13. Traffic and transport

Overview

The Project will have a number of significant positive traffic and transport effects (i.e. benefits) to the region, namely:

- improved route security through provision of an alternative route into and out of the capital city;
- reductions in travel times for both uses of the route and parts of the local road network;
- minimising travel time variability;
- improved amenity, accessibility and connectivity for communities along the existing SH1 route;
- improved safety.

These benefits are important for the movement of road-based freight and tourist traffic, and for the general public who will experience improved and more reliable journey times. Local coastal communities will benefit as a result of reduced traffic volumes (especially commercial vehicles) travelling on the existing SH1, and the resulting reduction in community severance, along with improved accessibility and safety. There will also be significant reductions in traffic volumes on some local roads, especially around the Pauatahanui Inlet (Grays Road and SH58), the Paekakariki Hill Road and Titahi Bay Road (east of the Kenepuru Drive intersection)

At a local, regional and national level, benefits include improved route security providing for an alternative route into and out of Wellington City, a significant consideration for the capital city in the event of a natural disaster.

While the Project will have significant positive traffic and transport effects overall, construction of the Project will result in some adverse traffic and transport effects on local communities arising from increased heavy construction traffic using local roads. These effects will be managed through a combination of measures set out in the draft Construction Traffic Management Plan.

13.1 Introduction

This chapter presents the key findings of the assessment of traffic and transport effects undertaken for the Project. This assessment is based on traffic modelling, the key results of which are described in Section 13.5 of this report. The key traffic and transport effects from the operation and construction of the Project are then described in Sections 13.6 and 13.7, respectively.

Further details on the assessment of traffic and transport effects are contained in **Technical Report 4**.

13.2 The existing transportation and traffic environment

The existing transportation network comprises the State highway, local road, rail, bus, walking and cycling networks.

13.2.1 Existing State highway network

State Highway 1

SH1 is the primary strategic route within the Wellington region, providing essential connectivity, not only for the communities situated along it, but also for longer distance traffic movements between Wellington and the north. Key parts of the route are (from south to north):

- Linden to the Mungavin Interchange at Porirua:
    - Motorway status with a 100km/hr speed limit, two lanes in each direction, a grassed median and hard shoulders;
    - Mungavin Interchange is a grade-separated roundabout with full slip roads, whilst the northern Porirua intersection (Ramp Bridges) has north-facing slip roads only; and
    - Whitford Brown intersection (located north of Porirua) is an at-grade intersection controlled by traffic signals.
- Paremata roundabout to north of Plimmerton
    - SH1 is urban in nature with a 50km/hr speed limit, two lanes in each direction, many intersections or private accesses and no physical median barrier,
    - Marina View to Acheron Road: currently operates with the kerbside lanes reserved for high occupancy vehicles during peak periods (i.e. T2 lanes, for vehicles carrying two or more people at peak times[85]).
- North of Plimmerton to just south of Pukerua Bay:
    - The rural section of SH1 provides an expressway standard road with a 100km/hr speed limit, four lanes and a wire rope median barrier;
    - An at-grade intersection provides access to Airlie Road and the northern part of Plimmerton.
- Pukerua Bay to Paekakariki:
    - The road standard drops to one lane in each direction within Pukerua Bay Township, with a 50km/hr speed limit and frequent intersections and accesses. There is also a 70km/hr buffer zone at the northern end of Pukerua Bay;
    - North of Pukerua Bay, the coastal section has a 80km/hr speed restriction, with one lane in each direction separated by a wire rope barrier; and

85. A recent review of the operation of Mana Esplanade, which was required as a condition of the designation, recommended the removal of the T2 lanes. These are now proposed to be removed (expected to occur in late 2011) and replaced with 'Clearway' controls which will apply at peak periods.

    - At Paekakariki, the speed limit drops to 70km/hr and an at-grade intersection provides access to the township via Beach Road and to Paekakariki Hill Road.
- Between south of Pukerua Bay and MacKays Crossing overtaking is prohibited for a distance of over 10 kilometres.
- North of Paekakariki
    - the speed limit increases to 80km/hr and then 100km/hr with one lane in each direction;
    - From MacKays Crossing north, four lanes with a median barrier are provided until SH1 reaches the Poplar Avenue intersection, at the southern edge of Raumati.

State Highway 58

SH1 is connected to SH2 via SH58, which runs for a distance of approximately 15kms from SH1 at Paremata to SH2 at Haywards (in Upper Hutt City). To the west of Pauatahanui, SH58 follows the southern edge of the Pauatahanui inlet, with a number of tight bends. This section is subject to periodic closure as a result of slips or flooding. The section of SH58 at Paremata is urban in nature and subject to a 50km/hr speed restriction. The coastal and rural sections of SH58 have 80km/hr or 100km/hr speed limits.

State Highway 2

SH2 connects communities in the Hutt Valley with Wellington City, the Wairarapa and beyond to Hawke's Bay. SH1 and SH2 intersect at the base of the Ngauranga Gorge approximately 11.7kms south of the Transmission Gully alignment at Linden.

13.2.2 Local road network

The State Highway network is supported by a network of local roads. Those local roads that are main links and connectors in the vicinity of the Project include:

- Kenepuru Drive / Main Road Tawa: this is a route broadly parallel to SH1 which links the residential and commercial areas of southern Porirua and Tawa;
- Mungavin Avenue / Warspite Avenue: links SH1 at Porirua with Ranui Heights, Cannons Creek and Waitangirua;
- Titahi Bay Road: links SH1 with the Porirua CBD, Elsdon and Titahi Bay;
- Whitford Brown Avenue: links SH1 north of Porirua with Papakowhai, Aotea, Ascot Park and Whitby;
- Grays Road: links SH1 at Plimmerton with Pauatahanui and SH58 along the northern side of the Pauatahanui inlet. The tight geometry of this road at its western end restricts access for some heavy vehicles and the road is subject to occasional closures due to flooding from streams and high tides / storm surges. There is currently a 60km/hr speed restriction (a temporary safety measure) around the inlet;

- Paekakariki Hill Road: this is a steep, narrow and winding rural road which runs from SH1 at Paekakariki to SH58 at Pauatahanui. This road cannot safely accommodate heavy vehicles or vehicles with long trailers over its full length, and is prone to closure during significant rainfall events primarily from slips and stream debris;
- Akatarawa Road: although providing a more direct route between SH1 at Waikanae and SH2 at Upper Hutt, this road is of a low standard with a poor alignment and several single lane sections. As such, it is not suitable for any significant volumes of traffic, cannot easily accommodate heavy vehicles and is subject to closure during significant rainfall events;
- James Cook Drive: an arterial route in Whitby connecting SH58 to Discovery Drive and Navigation Drive;
- Discovery Drive: an arterial route in Whitby that connects the Whitby Shopping Centre to James Cook Drive and Spinnaker Drive; and
- Navigation Drive: an arterial route on the south side of Whitby that connects to James Cook Drive and links to Pauatahanui Village and SH58 via Joseph Banks Drive.

13.2.3 Rail network

The North Island Main Trunk (NIMT) railway runs between Wellington City and the Kapiti Coast and beyond this to the central North Island and further north. Suburban passenger services operate between Wellington and Waikanae, with a high frequency service during weekday peak periods and frequent trains at other times. Scheduled running times are 60 minutes between Waikanae and Wellington and 30 minutes between Plimmerton and Wellington. Patronage levels are high in the corridor with 4-5 million passenger trips per annum. The “Capital Connection” service operates once a day between Palmerston North and Wellington, providing connectivity to the Horowhenua and northern Kapiti Coast areas. In addition to these commuter services, the Overlander is a mainly tourist-orientated service operating once a day in each direction between Wellington and Auckland. The NIMT also carries a significant volume of freight, with several daily trains in each direction.

The railway network is also currently the subject of an upgrade project, the main elements of which are:

- delivery of new ‘Matangi’ rolling stock, comprising 48 two-car electric units, each providing 149 seats, to progressively replace the English Electric units;
- extension of electrification and double tracked lines to extend commuter services to Waikanae (completed);
- installation of improved power supply equipment and railway signalling;
- addition of another line into Wellington railway station to reduce delays (completed);
- enlargement of the Johnsonville line tunnels (completed);
- improvement of a number of platform and station facilities (completed).

Other network-wide improvements include the implementation of a real-time information system and integrated ticketing.

13.2.4 Bus network

Bus services are currently precluded from operating in the corridor where these would compete with the subsidised rail service. The extensive network of local bus services across the corridor area is primarily orientated towards providing connectivity between residential areas and the rail network.

