12 Traffic and transport

Overview

The Project has significant positive traffic and transport effects (i.e. benefits) for the region and district, namely:

- improved safety for road users on SH1, and for communities using and adjacent to the existing SH1;
- improved route security through provision of a second Waikanae River road bridge crossing;
- provision of an alternative north / south route through Kāpiti linking to the Capital, and to key district facilities;
- reductions in congestion and in travel times for users of SH1, and for the majority of local road network users;
- improved travel time reliability;
- significant enhancement of the walking, cycling and bridleway network in Kāpiti;
- amenity, accessibility and connectivity improvements for communities along the existing SH1 route;
- improvement in access to bus and rail stations across the existing SH1, and enabling additional options for bus routes within Kāpiti.

These benefits are important for the movement of national and regional road-based freight, commuter and tourist traffic, and also for Kāpiti residents.

Modelling indicates that introduction of the proposed Expressway into Kāpiti's urban and rural fabric will have the effect of assisting local network functioning. Project design for interchange location and configuration (full or partial interchanges) has been informed by the modelling. Proposed Expressway induced demands will require the provision of mitigation works on the local network in the immediate vicinity of Project interchanges and these mitigation works form part of the Project. These additional works do not, however, remedy the District's existing on-going growth management related challenges. Current and future urban development will continue to put pressure on the local roading network due to the substantial development potential of land zoned in Kāpiti for residential and commercial purposes.

Residential communities at Paraparaumu and Waikanae will benefit from the Project as a result of reduced traffic volumes (especially commercial vehicle volumes) on the existing SH1, and associated reductions in community severance at these locations. Access and safety improvements will improve for local east / west movement to and from rail and bus stations, community halls and facilities and services located east of the existing SH1. There will also be significant reductions in traffic volumes on some local roads, especially at the eastern ends of Te Moana and Kāpiti Roads.

The Project will have significant positive traffic and transport effects overall, however during construction adverse traffic and transport effects on local communities will occur. These arise primarily

from increased construction traffic using local roads, and delays on local roads while bridges and related works are completed. The Construction Traffic Management Plan (CTMP) in Appendix O of the CEMP (Volume 4) is designed to manage and mitigate these effects to an acceptable level.

12.1 Introduction

This Chapter presents the key findings of the assessment of traffic and transport effects undertaken for the Project. This assessment is based on traffic modelling, the key results of which are described in Section 12.5.1. The key traffic and transport effects from the operation and construction of the Project are then described in Sections 12.8, 12.10 and 12.11 of this AEE, respectively.

Further details on the assessment of traffic and transport effects are contained in Technical Report 32 (Assessment of Transport Effects) and Technical Report 33 (Assessment of Temporary Traffic Effects) in Volume 3 of the AEE, while the results of the modelling work is provided in Technical Report 34 (Traffic Modelling Report), Volume 3.

12.2 Traffic and transport issues and objectives

The NZTA has specific Project objectives which are directly relevant to the traffic and transport assessment for the 18 km proposed Expressway between MacKays Crossing and Peka Peka (these are outlined in Part A, Chapter 2, Volume 2 of the AEE). The Project NOR and resource consents sought are for approximately 16 kilometres of this length. The balance length along the Raumati Straight to MacKays Crossing will be addressed by upgrading works within the existing designated SH1 corridor.

Improved safety, route security and reliability, and travel times are key objectives for the NZTA. The following sections describe the issues with the existing network in this regard. Summary descriptions of the traffic and transport network then follow, and sections on effects assessment and mitigation requirements.

12.2.1 Safety

Between 2006 and 2010, 413 crashes were recorded on SH1 from MacKays Crossing to Peka Peka, of which 4 involved fatalities. While safety improvement works on this section of SH1 have been instituted over this period, on-going traffic growth means there has been no discernible downward trend in the total number of crashes. From 2010 onwards a further 3 fatalities have occurred.

Of the 413 reported crashes, 43% occurred in urban 50km/h sections of SH1. The remainder occurred in peri-urban or rural 70, 80, or 100km/h sections of SH1. Over a third of crashes (35%) involved turning movements into or off of SH1 from or to the local network.

The scope for further reductions in the number of crashes through road improvements to the existing SH1 is constrained by the multiple access points from side roads and private properties along the existing SH1. Options for carriageway realignment and widening to rectify these deficiencies, including associated land take and financial implications have been considered and rejected in favour of the proposed Project.

The Project will address rising traffic demands (especially demand from commercial vehicles) by the provision of an alternative route which has been designed to modern safety standards.

Tables 12.1 and 12.2 summarise the reported crash history on SH1 from MacKays Crossing to Peka Peka.

Table 12.1: Annual Distribution of Crashes on SH1 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 12.2: Crash Type 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%**

While a significant proportion of local traffic is expected to continue to use the existing SH1 route, through traffic is expected to use the new route. Without the Project, existing crash problems are likely to increase with an increase in traffic over time and this will have a further adverse effect on the reliability of travel times.

12.2.2 Route security

A key element of NZTA's Project Objectives is to provide a state highway network with good route security. Construction of the Project will provide better security of access into and out of the capital city. The northern access to Wellington is currently vulnerable to closure from a range of events. These include a significant earthquake, tsunami or storm event, or due to other events such as traffic crashes. This risk is compounded by the eastern access to Wellington (via the Rimutaka Hill section of SH2) also being vulnerable to closure, particularly due to slips after heavy rain, and during periods of high winds.

Current SH1 and SH2 vulnerabilities mean that closure as a result of significant damage in an extreme event could take several weeks or months to repair. Building resilience into the State Highway network lessens closure risks which would otherwise be extremely disruptive and result in lost productivity both regionally and nationally.

The MacKays to Peka Peka section of the existing SH1 has a particular vulnerability as it is currently the only road crossing of the Waikanae River and it is proximate to a fault line.

