Technical Report 32

Assessment of Transport Effects

Revision History

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Document Acceptance

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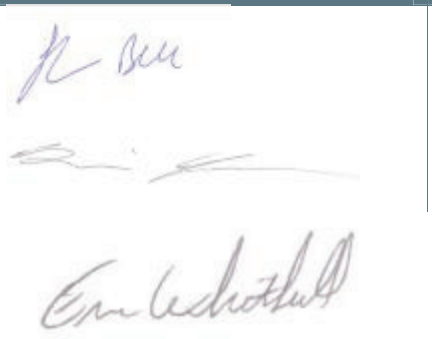
Prepared by	Graham Bell, Brian Wolfman, Eric Whitfield, Reena Solanki		17 February 2012
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on behalf of	Beca Infrastructure Ltd		

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Appendices

1. Executive Summary

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCAs) to construct, operate and maintain an Expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

The MacKays to Peka Peka Expressway route has been identified as one of eight sections within the Wellington Northern Corridor (State Highway 1 from Levin to the Wellington Airport) which is an identified "Road of National Significance" (RoNS) in terms of the 2009 Government Policy Statement. The upgrading of the Wellington Northern Corridor and the other six RoNS across the country are to be substantially progressed in the next 10 years.

The MacKay's to Peka Peka Project team[1] has been commissioned by the NZTA to undertake a Transport Assessment to assess the potential effects of the works to be undertaken for the Project. This will inform the Assessment of Environmental Effects (AEE) for the Project and any transport evidence presented at a Board of Inquiry.

This report considers the transportation effects of the Project once it is operational. The transportation effects during construction of the Project are documented separately.

There are a number of technical reports which support and inform this Transport Assessment. These reports will be provided separately as part of the AEE. The other transport reports include:

- The *Traffic Modelling Report* (Technical Report 34, Volume 3);
- The *Assessment of Temporary Traffic Effects* (Technical Report 33, Volume 3); and
- The *Construction Traffic Management Plan* (Appendix O of the CEMP, Volume 4).

The MacKays to Peka Peka Expressway Project will provide significant transport infrastructure that forms an integral part of the Wellington Road of National Significance. The proposed Expressway is predicted to significantly improve travel times for through traffic between MacKays Crossing and Peka Peka, reducing the travel time in 2026 by seven minutes in the weekday morning peak (southbound) and over ten minutes in the weekday evening peak (northbound).. The provision of the proposed Expressway will also generally provide travel time savings for freight vehicles. The overall network will operate with significantly improved travel times, relieving congestion and facilitating planned growth within the Kāpiti District.

[1] This Technical Report refers to the Project team as carrying out works on behalf of and as contracted by the NZTA. The NZTA is the requiring authority and the consent holder.

The Project Objectives and *Guiding Objectives for the Project Alliance Board* are detailed in the AEE. This transportation assessment has found that the proposed Expressway Project will be consistent with the Project Objectives and the *Guiding Objectives* in that:

- The Project is predicted to enhance efficiency and journey time reliability;
- The Project balances inter-regional and local traffic movements. The proposed Expressway provides significant benefits for through traffic and local traffic movements, including freight vehicle movements;
- The proposed Expressway will operate at Level of Service B in 2026;
- The overall network operates to significantly improve travel times with the proposed Expressway in place;
- The Project significantly reduces the volume of traffic on SH1. In Waikanae town centre this enables a reduction in congestion;
- Most existing local road crossings are maintained by the Project. The eastern end of Leinster Avenue will be closed by the Project, however alternative access is provided to Leinster Avenue via Poplar Avenue;
- The Project improves network resilience by providing a second crossing of the Waikanae River;
- Intersections between the Expressway and the local road network will operate at Level of Service C or better in 2026; and
- The Project has been designed to minimise adverse effects on adjoining properties.

This transport assessment identified some likely or possible negative effects of the Project on the transport system, for which mitigation measures have been developed. In summary, the mitigation measures or further design proposed includes:

- Further design work is necessary to develop pedestrian and cycle connections to the local road network, including further design of the dedicated walkway / cycleway;
- The proposed Expressway affects existing bus stops on Kāpiti Road and at Peka Peka. Further design work is necessary to develop suitable alternative locations for these bus stops;
- It is recommended that traffic calming measures are considered for Park Avenue to mitigate any adverse effects generated by the increase in traffic volumes as a result of the Project; and
- Further design work is necessary to develop alternative access to properties whose existing access is affected by the Project.

Overall it is considered that this transportation assessment demonstrates that the proposed Project and identified mitigation measures will be consistent with the transport-related Project Objectives. Furthermore, it is also considered that this proposed Project and identified mitigation measures will be consistent with the transport-related Guiding Objectives for the Project Alliance Board.

2. Introduction

2.1. Background

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCAs) to construct, operate and maintain an Expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

The MacKays to Peka Peka Expressway route[2] has been identified as one of eight sections within the Wellington Northern Corridor (State Highway 1 from Levin to the Wellington Airport, shown in **Figure 1.1**) which is an identified "Road of National Significance" (RoNS) in terms of the 2009 Government Policy Statement[3]. The upgrading of the Wellington Northern Corridor and the other six RoNS across the country are to be substantially progressed in the next 10 years.

The Project is a proposal of national significance and has been lodged with the Environmental Protection Authority. The NZTA is to request that the Minister for the Environment makes a direction that the Project be referred to a Board of Inquiry.

Figure 1.1: Wellington Northern Corridor

[2] Route refers to the overall corridor of land between MacKays Crossing and Peka Peka

[3] Government Policy Statement on Land Transport Funding 2009/2010-2018/2019, and GPS2012.

The MacKays to Peka Peka Project team has been commissioned by the NZTA to undertake a Transport Assessment to assess the potential effects of the works to be undertaken for the Project. This will inform the Assessment of Environmental Effects (AEE) for the Project and any transport evidence presented at a Board of Inquiry.

2.2. Assessment Approach and Report Structure

The preparation of this Transport Assessment has taken account of the NZTA *Integrated Transport Assessment Guidelines November 2010*.

For the purpose of reporting, the description of the Project has been divided into sectors of "common environment" or community interest for consistency with other specialist reports prepared for the AEE. The location of these Sectors can be seen in **Figure 1.2**.

The assessment of transport effects has been considered as a whole, rather than sector by sector, as the transportation system functions as a network and the assessment can be more readily reported in this way. In general, the description of the Project and the assessment of effects is reported from south to north. A location diagram of the study area is contained in **Figure 1.2**.

This report considers the transportation effects of the Project once it is operational. The transportation effects during construction of the Project are documented separately.

The structure of this report is as follows:

- Section 2 provides a description of the existing transportation environment;
- Section 3 references the Project description (which is described in full in the AEE);
- Section 4 describes the transportation assessment methodology and assessment matters;
- Section 5 provides the operational assessment of transport effects;
- Section 6 describes the results of sensitivity testing; and
- Section 7 provides the assessment conclusions.

2.3. Other Transport Reports

There are a number of technical reports which support and inform this Transport Assessment. These reports will be provided separately as part of the AEE. The other transport reports include:

- The *Traffic Modelling Report* (Technical Report 34, Volume 3);
- The *Assessment of Temporary Traffic Effects* (Technical Report 33, Volume 3); and
- The *Construction Traffic Management Plan* (Appendix O of the CEMP, Volume 4).

Figure 1.2: Location Diagram

3. Existing Transport Environment

This chapter describes the existing transport environment, in terms of the pedestrian and cycle network, the public transport system, the road network and its operation. It also describes the expected future network (excluding the Project), in terms of planned improvements to the network and the predicted future traffic growth and performance of the road network.

3.1. Pedestrian and Cycle Facilities

This section discusses the current pedestrian and cycle facilities provided within the area surrounding the Project. An overview of the existing facilities across the Project area is provided, followed by more detailed consideration of the facilities along the current SH1 and local roads in the vicinity of the proposed Expressway alignment. Potential future facilities are discussed in **Section 5.1.**

3.1.1. Pedestrian and Cycle Routes

Kāpiti Coast District Council (KCDC) has published the *Coastal Cycleway Guide*[4] which indicates the cycling routes generally between Paekakariki and Peka Peka. A copy of this guide is included in **Appendix 32.A**.

The *Coastal Cycleway Guide* notes a number of cycle routes including the Coastal Cycle Route, which runs from Paekakariki through to Peka Peka, generally along residential streets and also through Queen Elizabeth Park and along the Waikanae River. The proposed Expressway does not cross the Coast Cycle Route.

As shown in the *Sustainable Transport Strategy* Network Hierarchy (discussed further in **Section 4.2.4** and contained in **Appendix 32.B**) there are two existing key cycle routes which are both crossed by the proposed Expressway:

a. Wharemakau Trail

The Wharemakau Trail follows the Wharemakau Stream. It provides a pedestrian and cycle route connecting Raumati Village to Rimu Road in Paraparaumu. The location of the Wharemakau Trail is shown in **Appendix 32.B**.

b. Waikanae River Trail

The Waikanae River Trail is a popular pedestrian and cycle route connecting Waikanae to Waikanae Beach and Otaihanga to Waikanae. It runs along both sides of the Waikanae River.

[4] http://Kāpiticoast.govt.nz/Documents/Downloads/Kāpiti-Coast-District-Coastal-Cycleway-Guide.pdf

There are two pedestrian/cycle bridges across the Waikanae River: one at Otaihanga Domain and another near Jim Cooke Park. The location of the Waikanae River Trail is shown in **Appendix 32.B**.

3.1.2. Pedestrian / Cycle Facilities on SH1

There are currently no cycle lanes on the existing SH1 between MacKays Crossing and Peka Peka. Cyclists ride in the shoulder, where available. The Paraparaumu rail overbridge and the Waikanae River bridge are particular pinch points for cyclists, as both bridges are very narrow and cyclists are effectively forced to ride in the traffic lane.

Footpaths, generally separated from the road carriageway by kerb or berm, are provided along various sections of the existing SH1, especially where it travels through urban and suburban areas. There are footpaths along the following sections of SH1:

- West side of SH1 from Leinster Avenue to approximately 400m north of Leinster Avenue;
- West side of SH1 just north and south of Ihakara Street;
- West side of SH1 from the McDonald's carpark (south of Coastlands) to the Coastlands driveway, including a separate pedestrian bridge over the Wharamaukau Stream;
- A pedestrian underpass from Coastlands to the Paraparaumu rail station;
- Generally along the east and west sides from the Kāpiti Lights shopping complex to the Paraparaumu rail overbridge;
- Along the southeast side of the Paraparaumu rail bridge. On the north side of the bridge pedestrians are directed under the State Highway and along Buckley Grove;
- East and west side of SH1 from Hinemoa Street to Rimutaka Street;
- West side of SH1 from Rimutaka Street to Ventnor Drive;
- West side of SH1 from just south of Te Moana Road to Elizabeth Street in Waikanae;
- East and west sides of SH1 through Waikanae town centre, from Elizabeth Street north to Ngaio Road. On the east side pedestrians can access the Waikanae rail station; and
- West side from Ngaio Road to Hemi Street.

3.1.3. Pedestrian / Cycle Facilities Adjacent to Project Route

This section describes the existing pedestrian and cycle facilities on local roads in the vicinity of proposed Expressway interchanges.

c. Poplar Avenue

On the north side of Poplar Avenue, there is an off-road gravelled path for use by pedestrians and cyclists, which runs for approximately 100 metres east and west of Te Ra School. To the west it connects to a formed footpath which extends to Matai Road and to the east connects it to a footpath which runs to Leinster Avenue, although there is no footpath to the east of Leinster Avenue. There

is no footpath on the south side of Poplar Avenue and there are currently no cycle lanes on Poplar Avenue.

d. Kāpiti Road

On Kāpiti Road in the vicinity of the proposed Expressway corridor there is a footpath and an on-road cycle lane on the north side and a shared use pedestrian/cycle way on the south side. These facilities provide pedestrian and cycle connections from the Paraparaumu town centre / Coastlands area to Paraparaumu Beach.

e. Te Moana Road

In the vicinity of the proposed Expressway, on the north side of Te Moana Road there is a footpath separated from the edge of seal by a grassed berm (approximately 2.5 metres wide). This footpath connects to other footpaths along Te Moana Road away from the proposed Expressway corridor and provides a pedestrian connection from Waikanae town centre to Waikanae Beach. There is no footpath on the south side of Te Moana Road and no cycle lanes.

f. Peka Peka Road and Hadfield Road

There are no footpaths or cycle lanes on Peka Peka Road or Hadfield Road in the vicinity of SH1 or the Expressway area.

3.1.4. Pedestrian and Cycle Movements

Pedestrian and cycle counts were undertaken by the Project team at four locations in the study area on 14 June 2011:

- Kāpiti Road where crossed by the proposed Expressway;
- Te Moana Road where crossed by the proposed Expressway;
- Wharemakau Trail; and
- Waikanae River crossing at Otaihanga Domain.

The Kāpiti Road and Te Moana Road counts were undertaken to gain an understanding of the pedestrian and cycle movements at the location of the proposed Expressway interchanges. The Wharemakau Trail and Waikanae River crossing counts were undertaken to gain an understanding of the pedestrian and cycle movements on these key routes.

The surveys were undertaken during the following weekday periods to capture the school peaks:

- 7:30 to 9:30am; and
- 1:30 to 4:30pm.

The results of the survey are summarised in **Table 3.1**. The survey results can be found in **Appendix 32.C**.

Location	Pedestrians		Cyclists	
	7:30-9:30am	1:30 to 4:30pm	7:30-9:30am	1:30 to 4:30pm
Kāpiti Road at proposed Interchange	45	66	20	24
Te Moana Road at proposed Interchange	8	23	34	38
Wharemakau Trail at Expressway corridor	16	50	13	13
Waikanae River Crossing – Otaihanga Domain	12	68	90	107

Table 3.1: Results of Pedestrian and Cycle Counts

The results of the survey indicate that there is a reasonable volume of pedestrians and cyclists which travel along Kāpiti Road and Te Moana Road through the proposed Expressway interchange locations. The surveys also show that the Wharemakau Trail and Waikanae River Trail are well utilised especially in the weekday afternoon.

3.2. Public Transport

The Kāpiti Coast District is well serviced by public transport with rail and bus services. **Figure**[5] **3.2** shows the bus and rail network services which operate in the Project area.

[5] Source: Greater Wellington Regional Council's public transport website: www.metlink.org.nz

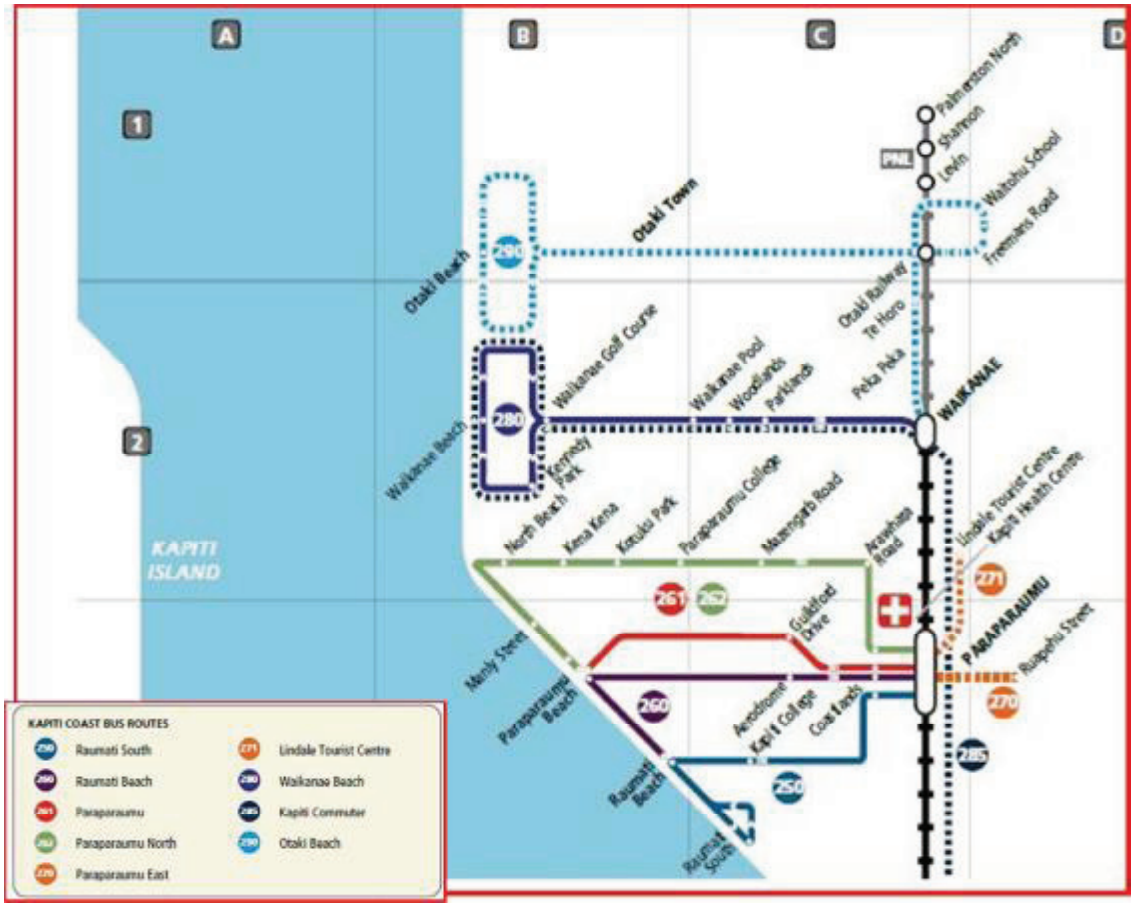


Figure 3.2: Project Area Public Transport Network Map

KCDC's future public transport strategy is discussed in **Section 4.2.5**. The following sections outline the existing public transport services provided within the Project area.

3.2.1.Rail

The North Island Main Trunk (NIMT) rail line runs north-south through the Kāpiti Coast District. Within the Project area there are rail stations at Paraparaumu and Waikanae. The Project area is well serviced by passenger rail services. A major capital works upgrade Project including double tracking and rail station upgrades has been completed over the last five years. GWRC's TranzMetro service provides numerous rail services to Wellington and at these stations generally the following frequencies:

- 20-25 minutes during the weekday peak periods;
- 30 minutes during the off peak;
- 60 minutes in late evening and night (between 7pm and 12am); and
- 30 minutes during the weekend.

In the weekday morning (am) and evening (pm) peak periods, the service operates as an express service (no stops between Porirua and Wellington). In the off peak and weekends, the service generally operates on a 30 minute frequency stopping at all stations on the line.

There are also two services run by TranzScenic which serve the Project area:

- The Capital Connection; and
- The Overlander.

The Capital Connection is a commuter rail service running once daily between Palmerston North and Wellington (southbound in the weekday am peak and northbound in the weekday pm peak). Within the Project area it stops at both Paraparaumu and Waikanae. The Overlander runs daily between Wellington and Auckland and within the Project area stops at Paraparaumu rail station.

a. Paraparaumu Rail Station

Paraparaumu rail station is located on the eastern side of SH1, south of the Kāpiti Road level crossing and is bounded to the east by Hinemoa and Epiha Streets. Free parking is provided for the Park and Ride facilities at Paraparaumu rail station. Car parks are accessed via Hinemoa Street off Kāpiti Road and Ruapehu Street.

Paraparaumu station is well served by bus services, with a bus terminal located immediately to the west of the station in a dedicated drop off/ pick up area on the eastern side of SH1. From the bus terminal, it is possible to access the majority of bus services that are provided within the Kāpiti District, along with services to Hawke's Bay, Auckland and Wellington.

b. Waikanae Rail Station

The recently upgraded Waikanae rail station is located on the eastern side of SH1, approximately 55km from Wellington. Free parking is provided for the Park and Ride facilities on the west side of the station and are accessed directly from SH1. Unrestricted on-street parking is also available on Pehi Kupa Street, accessed via Elizabeth Street. Bus Route 280 connects Waikanae rail station to Waikanae and Waikanae Beach suburbs.

3.2.2. Buses

There is a network of bus services on the Kāpiti Coast, as illustrated in **Figure 2.1**, including the following routes:

- Routes 250 and 260: Raumati Beach to Paraparaumu Rail Station;
- Routes 261 and 262: Paraparaumu Beach to Paraparaumu Rail Station;
- Route 270: Paraparaumu East to Paraparaumu Rail Station;
- Route 271: Lindale Shuttle to Paraparaumu Rail Station;
- Route 280: Waikanae to Waikanae Rail Station; and

- Route 290: to Waikanae Rail Station.

Roads which carry public transport routes are shown in **Figure 2.2**. The bus services are generally scheduled to meet trains at Paraparaumu and Waikanae rail stations. Bus services generally run at 20 – 25 minute frequencies during the peak periods, and on weekends and off peak the bus routes operate on a one hour frequency.

Bus route 250 crosses the proposed Expressway corridor on Raumati Road. Routes 260, 261, and 262 cross the proposed Expressway corridor on Kāpiti Road. Route 280 crosses the proposed Expressway corridor on Te Moana Road. Routes 270, 271 and 290 do not cross the proposed Expressway corridor.

Prior to the extension of the rail service to Waikanae, there was a regular bus route which connected Waikanae to Paraparaumu. Following the extension of the rail service to Waikanae, this bus route was terminated. Public transport trips between Waikanae and Paraparaumu now must be made by rail, with a transfer to local Waikanae or Paraparaumu bus routes depending on the origin/destination. For example, a public transport trip from Waikanae Beach to Paraparaumu will include a bus journey to the Waikanae rail station, a rail journey to the Paraparaumu rail station, and potentially a Paraparaumu bus journey depending on the destination of the traveller.

a. Bus Stops

i. Kāpiti Road

There are two bus stop locations on Kāpiti Road in the vicinity of the Expressway corridor:

- East of Milne Drive; and
- West of Arawhata Road.

ii. Peka Peka

There is a bus stop at the intersection of Peka Peka Road with SH1. This bus stop is used by bus route 290 which travels between Ōtaki and Waikanae.

3.3. Road Network

3.3.1. Road Layout and Hierarchy

The road network layout and hierarchy is shown on **Figure 3.2**.

SH1 is the only continuous north-south arterial between MacKays Crossing and Peka Peka. SH1 is also the only road crossing of the Waikanae River: there is no alternative route for local traffic to use between Waikanae and Paraparaumu.

SH1 provides a high degree of local connectivity, with numerous local road intersections and driveways between MacKays Crossing and Peka Peka. A number of roads which are classified as secondary arterials intersect SH1, including:

- Poplar Avenue;
- Raumati Road;
- Ihakara Street;
- Kāpiti Road;
- Otaihanga Road;
- Te Moana Road;
- Elizabeth Street; and
- Ngaio Road

All of these roads are east-west links. There is currently no local north-south arterial link through the district. The absence of an alternative north-south local arterial, combined with a significant amount of local access directly onto SH1, contributes to a significant amount of local traffic on SH1. At the Waikanae River crossing approximately 70% of traffic is “local” traffic. In this sense, SH1 performs a local road function which erodes its ability to effectively perform its role as a mover of through traffic and freight.

Figure 3.2: KCDC Road Hierarchy Plan

3.3.2. Existing Road Network

The following sections describe the existing road environment within the Project area, including an overview of the State Highway network, as well as the local roads in the vicinity of the Project corridor.

b. State Highway 1

The existing SH1 between MacKays Crossing and Peka Peka traverses mostly flat terrain and passes through a variety of both rural and urban environments. SH1 provides a high degree of local connectivity with numerous local road intersections and property accesses over the Project area length.

SH1 is the only continuous north-south arterial between MacKays Crossing and Peka Peka and it is the only road crossing of the Waikanae River. The absence of a north-south local arterial, the significant amount of local access from SH1, and the single crossing of the Waikanae River contribute to a significant amount of local traffic on SH1. At the Waikanae River Crossing, only around 30% of traffic on SH1 is "through traffic" (vehicles travelling on SH1 between MacKays Crossing and Peka Peka without starting or stopping their journey in between).

The following sections describe the existing road environment on SH1.

i. MacKays Crossing to Poplar Avenue (RP1023/7.240 to RP1023/3.612)[6]

Between MacKays Crossing and Poplar Avenue, SH1 is a four-lane median divided highway with a 100kph speed limit. Through this area SH1 is bounded by the NIMT on the east side and Queen Elizabeth Park on the west side. Until recently there was one local road intersection along this stretch of SH1 at Waterfall Road. The Waterfall Road intersection was closed in January 2011, and access to Waterfall Road is now provided from SH1 via the MacKays Crossing Interchange and Emerald Glen Road extension.

ii. Poplar Avenue to Ihakara Street (RP 1023/3.612 to RP1023/1.380)

From Poplar Avenue to Ihakara Street, SH1 remains 100kph and passes alongside the Raumati South community. It continues to be bounded by the NIMT on the east side.

At Poplar Avenue, the two northbound lanes merge into one lane. Between Poplar Avenue and Ihakara Street, SH1 has two southbound lanes and one northbound lane. On the west side, SH1 provides access to a number of residential and commercial properties, as well as the intersections with Poplar Avenue, Leinster Avenue, Raumati Road, and Ihakara Street.

[6] State Highway Route Positing reference system

iii. Ihakara Street to Ventnor Drive (RP1023/1.380 to RP1012/10.250)

At Ihakara Street, SH1 enters the Paraparaumu urban area. The posted speed limit drops to 70kph near Ihakara Street and again to 50kph near the entrance to the Coastlands shopping centre.

A second northbound lane starts approximately 300 metres north of Ihakara Street, resulting in SH1 being four lanes wide (undivided). Two access points to the Coastlands shopping mall are provided, including one left out only intersection at the northern end of Coastlands. Access points are also provided to fast food stores such as Burger King and McDonald's. Approximately 100 metres south of Kāpiti Road, a left-in / left-out only access to / from SH1 northbound is provided to the Kāpiti Lights shopping centre. On the southbound side of SH1, a left-in / left-out only access is provided to the Paraparaumu rail station.

Just north of the signalised intersection with Kāpiti Road, SH1 reduces to one lane in each direction with a 50kph speed limit. Through the Paraparaumu urban area (generally between Kāpiti Road and Ruahine Street) SH1 provides direct access to many private properties. The SH1 rail overbridge (highway over rail) is between Amohia Street and Buckley Grove. The overbridge and approaches are particularly narrow with little or no shoulders and a poor geometry. There is a footpath on the south side of the bridge.

North of the intersection with Ruahine Street, SH1 traverses the Ventnor Drive grade-separated intersection which provides access to the Lindale tourist centre and the Nikau Valley.

iv. Ventnor Drive to Otaihanga Road (RP1012/10.250 to RP1012/8.172)

At Ventnor Drive, SH1 leaves the Paraparaumu urban area and the surrounding land use environment has a more rural character. The posted speed limit increases to 80kph. SH1 provides access to a number of rural residential properties along this stretch. There is a stop-controlled intersection at Otaihanga Road, where SH1 curves to/from the northeast.

v. Otaihanga Road to Waikanae River Bridge (RP1012/8.172 to RP1012/5.160)

North of Otaihanga Road, SH1 increases to 100kph speed limit and then widens to four lanes to accommodate a passing lane in each direction. A number of rural residential properties are accessed via SH1 in this area. Just south of Kebbell Drive, the passing lanes end and SH1 resumes as a two-lane highway. SH1 passes under the rail overbridge (rail over highway) just south of the Waikanae River bridge.

vi. Waikanae River Bridge to Hemi Street (RP1012/5.160 to RP1012/3.810)

At the north end of the Waikanae River Bridge, SH1 reduces to 70kph and then again to 50kph as it enters Waikanae Town Centre. Here SH1 again runs alongside the NIMT, which is along the eastern side of SH1. There are two signalised intersections in Waikanae, one with Te Moana Road

and another with Elizabeth Street. Between the two roads, SH1 is five lanes wide to accommodate two lanes in each direction with a centre right turn lane / median.