13.2.5 Walking and cycling network

Walking and cycling are important modes of transportation for shorter distance trips within the corridor. These modes are being actively promoted by local authorities, with the development of more integrated networks. A longer distance cycle route runs parallel to SH1 between Porirua and Kapiti (the Ara Harakeke Pathway), part of which comprises a narrow shared-use path adjacent to SH1 Centennial Highway. The NZTA contributed to the development of this pathway when the Paremata to Plimmerton project was completed by converting the old highway alignment to a cycleway / walkway between Plimmerton and Paremata.

13.3 Traffic and transport issues and objectives

The NZTA and the PCC have specific objectives for the Project which are directly relevant to the traffic and transport assessment. Changes in travel patterns and associated benefits, improved traffic safety and route security are key concerns for the NZTA. The following sections describe key difficulties with the existing network in this regard.

13.3.1 Travel demand patterns

Commuters

Some of the existing travel demands in the corridor, for example commuter travel between Kapiti and Wellington, are jointly serviced by both road and public transport networks. However, there are also significant travel demand patterns which are able to be efficiently serviced by public transport. For example, this includes movements between Kapiti and the Hutt Valley, and between Porirua and the Hutt Valley.

Congestion

Traffic congestion in the SH1 corridor results in increased travel times during weekday peak periods. For example, in 2026 it is expected that a northbound journey from Linden to MacKays Crossing will take 54% longer in the weekday PM peak when compared to the uncongested AM peak. Travel between the Hutt Valley and SH1 (north) requires the use of routes which are indirect, slow and suffer from poor geometry (SH58 and Grays Road around the Pauatahanui inlet and Paekakariki Hill Road).

During weekend and holiday periods severe congestion often occurs as a result of increased road traffic demands. In the event of an incident, such as a crash or natural event, the extent of disruption can be magnified significantly.

Traffic congestion not only increases total travel times but also the variability or uncertainty of travel times in the corridor. The planning of journeys within the corridor can become increasingly difficult, resulting in additional and unnecessary costs being borne by travellers and businesses.

13.3.2 Safety

Between 2005 and 2009, 974 crashes were recorded on SH1 (Linden to MacKays), SH58 and Grays Road. Over this period there has been no discernible downward trend in the total number of crashes. However, a number of improvements have been made in recent years to address specific crash problems and the severity of crashes in localised areas within the corridor, such as the installation of a wire rope median barrier along the coastal section of SH1.

The scope for further reductions in the number of crashes through road improvements is constrained by the topography of the area, as carriageway realignments and widening would be required, with associated land and financial requirements

The Project will address rising traffic demands (especially commercial vehicles) by the provision of an alternative route which has been designed to modern safety standards. Local traffic will typically continue to use the existing route, but through traffic is expected to use the new route. Without the Project, existing crash problems are likely to increase with an increase in traffic over time and this will have a further adverse effect on the reliability of travel times.

13.3.3 Route security

As discussed in Chapter 2, the northern access to Wellington is vulnerable to closure either after a significant earthquake, tsunami or storm event, or due to other unplanned events such as traffic crashes and bad weather. The eastern access to Wellington (via the Rimutaka Hill section of SH2) is also vulnerable to closure, and is regularly closed after heavy rain, as a result of slips, and during periods of high winds. The issue of route security is a significant one for the NZTA and a key reason for constructing the Project is to provide better security of access into and out of the capital city.

Because both SH1 and SH2 are vulnerable to closure as a result of significant damage in an extreme event, these routes and the adjacent railways could be closed for several weeks or months while repair and reinstatement work takes place. Such closures are of significant concern as they would be extremely disruptive and would result in lost productivity both regionally and nationally.

13.4 Methodology for assessing effects

The assessment has been informed using outputs from the Wellington Transport Strategy Model (WTSM) which is a multi-modal model, and from traffic models simulating the performance of the road network (SATURN) and individual intersections (SIDRA). These models have been subjected to rigorous processes of calibration, validation and peer review to ensure that the resulting forecasts are reliable.

Together, these models provide forecasts of travel demands by mode, traffic volumes and conditions on road sections and the detailed performance of intersections, all for representative weekday AM peak, inter-peak and PM peak periods.

13.4.1 Modelling Methodology

Travel demands in the models are based upon household interview survey information, census data and demographic and economic forecasts.

The modelling assessments have been based around two principal scenarios, a 'Basecase' scenario without the Project in place, and a 'with Project' scenario. The assessments focus upon the evaluation of conditions in 2026, a few years after the expected completion of construction, with further modelling carried out for 2031 and 2041. These two scenarios are described in more detail below.

In addition to these two scenarios, a number of "sensitivity tests" have been undertaken to assess the extent to which the assessments of the Project may be sensitive to changes in some of the key assumptions which form the basis of these scenarios. These tests are described in detail in **Technical Report 4**.

13.4.1.1 Basecase / 'without Project' scenario

The Basecase represents a realistic future scenario for 2026, but without the Project in place. This has been developed to provide a baseline against which the effects of the Project can then be assessed.

The Basecase recognises that a number of other transportation projects are likely to be progressed and development will continue to occur in the period to 2026, irrespective of the Project. This is an accepted approach in traffic modelling as stated in **Technical Report 4**. The year 2026 is used as it is a few years after the expected opening date of 2021.

The Basecase includes the land use changes forecast by the GWRC, consistent with the assessment of other transportation projects across the region. Transport projects which have not yet been constructed (and have not been consented), but are expected to be completed by 2026 regardless of whether the Project goes ahead are included in the Basecase. The projects included in the Basecase modelling are detailed in **Technical Report 4**. Principal among these are:

- other RoNS projects;
- the Petone (SH2) to Grenada (SH1) Link Road;
- SH58 upgrades; and
- anticipated public transport improvements (i.e. new rolling stock, twin tracking and electrification to Waikanae, integrated ticketing etc).

Other RoNS projects have been included because the Project is only one component of a package of prioritised infrastructural improvements to the SH1 corridor between Wellington Airport and Levin. Sensitivity testing (discussed in **Technical Report 4**) concluded that the assessed benefits of the Project would be largely unaffected by the completion of the other RoNS projects.

13.4.1.2 'With Project' scenario

The 'with Project' scenario is the same as the Basecase, except that it also includes the Project and a number of associated changes to the existing SH1 (or the Coastal Route). The existing coastal route is likely to revert to a local road (under the control of PCC) once the Project is opened to traffic. Regardless, there will be changes to its form and function. This is reinforced by one of the Project objectives which is "To assist in the integration of the land transport system by enabling the existing SH1to be developed into a safe and multi-functional alternative to the proposed new strategic link."

Consistent with this objective, an indicative package of measures to be applied to the coastal route was developed in consultation with the NZTA and PCC – the two agencies that would be involved with making decisions about the future of the existing road. The package of measures is representative of the changes that could feasibly be applied to the coastal route, and these are described in **Technical Report 4**.

The package of measures includes additional traffic signals, retiming of signals to give more time to side road access and reduced speed limits in some locations.

13.4.2 Effects based assessment methods

The two scenarios described above, and the outputs from the models, have been assessed across a range of criteria which measure the performance of the transportation network. The traffic and transport models have been used to provide quantitative forecasts to assist in this process.

The criteria assessed are:

- changes in trip patterns (distribution, length, trip induction, mode transfer);
- traffic impacts analysis (traffic volumes, travel times, overall network performance, interchange performance);
- heavy vehicles (volumes by road sections, travel times);
- route security and trip reliability;
- public transport (patronage, trip patterns, volumes);
- walking and cycling (opportunities, impacts); and
- safety (changes in frequency, severity and location of crashes).

These effects have been assessed by identifying conditions for the Basecase (without the Project) and then assessing the changes which would occur with the Project in place.

Some of this information has been used to inform analyses of other effects undertaken by other technical specialists, including acoustics (traffic noise and vibration), air quality (vehicle emissions) and water quality (discharges to the stormwater system from road runoff).

13.5 Traffic model forecasts

The traffic and transport model outputs are in the form of forecasts of travel demands by mode, and traffic volumes by road section. The following figures show the predicted traffic volumes:

- Along the new roads created by the Project (Figure 13.1);
- Along existing State highways (Figure 13.2); and
- Along existing local roads (Figure 13.3).

