather, maintenance, or accidents. There are limited viable alternative routes for customers, particularly routes which are suitable for heavy goods vehicles, and diversions can involve a 2 to 2.5-hour detour via SH2 through Karangahake Gorge or via Rotorua and SH36. Issues relating to drainage and surface water further exacerbate the resilience issues on this stretch of the corridor.

Whilst susceptible to congestion, resilience within Tauranga urban area is considered to be good as both State Highways, together with the local arterial network, provide suitable alternatives in the event of closures.

Amenity

Amenities for customers along the route are limited. Hinuera and Te Poi offer fuel and a small range of retail goods for travellers. There is a view point near the summit of the Kaimai Range on the west side of the hill offering excellent views across the Waikato.

The route passes through rural and urban landscapes, generally benefitting a scenic tourism route. The roughness of the road surface varies depending on location, for example older chipseal pavements on the Waikato side are regularly maintained, but are perceived as rougher than the asphalt pavement in the Tauranga urban area. Pavement along the Kaimais is regularly monitored, with focus on the winding sections.

Accessibility

SH29 has limited safe passing lanes, and limited deceleration lanes on approaches to intersections. Along the rural sections, the corridor has a number of intersections with local roads that provide access to residential property. Many of these intersections have suffered from high crash rates, so have been improved with treatments including turning bays, sight line improvements and skid resistance improvements. However, a number of them are still sub optimal and are experiencing traffic growth due to local development, for example Belk Road and Omanawa Road.

As the corridor approaches Tauranga, accesses are limited to key intersections and roundabouts, but does not provide for substantial change in accessibility rating identified for a National (High Volume) road. The section is not considered to be highly engineered nor does it provide provision of quality information relevant to national road user needs.

Safety

The majority of the corridor has a KiwiRAP star rating of 2 or 3-star which falls below the standard for a National (High Volume) route of 4-star. This star rating denotes some major deficiencies in the road geometry.

The section of SH29A on the approach to SH2 through Maungatapu is rated as 4 star which meets the target classification of the route. There are some significant sections on SH29 with high collective risk and personal risk.

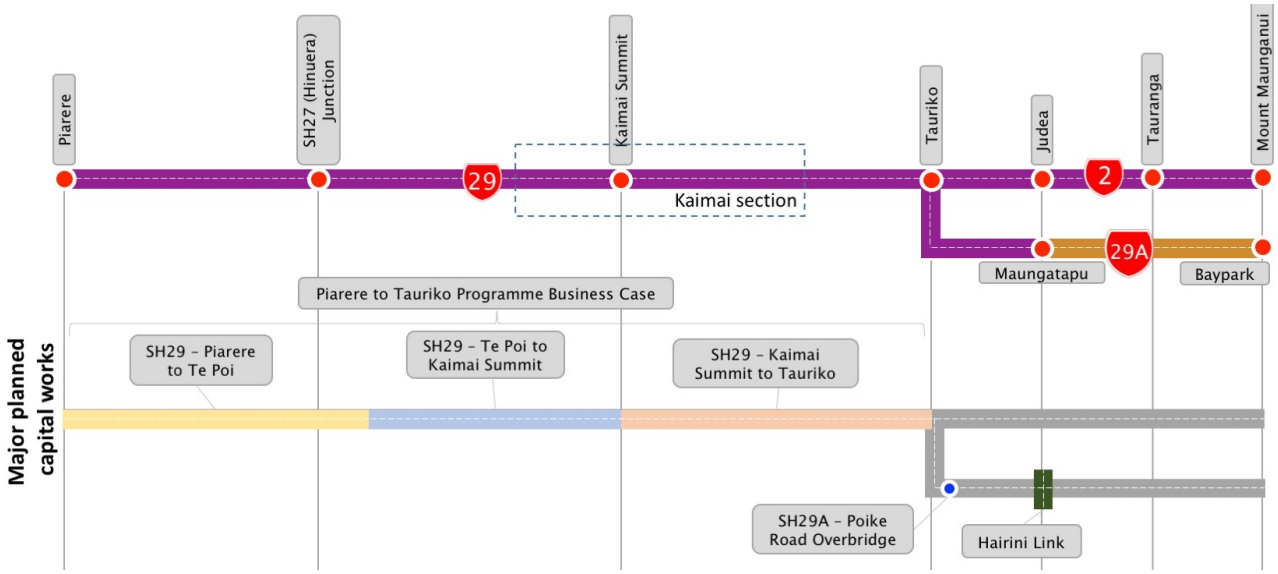
Improving the customer experience

In responding to Customer Levels of Service it is important to acknowledge that significant improvements to the corridor are planned or underway. Figure 8 shows the planned improvements in the corridor.

When completed, the planned improvements to the corridor will deliver an overall increase in efficiency, resilience and safety, focusing on realignment of high-radius and accident-prone curves on the Kaimai section of the route, additional passing opportunities and safety interventions at several intersections. Within the Tauranga section of the corridor, the planned improvements will deliver new links to the wider State Highway network and other urban areas.

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

Figure 8 – Significant corridor planned improvements



Access

Carriageway configuration

The carriage configuration is reasonably consistent throughout the corridor, typically one lane in each direction with minimal passing lane opportunities. Passing lanes are typically on the uphill direction of hills throughout the corridor. The downhill slow vehicle bays on the west side of the Kaimai Summit are short and can become hazardous should a vehicle not have sufficient time to overtake. Through Tauranga, the SH29 Toll Road is a 2 plus 1 cross section, then merges into a divided four lane expressway through to the City and Port. SH29A is predominately one lane in each direction from the junction with SH36 to Matapihi, where it begins to form into a four-lane divided cross section with median barrier. The section of SH2 is generally a four-lane divided cross section with median barrier.

Speed limits

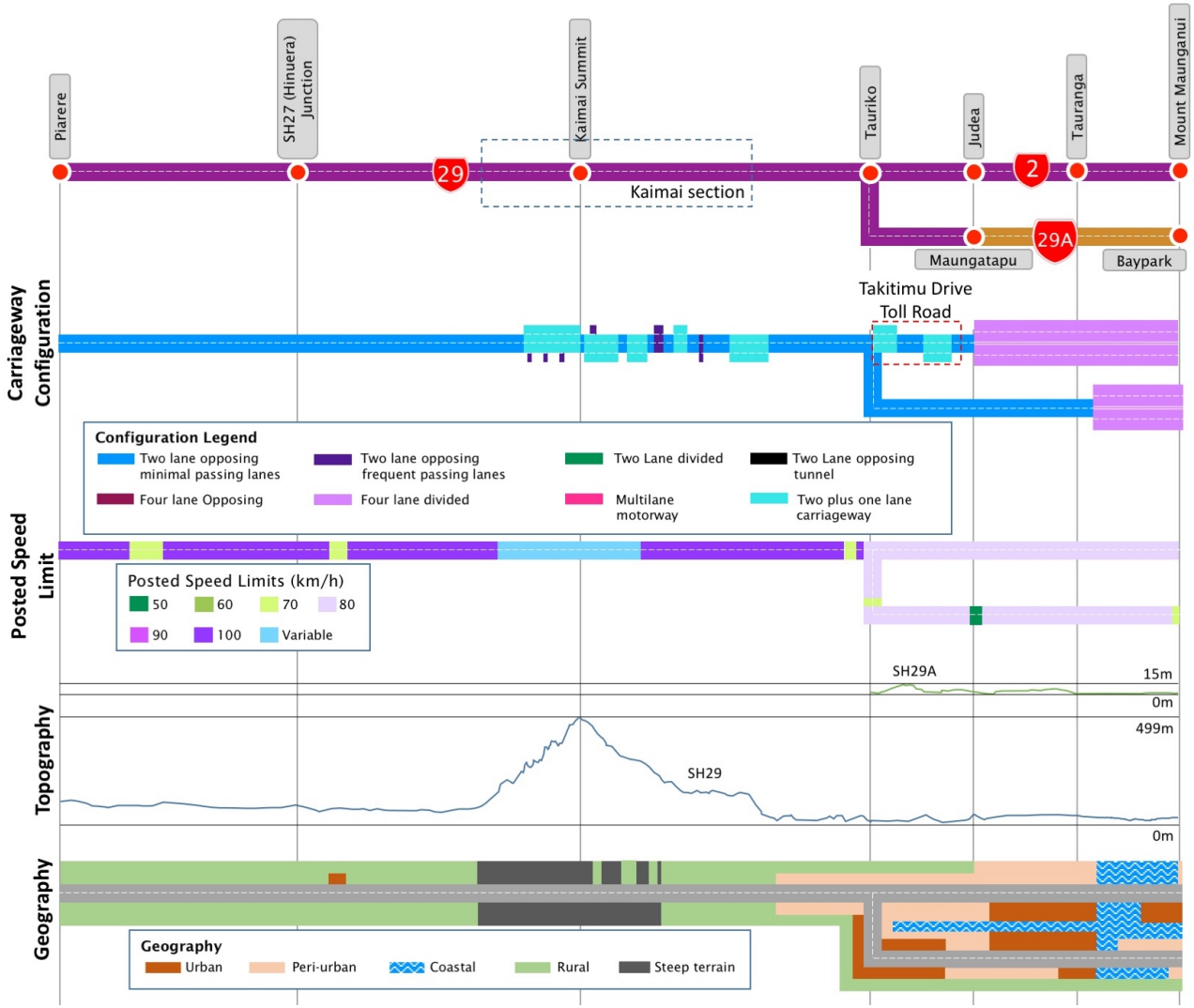
The corridor generally has a posted speed limited of 100km/hr, lowering to 80kmh as it enters the urban area along the Takitimu Drive Expressway (SH29). Through the smaller communities along the route, Hinuera, Te Poi, and Tauriko, the speed limit reduces to 70km/hr. Weather Activated Variable Speed Limits signs (WAVSL) are in place on the Summit section of SH29 crossing the Kaimai Range to warn users to slow in the event of inclement weather events. These WAVSL signs reduce the speed limits to a 60 – 80kmh range temporarily when activated during inclement weather including heavy rain and fog.

Topography/geography

The corridor is flat between Piarere and SH28 intersection east of Te Poi. There the corridor climbs to the Kaimai Summit at approximately 500 metres elevation. From the summit, the corridor descends towards the Wairoa River, before climbing again to the Tauriko Ridge. The west side of the Kaimai Range is steeper than the east, with gradients approaching 11%.

The corridor is predominantly rural in nature on its approaches to Tauranga with few small settlements. SH29A particularly runs through the peri-urban and urban areas of Tauranga city.

Figure 9 - Corridor characteristics

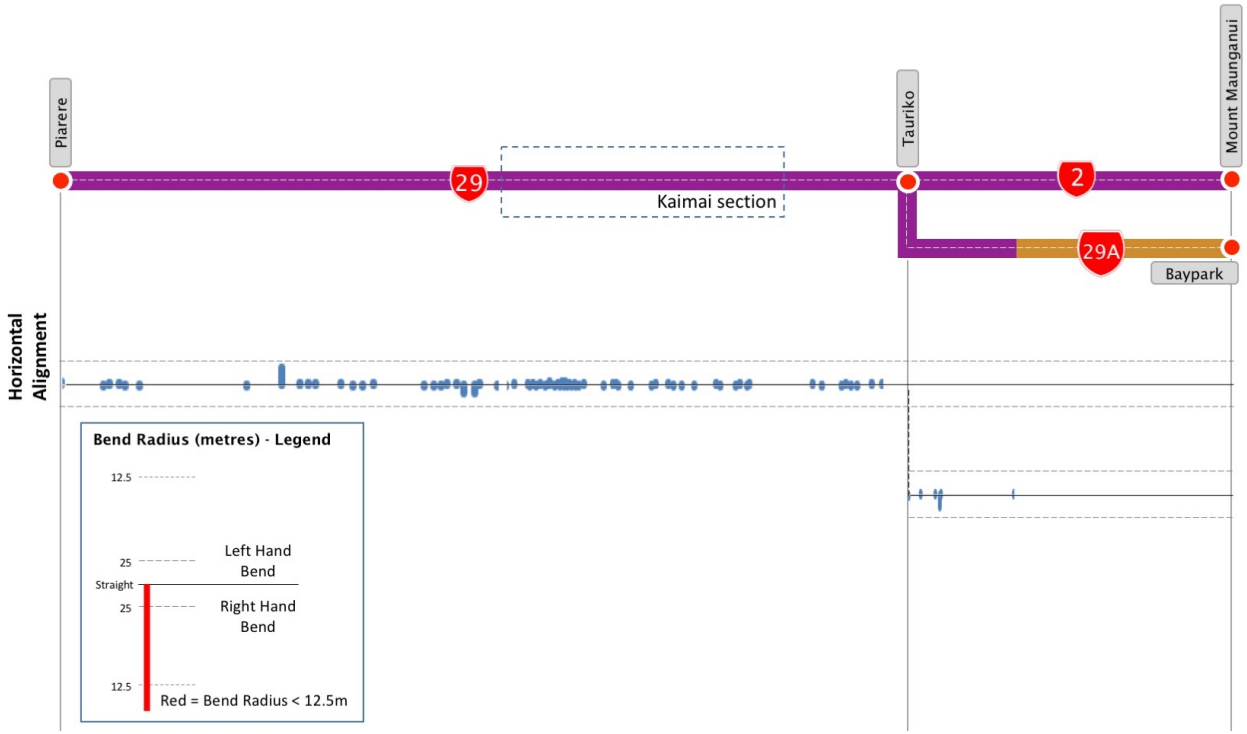


Horizontal alignment

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 does not contain any severe bends with a radius under 25m. The main concentration of out of context curves occurs across the Kaimai range section of the corridor.