On-street parking is accommodated on the west side of SH1. On the east side, north of Elizabeth Street, SH1 provides vehicular access to the recently upgraded Waikanae rail station.

North of the priority-controlled intersection with Ngaio Road, SH1 reduces to two lanes (one lane in each direction with a centre flush median). Approximate 80 metres north of Ngaio Road is the priority-controlled access to the New Work supermarket on the west side of SH1. The speed limit increases to 70kph around Martin Street. At Hemi Street, SH1 leaves the Waikanae urban area and the posted speed limit increases to 100kph.

vii. Hemi Street to Peka Peka Road (RP1012/3.810 to RS1012)

Between Hemi Street and Peka Peka Road, SH1 is a 100kph two-lane (one lane in each direction) highway. A southbound passing lane was recently constructed south of Peka Peka Road. The NIMT bounds SH1 on the eastern side, with rural land on the western side of SH1.

c. Crash Records

NZTA's Crash Analysis System (CAS) was interrogated to determine the reported crash history for the five-year period 2006 to 2010 along SH1 from MacKays Crossing to Peka Peka and at each of the key intersections within the Project area on the local road network.

The **Tables 3.2 and 3.3** summarise the reported crash history on SH1 from MacKays Crossing to Peka Peka.

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	2	6	19	48	**75**
2007	1	3	15	68	**87**
2008	0	2	18	54	**74**
2009	0	2	17	66	**85**
2010	1	4	14	73	**92**
TOTAL	**4**	**17**	**83**	**309**	**413**

Table 3.2 - Annual Distribution of Crashes on SH1 MacKays Crossing to Peka Peka

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	44	11%
Straight Road Lost Control/Head On	55	13%
Bend - Lost Control/Head On	41	10%
Rear End/Obstruction	114	28%
Crossing/Turning	145	35%
Pedestrian Crashes	9	2%
Miscellaneous Crashes	5	1%
TOTAL	**413**	**100%**

Table 3.3 - Crash Type SH1 MacKays Crossing to Peka Peka

In the five-year period (2006 to 2010) a total of 413 crashes were reported on SH1 between MacKays Crossing and Peka Peka. Of these, four of the crashes involved fatalities, 17 resulted serious injuries and 89 resulted in minor injuries, with 309 non-injury crashes. One of the fatal crashes occurred at the SH1 / Hadfield Road intersection, near the Peka Peka intersection and involved a vehicle failing to give way turning right into Hadfield Road. Two of the fatalities occurred at midblock locations and involved loss of control or crossing / turning. One of the fatalities involved a pedestrian walking with traffic near Greenhill Road north of Waikanae. The crash report states that the pedestrian appears to have jumped in front of the vehicle's path and was hit.

Of the 17 serious injury crashes, six were lost control type crashes, five occurred while a vehicle was turning or waiting to turn across traffic to the right, and three were head-on type crashes. Others were the result of overtaking, queuing, or turning to the left.

Over half of the minor injury crashes involved right turns, loss of control type crashes, or rear end type crashes. Many other minor injury crashes were over taking, head on or other turning and crossing type crashes.

Of the 413 reported crashes, 43% occurred in urban, 50kph sections of SH1. The remainder occurred in peri-urban or rural 70, 80, or 100kph sections of SH1.

A summary of the CAS crash data is included in **Appendix 32.D**.

d. Local Roads Crossed by Project

There are a number of local existing east-west roads and arterials which are crossed by the Project (or will be connections to the Project). These are, from south to north:

- Poplar Avenue;
- Leinster Avenue;
- Raumati Road;

- Kāpiti Road;
- Mazengarb Road;
- Otaihanga Road;
- Te Moana Road;
- Ngarara Road;
- Smithfield Road; and
- Peka Peka Road.

All of these roads are two lanes (one lane in each direction) with a posted speed limit of 50kph, except for Otaihanga Road which has a posted speed limit of 80kph in the vicinity of the Expressway corridor. Poplar Avenue, Raumati Road, Kāpiti Road, Mazengarb Road, Otaihanga Road and Te Moana Road are classified as "Secondary Arterials" in the KCDC District Plan. Leinster Avenue, Ngarara Road, Smithfield Road, and Peka Peka Road are classified as local roads.

Traffic volumes and pedestrian/cycling facilities on local roads are discussed in separate sections in this report.

3.4. Traffic Flows and Travel Times

3.4.1. Traffic Counts and Profiles

Average Annual Daily Traffic volumes[7] and heavy vehicle per cent for various locations on SH1 from MacKays Crossing to Peka Peka are summarised in **Table 3.4**.

Count Location on SH1	Average Annual Daily Traffic Volume (2010)	Per cent Heavy Vehicles
Marycrest (north of Peka Peka)	16,800	8%
North of Elizabeth Street (Waikanae)	21,500	7%
North of Ihakara Street (Paraparaumu)	25,900	7%
South of MacKays Crossing	25,000	8%

Table 3.4 – Average Annual Daily Traffic Volumes on SH1

Average weekday[8] traffic volumes on Kāpiti Road and Te Moana Road in the vicinity of the proposed interchanges are:

[7] Source: *State Highway Traffic Volume Data Booklet (NZTA) 2006-2010*

- Kāpiti Road: 21,931 vehicles per day, with 4% HCVs; and
- Te Moana Road: 7,429 vehicles per day, with 3% HCVs.

Figure 3.3 shows the average weekday two-way hourly traffic flow profile on SH1 in Paraparaumu and Waikanae, and also on Kāpiti Road and on Te Moana Road.

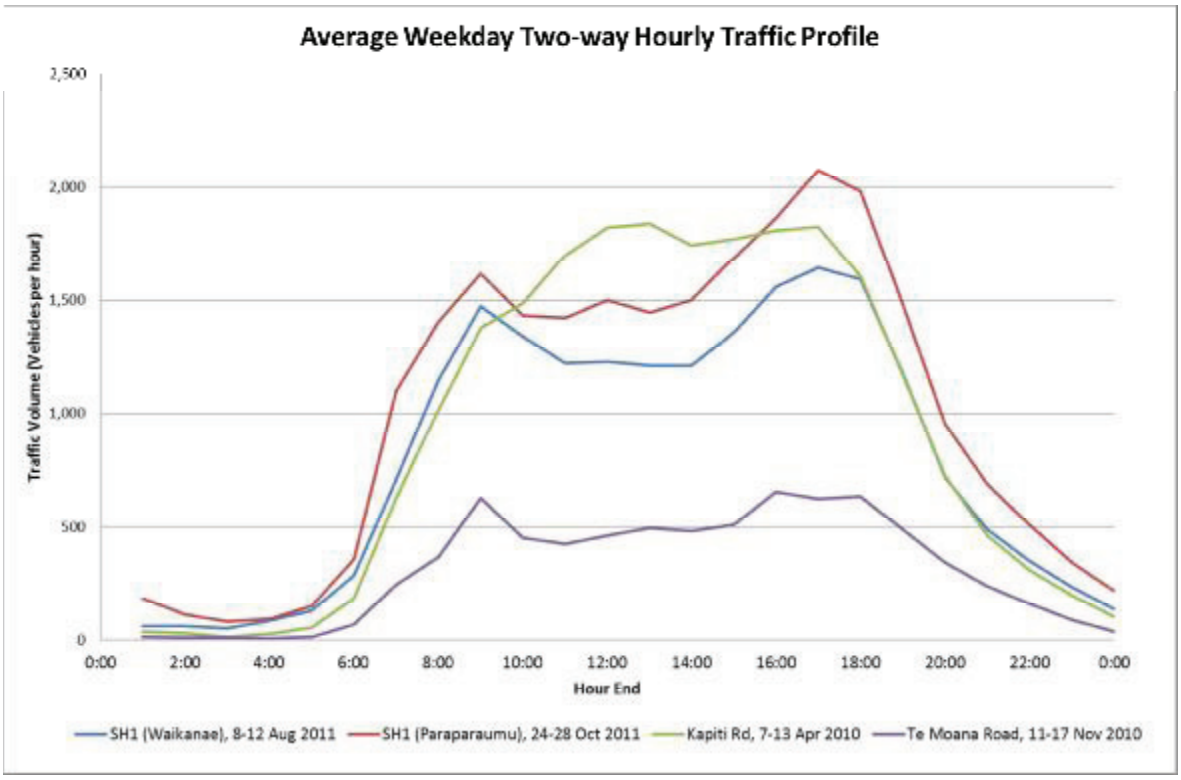


Figure 3.3: Average Weekday Traffic Flow Profile on SH1, Kāpiti Road, and Te Moana Road

For SH1 count sites, the traffic flow profiles clearly show the weekday morning peak and the afternoon peak. The afternoon peak is larger than the morning peak at both locations. The traffic flow profile for Te Moana Road shows both the weekday morning and afternoon peaks. The traffic flow profile for Kāpiti Road shows a different trend in that traffic flows gradually increase during the morning to a high around midday and then stay around that level until approximately 5pm when they begin to decrease.

[8] There is very limited holiday and weekend observed traffic volume information. Due to this limited dataset, the information is likely to be highly variable in terms of quality and quantity by geographical area and is therefore not presented here.

3.4.2. Existing and Future Flows

The following section provides a summary of the modelled traffic flows across the Project area as obtained from the Project assignment model (detailed in Technical Report 34, Volume 3). This provides a comparison of the baseline 2010 traffic flows with the forecast "Do-Minimum" traffic flows (without the Project) in 2016 and 2026.

The daily two-way directional traffic flows on SH1 for 2010 and the 2016 and 2026 forecast future years are shown in **Table 3.5**. A percentage change is shown to compare the traffic growth from 2010 to the future 2016 and 2026 years based on the Do-Minimum models.

Location	2010	2016 DM	2010 - 2016 DM Change	2026 DM	2010 - 2026 DM Change
South of Poplar Ave	22,700	23,000	1%	26,400	16%
South Kāpiti Road	27,000	29,100	8%	31,900	18%
South of Otaihanga Road	22,400	22,700	1%	25,800	15%
South of Te Moana Road	26,900	27,500	2%	31,700	18%
South of Peka Peka Road	17,000	18,100	6%	20,500	21%

Table 3.5: Comparison of 2010 with 2016 and 2026 Daily Flows on SH1 (Vehicles per Day)

As summarised above, there is a limited amount of growth (less than 10%) predicted to occur between 2010 and 2016, with a greater amount of growth (15 – 21%) predicted to occur to the year 2026. This is discussed further in Techical Report 34, Volume 3.

The wider network effects of the growth from 2010 to 2016 and 2026 respectively are shown in **Table 3.6**. This allows the comparison of the impacts on roads of growth over this period and provides the Do-Minimum scenario to assess the impact of the Project during operation. **Table 3.6** shows the changes in daily flow on selected arterial routes.

Location	2010	2016 DM	2010 - 2016 DM Change	2026 DM	2010 - 2026 DM Change
Poplar Ave, East of Matai Rd	2,500	3,000	20%	3,300	32%
Matai Rd, South of Raumati Rd	4,300	4,400	2%	5,900	37%
Raumati Rd, West of Rimu Rd	13,000	15,200	17%	17,800	37%
Rimu Rd, South of Kāpiti Rd	19,600	19,500	-1%	16,100	-18%
Kāpiti Rd, West of SH1	16,200	16,300	1%	18,600	15%
Kāpiti Rd, West of Arawhata Rd	24,900	27,200	9%	29,400	18%
Kāpiti Rd, West of Te Roto Dr	15,600	17,500	12%	20,800	33%

Location	2010	2016 DM	2010 - 2016 DM Change	2026 DM	2010 - 2026 DM Change
Arawhata Rd, North of Kāpiti Rd	7,800	7,800	0%	6,500	-17%
Te Roto Dr, North of Kāpiti Rd	10,300	11,700	14%	12,400	20%
Realm Dr, North of Guildford Dr	2,900	3,200	10%	4,100	41%
Mazengarb Rd, East of Guildford Dr	5,300	6,100	15%	6,200	17%
Ratanui Rd, North of Mazengarb Rd	7,200	7,700	7%	7,800	8%
Otaihanga Rd, West of SH1	6,500	7,300	12%	8,600	32%
Te Moana Rd, West of SH1	10,700	10,600	-1%	13,000	21%
Te Moana Rd, West of Walton Ave	5,200	5,800	12%	8,100	56%
Park Ave, North of Te Moana Rd	1,800	2,900	61%	4,500	150%
Paetawa Rd, South of Peka Peka Rd	900	1,000	11%	1,300	44%
Peka Peka Rd, West of SH1	1,100	1,200	9%	1,300	18%

Table 3.6: Comparison of 2010 with 2016 and 2026 Daily Flows on Selected Local Roads (Vehicles per Day)

The following can be observed from **Table 3.6**:

- Traffic volumes on Kāpiti Road are predicted to increase by 15% west of SH1, 18% west of Arawhata Road, and by 33% west of Te Roto Drive, between 2010 and 2026;
- Traffic volumes on Te Moana Road west of Walton Avenue are predicted to increase by 12% from 2010 to 2016 and then increase by 56% (2010 to 2026). This is primarily due to significant growth planned in the Waikanae North and Ngarara development areas;
- Traffic volumes on Rimu Road are predicted to stay approximately constant to 2016 and then reduce in 2026. The reduction in traffic flow on Rimu Road is due to the inclusion of new local road links in Paraparaumu town centre and also the Ihakara Street Extension in the 2026 model;
- Traffic volumes on Arawhata Road are predicted to stay approximately constant to 2016 and then reduce in 2026, as a result of some vehicles choosing alternative routes to avoid the traffic signals at the Kāpiti Road / Arawhata Road intersection which are in the 2026 traffic model; and
- Traffic volumes on Park Avenue are predicted to increase by 61% by 2016 and by 150% by 2026 (relative to 2010).

3.4.3. Existing and Future Travel Times

The Kāpiti Traffic Model (KTM2), the Project assignment model, was used to derive travel times along three selected routes in the Project area:

- SH1 from MacKays Crossing to Peka Peka Road;
- Kāpiti Road from Ocean Road to Hinemoa Street; and
- Te Moana Road / SH1 / Elizabeth Street from Ruaparaha Street to Winara Ave.

The travel times for the Do-Minimum scenario will later be used to compare with the travel times which result from the completion of the Project. The travel times along these three routes for 2010, 2016 Do-Minimum, and 2026 Do-Minimum are summarised in **Tables 3.7 and 3.8.**

Location	Direction	2010	2016 DM	2026 DM	2010 - 2026 DM Change
SH1: MacKays Crossing to Peka Peka	SB	13.6	13.6	16.4	20%
	NB	13.3	13.5	14.6	10%
Kāpiti Road: Ocean to Hinemoa	EB	5.6	5.8	6.3	13%
	WB	5.9	6.4	6.6	12%
Te Moana Rd / Elizabeth St: Ruaparaha to Winara	WB	6.4	7.1	7.4	15%
	EB	7.0	7.9	8.0	15%

Table 3.7: AM Peak Hour Modelled Travel Times on Selected Routes (min)

Location	Direction	2010	2016 DM	2026 DM	2010 - 2026 DM Change
SH1: MacKays Crossing to Peka Peka	SB	12.1	12.3	12.6	4%
	NB	16.4	16.6	20.2	23%
Kāpiti Road: Ocean to Hinemoa	EB	6.0	6.3	6.8	13%
	WB	6.0	6.6	6.6	10%
Te Moana Rd / Elizabeth St: Ruaparaha to Winara	WB	7.2	7.1	7.7	6%
	EB	7.5	7.4	7.6	1%

Table 3.8: PM Peak Hour Modelled Travel Times on Selected Routes (min)

The modelling is predicting significant travel time increases on SH1 in the peak directions (southbound in the am and northbound in the pm) between 2010 and the 2026 Do-Minimum. Travel times east-west on Kāpiti Road are also expected to increase by approximately 12-15%. The Te Moana Road to Elizabeth Street route is predicted to experience an increase of 1 to 15% in travel time in the westbound direction and 6 to 16% in the eastbound direction.

The Kāpiti Road corridor from Te Roto Drive to Arawhata Road is described separately within the operational model assessment (in **Section 5.3.2**).

Although not directly forecast by the models (which predict average travel times), it is known that travel time variability increases as traffic levels approach the capacity of the network, as expected in this corridor. There is a proven link between congestion and reliability, i.e. in general, reduced congestion results in improved reliability, largely through reductions in Day to Day Variability (DTDV) and vice versa.

3.4.4. Future Road Network

The Do Minimum scenario represents the minimum investment needed in the study corridor to maintain operations and hence represents the 'no Project' case. It is however assumed to include new projects and upgrades outside of the study area, and these assumptions are assumed to be common to both the 'no Project' and 'Project' scenarios.

The proposed changes to the model network from 2011 to 2026 are summarised in **Table 3.9**.

Road Network Change	Description	Comment
Extension of The Drive	Extension of The Drive to Otaihanga Road.	
Ihakara Street extension	Extension of Ihakara Street from its current end point west of Rimu Road, around the Airport to Kāpiti Road	Part of Paraparaumu Airport development.
Paraparaumu Town Centre development links	▪ A new north-south link connecting Kāpiti Road to Ihakara Street. ▪ A new east-west link connecting Rimu Road to the new north-south link above. ▪ Both links to be coded as 30kph to reflect their town-centre purpose.	Kobus Mentz 2010 concept for Paraparaumu Town Centre attached.
Kāpiti Road intersection changes	▪ Roundabout at new Ihakara Street intersection ▪ Roundabout at Langdale intersection with new Airport access. ▪ Traffic signals at Arawhata Road intersection with new Paraparaumu Town Centre access.	In previous version of KTM, the new intersections at Ihakara Street, Langdale Ave, and the Mitre 10 access were coded as traffic signals. However a roundabout was recently constructed at the Mitre 10 access. It is assumed that the intersections west of here will also be constructed as roundabouts.

Table 3.9: Proposed 2026 Do-Min Network Changes

A full description of the Do-Minimum is contained in Technical Report 34, Volume 3.

4. Project Description

A full Project description (Construction & Operation) is contained within Volume 2, Part D of the AEE.

5. Methodology and Assessment Matters

The preparation of this Transport Assessment has taken account of the NZTA *Integrated Transport Assessment Guidelines November 2010*. Based on the NZTA guidance, this Transport Assessment considers the following matters which are specifically relevant to assessing the Project:

- How the Project meets general and specific transport planning and policy objectives including the specific Project objectives;
- The opportunities provided by the Project in contributing to the development of the future transport network; and
- The effects of the operation of the Project on the existing and future transport network, together with the nature and scale of any changes to the transport network required to mitigate these effects.

5.1. Methodology

5.1.1. Traffic Modelling and Traffic Assessment

The development of the traffic modelling methodology is a key element of the assessment of transport effects. The Project follows the hierarchical modelling structure used successfully on other major projects across New Zealand. This involves the following three components:

- A strategic **Demand** model that relates land use (such as population and employment) to travel patterns at a strategic, region-wide level;
- A **Project Assignment** model which has a more refined network in the Project area. This model loads the vehicle trip patterns predicted by the demand model onto the road network to test various options and investigate the traffic effects at a more detailed level; and
- **Operational** models which use micro-simulation (VISSIM) and other intersection analysis packages (SIDRA) to look at traffic operation in even greater detail in the Project area.

The Project assignment and operational models are the subject of Technical Report 34, Volume 3. The Project assignment model provides the traffic volumes for this Transport Assessment. Details of the assumptions used in the strategic demand model are also included in Technical Report 34, Volume 3. The hierarchy of models is required as it is not practical to develop a system in a single model to cover both the strategic demand issues across the region and the detailed local operational effects. This hierarchical system has been used successfully on most major projects across New Zealand and is a common modelling approach.

The strategic demand model is the Wellington Transport Strategy Model (WTSM) developed in the EMME software, which is a well-used and proven platform for this kind of analysis. It was developed and is maintained by Greater Wellington Regional Council (GWRC). It has a base year of 2006 and is updated every five years. It is the WTSM that predicts the overall regional traffic patterns based on the inputs and forecasts of population and employment growth, together with the assumed level of road and public transport infrastructure. This model also predicts how trip making will change in response to a major project, such as the MacKays to Peka Peka Project.

The Project assignment model is the Kāpiti Traffic Model (KTM2) which was developed by the Project team in the SATURN software. The KTM2 represents the road network in greater detail and generally covers the Kāpiti District from MacKays Crossing to north of Ōtaki. The KTM2 was validated to a 2010 base year as detailed in Technical Report 34, Volume 3.

Operational models are used to assess localised issues in more detail than is possible in the Project assignment model. An operational model, a micro-simulation model, has been developed in the VISSIM software package. The VISSIM model covers Kāpiti Road from west of Te Roto Drive to east of Arawhata Road and was developed to assess the operation of the Kāpiti Road Interchange on the neighbouring intersections (Te Roto Drive, Milne Drive, and Arawhata Road).

This operational model obtains travel demands in the form of origin-destination trip tables from the Project assignment model. The trip tables are then loaded as flow rates in the simulation models. Details of the methodology used to develop this operational model are presented in Technical Report 34, Volume 3.

In addition to this operational model, operational models using the SIDRA software have been used to model the operation of the Expressway ramp intersections at Poplar Avenue, Te Moana Road, and Peka Peka Road.

5.1.2. Other Transport Considerations

The Transport Assessment also considers the potential effects of the Project on other modes of transport including pedestrians, cyclists and public transport, together with the assessment of the potential effects on property access in the vicinity of the Project, as appropriate, relating to the operation of the Project.

The assessment of effects in relation to pedestrians, cyclists and public transport considers the existing and future provision. This will identify the potential for this Project, where appropriate, to assist in delivering opportunities for travel by these transport modes. The effects of the Project within this environment will also be considered and potential mitigation identified, where appropriate.

5.1.3. Other Transport Reports

As discussed earlier there are a number of technical reports which support and inform this Transport Assessment. These reports will be provided separately to the Transport Assessment as part of the AEE. The other transport reports include:

- The *Traffic Modelling Report* (Technical Report 34, Volume 3);
- The *Assessment of Temporary Traffic Effects* (Technical Report 33, Volume 3); and
- The *Construction Traffic Management Plan* (Appendix O of the CEMP, Volume 4).

5.2. Assessment Matters

5.2.1. Project Objectives

The Project Objectives and their relationship with the objectives for the wider RoNS corridor are described in full in the AEE. The Project objectives, for the purpose of section 171 of the Resource Management Act 1991, are:

1. To:

    a) enhance inter-regional and national economic growth and productivity;

    b) enhance efficiency and journey time reliability from, to and through the Kāpiti District, Wellington's CBD, key industrial and employment centres, port, airport and hospital;

    c) enhance safety of travel on SH1;

    d) appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti District to be efficiently accessed;

    by developing and constructing a cost optimised new State Highway alignment to the proposed Expressway standards between MacKays Crossing and Peka Peka.

2. To manage the social, cultural, land use and other environmental impacts of the Project on the Kāpiti District and its communities by avoiding, remedying or mitigating any such effects through route and alignment selection, Expressway design and conditions.

3. To integrate the proposed Expressway into the urban form of Kāpiti District by taking into account current and future planned settlement patterns in route and alignment selection and proposed Expressway design [and conditions].

5.2.2. Guiding Objectives for the Project Alliance Board

The NZTA and KCDC developed a set of objectives specifically for the M2PP Project that are set out in the document *Guiding Objectives for the Alliance Board (Guiding Objectives).* The Guiding Objectives include a number of transportation-related objectives, relating directly to the proposed Expressway, which are listed below.

- (3) **Levels of Service**:
  - (a) the Expressway achieves Level of Service 'B' between MacKays Crossing rail over-bridge and the location of the current intersection of Peka Peka Road and the existing SH1 [during peak periods in the year 2026].
  - (b) Level of Service 'C' is achieved at the intersections between the Expressway and local network [in the year 2026].
  - (c) that the overall network operates to significantly improve travel times.
  - (d) an integrated transport network can operate in a manner which reduces congestion in Waikanae town centre and at the Elizabeth Street level crossing.
- (4) **Connectivity:**
  - (a) All existing and proposed east/west local road, cyclist and pedestrian connections are to be maintained…
  - (b) The Project will maximise connectivity (including grade separated and left on/left off interchanges) to the local network consistent with the Expressway's inter-regional function.
- (5) **Resilience**:
  - (a) The Project will improve network resilience in the event of emergencies.
- (7) **Property Impacts**:
  - (a) The Project is to be designed and constructed in a way that seeks to minimise adverse impacts on adjoining and surrounding properties.

(8) **Local Planning:**

  - (b) …the Project is to include well designed, direct access via the proposed Expressway into and out of Paraparaumu town centre, nearby commercial areas and the airport, consistent with the proposed Expressway's inter-regional function.

5.2.3. National Policy Context

a. Government Policy Statement on Land Transport Funding

The Government Policy Statement on Land Transport Funding (GPS) sets out the Government's priorities for expenditure from the National Land Transport Fund over the next 10 years. It sets out how funding is allocated between activities such as road safety policing, State Highways, local roads and public transport.

Under the Land Transport Management Act 2003 (LTMA):

The vision is that: 'People and freight in New Zealand have access to an affordable, integrated, safe, responsive, and sustainable transport system.'

The vision is supported by five transport objectives:

- ensuring environmental sustainability;
- assisting economic development;
- assisting safety and personal security;
- improving access and mobility; and
- protecting and promoting public health.

5.2.4. Further Requirements

- The NZTA must give effect to the GPS in developing the National Land Transport Programme and take account of the GPS when approving funding for activities;
- Regional Land Transport Strategies must take account of the GPS; and
- Regional Land Transport Programmes must be consistent with the GPS.

The LTMA requires the GPS to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system, and also to the five transport objectives of the LTMA.

The GPS contains a number of short to medium term goals to contribute to economic growth and productivity including:

- Improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation through:
  - improvements in journey time reliability;
  - easing of severe congestion;
  - more efficient freight supply chains;
  - better use of existing transport capacity.
- better access to markets, employment and areas that contribute to economic growth;
- a secure and resilient transport network;
- reductions in deaths and serious injuries as a result of road crashes;
- more transport choices, particularly for those with limited access to a car where appropriate;
- reductions in adverse environmental effects from land transport; and
- contributions to positive health outcomes.

In the GPS, the Government has listed seven initial Roads of National Significance (RoNS) as a statement of national road development priorities. This statement serves as a focus for investment

to achieve economic growth and productivity. The GPS names the RoNS as New Zealand's most essential routes that require significant development to reduce congestion, improve safety and support economic growth. The Wellington Northern Corridor (SH1 from Levin to Wellington Airport) is one of the seven RoNS.

5.2.5. Regional Policy Context

Other key regional documents from a transport planning perspective relating to the Project are outlined below.

b. Regional Land Transport Strategy

The Regional Land Transport Strategy (RLTS) 2010-2040 is a statutory document adopted by GWRC with the NZTA having regard to this document. It is the strategic transport document that guides the development of the region's transport system including public transport, roads, walking, cycling and freight for the next ten years and beyond.

The RLTS provides an overall context for investment in the region's transport network. It forms the basis for identification, selection, and prioritisation of projects and activities by the Regional Transport Committee, sets targets against which the region's transport networks can be monitored, and guides reviews of more detailed transport implementation and corridor plans.