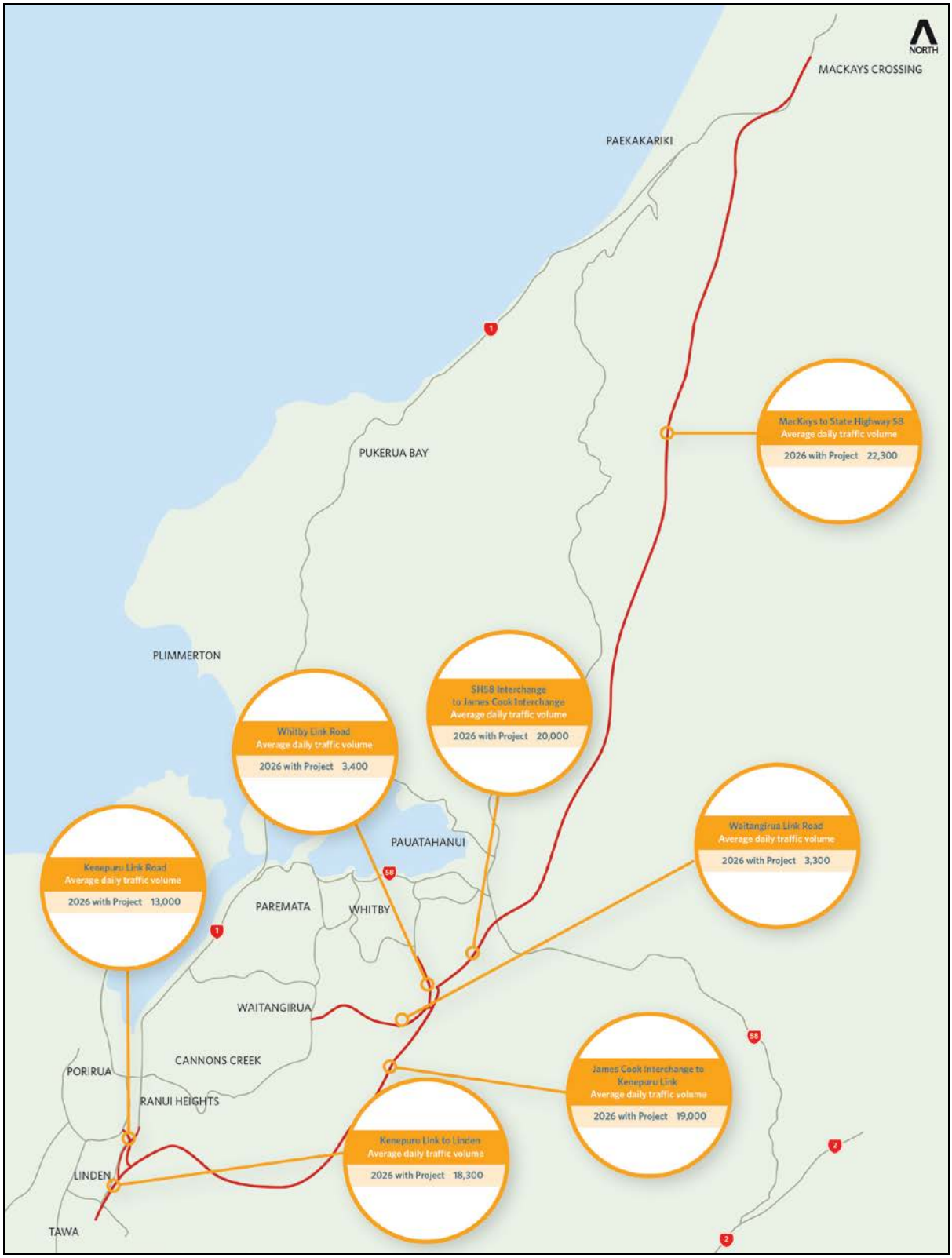

Figure 13.1: Predicted traffic volumes on new roads created by the Project

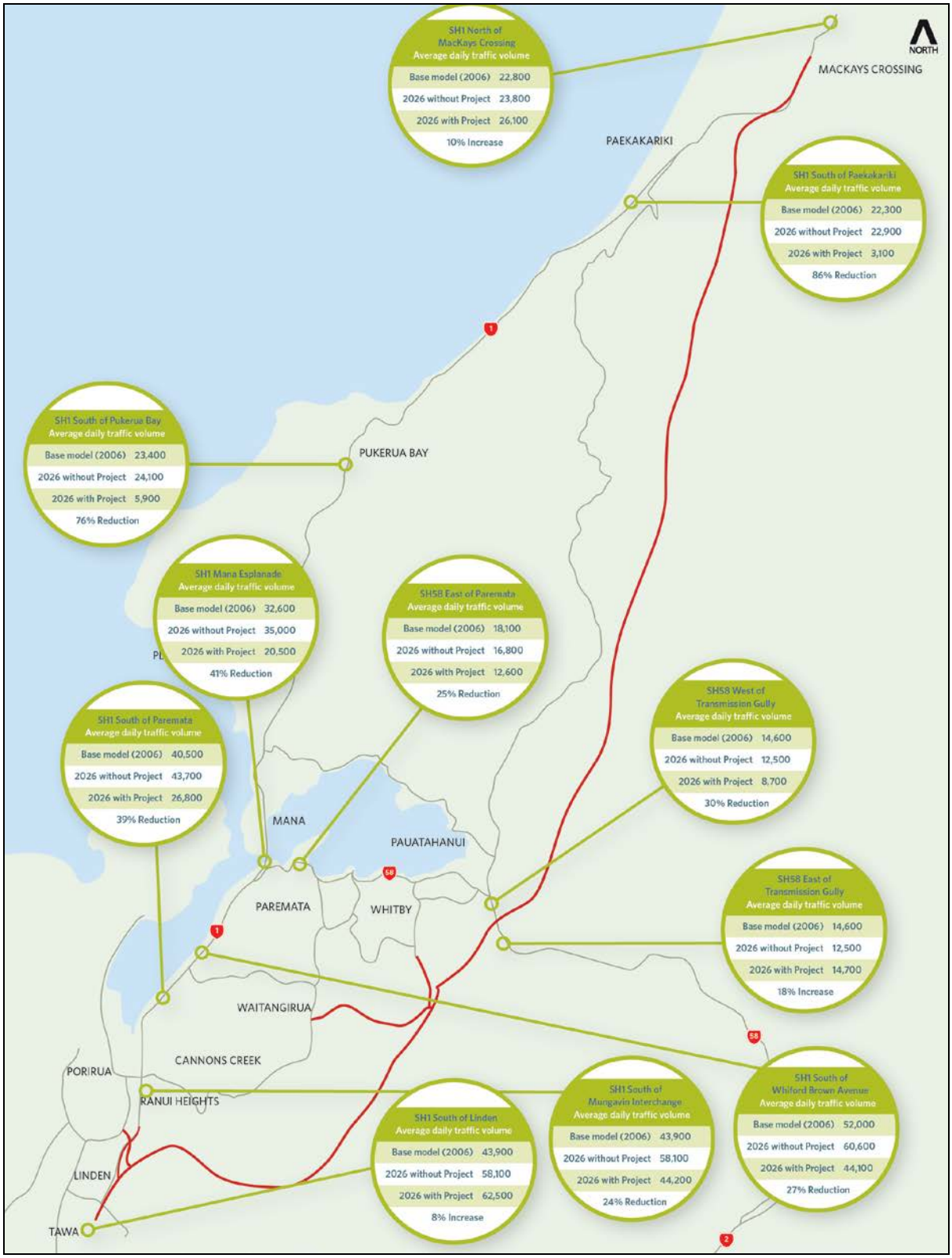

Figure 13.2: Predicted traffic volumes on existing State highways

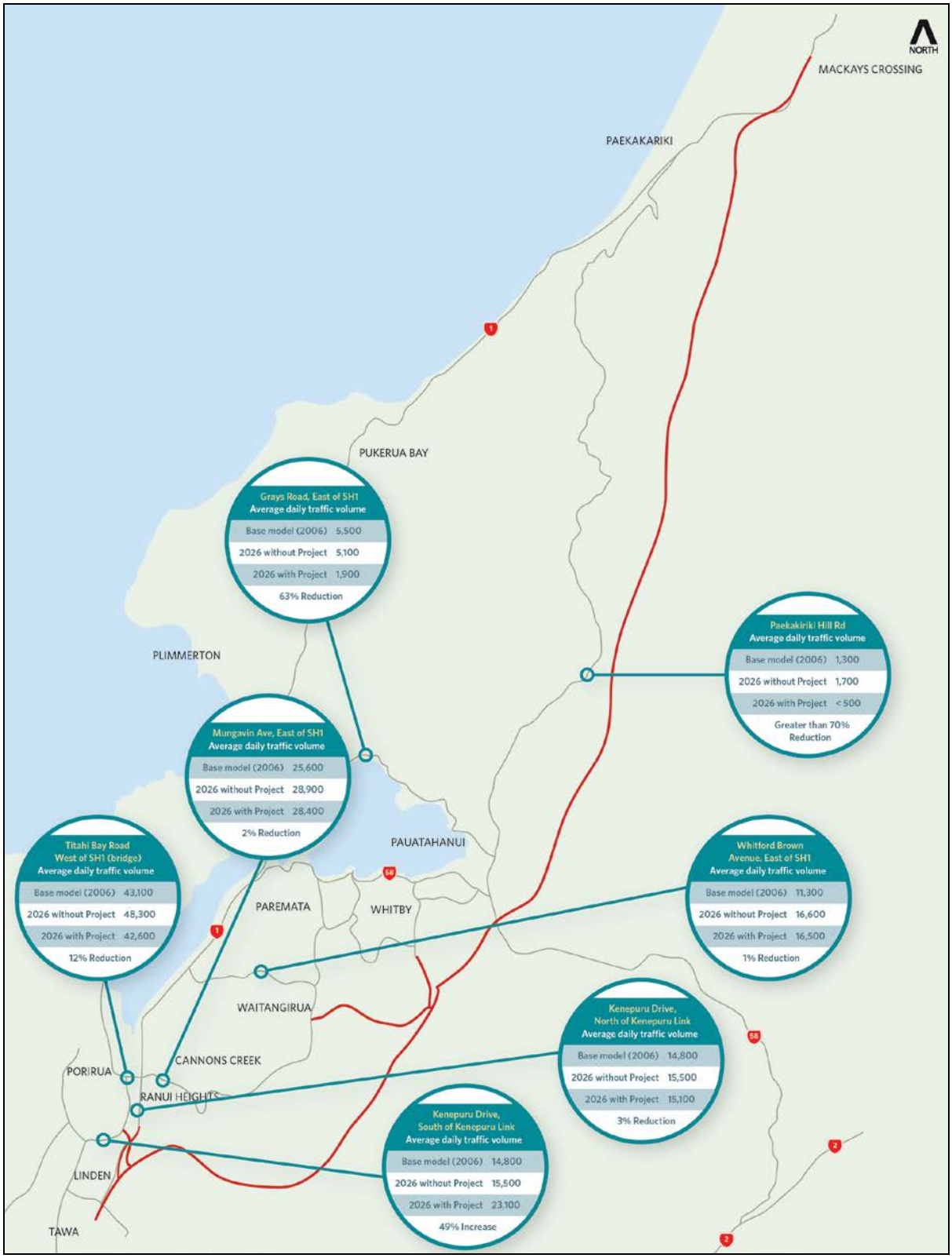

Figure 13.3: Predicted traffic volumes on existing local roads

In summary, the modelling indicates that there will be significant changes in patterns of transportation and traffic demands throughout the region arising as a result of the Project.

Some of the more significant changes in weekday traffic volumes in 2026 include:

- Declining traffic volumes:
    - the existing SH1 route between Linden and MacKays Crossing - significant reductions ranging from 87% south of Paekakariki to 24% south of the Mungavin Interchange at Porirua;
    - Grays Road (west of SH1) – 62% reduction;
    - SH58 East of Paremata – 25% reduction; and
    - Paekakariki Hill Road – more than 70% reduction.
- Increasing traffic volumes:
    - Kenepuru Drive (between Kenepuru Link and Raiha Street) – 49% increase, arising from the anticipated attractiveness of the Kenepuru Link Road ; and
    - SH58 East of Pauatahanui – 17% increase, due to a general increase in traffic activity between the SH1 corridor and the Hutt Valley.

13.6 Operational traffic and transport effects

Once operational, the Project will have a number of significant positive effects including:

- Large reductions in traffic activity along the existing SH1.
- Significant travel time reductions for traffic using the Project. For example, road users between Linden and MacKays Crossing will experience travel time savings of nearly 30% or approximately 7 minutes in uncongested conditions, with larger time savings during weekday peak periods.
- Significant improvements in accessibility between the Hutt Valley and SH1 (north), with the provision of a more direct and much quicker route.
- Greatly improved travel time reliability arising from reduced congestion, meaning that travellers will have more certainty regarding their expected arrival times at their destination, especially important for freight movements (currently travel times are 31-50% higher in peak periods than in the non-peak periods).
- Improved amenity, accessibility and connectivity for communities along the existing SH1 route.
- Improvements in network connectivity across the region, with new linkages between State Highways, and between Kapiti, Porirua and the Hutt Valley.

Detailed effects on the transport network are outlined in the following sections. A series of sensitivity tests to confirm operational assumptions has also been completed, which are described in **Technical Report 4**.

13.6.1 Changes in traffic volumes

Traffic volumes and congestion levels on a number of local roads will be affected by the Project. Table 13.1 outlines key changes and effects on traffic volumes (these changes are presented in the figure above which sets out the modelling predictions). The key local road sections where notable changes in traffic volumes are experienced are summarised in the following table. The locations where significant changes (in percentage terms) will be felt are highlighted with green indicating a significant reduction predicted, and red indicating a significant predicted increase predicted.