12.2.3 Time and congestion

Traffic congestion in the SH1 corridor results in increased travel times during weekday peak periods. In 2026, it is expected that, without the Project, this will be most evident for a northbound journey from MacKays Crossing to Waikanae. This would take 20% longer in the weekday PM peak than it does now.

During weekend and holiday periods severe congestion often occurs along the existing SH1 as a result of increased road traffic demands. In the event of an incident, such as a crash or natural event, the extent of disruption can be magnified significantly.

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

The Project is predicted to significantly improve travel times for through traffic between MacKays Crossing and Peka Peka, reducing the projected travel time in 2026 by an estimated seven minutes in the weekday morning peak and over ten minutes in the weekday evening peak.

12.3 The existing transportation and traffic environment

SH1 is the primary strategic route within the Wellington region. The nearest alternative State highway connection to the Project area is SH58 19km south of the Project, which links with SH2. SH1 provides essential connectivity for the Kāpiti communities situated along it, and for longer distance traffic movements between Wellington and the north.

Approximately 50% of journeys that use one or more sections of the proposed Expressway are predicted to either originate or terminate outside the study area. This reflects the study area's importance to the overall operation of the Northern Corridor RoNS.

The existing transport environment for the Project is described below in terms of the:

- Existing State Highway and Local Network and its operation;
- Kāpiti pedestrian and cycle network; and
- Public transport system.

12.3.1 Existing State highway and local network

The existing road network layout and hierarchy is shown on Figure 12.1.

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 meaning there is no alternative route for local traffic to use between Waikanae and Paraparaumu.

SH1 also provides an essential element 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:

- 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. This adversely impacts on safety by mixing a high volume of local traffic making frequent turns onto and off the existing SH1, with passing traffic and freight attuned to and seeking open road speeds.

Figure 12.1: KCDC Road Hierarchy Plan & Proposed Expressway Route

12.3.2 Current State highway 1 environment

The existing road environment within the Project area is described for the State highway network, including local roads in the vicinity of the Project corridor.

The existing SH1 between MacKays Crossing and Peka Peka traverses mostly flat terrain and passes through a variety of both rural and urban environments.

a. **MacKays Crossing to Poplar Avenue** (RP1023/7.240 to RP1023/3.612)[103]

Between MacKays Crossing and Poplar Avenue, SH1 is a four-lane median divided highway with a 100km/h speed limit. Through this area SH1 is bounded by the NIMT Railway line on the east side and Queen Elizabeth Park on the west side.

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

From Poplar Avenue to Ihakara Street, SH1 remains 100km/h 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.

c. **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 70 km/h near Ihakara Street and again to 50 km/h 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 (divided) to the intersection with Kāpiti Road. Two access points to the Coastlands shopping mall are provided. Access points are also provided to fast food stores such as Burger King and McDonalds. 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 50km/h 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 railway) is between Amohia Street and Buckley Grove. The overbridge and approaches are particularly narrow with little or no shoulders and poor geometry. There is a footpath on the south side of the bridge.

[103] State Highway Route Positioning reference system

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

d. **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 80 km/h. 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.

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

North of Otaihanga Road, the SH1 posted speed limit increases to 100km/h 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. Due to crash fatalities in late 2011 a 50 km/h limit has been put in place for portions of this stretch of road.

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

At the north end of the Waikanae River Bridge, the posted speed limit on SH1 reduces to 70km/h and then again to 50km/h as SH1 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 intersections, 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 and a new parking area.

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 World supermarket on the west side of SH1. The speed limit increases to 70km/h around Martin Street. At Hemi Street, SH1 leaves the Waikanae urban area and the posted speed limit increases to 100km/h.

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

Between Hemi Street and Peka Peka Road, SH1 is a 100km/h 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.

12.3.3 Pedestrian and cycle routes

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 SH1 traffic lane.

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

The *Coastal Cycleway Guide*[104] identifies a cycling route between Paekākāriki and Peka Peka, running mainly along residential streets and also through Queen Elizabeth Park and along the Waikanae River. The proposed Expressway does not cross this Route.

Two existing cycle and walking routes are crossed by the proposed Expressway. These are the Wharemauku Trail which follows the Wharemauku Stream; and, the Waikanae River Trail connecting Waikanae to Waikanae Beach and Otaihanga to Waikanae. The Waikanae River Trail runs along both sides of the Waikanae River. Connections to these Trails by a new north to south cycleway / walkway are proposed as part of the Project.

Other existing pedestrian and cycle facilities on local roads in the vicinity of proposed Expressway interchanges are:

- **North side of Poplar Avenue**, an off-road gravelled path for use by pedestrians and cyclists, which runs for approximately 100 metres east and west of Te Ra School.
- **Kāpiti Road** in the vicinity of the proposed Expressway where 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.
- **North side of Te Moana Road** where 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.
- There are **no footpaths or cycle lanes on Peka Peka Road or Hadfield Road** in the vicinity of SH1 or the proposed Expressway area.

12.3.3.1 Information on pedestrian and cycle movements

Pedestrian and cycle counts were undertaken by the Project team at four locations in the study area in June 2011 to assist with design and to inform effects assessments. The results of these surveys indicate the volumes of pedestrians and cyclists travelling along Kāpiti Road and Te Moana Road through the proposed Expressway interchange locations. The surveys also informed the Project team on the use of

[104] http://kapiticoast.govt.nz/Documents/Downloads/Kapiti-Coast-District-Coastal-Cycleway-Guide.pdf

the Wharemauku Trail and Waikanae River Trail and showed these to be well utilised, especially in the weekday afternoons.

Further information is included in Technical Report 32, Volume 3.

12.3.4 Public transport

The Kāpiti Coast District is well serviced by public transport with rail and bus services. Figure 12.2[105] below shows the bus and rail network services which currently operate in the project area.

