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TRANSPORTATION SPECIALISTS

Road Transport Upgrade through Kapiti

Transportation Review for Kapiti Coast District Council

September 2009

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APPENDICES

1 INTRODUCTION

In accordance with the Government identifying the Levin to Wellington Airport route as a road of national significance, the New Zealand Transport Agency (NZTA) proposes to provide a four-lane expressway through the Kapiti Coast. The NZTA has issued two options for public consideration for the MacKays Crossing to Peka Peka section and one option for the Peka Peka to Otaki section.

The options for the MacKays Crossing to Peka Peka section comprise "SH1 Expressway that avoids town centres", referred to in this report as "Option 1 (West)" and "SH1 Expressway with local supporting roads" referred to in this report as "Option 2 (East)" The concept plans prepared by NZTA identify the following key components of each option.

Key components of Option 1 (West):

- Upgraded SH1 north to Paraparaumu Domain then new expressway along western side of railway to vicinity of Blue Water Place, then new expressway along alignment of Western Link Road, and then connecting to Peka Peka Road
- Interchange comprising south facing ramps at Poplar Avenue
- Interchange at Otaihanga Road (diamond layout)
- Potential interchange at Te Moana Road (layout not defined)
- Interchange at Peka Peka Road (diamond layout)
- Poplar Avenue upgrade between SH1 and new local road, with roundabout at intersection of Poplar Avenue and the new local road
- New local road between Poplar Avenue to Kapiti Road along alignment of proposed Western Link Road
- Traffic signals along proposed Western Link Road at Raumati Road and Kapiti Road
- Underpass for Kapiti Road beneath SH1 Expressway
- New service road between Poplar Avenue and north of Raumati Road, adjacent to SH1 expressway
- New service road between Kapiti Road and Tutanekai Street, adjacent to SH1 expressway

Key components of Option 2 (East):

- Upgraded SH1 north to Paraparaumu Domain then new expressway along western side of railway to Te Moana Road and then upgraded SH1 to Peka Peka Road
- Interchange comprising south facing ramps at Poplar Avenue
- Interchange at Otaihanga Road (diamond layout)
- Interchange at Peka Peka Road (diamond layout)
- Poplar Avenue upgrade between SH1 and new local road, with roundabout at intersection of Poplar Avenue and the new local road
- New local road between Poplar Avenue to Kapiti Road along alignment of proposed Western Link Road
- Traffic signals along proposed Western Link Road at Raumati Road and Kapiti Road
- New local road between Otaihanga Road and Te Moana Road along alignment of proposed Western Link Road

- Underpass for Kapiti Road beneath SH1 Expressway
- Underpass for Te Moana Road beneath SH1 Expressway
- New service road between Poplar Avenue and north of Raumati Road, adjacent to SH1 expressway
- New service road between Kapiti Road and Tutanekai Street, adjacent to SH1 expressway
- New service road extending east from Otaihanga Road along or in the vicinity of King Arthur Drive
- New service road between Parata Street and Peka Peka Road

The key components for the section between Peka Peka and Otaki include:

- New SH1 Expressway along western side of railway, crossing the railway in the vicinity of Sutton Road and joining the existing alignment north of County Road
- Northbound off ramp, north of Addington Road
- Northbound on ramp at County Road
- Southbound on ramp at Rahui Road
- Southbound off ramp to existing SH1, north of Waitohu Valley Road
- New local road between Peka Peka Road along western side of expressway, joining existing SH1 north of Sutton Road
- New local road extending Sutton Road west and south
- New local road connections Gear Road and School Road to Te Horo Beach Road via overbridge.
- New local road joining Old Hautere Road to Otaki Gorge Road and Addington Road
- Underpass for Otaki Gorge Road beneath new SH1 Expressway, railway and existing SH1

Copies of the concept plans from the NZTA website are included in Appendix A.

Kapiti Coast District Council ("KCDC") has asked Flow Transportation Specialists Limited ("Flow") to undertake a limited review of NZTA's proposals for upgrading road transport through Kapiti. The scope of the review includes assessing the following:

- the strategic transportation issues arising from the proposals;
- issues arising from the omission of the section of the Western Link between Kapiti Road and Otaihanga Road in Option 2;
- specific local road impacts, appropriateness, need for mitigation of effects etc. In particular in the vicinity of Marae Lane (Waikanae), Ruahine Street, Realm Drive (Paraparaumu), Rahui Road (Otaki);
- impacts on accessibility of public transport; and
- impacts for cycling and walking.

The following sources have been used for information:

- NZTA's website http://www.nzta.govt.nz/projects/kapiti-consultation/index.html
- Traffic model output for years 2016 and 2026 and economic evaluation worksheets (prepared by Opus International Consultants for NZTA, provided to Flow by KCDC)
- Urban Design Report and Executive Summary, Integrated Land Use and Transport Study, August 2009 (prepared by Common Ground Ltd for Kapiti Coast District Council)

2 STRATEGIC TRANSPORTATION ISSUES

2.1 National Strategy and Funding Programme

With regards to high level strategic transportation issues, a review of the New Zealand Transport Strategy (NZTS), Government Policy Statement (GPS) on Land Transport Funding and the 2009-2012 National Land Transport Programme (NLTP) has been undertaken to provide context. Relevant aspects of these documents are detailed in Appendix B. In summary, these documents provide a high level vision for transport, objectives and funding priorities for the short and medium terms. The NZTA gives effect to the GPS (and the Land Transport Management Act) through the NLTP.