Table 13.1: Local road traffic volume changes

Local road section	Traffic volumes (vehicles/day)		
	Basecase (2026)	With the Project (2026)	% change (2026)
Grays Road - east of SH1	5,100	1,900	-62%
Main Road Tawa - Raiha Street to Linden Avenue	22,000	19,100	-13%
Raiha Street - Kenepuru Drive to Prosser Street	10,500	10,500	0%
Kenepuru Drive - Titahi Bay Road to Kenepuru Link Road	15,500	15,100	-3%
Kenepuru Drive - Kenepuru Link Road to Raiha Street	15,500	23,100	49%
Titahi Bay Road - Mungavin Interchange to Hagley Street	48,300	42,600	-12%
Whitford-Brown Avenue - SH1 to Warspite Avenue	16,600	16,500	-1%
Warspite Avenue - Omapere Street to Waitangirua Link Road	6,600	6,900	5%
Warspite Avenue - Waitangirua Link Road to Waihora Crescent	6,800	7,300	7%
James Cook Drive - Navigation Drive to SH58	3,400	2,000	-41%
Discovery Drive-James Cook Drive to Spinnaker Drive	3,600	3,500	-3%
Navigation Drive - James Cook Drive to Joseph Banks Drive	2,500	3,200	28%
Paekakariki Hill Road - SH1 to Grays Road	1,700	100	> -70%

Source: SATURN model and Technical Report 4

Traffic congestion both increases the total length of travel, and the variability or uncertainty of travel times in the corridor. This means that the planning of journeys becomes increasingly difficult due to uncertainty, resulting in additional and unnecessary costs being borne by travellers and businesses.

The change in traffic volumes on the road also gives an indication of the potential for safety improvements – i.e. the number of crashes predicted due to vehicle exposure. Traffic safety is assessed further below.

13.6.2 Effects on total travel demand and mode of travel

The Project will result in a number of changes in travel behaviour, arising from reductions in the costs of road travel and improved accessibility. Trip movements which are currently suppressed due to the effects of congestion and lengthy journey times will be released, leading to an overall increase in road traffic activity, 'induced' trips. **Technical Report 4** concludes that resulting 'induced trips' can occur for a number of reasons including:

- Some people choose to visit destinations in the SH1 corridor in preference to other locations because of the improved accessibility. This could be in the form of a short term response with trips made for shopping or business (for example) or a longer-term response in the form of moving house or business; and
- Some people who previously travelled earlier or later than desired in order to avoid expected congestion (and variability in travel times), especially at peak periods, may choose to travel closer to their desired time of travel because of improvements in the reliability of journey times; and
- Some people who previously use public transport network will travel by private vehicle instead.

The forecast volumes of major travel movements in the corridor for 2026 (summarised in Figure 13.4) indicates that there would be some increase both in the total volume of travel in the corridor and also the proportion of the travel which is undertaken by road, as a result of the Project.