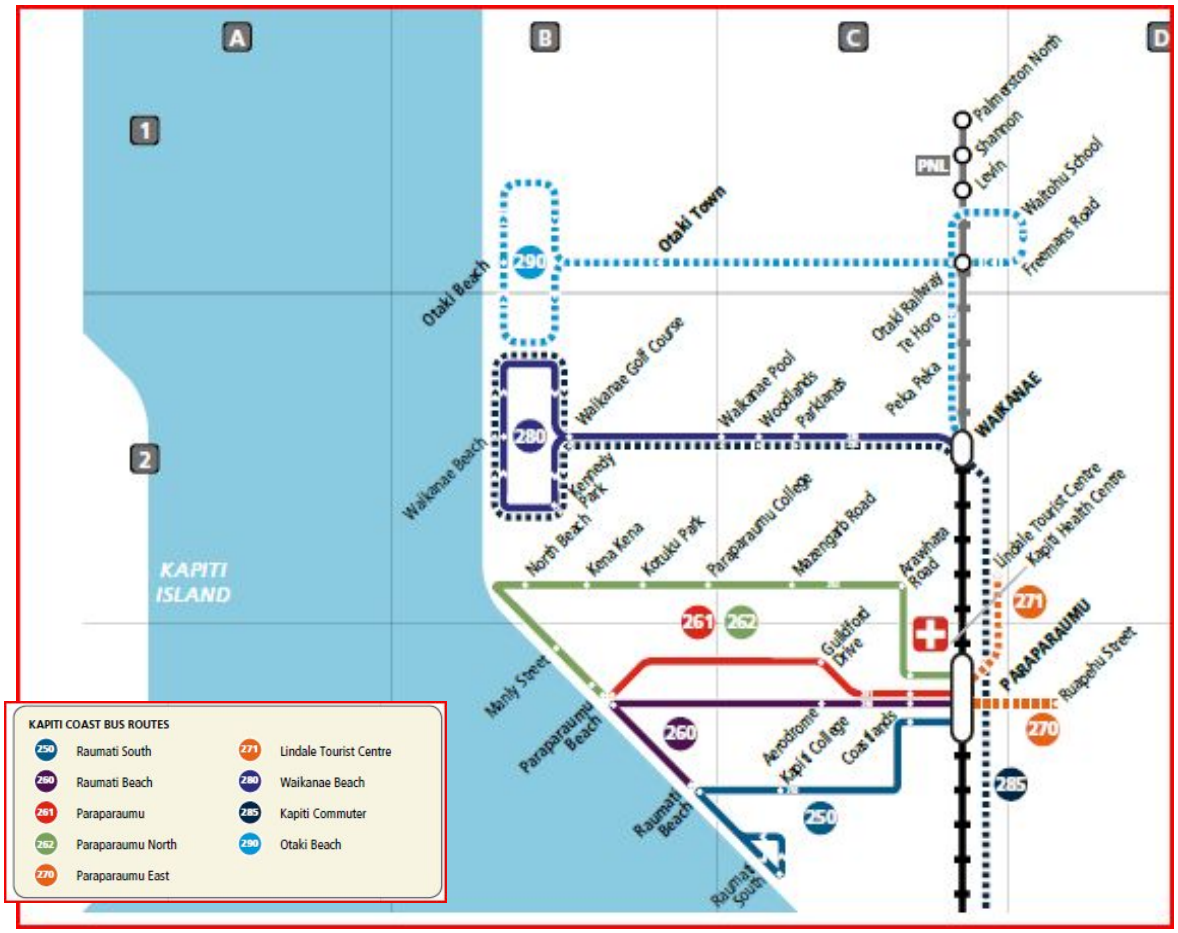

Figure 12.2: Project Area Public Transport Network Map

Effects assessment has also been informed by KCDC's policy and transport strategy, and recognition of public transport management and review processes overseen by Greater Wellington Regional Council.

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

12.3.4.1 Rail

The 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 5 years. GWRC's TranzMetro service provides numerous rail services to Wellington at these stations generally at frequencies of:

- 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.

Additional information on services is detailed in Technical Report 32, Volume 3.

GWRC has previously identified long term potential for additional future railway stations in the Project area, and the proposed Expressway design has sought to ensure these options are not precluded long term. In particular, community interest in car parking space for a possible station at Raumati South was recognised. A design analysis indicated that the Project would not preclude opportunities to provide car parking in that location[106].

12.3.4.2 Buses

There is a network of bus services on the Kāpiti Coast, as illustrated in Figure 12.2. 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 generally operate on a one hour frequency. Location of bus stops relative to the proposed Expressway has informed Project alignment and design considerations.

The Project will enable service providers and GWRC to consider the viability of loop services using the current Waikanae River Bridge crossing with access to and from the full interchanges at Paraparaumu and Te Moana Road[107].

12.3.4.3 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 identified and the nature of crossing described. From south to north:

[106] 2011 Project Team and GWRC officer discussions

[107] 2011 Project Team and GWRC officer discussions

- Poplar Avenue - remains at grade, with the proposed Expressway crossing the local road by bridge overhead and south facing connections provided;
- Leinster Avenue – cul-de-sac formed;
- Raumati Road – local road remains at grade, with the proposed Expressway crossing by bridge overhead;
- Kāpiti Road - remains at grade, with the proposed Expressway crossing by bridge overhead and north and south facing connections provided;
- Mazengarb Road - remains at grade, with the proposed Expressway crossing by bridge overhead;
- Otaihanga Road - remains at grade, with the proposed Expressway crossing by bridge overhead;
- Te Moana Road - remains at grade, with the proposed Expressway crossing by bridge overhead and north and south facing connections provided;
- Ngarara Road - bridge at grade, with the proposed Expressway crossing beneath;
- Ngarara Road (paper road) – cul-de-sac of paper road formed;
- Smithfield Road – cul-de-sac formed, with a new local road bridge provided above the proposed Expressway; and
- Peka Peka Road – new local bridge provided above the proposed Expressway, and north facing connections provided to it.

The proposed Expressway also crosses a potential extension of Ihakara Street. This future link is identified in the KCDC District Plan as an east / west connection between the Paraparaumu Town Centre and Airport. The proposed Expressway design enables this link to be provided at a future date.