The RLTS has six objectives:

- Assist economic and regional development;
- Assist safety and personal security;
- Improve access, mobility, and reliability;
- Protect and promote public health;
- Ensure environmental sustainability; and
- Ensure that the Regional Transport Programme is affordable for the regional community.

Four Corridor Plans support the RLTS and outline the improvements proposed in each Corridor. The plans enable the Regional Transport Committee to assess the interaction of the Projects with each other and with the existing regional and local network. The four Corridor Plans are:

- Western Corridor Plan (MacKays to Peka Peka is contained in this Corridor);
- Hutt Corridor Plan;
- Wairarapa Corridor Plan; and
- Ngauranga to Airport Corridor Plan.

The RLTS recognises the Wellington Northern Corridor Road of National Significance (RoNS). The RLTS notes that many of the Projects that make up the overall Wellington RoNS programme were developed in the context of the region's Western Corridor Plan 2006 and the Ngauranga to Wellington Airport Corridor Plan 2008[9]. The planned timing of the individual Projects is expected to change from those reported in the corridor plans. The RLTS further notes that the main purpose of several of the RoNS Projects is to ensure quick and reliable through travel. Investigation and design phases of these Projects should include consideration of local connectivity, walking and cycling, as well as local economic issues.

c. Regional Freight Plan (Non-Statutory Document)

In June 2011, GWRC adopted the Regional Freight Plan (RFP). The RFP highlights the importance that freight movement plays in the regional and national economy and notes that there is a direct relationship between freight growth and economic growth. The Wellington region's economy and population is expected to continue to grow at a modest rate, driving an increasing demand for travel and freight movement. The RFP expects freight volumes to double by 2031. The region's transport network will need to accommodate the increased freight traffic demand.

To help cater for the increased freight demand, the RFP includes a number of freight Projects such as:

- The Levin to Wellington Airport Road of National Significance;
- Rail Projects; and
- Travel demand management.

The RFP includes the MacKays to Peka Peka Expressway as a specific Project to be completed as part of the Levin to Wellington Airport Road of National Significance.

5.2.6. Local Context

Key local documents developed by KCDC relating to the Project from a transport planning perspective are outlined below.

d. Sustainable Transport Strategy

In 2008, KCDC published the *Kāpiti Coast: Choosing Futures, Towards a Sustainable Transport System, A Strategy for Managing Transport on the Kāpiti Coast*[10] (Sustainable Transport Strategy). The Sustainable Transport Strategy contains the following Transport Objective for the Kāpiti Coast:

[9] RLTS Page 74, GWRC

[10] http://kapiticoast.govt.nz/Documents/Downloads/Strategies/Sustainable-Transport-Strategy.pdf

"*Within the overall District vision, the primary transport objective for the Kāpiti Coast is to… create a physical transport system that is attractive, affordable, connected, responsive, safe and offers effective mode choice so that it enables people to act in a sustainable way.*"

The Sustainable Transport Strategy identifies that the key features of the KCDC Community Outcomes relevant to transport are:

- Outcome 1: That Kāpiti Coast becomes nationally famous for an extensive walkway, cycleway, and bridleway system…;
- Outcome 2: That the level and quality of access within and between communities is improved;
- Outcome 3: That linkages between Waikanae and Paraparaumu are improved to reduce energy use and travel time;
- Outcome 4: That the District develops a role as a transport hub, including the distribution of freight;
- Outcome 5: That there is improved internal transport access for the labour force;
- Outcome 6: That there is better public transport; and
- Outcome 7: There are extensive access linkages within the District in addition to SH1.

The Sustainable Transport Strategy defines a network hierarchy including for pedestrians and cyclists as well as roads for general traffic. A copy of the network hierarchy is included in **Appendix 32.B**. Roads noted on the network hierarchy which are crossed by the proposed Expressway include:

- Te Moana Road, Raumati Road, and Kāpiti Road, Ihakara Street, Mazengarb Road, and Poplar Avenue. They are defined as: "Major Community Connector Routes". "Major Community Connector Routes" are described as:
  - Connecting suburbs and/or major transport nodes and may include access to regionally significant destinations;
  - Are major entry points from highway to the Coast;
  - Vehicle travel speed addressed on case-by-case basis, can be higher speeds than local/centres streets, but likely to be 70kmh or less;
  - Some will have major traffic volumes; and
  - On-street parking may be discouraged in some areas.
- Peka Peka Road and Otaihanga Road. They are defined as: "Local Community Connectors". "Local Community Connectors" are described as:
  - provides main access routes through suburbs;
  - connects local centres;
  - traffic movement mainly locally generated;
  - significant walkways/cycleways between local centres, schools and employment areas;

- may be some routes with relatively high traffic volumes;
- expect moderate speed.

The Sustainable Transport Strategy also sets out a desired public transport system, illustrated in **Figure 5.2** below.

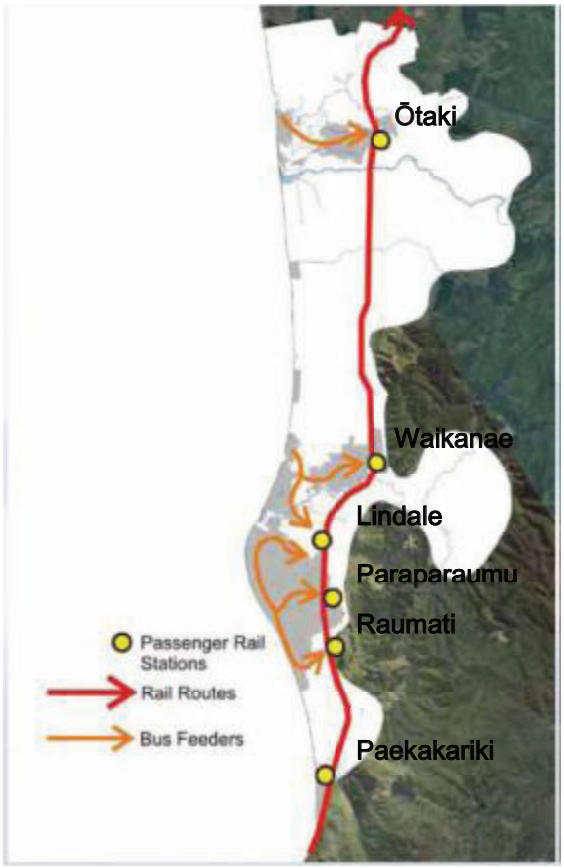


Figure 5.2: Desired Passenger Transport System

Figure 5.2 illustrates a desired passenger transport system, generally based on having a rail system which connects the District to the north and south and supported by a bus system which connects communities to rail stations. As discussed earlier, the passenger rail system was recently extended to Waikanae.

Most of the bus routes shown on the desired passenger transport system diagram in the Sustainable Transport Strategy currently exist. Of particular note is the route shown connecting Waikanae Beach to Paraparaumu along the the existing WLR designation.

e. Cycleways, Walkways, and Bridleways Strategy

In 2009, KCDC adopted its Cycling, Walkways and Bridleways (CWB) Strategy[11] which is an update of the previous 2004 strategy. The vision for the 2009 CWB Strategy is:

"The Kāpiti Coast is renowned for cycling walking and horse riding"

The 2009 CWB Strategy retains the core network features of the 2004 strategy including:

- Good access to the Tararua Ranges;
- A coastal walkway / cycleway from Paekakariki to Ōtaki and north;
- Relatively easy access along the coastal escarpment and lower hills;
- Extensive linkages through built up areas to key natural features e.g. rivers and native bush; and
- Good local linkages to schools and centres.

Figure 5.3 is taken from the CWB Strategy and shows the key elements of the CWB network strategy.

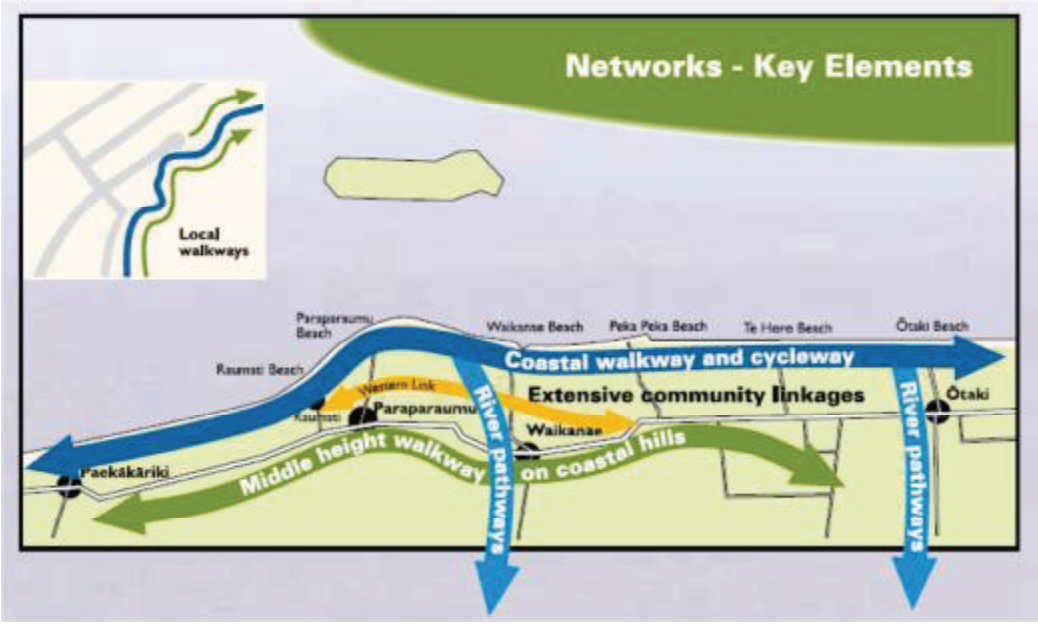


Figure 5.3: Key Elements of CWB Network

The network includes the following key features in the Project area:

- A coastal walkway, cycleway and bridleway from Paekakariki to Ōtaki and north;

[11] http://kapiticoast.govt.nz/Documents/Downloads/Strategies/Cycleways-Walkways-Bridleways-Strategy.pdf

- Extensive linkages to schools, town centres, community facilities, public transport and key natural features;
- Safe access within and across the State Highway and existing WLR designation;
- Relatively easy “middle height” access along the coastal escarpment and lower hills; and
- Good access up into the back country.

In particular, a key element of the CWB Strategy is the establishment of a CWB corridor along the existing WLR designation, of which the proposed Expressway is a part of. The assessment of the Project against these policies and objectives is described in the next section.

6. Operational Assessment of Effects

Based on the NZTA guidelines, this Transport Assessment considers the following matters relevant to assessing the operational effects of the MacKays to Peka Peka Project:

- How the Project meets general and specific transport planning and policy objectives, including the specific Project Objectives and *Guiding Objectives* for the Project Alliance Board;
- The opportunities provided by the Project in contributing to the development of the future transport network as set out in the other relevant regional and local transport planning and policy documents; and
- The effects of the operation of the Project on the existing and future transport network, together with the nature and scale of any changes to the transport network required to mitigate these effects.

The assessment of the operational effects of the Project has been undertaken around the potential effects and opportunities associated with the Project in the currently anticipated year of opening in 2016 and 2026 (ten years after the anticipated opening) in relation to the longer term effects on the transport network operation. An assessment of the Project for the year 2026 is also consistent with the *Guiding Objectives*.

This section details the assessment of the potential operational transport effects of the Project; considering the following potential effects and any necessary measures to mitigate the identified effects:

- Pedestrian and Cycle Assessment;
- Public Transport Assessment;
- Traffic Assessment, including:
  - Project and local area assessments;
  - Operational traffic model assessments; and
  - Property access assessment.

6.1. Pedestrians and Cycle Assessment

The Project objective relevant to the design and provision of walking and cycling facilities as part of the Project is:

- 1(a): appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti District to be efficiently accessed.

The *Guiding Objective* for the Project relevant to the design and provision of walking and cycling facilities as part of the Project is:

- 4(a) All existing and proposed east/west local road, cyclist and pedestrian connections are to be maintained.

The assessment of the effects of the Project in relation to existing and future pedestrian and cycle facilities has been considered in relation to these objectives together with local policy plans for pedestrian and cycle facilities as set out in the KCDC CWB Strategy.

6.1.1. New Walkway / Cycleway / Bridleway

It is proposed to provide a new dedicated facility for pedestrians, cyclists, and horse-riders along the Project corridor from Poplar Avenue to Peka Peka Road. Cyclists are also allowed to ride in the shoulder of the proposed Expressway. It is expected that confident cyclists will choose to ride along the proposed Expressway. The provision of an off-road, dedicated facility is expected to provide a convenient and comfortable alternative to riding on the road and will better cater to recreational cyclists, and pedestrians.

The new walkway / cycleway / bridleway will run along the length of the Project. In most cases the facility will provide at-grade access to local roads crossed by the route. At the Kāpiti Road Interchange, pedestrians and cyclists will be able to cross Kāpiti Road at the new signalised intersections (with the proposed Expressway ramps). Pedestrian crossings and phasing will be provided to accommodate pedestrian movements across Kāpiti Road. Cycle lanes will be provided along Kāpiti Road through the interchange area. At the Waikanae River, a separate bridge will be provided for the facility.

The KCDC CWB Strategy identifies a CWB route along the existing WLR designation. The provision of a walkway / cycleway / bridleway along the Project corridor (generally along the existing WLR designation) is seen to be consistent with the KCDC CWB Strategy and will enhance walking and cycling connectivity between local communities.

As the Project progresses, further design work will be undertaken on the facility and at locations where the facility connects with and crosses local roads. The design work will be consistent with the Project design philosophy statement and relevant design standards.

6.1.2.Key East / West Connections

The Wharemakau Trail will be bridged by the proposed Expressway (Expressway over), maintaining the east-west pedestrian / cycle route and future proofing for the Ihakara Street extension. The Waikanae River Trail will also be crossed by the proposed Expressway (Expressway over) and maintained. Access will be provided to both the Wharemakau Trail and Waikanae River Trail by the proposed new walkway / cycleway / bridleway along the proposed Expressway. East/west pedestrian and cycle facilities will be maintained where the proposed Expressway crosses Raumati Road, Mazengarb Road, and Otaihanga Road.

Additional pedestrian and cycle facilities will be provided at interchanges (where the proposed Expressway intersects with local roads) at Poplar Avenue, Kāpiti Road, Te Moana Road, and Peka Peka Road. These additional facilities are described below.

Figures 6.1 – 6.4 summarise the key proposed pedestrian and cycle facilities at the interchanges.

Along Poplar Avenue a new off road pedestrian and cycleway will be provided from the new walkway / cycleway / bridleway to Leinster Avenue, as shown in **Figure 6.1**. This will result in the provision of a pedestrian and cycle facility where none currently exists.

Figure 6.1: Poplar Avenue Cycle / Pedestrian Facilities

Pedestrian and cycle movements will be accommodated at the Kāpiti Road interchange through provision of signalised pedestrian crossings and cycle lanes, as shown in **Figure 6.2**. The signalised crossings will accommodate north/south movements across Kāpiti Road as well as east/west movements across the interchange ramps.

Figure 6.2: Kāpiti Road Cycle / Pedestrian Facilities

Figures 6.3 and 6.4 show the proposed walkway / cycleway at the interchanges with Te Moana Road and Peka Peka Road. At both of these locations the walkway / cycleway crosses the road adjacent to the interchange roundabout. .

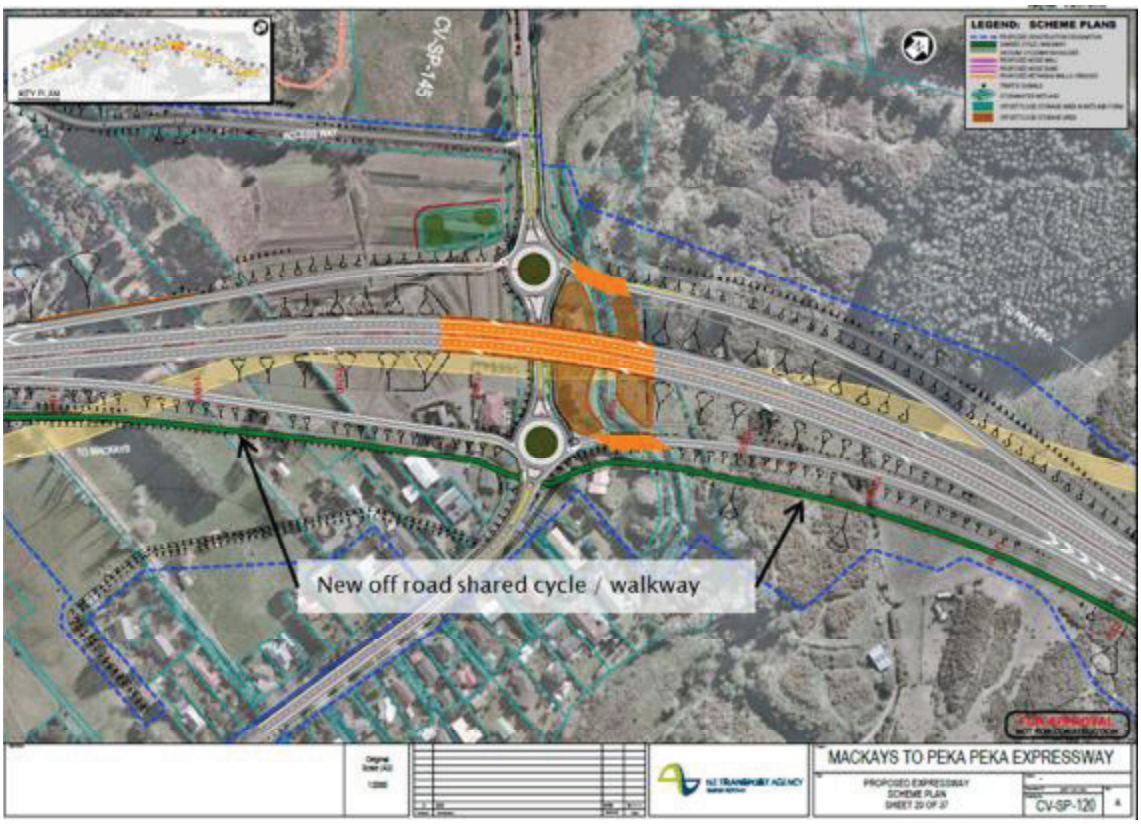


Figure 6.3: Te Moana Cycle / Pedestrian Facilities

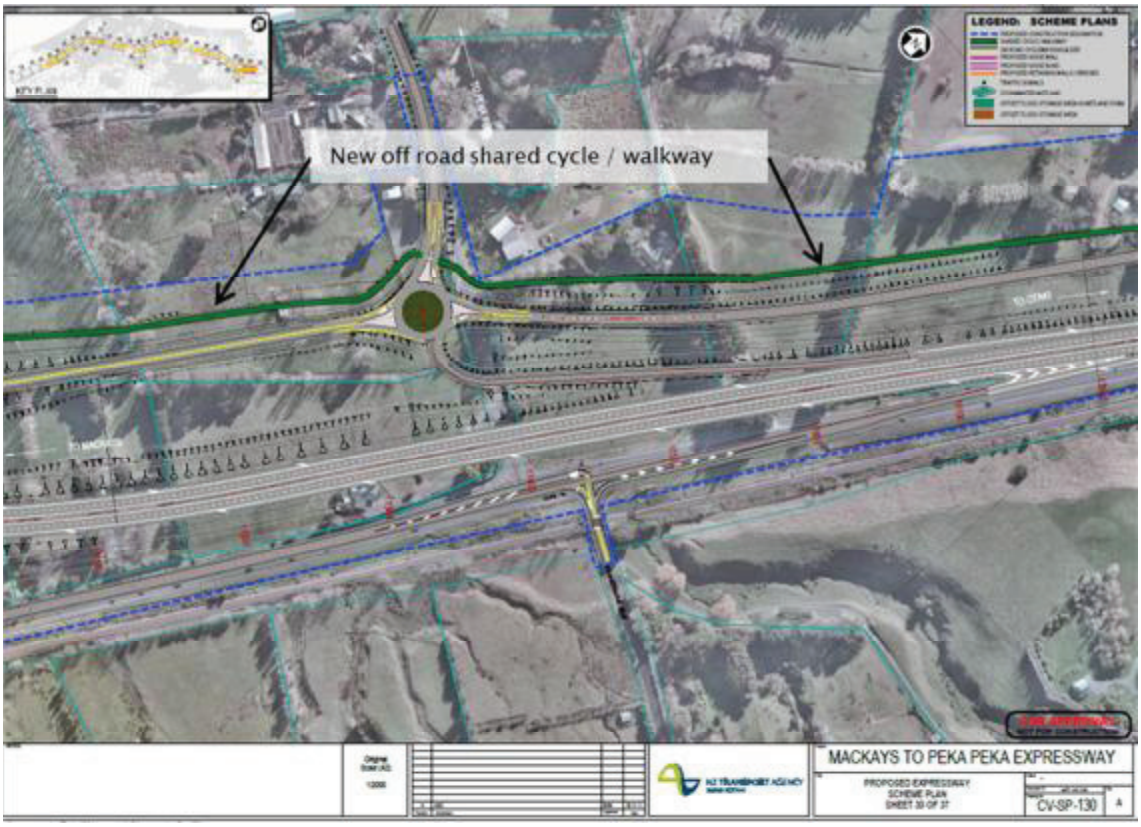


Figure 6.4: Peka Peka Road Cycle / Pedestrian Facilities

6.1.3. Existing SH1

As will be further discussed later in this report, traffic flows on the existing SH1 will reduce significantly with the proposed Expressway in place. This offers an opportunity after the proposed Expressway completion to make changes to the existing SH1 to provide an improved environment for pedestrians and cyclists, as well as other road users, along the route. The development of schemes for changes to the existing SH1 was developed by the Project team as a separate Project, in collaboration with KCDC. It does not form part of the application and assessment. The SH1 Revitalisation Study has informed this transport effects assessment by way of background context.

6.1.4. Summary

The Project will provide a dedicated walkway / cycleway along the proposed Expressway corridor which is seen to be consistent with KCDC's CWB Strategy, the Project Objectives, and the Guiding Objectives, and will enhance connectivity between local communities. Pedestrian and cycle facilities will be provided at each of the proposed Expressway interchanges to facilitate movement through these key movement nodes.

6.2. Public Transport Assessment

The Project objective relevant to the design and provision of public transport facilities as part of the Project is:

- 1(a): appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti District to be efficiently accessed.

The *Guiding Objectives* of the Project relevant to public transport are:

- 3(c) that the overall network operates to significantly improve travel times; and
- 3(d) an integrated transport network can operate in a manner which reduces congestion in Waikanae town centre and at the Elizabeth Street level crossing.

The assessment of the effects of the Project in relation to existing and future public transport facilities has generally been considered in relation to these objectives together with local policy plans for public transport facilities as set out in the KCDC *Sustainable Transport Strategy*.

6.2.1. Travel Times

The modelling undertaken for the Project indicates that the overall road network will experience improvements in travel time. This is discussed further in the traffic assessment and further detailed in Technical Report 34, Volume 3. It is expected that travel time improvements predicted for general traffic will also be experienced by buses operating on the local road network.

6.2.2. Waikanae Town Centre

As discussed later in the report, traffic volumes on the existing SH1 are expected to reduce significantly with the proposed Expressway in place. The significant reduction in traffic volume provides the opportunity to optimise the traffic signals in Waikanae town centre to reduce delays and congestion. It can be expected that the reduction in traffic and congestion in the Waikanae town centre will improve accessibility to the Waikanae rail station. This Project enables possible changes to bus/rail integration and redevelopment of SH1 in Waikanae town centre which are part of a separate Project via the *SH1 Revitalisation Study.*

6.2.3. Waikanae Beach / Paraparaumu Bus Route

It was noted in **Section 4.2.5** that the KCDC Sustainable Transport Strategy identifies a bus route connecting Waikanae Beach to Paraparaumu along the existing WLR designation. The proposed Expressway will provide an opportunity to establish this bus route which does not currently exist.

6.2.4. Bus Stops

The development of the Kāpiti Road Interchange and the Peka Peka interchange will affect the location and operation of existing bus stops. Indicative locations for the relocation of the bus stops on Kāpiti Road and Peka Peka Road are shown in **Figures 6.5 and 6.6** respectively. Further design work regarding the exact locations and specifications for the bus stops will be undertaken in consultation with the bus service providers and KCDC.