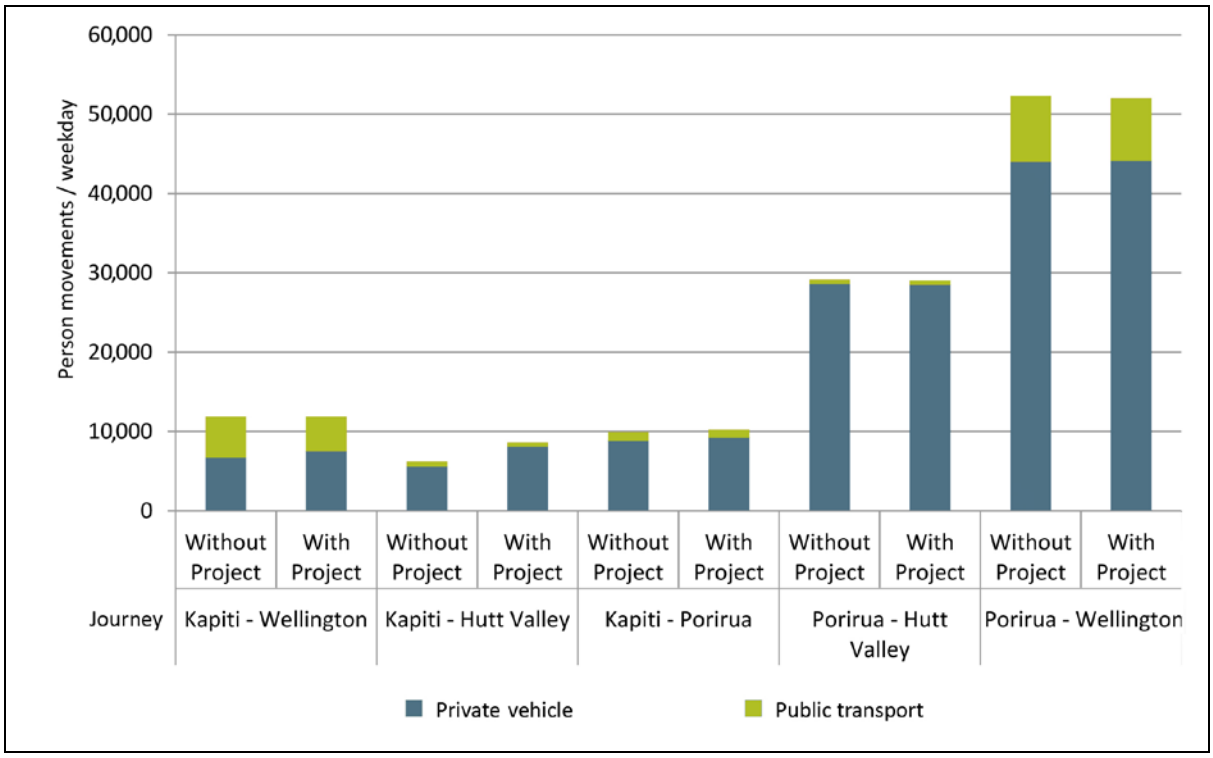

Figure 13.4: Comparison of forecast total travel demand in person trips for key journeys for a typical weekday (2026), with and without the Project

It is important to note that the effects above would occur because the improved accessibility provided by the Project allows people to travel to the destinations they wish, at the times and using the mode of transport which is most convenient to them. All of these responses have an associated benefit to the travellers concerned and in aggregate, to the region as a whole.

13.6.3 Effects on the road network

Actual and potential effects on the wider local and State Highway road network include effects on overall network performance and traffic volumes.

Overall network performance

The Project will have a small impact on the overall road network performance. Whilst the change in the overall number of vehicle trips in the region is expected to be negligible, the Project will have the effect of reducing total travel times within the network as a whole. There will be a small increase in total travel distances, although they will be travelled at increased speeds due to reduced congestion.

Traffic volumes

The Project will result in a large diversion of traffic away from the existing SH1 route between Linden and MacKays Crossing onto the Main Alignment. In addition, there would be a range of more subtle changes in traffic volumes on other sections of the road network (such as on parts of Warspite Ave) as drivers utilise routes which are less congested with the inclusion of Main Alignment. Furthermore, the Project would result in some induction of 'new' trips, as described above.

The Project will result in significant changes in the volumes and patterns of travel on the existing road network. Benefits will be felt in a number of locations, particularly where there is a reduction in the number of vehicles, making for a more pleasant and a safer road environment.

13.6.4 Effects on travel times

Between Linden and MacKays Crossing, the Main Alignment will be marginally longer (approximately 0.7km) than the existing SH1 route. However, the alignment of the route will enable uninterrupted travel at higher speeds, offering significant reductions in travel times when compared to the existing SH1 route.

A vehicle travelling at the posted speed limit of 100km/hr between Linden and MacKays Crossing will take approximately 16 minutes on the Main Alignment, which is nearly 7 minutes (or approximately 30%) less than using the existing SH1, which is approximately 23 minutes.

Travel time savings for vehicles travelling between the Hutt Valley and SH1 (north) will be more significant, arising from a significant reduction in travel distances combined with improvements in speed. For example, a vehicle travelling from MacKays Crossing to Haywards during the AM Peak in 2026 would experience a reduction in travel time of 15.5 minutes (45%). A vehicle in the opposite direction during the PM peak would experience a reduction in travel time of 22.8 minutes (54%).

Peak traffic periods

The benefits of the Project will be more apparent during peak period traffic conditions when congestion commonly affects the existing SH1 route, resulting in delays. With the Project in place, residual traffic using the existing SH1 route would benefit from reduced travel times as a result of reduced congestion with most vehicles using the new route. However, these reduced travel times will be partially offset by measures on the coastal route designed to improve local accessibility, consistent with the change in road status from State Highway to local road.

The net result of these effects would be determined by the time of day and direction of travel. For example, northbound movements on the existing SH1 in the AM peak period would experience some increase in travel times (because these are not currently subjected to significant congestion). Conversely, southbound movements in the AM peak would benefit from reduced travel times because the effects of reducing congestion in this direction will outweigh the impact of the measures to be applied to the route to change the route's focus from a State Highway to a local access road.

Local accessibility as a result of the Kenepuru Link Road and Porirua Link Roads

The proposed Kenepuru, Waitangirua and Whitby Link Roads will provide improvements in accessibility to the areas they serve, allowing traffic to access the strategic road network more quickly, removing traffic from parts of the local road network.

Effects on travel time variability

The variability or uncertainty of travel times in the existing SH1 corridor is a significant issue. As a result of significant reductions in regular congestion and in random incidents such as crashes, the Project would eliminate virtually all travel time variability between Linden and MacKays Crossing, with a very low residual level of variability in 2026. This is an important benefit of the Project, enabling individuals and businesses to plan their travel with a much greater degree of certainty.

Without the Project, rising traffic demands will increase the frequency, duration and severity of congestion in the corridor. Modelled travel times for the years 2006 and 2026 indicated that under normal traffic flow conditions, travel times may be increased by as much as 14% on existing SH1 over this period. This will be accompanied by increases in the variability of travel times, and magnified as a result of incidents when they occur.

13.6.5 Effects on freight movements

In combination with the package of measures to be applied to the existing coastal route, the Project will enable the removal of a large number of commercial vehicles from the existing SH1 route and in particular, the communities of Paekakariki, Pukerua Bay, Plimmerton, Mana and Paremata.

These reductions would result in noticeable amenity improvements for the communities along the existing SH1. The Road Transport Association (RTA) has indicated that truck drivers have a preference for avoiding urban areas because of the interruptions to travel resulting from frequent intersections. As outlined above, travel time variability is virtually eliminated by the Project. This, together with the predicted significant travel time savings (especially in peak periods) using the Main Alignment is

expected to result in virtually all through commercial vehicle movements between Linden and MacKays Crossing using the Main Alignment, in preference to the existing coastal route. This is despite the greater degree of ascent and descent necessary on the Main Alignment and the marginally longer distance involved.

Accordingly, the Project will result in significant reductions in the number of commercial vehicles using the existing SH1 coastal route. The current difficulty of access for heavy vehicles between SH1 and SH58 (to the east of the Main Alignment), due to the poor alignment of SH58 and Grays Road, results in many such vehicles using a longer route through the Ngauranga Gorge between the SH1 and SH2 corridors. By the provision of a more convenient route between SH1 and SH58, the Project would remove many heavy vehicles from the routes on both sides of the Pauatahanui Inlet, and provide more direct accessibility to and from the Hutt Valley.

13.6.6 Effects on route security

One of the key project objectives is to improve transport route security. Through the introduction of a parallel alternative route to SH1, the effects of incidents (crashes and natural events such as slips and earthquakes) would be significantly reduced by the Project. These effects are described in more detail in **Technical Report 4**. This report confirms that the significant route security benefits associated with the construction of the Project are:

- the Project will bypass sections of earthquake vulnerability on existing SH1;
- the Project route is less prone to slips;
- the Project route has been designed to a modern safety standard and will be safer and less prone to traffic crashes than the existing SH1; and
- having two alternative northbound routes into and out of Wellington will provide a greater level of security to the capital city in the event of an emergency.