Project planning for the proposed Expressway has included consideration of KCDC planned future urban growth, particularly in Waikanae North, which are envisaged to have new local roads, including new east-west link roads.

12.4 Traffic flows and travel times

12.4.1 Traffic counts and profiles (2010)

Average Annual Daily Traffic volumes[108] and heavy vehicle percentages for various locations on the existing SH1 from MacKay's Crossing to Peka Peka are summarised in Table 12.3 below:

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

Table 12.3: Average Annual Daily Traffic Volumes on SH1

Count Location on SH1	Average Annual Daily Traffic Volume (2010)	Percentage Heavy Vehicles
Marycrest (north of Peka Peka)	16,798	8%
North of Elizabeth Street (Waikanae)	21,537	7%
North of Ihakara Street (Paraparaumu)	25,923	7%
South of MacKays Crossing	25,012	8%

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

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

For SH1 count sites, the afternoon peak is larger than the morning peak at both locations.

12.5 Methodology for assessing effects

The effects assessment was informed using outputs from regional and district level models. These models have been subjected to rigorous processes of calibration, validation and peer review to ensure that the resulting forecasts are reliable.

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

The Project effects assessment involved use of a hierarchical modelling system involving the following three components below:

- A strategic multi-modal demand model that relates land use (such as population and employment), to person travel patterns at a strategic, region-wide level (see Technical Report 34, Volume 3);
- A project assignment model, which is smaller in area than the demand model but 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
- An operational model, which uses micro-simulation to look at specific intersections and connections in even greater detail.

12.5.1 Modelling methodology and outputs

Modelling has been carried out to enable effects to be assessed between what would occur without the Project and with the Project.

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

The modelling assessments have been based around two principal scenarios, a Do Minimum scenario without the Project in place, and a 'with Project' scenario. The assessments focus upon the evaluation of conditions in 2026, a few years after the expected completion of construction in 2017/18.

In addition to these two scenarios, "sensitivity testing" has been undertaken to assess the extent to which the traffic demand modelling results for the two scenarios may be sensitive to changes in some of the key assumptions for these scenarios. The sensitivity testing is described in Technical Report 34, Volume 3 and is not considered to alter the conclusions of the effects assessment.

12.5.1.1 Do minimum scenario 'without Project'

The Do Minimum represents a realistic future scenario to 2026, but without the Project in place. This has been developed to provide a baseline against which the effects of the Project can then be assessed. Details on the scenario are set out in Technical Report 34, Volume 3.

The Do Minimum includes the land use changes forecast by the GWRC and KCDC, consistent with the assessment of other transportation projects across the region. Transport projects which have not yet been constructed, but are expected to be completed by 2026, regardless of whether the Project goes ahead are included in the Do Minimum. This is based on input from KCDC and GWRC as to an appropriate Do Minimum scenario.

Modelling includes a comparison of the baseline 2010 traffic flows with the forecast "Do-Minimum" traffic flows (i.e. without the Project) in 2016 and 2026. The estimated daily two-way directional traffic flows on SH1 under the Do Minimum scenario are shown in Table 12.4 below.

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 (without Project).

Table 12.4: Do Minimum 'Without Project' 2010, 2016 and 2026 Daily Flows on SH1 (Two-directional Vehicles per Day)

Location	2010	2016 Do Min	2010 - 2016 DM Change	2026 Do Min	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%	31,900	19%
South of Peka Peka Road	17,000	18,100	6%	20,500	21%

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 due to projected demographic and economic factors.

The wider network effects of the traffic growth under the Do Minimum (without project) from 2010 to 2016 and 2026 respectively are shown in Table 12.5 below. This information provides a basis for assessing Project effects compared with the Do Minimum scenario.

Table 12.5: Do Minimum 'Without Project' Comparison of 2010 with 2016 and 2026 Daily Flows on Selected Local Roads (Two- directional Vehicles per Day)

Location	2010	2016 Do Min	2010 - 2016 DM Change	2026 Do Min	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%
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%

12.5.1.2 Traffic Model Forecasts 'With Project'

The 'With Project' scenario is the same as the Do Minimum, except that it also includes the Project and associated changes to existing SH1 and the local network.

With the Project constructed, the predicted difference at 2026 in daily traffic between the Do Minimum and Project in 2026 is shown across Kāpiti District in Figures 12.3 and 12.4 below.

Positive (green) shows where the traffic is predicted to increase compared to the Do Minimum. Negative (blue) indicates where traffic is expected to decrease.

Width of lines denotes the level of volume change. This is also detailed in Table 12.6.

As it is not possible to present comparisons where the network differs, flows along the proposed Expressway (which would be positive) are not displayed. What can be seen is the magnitude of the change in flows along SH1 and other local roads within the study area, such as Te Moana Rd and Otaihanga Rd, as a result of opening the proposed Expressway.