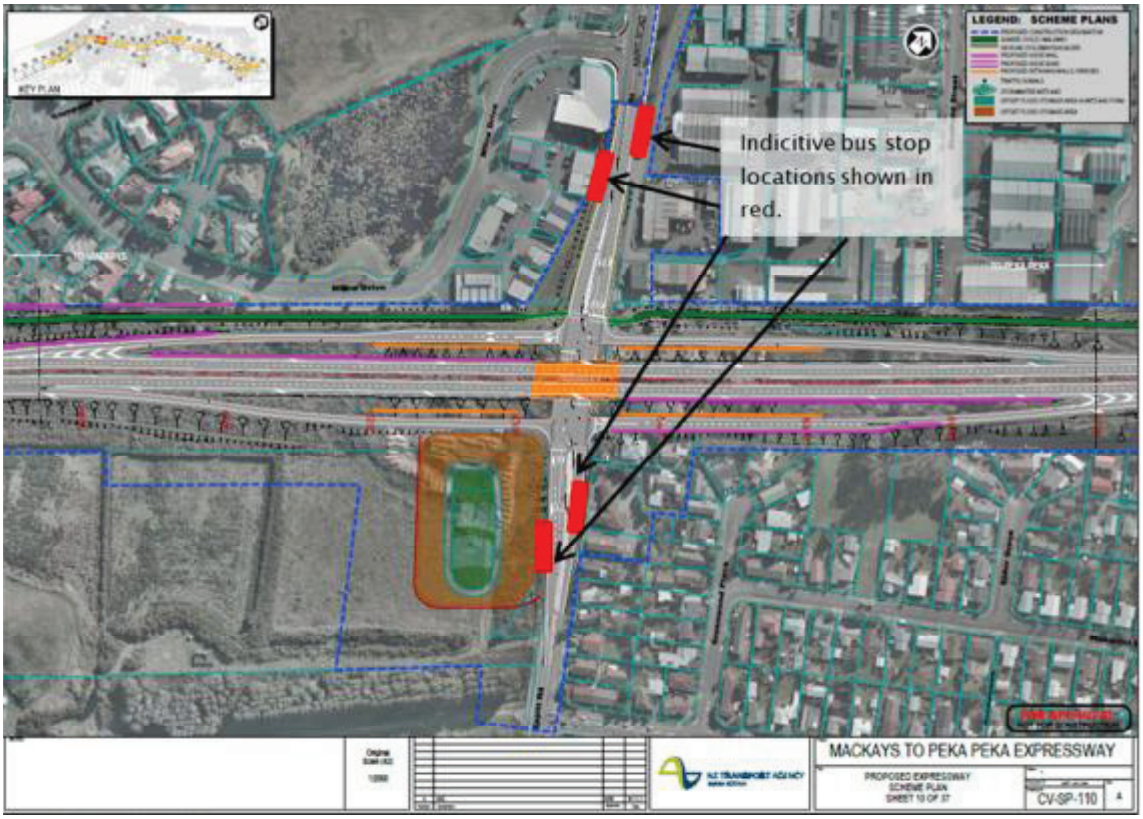


Figure 6.5: Kāpiti Road Indicative Bus Stop Locations

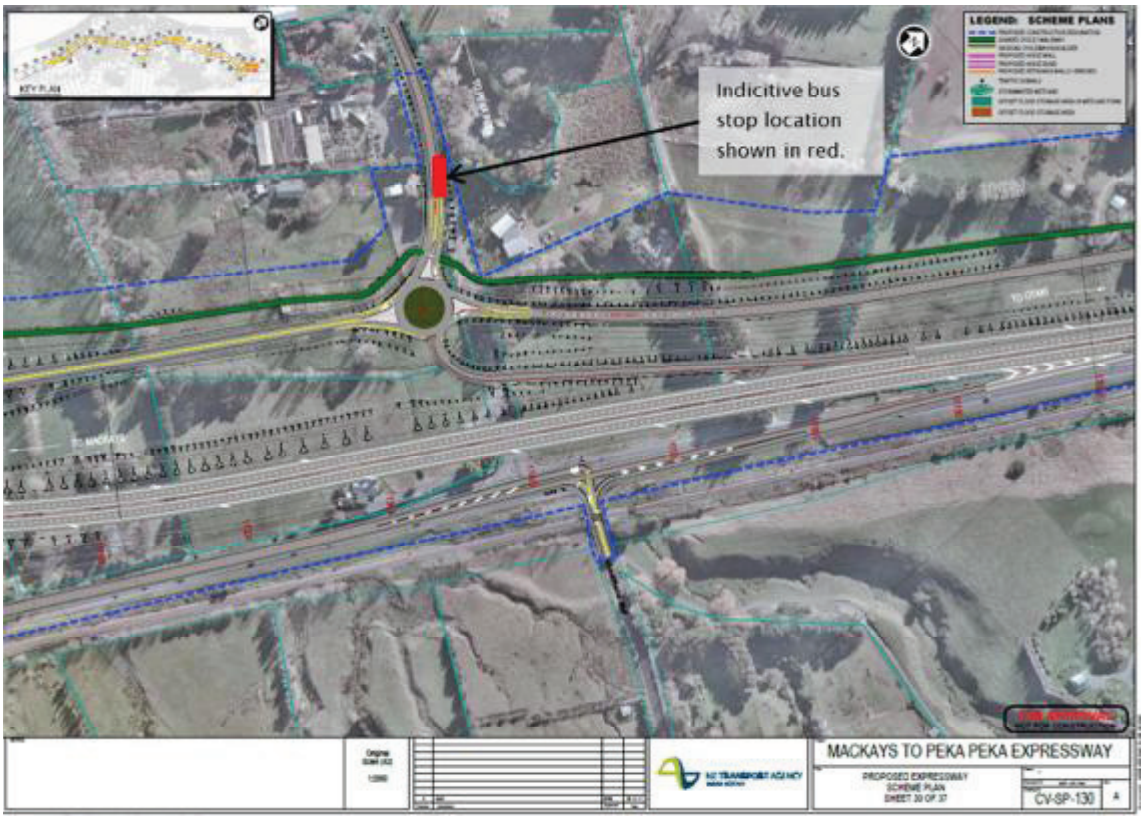


Figure 6.6: Peka Peka Road Indicative Bus Stop Locations

6.2.5. Impact on Overall Demand

Technical Report 34, Volume 3 details the impacts of the Project on public transport. In summary, public transport demand decreases between the Option and Do Minimum by approximately 6 to 7%. At a zonal level the percentage decrease is most pronounced for areas such as Waikanae Beach and Waikanae East as users in these areas have the most to gain from the proposed Expressway in terms of improved highway travel times.

6.2.6. Summary

The provision of the proposed Expressway will result in travel time improvements and journey time reliability across the road network which will also be experienced by buses. The proposed Expressway provides an opportunity to establish a Waikanae Beach to Paraparaumu bus route along the existing WLR designation which is seen to be consistent with KCDC's *Sustainable Transport Strategy*. Indicative bus stop locations have been identified on Kāpiti Road and Peka Peka Road. Further design work regarding the exact locations and specifications for the bus stops will be undertaken in consultation with the bus service providers and KCDC.

The reduced capacity is expected to marginally reduce public transport demands to/from the south, however the Project provides the opportunity to, for example, improve the integration of rail stations into the town centres.

6.3. Traffic Assessment

The Project objectives relevant to the traffic assessment are:

- 1(a) enhance efficiency and journey time reliability from, to and through the Kāpiti District, Wellington's CBD, key industrial and employment centres, port, airport and hospital;
- 1(b) enhance safety of travel on SH1; and
- 1(c) appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti District to be efficiently accessed;

The *Guiding Objectives* of the Project relevant to the traffic assessment are:

- (3) **Levels of Service**:
  - (a) the proposed Expressway achieves Level of Service 'B' between MacKays Crossing rail over-bridge and the location of the current intersection of Peka Peka Road and the existing SH1 [during peak periods in the year 2026].
  - (b) Level of Service 'C' is achieved at the intersections between the proposed Expressway and local network [in the year 2026].
  - (c) that the overall network operates to significantly improve travel times.

- (d) an integrated transport network can operate in a manner which reduces congestion in Waikanae town centre and at Elizabeth Street level crossing.

- (4) **Connectivity:**
  - (a) All existing and proposed east/west local road, cyclist and pedestrian connections are to be maintained…
  - (b) The Project will maximise connectivity (including grade separated and left on/left off interchanges) to the local network consistent with the proposed Expressway's inter-regional function.
- (5) **Resilience**:
  - (a) The Project will improve network resilience in the event of emergencies.

The assessment of the effects of the Project in relation to the existing and future road network has been considered in relation to these objectives, together with the regional and local policy plans, including the Regional Freight Plan. The effects and opportunities in relation to other modes of transport have been discussed above and the effects on the road network associated with the Project discussed below therefore include:

- Project and surrounding area assessments, based on the Project assignment model;
- Operational traffic assessment, based on the VISSIM and SIDRA models; and
- Property access assessment.

The assessment of the traffic effects of the Project is based on the Project assignment and operational models. A more comprehensive description of the modelling methodology, process and the outputs is provided in Technical Report 34, Volume 3. The VISSIM model is used to assess localised issues along Kāpiti Road from Te Roto Drive to Arawhata Road (including the proposed Kāpiti Road interchange) in more detail, during the am and pm peak periods, than is possible in the Project assignment model. SIDRA models are also used to assess the performance of the proposed Expressway ramps intersections with Poplar Avenue, Te Moana Road, and Peka Peka Road.

In relation to the reporting of effects identified by the traffic modelling, it is noted that this considers both the 2016 and 2026 future years. The assessments report both the effects of completion of the Project, the Option (OPT), and without the Project, the Do-Minimum (DM), in these future years.

6.3.1. Project and Surrounding Area Assessments

a. Users of the Expressway

The predicted daily and peak hour volume of the proposed Expressway is summarised in **Tables 6.1 and 6.2**.

Location	Direction	2016	2026	Increase 2016-2026
Expressway South of Poplar Ave	NB	11,800	13,900	18%
	SB	11,200	13,000	16%
Expressway Between Poplar Ave and Kāpiti Rd	NB	6,100	7,100	16%
	SB	6,000	6,800	13%
Expressway Between Kāpiti Rd and Te Moana Rd	NB	8,200	10,300	26%
	SB	8,300	10,500	27%
Expressway Between Te Moana Rd and Peka Peka Rd.	NB	5,400	6,400	19%
	SB	5,200	6,300	21%
Expressway North of Peka Peka Rd	NB	6,900	8,100	17%
	SB	6,600	7,800	18%
Poplar Ave South-Facing Ramps	NB (Off)	5,800	6,800	17%
	SB (On)	5,200	6,200	19%
Kāpiti Rd South Facing Ramps	NB (Off)	2,000	2,400	20%
	SB (On)	1,800	1,900	6%
Kāpiti Rd North Facing Ramps	NB (On)	4,200	5,600	33%
	SB (Off)	4,000	5,600	40%
Te Moana Rd South Facing Ramps	NB (Off)	3,300	4,500	36%
	SB (On)	3,500	4,800	37%
Te Moana Rd North Facing Ramps	NB (On)	530	670	26%
	SB (Off)	400	510	28%
Peka Peka Rd North Facing Ramps	NB (On)	1,500	1,700	13%
	SB (Off)	1,400	1,500	7%

Table 6.1 Daily Users of Expressway

Location	Direction	2016 AM	2016 PM	2026 AM	2026 PM
Expressway South of Poplar Ave	NB	910	1,590	1,100	1,830
	SB	1,200	820	1,440	970
Expressway Between Poplar Ave and Kāpiti Rd	NB	480	780	580	930
	SB	640	420	770	500
Expressway Between Kāpiti Rd and Te Moana Rd	NB	580	810	700	1,060
	SB	830	570	1,200	690
Expressway Between Te Moana Rd and Peka Peka Rd	NB	450	480	550	570
	SB	460	420	630	480
Expressway North of Peka Peka Rd	NB	570	640	700	740
	SB	620	520	820	590
Poplar Ave South-Facing Ramps	NB (Off)	420	800	520	900
	SB (On)	550	400	670	460
Kāpiti Rd South Facing Ramps	NB (Off)	140	360	170	410
	SB (On)	290	100	300	140
Kāpiti Rd North Facing Ramps	NB (On)	230	380	290	550
	SB (Off)	470	250	740	320
Te Moana Rd South Facing Ramps	NB (Off)	170	360	220	540
	SB (On)	420	190	640	250
Te Moana Rd North Facing Ramps	NB (On)	50	40	70	50
	SB (Off)	50	30	70	40
Peka Peka Rd North Facing Ramps	NB (On)	110	150	140	170
	SB (Off)	170	110	200	110

Table 6.2 AM and PM Peak Hour Users of Expressway

From **Table 6.1** and **Table 6.2** the following points can be made:

- The highest daily flow (20,800 vpd) occurs between Kāpiti Road and Te Moana Road intersections; and
- The Poplar Avenue south-facing ramps are the busiest during the day, followed by the Kāpiti Road north-facing ramps.

Further analysis on the predicted users of the proposed Expressway is contained in Technical Report 34, Volume 3. In summary:

- Over 75% of trips have either or both the origin / destination end of their journey north of Peka Peka or south of MacKays Crossing;
- Around 25% of daily users travel between Waikanae and Paraparaumu;
- Around 60% of journeys join / leave at Kāpiti Intersection; and
- Approximately 40% of journeys join / leave at Te Moana intersection.

b. Impacts on Existing SH1

The Project is expected to significantly reduce the volume of traffic using the existing SH1, as summarised in **Table 6.3**.

Location	2010	2016 DM	2016 OPT	2016 DM-2016 OPT Change	2026 DM	2026 OPT	2026 DM-2026 OPT Change
South of Poplar Ave	22,700	23,000	23,100	0%	26,400	26,900	2%
South Kāpiti Rd	27,000	29,100	17,300	-41%	31,900	20,100	-37%
South of Otaihanga Rd	22,400	22,700	12,100	-47%	25,800	13,900	-46%
South of Te Moana Rd	26,900	27,500	14,300	-48%	31,700	17,000	-46%
North of Peka Peka Rd	17,000	18,100	16,600	-8%	20,500	20,700	1%

Table 6.3: Comparison of 2010, 2016 DM and 2026 DM with 2016 OPT and 2026 OPT Daily Flows on SH1 (Vehicles per Day)

With the Project in place, the traffic flows on the existing SH1 are expected to reduce approximately 37% (south of Kāpiti Road) to 46% (south of Otaihanga Road). This is likely to be a function of through traffic transferring to the proposed Expressway and also some local traffic transferring to the proposed Expressway. The significant reduction in traffic on SH1 provides an opportunity to make changes to the existing SH1 as discussed in the *SH1 Revitalisation Study Report*.

Technical Report 34, Volume 3 documents further analysis undertaken at existing key intersections along SH1, including the signalised intersections at Elizabeth Street, Te Moana Road, and Kāpiti Road as well as the priority-controlled intersections at Poplar Avenue, Raumati Road, Ihakara Street, and Otaihanga Road.

The analysis indicated that delays at the Elizabeth Street, Te Moana Road, and Kāpiti Road intersections reduce slightly with limited optimisation of the signals with the KTM2. With the significant reduction in traffic on the existing SH1, it is expected that the intersections could be optimised to provide greater reduction in delay.

The analysis also indicated that the delays at the four priority-controlled intersections reduce significantly with the proposed Expressway in place. This is due to the significant reduction in traffic on SH1, making it easier to find gaps in the traffic flow to turn into and out of these intersections.

Impacts on Local Roads

Table 6.4 summarises 2010, 2016 DM and 2026 DM traffic volumes as well as 2016 OPT and 2026 OPT traffic volumes on selected local roads with the proposed Expressway in place.

Location	2010	2016 DM	2016 OPT	2016 DM-2016 OPT Change	2026 DM	2026 OPT	2026 DM-2026 OPT Change
Poplar Ave, East of Matai Rd	2,500	3,000	3,400	13%	3,300	3,800	15%
Matai Rd, South of Raumati Rd	4,300	4,400	4,000	-9%	5,900	5,300	-10%
Raumati Rd, West of Rimu Rd	13,000	15,200	14,300	-6%	17,800	16,300	-8%
Rimu Rd, South of Kāpiti Rd	19,600	19,500	18,700	-4%	16,100	15,500	-4%
Kāpiti Rd, West of SH1	16,200	16,300	13,500	-17%	18,600	13,700	-26%
Kāpiti Rd, West of Arawhata Rd	24,900	27,200	27,800	2%	29,400	29,700	1%
Kāpiti Rd, West of Te Roto Dr	15,600	17,500	19,100	9%	20,800	22,000	6%
Arawhata Rd, North of Kāpiti Rd	7,800	7,800	7,400	-5%	6,500	6,300	-3%
Te Roto Dr, North of Kāpiti Rd	10,300	11,700	11,300	-3%	12,400	12,200	-2%
Realm Dr, North of Guildford Dr	2,900	3,200	2,600	-19%	4,100	3,400	-17%
Mazengarb Rd, East of Guildford Dr	5,300	6,100	5,800	-5%	6,200	5,700	-8%
Ratanui Rd, North of Mazengarb Rd	7,200	7,700	5,200	-32%	7,800	4,800	-38%
Otaihanga Rd, West of SH1	6,500	7,300	4,800	-34%	8,600	5,500	-36%

Location	2010	2016 DM	2016 OPT	2016 DM-2016 OPT Change	2026 DM	2026 OPT	2026 DM-2026 OPT Change
Te Moana Rd, West of SH1	10,700	10,600	5,500	-48%	13,000	6,200	-52%
Te Moana Rd, West of Walton Ave	5,200	5,800	4,200	-28%	8,100	5,500	-32%
Park Ave, North of Te Moana Rd	1,800	2,900	4,200	45%	4,500	6,200	38%
Paetawa Rd, South of Peka Peka Rd	900	1,000	900	-10%	1,300	1,200	-8%
Peka Peka Rd, West of SH1	1,100	1,200	600	-50%	1,300	700	-46%

Table 6.4: Comparison of 2010, 2016 and 2026 DM with 2016 and 2026 Option Daily Flows on Selected Local Roads (Vehicles per Day)

The Project is predicted to change traffic flows on local roads in a number of ways:

- In many cases traffic volumes on local roads are predicted to decrease as a result of the Project. Kāpiti Road west of SH1, Otaihanga Road, Realm Drive, Ratanui Road, Te Moana Road, and Peka Peka Road west of SH1 are all predicted to significantly decrease in traffic volume as a result of the Project;
- Traffic volumes on Matai Road, Raumati Road, Mazengarb Road, and Paetawa Road are also expected to decrease as a result of the Project;
- Traffic volumes are expected to increase by around 6-9% on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. However as will be discussed in **Section 6.3.2**, the increase in traffic volume is not expected to significantly adversely impact on the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road is expected to experience an increase in traffic of 13-15%. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day, comparing the DM and OPT scenarios, due to the relatively low volume of traffic on Poplar Avenue and will not alter the current nature and character of the road environment, nor cause any significant increase in delay or queuing. As will be discussed in **Section 6.3.2.b**, the Poplar Avenue intersections with the proposed Expressway ramps will operate with an excellent Level of Service and minimal delays and queuing; and
- Traffic volumes on Park Avenue, north of Te Moana Road are predicted to increase by 38% (1,700 vehicles per day) by 2026. This is due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. SIDRA modelling of the intersections of Park Avenue with Te Moana Road and Ngarara Road was undertaken for

the 2026 Do Minimum and with Project scenarios. The modelling indicated there was negligible effect on the Park Avenue / Ngarara Road intersection and that the delays were forecast to reduce on Park Avenue with the Option in place. The SIDRA analysis is contained in **Appendix 32.F**. Based on the SIDRA analysis the increase in traffic is not expected to result in any significant delays or queuing It is recognised that the road environment is primarily residential in character with regular property access and that there could be a perception that the increase in traffic would result in safety problems. It is recommended that NZTA work with KCDC to develop and fund traffic calming measures on Park Avenue following the opening of the Project.

Tables 6.5 and 6.6 compare AM and PM peak hour 2016 DM and 2026 DM traffic volumes with 2016 OPT and 2026 OPT traffic volumes on the same selected local roads.

Location	2016 DM AM Peak	2016 OPT AM Peak	2016 DM-2016 OPT Change	2016 DM PM Peak	2016 OPT PM Peak	2016 DM-2016 OPT Change
Poplar Ave, East of Matai Rd	300	370	23%	310	420	35%
Matai Rd, South of Raumati Rd	370	320	-14%	440	330	-25%
Raumati Rd, West of Rimu Rd	1,410	1,280	-9%	1,350	1,190	-12%
Rimu Rd, South of Kāpiti Rd	1,200	1,120	-7%	1,430	1,400	-2%
Kāpiti Rd, West of SH1	1,200	970	-19%	1,110	840	-24%
Kāpiti Rd, West of Arawhata Rd	1,660	1,670	1%	1,850	1,870	1%
Kāpiti Rd, West of Te Roto Dr	1,070	1,240	16%	1,200	1,370	14%
Arawhata Rd, North of Kāpiti Rd	610	550	-10%	700	700	0%
Te Roto Dr, North of Kāpiti Rd	750	760	1%	730	750	3%
Realm Dr, North of Guildford Dr	230	200	-13%	310	250	-19%
Mazengarb Rd, East of Guildford Dr	690	640	-7%	560	540	-4%

Location	2016 DM AM Peak	2016 OPT AM Peak	2016 DM-2016 OPT Change	2016 DM PM Peak	2016 OPT PM Peak	2016 DM-2016 OPT Change
Ratanui Rd, North of Mazengarb Rd	780	540	-31%	750	530	-29%
Otaihanga Rd, West of SH1	710	470	-34%	730	500	-32%
Te Moana Rd, West of SH1	890	450	-49%	810	400	-51%
Te Moana Rd, West of Walton Ave	500	350	-30%	440	320	-27%
Park Ave, North of Te Moana Rd	280	420	50%	260	390	50%
Paetawa Rd, South of Peka Peka Rd	100	80	-20%	80	80	0%
Peka Peka Rd, West of SH1	110	50	-55%	100	50	-50%

Table 6.5: Comparison of 2016 AM and PM Peak Hour Volumes: DM vs OPT (Vehicles per Hour)

Location	2026 DM AM Peak	2026 OPT AM Peak	2026 DM-2026 OPT Change	2026 DM PM Peak	2026 OPT PM Peak	2026 DM-2026 OPT Change
Poplar Ave, East of Matai Rd	300	440	47%	350	460	31%
Matai Rd, South of Raumati Rd	460	410	-11%	650	450	-31%
Raumati Rd, West of Rimu Rd	1,560	1,420	-9%	1,610	1,370	-15%
Rimu Rd, South of Kāpiti Rd	910	880	-3%	1,170	1,080	-8%
Kāpiti Rd, West of SH1	1,390	990	-29%	1,600	1,010	-37%
Kāpiti Rd, West of Arawhata Rd	1,740	1,740	0%	2,200	2,070	-6%
Kāpiti Rd, West of Te Roto Dr	1,250	1,460	17%	1,560	1,690	8%

Location	2026 DM AM Peak	2026 OPT AM Peak	2026 DM-2026 OPT Change	2026 DM PM Peak	2026 OPT PM Peak	2026 DM-2026 OPT Change
Arawhata Rd, North of Kāpiti Rd	530	420	-21%	570	640	12%
Te Roto Dr, North of Kāpiti Rd	800	800	0%	760	800	5%
Realm Dr, North of Guildford Dr	310	270	-13%	280	290	4%
Mazengarb Rd, East of Guildford Dr	690	590	-14%	440	520	18%
Ratanui Rd, North of Mazengarb Rd	810	460	-43%	520	460	-12%
Otaihanga Rd, West of SH1	890	540	-39%	560	580	4%
Te Moana Rd, West of SH1	1,130	520	-54%	1,020	450	-56%
Te Moana Rd, West of Walton Ave	700	460	-34%	610	430	-30%
Park Ave, North of Te Moana Rd	400	590	48%	430	600	40%
Paetawa Rd, South of Peka Peka Rd	130	100	-23%	110	110	0%
Peka Peka Rd, West of SH1	130	60	-54%	110	60	-45%

Table 6.6: Comparison of 2026 AM and PM Peak Hour Volumes: DM vs OPT (Vehicles per Hour)

The pattern of peak hour traffic changes is broadly similar to the predicted change in daily trends. Predicted traffic volumes with the proposed Expressway in place are still appropriate for the function of a local road. The peak hour flow change again shows an increase in traffic on Park Avenue.

c. Travel Time Savings

Predicted travel time along a number of selected routes was calculated for the Do-Minimum and Option in 2026. The selected routes are:

- Poplar Avenue;
- Kāpiti Road;
- Rimu Road / Mazengarb Road;

- Te Moana Road;
- SH1 – MacKays Crossing to Peka Peka; and
- Expressway – MacKays Crossing to Peka Peka.

The selected routes are illustrated in **Figure 6.7** below.

Figure 6.7: Travel Time Routes

Table 6.7 summarises the AM and PM peak travel times along each of the selected routes in 2026 for both the DM and OPT.

Origin	Direction	Length (km)	DM AM	OPT AM	Absolute Change	% Change	DM PM	OPT PM	Absolute Change	% Change
Expressway	SB	16	-	9.4	-	-	-	9.4	-	-
	NB	16	-	9.4	-	-	-	9.4	-	-
SH1	SB	15	16.4	13.1	-3.3	-20%	12.6	12.8	0.2	2%
	NB	15	14.6	13.3	-1.3	-9%	20.2	13.6	-6.6	-33%
Te Moana Rd	WB	5	7.4	7.1	-0.3	-4%	7.7	7.4	-0.3	-4%
	EB	5	8.0	7.8	-0.2	-3%	7.6	7.7	0.1	1%
Rimu Rd / Mazengarb Rd	EB	6.5	16.8	10.5	-6.3	-38%	16.8	11.2	-5.6	-33%
	WB	6.5	9.2	8.7	-0.5	-5%	10.0	9.4	-0.6	-6%
Kāpiti Rd	EB	3.7	6.3	7.0	0.7	11%	6.8	6.9	0.1	1%
	WB	3.7	6.6	7.3	0.7	11%	6.6	7.3	0.7	11%
Raumati Avenue	EB	5	12.6	6.6	-6.0	-48%	11.1	6.6	-4.5	-41%
	WB	5	6.4	6.2	-0.2	-3%	6.8	6.3	-0.5	-7%
Poplar Avenue	EB	3	12.9	3.3	-9.6	-74%	6.6	3.5	-3.1	-47%
	WB	3	3.1	3.3	0.2	6%	5.4	3.5	-1.9	-35%

Table 6.7: Travel Times on Selected Routes (mins)

From **Table 6.7**, it can be seen that in the am peak the proposed Expressway provides a route that is predicted to be seven minutes faster between Peka Peka and MacKays Crossing compared with the equivalent SH1 route in the Do Minimum in the peak direction. In the PM peak the proposed Expressway provides a route that is over ten minutes faster in the peak direction than the equivalent SH1 corridor, due to congestion within Paraparaumu and Waikanae town centres in the PM peak Do Minimum networks.

The travel time data shows that:

- AM peak travel times along SH1 (southbound) are 20% quicker in the Option than the Do Minimum;
- In the PM peak the northbound SH1 travel time is approximately 7 minutes slower than the northbound travel time in the Option;
- Travel times along Kāpiti Rd increase slightly in the Option, as a result of traffic signals at the Kāpiti Road interchange; and
- Raumati Rd, Poplar Avenue and Rimu Rd/ Mazengarb have improved travel times in the Option compared to the Do Minimum – this is most noticeable in the PM peak.

Further detailed analysis was undertaken to understand the travel time benefits for through traffic and local traffic. The introduction of the Project has an impact on travel times across the network. The effect on travel times between a number of origin and destination sectors were calculated. The travel times for both the Do Minimum and Option can be found in Section 6.7 of the Technical Report 34, Volume 3.

The conclusion that can be drawn from the travel time analysis contained in Technical Report 34, Volume 3 is that the Project provides significant travel time savings for both through traffic on the proposed Expressway and local traffic movements.

d. Heavy Commercial Vehicles

Once completed, it is expected that a significant volume of heavy commercial vehicles (HCVs) will transfer to the proposed Expressway. The expected volume (and per cent) HCVs on the proposed Expressway in 2016 and 2016 is summarised in **Table 6.8.**

Location on Expressway	2016 HCV Volume	2016 Total Traffic Volume	HCV % 2016	2026 HCV Volume	2026 Total Traffic Volume	HCV % 2026
South of Poplar Ave	3,170	23,100	14%	4,640	26,900	17%
Between Poplar and Kāpiti	1,640	12,100	14%	2,190	13,900	16%
Between Kāpiti and Te Moana	1,950	16,600	12%	2,760	20,700	13%
Betweeen Te Moana and Peka Peka	1,760	10,600	17%	2,560	12,700	20%
North of Peka Peka	2,060	13,500	15%	2,930	15,900	18%

Table 6.8: Volume and Per cent Heavy Vehicles on Expressway 2016 and 2026 (Vehicles per Day)

As summarised in **Table 6.8**, of the total traffic the proposed Expressway is predicted to carry, between 12 and 20% will be HCVs. This is consistent with the character of an Expressway and well within its capacity.

The impact of the Project on HCVs on the existing SH1 both in the DM and OPT scenarios in 2016 and 2026 is summarised in **Table 6.9.**

Location on Existing SH1	2016 DM	2016 OPT	2016 DM-OPT Change	2026 DM	2026 OPT	2026 DM-OPT Change
South of Poplar Ave	3,180	3,170	0%	4,650	4,640	0%
South Kāpiti Road	3,250	1,670	-49%	4,100	1,830	-55%
South of Otaihanga Road	2,930	1,210	-59%	3,470	1,300	-63%
South of Te Moana Road	3,050	1,100	-64%	3,960	1,200	-70%
North of Peka Peka Road	2,580	800	-69%	3,470	890	-74%

Table 6.9: Change in Heavy Vehicles on SH1 in 2016 and 2026 (Vehicles per Day)

The Project is expected to significantly reduce the volume of heavy vehicles on SH1.

The impact of the Project on HCVs on other selected local roads is summarised in **Table 6.10**.