13.6.7 Effects on intersection performance

13.6.7.1 Existing intersections

Consistent with significant reductions in traffic demands on many existing roads, the Project will lead to an improvement in the performance of a number of key intersections throughout the corridor.

Specific intersection assessments have been undertaken for those intersections where some increases in delays could occur as a result of the Project. Reductions in volumes of through traffic along the existing SH1 route would generate significant benefits to traffic turning to, or from, side roads along the SH1 route.

Examples of locations where key changes occur include:

- Titahi Bay Road / Kenepuru Drive intersection: traffic reductions on Titahi Bay Road (east) and Kenepuru Drive (north of the Kenepuru Link Road) would provide some improvements in the efficiency of this intersection, especially during the Inter Peak period.

- SH1 / Whitford Brown Avenue intersection.
- The removal of large volumes of through traffic will allow delays to be substantially reduced for movements turning to and from Whitford-Brown Avenue.
- Kenepuru Drive / Raiha Street intersection.

The distribution of traffic movements at this intersection will change significantly as a result of the Project. Whilst the overall performance is not expected to change, an alternative intersection is one measure which may be considered as a means of addressing the traffic management and safety issues arising from the increase in traffic volumes expected on this section of Kenepuru Drive.

13.6.7.2 New intersections

For the Kenepuru Drive / Kenepuru Link Road intersection, both roundabout and traffic signal configurations were assessed. A roundabout has currently been adopted as the preferred solution at this location, as this would offer the most efficient means of accommodating the expected traffic demands. Also, pedestrian and cycle movements along Kenepuru Drive are able to be accommodated safely beneath the elevated Kenepuru Link Road approach.

For the Waitangirua Link Road / Warspite Avenue intersection, traffic signals are currently considered to be the preferred form of control, despite these not providing the optimal solution in terms of traffic delays. This was because the needs of pedestrians and cyclists can be more safely accommodated at this location by using traffic signals, rather than a roundabout.

In both of these cases, the proposed solution would not preclude the adoption of an alternative intersection configuration at some point in the future if this was considered appropriate as there will be adequate width in the designation. Any alternative configuration would need to consider the functionality for vehicles, cyclists and pedestrians.

13.6.8 Traffic safety effects

13.6.8.1 Traffic safety effects – State highway network

For the purpose of assessing road safety effects, the existing SH1 was divided into five sections within which the road characteristics are similar:

- Linden (South) to the Paremata Roundabout (motorway / expressway);
- the Paremata Roundabout to Plimmerton (urban);
- Plimmerton to Pukerua Bay (rural-rolling);
- Pukerua Bay (urban); and
- Pukerua Bay to MacKays Crossing (North) (rural-rolling).

These sections were analysed using the Basecase modelling scenario to calculate the estimated number of midblock injury crashes (i.e. crashes that occur in between intersections) on sections of SH1 in the future.

In addition to the five sections of SH1 analysed for the Basecase, the Project was split into three sections for the purposes of forecasting crash numbers on the new alignment:

- the southern tie-in at Linden to the James Cook Interchange;
- the James Cook Interchange to SH58 Interchange; and
- the SH58 Interchange to the northern tie-in at MacKays Crossing.

Once the expected number of crashes on sections of SH1 and the Main Alignment, for both the Basecase and With Project scenarios was calculated, a comparison was made for individual sections of SH1 and for the route as a whole. This calculation shows the expected number of mid-block crashes along SH1 and the Main Alignment for both the Basecase and With Project scenarios.

Overall, a net reduction in the number of crashes of 42% is estimated. This occurs as traffic re-routes from the existing SH1, with poor geometry, limited passing opportunities and frequent intersections, to the Main Alignment, which will be constructed to the latest design standards, with grade separated intersections and passing opportunities throughout.

Table 13.2: Crash analysis summary, detailing expected injury crashes in 2026 - with the Basecase / and with the Project

Location		2026		
		Basecase Injury Crashes per year	With Project Injury Crashes per year	% change from Basecase
Existing SH1	Linden (South) to Paremata Roundabout	11	7	-36%
	Paremata Roundabout to Plimmerton	3	2	-33%
	Plimmerton to Pukerua Bay	5	1	-80%
	Pukerua Bay	3	1	-67%
	Pukerua Bay to MacKays Crossing (North)	10	1	-90%
The Project	Linden (Southern tie in) to James Cook Interchange	-	2	-
	James Cook Interchange to SH58 Interchange	-	2	-
	SH58 Interchange to MacKays (Northern tie in)	-	2	-
Total	SH1	31	12	-61%
	The Project	-	6	-
	Total	**31**	**18**	**-42%**

Source: SATURN model and EEM2 procedures

13.6.8.2 Traffic safety effects – Local road network

As discussed above, there will be a significant reduction in traffic numbers on some local roads. The percentage change in traffic volumes will affect the number of crashes as a result of changes in exposure to crashes. The following table highlights the locations (in green) where a significant reduction in traffic volumes expected, along with the current number of crashes.

Table 13.3: Local road crashes and traffic volume changes

Local Road Section	Number of crashes (2005-2009)	Traffic Volumes % change (2026)
Grays Road - SH1 to SH58 (includes small section of Paekakariki Hill Road)	28	-62%
Main Road - Raiha Street to Linden Avenue	28	-13%
Raiha Street - Kenepuru Drive to Prosser Street	35	0%
Kenepuru Drive - Titahi Bay Road to Kenepuru Link Road	105	-3%
Kenepuru Drive - Kenepuru Link Road to Raiha Street	34	49%
Titahi Bay Road - Mungavin Interchange to Hagley Street	147	-12%
Whitford-Brown Avenue - SH1 to Warspite Avenue	69	-1%
Warspite Avenue - Omapere Street to Waitangirua Link Road	30	5%
Warspite Avenue - Waitangirua Link Road to Waihora Crescent	37	7%
James Cook Drive - Navigation Drive to SH58	9	-41%
Discovery Drive-James Cook Drive to Spinnaker Drive	14	-3%
Navigation Drive - James Cook Drive to Joseph Banks Drive	3	28%
Paekakariki Road - SH1 to Grays Road (including non-injury)	121	> -70%

The section of Kenepuru Drive between the Kenepuru Link Road and Raiha Street intersections would experience a significant increase in traffic of 49%. As this section of road already carries significant volumes of traffic, a package of appropriate traffic management measures to effectively maintain safety in this area will be implemented to mitigate this potential adverse road safety effect.

Navigation Drive would experience an increase of 28% in traffic volumes. In this case, the existing traffic volumes are low and the wide cross-section means that this road would be able to easily accommodate the increased traffic demands without any deterioration in safety.

13.6.8.3 Traffic safety effects – Intersections

As shown in Table 13.4, a significant number of crashes currently occur at intersections along the SH1 route. The removal of large volumes of through traffic from these intersections will result in a substantial reduction in the frequency of crashes at these locations.

Table 13.4: SH1 intersection crashes and traffic volume reductions

SH1 Intersections	Number of observed crashes (2005-2009	SH1 Traffic Volumes (vehicles/day)		
		Basecase (2026)	With TG (2026)	% change[86] (2026)
Paekakariki / Beach Road	9	26,500	5,700	-79%
Ames Street	2	23,000	4,600	-80%
Pa / Toenga Road	63	23,600	5,200	-78%
Pukerua Beach Road	4	24,600	6,300	-75%
Wairaka Road	2	24,100	5,800	-76%
Teihana Road	12	24,400	6,100	-75%
Gray Street	3	25,200	7,000	-72%
Airlie Road	9	24,100	5,900	-75%
Plimmerton Roundabout	17	25,400	7,300	-71%
Grays Road	9	27,200	9,100	-66%
Steyne Avenue	8	29,500	14,600	-50%
Pope Street	8	28,700	13,900	-51%
Acheron Road	20	30,400	15,700	-48%
Mana View Road	22	32,900	18,400	-44%
Pascoe Avenue	12	35,700	21,200	-41%
Marina View Road	7	35,000	20,500	-41%
Paremata Roundabout	73	48,200	31,200	-35%
Whitford Brown Avenue	24	41,900	33,200	-21%
Mungavin interchange	67	86,500	69,400	-20%
Source: CAS Database and SATURN Model				

13.6.9 Wider (regional) effects of the Project

Whilst the primary effects of the Project will be felt in the more immediate SH1 and SH58 corridors, some changes in traffic volumes will occur in areas further away from the Project. However, the modelling indicates that the effects upon more remote parts of the network will be small, and likely to be within the normal day to day variability in traffic volumes.