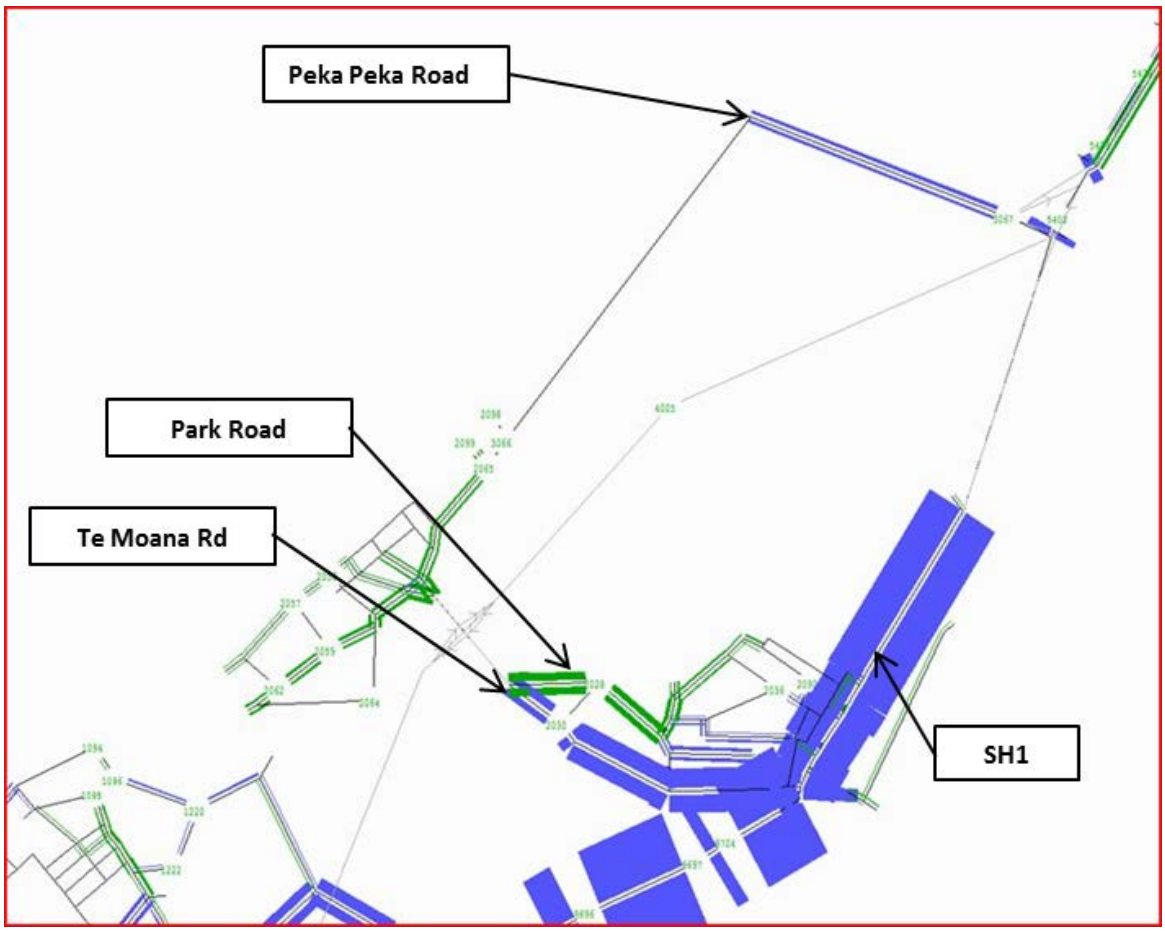

Figure 12.3: Predicted difference in daily flows at Waikanae: Do Minimum vs Project at 2026

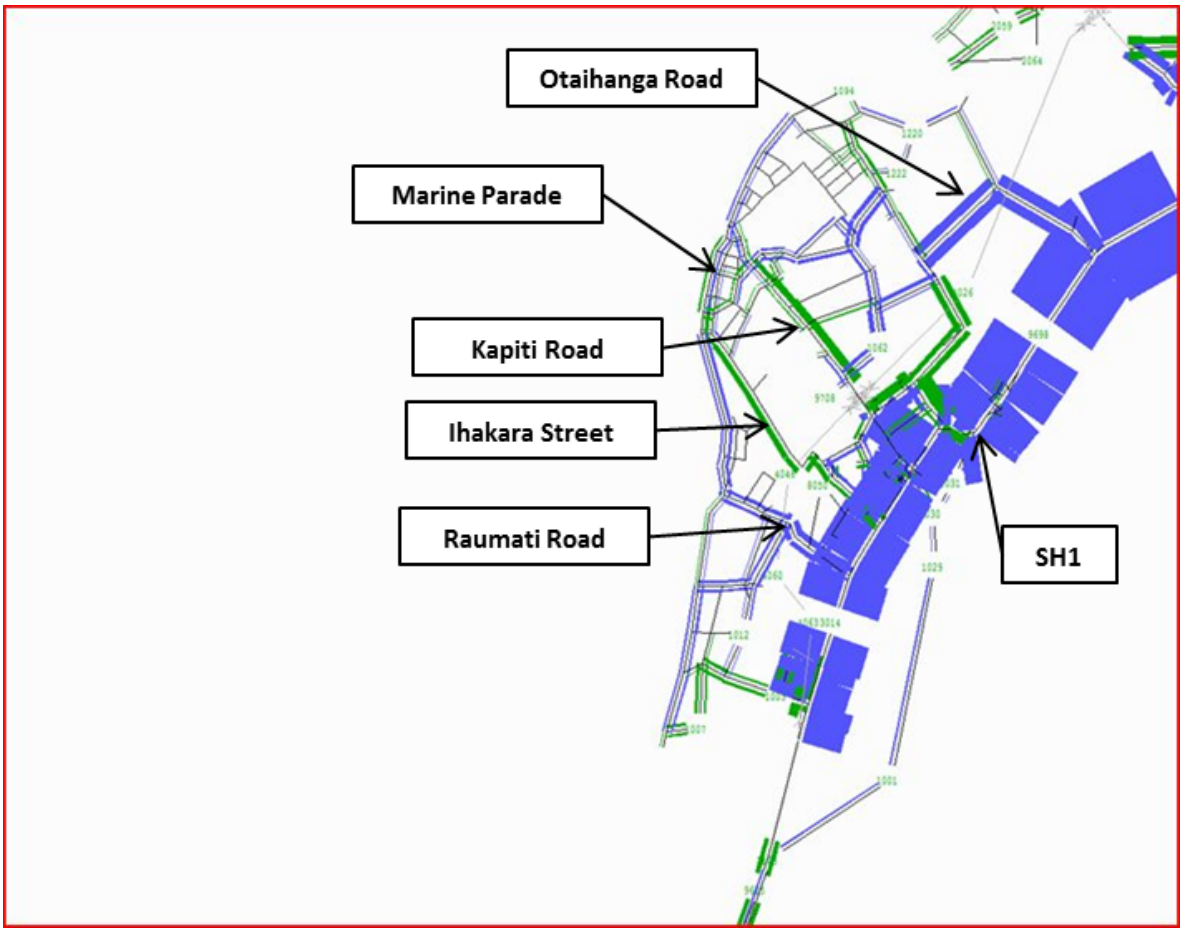

Figure 12.4: Predicted difference in daily flows at Paraparaumu: Do Minimum vs Project at 2026

The Traffic Modelling Report also evaluates travel demands by mode, and traffic volumes by road section.