Figure 10 – Horizontal alignment



Volumes

Traffic volumes are heaviest in the corridor approaching Tauranga and along SH29A through Maungatapu. Heavy Good Vehicle volumes are also at their highest approaching Tauranga. SH2 takes a greater share of heavy vehicle traffic volumes to the Port than SH29A.

HPMV routes

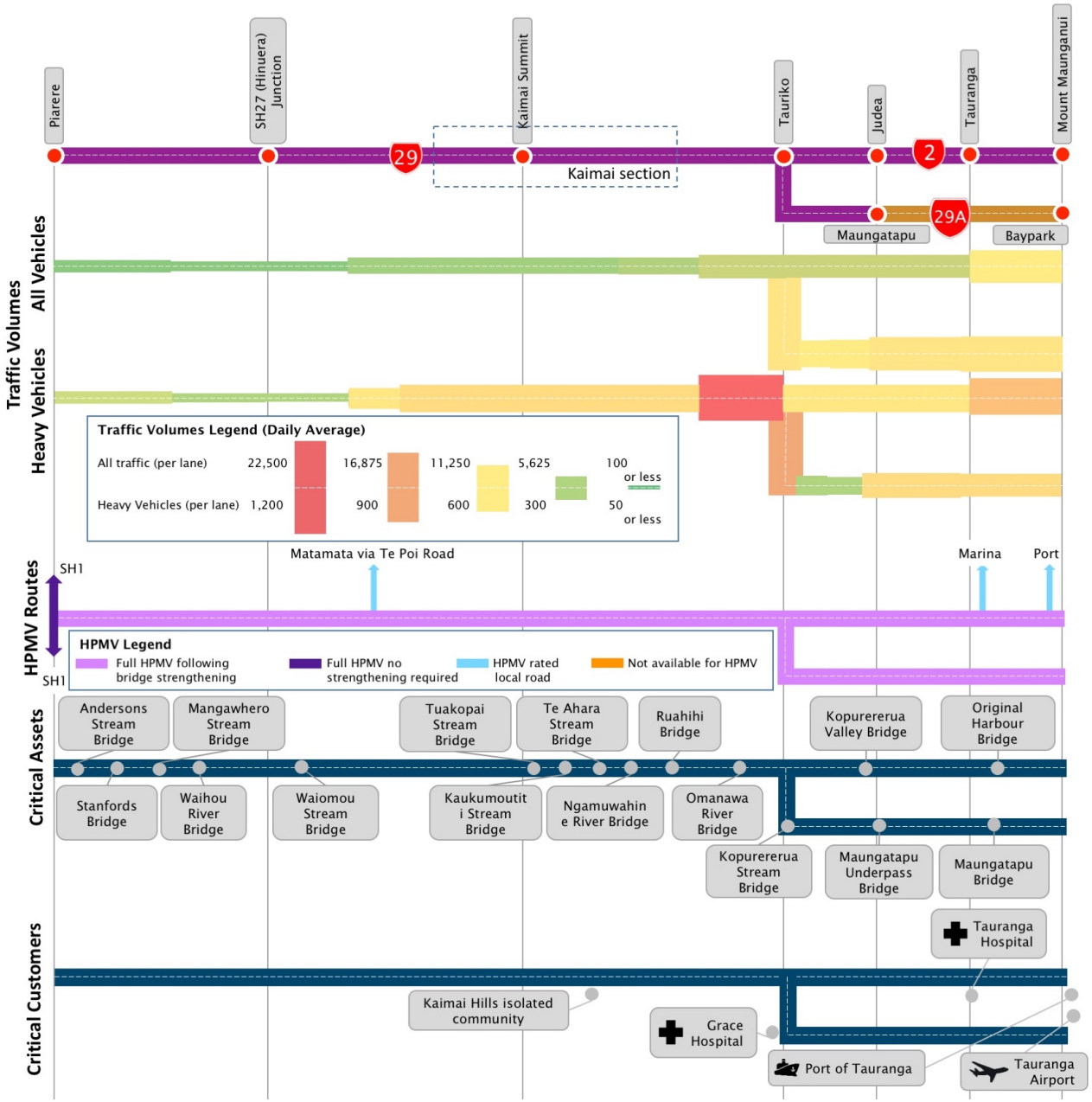
The whole corridor from Piarere to Tauranga is available for HPMVs following bridge strengthening across the route.

Critical customers and assets

There are a number of critical customers adjacent or close to the corridor which rely on the corridor to be open 24/7 and are vulnerable to short term interruptions. These customers include Tauranga and Grace Hospitals and the Port of Tauranga.

There are also a number of critical road assets along the corridor that require enhanced maintenance as failure would significantly disrupt services along the corridor. Examples of this include the drainage on Kaimai Ranges, and the Maungatapu Bridge on SH29A.

Figure 11 - Corridor capacity



Pressures

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

- **Urban growth in and around Tauranga:** It is anticipated that approximately 45,000 homes will be built in Tauranga over the next 50 years, including at Tauriko on SH29 which is estimated to develop to accommodate 3,000 new dwellings. The traffic generating potential of the resultant population will impact on the existing State Highway network.
- **Ongoing development of the Port of Tauranga:** As the Port of Tauranga operations continue to expand, capacity constraints along the existing SH29 (Takitimu Drive) are likely to be felt. This is likely to create increased pressure on parallel routes within the corridor.
- **Limited passing opportunities:** The carriageway between Piarere and the Kaimai Range is two lanes and with increasing volumes of traffic, opportunties for passing on SH29 between Piarere and Kaimai are limited. This combined with heavy vehicles from local quarrying and agriculture, as well as inter-regional freight is reducing then efficiency of this section of the corridor. Downhill slow vehicle bays on the west side of the Kaimai Summit are short and can become hazardous should a vehicle not have sufficient time to overtake.

Future considerations

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

- **Collaborative partnerships to plan for growth:** The Tauriko for Tomorrow collaborative project between Western Bay of Plenty District Council, Bay of Plenty Regional Council, Tauranga City Council and the NZ Transport Agency is an example of how agencies can work together to plan for growth ensuring the required form and function of infrastructure, including the State Highway. Working closely with the Port of Tauranga as well to maintain efficient access to the Port will be increasingly important as the Port growth along with the general population of Tauranga.
- **Whole of life capital investment:** The design and construction quality of new assets on the corridor will impact on type, frequency and cost of future maintenance. Planned improvements on the corridor will result in growth of assets on the corridor. Provision for adequate maintenance and renewal investment should be considered as these projects are committed.
- **Increased passing opportunities:** Passing lanes between Piarere and the Kaimai Range, along with key intersection improvements, such as Hopkins Road, would improve efficiency.
- **Improved signage and wayfinding:** Opportunity to improve signage particularly on rural sections of the corridor. For example, provide for better directional signing to key attractions and facilities as well as alternative routes through settlements including Te Poi where good links are available.

Resilience

The corridor is a strategic route linking Waikato region and the Upper North Island with Tauranga and the eastern coastal settlements via SH2. Important parts of the corridor have a significant resilience risk profile resulting from the impact of both planned and unplanned events and limited availability of alternatives. This is particularly prevalent on approaches to the Kaimai Ranges.

There are alternatives for a number of these routes, but these options are usually time consuming and lengthy, particularly for the high volume of heavy vehicles who use the corridor.

Vulnerabilities

The pavement over the Kaimai Ranges suffers from very high loading, due to high HCV volumes, tight corners and high rainfall. Consequently, there is relatively large number of planned maintenance works to maintain an adequate standard road surface. Delays during maintenance works cause disruption to customers.

Slippages and flooding events occur on the corridor particularly on the approaches to Kaimai Summit. However, these are fairly infrequent and confined to extreme weather events. Surface water can cause some aquaplaning and pavement damage in this section due to inadequate drainage. Several property access points in the rural sections of the corridor have poor visibility and sightlines particularly on corner locations.

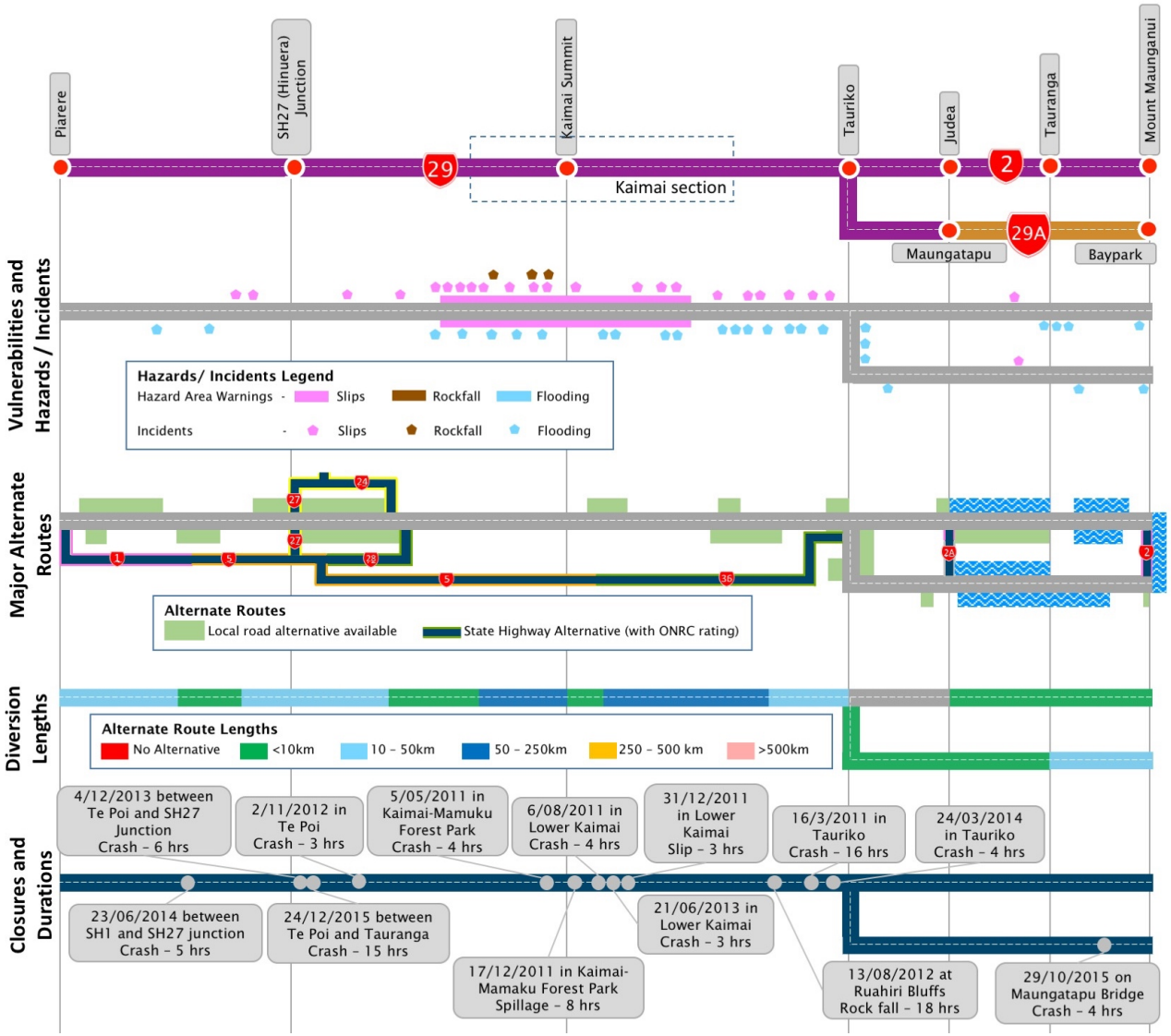
Alternative routes and diversion lengths

The majority of the corridor has diversion routes which are less than 50km in length in the event of closure. The longest diversion would take place should an incident occur on or near the Kaimai Summit, where customers would be diverted over 120km via SH28, SH5 and SH36.