13.6.10 Effects on public transport

Rail network

One of the effects of the Project will be a transfer of some trips from public transportation, principally the parallel rail network, to road. Without the Project, rail patronage is expected to grow significantly in the period from 2006 to 2026, due principally to the effects of investment in the rail network and increasing congestion on SH1 and other routes.

86. The percentage change is the change in volumes on the road and is indicative only of the likely change in the number of crashes.

This is consistent with the findings and recommendations of the Western Corridor Study. This identified that upgrades to either the roading network or the rail network alone would not adequately address the issues in the corridor, and a combined package was required which improved rail patronage whilst also significantly improving the capacity of the road network.

In practice, the Project is an integral component of a wider and balanced transportation strategy as defined by the RLTS. This package of measures, identified by the Western Corridor Study, will have the net effect of improving overall rail patronage whilst also significantly improving the capacity of the road network.

Bus network

The effects of the Project upon bus patronage will be small and will relate mainly to the use of buses for connection to the rail network.

Some bus routes would benefit from the congestion relief attributable to the Project, allowing for more reliable operation against published timetables. For example, bus services which connect with trains at the Paremata railway station would not be subjected to the high existing delays experienced when exiting onto the Paremata roundabout.

Walking / cycling network

It is expected that the Project would not have any noticeable effect on the number of trips made by the active modes of transport (walking, cycling).

However, the removal of large volumes of traffic from the existing SH1 route and some local roads would create opportunities for improved cycling and walking facilities. Once the Project is constructed, the existing cycleway adjacent to SH1 between Pukerua Bay and Paekakariki would provide a less intimidating and a more pleasant experience, which is likely to result in increased usage.

Similarly, severance will be reduced in communities such as Pukerua Bay, allowing the railway station to be more readily accessed from residential areas to the west of the existing SH1. At Mana, the retail area on the western side of SH1 will become more accessible by pedestrians and cyclists from residential areas to the east.

Proposals for the form of the Kenepuru Link Road / Kenepuru Drive and Waitangirua Link Road / Warspite Avenue intersections have taken account of the needs of pedestrians and cyclists. In this respect, the provisional intersection designs have been developed in close liaison with both PCC officers and the Project's urban design team.

The Project alignment would cross a number of established walking and cycling routes. At these locations, access will be maintained or enhanced through the provision of underpasses, as described in the Urban Design and Landscape Framework (**Technical Report 23**)

13.7 Assessment of construction traffic effects

The majority of works during construction will occur in the rural environment, away from urban areas and any sensitive receptors (such as schools, retirement homes etc.). Once construction traffic is within the route, it is likely to use the Main Alignment to access other parts of the alignment. However, there will be initial phases where local roads will be used for access.

An assessment of the traffic effects expected during construction of the Project has been undertaken based upon the best available information relating to the likely construction methodology. Actual and potential construction traffic effects are expected to be:

- safety effects on local roads;
- other effects arising from an increased volume of large and small construction related vehicles;
- possible damage to local roads; and
- inconvenience from traffic management measures including changing road layouts at intersections.

Associated traffic nuisance effects including noise, vibration, dust and fumes are assessed in the noise and air quality chapters of this report (Chapters 16 and 17, respectively).

The Construction Traffic Management Plan (CTMP) also provides the framework for how any construction traffic effects will be managed. The final methodology will be determined by the contractor appointed to undertake the works, and the CTMP expanded to reflect the adopted methodology.

13.7.1 Actual and potential effects on local roads

The locations where construction activities are likely to affect operating traffic conditions on the existing road networks are:

- Southern tie-in at Linden;
- Kenepuru Drive;
- Waitangirua Link Road (Warspite Avenue);
- Whitby Link Road (James Cook Drive);
- SH58 Interchange;
- Paekakariki Hill Road;
- MacKays Crossing; and
- Takapu Road.

13.7.1.1 Southern tie- in at Linden

At Linden, the majority of the works would be completed offline (i.e. away from the existing highway). However, the tie-in between the Main Alignment and the existing SH1 would need to be carefully managed and programmed. Some works will require operations in, or over, existing traffic lanes, such as the installation of bridge beams. To facilitate this, the CTMP will include measures to manage effects, such as closures of lanes or potentially closure of directions of travel (i.e. complete closure of the north or southbound lanes). All closures would generally be scheduled to occur at night or during other periods of low demand. Where appropriate, signed diversion routes over local roads would be put in place to direct traffic through the affected areas. The management of construction works would require speed restrictions to be put in place to allow for the narrower lanes, which may lead to some reduction in capacity.

13.7.1.2 Kenepuru Drive

At the connection to Kenepuru Drive, vehicle, pedestrian and cycle access would need to be maintained at all times along with property access. This may involve lane narrowing and construction of temporary footways, traffic lanes and property accesses as required. Speed restrictions will be put in place to improve safety for road users using the narrower lanes which may lead to some reduction in capacity. Temporary Traffic Management (TTM) Plans would be developed to minimise impacts or mitigate the effects of the traffic management.

13.7.1.3 Waitangirua Link Road (Warspite Avenue)

The connection to Warspite Avenue would be managed in a similar way to that described for the Kenepuru Drive. Due to the residential nature of this area, it is unlikely that night works would be able to be conducted. Therefore, construction works which requires the closure of the road will be carefully planned for alternating flow (stop / go) operations to be implemented without causing any significant delays. The low traffic volumes on Warspite Avenue outside peak periods will minimise adverse effects.

13.7.1.4 Whitby Link Road

The connection to James Cook Drive / Navigation Drive will be managed in a similar way to that described for the Waitangirua Link above.

13.7.1.5 SH58 Interchange

At the Interchange of SH58 and the Main Alignment, the majority of works will be undertaken offline with traffic lanes moved in stages to allow for construction. Site access points will be installed providing access to the works and the nearby site compound as appropriate. Construction of bridge structures will be staged with traffic diverted over, or around, the construction site.

13.7.1.6 MacKays Crossing

At MacKays Crossing the majority of works will be undertaken offline although the works required to construct the tie- in into the existing State highway will require careful temporary traffic management. This is particularly important given that overnight volumes on the existing SH1 and Paekakariki Hill Road (especially trucks) can be significant and no practical diversionary route is available.

13.7.1.7 Takapu Road

At Takapu Road site access points will be used for up to three years. Maintenance and, in some cases, upgrades, of the existing alignment will be required to accommodate the additional vehicle movements safely.

13.7.2 Site offices and longer term construction access locations

When the construction method developed further, the exact location of construction site offices will be confirmed through the process of finalising the CEMP and the SSEMPs.

The main site compound will be located at Lanes Flat as discussed previously. In addition to the main site compound, three indicative satellite site compound locations have been identified at:

- approximately 8,500m on the Main Alignment, to the north of BHFFP;
- approximately 11,500m on the Main Alignment, accessed from Paekakariki Hill Road; and
- approximately 27,000m on the Main Alignment, accessed from the end of Little Collins Street.

Construction traffic accessing each site has the potential to generate adverse effects, in the form of nuisance effects associated with increased traffic, congestion, queuing around the access points and increased degradation of the local road surface. Options to reduce, or better manage, construction traffic numbers are set out in the CTMP and include carpooling and minibuses for worker transport, active management of shift changeovers, awareness of, and planning around traffic peak periods including school hours. Mitigation measures are set out further in the sections below.

The effect of light and heavy vehicles travelling to and from site offices will be minor, and is able to be accommodated within the existing road network.

In some locations there are specific traffic management requirements which would need to be implemented through the CTMP, namely:

- Paekakariki Hill Road;
- Ranui Heights; and
- Takapu Road.

13.7.2.1 Paekakariki Hill Road

Paekakariki Hill Road would provide light and heavy commercial vehicle (HCV) access to the proposed site office at 548 Paekakariki Hill Road, which is located along the Main Alignment corridor. This Road would provide access to the northern sections of the Project towards the Wainui Saddle, while also providing convenient access to SH58 as a key arterial.

The construction traffic generated by the Project represents an increase of approximately 30% in overall traffic volume during the peak hour (an increase in the order of 140-150 vehicles per day). The volumes are still low and well within the capacity of the road corridor, even considering the narrow and geometrically constrained nature of Paekakariki Hill Road. In order to manage the effects created by the increase in heavy vehicle numbers during the peak period, through consultation with PCC, consideration will be given to implementing road safety improvements along Paekakariki Hill Road to enhance movement of heavy vehicles. Overall, while there would be a large increase in traffic movement, with the planned safety improvements and other traffic management measures being put in place, the effects are likely to be no more than minor.