In summary, the modelling indicates that there will be significant changes in patterns of transportation and traffic demands throughout the District arising as a result of the Project. Many of the changes are positive, and where new pressures relate to the proposed Expressway, upgrading work in the immediate vicinity of interchanges for the Project address these.

Table 12.6: Comparison of 2010, 2016 and 2026 Do Minimum with 2016 and 2026 Project Daily Flows on Selected Local Roads (Two- directional Vehicles per Day)

Location	2010	2026 Do Min	2026 Project	Change b/w 2026 Do Min & 2026 Project
Poplar Ave, East of Matai Rd	2,500	3,300	3,800	15%
Matai Rd, South of Raumati Rd	4,300	5,900	5,300	-10%
Raumati Rd, West of Rimu Rd	13,000	17,800	16,300	-8%
Rimu Rd, South of Kāpiti Rd	19,600	16,100	15,500	-4%
Kāpiti Rd, West of SH1	16,200	18,600	13,700	-26%
Kāpiti Rd, West of Arawhata Rd	24,900	29,400	29,700	1%
Kāpiti Rd, West of Te Roto Dr	15,600	20,800	22,000	6%
Arawhata Rd, North of Kāpiti Rd	7,800	6,500	6,300	-3%
Te Roto Dr, North of Kāpiti Rd	10,300	12,400	12,200	-2%
Realm Dr, North of Guildford Dr	2,900	4,100	3,400	-17%
Mazengarb Rd, East of Guildford Dr	5,300	6,200	5,700	-8%
Ratanui Rd, North of Mazengarb Rd	7,200	7,800	4,800	-38%
Otaihanga Rd, West of SH1	6,500	8,600	5,500	-36%
Te Moana Rd, West of SH1	10,700	13,000	6,200	-52%
Te Moana Rd, West of Walton Ave	5,200	8,100	5,500	-32%
Park Ave, North of Te Moana Rd	1,800	4,500	6,200	38%
Paetawa Rd, South of Peka Peka Rd	900	1,300	1,200	-8%
Peka Peka Rd, West of SH1	1,100	1,300	700	-46%

12.6 Summary of changes in traffic flows

The Project is predicted to change traffic flows on local roads as follows:

- In the majority of cases traffic volumes on local roads are predicted to decrease as a result of the Project. In particular, 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 have significant decreases 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, 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 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, due to Park Avenue being a direct route to the Te Moana Interchange from the Ngarara and Waikanae North development areas. The increase in traffic is not expected to result in any significant delays or queuing. However, it is recognised that the road environment is primarily residential in character with regular property access points. The change in traffic volume could have an impact on the character of the road environment.

Effects on the transport network are outlined in the following sections and are described in detail in Technical Report 32, Volume 3.

12.7 Effects based assessment methods

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

The criteria assessed are:

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

These effects are assessed by identifying conditions for the Do Minimum (without the Project) and then assessing the changes which would occur with the Project in place. Particular attention is given to traffic congestion and traffic volumes, as traffic congestion both increases the total length of travel, and the variability or uncertainty of travel times in the corridor. This means that the planning of journeys becomes increasingly difficult due to uncertainty, resulting in additional and unnecessary costs being borne by travellers and businesses.

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

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

12.8 Operational traffic and transport effects

In 2026, over 20,000 vehicles per day are predicted to use the proposed Expressway between Kāpiti Road and Te Moana Road. The Project will have a number of significant positive effects by 2026, including the following:

- It is forecast that the proposed Expressway will result in a seven minute average improvement in southbound travel times between Peka Peka and MacKays Crossing in the AM peak and a ten minute average improvement in the opposite direction in the PM peak;
- Of the traffic using the proposed Expressway, 88% is predicted to be existing traffic that has migrated to the proposed Expressway, with 12% is predicted to be 'induced traffic '(new travel) forecast as a result of the Project. Traffic volumes on the existing SH 1 and a number of other local roads are predicted to reduce;
- 12-20% of the traffic using the proposed Expressway is predicted to be Heavy Commercial Vehicles, which is consistent with the character of an Expressway and is well within its capacity. It is expected that there will be a significantly reduced volume of HCVs on existing SH1;
- Although not directly forecast by the models (which predict average journey times), travel time variability is known to increase as traffic levels approach the capacity of the network, as expected in the Kāpiti corridor without the Project. Therefore the significant increase in capacity provided as part of the Project is expected to significantly improve journey time reliability;
- Greatly improved travel time reliability arises from reduced congestion, meaning that travellers will have more certainty regarding their expected arrival times at their destination, especially important for freight movements.
- The proposed Expressway is predicted to lead to substantial improvements in journey times across a wide range of routes within the Kāpiti Coast District;
- In the majority of cases, traffic volumes on local roads are predicted to decrease as a result of the Project;
- With the proposed Expressway in place, daily two-way traffic volumes along the existing SH1 between Peka Peka and MacKays Crossing are predicted to reduce by approximately 37% to 46%;
- The proposed Expressway between MacKays Crossing and Peka Peka is predicted to operate at Level of Service B in 2026 (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 – see Technical Report 32, Volume 3 for further details).
- Proposed Expressway interchanges at Poplar Avenue, Te Moana Road and Peka Peka Road are all predicted to operate at Level of Service B or better. Analysis indicates that the proposed Expressway interchange with Kāpiti Road will operate at Level of Service C.
- The delays experienced at priority-controlled intersections such as Poplar Avenue, Raumati Road, and Ihakara Street are predicted to reduce significantly;
- Delays experienced by traffic turning onto the existing SH1 from side roads such as Raumati Rd, Rimu Rd and Otaihanga Rd are predicted to substantially reduce as the proposed Expressway draws traffic off the existing State highway, reducing traffic congestion along this route;