Location	2016 DM	2016 OPT	2016 DM-OPT Change	2026 DM	2026 OPT	2026 DM-OPT Change
Poplar Ave, East of Matai Rd	210	220	5%	240	250	4%
Matai Rd, South of Raumati Rd	140	130	-7%	180	170	-6%
Raumati Rd, West of Rimu Rd	780	720	-8%	1,310	1,130	-14%
Rimu Rd, South of Kāpiti Rd	900	840	-7%	700	590	-16%
Kāpiti Rd, West of SH1	1,140	860	-25%	1,710	850	-50%
Kāpiti Rd, West of Arawhata Rd	1,530	1,690	10%	1,900	1,880	-1%
Kāpiti Rd, West of Te Roto Dr	1,000	1,190	19%	1,390	1,870	35%
Arawhata Rd, North of Kāpiti Rd	280	330	18%	260	240	-8%
Te Roto Dr, North of Kāpiti Rd	990	1,020	3%	1,140	1,100	-4%
Realm Dr, North of Guildford Dr	310	240	-23%	440	280	-36%
Mazengarb Rd, East of Guildford Dr	580	480	-17%	840	500	-40%
Ratanui Rd, North of Mazengarb Rd	570	330	-42%	900	290	-68%
Otaihanga Rd, West of SH1	640	400	-38%	1,060	450	-58%
Te Moana Rd, West of SH1	490	250	-49%	560	270	-52%
Te Moana Rd, West of Walton Ave	370	330	-11%	410	370	-10%
Park Ave, North of Te Moana Rd	140	200	43%	150	210	40%
Paetawa Rd, South of Peka Peka Rd	90	110	22%	110	120	9%
Peka Peka Rd, West of SH1	110	50	-55%	130	60	-54%

Table 6.10: Change in Heavy Vehicles on Selected Local Roads in 2016 and 2026 (Vehicles per Day)

The results of the modelling indicate that with the proposed Expressway in place, heavy vehicle volumes on most of these local roads will reduce, many of them significantly. Heavy vehicle volumes are predicted to increase on Kāpiti Road west of Te Roto Drive by around 19-35%. The volume of heavy vehicles is predicted to increase on Park Avenue and Paetawa Road by 60 and 10

vehicles respectively in 2026. This small predicted increase on Park Avenue and Paetawa Road is not expected to adversely impact on the function of these roads.

As discussed earlier, the Wellington Regional Freight Plan expects freight volumes to double by 2031 and includes Projects such as the Levin to Wellington Airport Road of National Significance (of which the Project is part) to help cater for the increased freight demand. It is therefore considered that the implementation of the Project is consistent with the Regional Freight Plan

e. Expressway Level of Service

The *Guiding Objectives* contain a Level of Service target for the proposed Expressway:

> *"3(a) the proposed Expressway achieves Level of Service 'B' between MacKays Crossing rail over-bridge and the location of the current intersection of Peka Peka Road and the existing SH1 [in the year 2026]."*

The Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads Guide) was used to calculate the Level of Service for the proposed Expressway based on the "basic freeway segments". The Austroads criteria are contained in Appendix 32.E.

According to the Austroads Guide, Level of Service B will be achieved if the maximum flow (passenger cars per hour per lane) is less than 1,100 for a facility with a free flow speed of 100kph.

The highest peak hour volume on the proposed Expressway between Poplar Avenue and Peka Peka Road in the 2026 occurs during the am peak, southbound between Kāpiti Road and Te Moana Road, at 1,364 passenger car units (pcus) per hour. This volume is accommodated in two traffic lanes. At 50% of the volume per lane, this would result in 682 pcus per lane, which would be within the criteria for Level of Service B.

The section of the proposed Expressway between MacKays Crossing and Poplar Avenue (which is already four lanes wide) is predicted to carry 1,934 pcus northbound in the pm peak. At 50% of the volume per lane, this would result in 967 pcus per lane, which would be well within the criteria for Level of Service B.

Based on this assessment, it can be readily concluded that the proposed Expressway between MacKays Crossing and Peka Peka will meet the objective of achieving Level of Service B in 2026.

f. Summary

In summary, the key points discussed in the traffic assessment for the Project and surrounding area are:

- The highest daily flow on the proposed Expressway is nearly 20,800 vehicles per day, which occurs between Kāpiti Road and Te Moana Road intersections;

- With the Project in place, the traffic flows on the existing SH1 are expected to reduce approximately 37% to 46%. The delays experienced at priority-controlled intersections such as Poplar Avenue, Raumati Road, and Ihakara Street are predicted to reduce significantly;
- In many cases traffic volumes on local roads are predicted to decrease as a result of the Project;
- Traffic volumes are expected to increase by around 6-9% on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. However as will be discussed in **Section 6.3.2**, the increase in traffic volume is not expected to significantly adversely impact on the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road is expected to experience an increase in traffic of 13-15%. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day, comparing the DM and OPT scenarios, due to the relatively low volume of traffic on Poplar Avenue and will not alter the current nature and character of the road environment, nor cause any significant increase in delay or queuing;
- Traffic volumes on Park Avenue, north of Te Moana Road are predicted to increase by 38% (1,700 vehicles per day) by 2026. This is due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. SIDRA modelling of the intersections of Park Avenue with Te Moana Road and Ngarara Road was undertaken for the 2026 Do Minimum and with Project scenarios. The modelling indicated there was negligible effect on the Park Avenue / Ngarara Road intersection and that the delays were forecast to reduce on Park Avenue with the Option in place. Based on the SIDRA analysis the increase in traffic is not expected to result in any significant delays or queuing It is recognised that the road environment is primarily residential in character with regular property access and that there could be a perception that the increase in traffic would result in safety problems. It is recommended that NZTA work with KCDC to develop and fund traffic calming measures on Park Avenue following the opening of the Project; In the AM peak the proposed Expressway is predicted to reduce the travel time for through traffic in the peak (southbound) direction by seven minutes. In the PM peak the proposed Expressway is predicted to reduce the travel time for through traffic in the peak (northbound) direction by over 10 minutes;
- The travel time analysis contained in Technical Report 34, Volume 3 indicates that the Project provides significant travel time savings for both through traffic on the proposed Expressway and local traffic movements.
- 12-20% of the traffic using the proposed Expressway is predicted to be HCVs, which is consistent with the character of an Expressway and is well within its capacity, and is expected to significantly reduce the volume of HCVs on SH1;
- HCV travel times on the existing SH1 are expected to improve with the proposed Expressway in place;
- HCV volumes are predicted to reduce on many local roads including Te Moana Road. The volume of heavy vehicles is predicted to increase on Park Avenue and Paetawa Road by 60 and

10 vehicles per day respectively in 2026. This small predicted increase on Park Avenue and Pawtawa Road is not expected to adversely impact on the function of these local roads; and

- The proposed Expressway between MacKays Crossing and Peka Peka will meet the objective of achieving Level of Service B in 2026.

Based on the above assessment, it is considered that the Project is consistent with the Project Objectives and Guiding Objectives in that:

- The Project is predicted to enhance efficiency and journey time reliability;
- The Project balances inter-regional and local traffic movements. The proposed Expressway provides significant benefits for through traffic and local traffic movements;
- The proposed Expressway will operate at Level of Service B in 2026;
- The overall network operates to significantly improve travel times with the proposed Expressway in place;
- The Project significantly reduces the volume of traffic on SH1. In Waikanae town centre this enables a reduction in congestion;
- Existing and proposed local road crossings are maintained by the Project; and
- The Project improves network resilience by providing a second crossing of the Waikanae River.

Operational Model Assessments

Operational models have been developed to provide an assessment of the future year traffic effects along the Kāpiti Road corridor between the intersections of Kāpiti Road with Te Roto Drive and Arawhata Road. The performance of the road corridor has been assessed using VISSIM, an industry standard micro-simulation package. Details of the development of the VISSIM model and model outputs are contained in Technical Report 34, Volume 3.

SIDRA models have been developed to model the performance of the Poplar Avenue, Te Moana Road, and Peka Peka Road Interchanges.

g. Summary of VISSIM Modelling

The proposed interchange is a new facility which will be located between closely spaced intersections and therefore detailed operational analysis which considers congestion and queuing from the upstream and downstream intersections is required. Micro-simulation models represent vehicles individually, allowing interaction effects between vehicles and with the road environment such as this to be simulated, and therefore is seen to be highly appropriate for operational assessments of this type of Project.

The assessment identifies the traffic conditions based on a do-minimum (DM) and an option (OPT) scenario for the future years of 2016 and 2026. Road network arrangements and intersection layout details for each of the aforementioned scenarios are listed below:

- **DM 2016.** This scenario retains all existing (2011) intersection layouts and assumes no changes to the road corridor, within the extent of the operational model.
- **DM 2026.** This scenario is as per the 2016 DM network, with the introduction of the Arawhata Road extension which creates a connection between Kāpiti Road and the Paraparaumu town centre. The new Kāpiti Road/Arawhata Road intersection will be signalised.
- **OPT 2016.** The 2016 OPT scenario retains the 2016 DM network, but includes two signalised intersections which connect Kāpiti Road to the proposed Expressway on and off ramps.
- **OPT 2026.** This scenario is as per the 2026 DM scenario, but includes the two signalised Kāpiti Road/ M2PP Expressway ramps intersections.

Figure 6.8 provides a diagrammatical representation of the differences between each scenario.

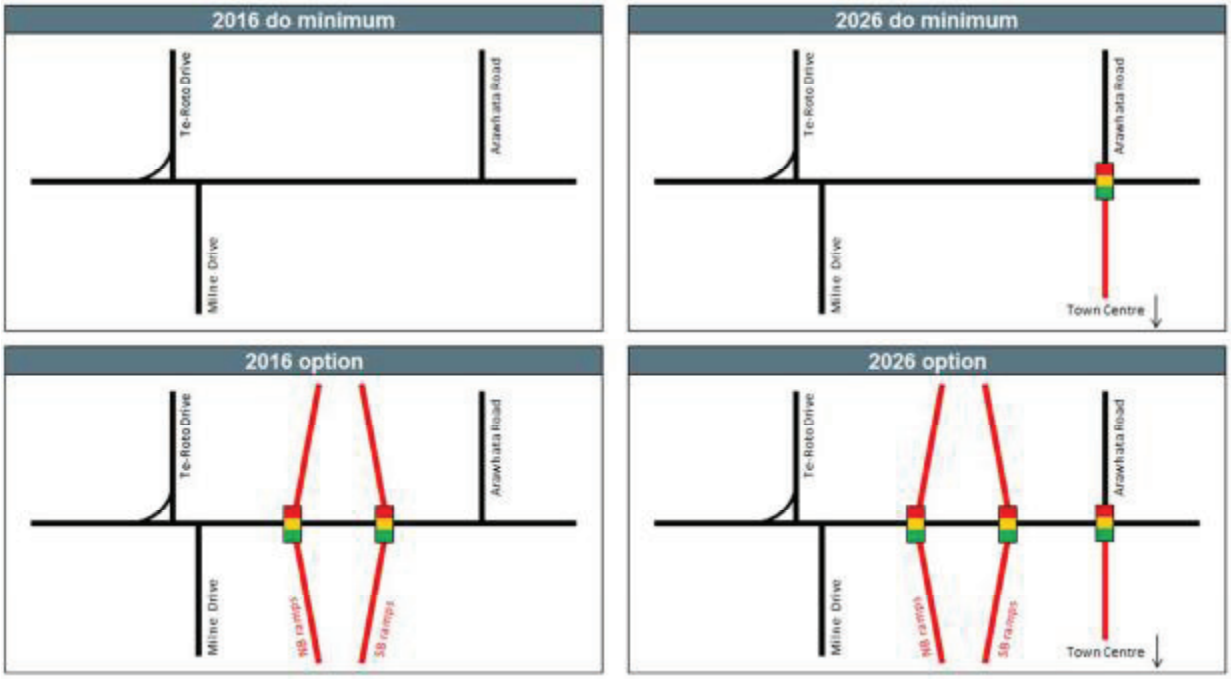


Figure 6.8: Future Year Model Scenarios

i. 2016 Do Minimum versus Option

The 2016 OPT scenario increases the travel times for the through movements along Kāpiti Road by up to 40 seconds during peak periods. However, the overall Te Roto Drive / Kāpiti Road and Milne Drive / Kāpiti Road intersections perform significantly better in the OPT scenario when compared to the DM scenario, during the PM peak. During the AM peak these intersections perform at the same LoS between the two scenarios. Reduction in average delays of up to 40 seconds (in PM peak) is also expected for the right turn movement out of Arawhata Road. The maximum queue length for the right turn movement on Kāpiti Road at Te Roto Drive and Milne Drive intersections is expected to reduce significantly (up to 80% at Te Roto Drive) with the OPT scenario. The overall intersection performances, in the 2026 OPT scenario within the modelled network, is considered satisfactory

with LoS C or better achieved at all intersections, in both peak periods, and is therefore consistent with *Guiding Objectives*.

ii. 2026 Do-Minimum versus Option

The average travel times along the modelled Kāpiti Road corridor in the 2026 OPT scenario, in the westbound direction increase by around 20 seconds when compared to the 2026 DM (in both peak periods). In the westbound direction the average travel times increase by approximately 30 seconds in both peaks, when compared to the 2026 DM scenario. As for the 2016 OPT scenario, these increases in travel times are due to the traffic signals on Kāpiti Road as well as increase in demands in the road network with the 2026 option scenario. It is noted that the signals at the interchange provide less delay to the side road movements (especially right turn out of Te Roto Drive and Milne Drive approaches) during the PM peak period (when higher volumes of traffic is travelling along Kāpiti Road) and hence is considered not to create any detrimental effect on the Kāpiti Road corridor.

The northbound and southbound off ramp maximum expected queue lengths are shorter than the critical queuing length, during both AM and PM peak periods. This indicates that the off ramp queue is not expected to block back onto the proposed Expressway. Although the average delays for right turn movement at the northbound and southbound ramps is expected to be high (40–60 seconds), the overall interchange operates at a LoS C as the volume of this right turning traffic is significantly less when compared to the left turning movement at the ramp or the through traffic on Kāpiti Road.

The maximum queue lengths for the through movements at the Kāpiti Road approaches to Arawhata Road intersection are less than the critical queuing length. Therefore, these movements are not expected to block back to the upstream intersections. The maximum queue length of the right turn traffic at Kāpiti Road (west) however is expected to exceed the critical length (length of the right turn bay) in both peak periods and block back onto the through lane. It is noted that this is however, not expected to occur over the full peak hour period and that the average queue length is around only 10m, in both peak periods.

The operations of the intersections along the modelled Kāpiti Road corridor in the 2026 OPT scenario meets the guiding objective of the Project Alliance Board (3b) (as discussed in Section 4.2) which states that a LoS C is to be achieved at intersections between the proposed Expressway and the local road network in the year 2026.

The average travel times along the modelled Kāpiti Road corridor is expected to increase slightly (by up to 30 seconds) due to the traffic signals at Arawhata Road / Kāpiti Road intersection and the interchange, when compared to the 2026 DM scenario. However, with increase in demands (compared to 2026 DM) on the road network, the average delays at the three intersections remain similar to that for the 2026 DM scenario. The maximum queue length for key movements at intersections are expected to decrease at all but one approach (right turn into Milne Drive in AM

peak). Hence, the congestion along Kāpiti Road corridor and for vehicles on side roads are generally observed to reduce with the 2026 OPT scenario. It is noted that the delays for the right turn movement out of Te Roto Drive increase with the proposed option in place, in the AM peak, however the Te Roto Drive/ Kāpiti Road intersection experience similar delays in both DM and OPT scenarios.

Both scenarios meet the guiding objective (3b) set out by NZTA and KCDC for the Project Alliance Board that intersections between the proposed Expressway and the local road network are to achieve a LoS C or better. The OPT model is observed to have significantly lesser queues at all approaches, in the PM peak period. The PM peak operates much better with less delays and shorter queue lengths at all intersections, when compared to the 2026 DM scenario.

The 2026 OPT AM model results indicate that this scenario operates more efficiently at Arawhata Road / Kāpiti Road intersection (LoS B) when compare to 2026 DM. The overall intersection delay with the OPT scenario is higher at Te Roto Drive intersection, in the AM peak when compared to the DM scenario. This is mainly due to increase in delay experienced by the right turn movement at Te Roto Drive approach. With 2026 OPT AM scenario there is an increase in eastbound peak direction traffic (when compared to the 2026 DM), which reduces the available appropriate gap in the through traffic stream which hence is observed to increase the delays for the right turn traffic from Te Roto Drive. However, it is noted that the increase in the overall intersection delay in 2026 OPT scenario is considered to be minor as the number of vehicles at this approach is not significant when compared to the high volumes of through vehicles travelling on Kāpiti Road.

h. Poplar Avenue, Te Moana Road, and Peka Peka Interchanges

The *Guiding Objectives* also contain Level of Service targets for the proposed Expressway interchanges:

> *"3(b) Level of Service 'C' is achieved at the intersections between the proposed Expressway and local network [in the year 2026]."*

The SIDRA software was used to assess the Level of Service at three of the proposed Expressway interchanges:

- Poplar Avenue;
- Te Moana Road; and
- Peka Peka Road

An analysis of the Kāpiti Road Interchange is discussed separately under the Operational Model Assessment.**Table 6.11** summarises the results of the interchange SIDRA analysis. The detailed SIDRA outputs are contained in **Appendix 32.F**.

Intersection	2016		2026	
	AM	PM	AM	PM
Poplar Ave NB Ramps	B	B	B	B
Poplar Ave SB Ramps	B	A	B	A
Te Moana Rd NB Ramps	A	A	A	A
Te Moana Rd SB Ramps	A	A	A	A
Peka Peka Rd NB Ramps	A	A	A	A
Peka Peka Rd SB Ramps	B	B	B	B

Table 6.11: Intersection Level of Service at Expressway Interchanges

The SIDRA analysis indicates that the intersection of Poplar Avenue with the proposed Expressway northbound off ramp will operate at LOS B in all time periods during a 'typical' average week day. The intersection of Poplar Avenue with the southbound Expressway ramp (and old SH1) will operate at LOS B in both AM peaks and LOS A in both PM peaks. The Te Moana Road ramps are expected to operate at LOS A in all time periods. The Peka Peka Road northbound ramp is expected to operate at LOS A in all time periods. The Peka Peka Road southbound ramp is expected to operate at LOS B in all time periods.

Based on the SIDRA analysis, the Poplar Avenue, Te Moana Road, and Peka Peka Road interchanges will meet the *Guiding Objective* 3(b) for LOS.

i. Summary of Operational Modelling

The main constraint in all scenarios is the limited availability of right turning bay lengths, as well as lane capacity on Kāpiti Road at Te Roto and Milne Drive intersections. Currently only a single lane runs through these intersections, however, the future peak period traffic demand (Do-Minimum and Option) on Kāpiti Road (as well as movements into and out of Te Roto and Milne Drive) is expected to increase substantially when compared to the existing demand. As mitigation to accommodate these additional trips in the study network, provision for an extra lane capacity on Kāpiti Road is recommended, irrespective of the proposed Expressway being present.

The following form the overall summary to the micro-simulation modelling undertaken for the Kāpiti Road study corridor:

- The option scenario generally operates significantly better than the DM scenario;
- An additional lane on Kāpiti Road in the section between the proposed interchange and Te Roto Drive / Kāpiti Road and Milne Drive / Kāpiti Road intersection is recommended to help increase the capacity of the road and operation of these intersections;
- Overall, the proposed interchanges meet the Guiding Objective of the Project Alliance (to operate at LoS C or better) although it is noted that some movements at the ramps have a LoS E. However, the queues at the ramps do not exceed the ramp length.

- The delays at Te Roto Drive and Milne Drive generally improve significantly in the option scenarios, due to platooning of vehicles created by the signals at the interchange. It is noted however, that in the AM 2026 Option scenario, the delays at Te Roto Drive increase slightly at Te Roto Drive approach when compared to the 2026 Do-Minimum. However, this increase in delay is considered to be minor.
- Overall, the average speed along Kāpiti Road is slightly worse in the option scenario due to the signals at the interchange and Arawhata Road / Kāpiti Road intersection. However, it is considered that increase in traffic volumes on Kāpiti Road (when compared to the Do-Minimum) also contributes to the reduction in speeds along this corridor.

The results of the SIDRA analysis indicated that the proposed Expressway interchanges with Poplar Avenue, Te Moana Road, and Peka Peka Road all operate at LoS B or better in 2026. The VISSIM analysis indicated that the proposed Expressway interchange with Kāpiti Road will operate at LoS C in 2026. Therefore, Guiding Objective 3(b) which requires achievement of LoS C in 2026 at the intersections between the proposed Expressway and local network will be met.

6.4. Property Access

The *Guiding Objective* of the Project relevant to the traffic assessment is:

- (7) **Property Impacts**:
  - (a) The Project is to be designed and constructed in a way that seeks to minimise adverse impacts on adjoining and surrounding properties.

Properties directly affected by the Project are discussed in the AEE. The proposed property accesses affected by the Project once completed are discussed in this section. Potential effects on property accesses during construction of the Project are discussed in the *Assessment of Temporary Traffic Effects*.

6.4.1 Sector 1 – Raumati South

As discussed earlier, the alignment of the proposed Expressway results in the eastern end of Leinster Avenue being closed (shown in **Figure 6.9**). This includes the need to purchase several properties. Other properties which remain on Leinster Avenue will continue to have their existing access to Leinster Avenue, but will no longer have direct access between Leinster Avenue and SH1.

There are a number of properties to the north of Leinster Ave which currently access SH1 whose access will be directly affected by the Project. This is due to the proposed Expressway passing through part of their property and cutting off the existing access to SH1. It is proposed to provide alternative access to these properties via a service road which will connect to the (new) eastern end of Leinster Avenue, as shown in **Figure 6.9.**

Figure 6.9: Leinster Avenue Service Road

6.4.2 Sector 2 – Raumati / Paraparaumu

The proposed Kāpiti Road Interchange and widening along Kāpiti Road will affect a number of properties on the north side of Kāpiti Road. An existing service road is proposed to be extended to provide access to the properties to the west of the interchange. The service road which currently has access off Te Roto Drive and Kāpiti Road will run along the frontage of the properties as shown in **Figure 5.10**.

An access off Kāpiti Road will be provided to allow access for HCVs onto and off Kāpiti Road in both directions.

Access will also be affected for a number of properties to the east of the interchange; access will be directly off Kāpiti Road with right turning access and egress being achieved via a hatched flush median strip.

At the time of preparing this report, details of access provisions to the two properties closest to the interchange had not yet been developed. Accordingly, it is recommended that appropriate access provisions be included as mitigation, which may involve possible land swap or negotiation to move the access away from the interchange.

Figure 6.10: Kāpiti Interchange Service Road

Mazengarb Road is proposed to be lowered at the point where the proposed Expressway passes over it, as shown in **Figure 6.11**. The lowering of Mazengarb Road will affect the existing access provisions for the two properties which front the proposed lowering. The access to these properties will be achieved by some local regrading of the accesses to maintain direct access off Mazengarb Road.

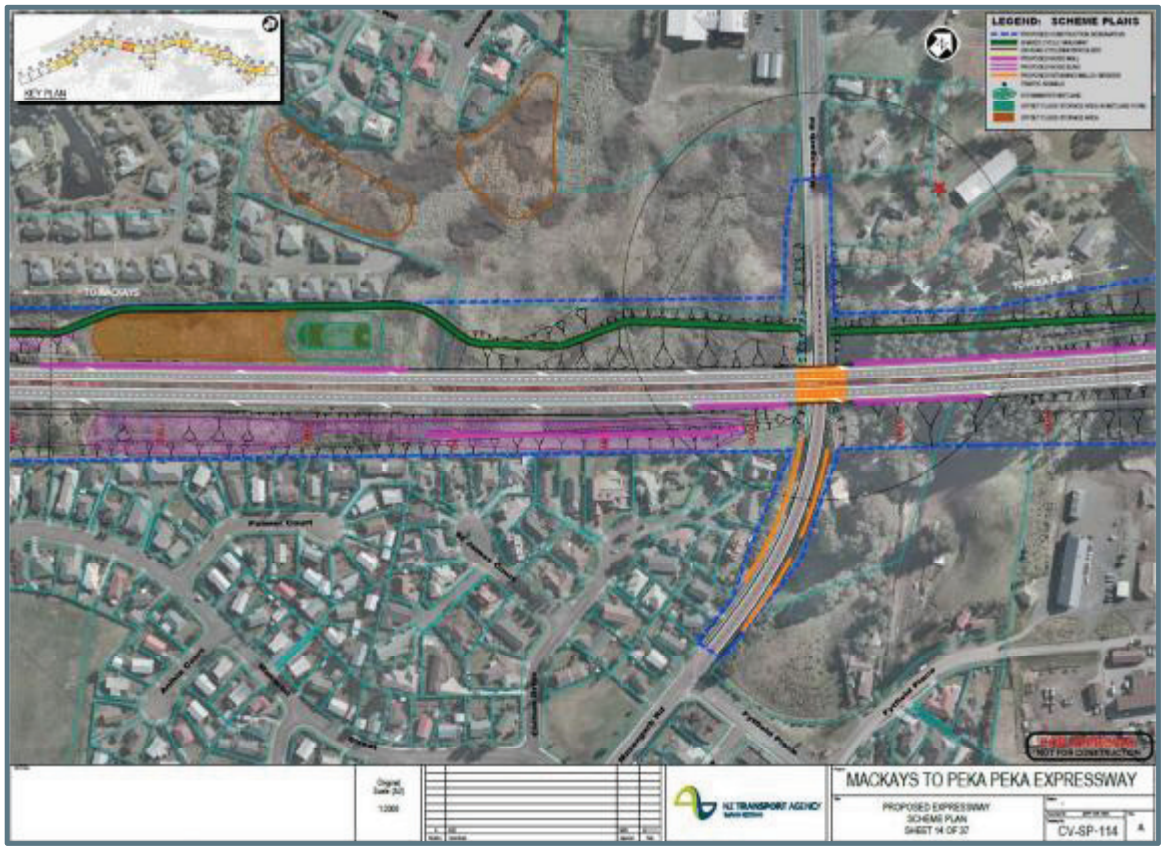


Figure 6.11: Mazengarb Road

6.4.3 Sector 3 – Otaihanga / Waikanae

In Otaihanga, the provision of the proposed Expressway will affect existing access to a number of properties which currently access Otaihanga Road. Alternative access will be provided to these properties via a proposed service road, as shown in **Figure 6.12**.