13.7.2.2 Ranui Heights

Ranui Heights would provide access to the southern end of the Project area for work crews and to the Kenepuru Interchange (via Awatea Street, Apple Terrace and Ribbonwood Terrace) for up to 12 months. Given that these roads are residential, it is recommended that minibuses are used extensively to provide access at this location to reduce potential amenity effects from up to 200 light vehicles using this access route on a daily basis. With a maximum of 20 minibus trips required, this number of movements would have little effect on road safety and amenity. If vehicle numbers are managed through the use of minibuses, the combined effects of light and heavy vehicles using this access are considered to be no more than minor (in the order of 30 vehicles per day).

13.7.2.3 Takapu Road

This Road would provide access to the Cannons Creek Bridge and adjacent sections of the Project. An upper end estimate of 90 light vehicles (if minibuses were not used) and 55 heavy commercial vehicle (HCV) movements could be expected to use Takapu Road between the site access and SH1 on a 'peak day' when all deliveries would be arriving on site at the peak of construction. Typically, the number of vehicles expected to use this route during a 'normal' construction day would be 75 light vehicles (without minibus use) and 10 HCV movements. A peak demand of 25 HCVs over an eight hour day would be fewer than seven HCVs every hour.

The indicative number of vehicles envisaged would not be out of character for a road of this type, which is regularly used by Transpower to access the Takapu Road substation and GWRC to access the Wellington bulk water main within Belmont Regional Park. However, a more detailed review of the use of the road should be completed with WCC in the detailed design phase of the project. Overall, the combined effect of light vehicles and HCVs using this access are considered to be no more than minor.

13.8 Measures to avoid, remedy or mitigate actual and potential adverse traffic and transport effects

The traffic and transport assessment identified a range of significant benefits arising from the operation of the Project. There will be some minor adverse effects associated with the Project, primarily of a temporary or short term nature during construction. The following section outlines the measures which have been identified to avoid, remedy or mitigate actual and potential adverse traffic and transportation effects.

13.8.1 Managing potential traffic effects during construction

During construction, there will be effects from construction traffic using local roads for access. The specific routes and locations that may be affected (depending on the chosen construction methodology) have been identified and assessed.

13.8.1.1 Construction Traffic Management Plan (CTMP)

In all cases, potential effects will be managed using a CTMP, supported by a number of Site Specific Traffic Management Plans (SSTMPs) which will be produced on a case by case basis.

The proposed designation conditions set out the requirements for construction traffic management, and the required contents for the CTMP. A draft CTMP has been prepared for this application (refer to Volume 5) and it sets out the procedures, and objectives required to produce SSTMPs and to manage the actual and potential effects of construction traffic. It details the standards to be adhered to, identifies the objectives in developing SSTMPs and the issues that must be considered, and how the effects of traffic management methods, and construction traffic on local roads could be managed. Key team members' roles and responsibilities are also included.

The CTMP details the following methods for the delivery of Temporary Traffic Management (TTM) during the construction of the Project:

- Compliance with the Code of Practice for Temporary Traffic Management (COPTTM), where practicable. A method for situations where non-compliance or departures from the standard are required is set out in the CTMP.
- Focus on leading industry standards with regard to TTM and safety.
- Minimise disruption on the State highways and local roads, wherever practicable.
- Limit, where possible, the number of construction vehicle trips on local roads and obtain access from arterial roads and State highways.
- Maintain existing flows and travel times on State highways and local roads adjacent to the work site, where practicable.
- Minimise the impact of works on vulnerable road users such as pedestrians and cyclists.
- Minimise the effects of construction traffic on local roads used for access.
- Minimise the impact of construction parking.

- Develop SSTMPs having consideration for all key stakeholders i.e. residents, GWRC, WCC, PCC and KCDC, emergency services etc.
- Identify all issues and have a planned SSTMP submitted and approved to the applicable local authority and the NZTA's network management consultant at least five days before implementation is required.
- Provide effective communication to affected parties.
- Implement TTM that provides stakeholders with exceptional service in terms of functionality and clarity of direction of travel through roadwork sites.

These objectives would be achieved through implementation of the CTMP, which will manage construction effects. It should be noted that construction dust and noise would be managed throughout the construction process. While some reference is made to these issues in the CTMP, their management is dealt with primarily in the Construction Noise and Vibration Management Plan (CNVMP) and the Construction Air Quality Management Plan (CAQMP).

13.8.1.2 Other methods to manage adverse effects from construction traffic

A summary of the actual and potential effects and methods to avoid, remedy or mitigate effects from construction traffic is provided in Table 13.5.

Table 13.5: Proposed methods to manage construction traffic effects

Potential effect	Method to avoid, remedy or mitigate potential effect
Rubbernecking, reduction in capacity on existing roads, increasing travel times and, in some cases reducing inter-regional travel for short periods of time.	• Screens can be installed to avoid rubbernecking from passing motorists. • For road capacity reduction activities, the timing of these would be targeted to low flow conditions. Where road closures take place targeted communication of these closures and diversions would be undertaken.
Construction traffic on local residential roads leads to potential amenity and safety concerns especially through Pauatahanui Village	• Construct alternative access ways where required and practicable. • Use minibuses for access and manage noise and air quality through appropriate management plans to address amenity concerns. • Restrict heavy vehicle movements to avoid school drop off and pick up times. • Minor safety improvements implemented where required. For example to Paekakariki Hill Road such as improved delineation, temporary speed restrictions through Pauatahanui Village, curve easing, inter-visibility improvements etc. • Restrict heavy vehicle access at the intersection of SH1 and Paekakariki Hill Road due to safety deficiencies (visibility and geometric alignment). • Develop a maintenance intervention strategy with Road Controlling Authority (RCA).
Increased construction traffic movements of both light vehicles and heavier vehicles are likely to have adverse amenity and safety effects on local roads.	• Implement a CTMP, • Control construction vehicle movements – for example time of day, day of week etc. Use of the Main Alignment as early as possible for construction vehicles, • Provide controls for traffic movements around shift start / finish

Potential effect	Method to avoid, remedy or mitigate potential effect
	to avoid intensive traffic movement periods, including using mini buses to get workers travelling through to construction sites, • Upgrade some local roads to accommodate construction traffic, • Minor safety improvements / upgrades to local roads in key locations (in consultation with RCA).
Construction traffic may cause shoulder or road closures.	• Use CTMP to manage traffic, alternative routes and communication.
Construction traffic may cause damage to local roads.	• Carry out a condition survey of local roads which will be used for access prior to commencement and post-commencement. Work with the relevant RCA to identify any necessary repairs prior to the completion of construction contract(s).
Disruption to regional cycle and pedestrian networks during construction, including at MacKays Crossing, SH58 and Kenepuru Drive.	• During construction, provide temporary safe and convenient alternative route for cyclists and pedestrians, which are well sign-posted.
Potential for disruption to pedestrian movements along Warspite Avenue	• During construction, provide temporary safe and convenient alternative route for Warspite Avenue pedestrians, which are well sign-posted.

13.8.2 Managing operational traffic effects

The Project will have significant traffic and transport related benefits to the overall transport network. There are some minor actual and potential adverse effects that may arise from the operation of the network which will require management. These are outlined in Table 13.6.

Table 13.6: Methods to manage operational traffic effects

Identified effect	Method to avoid, remedy or mitigate potential effect
Significant increase in traffic volumes using Kenepuru Drive (between the Kenepuru Link Road and Raiha Street) could result in adverse safety and access effects and potential effects on travel times.	• Some form of upgrade to part of Kenepuru Drive is likely to be required to manage safety and capacity issues from the predicted increased traffic along Kenepuru Drive. Detailed design of the Kenepuru Link Road / Kenepuru Drive intersection will consider this. This will need to be undertaken in consultation with the PCC as the road controlling authority.
Reduced safety and amenity of the regional cycle network around the tie-ins / intersections including at MacKays Crossing, SH58 and Kenepuru Drive.	The detailed design phase would need to address this by including: • detailing pedestrian and cycle tie-ins at SH58 and MacKays Crossing • detailed design of a cycle lane (or separated cycle path) will need to be provided for 50m either side of Kenepuru Drive roundabout on the western side.
Loss of pedestrian and cyclist amenity around Collins Avenue replacement bridge.	• Requirement for informal pedestrian path between Raroa Terrace and Collins Avenue to be formalised and vested with WCC.