- The Project will have neutral to adverse effects by 2026, including the following:
- Traffic volumes are expected to increase by around 6-9% by 2026 on Kāpiti Road in the vicinity of the Kāpiti Road Interchange. The increase in traffic volume is not expected to significantly adversely impact the operation of Kāpiti Road;
- Poplar Avenue, east of Matai Road is expected to experience an increase in traffic of 13-15% by 2026. While significant in percentage terms, this results in an increase of only 400-500 vehicles per day, comparing the Do Minimum scenario with the Project, due to the relatively low volume of traffic on Poplar Avenue. The additional traffic volumes 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. The increase in traffic is not expected to result in any significant delays or queuing. However, it is recognised that the road environment is primarily residential in character with regular property access;
- The volume of heavy vehicles is predicted to increase on Park Avenue and Paetawa Road by 60 and 10 vehicles per day respectively. These small predicted increases on Park Avenue and Paetawa Road are not expected to adversely impact on the function of these local roads;

12.8.1 Effects on total travel demand and mode of travel

The Project will result in a number of changes in travel behaviour, arising from reductions in the costs of road travel, improved trip reliability, and improved accessibility. Trip movements which are currently suppressed due to the effects of congestion and lengthy journey times are likely to be released (forecast at 12% of the predicted traffic volumes for the Project), leading to an overall increase in road traffic activity. These are called 'induced' trips and can be viewed as a benefit through individuals valuing the improved accessibility, time savings and / or trip reliability provided by the Project. Technical Report 32 (Volume 3) discusses this in more detail.

The forecast volumes of major travel movements in the corridor for 2026 (summarised in Technical Report 34, Volume 3) indicates that there would be some increase both in the total volume of travel in the corridor and also in the proportion of the travel which is undertaken by road, as a result of the Project.

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

12.9 Effects assessment conclusions

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

- The Project is predicted to enhance journey efficiency, safety, and journey time reliability;
- The Project balances inter-regional and local traffic movements, with the proposed Expressway providing significant benefits for both through traffic and local traffic movements;
- The proposed Expressway is predicted to operate at Level of Service B in 2026;
- With the proposed Expressway in place, travel times within the overall network would significantly improve;
- The Project significantly reduces the volume of traffic on SH1, enabling reductions in congestion in the Paraparaumu and Waikanae town centres, and safety benefits;
- All existing principal east-west local link roads would be maintained by the Project, and there are opportunities for providing future linkages across the proposed Expressway.
- The Project has the effect of improving network resilience by providing a second road crossing of the Waikanae River;
- The Project provides a dedicated walkway / cycleway along the proposed Expressway corridor which will enhance connectivity between local communities; and,
- The proposed Expressway provides opportunities to enhance access to rail and bus stations, and options for alternative routes for bus services
- In general the construction traffic effects of this Project are expected to be able to be mitigated acceptably provided the procedures outlined by the CTMP are followed.
- The effects are not anticipated to be significantly greater or unusual compared with other major road construction projects completed in the Wellington region in the last five to ten years. As such, the NZTA has considerable experience and a strong track record of successfully managing the effects of construction on traffic that will be carried through onto the MacKays to Peka Peka Project.

12.10 Measures to avoid, remedy or mitigate actual or potential adverse effects

Project design has incorporated measures and features to avoid, remedy or mitigate actual or potential traffic and transport effects on the wider local and State highway road network.

12.10.1 Pedestrians and cyclists

The Project provides a dedicated walkway / cycleway along the proposed Expressway corridor which will enhance connectivity between local communities. This enhancement is consistent with KCDC's Cycling, Walking, Bridleways Strategy, as well as the Project Objectives. Pedestrian and cycle facilities will be provided at each of the proposed Expressway interchanges to facilitate movement through these key movement nodes.

12.10.2 Public transport

The Project is predicted to result in travel time improvements across the road network which will also be experienced by buses. The proposed Expressway would also provide the potential for new bus routes, such as an opportunity to establish a bus route between Waikanae Beach to Paraparaumu via the

proposed Expressway (along the former WLR route), which is considered to be consistent with KCDC's *Sustainable Transport Strategy* in supporting and promoting modal choice.

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 as part of CEMP process.

Pedestrian access to rail stations can be assisted once the proposed Expressway is opened, taking advantage of the reduced traffic flows along the existing SH1, which provide the potential for a reduced speed environment to be instituted, and scope for improvements at crossing points along that route.

12.10.3 Property access

The proposed Expressway will affect existing access to a number of properties. The proposed Expressway has been designed to mitigate adverse effects on adjoining properties. The Project design includes provision for alternative access.

12.11 Managing operational traffic effects

While the Project will have significant traffic and transport related benefits to the overall transport network, there are actual and potential adverse effects that may arise from the operation of the network with the Project in place which require management.

Processes for managing these effects are provided primarily through the Land Transport Management Act and implemented by KCDC, GWRC or NZTA.

12.12 Construction traffic and transport effects management

There will be some adverse effects associated with the Project, primarily of a temporary or short term nature, during construction. The following section outlines the measures identified to avoid, remedy or mitigate actual and potential adverse traffic and transportation effects during construction.

During construction, adverse effects arise from construction traffic using local roads for access. The specific routes and locations that may be affected (depending on the chosen construction methodology) have been identified and assessed. Construction traffic effects are set out in more detail in Table 12.8 below.