Closures and duration

A number of major closure have occurred in the last five years as shown inFigure 12. In total 9 crashes resulted in the road being closed for longer than 4 hours. The shortest being 3 hours resulting from a slip in the Lower Kaimai and the longest being 18 hours after a rock fall near Ruahihi Bluff. These crashes resulted in over 80 hours in total closures over the 5-year period.

Figure 12 – Resilience



Pressures

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

- **Frequency of maintenance:** Sections of the corridor, particularly through the Kaimai Range require significant maintenance to continue to meet the LoS. The topography is challenging and poor drainage exacerbates pavement deterioration. Delays during maintenance can be significant.
- **Vulnerability to natural events:** With a steep topography and poor drainage, the corridor through the Kaimai Ranges is at risk of closure from slips and fallen trees. Adverse weather conditions in this area also significantly increases the risk of crashes.
- **Suitable alternative routes:** Whilst there are a number of alternative routes available to customers on most sections of the corridor, often these need considerable local knowledge to use. Some routes are also not suitable for heavy vehicles. This can result in customers creating further issues on the network, or being delayed further as they make the wrong alternative route decision. There is also a significant diversion length of around 120km via SH28, SH5 and SH36, should an incident occur on the Kaimai Summit.

Future considerations

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

- **Preventive maintenance:** Continued investment in monitoring and preventive maintenance to mitigate resilience risk on sections of the corridor where there are poor viable alternatives. This may include provisions to:
  - Increase drainage to extending the life of pavements,
  - Stabilise erodible and high risk cuts, embankments and fills to mitigate effect of slips and rock falls.
- **Technology solutions:** The ability to know when an incident has occurred and to advise customers is an area that could be enhanced to assist in the dealing with reliance issues as they arise. Future investment into existing technologies could be considered to create improved and innovative early warning systems in the event of unplanned closures, including natural events and crashes.

Reliability and efficiency

Efficiency

Overall the corridor performs well in terms of capacity and congestion. There are a few areas of congestion particularly on SH29A on the approaches to SH36/SH29 roundabout west of Maungatapu. Additionally, congestion can be experienced during typical morning and afternoon peak commuter periods in the vicinity of the Port and on Hewlett's Road.

Variability

Travel time variability is high particularly at the eastern and western extremity of the corridor. For the eastern end of the corridor this is indicative of the interaction with local traffic movements.

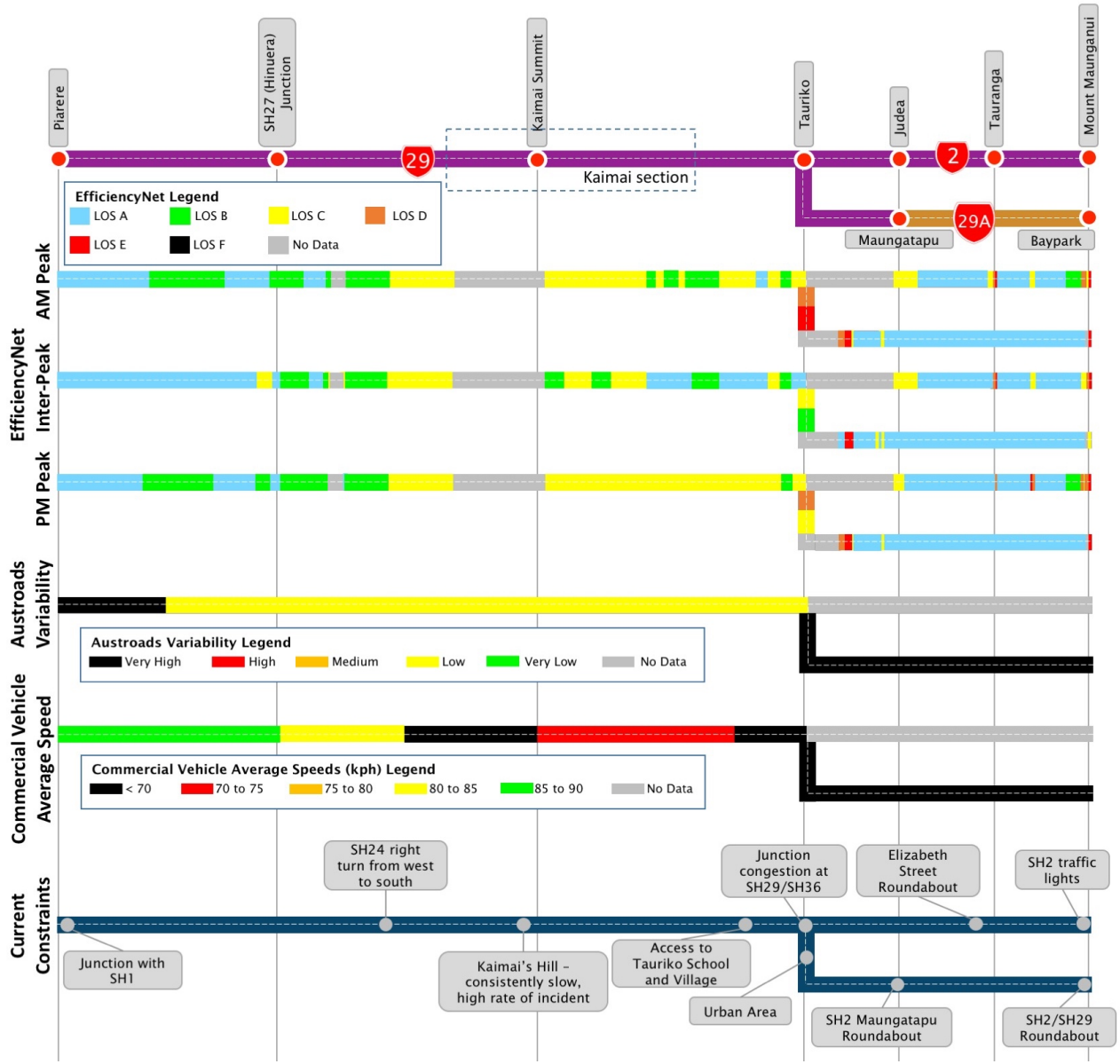
Commercial vehicle average speed

Average speeds for commercial vehicles are relatively low across the Kaimai Ranges, considering SH29's classification as a National (High Volume) route. This is indicative of the difficulties for heavy good vehicles which use the corridor.

Current constraints

The major current constraints on the network effecting journey reliability and efficiency are shown in Figure 13. Constraints are predominately centred around intersections with other state highways and on local roads within Tauranga. Additionally, the impact on heavy vehicle speeds on the steep approaches to Kaimai Summit should also be noted.

Figure 13 - Reliability and efficiency



Pressures

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

- **Topography and gradients:** Slow heavy vehicles crossing the Kaimai Range can cause delays and disruption to other traffic. Commercial and heavy vehicles comprise 10% to 15% of trips on the corridor and their efficiency and cost of travel is affected when there is congestion. The gradients on the hilly sections of the corridor further reduces the speeds of heavy vehicles which in turn also impacts on the reliability and efficiency of other vehicles on the corridor.
- **Seasonal peaks and long weekend travel leading to travel time delays:** During summer holiday periods tourists into the region creates spikes in demand at key locations, including links between Rotorua (SH36) and Mount Maunganui at the eastern end of the corridor.
- **Conflict between State Highway traffic and local community resulting in reduced route efficiency:** A high frequency of intersections and access ways on SH29 between Kaimai and Tauranga, particularly around Tauriko, combined with heavy traffic volumes is making it difficult for traffic accessing the State Highway from the local network resulting in reduced route efficiency.
- **Low public transport usage:** Daily commuter traffic on the network within the urban and peri-urban areas of Tauranga is resulting in lower levels of service, especially during the AM peak on SH29A between Tauriko and Maungatapu.

Future considerations

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

- **Improved customer communication:** Providing real time information for customers will help make timely informed decisions in order to minimise the effect that a closure may have on travel time and costs. As diversion routes are particularly long for some sections of the corridor, information on detour routes and travel times should be readily available such that when a closure occurs people are already of their alternative options.
- **Collaborative partnerships to plan for growth:** The Tauriko for Tomorrow collaborative project between Western Bay of Plenty District Council, Bay of Plenty Regional Council, Tauranga City Council and the NZ Transport Agency is an example of how agencies can work together to plan for growth ensuring the required form and function of infrastructure, including the State Highway. Working closely with the Port of Tauranga as well to maintain efficient access to the Port will be increasingly important as the Port growth along with the general population of Tauranga.
- **Expand and connect alternative mode initiatives:** Including public transport, walking and cycling to manage both commuter and tourist demand, as the urban population grows and development expands especially at built up areas closer to Tauranga i.e. Katikati, Omokoroa.

Safety

Collective risk

The SH29 corridor from Piarere to Tauriko is predominantly rated as medium-high or high risk with only small segments around the SH27 (Hinuera Junction) and on the approach to Tauriko rated low or medium. From Tauriko to Mount Maunganui (SH2) it is either low or medium collective risk.

SH29A has a high-risk rating from Tauriko to the northern end of Maungatapu and then a low collective rating to Baypark.

Personal risk

The SH29 corridor from Piarere to the western end of the Kaimai Range is generally rated as having a medium personal risk. The risk is high from the western end of the Kaimai Range to the Kaimai Summit before dropping to medium between the eastern end of the Kaimai Range to Tauriko. SH2 has a low personal risk rating from Judea to Mount Maunganui. SH29A generally has a low personal risk rating, except between Tauriko to Maungatapu which has a medium risk rating.

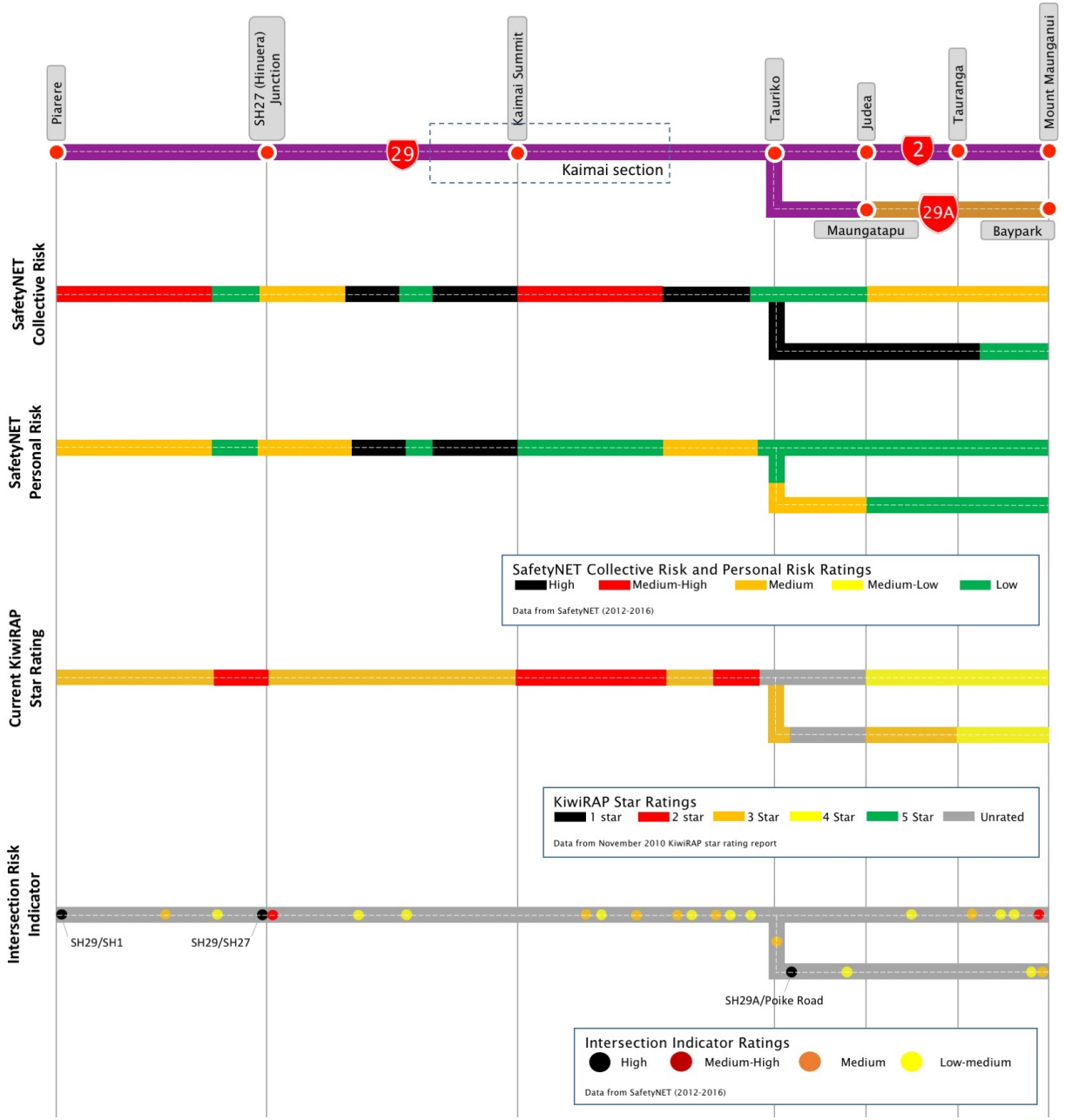
Star rating

Most of the SH29 corridor from Piarere to the Kaimai Summit has a KiwiRAP 3-star rating, while from the Kaimai Summit to Tauriko, the corridor generally has a 2-star rating. SH2 has a 4-star rating from Judea to Mount Maunganui. SH29A has a 3-star rating in most sections between Tauriko and the northern end of the Maungatapu Bridge. From the northern end of the Maungatapu Bridge to Baypark, the corridor has a 4-star rating.