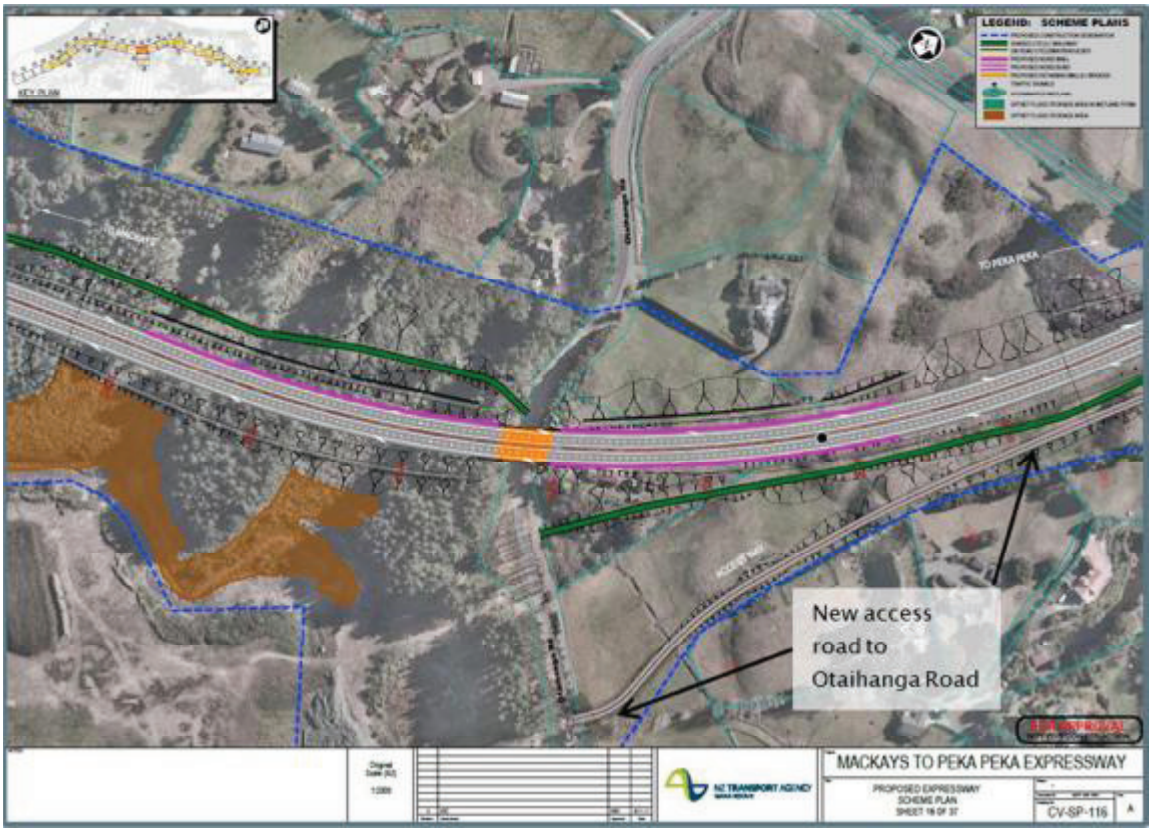


Figure 6.12: Otaihanga Road Service Road

To the north of the Waikanae River, the proposed Expressway will affect existing access to the Waikanae Christian Holiday Park (El Rancho). Access will be provided underneath the proposed Expressway bridge, as shown in **Figure 6.13.**

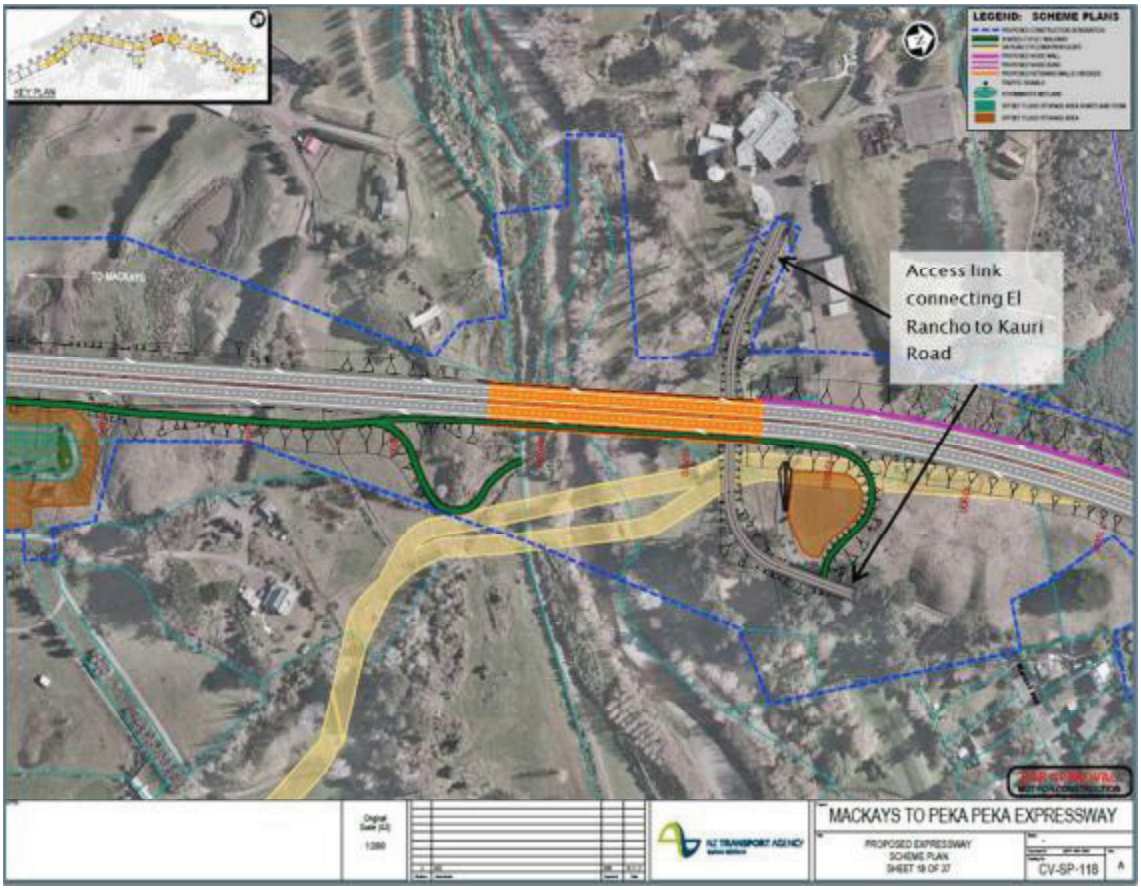


Figure 6.13: Proposed El Rancho Access

South of Te Moana Road, the proposed Expressway will affect the existing access to a number of properties on the west side of the proposed Expressway. Alternative access is proposed to these properties via a new service road from Te Moana Road, as shown in **Figure 6.14**.

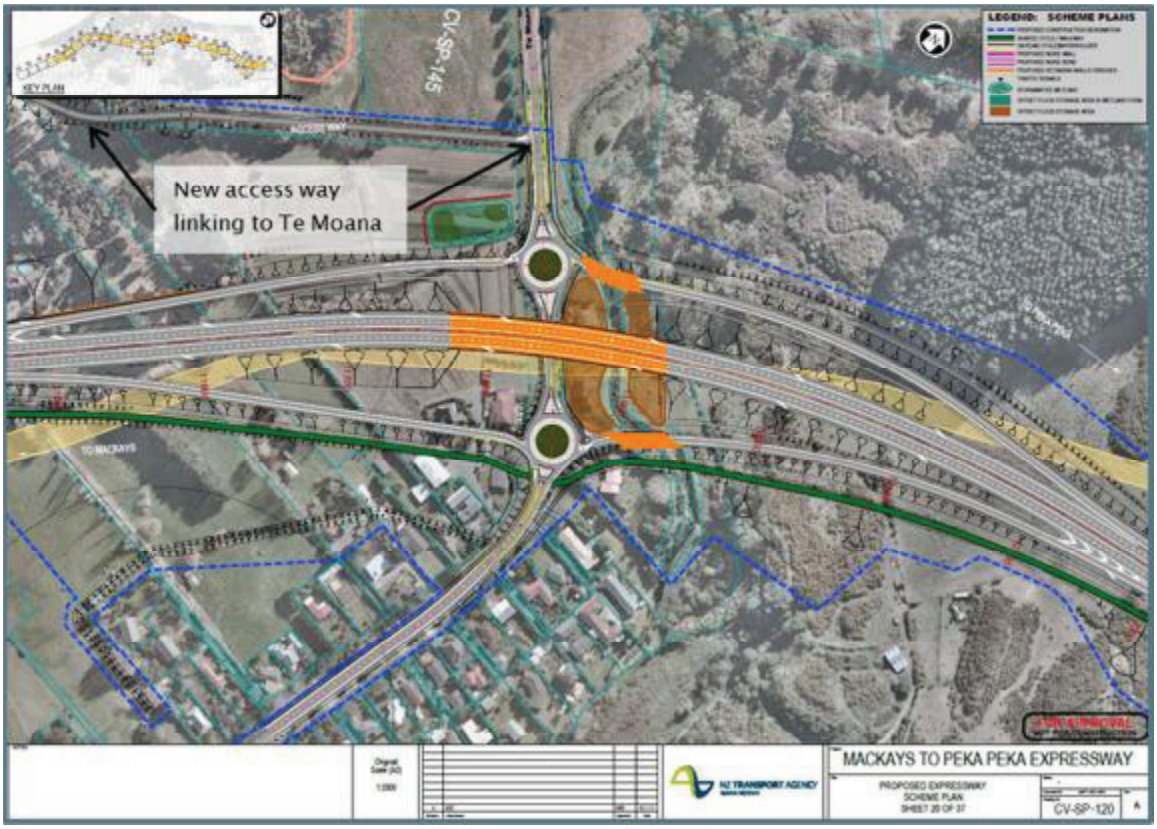


Figure 6.14: Proposed Access Road from Te Moana Road

6.4.4 Sector 4 – Waikanae North

As discussed earlier Ngarara Road and Smithfield Road will both be realigned as a result of the Project. A new Ngarara Road / Smithfield Road intersection will be constructed The new Smithfield Road will provide access to a number of properties whose access is affected by the provision of the proposed Expressway. A new access road will be constructed from Smithfield Road to provide access to these properties.

The existing access to the Nga Manu Wildlife Sanctuary is affected by the provision of the proposed Expressway. New access will be provided via the new Smithfield Road, as shown in **Figure 6.15**.

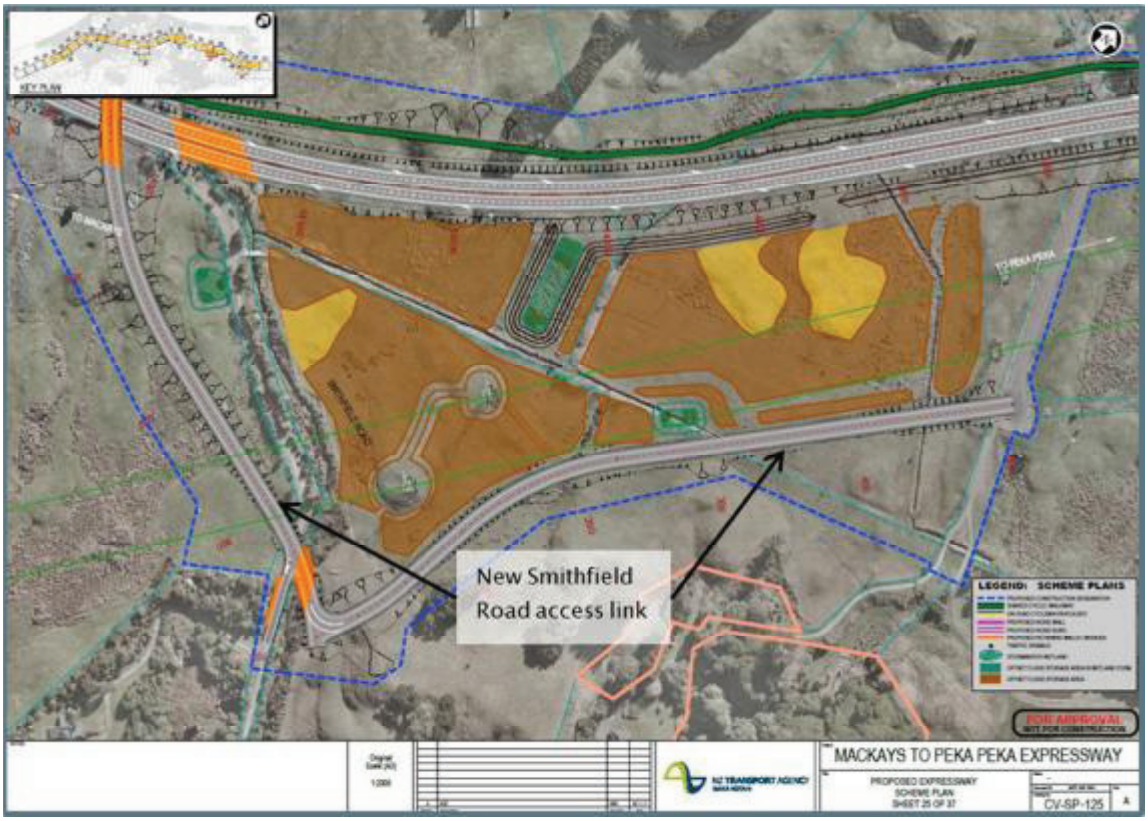


Figure 6.15: Proposed Smithfield Road and Nga Manu Access

North of Peka Peka Road, the existing access to a number of properties will be affected by the provision of the proposed Expressway. This is due to the proposed Expressway severing the access to the existing SH1. Alternative access will be provided via a service road which will connect Peka Peka Road to other local roads to the north, and connect to the Peka Peka to Ōtaki Project.

6.4.5 Summary

The proposed Expressway will affect existing access to a number of properties. The proposed Expressway has been designed to minimise adverse effects on adjoining properties, consistent with Guiding Objective 7(a). Appropriate alternative access is proposed as mitigation and will be further developed during the design phase of the Project.

6.5. Transport Policy Assessments

6.5.1 KCDC Sustainable Transport Strategy Assessment

Section 4.2.5 described the KCDC Sustainable Transport Strategy which is a key local document relating to the Project from a transport planning perspective. The Sustainable Transport Strategy contained the following Transport Objective for the Kāpiti Coast:

"*Within the overall District vision, the primary transport objective for the Kāpiti Coast is to… create a physical transport system that is attractive, affordable, connected, responsive, safe and offers effective mode choice so that it enables people to act in a sustainable way.*"

The Sustainable Transport Strategy identifies that the key features of the KCDC Community Outcomes relevant to transport are:

- Outcome 1: That Kāpiti Coast becomes nationally famous for an extensive walkway, cycleway, and bridleway system…;
- Outcome 2: That the level and quality of access within and between communities is improved;
- Outcome 3: That linkages between Waikanae and Paraparaumu are improved to reduce energy use and travel time;
- Outcome 4: That the District develops a role as a transport hub, including the distribution of freight;
- Outcome 5: That there is improved internal transport access for the labour force;
- Outcome 6: That there is better public transport; and
- Outcome 7: There are extensive access linkages within the District in addition to SH1.

An assessment of the Project against these seven outcomes is presented in **Table 6.12**.

Transport Outcome	Assessment
Outcome 1: That Kāpiti Coast becomes nationally famous for an extensive walkway, cycleway, and bridleway system…	▪ A walkway / cycleway will be provided along the length of the proposed Expressway as part of The Project. This route is also available for use by horse-riders. This additional walking/cycling route will contribute significantly to the walkway, cycleway, and bridleway system on the Kāpiti Coast. ▪ The Project is expected to significantly reduce the volume of

Transport Outcome	Assessment
	traffic on SH1,which presents an opportunity to reconfigure the corridor to benefit walking and cycling.
Outcome 2: That the level and quality of access within and between communities is improved	▪ The Project provides a second continuous north-south transport route between Raumati South and Peka Peka. ▪ Four access points to the proposed Expressway are provided between Raumati South and Peka Peka which will improve the level of access between communities. ▪ The Project is expected to significantly reduce the volume of traffic on SH1 which is expected to improve the quality of journeys on SH1 through reduced travel time and congestion. ▪ The Project will provide a walkway / cycleway along the proposed Expressway route which will improve access within and between communities for pedestrians and cyclists. ▪ The crossing of existing east-west roads is maintained by the Project, maintaining current access levels. It is noted that the eastern end of Leinster Avenue is proposed to be closed by the Project, however alternative access is provided at the western end of Leinster Avenue via Poplar Avenue. Overall is is considered that the Project will greatly improve the level of access within the District which outweighs the closing of the eastern end of Leinster Avenue.
Outcome 3: That linkages between Waikanae and Paraparaumu are improved to reduce energy use and travel time	▪ The Project provides a second continuous north-south transport route between Raumati South and Peka Peka. With full interchanges in Paraparaumu and Waikanae available for local use, the Project improves linkages between Paraparaumu and Waikanae. The modelling undertaken indicates that journey times between these communities will improve as a result of the Project.
Outcome 4: That the District develops a role as a transport hub, including the distribution of freight	▪ The Project provides significant travel time savings which is expected to improve productivity including for distribution of freight. ▪ Access to the proposed Expressway is provided close to the significant commercial / industrial development areas of Paraparaumu Airport and Paraparaumu Town Centre which will support the development of the District as a transport hub including for freight distribution.

Transport Outcome	Assessment
Outcome 5: That there is improved internal transport access for the labour force	▪ Similar to the assessment of Outcome 2, the Project is expected to significantly improve internal transport access for use by the labour force.
Outcome 6: That there is better public transport	▪ The Project does not provide public transport services however the proposed Expressway does provide an opportunity for a new public transport route between Waikanae Beach and Paraparaumu as identified in the Sustainable Transport Strategy.
Outcome 7: There are extensive access linkages within the District in addition to SH1.	▪ The Project provides a second continuous north-south transport route between Raumati South and Peka Peka. ▪ The Project will provide a walkway / cycleway along the proposed Expressway route which will improve access within and between communities for pedestrians and cyclists. ▪ The additional road, pedestrian and cycle infrastructure provided by the Project significantly increases the access linkages in the District in addition to SH1.

Table 6.12: Assessment of Project against Community Transport Outcomes

Based on the above assessment it is considered that the Project will contribute strongly to the community transport objectives.

The Sustainable Transport Strategy defines a network hierarchy including for pedestrians and cyclists as well as roads for general traffic. A copy of the network hierarchy is included in **Appendix 32.B**. Transport Routes noted on the network hierarchy which are crossed by the proposed Expressway include:

- "Major Community Connector Routes": Te Moana Road, Raumati Road, and Kāpiti Road, Ihakara Street, Mazengarb Road, and Poplar Avenue;
- "Local Community Connectors": Peka Peka Road and Otaihanga Road; and
- "Major Community Connector – Walkway": Waikanae River Walkway and Wharemakau Trail.

The cross connection for all of these Major Community Connectors, Local Community Connectors, and Major Community Walkway Connectors is maintained with the proposed Expressway in place and in this regard the Project does not degrade the east-west connectivity contained in the Sustainable Transport Strategy Network Hierarchy.

6.5.2 Land Transport Management Act Assessment

The Land Transport Management Act 2003 (LTMA) provides the legal framework for managing and funding land transport activities. The purpose of the LTMA is to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system. Transport Projects must be assessed against the LTMA and the five objectives from the New Zealand Transport Strategy (NZTS) as outlined below.

- Ensuring environmental sustainability
- Assisting economic development
- Assisting safety and personal security
- Improving access and mobility
- Protecting and promoting public health

The LTMA assessment was completed for the Project and is presented below.

Economic Development

The proposed Expressway forms part of the Wellington Northern Corridor RoNS, which the Government identified as one of seven most essential routes to support economic growth and productivity. By reducing travel times and congestion and, hence, improving travel time reliability for car and HCV vehicles, the Project is expected to assist in stimulating economic growth and productivity.

Assist Safety and Personal Security

The existing SH1 from MacKays to Peka Peka has a significant crash history with 399 reported crashes during the five year period from 2006 to 2010 including four fatalities, 17 serious injury crashes and 83 minor injury crashes. The fatalities and the majority of injury crashes occurred as a result of right-turn against movements at-grade intersections and loss of control / cross centreline crashes. These types of crashes occur on the existing highway because of the abundance of local access, out of context curves and an inconsistent speed environment.

The proposed Expressway will meet modern design standards and will offer significantly improved geometry compared to the old highway. The absence of at-grade intersections will eliminate the risk of right-turn accidents, whilst the presence of a central median will eliminate the risk of cross centreline/ head-on crashes.

The proposed Expressway will reduce the volume of traffic and the crash risk on the old State Highway including at its intersections with other local roads, improving safety on the old highway which will become a local road.

Improve Access and Mobility

The development of an Expressway will significantly improve access and mobility for through and local traffic, including bus and freight vehicle movements, as discussed in detail earlier in this report.

Protect and Promote Public Health

Specialised social impact assessments were completed for the AEE and can be found in Technical Report 20, Volume 3.

Ensure Environmental Sustainability

Specialised environmental assessments were completed for the AEE and can be found in Volume 3.

6.5.3 Government Policy Statement Assessment

Under the LTMA, the NZTA must give effect to the Government Policy Statement on Land Transport Funding (GPS) in developing the National Land Transport Programme and take account of the GPS when approving funding for activities. The LTMA requires the GPS to contribute to the aim of achieving an affordable, integrated, safe, responsive and sustainable land transport system, and also to the five transport objectives of the NZTS.

The Wellington Northern Corridor is one of seven RoNS outlined in the 2009 GPS. SH1 from MacKays to Peka Peka forms part of the Wellington Northern Corridor RoNS. The GPS identifies that seven RoNS as:

> *"The most essential routes that require significant development to reduce congestion, improve safety and support economic growth."*

As part of a RoNS, the MacKay's to Peka Peka Expressway is a significant component in achieving the GPS. The GPS also contains a number of short to medium-term impacts that the Government expects to be achieved through the use of the National Land Transport Fund which contribute to economic growth and productivity including:

- Improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation through:
  - improvements in journey time reliability;
  - easing of severe congestion;
  - more efficient freight supply chains;
  - better use of existing transport capacity.
- Better access to markets, employment and areas that contribute to economic growth;
- A secure and resilient transport network.

Other short to medium-term impacts that the Government expects are:

- Reductions in deaths and serious injuries as a result of road crashes;
- More transport choices, particularly for those with limited access to a car where appropriate;
- Reductions in adverse environmental effects from land transport; and

- Contributions to positive health outcomes.

Each of the base options are assessed against the short to medium term GPS targets below.

Improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation

The proposed Expressway will enhance transport efficiency and lower the cost of transportation by reducing travel times and congestion, and, hence, improving travel time reliability, for both commercial and non-commercial traffic.

Better access to markets, employment and areas that contribute to economic growth

The reduction in congestion and travel times will enhance access to markets, employment and economic growth areas both within Kāpiti and inter-regionally.

A secure and resilient transport network

The proposed Expressway will provide a second crossing of the Waikanae River. This will improve the security and reliance of the transport network. Connections to the proposed Expressway in Paraparaumu and Waikanae will increase the security and reliance benefits by allowing the second crossing of the Waikanae River to be of more use to traffic travelling between the two communities.

Reductions in deaths and serious injuries as a result of road crashes

As discussed under the LTMA assessment, the proposed Expressway will meet modern design standards and will offer significantly improved geometry compared to the old highway. The absence of at-grade intersections will eliminate the risk of right-turn accidents, whilst the presence of a central median will eliminate the risk of cross centreline / head-on crashes.

More transport choices, particularly for those with limited access to a car where appropriate

While the provision of the proposed Expressway will improve transport for private vehicle users, the provision of the proposed Expressway is not expected to improve transport choices for non-private vehicle users.

Reductions in adverse environmental effects from land transport

Specialised environmental assessments were completed for the AEE and can be found in Volume 3.

Contributions to positive health outcomes

Specialised social impact assessments were completed for the AEE and can be found in Technical Report 20, Volume 3.

6.5.4 Regional Land Transport Strategy Assessment

As noted in Section 4.2.4, the RLTS provides an overall context for investment in the region's transport network. It forms the basis for identification, selection, and prioritisation of projects and activities by the Regional Transport Committee, sets targets against which the region's transport networks can be monitored, and guides reviews of more detailed transport implementation and corridor plans.

The RLTS has six objectives:

- Assist economic and regional development;
- Assist safety and personal security;
- Improve access, mobility, and reliability;
- Protect and promote public health;
- Ensure environmental sustainability; and
- Ensure that the Regional Transport Programme is affordable for the regional community.

The first five RLTS objectives are consistent with the LTMA objectives. These are assessed above and the Project was found to be consistent with the LTMA objectives.

The sixth RLTS objective relates to the affordability of the Regional Transport Programme. The RLTS recognises the Wellington Northern Corridor RoNS and the investigation phase for the Wellington Northern Corridor RoNS is included in the Regional Transport Programme.

6.6. Summary of Transport Effects and Mitigation Measures

6.6.1 Pedestrians and Cyclists

The Project will provide a dedicated walkway / cycleway along the proposed Expressway corridor which is seen to be consistent with KCDC's CWB Strategy, the Project Objectives, and the Guiding Objectives, and will enhance connectivity between local communities. Pedestrian and cycle facilities will be provided at each of the proposed Expressway interchanges to facilitate movement through these key movement nodes.

Further design work of pedestrian and cycle connections, including the dedicated walkway / cycleway, will be undertaken during the design phase of the Project. Traffic flows on the existing SH1 will reduce significantly with the proposed Expressway in place and this offers an opportunity after the proposed Expressway completion to make changes to the existing SH1 to provide an improved environment for pedestrians and cyclists, as well as other road users, along the route.

6.6.2 Public Transport

The provision of the proposed Expressway will result in travel time improvements, including travel time reliability, across the road network which will also be experienced by buses. The proposed

Expressway provides an opportunity to establish a Waikanae Beach to Paraparaumu bus route along the existing WLR designation which is seen to be consistent with KCDC's *Sustainable Transport Strategy*.

The location of existing bus stops on Kāpiti Road and at Peka Peka will be affected. Further design work will be undertaken to develop new, suitable locations for these bus stops.

6.6.3 Traffic

In summary, the key points discussed in the traffic assessment for the Project and surrounding area are:

- The highest daily flow on the proposed Expressway is nearly 20,800 vehicles per day, which occurs between Kāpiti Road and Te Moana Road intersections;
- With the Project in place, the traffic flows on the existing SH1 are expected to reduce approximately 37% to 46% leading to an improvement in travel times and travel time reliability for both car and HCV vehicles. The delays experienced at priority-controlled intersections such as Poplar Avenue, Raumati Road, and Ihakara Street are predicted to reduce significantly;
- In many cases traffic volumes on local roads are predicted to decrease as a result of the Project;
- Traffic volumes are expected to increase by around 6-9% on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. However as will be discussed in **Section 5.3.2**, the increase in traffic volume is not expected to significantly adversely impact on the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road is expected to experience an increase in traffic of 13-15%. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day, comparing the DM and OPT scenarios, due to the relatively low volume of traffic on Poplar Avenue and will not alter the current nature and character of the road environment, nor cause any significant increase in delay or queuing;
- Traffic volumes on Park Avenue, north of Te Moana Road are predicted to increase by 38% (1,700 vehicles per day) by 2026. This is due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. SIDRA modelling of the intersections of Park Avenue with Te Moana Road and Ngarara Road was undertaken for the 2026 Do Minimum and with Project scenarios. The modelling indicated there was negligible effect on the Park Avenue / Ngarara Road intersection and that the delays were forecast to reduce on Park Avenue with the Option in place. Based on the SIDRA modelling the increase in traffic is not expected to result in any significant delays or queuing It is recognised that the road environment is primarily residential in character with regular property access and that there could be a perception that the increase in traffic would result in safety problems. It is recommended that NZTA work with KCDC to develop and fund traffic calming measures on Park Avenue following the opening of the Project;

- The proposed Expressway is predicted to significantly improve travel times for through traffic between MacKays Crossing and Peka Peka, reducing the travel time in 2026 by seven minutes in the weekday morning peak (southbound) and over ten minutes in the weekday evening peak (northbound);
- The travel time analysis contained in Technical Report 34, Volume 3 indicates that the Project provides significant travel time savings for both through traffic on the proposed Expressway and local traffic movements.
- 12-20% of the traffic using the proposed Expressway is predicted to be HCVs, which is consistent with the character of an Expressway and is well within its capacity, and is expected to significantly reduce the volume of HCVs on SH1;
- HCV volumes are predicted to reduce on many local roads including Te Moana Road, leading to an improvement in HCV travel times and reliability. The volume of heavy vehicles is predicted to increase on Park Avenue and Paetawa Road by 60 and 10 vehicles per day respectively in 2026. This small predicted increase on Park Avenue and Pawtawa Road is not expected to adversely impact on the function of these local roads; and
- The proposed Expressway between MacKays Crossing and Peka Peka will meet the objective of achieving Level of Service B in 2026.