12.12.1 Construction Traffic Management Plan (CTMP)

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

The proposed designation conditions set out the requirements for construction traffic management, and the required contents for the CTMP. The CTMP prepared for this application (refer to CEMP Appendix O, Volume 4) sets out the objectives and procedures required to produce SSTMPs and to manage the actual and potential effects of construction traffic. It details the standards to be adhered to, identifies the objectives in developing SSTMPs and the issues that must be considered, and how the effects of traffic

management methods, and construction traffic on local roads could be managed. Key team members' roles and responsibilities are also included.

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

- Compliance with the NZTA's Code of Practice for Temporary Traffic Management (COPTTM), 2004. A method for situations where practicably non-compliance or departures from the standard are unavoidable is set out in the CTMP.
- The use of leading industry standards with regard to TTM and safety.
- Minimising disruption on the State highways and local roads, wherever practicable.
- Limiting, where practicable, the number of construction vehicle trips on local roads and obtain access from arterial roads and State highways.
- Maintaining existing flows and travel times on State highways and local roads adjacent to the work site as far as is practicable within overall project needs for safe, efficient and timely construction.
- Minimising the impact of works on vulnerable road users such as pedestrians and cyclists so far as practicable.
- Minimising the effects of construction traffic on local roads used for access so far as practicable.
- Minimising the impact of construction parking so far as practicable.
- Developing SSTMPs having consideration for all key stakeholders (i.e. residents, GWRC and KCDC, emergency services, iwi, and businesses).
- Identifying all issues and have a planned SSTMP submitted to and approved by both KCDC and the NZTA's network management consultant at least five days before implementation is required.
- Providing effective communication to affected parties.
- Implementing TTM that provides stakeholders with information in terms of functionality and clarity of direction of travel through roadwork sites.

These objectives are to be achieved through implementation of the CTMP which manages construction effects, with dust and noise from construction traffic managed through a Construction Noise and Vibration Management Plan (CNVMP) and a Construction Air Quality Management Plan (CAQMP).

Specific means available through the CEMP and CTMP are set out in Table 12.7.

Table 12.7: Proposed methods to manage construction traffic effects

Potential effect	Possible method to avoid, remedy or mitigate potential effect
Passing traffic slowing to view works (i.e. 'Rubbernecking) thereby increasing delays.	■ Screens might be installed to avoid or reduce views of construction work available to passing motorists.
Reduction in capacity on existing roads, increasing travel times and, in some cases, reducing inter-regional travel for short periods of time.	■ For road capacity reduction activities, the timing of these would seek to be targeted to low flow conditions. Where road closures take place targeted communication of these closures and diversions would be undertaken.
Construction traffic on local residential roads leads to potential amenity and safety concerns	■ Utilise the designation alignment as a haul road as far as practicable. ■ Construct alternative access ways where required and practicable. ■ Use minibuses for construction staff access. ■ Manage noise and air quality through appropriate management plans to address amenity concerns. ■ Restrict heavy vehicle movements to avoid school drop off and pick up times. ■ Minor safety improvements implemented where required, such as improved delineation, temporary speed restrictions, and inter-visibility improvements. ■ Restrict heavy vehicle access at uncontrolled intersections of SH1 due to safety deficiencies (visibility and geometric alignment). ■ Develop a maintenance intervention strategy with KCDC as Road Controlling Authority (RCA).
Increased construction traffic movements of both light vehicles and heavier vehicles have adverse amenity and safety effects on local roads.	■ Implement the CTMP. ■ Control construction vehicle movements – for example time of day, day of week etc. Use of the Main Alignment as early as practicable for construction vehicles. ■ Provide controls for traffic movements around shift start / finish to avoid intensive traffic movement periods, including using mini buses to get workers travelling through to construction sites. ■ Upgrade some local roads to accommodate construction traffic. ■ Minor safety improvements / upgrades to local roads in key locations (in consultation with RCA).
Construction traffic may cause shoulder or road closures.	■ Use CTMP to manage traffic, alternative routes and communication.
Construction traffic may cause damage to local roads.	■ Carry out a condition survey of local roads which will be used for access prior to commencement and post-commencement. Work with the KCDC as RCA to identify any necessary repairs prior to the completion of construction contract(s).
Disruption to regional cycle and pedestrian networks during construction, including at Raumati Straight / Main Road, and the Waikanae River Trail.	■ During construction, provide temporary safe and convenient alternative routes for cyclists and pedestrians, which are well sign-posted.
Potential for disruption to pedestrian movements along local roads running east to west across the Project alignment (e.g. Raumati Road, Kāpiti Road, Mazengarb, Te Moana Road).	■ During construction, provide temporary safe and convenient alternative routes for pedestrians, which are well sign-posted.

Table 12.8 identifies matters which will arise over the construction period and into the commissioning period for the proposed Expressway.

Table 12.8: Methods to manage traffic effects related to proposed Expressway commissioning

Identified effect	Method to avoid, remedy or mitigate potential effect
Disruption of property access	■ Design work carried out to finalise detail for alternative access to properties whose existing access is affected by the Project
Bus stops disrupted on Kāpiti Road and at Peka Peka.	■ Detailed design work undertaken to replace bus stops on Kāpiti Road and at Peka Peka. Further design work is necessary to develop suitable alternative locations for these bus stops
Park Avenue residential character changes due to increased traffic volumes.	■ A post-construction survey within two years after commissioning to determine if any traffic calming measures are warranted.
Reduced safety and amenity of the regional cycle network around the tie-ins / intersections including at Poplar Avenue, and SH1 at Peka Peka.	■ Further detailed design to address this by detailing pedestrian and cycle tie-ins with local roads and the dedicated walkway / cycleway as part of CEMP process.
Loss of pedestrian and cyclist accessibility at mid- block locations at Poplar Avenue to Raumati Road, and the Kāpiti Road to Mazengarb Road sections of the Project.	■ Project provision of pedestrian and cycle overbridges for locations where accessibility would otherwise be cut off by the proposed Expressway. NZTA will work with KCDC to put these overbridges in place prior to opening of the proposed Expressway. Overbridges are to be formalised and vested with KCDC.