Intersection risk indicators

There are two high risk intersections along SH29, including the SH29/SH1 and SH29/SH27 intersections. The SH29A intersection with Poike Road is also classified as a high-risk intersection.

Figure 14 - Safety



Pressures

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

- **Challenging topography:** Access over the Kaimai Range is challenging and the geometric alignment causing out of context curves on some hilly sections which is creating safety risks.

Future Considerations

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

- **Intersection improvements:** As the transport demand increases across the corridor a number of significant intersections such as SH1/29 at Piarere, the SH29/29A/36 roundabout at Tauriko, and Hopkins Road (access to Hobbiton) may require safety and efficiency upgrades.

People, places and environment

Natural environment

There are a number of key natural environmental features along the corridor. This includes inland coastal sections around Rangataua Bay adjacent to Tauranga on SH29A, public conservations areas at the Kaimai Summit as well as a number of streams and waterway which cross the highways. This conservation land runs close to the State Highway at the summit and has a forest composition which includes semi-coastal and montane plant species.

Flora and fauna are not unique to the wider Waikato/Bay of Plenty area but have been substantially altered due to agriculture and demand for timber in the area.

Noise, vibration and air quality

Noise, vibration and air quality sensitive areas are generally restricted to the townships and cities along the route where there are large residential populations. This is particularly prevalent within Tauranga City.

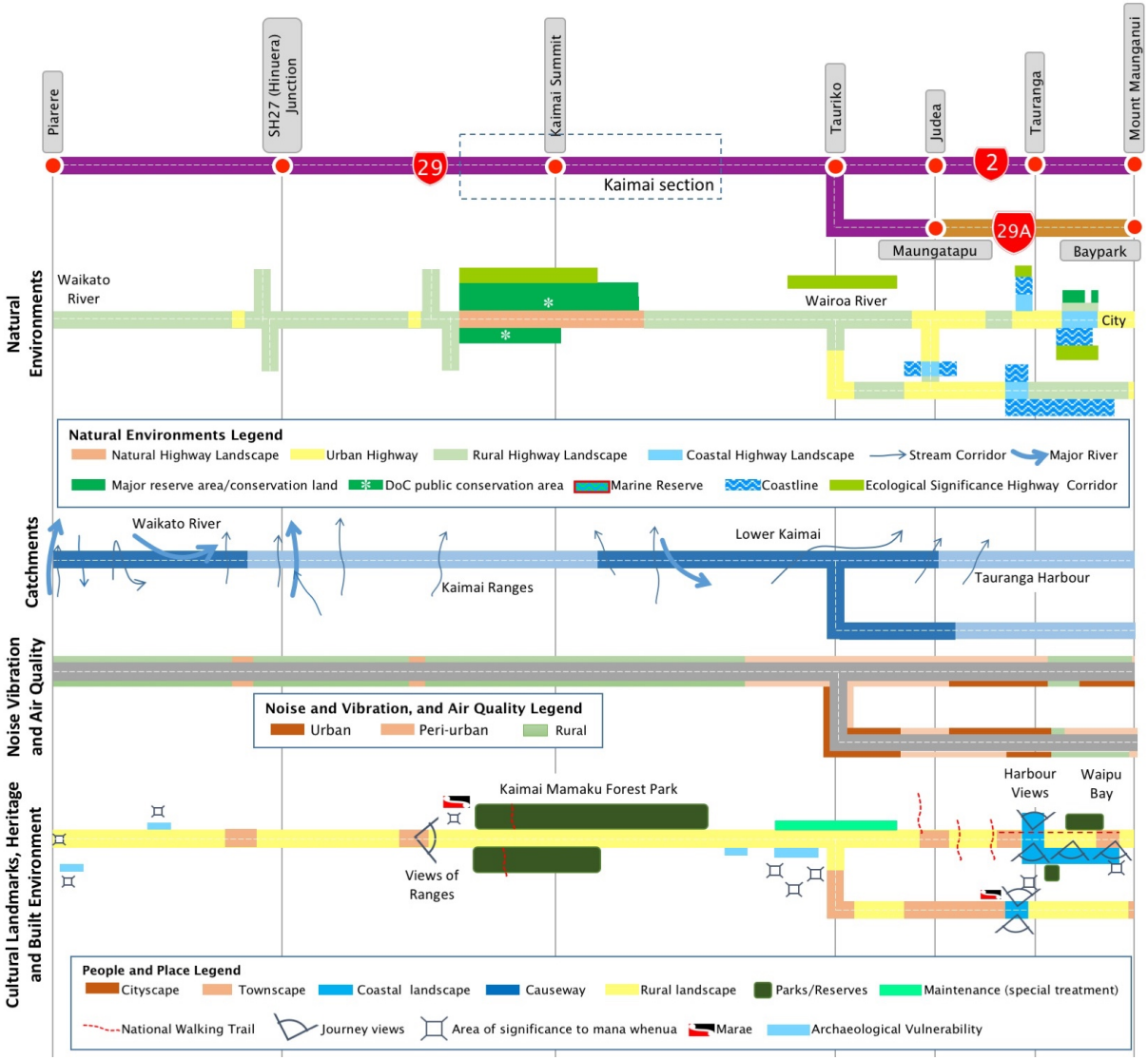
Cultural landmarks, heritage and built environment

There are a number of sites which present both archaeological vulnerability and have significance to Mana Whenua which is adjacent or close to the corridor. As the corridor approaches Tauranga, spectacular vistas of the coastline and onwards to Mount Maunganui across Rangataua Bay are found.

Additionally, a number of special maintenance treatments are required west of Tauriko.

There is also a number of recreational facilities along the corridor, including high quality parks and forestry areas.

Figure 15 – People, places and environment



Pressures

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

- **Increasing adverse weather:** More intensive rainfall patterns could increase the risk of erosion, rock fall, slips and flooding in the corridor. Erosion, rock fall, and slips are particularly relevant to the areas of steeper gradients approaching the Kaimai Summit. Active management of this risk will be required, including the strengthening of retaining structures and the use of vegetation to reduce the risk of slips. Flooding of other parts of the corridor due to increased rainfall intensity events is an increasingly common issue and causes considerable disruption to customers and damage to the environment and the state highway infrastructure. Improved drainage will be required to mitigate surface water flooding from extreme weather events.
- **Heritage sites:** There is a range of cultural and heritage locations and landmarks which are subject to increasing potential effects from corridor use and environmental changes. Some of these locations may require management plans with ongoing compliance obligations. Additional investigations and management of impacts on these features may also be required.
- **Relationships with iwi:** Acknowledgement of iwi/mana whenua relationships is a key input to the management of heritage assets and to the landscapes actively occurring. 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.
- **Community severance:** Heavy traffic volumes on SH29 pass through a number of built up areas resulting in community severance issues at Te Poi and Tauriko.

Future considerations

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

- **Relationships:** Effective relationships between iwi and associated councils to work together and maximise access to cultural and heritage places (built forms, monuments, marae and pa site) to support economic and social growth.
- **Archaeological sites:** Updating the GIS based record of the multiple archaeological sites adjacent to the highways would enable maintenance and capital works to avoid significant sites and improve planning, design and investment.

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 94 km of road network which reflects 0.8% nationally. The total value of the assets along the corridor is $286M (excluding ITS, and, heritage and green assets).

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

Asset condition and performance summary

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

Figure 16 – Corridor asset base

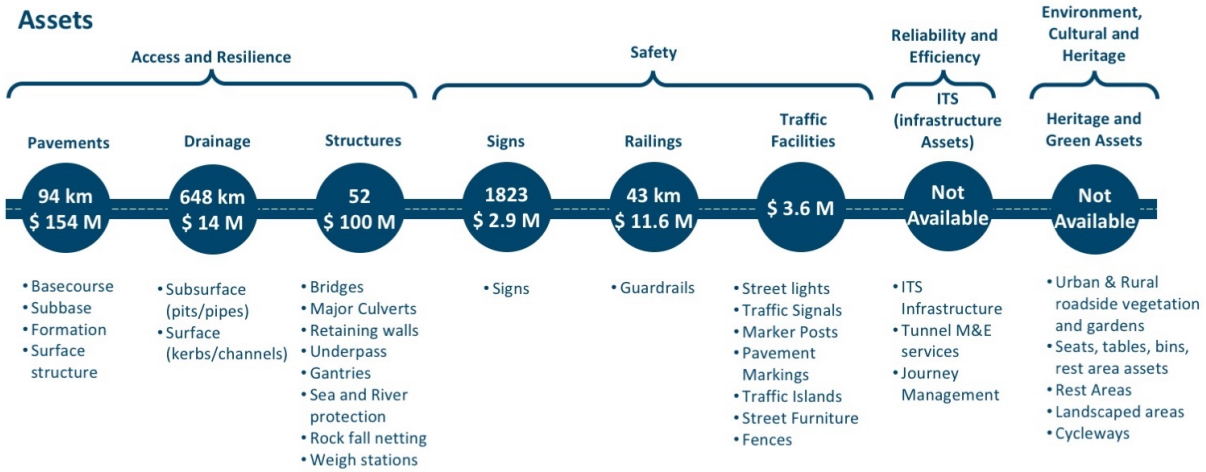


Figure 17 – Summary asset condition and performance

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.

Sections SH2/151 between Judea and Mt Maunganui, SH29/42 the western side of the Kaimai Range, SH29/50 between SH24 junction and SH27 junction, and, SH29A/8 between Tauriko and Maungatapu, show moderate levels of surface skid resistance within the threshold limit. Section SH29/42 has however shown a very significant improvement in surface skid resistance over the three-year period, as has SH29/48 between SH24 junction and SH28 junction.