Based on the above assessment, it is considered that the Project is consistent with the Project Objectives and Guiding Objectives in that:

- The Project is predicted to enhance efficiency and journey time reliability;
- The Project balances inter-regional and local traffic movements. The proposed Expressway provides significant benefits for through traffic and local traffic movements;
- The proposed Expressway will operate at Level of Service B in 2026;
- The overall network operates to significantly improve travel times with the proposed Expressway in place;
- The Project significantly reduces the volume of traffic on SH1. In Waikanae town centre this enables a reduction in congestion;
- Existing and proposed local road crossings are maintained by the Project; and
- The Project improves network resilience by providing a second crossing of the Waikanae River.

6.6.4 Operational Traffic Assessment

The results of the SIDRA analysis indicated that the proposed Expressway interchanges with Poplar Avenue, Te Moana Road, and Peka Peka Road all operate at LoS B or better in 2026. The VISSIM analysis indicated that the proposed Expressway interchange with Kāpiti Road will operate at LoS C in 2026. Therefore, Guiding Objective 3(b) which requires achievement of LoS C in 2026 at the intersections between the proposed Expressway and local network will be met.

6.6.5 Property Access

The proposed Expressway will affect existing access to a number of properties. The proposed Expressway has been designed to minimise adverse effects on adjoining properties, consistent with Guiding Objective 7(a). Appropriate alternative access is proposed as mitigation and will be further developed during the design phase of the Project.

6.6.6 Summary of Proposed Mitigation

In summary, the mitigation measures or further design proposed includes:

- Further design work is necessary to develop pedestrian and cycle connections to the local road network, including further design of the dedicated walkway / cycleway;
- The proposed Expressway affects existing bus stops on Kāpiti Road and Peka Peka Road. Potential locations for new bus stops have been identified in this report Further design work regarding the exact locations and specifications for the bus stops will be undertaken in consultation with the bus service providers and KCDC;
- It is recommended that NZTA work with KCDC to develop and fund traffic calming measures on Park Avenue following the opening of the Project;; and
- Further design work is necessary to develop alternative access to properties whose existing access is affected by the Project.

7. Sensitivity Testing

7.1. Introduction

Sensitivity testing allows the model user to test and determine the effects of "what if" scenarios which are different to an expected forecast situation. This type of testing compounds the robustness and credibility of the recommendations put forth for the expected forecast situation. An example of a sensitivity test, and as described in this chapter, could be an increase in traffic growth from a development should the 'uptake' of the development occur earlier than expected.

7.2. Scope of Sensitivity Testing

As discussed earlier, differences were identified between the Kāpiti land use growth regional forecasts and the local growth plans of KCDC. While a "Composite" growth scenario was developed for the core forecasting[12], sensitivity testing was undertaken to assess the performance of the road network with "Full Growth" in the Kāpiti District. The "Full Growth" land use includes full development (by 2026) of four significant growth areas in Kāpiti:

- Paraparaumu Town Centre;
- Paraparaumu Airport;
- Waikanae North; and
- Ngarara.

- Three network scenarios were initially considered using the "Full Growth" land use:
  - The Do-Minimum (as described earlier in this report);
  - With the Project in place; and
  - With the Project and a northbound Expressway off ramp to the proposed Ihakara Street Extension.

Note: the Paraparaumu Airport requested a sensitivity test of a northbound Expressway off ramp to the proposed Ihakara Street Extension to identify whether the KTM2 traffic modelling would indicate a reduction in traffic volumes along Kāpiti Road. This was the main objective of their request and, as such, only a high level analysis of the model outputs are presented in ***Chapter 8, Section 8.8*** *of Technical Report 34, Volume 3.*

[12] Refer to Technical Report 34, Volume 3, Chapter 5, Section 5.4

Only the two scenarios with the Project in place were assessed as a result of Do Minimum model convergence issues with the “Full Growth” land use in place. See Chapter 8, Section 8.6 of Technical Report 34, Volume 3 for further information.

The network modelling was undertaken using the KTM2. Operational model assessments were also undertaken of the Project. VISSIM was used to assess the performance of the Kāpiti Road interchange and SIDRA was used to assess the performance of the Poplar Ave, Te Moana Rd, and Peka Peka Rd interchanges.

The development and evaluation of the “Full Growth” scenario is discussed in detail in Technical Report 34, Volume 3. The sections below summarise key findings of the analysis.

7.3. KTM2 Network Modelling

7.3.1 Model Convergence

The KTM2 includes an iterative process of path building (where traffic is loaded to the least-cost paths through the network) and capacity constraint (where the resulting speeds, delays and queues are recalculated from the new flows). Convergence of this process is critical to providing valid model output, and from the outset, i.e. during base year model calibration and validation, strict model convergence parameters and criteria were defined. These convergence parameters and criteria dictate when the highway assignment terminates, i.e. when there is a sufficient balance in the changes in “global” travel costs (route choice) with respect to traffic demand. It is important that these convergence parameters and criteria are not altered once the base year model calibration phase is complete.

As a result of implementing the “Full Growth” scenario into the Do Minimum models, the AM and PM peak hour models in particular, were found to not converge. Large fluctuations in travel costs between each successive assignment iteration were still evident at the maximum number of iterations (399).

This indicates that the traffic demands exceed the available capacity too much to achieve a stable, converged model (it is a fundamental requirement of a valid model for the demands to be in equilibrium with the supply, which cannot be achieved if the models do not converge).

This suggests that additional road network capacity would need to be provided to support the anticipated “Full Growth” land use scenario, if the Project was not in place.

This in itself is a key conclusion of the modelling, however it is beyond the scope of this work to identify what infrastructure would be required to support such growth if the Project was not in place.

The 2026 Option network, i.e. with the Project in place, under the “Full Growth” scenario successfully converged. The results of the Option test under “Full Growth” are discussed in detail in Technical Report 34, Volume 3.

7.4. Operational Model Results

7.4.1 VISSIM Modelling

The 2026 PM “Full Growth” Scenario (Test (A) as discussed in Technical Report 34, Volume 3) was modelled in VISSIM and compared to the 2026 PM OPT “Composite Growth” Scenario. The “Full Growth” scenario is expected to have an additional 1,000 vehicle trips when compared to the 2026 OPT “Composite Growth” Scenario. The majority of the increase in the number of trips is from the Kāpiti Road west zone (just west of Arko Place) to Kāpiti Road east zone (just east of Arawhata Road/Town Centre link).

A total of 511 additional trips (51% of total increase), over the one hour PM peak, is expected to be generated **from** the Kāpiti Road west zone and travelling east **to** Arawhata Road, Te Roto Drive, northbound Expressway on-ramp and Kāpiti Road east zone. The total number of trips going to Kāpiti Road east zone increases to 291 trips (20% of total increase), when compared to 2026 OPT scenario.

The number of trips **from** Te Roto Drive decreases by 129 trips, in Test (A). The total number of trips travelling **to** Te Roto Drive from the east is expected to decrease by 130 trips in Test (A). This is observed to create a lesser queue and blocking back along Kāpiti Road from Te Roto Drive intersection to the proposed interchange.

The average delay per vehicle and the LoS results for each movement and the intersections are shown in **Table 7.1**.

Intersection	Arm	Movement	Option (Full Growth)		Option (Composite Growth)	
			Delay (s)	LOS	Delay (s)	LOS
Kāpiti Rd/Te Roto Drive	Kāpiti Rd West	Left	4	A	4	A
		Through	9	A	5	A
	Te Roto Drive	Left	34	D	54	F
		Right	209	F	194	F
	Kāpiti Rd East	Through	5	A	7	A
		Right	34	D	17	C
Average of Controlled Movements (Intersection)			**28**	**D**	**39**	**E**
Kāpiti Rd/Milne	Kāpiti Rd West	Through	2	A	1	A
		Right	47	E	30	D

Intersection	Arm	Movement	Option (Full Growth)		Option (Composite Growth)	
Drive	Milne Drive	Left	97	F	30	D
		Right	329	F	115	F
	Kāpiti Rd East	Left	2	A	2	A
		Through	6	A	5	A
Average of Controlled Movements (Intersection)			**94**	**F**	**37**	**D**
Kāpiti Rd/ Arawhata Rd	Kāpiti Rd West	Left	53	D	19	B
		Through	52	D	16	B
		Right	46	D	34	C
	Arawhata Rd North	Left	0	-	1	A
		Through	13	B	16	B
		Right	81	F	35	C/D
	Kāpiti Rd East	Through	29	C	21	C
		Right	42	D	26	C
	Town Centre Link	Left	46	D	17	B
		Through	44	D	18	B
		Right	32	C	14	B
All Approaches (Intersection)			**39**	**D**	**20**	**C**
Kāpiti Rd/Ramps	Northbound Offramp	Left	23	C	27	C
		Right	75	E	71	E
	Kāpiti Rd West	Left	40	D	37	D
		Through	41	D	29	C
	Southbound Offramp	Left	23	C	14	B
		Right	53	D	42	D
	Kāpiti Rd East	Left	47	D	29	C
		Through	65	E	44	D
All Approaches (Intersection)			**42**	**D**	**30**	**C**

Table 7.1 – 2026 PM Peak Hour Results; Option (Full Growth) VS Option (Composite Growth)

The following observations are noted from the 2026 PM Peak hour Option (ie with Project in place) with “Full Growth”

- A high level of congestion and queuing is observed along Milne Drive and Te Roto Drive, which is a result of significant right turning traffic attempting to cross the busy Kāpiti Road. However, as stated above, there is a decrease in the overall volume of traffic turning into Te Roto Drive and which is observed to lessen congestion and queues blocking back to the Kāpiti Road interchange;
- The intersection of Kāpiti Road and Arawhata Road is observed to operate well, with queues that dissipate within 2 cycle periods (total 90 seconds);
- The interchange is expected to operate to within capacity level without significant queuing or vehicle delay issues. However, the pedestrian crossing located north of Te Roto Drive is observed to cause traffic to block back significantly, and to the model extents. This means that some vehicles are unable to be released into the model. This may be the reason why the interchange and the intersection of Kāpiti Road / Arawhata Road operate to an acceptable level. However, the pedestrian crossing creates platoons of through movements along Kāpiti Road and which provides gaps in vehicles allowing right turning traffic to cross Kāpiti Road. Removing the pedestrian crossing is observed to create extended queues and significant congestion along Kāpiti Road and blocking back through the interchange and further upstream intersections; and
- The average delays at the Milne Drive approach is expected to increase significantly as the total volume of traffic travelling on the Kāpiti Road modelled corridor has increased. Therefore the overall intersection LoS is reduced and the delays are increased significantly.

In terms of the performance of the Kāpiti Road interchange, the VISSIM modelling indicates that the interchange will operate within its capacity under the “Full Growth” Scenario. However, the intersection LOS is predicted to reduce to D with several movements operating at LOS E. It was noted that there were vehicles which were unable to be released into the model beyond the interchange area. This would indicate that road network improvements would be required outside of the Project area to accommodate the “Full Growth” demands.

7.4.2 SIDRA Modelling

The SIDRA software was used to assess the Level of Service at three of the proposed Expressway interchanges under the “Full Growth” scenario:

- Poplar Avenue;
- Te Moana Road; and
- Peka Peka Road

Table 7.2 summarises the results of the interchange SIDRA analysis. The detailed SIDRA outputs are contained in **Appendix 32.F**.

Intersection	2026 LOS	
	AM	PM
Poplar Ave NB Ramps	E	B
Poplar Ave SB Ramps	B	B
Te Moana Rd NB Ramps	A	B
Te Moana Rd SB Ramps	B	A
Peka Peka Rd NB Ramps	A	A
Peka Peka Rd SB Ramps	B	B

Table 7.2: Intersection Level of Service at Expressway Interchanges (Full Growth)

The SIDRA analysis indicates that all of the proposed Expressway interchanges will operate at LOS B or better under Full Growth except for the Poplar Avenue northbound off ramp in the AM peak. Under Full Growth the northbound off ramp volume increases to more than 800 pcus in the AM peak which conflict with nearly 500 pcus on the east approach. In the AM peak the intersection (single lane roundabout) will be over capacity. SIDRA modelling indicates that the capacity can be improved by dual-laning the roundabout and widening the off ramp to two lanes. With this layout LOS B is achieved under Full Growth.

7.5. Summary of Sensitivity Testing

Based on the sensitivity testing undertaken on a "Full Growth" scenario the following conclusions are made:

- The KTM2 did not converge for the Do Minimum network due to the traffic demands significantly exceeding the capacity of the network, and hence a stable model result was not found. Convergence was however found with the Project in place. This indicates that substantial transport network improvements would be required to accommodate the demands predicted under the "Full Growth" scenario.

Option Model (with Project in place)

- The 2026 Option model was able to converge under Full Growth which indicates that the Project improves the performance of the road network to better accommodate Full Growth demands. However other road improvements may be required to improve the performance of the network to better accommodate such growth;
- The VISSIM modelling for the "Full Growth" scenario indicated that the Kāpiti Road interchange will operate within capacity however the LOS will reduce to D with a number of movements operating at LOS E;
- The Te Moana Road and Peka Peka interchanges will operate at LOS B or better under Full Growth demands;
- The Poplar Avenue southbound ramp intersection will operate at LOS B under Full Growth; and

- The Poplar Avenue northbound ramp intersection will operate at LOS E under Full Growth in the AM peak under its current proposed configuration. The LOS can be improved to B in the AM peak by dual-laning the roundabout and off ramp.

8. Conclusions

The MacKays to Peka Peka Expressway Project will provide significant transport infrastructure that forms an integral part of the Wellington Road of National Significance. The proposed Expressway is predicted to significantly improve travel times for through traffic between MacKays Crossing and Peka Peka, reducing the travel time in 2026 by seven minutes in the weekday morning peak (southbound) and over ten minutes in the weekday evening peak (northbound). The provision of the proposed Expressway will also generally provide travel time savings to local traffic. The overall network will operate with significantly improved travel times, relieving congestion and facilitating planned growth within the Kāpiti District.

This transportation assessment has found that the proposed Expressway Project will be consistent with the Project Objectives and the *Guiding Objectives* in that:

- The Project is predicted to enhance efficiency and journey time reliability;
- The Project balances inter-regional and local traffic movements. The proposed Expressway provides significant benefits for through traffic and local traffic movements;
- The proposed Expressway will operate at Level of Service B in 2026;
- The overall network operates to significantly improve travel times with the proposed Expressway in place;
- The Project significantly reduces the volume of traffic on SH1. In Waikanae town centre this enables a reduction in congestion;
- Most existing local road crossings are maintained by the Project. The eastern end of Leinster Avenue will be closed by the Project, however alternative access is provided to Leinster Avenue via Poplar Avenue;
- The Project improves network resilience by providing a second crossing of the Waikanae River;
- Intersections between the proposed Expressway and the local road network will operate at Level of Service C or better in 2026; and
- The Project has been designed to minimise adverse effects on adjoining properties.

This transportation assessment has also considered sensitivity testing of a “Full Growth” scenario and concluded that:

- The KTM2 did not converge for the Do-Minimum network due to the traffic demands significantly exceeding the capacity of the network, and hence a stable model result was not found. Convergence was however found with the Project in place. This indicates that substantial transport network improvements would be required to accommodate the demands predicted under the “Full Growth” scenario; and

- The VISSIM modelling for the “Full Growth” scenario indicated that the Kāpiti Road interchange will operate within capacity however the LOS will reduce to D with a number of movements operating at LOS E.

This transportation assessment has also found that the Project is consistent with the Wellington Regional Land Transport Strategy, the Regional Freight Plan and local strategies such as KCDC’s Sustainable Transport Strategy and Cycleway Walkway Bridleway Strategy.

This assessment has identified some negative effects on the transport system, for which mitigation measures have been identified. In summary, the mitigation measures or further design proposed includes:

- Further design work is necessary to develop pedestrian and cycle connections to the local road network, including further design of the dedicated walkway / cycleway;
- The proposed Expressway affects existing bus stops on Kāpiti Road and Peka Peka Road. Potential locations for new bus stops have been identified in this report Further design work regarding the exact locations and specifications for the bus stops will be undertaken in consultation with the bus service providers and KCDC;
- It is recommended that NZTA work with KCDC to develop and fund traffic calming measures on Park Avenue following the opening of the Project;; and
- Further design work is necessary to develop alternative access to properties whose existing access is affected by the Project.

Overall it is considered that this transportation assessment demonstrates that the proposed Project and identified mitigation measures will be consistent with the following Project Objectives:

  - 1(a) enhance efficiency and journey time reliability from, to and through the Kāpiti District, Wellington’s CBD, key industrial and employment centres, port, airport and hospital; and
  - 1(c) appropriately balance the competing functional performance requirements of inter-regional and local traffic movements, recognising that modal and route choice opportunities need to be provided that enable local facilities and amenities in the Kāpiti District to be efficiently accessed.

It is also considered that this proposed Project and identified mitigation measures will be consistent with following Guiding Objectives:

- (3) **Levels of Service**:
  - (a) the proposed Expressway achieves Level of Service ‘B’ between MacKays Crossing rail over-bridge and the location of the current intersection of Peka Peka Road and the existing SH1 [in the year 2026].
  - (b) Level of Service ‘C’ is achieved at the intersections between the proposed Expressway and local network [in the year 2026].
  - (c) that the overall network operates to significantly improve travel times.

- (d) an integrated transport network can operate in a manner which reduces congestion in Waikanae town centre and at Elizabeth Street level crossing.

- (4) **Connectivity:**
  - (a) All existing and proposed east/west local road, cyclist and pedestrian connections are to be maintained…
  - (b) The Project will maximise connectivity (including grade separated and left on/left off interchanges) to the local network consistent with the proposed Expressway's inter-regional function.
- (5) **Resilience**:
  - (a) The Project will improve network resilience in the event of emergencies.
- (7) **Property Impacts**:
  - (a) The Project is to be designed and constructed in a way that seeks to minimise adverse impacts on adjoining and surrounding properties.
- (8) **Local Planning:**
  - (b) …the Project is to include well designed, direct access via the proposed Expressway into and out of Paraparaumu town centre, nearby commercial areas and the airport, consistent with the proposed Expressway's inter-regional function.
  -

Appendix 32.A

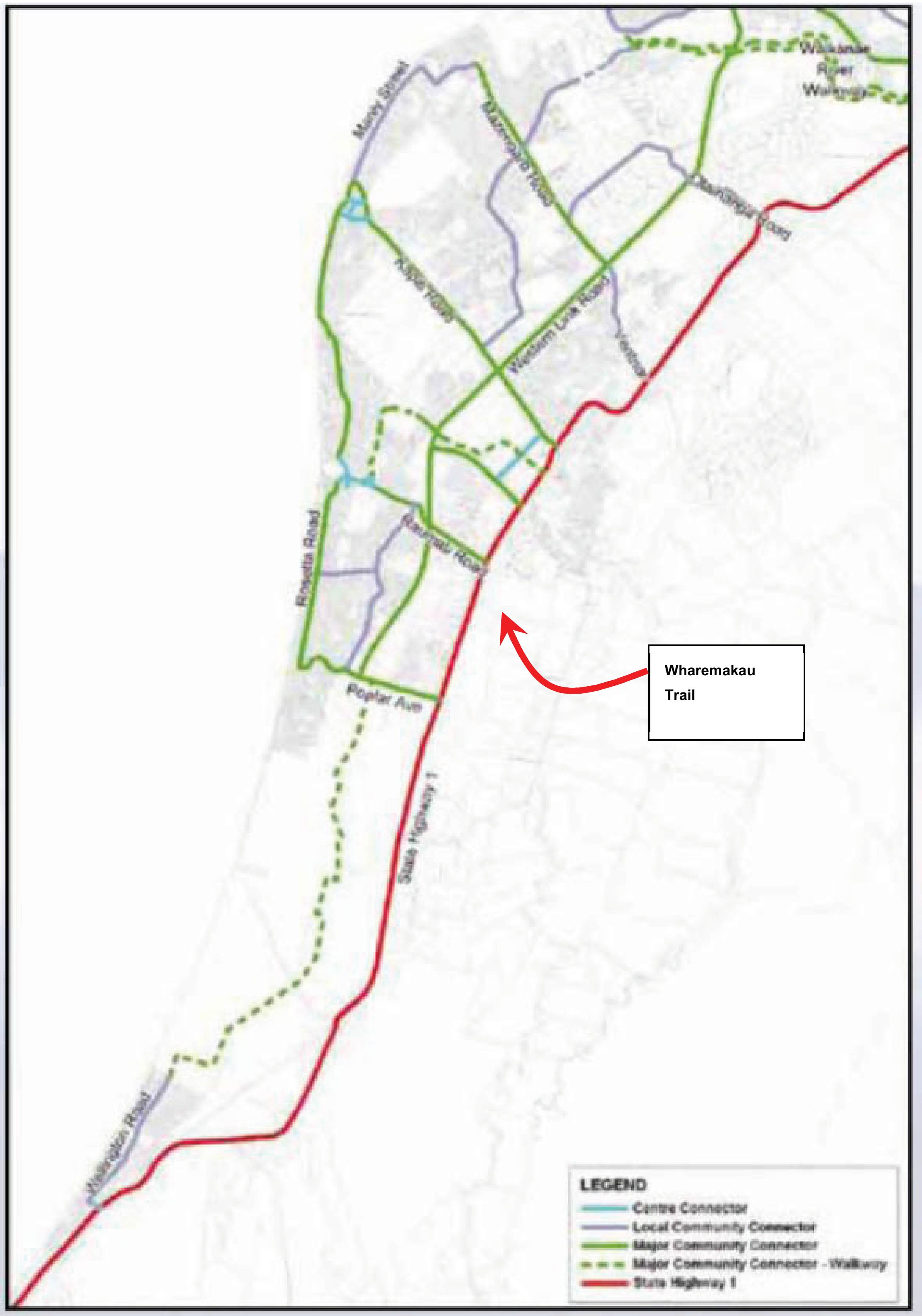
KCDC Cycleway Guide


Businesses who have contributed to the cost of this map.
Beach Deli Café
Coast to Coast Café
Beachcomber Café
Wave Café
The Front Room Café
Waikanae Beach
& A Taste of Country
Garden Café, Peka Peka
On Yer Bike Cycle Shop
Paraparaumu
WAIKANAE BEACH
Waikanae Estuary
WAIKANAE
OTAIHANGA
PARAPARUMU BEACH
RAUMATI BEACH
PARAPARUMU
RAUMATI SOUTH
QUEEN ELIZABETH PARK
N
KAPITI COAST DISTRICT
COASTAL CYCLEWAY
Total distance shown = 16km
Time to ride = 20mins approx.
Coastal Cycle Route
Off Road Gravel Path
Off Road Asphalt Path
Residential Routes
Country Road
Other Roads
Shortcuts
Foot Bridge
GOLF COURSE
AIRPORT
TRAIN STATION
BUS STOP
HOSPITAL
CAFÉ
RESTAURANT
TOILETS
BOAT RAMP
CAMPING
ON YER BIKE SHOP

Appendix 32.B

KCDC Sustainable Transport Strategy Network Hierarchy


LEGEND
Centre Connector
Local Community Connector
Major Community Connector
Major Community Connector - Walkway
State Highway 1
Te Hoia Beach Road
Morrison Road
Peka Peka Road
Paraoa Road
Waikanae River Trail runs along both sides of the Waikanae River
Western Link Road
State Highway 1
Te Moana
Waikanae River Walkway
Elizabeth St
Otaihanga Road



Maney Street
Mazengarb Road
Kapiti Road
Western Link Road
Ratanui Road
Rosetta Road
Raumati Road
Poplar Ave
State Highway 1
Wellington Road
Waikanae River
Wharemakau
Trail
LEGEND
Centre Connector
Local Community Connector
Major Community Connector
Major Community Connector - Walkway
State Highway 1

Appendix 32.C

Pedestrian and Cycle Survey Results

Cycling/Pedestrian Counts

June 14th 2011

Site: PEDESTRIANS		Wharemakau Stream		Kāpiti Road		Waikanae R Bridge		Te Moana Road	
START	END	West	East	West	East	North	South	West	East
7:30	7:45	0	1	1	2	No Data	No Data	0	1
7:45	8:00	0	0	4	7	0	2	1	0
8:00	8:15	0	0	3	3	0	0	1	0
8:15	8:30	0	0	2	2	0	2	0	0
8:30	8:45	2	1	1	2	0	2	1	0
8:45	9:00	1	5	7	0	0	0	1	0
9:00	9:15	1	1	6	2	0	4	0	0
9:15	9:30	1	3	1	2	0	2	2	1
1:30	1:45	2	1	3	2	3	0	0	0
1:45	2:00	5	0	1	2	2	3	0	4
2:00	2:15	2	3	2	5	0	4	0	0
2:15	2:30	0	1	2	1	6	8	1	2
2:30	2:45	2	2	1	4	0	5	0	0
2:45	3:00	1	3	2	4	4	2	0	1
3:00	3:15	0	0	4	5	2	1	0	0
3:15	3:30	1	1	2	2	1	5	2	0
3:30	3:45	2	3	4	2	3	2	3	0
3:45	4:00	2	4	2	3	4	2	0	2
4:00	4:15	3	3	2	4	1	3	2	0
4:15	4:30	4	5	4	3	1	6	3	3
TOTAL		29	37	54	57	27	53	17	14

Site: CYCLISTS		Wharemakau Stream		Kāpiti Road		Waikanae R Bridge		Te Moana Road	
START	END	West	East	West	East	North	South	West	East
7:30	7:45	2	2	2	1	No Data	No Data	0	2
7:45	8:00	1	1	1	2	0	3	0	5
8:00	8:15	0	0	0	0	0	12	0	4
8:15	8:30	0	2	2	5	1	21	0	7
8:30	8:45	0	0	1	1	2	32	2	7
8:45	9:00	0	0	1	2	1	10	1	3
9:00	9:15	0	2	1	0	1	5	2	1
9:15	9:30	2	1	1	0	0	2	0	0
1:30	1:45	1	1	1	1	0	2	0	0
1:45	2:00	1	0	0	1	0	1	1	0
2:00	2:15	0	0	1	0	3	1	1	1
2:15	2:30	1	0	0	1	1	0	2	0
2:30	2:45	1	0	0	0	6	1	0	0
2:45	3:00	0	0	0	1	1	5	0	1
3:00	3:15	1	1	0	3	1	2	1	0
3:15	3:30	0	1	1	2	29	1	15	2
3:30	3:45	0	0	2	3	41	0	2	1
3:45	4:00	1	1	1	2	1	3	2	1
4:00	4:15	1	0	1	0	4	0	5	0
4:15	4:30	1	1	2	1	1	3	1	2
TOTAL		13	13	18	26	93	104	35	37

Appendix 32.D

Crash Data Summary

NZTA's Crash Analysis System (CAS) was interrogated to determine the reported crash history for the five year period 2006 to 2010 along SH1 from MacKays Crossing to Peka Peka and at each of the key intersections within the Project area. **Tables 1 and 2** below summarise the reported crash history on SH1 from MacKays Crossing to Peka Peka and associated intersections.