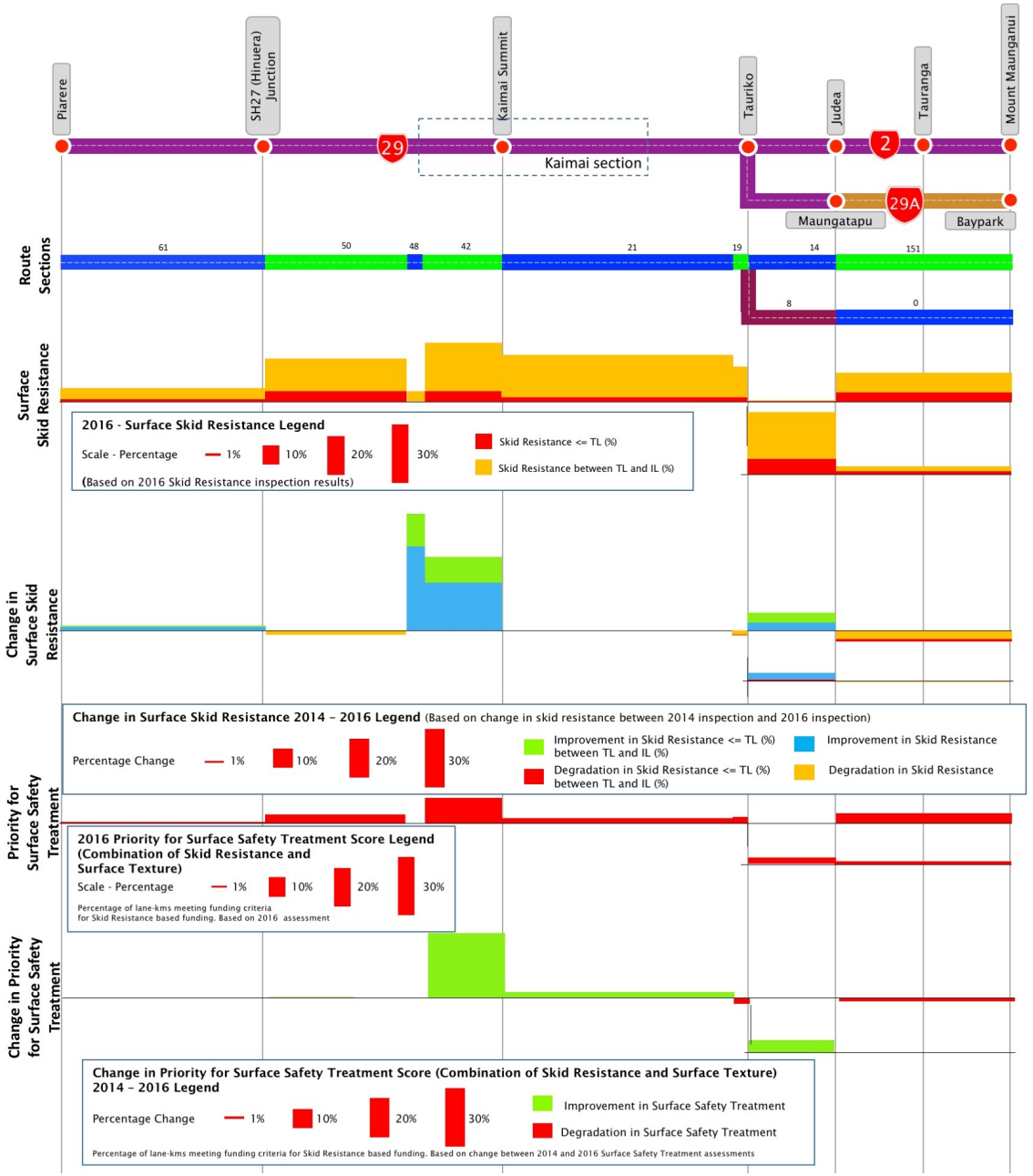
Priority for surface safety treatment

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

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

A relatively high percentage (3.2 %) of the corridor achieved Skid Assessment Length that qualifies for funding. This equates to 5 lane-km of the 156-total lane-km of the corridor. The section with the highest priority for surface safety treatment qualifying for funding is SH29/42 the western side of the Kaimai Range, even though this section has shown a significant improvement in surface skid resistance scores over the last 3 years.

Figure 18 – Asset condition



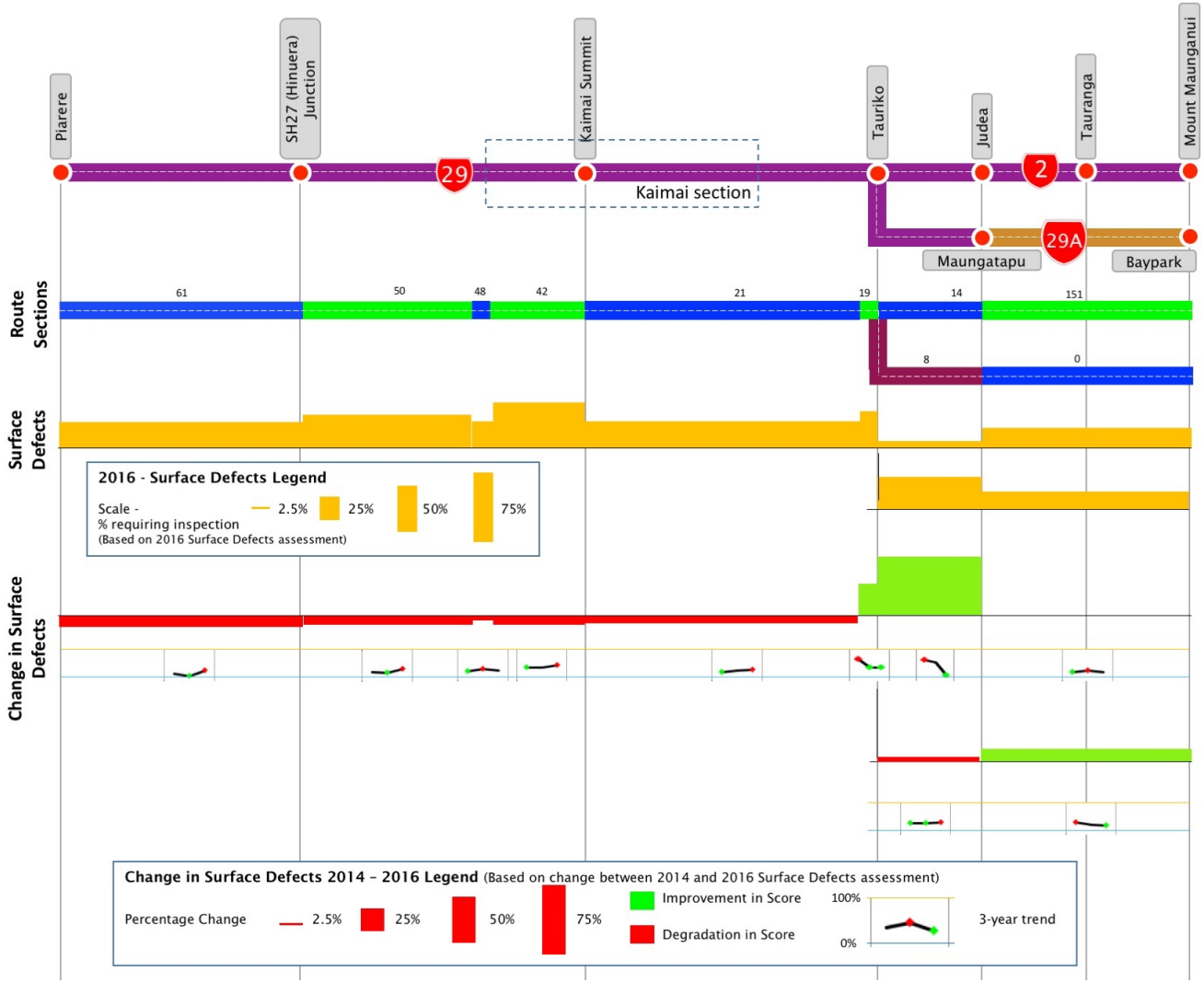
Surface defects

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

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

Overall, 26.9% of the corridor achieves a score above which inspection is required making it one of the poorer performing corridors on the state highway network. Sections with significant lengths of surface requiring inspection include: SH29/42 the western side of the Kaimai Range, and, SH29/50 Between SH24 junction and Hinuera. These sections also show a moderate level of degradation in score over the last three years.

Figure 19 – Asset condition 2



Surface age

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

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

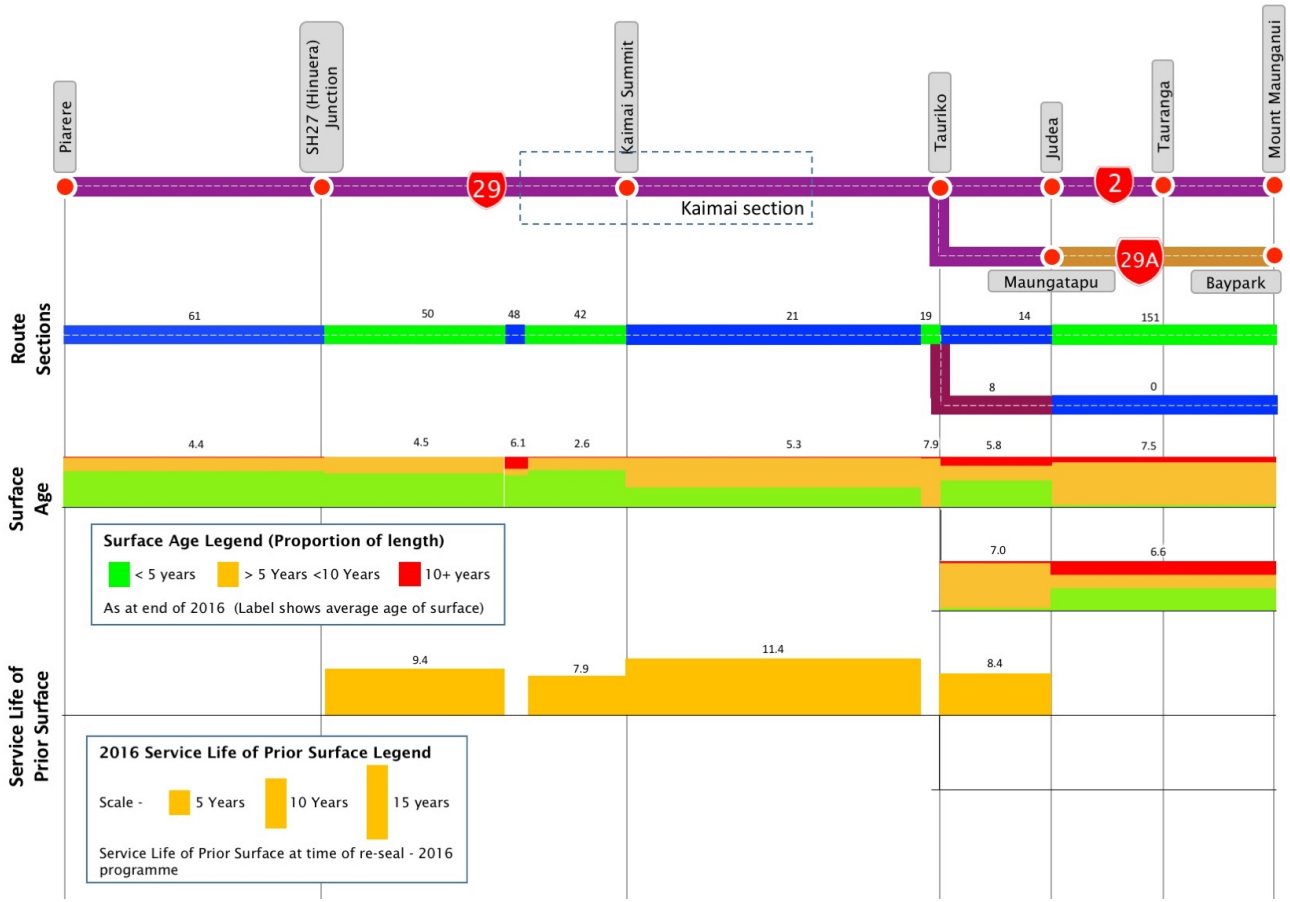
The corridor has a relatively low average surface age at 5.9 years. The section with the oldest average age is SH29/19 between Takitimu Drive and Cambridge Road.

Service life of prior surface

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

Overall the re-surfaced sections achieved an average service life of 8.4 years, with section SH29/21, the eastern side of the Kaimai Range from the summit to Tauriko achieving an average service life in excess of 11 years.

Figure 20 – Asset condition 3



Resurfacing

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

The major resurfacing works are planned for sections SH29A/0 between Mt Maunganui and Maungatapu, and, SH29A/8 between Maungatapu and 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.

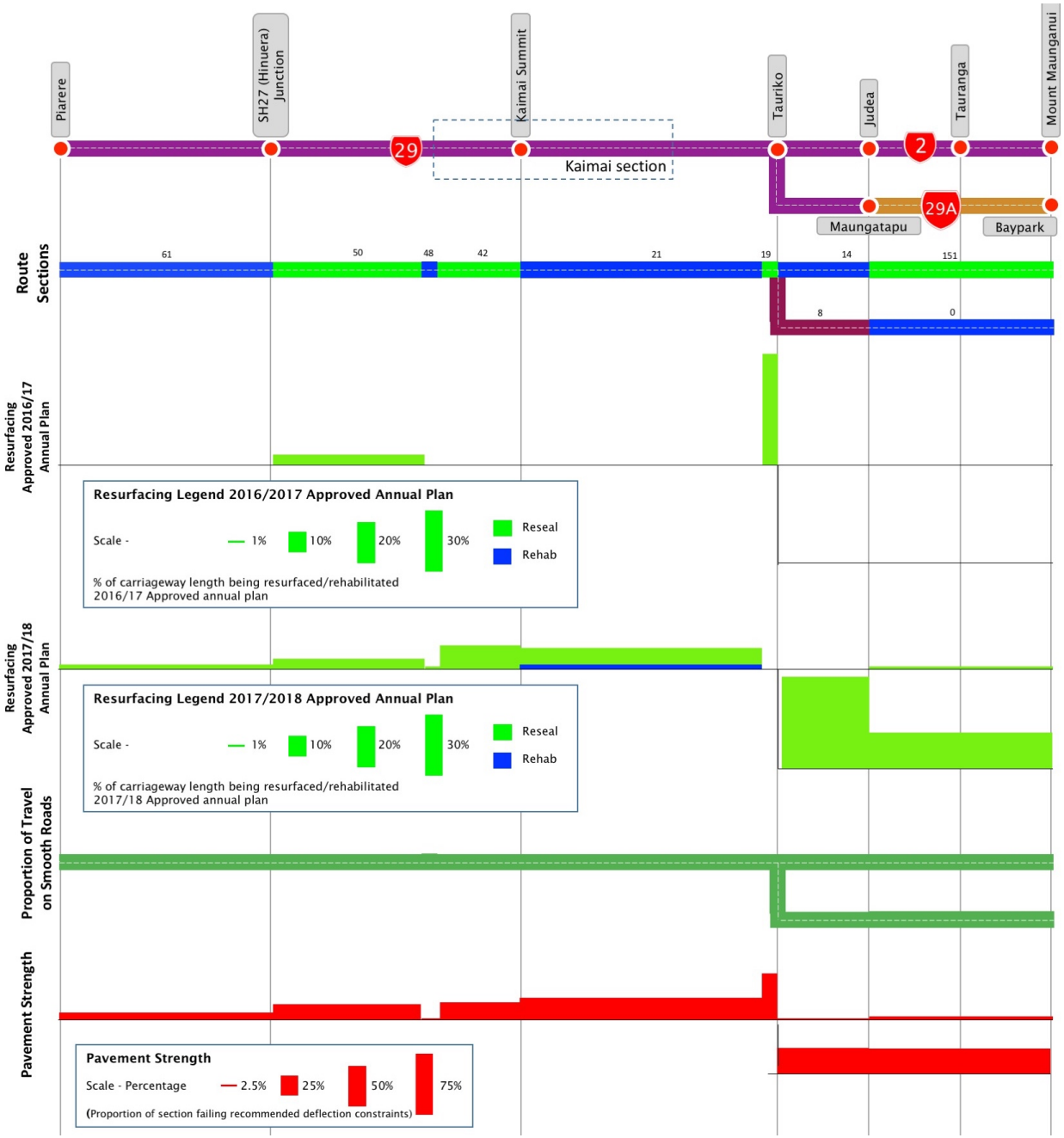
The corridor has no sections that fail to meet the standard for proportion of travel on smooth roads.

Pavement strength

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

The sections of corridor with the highest proportion of pavement failing to meet the deflection constraints occur at SH29/19 at Tauriko, and, all of SH29A between Tauriko and Baypark.

Figure 21 – Asset condition 4



Asset condition and performance pressures

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

- **Takitimu Drive, Tauranga SH29/14:** There have been problems with premature and rapid pavement failure. Some form of strengthening will be required in the future to attain a reasonable asset life.
- **West side of Kaimai Hill SH29/42:** – Drainage issues are causing flooding. Pavements are quite week, requiring significant reactive maintenance. High stress turning movements and heavy vehicle braking damages the surface. This section is also a difficult location to work safely with tight corners and braking required descending the hill.
- **Environmental assets:** There has been a significant Increase in investment in environmental areas, such as: plantings, vegetation control, and wetland monitoring / maintenance.
- **The corridor supports 1500 heavy vehicles per day:** Trucks stopping on uphill sections and then attempting to move off again has a detrimental effect on pavement asset condition.

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:

- **West side of Kaimai Hill SH29/42:** Resurface more regularly due to poor pavement condition. The increase in heavy traffic in future may further exacerbate the existing asset condition issues.
- **Maintenance Planning:** Capital improvements planned for the corridor could have an impact on maintenance scheduling. Will need to consider the extent of future works, what is planned, and when to intervene.
- **Environmental Costs:** It is expected there will be further increases in the cost to maintain environmental assets.
- **Potential new route – west side of Kaimai Hill:** The current Programme Business Case for this corridor considers the potential for an alternative route of the western side of Kaimai Hill, that would reduce the number of tight bends and severity of the climb.
- **Preventive maintenance:** Continued investment in monitoring and preventive maintenance to mitigate resilience risk on sections of the corridor where there are poor viable alternatives. This may include provisions to:
  - Increase drainage to extending the life of pavements,
  - Stabilise erodible and high risk cuts, embankments and fills to mitigate effect of slips and rock falls.

Investing in the corridor

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

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

Right treatment, right place, right time

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

Intervention works will be programmed to ensure:

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

Interventions will:

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

Summary investment

The proposed investment in the corridor is as follows:

Table 1- Summary corridor investment ($000)

Outcome	Expenditure Category	2018-2021	2021-2024	2024-2028
Access and Resilience	Maintenance and Operations	$9,988	$12,090	$18,856
	Renewals	$22,067	$35,143	$39,266
	Improvements	$0	$0	$0
Reliability and Efficiency	Maintenance and Operations	$4,835	$5,439	$8,206
	Renewals	$560	$602	$5,667
	Improvements	$8,683	$83,950	$44,700
Safety	Maintenance and Operations	$8,788	$12,317	$20,337
	Renewals	$2,899	$2,831	$4,251
	Improvements	$28,584	$361,500	$219,500
People, places and Environment	Maintenance and Operations	$5,156	$5,642	$8,474
	Renewals	$206	$228	$342
	Improvements	$0	$0	$0
	Total	**$91,766**	**$519,742**	**$369,602**

Figure 22 – Corridor investment

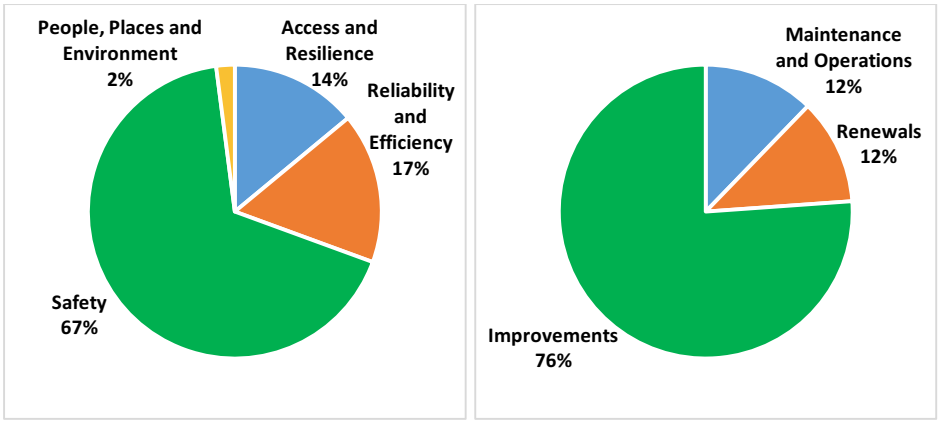


Table 2 - Summary investment by work category ($000)

Outcome	Work Category		2018-2021	2021-2024	2024-2028
Access and Resilience	111	Sealed Pavement Maintenance	$1,903	$3,072	$5,292
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$802	$945	$1,420
	114	Structures Maintenance	$2,568	$2,411	$3,641
	121	Environmental Maintenance	$994	$1,068	$1,602
	122	Traffic Services Maintenance	$65	$116	$174
	124	Cycle Path Maintenance	$73	$79	$119
	151	Network & Asset Management	$2,876	$3,532	$5,305
	161	Property	$707	$868	$1,303
	211	Unsealed Road Metalling	$10	$13	$19
	212	Sealed Road Resurfacing (excl. surface skid resistance)	$12,089	$14,344	$13,566
	213	Drainage Renewals	$515	$611	$963
	214	Pavement Rehabilitation	$8,240	$18,180	$21,701
	215	Structures Component Replacements	$1,169	$1,919	$2,903
	222	Traffic Services Renewals	$43	$76	$114
	321 - 341	Improvements	$0	$0	$0
Reliability and Efficiency	121	Environmental Maintenance	$780	$875	$1,314
	123	Operational Traffic Management	$3,040	$3,373	$5,096
	151	Network & Asset Management	$886	$1,034	$1,560
	161	Property	$129	$157	$236
	222	Traffic Services Renewals	$560	$602	$5,667
	321 - 341	Improvements	$8,683	$83,950	$44,700
Safety	111	Sealed Pavement Maintenance	$2,204	$3,370	$5,740
	112	Unsealed Roads	$0	$0	$0
	113	Drainage Maintenance	$188	$245	$368
	114	Structures Maintenance	$691	$2,047	$4,268
	121	Environmental Maintenance	$139	$198	$297
	122	Traffic Services Maintenance	$3,231	$3,637	$5,467
	124	Cycle Path Maintenance	$0	$0	$0
	151	Network & Asset Management	$2,031	$2,441	$3,627
	161	Property	$303	$380	$571
	212	Surface Skid Resistance	$982	$1,168	$1,754
	214	Pavement Rehabilitation	$25	$55	$83
	215	Structures Component Replacements	$181	$228	$343
	222	Traffic Services Renewals	$1,712	$1,379	$2,072
	321 - 341	Improvements	$28,584	$361,500	$219,500
People, places and Environment	111	Sealed Pavement Maintenance	$337	$370	$556
	121	Environmental Maintenance	$4,437	$4,804	$7,215
	151	Network & Asset Management	$307	$376	$564
	161	Property	$76	$92	$139
	221	Environmental Renewals	$206	$228	$342
	321 - 341	Improvements	$0	$0	$0
		Total	**$91,766**	**$519,742**	**$369,602**

To be confirmed through the RLTP

Investing in access and resilience

Operations and maintenance

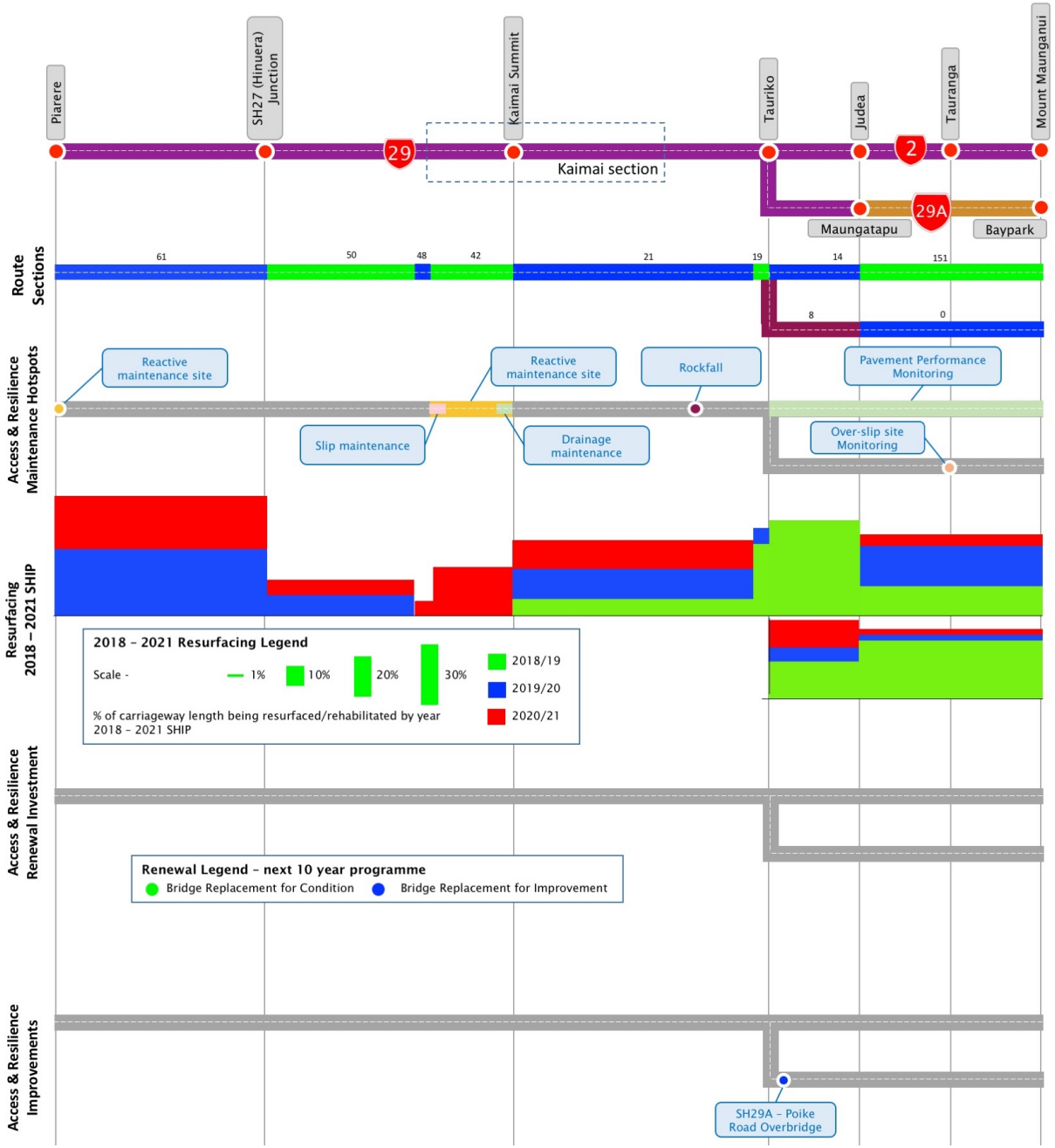
The main areas of investment to provide and preserve access and resilience are drainage maintenance, sealed road surfacing and structural component replacements and vegetation control. A key focus is to realign the base preservation quantities toward increased preventative maintenance and to slow pavement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