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	2	6	19	48	**75**
2007	1	3	15	68	**87**
2008	0	2	18	54	**74**
2009	0	2	17	66	**85**
2010	1	4	14	73	**92**
TOTAL	**4**	**17**	**83**	**309**	**413**

Table 1 - Annual Distribution of Crashes on SH1 MacKays Crossing to Peka Peka

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	44	11%
Straight Road Lost Control/Head On	55	13%
Bend - Lost Control/Head On	41	10%
Rear End/Obstruction	114	28%
Crossing/Turning	145	35%
Pedestrian Crashes	9	2%
Miscellaneous Crashes	5	1%
TOTAL	**413**	**100%**

Table 2 - Crash Type SH1 MacKays Crossing to Peka Peka

In the five year period 2006 to 2010 a total of 413 crashes were reported on SH1 between MacKays Crossing and Peka Peka. From these, four of the crashes involved fatalities, 17 resulted serious injuries and 89 resulted in minor injuries. One of the fatal crashes occurred at the SH1 / Hadfield intersection, just north and opposite of the Peka Peka intersection and involved a vehicle failing to give way. Two of the fatalities occurred at midblock locations and involved loss of control or crossing / turning. One of the fatalities involved a pedestrian walking with traffic near Greenhill Road north of Waikanae.

Of the 17 serious injury crashes, six were lost control type crashes, five occurred while a vehicle was turning or waiting to turn across traffic to the right, and three were head-on type crashes. Others were the results of overtaking, queuing, and turning to the left.

Over half of the minor injury crashes involved right turns, lost control type crashes, or rear end type crashes. Many other minor injury crashes involved pedestrians, over taking, head on or other turning and crossing type crashes.

Crashes at Intersections

The reported crash history was analysed for significant intersections along SH1 between MacKays Crossing and Peka Peka and the results of the assessment are presented in **Tables 3 and 4** overleaf.

Poplar Avenue / SH1

For the five year period 2006 to 2010, a total of 9 crashes were reported within 200m of the SH1 / Poplar Avenue intersection on SH1 and within 50m on Poplar Ave. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	0	1	0	2	3
2007	0	0	0	1	1
2008	0	0	0	2	2
2009	0	0	1	1	2
2010	0	0	0	1	1
TOTAL	**0**	**1**	**1**	**7**	**9**

Table 3 - Annual Distribution of Crashes and Injuries at the SH1 / Poplar Avenue Intersection

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	0	0%
Straight Road Lost Control/Head On	3	33%
Bend - Lost Control/Head On	4	44%
Rear End/Obstruction	1	11%
Crossing/Turning	1	11%
Pedestrian Crashes	0	0%
Miscellaneous Crashes	0	0%
TOTAL	**9**	**100%**

Table 4 - Crash Type at the SH1 / Poplar Avenue Intersection

Of these reported crashes, one resulted in a serious injury and one resulted in a minor injury. The predominant crash type was loss of control which accounted for 78% of the reported crashes. The serious injury crash involved a vehicle turning right into Poplar Avenue failing to give way to a

northbound vehicle moving straight through the intersection. There were no reported pedestrian or cyclist crashes within the five year period.

Raumati Road / SH1

For the five year period 2006 to 2010 a total of 24 crashes were reported within 200m of the SH1 / Raumati Road intersection on SH1 and within 50m on Raumati Road. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Inj	Total
2006	0	1	4	1	**6**
2007	0	0	0	0	**0**
2008	0	0	2	2	**4**
2009	0	0	2	7	**9**
2010	0	1	1	3	**5**
TOTAL	**0**	**2**	**9**	**13**	**24**

Table 5 - Annual Distribution of Crashes and Injuries at the SH1 Raumati Road Intersection

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	1	4%
Straight Road Lost Control/Head On	6	25%
Bend - Lost Control/Head On	2	8%
Rear End/Obstruction	2	8%
Crossing/Turning	12	50%
Pedestrian Crashes	0	0%
Miscellaneous Crashes	1	4%
TOTAL	**24**	**100%**

Table 6 - Crash Type at the Raumati Road Intersection

Out of these reported crashes, two serious injuries and nine minor injuries were reported. The predominant crash type was crossing/turning which accounted for 50% of all reported crashes. The majority of all injury crashes were attributable to vehicles failing to give-way when turning at the intersection. The CAS crash list detail report indicated that failing to give-way was a factor in 46% of crashes reported at the intersection. There were no reported pedestrian or cyclist crashes within the five year period.

Kāpiti Road / SH1

For the five year period 2006 to 2010 a total of 65 crashes were reported within 100m of the SH1 / Kāpiti Road intersection on SH1 and within 50m on Kāpiti Road. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	0	1	3	5	9
2007	0	0	1	8	9
2008	0	0	1	11	12
2009	0	0	5	15	20
2010	0	0	3	12	15
TOTAL	**0**	**1**	**13**	**51**	**65**

Table 7 - Annual Distribution of Crashes and Injuries at the SH1 Kāpiti Road Intersection

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	4	6%
Straight Road Lost Control/Head On	2	3%
Bend - Lost Control/Head On	2	3%
Rear End/Obstruction	9	14%
Crossing/Turning	43	66%
Pedestrian Crashes	5	8%
Miscellaneous Crashes	0	0%
TOTAL	**65**	**100%**

Table 8 - Crash Type at the SH1 Kāpiti Road Intersection

Of these reported crashes, one resulted in a serious injury and 13 resulted in minor injuries. The predominant crash type was crossing/turning which accounted for 66% of all reported crashes. The serious injury crash involved a vehicle losing control when slowing down for a red traffic signal. The majority of minor injury crashes involved vehicles failing to give way when turning at the intersection.

There were seven reported crashes at the intersection involving pedestrians and cyclists within the five year period. Four of the crashes involved pedestrians crossing a road and all resulted in minor injuries. Three of the crashes involved cyclists and all resulted in minor injuries.

Otaihanga Road / SH1

For the five year period 2006 to 2010 a total of 24 crashes were reported within 200m of the SH1 / Otaihanga Road intersection on SH1 and within 50m on Otaihanga Road. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Injury	Total
2006	0	0	3	3	**6**
2007	0	0	1	2	**3**
2008	0	2	1	2	**5**
2009	0	0	0	4	**4**
2010	0	1	0	5	**6**
TOTAL	**0**	**3**	**5**	**16**	**24**

Table 9 - Annual Distribution of Crashes and Injuries at the SH1 Otaihanga Road Intersection

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	2	8%
Straight Road Lost Control/Head On	1	4%
Bend - Lost Control/Head On	6	25%
Rear End/Obstruction	7	29%
Crossing/Turning	8	33%
Pedestrian Crashes	0	0%
Miscellaneous Crashes	0	0%
TOTAL	**24**	**100%**

Table 10 - Crash Type at the SH1 Otaihanga Road Intersection

Of these reported crashes, three resulted in serious injuries and five resulted in minor injuries. The most frequent crash types were loss of control/head on (29%), rear end/obstruction (29%) and crossing/turning (33%). One of the serious injury crashes involved failing to give way at the intersection, one involved failing to navigate the intersection, and the third involved loss of control while turning right. The common minor injury crash type involved vehicles failing to give way at the intersection. There were no reported pedestrian or cyclist crashes within the five year period.

Te Moana Road / SH1

For the five year period 2006 to 2010 a total of 30 crashes were reported within 100m to the south or 65m to the north of the SH1 / Te Moana Road intersection on SH1 and within 50m on Te Moana Road. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Inj	Total
2006	0	0	1	8	9
2007	0	0	1	7	8
2008	0	0	0	4	4

Year	Fatal	Serious	Minor	Non-Inj	Total
2009	0	0	0	5	5
2010	0	1	0	3	4
TOTAL	0	1	2	27	30

Table 11 - Annual Distribution of Crashes and Injuries at the SH1 Te Moana Intersection

Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	2	7%
Straight Road Lost Control/Head On	1	3%
Bend - Lost Control/Head On	2	7%
Rear End/Obstruction	9	30%
Crossing/Turning	15	50%
Pedestrian Crashes	0	0%
Miscellaneous Crashes	1	3%
TOTAL	30	100%

Table 12 - Crash Type at the SH1 Te Moana Intersection

Of these reported crashes, one resulted in a serious injury from a left turning vehicle failing to give way. Two resulted in minor injuries, of which, one also involved a left turning vehicle failing to give way, and one was due to overtaking at the intersection. The predominant crash type was crossing/turning which accounted for half of all reported crashes. There were no reported pedestrian or cyclist crashes within the five year period.

Elizabeth Street / SH1

For the five year period 2006 to 2010 a total of 25 crashes were reported within 100m to the north or 65m to the south of the SH1 / Elizabeth Street intersection on SH1 and within 50m on Elizabeth Street. The following tables summarise the CAS output data.

Year	Fatal	Serious	Minor	Non-Inj	Total
2006	0	0	0	1	1
2007	0	0	1	3	4
2008	0	0	0	4	4
2009	0	0	1	5	6
2010	0	0	3	7	10
TOTAL	0	0	5	20	25

Table 13 - Annual Distribution of Crashes and Injuries at the SH1 Elizabeth Street Intersection

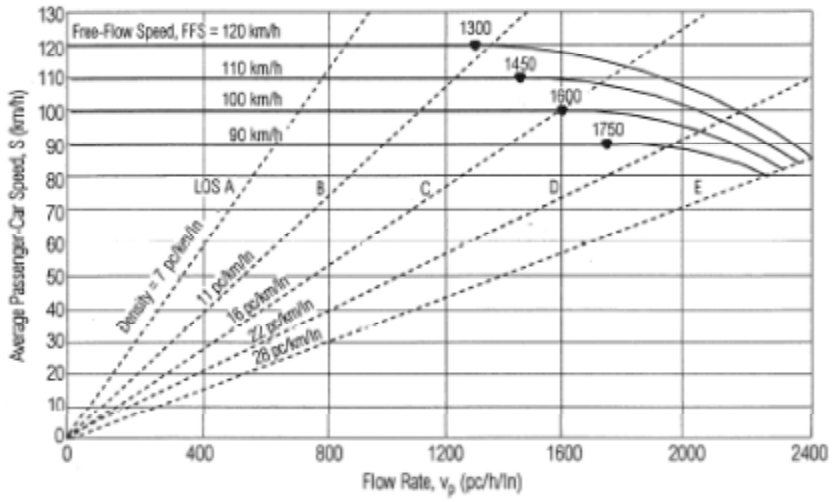
Crash Type	Number of Reported Crashes	Percentage of Reported Crashes
Overtaking Crashes	4	16%
Straight Road Lost Control/Head On	1	4%
Bend - Lost Control/Head On	1	4%
Rear End/Obstruction	5	20%
Crossing/Turning	14	56%
Pedestrian Crashes	0	0%
Miscellaneous Crashes	0	0%
TOTAL	**25**	**100%**

Table 14 - Crash Type at the SH1 Elizabeth Street Intersection

Of these reported crashes, five resulted in minor injuries of which two involved a vehicle failing to give-way while turning right. The most frequent crash types were rear- end/obstruction (20%) and crossing/turning (56%). There were no reported pedestrian or cyclist crashes within the five year period.

Appendix 32.E

Austroads LoS Criteria for Freeway Segments



Source: Exhibit 23-3 in the HCM 2000 (TRB 2000).

Figure 4.4: Speed-flow relationship for basic freeway segments

Table 4.5: LOS criteria for basic freeway segments

Criteria	LOS				
	A	B	C	D	E
FFS= 120 km/h					
Maximum density (pc/km/ln)	7	11	16	22	28
Minimum speed (km/h)	120.0	120.0	114.6	99.6	85.7
Maximum (v/c)	0.35	0.55	0.77	0.92	1.00
Maximum service flow rate (pc/h/ln)	840	1320	1840	2200	2400
FFS= 110 km/h					
Maximum density (pc/km/ln)	7	11	16	22	28
Minimum speed (km/h)	110.0	110.0	108.5	97.2	83.9
Maximum (v/c)	0.33	0.51	0.74	0.91	1.00
Maximum service flow rate (pc/h/ln)	770	1210	1740	2135	2350
FFS= 100 km/h					
Maximum density (pc/km/ln)	7	11	16	22	28
Minimum speed (km/h)	100.0	100.0	100.0	93.8	82.1
Maximum (v/c)	0.30	0.48	0.70	0.90	1.00
Maximum service flow rate (pc/h/ln)	700	1100	1600	2065	2300
FFS= 90 km/h					
Maximum density (pc/km/ln)	7	11	16	22	28
Minimum speed (km/h)	90.0	90.0	90.0	89.1	80.4
Maximum (v/c)	0.28	0.44	0.64	0.87	1.00
Maximum service flow rate (pc/h/ln)	630	990	1440	1955	2250

Source: Exhibit 23-2 in the HCM 2000 (TRB 2000).

Appendix 32.F

SIDRA Outputs

Park Avenue / Ngarara Road 2026

Do Min AM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ngarara Rd											
1	L	33	6.5	0.073	8.4	LOS A	0	0	0	0.95	49
2	T	103	4.1	0.073	0	LOS A	0	0	0	0	60
		136	4.7	0.073	2	NA	0	0	0	0.23	56.9
North: Ngarara Rd											
8	T	120	4.4	0.256	0.7	LOS A	1.4	10.3	0.3	0	53.2
9	R	244	3.4	0.256	9.3	LOS A	1.4	10.3	0.3	0.73	48
		364	3.8	0.256	6.4	NA	1.4	10.3	0.3	0.49	49.6
West: Park Ave											
10	L	296	3.9	0.413	10.7	LOS B	2.2	15.9	0.34	0.65	46.4
12	R	55	5.8	0.413	11	LOS B	2.2	15.9	0.34	0.83	46.3
		351	4.2	0.413	10.7	LOS B	2.2	15.9	0.34	0.68	46.4
		851	4.1	0.413	7.5	NA	2.2	15.9	0.27	0.53	49.2

Do Min PM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ngarara Rd											
1	L	47	2.2	0.095	8.2	LOS A	0	0	0	0.93	49
2	T	133	2.4	0.095	0	LOS A	0	0	0	0	60
		180	2.3	0.095	2.2	NA	0	0	0	0.24	56.6
North: Ngarara Rd											
8	T	98	3.2	0.327	1	LOS A	1.9	13.3	0.37	0	51.6
9	R	334	1.6	0.327	9.5	LOS A	1.9	13.3	0.37	0.72	47.6
		432	2	0.327	7.6	NA	1.9	13.3	0.37	0.56	48.5
West: Park Ave											
10	L	235	1.8	0.354	10.9	LOS B	1.6	11.4	0.38	0.66	46.1
12	R	42	2.5	0.354	11.2	LOS B	1.6	11.4	0.38	0.83	46
		277	1.9	0.354	11	LOS B	1.6	11.4	0.38	0.69	46.1
		888	2	0.354	7.5	NA	1.9	13.3	0.3	0.54	49.1

Park Avenue / Ngarara Road 2026

OPT AM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ngarara Rd											
1	L	68	3.1	0.089	8.3	LOS A	0	0	0	0.86	49
2	T	97	4.3	0.089	0	LOS A	0	0	0	0	60
		165	3.8	0.089	3.4	NA	0	0	0	0.36	54.9
North: Ngarara Rd											
8	T	83	5.1	0.288	0.9	LOS A	1.6	11.2	0.34	0	52.2
9	R	300	2.5	0.288	9.4	LOS A	1.6	11.2	0.34	0.72	47.7
		383	3	0.288	7.6	NA	1.6	11.2	0.34	0.56	48.6
West: Park Ave											
10	L	338	3.4	0.472	11.5	LOS B	3.2	23.2	0.38	0.68	45.7
12	R	58	5.5	0.472	11.8	LOS B	3.2	23.2	0.38	0.85	45.5
		396	3.7	0.472	11.5	LOS B	3.2	23.2	0.38	0.71	45.6
		944	3.5	0.472	8.5	NA	3.2	23.2	0.3	0.59	48.3

OPT PM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ngarara Rd											
1	L	59	3.6	0.092	8.3	LOS A	0	0	0	0.89	49
2	T	114	2.8	0.092	0	LOS A	0	0	0	0	60
		173	3	0.092	2.8	NA	0	0	0	0.3	55.7
North: Ngarara Rd											
8	T	97	3.3	0.332	1	LOS A	1.9	13.5	0.37	0	51.7
9	R	342	1.5	0.332	9.5	LOS A	1.9	13.5	0.37	0.72	47.6
		439	1.9	0.332	7.6	NA	1.9	13.5	0.37	0.56	48.5
West: Park Ave											
10	L	326	1.3	0.505	12.7	LOS B	3.9	27.4	0.41	0.72	44.5
12	R	65	1.6	0.505	12.9	LOS B	3.9	27.4	0.41	0.88	44.3
		392	1.3	0.505	12.7	LOS B	3.9	27.4	0.41	0.74	44.5
		1003	1.9	0.505	8.8	NA	3.9	27.4	0.32	0.59	47.8

Park Avenue / Te Moana Road 2026

Do Min AM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Te Moana Rd											
5	T	193	5.7	0.105	7.4	LOS A	1.5	11.2	0.76	0	46.9
6	R	1	0	0.105	15.9	LOS C	1.5	11.2	0.76	1.05	44.8
		194	5.7	0.105	7.5	NA	1.5	11.2	0.76	0.01	46.9
North: Park Rd											
7	L	1	0	1.175	228.2	LOS F	26.8	191.9	1	2.86	8.2
9	R	199	2.8	1.175	228.5	LOS F	26.8	191.9	1	2.66	8.2
		200	2.8	1.175	228.5	LOS F	26.8	191.9	1	2.66	8.2
West: Te Moana Rd											
10	L	249	4.5	0.446	8.3	LOS A	0	0	0	0.92	49
11	T	593	1.7	0.446	0	LOS A	0	0	0	0	60
		842	2.5	0.446	2.5	NA	0	0	0	0.27	56.3
		1237	3.1	1.175	39.8	NA	26.8	191.9	0.28	0.62	28.5

Do Min PM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Te Moana Rd											
5	T	400	2.5	0.21	3.2	LOS A	2.1	14.9	0.65	0	49.4
6	R	1	0	0.21	11.6	LOS B	2.1	14.9	0.65	1.02	48.6
		401	2.5	0.21	3.2	NA	2.1	14.9	0.65	0	49.4
North: Park Rd											
7	L	1	0	1.243	269.7	LOS F	43.5	308.5	1	4.2	7.1
9	R	280	1.6	1.243	270	LOS F	43.5	308.5	1	3.43	7.1
		281	1.6	1.243	270	LOS F	43.5	308.5	1	3.43	7.1
West: Te Moana Rd											
10	L	198	1.1	0.258	8.2	LOS A	0	0	0	0.86	49
11	T	287	3.5	0.258	0	LOS A	0	0	0	0	60
		484	2.5	0.258	3.4	NA	0	0	0	0.35	54.9
		1167	2.3	1.243	67.5	NA	43.5	308.5	0.46	0.97	20.7

Park Avenue / Te Moana Road 2026

OPT AM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Te Moana Rd											
5	T	218	5.1	0.119	4.4	LOS A	1.3	9.4	0.67	0	49
6	R	2	0	0.119	12.9	LOS B	1.3	9.4	0.67	1.05	47.3
		220	5.1	0.119	4.5	NA	1.3	9.4	0.67	0.01	48.9
North: Park Rd											
7	L	1	0	1.214	141.1	LOS F	28.3	201.5	1	2.76	12.2
9	R	328	2	1.214	141.5	LOS F	28.3	201.5	1	2.45	12.2
		329	2	1.214	141.5	LOS F	28.3	201.5	1	2.45	12.2
West: Te Moana Rd											
10	L	327	4.1	0.348	8.3	LOS A	0	0	0	0.82	49
11	T	318	3.5	0.348	0	LOS A	0	0	0	0	60
		644	3.8	0.348	4.2	NA	0	0	0	0.42	53.8
		1193	3.5	1.214	42.1	NA	28.3	201.5	0.4	0.9	27.5

OPT PM

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Te Moana Rd											
5	T	241	4.1	0.129	4	LOS A	1.3	9.7	0.66	0	49.1
6	R	1	0	0.129	12.4	LOS B	1.3	9.7	0.66	1.04	47.8
		242	4.1	0.129	4	NA	1.3	9.7	0.66	0	49.1
North: Park Rd											
7	L	1	0	1.119	103.2	LOS F	22.3	158.4	1	2.5	15.5
9	R	322	1.7	1.119	103.5	LOS F	22.3	158.4	1	2.2	15.5
		323	1.7	1.119	103.5	LOS F	22.3	158.4	1	2.2	15.5
West: Te Moana Rd											
10	L	343	1	0.32	8.2	LOS A	0	0	0	0.8	49
11	T	257	3	0.32	0	LOS A	0	0	0	0	60
		600	1.9	0.32	4.7	NA	0	0	0	0.46	53.1
		1166	2.3	1.119	32	NA	22.3	158.4	0.41	0.85	31.5

SIDRA Modelling of Expressway Interchanges

SIDRA Model	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
						Vehicles	Distance			
	veh/h	%	v/c	sec		veh	m		per veh	km/h
Northbound Offramp / Peka Peka Rd										
Northbound Offramp / Poplar Ave - AM 2016	1158	11	0.457	10.8	LOS B	3.9	30.6	0.5	0.61	48.9
Northbound Offramp / Poplar Ave - PM 2016	1592	4	0.736	13.6	LOS B	10.5	76.7	0.65	0.72	49.5
Northbound Offramp / Poplar Ave - AM 2026	1402	14	0.645	14	LOS B	8.7	63.0	0.66	0.79	47.1
Northbound Offramp / Poplar Ave - PM 2026	1814	5	0.866	18.5	LOS B	19.3	142.8	0.80	0.87	44.6
Existing SH1 / Poplar Ave - AM 2016	1581	11	0.539	10.5	LOS B	5.6	42.7	0.24	0.6	54.8
Existing SH1 / Poplar Ave - PM 2016	1784	5	0.613	9.2	LOS A	4.6	33.3	0.12	0.55	55
Existing SH1 / Poplar Ave - AM 2026	1933	14	0.69	11.2	LOS B	9.2	72.3	0.31	0.62	54.2
Existing SH1 / Poplar Ave - PM 2026	2087	7	0.704	9.4	LOS A	6.7	51.2	0.16	0.55	55.1
Northbound Offramp / Te Moana Rd - AM 2016	1077	4	0.446	5.3	LOS A	4.1	29.7	0.29	0.39	47.8
Northbound Offramp / Te Moana Rd - PM 2016	1054	3	0.334	7.9	LOS A	2.5	17.7	0.33	0.49	50.2
Northbound Offramp / Te Moana Rd - AM 2026	1324	4	0.551	5.7	LOS A	5.7	41.2	0.36	0.43	47.4
Northbound Offramp / Te Moana Rd - PM 2026	1389	3	0.511	9.2	LOS A	4.5	31.5	0.45	0.56	49.9
Southbound Offramp / Te Moana Rd - AM 2016	1170	0	0.392	6.4	LOS A	2.5	17.5	0.2	0.5	47.6
Southbound Offramp / Te Moana Rd - PM 2016	927	0	0.279	4.7	LOS A	2	14.0	0.15	0.4	47.4
Southbound Offramp / Te Moana Rd - AM 2026	1528	4	0.533	7.6	LOS A	5	36.3	0.3	0.59	47.2
Southbound Offramp / Te Moana Rd - PM 2026	1208	3	0.388	4.8	LOS A	2.6	19.0	0.17	0.41	47.2
Northbound Offramp / Peka Peka Rd - AM 2016	647	8	0.216	7	LOS A	1.6	12.0	0.23	0.52	49.7
Northbound Offramp / Peka Peka Rd - PM 2016	719	4	0.263	7.3	LOS A	2.1	15.3	0.21	0.54	49.6
Northbound Offramp / Peka Peka Rd - AM 2026	686	13	0.249	7.5	LOS A	2	15.0	0.27	0.54	49.3
Northbound Offramp / Peka Peka Rd - PM 2026	758	7	0.291	7.5	LOS A	2.4	17.9	0.22	0.54	49.4
Existing SH1 / Hadfield Rd - AM 2016	213	7	0.1	8.9	NA	0.1	0.6	0.03	0.53	69.1
Existing SH1 / Hadfield Rd - PM 2016	144	3	0.06	8.8	NA	0.1	0.4	0.04	0.54	66.6
Existing SH1 / Hadfield Rd - AM 2026	258	7	0.12	8.9	NA	0.1	0.8	0.04	0.54	68.9
Existing SH1 / Hadfield Rd - PM 2026	164	3	0.069	8.8	NA	0.1	0.4	0.04	0.54	66.6
Existing SH1 / Service Rd - AM 2016	818	8	0.207	5.8	LOS A	1.6	11.6	0.16	0.47	45.5
Existing SH1 / Service Rd - PM 2016	811	4	0.26	6.3	LOS A	2.1	14.9	0.11	0.46	46.7
Existing SH1 / Service Rd - AM 2026	922	7	0.234	7.5	LOS A	1.8	13.5	0.17	0.5	48
Existing SH1 / Service Rd - PM 2026	879	3	0.282	6.3	LOS A	2.3	16.5	0.11	0.46	46.6

SIDRA Modelling of Expressway Interchanges: Sensitivity Test based on "Full Growth"

SIDRA Model	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
						Vehicles	Distance			
	veh/h	%	v/c	sec		veh	m		per veh	km/h
Northbound Offramp / Poplar Ave - AM 2026	1689	15	1.158	72.2	LOS E	64.4	467.0	0.84	1.57	21.2
Northbound Offramp / Poplar Ave - PM 2026	1887	4	0.914	19.9	LOS B	25.9	191.0	0.77	0.93	42.4
Northbound Offramp/Poplar Ave 2L Roundabout - AM 2026	1689	15	0.444	12	LOS B	2.9	24.2	0.45	0.63	50.1
Northbound Offramp/Poplar Ave 2L Roundabout - PM 2026	1887	4	0.453	10.7	LOS B	3	21.8	0.42	0.61	50.8
Existing SH1 / Poplar Ave - AM 2026	2354	15	0.846	12.5	LOS B	17.5	137.0	0.39	0.65	53.3
Existing SH1 / Poplar Ave - PM 2026	2290	8	0.813	10.8	LOS B	15.7	119.4	0.34	0.54	55.6
Northbound Offramp / Te Moana Rd - AM 2026	1576	4	0.65	6.3	LOS A	7.5	53.8	0.45	0.48	46.8
Northbound Offramp / Te Moana Rd - PM 2026	1890	3	0.753	11.8	LOS B	12.2	86.5	0.58	0.67	46.8
Southbound Offramp / Te Moana Rd - AM 2026	1948	4	0.809	10.5	LOS B	15.2	109.4	0.46	0.78	44.9
Southbound Offramp / Te Moana Rd - PM 2026	1634	3	0.534	4.8	LOS A	5.1	36.6	0.24	0.42	46.7
Northbound Offramp / Peka Peka Rd - AM 2026	803	12	0.308	7.6	LOS A	2.6	20.0	0.28	0.54	49.2
Northbound Offramp / Peka Peka Rd - PM 2026	978	6	0.343	8.1	LOS A	3.1	22.9	0.28	0.58	48.8
Existing SH1 / Hadfield Rd - AM 2026	301	7	0.141	8.9	NA	0.1	0.9	0.04	0.54	69.1
Existing SH1 / Hadfield Rd - PM 2026	258	4	0.115	8.8	NA	0.1	0.5	0.04	0.54	68.2
Existing SH1 / Service Rd - AM 2026	1089	7	0.298	7.3	LOS A	2.5	18.6	0.17	0.5	47.8
Existing SH1 / Service Rd - PM 2026	1128	3	0.333	6.8	LOS A	2.9	21.1	0.15	0.48	47.2