Maintenance hot spots

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

- **SH29A/0:** Over-slips are occurring which may affect adjacent properties if not suitably remediated.
- **SH29/14 Takitimu Drive:** Additional pavement performance monitoring is undertaken along this section of corridor.
- **SH29/21:5 Ruahihi** - Rockfall can occur at this point along the corridor that affects the access and resilience of the corridor.
- **West side of Kaimai Hill SH29/42** – This is a reactive maintenance site. At the bottom of the hill slips occur. At the top of the hill drainage issue scan create problems with surface water.
- **SH29/61** – Pavement surface failure occurs at the SH1 junction at Piarere due to trucks standing at the intersection waiting to join SH1.
- **Omanawa bridge SH29/21** - There is an evolving maintenance situation, which has been evidenced by urgent repair works needed on an 80-year-old bridge, which was not constructed properly and HPMV traffic loading is producing structural problems from these defects not previously experienced. The repair works are causing significant delays due to the high traffic volumes on this corridor.

Figure 23 – Access and resilience investment



Renewals

Resurfacing

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

Significant investment in resurfacing is planned for most sections of the corridor except for sections SH29/42, SH29/48, and SH29/50 between Kaimai summit and Hinuera, with section SH29/61 between Hinuera and SH1 junction at Piarere scheduled for the highest level of expenditure on resurfacing.

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/

SH29A – Poike Road Overbridge

Description: The new Poike Road overbridge will address current and future pedestrian demands, provide a safe crossing for both pedestrians and cyclists, and help avoid pedestrians and cyclists attempting to cross the busy four lane highway

Investing in reliability and efficiency

Operations and maintenance

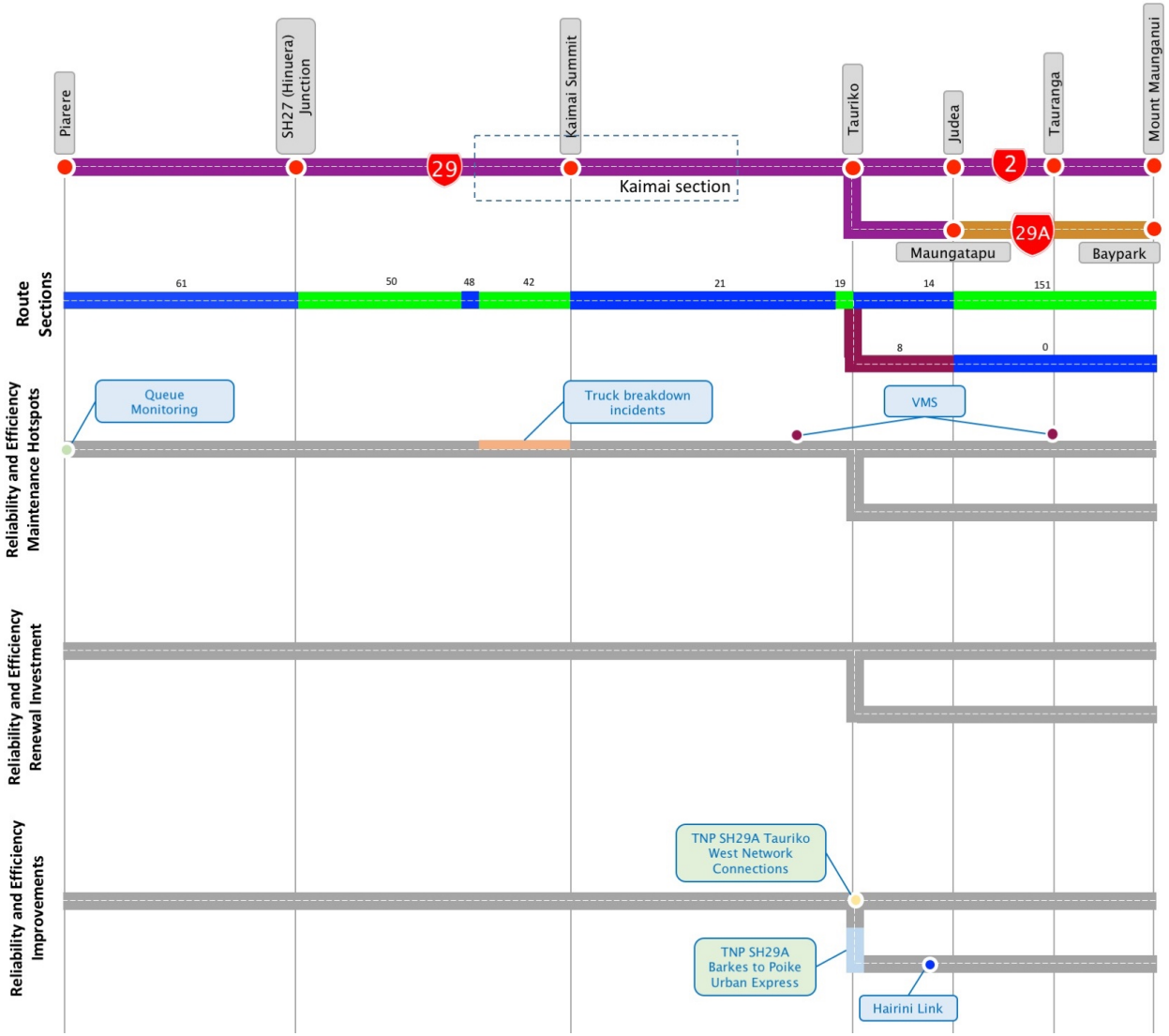
The main areas of investment to provide and preserve reliability and efficiency are environmental maintenance through keeping potential obstructions clear of the highway, wayfinding signage, and operational traffic management.

Maintenance hot spots

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

- **SH1/SH29 Piarere junction:** There are issues associated with queuing at the intersection. A journey continuing north along SGH1 requires a right turn across traffic travelling at high speed and on a bend with limited sight-lines.
- **SH29/42 Western side of Kaimai range:** Heavy vehicles that break down going uphill and are unable to get moving again occurs regularly (1-2 per week), blocking part of the carriageway and causing an issue for other road users
- **VMS:** Variable message signs are in place at SH29/21and SH2/151

Figure 24 – Reliability and efficiency investment



Renewals

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

Improvements

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/

Hairini Link

Description: The Maungatapu underpass will be a two-lane link underneath the Maungatapu roundabout, improving the traffic flow around the Maungatapu and Hairini roundabouts. It will connect Welcome Bay Road to the Turret Road causeway and a new bridge will be constructed over the Kaitemako Stream.

Draft Regional Programme considered for SHIP

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

Table 3- Draft regional programme considered for SHIP

Project	Funding Status	Description
TNP SH29A Barkes to Poike Urban Express		Urban link and intersection capacity upgrades
TNP SH29A Tauriko West Network Connections		Urban link and intersection capacity upgrades

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:

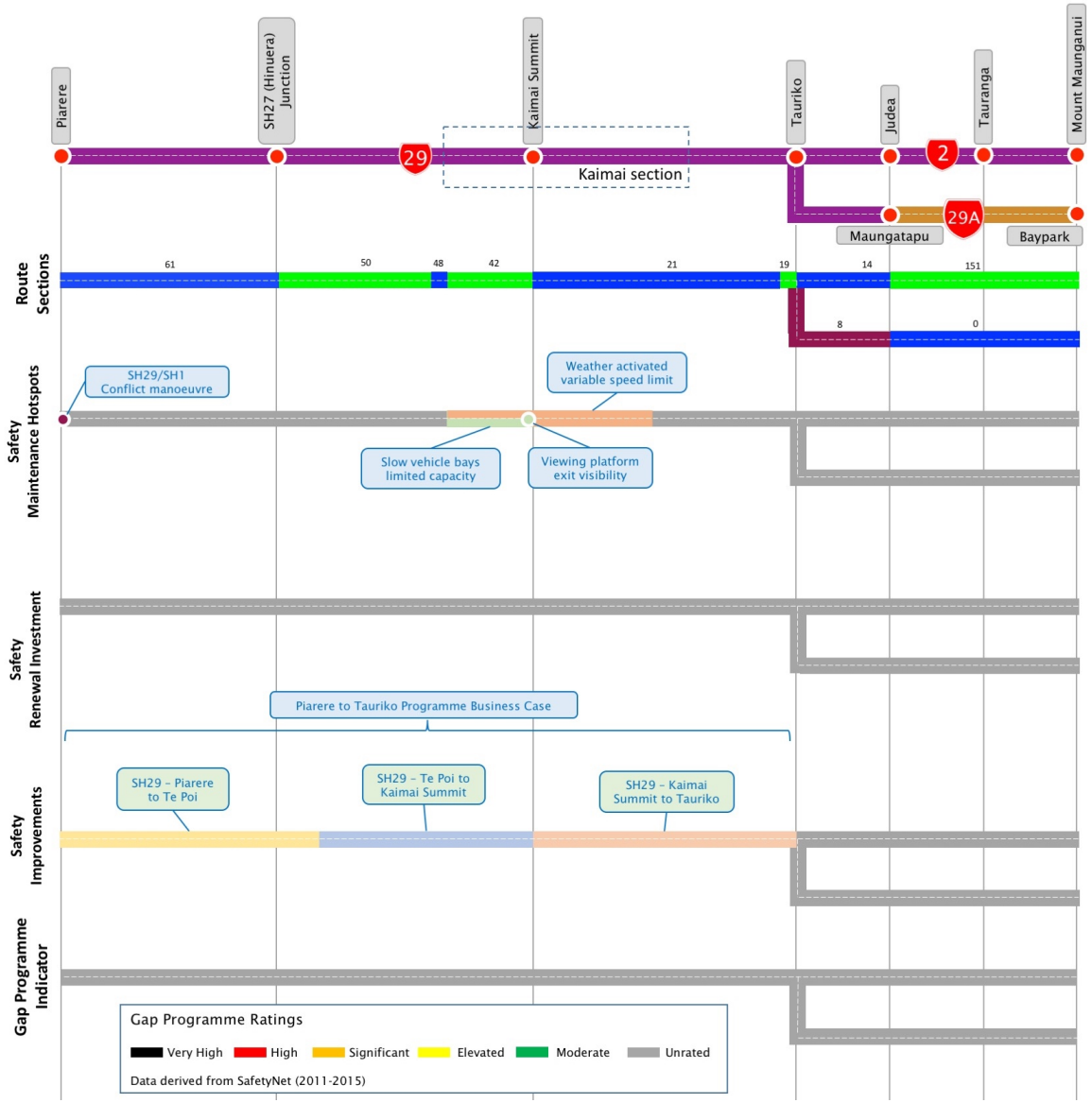
- **SH1/SH29 Piarere junction intersection**: this is a high-speed incident site with a requirement to undertake a right hand turn across traffic on a bend with limited sightlines.
- **SH29/21 and SH29/42:** A weather activated variable speed limit system is in place for the section of corridor over the Kaimai range. This system automatically lowers the speed limit when adverse weather is detected which would make the driving task more difficult.
- **SH29/42:** The lookout at the top of the hill has a dangerous right turn out of carpark for customers continuing west, due to limited sight lines, and the need to cross two lanes of uphill traffic.
- **SH29/42 downhill run**: The slow vehicle bays descending the western side are not long enough meaning vehicles get caught outside a slow-moving truck at the end of the slow vehicle bay, thereby encouraging dangerous passing manoeuvres.

Gap programme indicators

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

This corridor is unrated and therefore the potential crash savings are low or are being addressed under other existing programmes.

Figure 25 – Safety investment



Renewals

There are no safety related renewals planned for the corridor.

Improvements

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/

SH29 – Piarere to Tauriko Programme Business Case
(Piarere to Te Poi – Te Poi to Kaimai Submit – Kaimai Submit to Tauriko)

> **Description**: Programme business case for improvements to SH29 between Piarere and Tauriko.

Kaimai weather activated variable speed limit trial

Draft Regional Programme considered for SHIP

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

Table 4- Draft regional programme considered for SHIP

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

Investing in people, places and environment

Operations and maintenance

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

Maintenance hot spots

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

- **SH2/151: Additional plantings** around the motorway section through Tauranga urban area has created an additional maintenance burden. Maintenance of these plantings also requires traffic control.
- **SH29A/8 High-cut grass mowing** is required through cuttings along this section of corridor, also requiring traffic management while this is undertaken.
- **SH29/21 Ruahihi:** The area around Ruahihi power station is sensitive to local iwi, requiring a customised approach to engagement when maintenance works are undertaken.
- **SH29/21: Stock vehicles** deliberately dumping stock effluent near the summit before undertaking the downhill run causes a greasy surface, as well as an environmental problem with odour.
- **SH29/42:** There is a natural spring where people stop to obtain pure water. While there is a formed pullover bay, vehicles stopping at this site can sometimes affect other road users during peak periods.

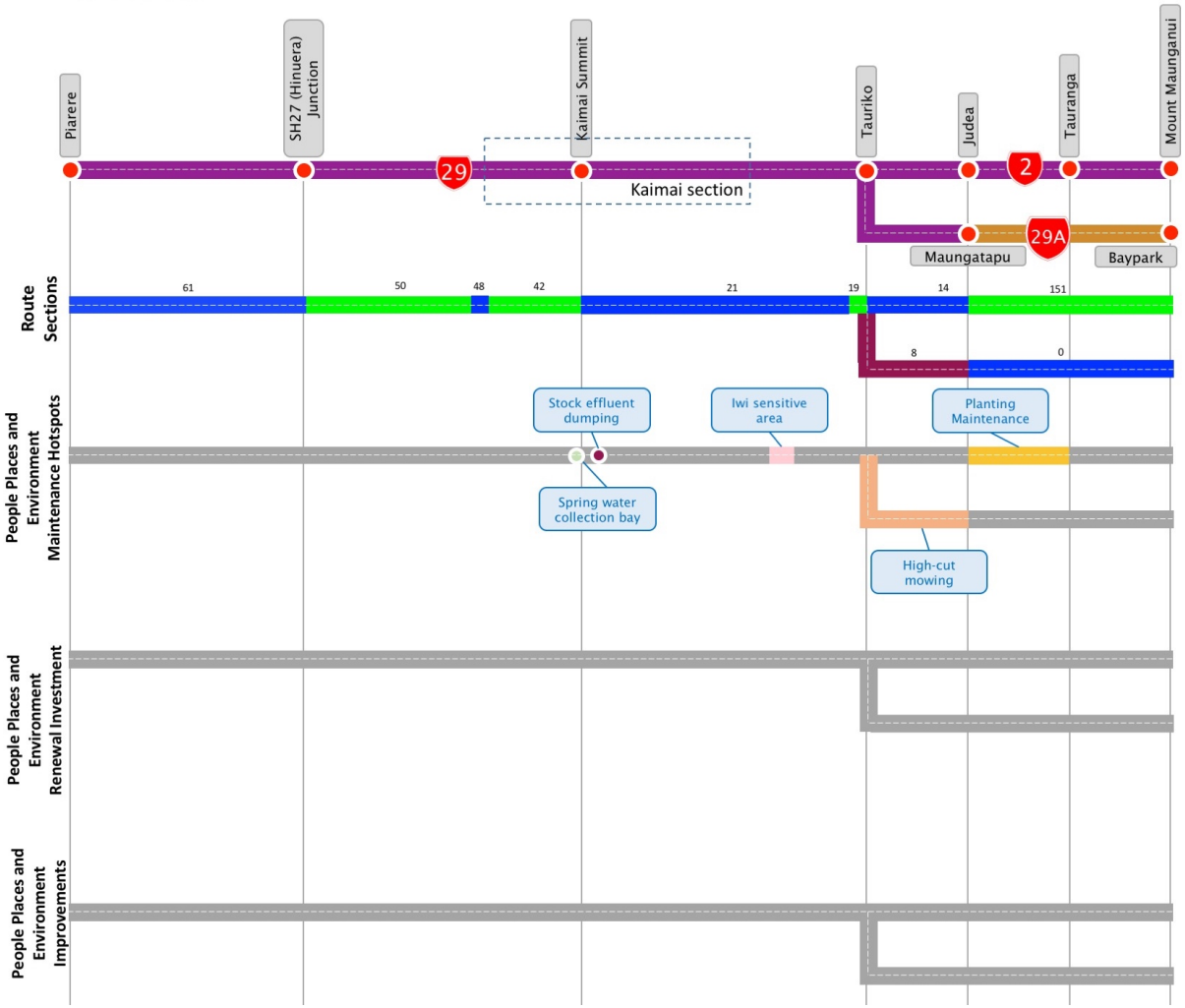
Renewals

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

Improvements

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

Figure 26 – People, places and environment investment



Investment pressures

Access and resilience

The following concerns excerpt pressure on the investment in **Access and resilience** on the corridor.

- **Maintenance:** Due to high volumes, there is no capacity along much of the length of the corridor to undertake maintenance during the day. However, there is capacity along some of the route, due to a 2+1 configuration, to support contraflow during maintenance.
- **Weather:** Occasional adverse weather causes difficult driving conditions on the high gradients of the Kaimai Summit. This is further exacerbated by poor drainage on this section of the corridor.
- **Ongoing development of the Port of Tauranga:** As the Port of Tauranga operations continue to expand, capacity constraints along the existing SH29 (Takitimu Drive) are likely to be felt. This is likely to create increased pressure on parallel routes within the corridor.

Reliability and efficiency

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

- **Summer peak:** During summer holiday periods tourists into the region creates spikes in demand at key locations, including links between Rotorua (SH36) and Mount Maunganui at the eastern end of the corridor.
- **Improved customer communication:** Providing real time information for customers will help make timely informed decisions in order to minimise the effect that a closure may have on travel time and costs. As diversion routes are particularly long for some sections of the corridor, information on detour routes and travel times should be readily available such that when a closure occurs people are already of their alternative options.
- **Expand and connect alternative mode initiatives:** Including public transport, walking and cycling to manage both commuter and tourist demand, as the urban population grows and development expands especially at built up areas closer to Tauranga i.e. Katikati, Omokoroa.

Safety

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

- **Intersection improvements:** As the transport demand increases across the corridor a number of significant intersections such as SH1/29 at Piarere, the SH29/29A/36 roundabout at Tauriko, and Hopkins Road (access to Hobbiton) may require safety and efficiency upgrades.

People, Places and Environment

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

- **Increasing adverse weather:** More intensive rainfall patterns could increase the risk of erosion, rock fall, slips and flooding in the corridor. Erosion, rock fall, and slips are particularly relevant to the areas of steeper gradients approaching the Kaimai Summit. Active management of this risk will be required, including the strengthening of retaining structures and the use of vegetation to reduce the risk of slips. Flooding of other parts of the corridor due to increased rainfall intensity events is an increasingly common issue and causes considerable disruption to customers and damage to the environment and the state highway infrastructure. Improved drainage will be required to mitigate surface water flooding from extreme weather events.

Investment future considerations

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

- **Need for higher quality asset:** Maintaining and developing a higher quality asset with greater resilience, longer life and lower maintenance. As a high-volume HGV route, the need to build a resilient network is imperative. Providing appropriate surfacing for this demand will reduce the regularity for which maintenance would need to take place.
- **Climate change** resulting in more intensive rainfall patterns could increase the risk of erosion, rock fall and slips in the corridor. This is particularly relevant to the areas of steeper gradients approaching the Kaimai Summit. Active management of this risk will be required, including the strengthening of retaining structures and the use of vegetation to reduce the risk of slips.
- **ITS system investment.** The ability to know when an incident has occurred and to advise customers is an area that could be enhanced to assist in the dealing with reliance issues as they arise. As diversion routes are particularly long for some sections of the corridor, information on detour routes and travel times should be readily available such that when a closure occurs people are made aware of their alternative options.
- **Safety improvements:** As the transport demand increases across the corridor a number of significant intersections such as SH1/29 at Piarere and the SH29/29A/36 roundabout at Tauriko may require safety and efficiency upgrades.
- **Cultural and heritage locations:** There are a range of cultural and heritage locations and landmarks which are subject to increasing potential effects from corridor use and environmental changes. Some of these locations may require management plans with ongoing compliance obligations.
- **Growth:** It is anticipated that approximately 45,000 homes will be built in Tauranga over the next 50 years. The traffic generating potential of the resultant population will likely impact on the existing State Highway network, particularly on intersections, unless appropriate travel demand management and other improvements to the network are made.
- **Lack of permeability** within the peri-urban and urban areas of Tauranga City is creating a barrier between communities. Future investment in infrastructure within this section should be considerate of the need to provide appropriate local connections.

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

Section	Infographic	Information Source	Date
	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

Section	Infographic	Information Source	Date
Reliability and efficiency	Efficiency	NZTA – MapHub EfficiencyNet	2016
	Variability	NZTA / Beca Dwg No. GIS-3391515-500-4 Network Performance - Attachments.pdf March 2012 eRUC Commercial Vehicle Data – State Highway Austroads Variability Assessment	2012
	Commercial Vehicle Average Speed	NZTA / Beca Dwg No. GIS-3391515-500-5 Network Performance - Attachments.pdf March 2012 eRUC Commercial Vehicle Data – State Highway Average Speeds	2012
	Current Constraints	Network Manager and Regional Staff Corridor drive-over	2016
Safety	KiwiRAP Collective Risk	https://nzta.abley.com/SafetyNET_2017 SafetyNET	2016
	KiwiRAP Personal Risk	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2016
	KiwiRAP Star Rating	http://www.kiwirap.org.nz From 2010 KiwiRAP star rating report.	2010
	Intersection Risk Indicator	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2016
	Gap Programme Rating	https://nzta.abley.com/SafetyNET_2017/ SafetyNET	2015
Environment Culture and Heritage	Natural Environment	NZTA - Environment and Urban Design Team	2016
	People and Place: Journeys	NZTA - Environment and Urban Design Team	2016
	People and Place: Landmarks and Heritage Places	NZTA - Environment and Urban Design Team	2016
	Noise and Vibration	NZTA - Environment and Urban Design Team	2016
	Drainage Catchments	NZTA - Environment and Urban Design Team	2016
Understanding the Infrastructure Assets			
Overview	Corridor Asset Base	NZTA_ 2017 Values by Corridor.xlsx complied by Opus International Consultants from RAMM and other asset information sources	
	Asset Condition and Performance	Summarised from the data sets described below	
Asset condition and performance	Surface Skid Resistance	SCRIM data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Safety Treatment	SAL data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Defects	100m Priority data derived from RAMM by NZTA Data Quality and Access team	2016
	Surface Age	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Service life of Prior Surface	Surface Age data derived from RAMM by NZTA Data Quality and Access team	2016
	Resurfacing	Resurface data derived from forward works programme	2016
	Proportion of Travel on Smooth Roads	STE data derived from RAMM by NZTA Data Quality and Access team	2016
	Pavement Strength	Deflection data derived from RAMM by NZTA Data Quality and Access team	2016
Investing in the Corridor			
Summary Investment	Summary Corridor Investment	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
	Summary investment by work category	2028-21 SHIP programme funding requests 2017/18 Annual Plans	2017
Investing in access and resilience			
Investing in access and resilience	Maintenance Hot Spots	Network Manager and Regional Staff	2017
	Resurfacing 2018 - 2021	Resurface data derived from forward works programme	

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

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

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NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government