The NLTP prioritises activities that make a significant contribution to roads of national significance and local roads critical to the roads of national significance (amongst other objectives). The NZTA is progressing detailed investigations with the aim that construction for most of the roads of national significance is completed within ten years. The Wellington Northern Corridor (State Highway 1 Levin to Wellington) has been identified as one of seven roads of national significance in the GPS, due to its regular congestion and relatively poor safety record, which inhibits the movement of people and freight and restricts economic growth. The Kapiti Western Link Road is also identified in the 2009-2012 NLTP, but the NLTP notes that the scope of the Western Link Road is likely to be influenced by the detailed investigation works for the Wellington Northern Corridor.

NZTA's proposals are expected to improve safety, improve journey time reliability and capacity and contribute to managing adverse environmental impacts from land transport[1] for state highway traffic. Improved safety, journey time reliability and capacity and greater management of adverse environmental impacts are also expected for local road traffic, through the partial provision of the Western Link Road and improved expressway.

2.2 Land Use Transport Integration

Transportation decisions can have a major impact on the local economy and community livability, that is, the environmental and social quality of an area as perceived by those living, working and visiting that area. The integrated planning of land uses and transport has wide ranging effects, including accessibility, property values, business activity, travel movements (origins, destinations and hence travel distance and journey time), travel modes (increasing densities along public transport routes to make services more viable, providing great pedestrian and cycle connections and facilities), social interaction, public health and safety, noise, air quality, water quality, community identify and pride.

A considerable amount of analysis and planning has been undertaken by the Council with regards to the integration and effects of land use and transport planning for Kapiti Coast[2]. This has resulted in land use and transport proposals, including a new multi modal corridor linking Kapiti Coast communities (the Western Link Road). The proposed Western Link Road is expected to "*relieve State Highway 1 and restore the efficiency of the local movement network. It also positions the Western Link project as a social, economic and environmental catalyst that will re-energise the Kapiti Coast economy and communities*".

[1] In so far as harmful emissions should be less with freer flowing traffic and less vehicle-kilometres travelled, tempered with a possible latent increase in vehicle traffic with the increased capacity

[2] As reported on in the Urban Design Report Integrated Land Use and Transport Study, Western Link, August 2009, Common Ground

Integrating the town centres with public transport facilities can encourage and facilitate better use of public transport. Consideration of a route for the expressway that passes to the east of the railway stations, thus allowing integration between the town centres and rail stations is being investigated by Beca.

The NZTA is currently undertaking a review of the "Transit Planning Policy Manual" and as such, it should be had regard to but not necessarily effect to. The Integrated Planning Policy section states that "*Transit is committed to working with others to ensure integrated land use and transport planning helps deliver an affordable, multi-modal transport system that supports a growing economy, vibrant communities and a healthy environment, now and in the future".*

Accordingly NZTA's proposals should integrate with the Council's land use and transport proposals. In this matter, it is recommended that NZTA and Council work together to determine the most appropriate location for the expressway and its interchanges and confirm the form and extent of the Western Link. Further comment is made on this in the following sections.

2.3 Expressway Function

The NZTA[3] defines expressways as "*high speed roads,* [with] *well spaced at-grade intersections. This means they may have accesses and driveways on to them and traffic lights"*. Motorways are defined as "*highly controlled, high-speed roads which normally have grade-separated intersections. In other words they have things such as flyovers so that motorists don't have to stop at traffic lights*".

Wikepedia[4] provides a list of motorways and expressways in New Zealand and provides the following definitions: "*In New Zealand motorways and expressways are high-speed roads designed to take large amounts of traffic. A motorway is a dual carriageway with grade-separated junctions, and does not allow pedestrians and cyclists; an expressway is either single or dual carriageway, with traffic lights and roundabouts or grade-separated motorway-style interchanges, with cyclists permitted but not pedestrians".*

By way of clarification, a "dual carriageway" is a term that can be used to describe a road where the opposing traffic lanes are separated by a central reservation.

The Transit Planning Policy Manual notes that some state highways are managed as "expressways" and that this "*signals Transit's long term intention to seek the declaration of the road as motorway*".

2.4 Capacity

With regards to capacity, the AUSTROADS "Guide to Traffic Engineering Practice Part 2 Roadway Capacity" provides advice on the theoretical capacity of freeways and two-lane and multi-lane roads. An assessment has been undertaken regarding the theoretical traffic volumes that can be accommodated on the new road whilst maintaining a level of service C. "Level of service" ("LOS") is an important performance indicator providing a qualitative assessment of the quantitative effect of factors such as volume of traffic and delays. Definitions for level of service for roads are provided below.

LOS A: generally free flow conditions where drivers are virtually unaffected by the presence of others in the traffic stream.

LOS B: relatively unimpeded operation with drivers having reasonable freedom to select their desired speed. Manoeuvring in the traffic stream is only slightly restricted.

[3] http://www.transit.govt.nz/about/faqs.jsp#6
[4] http://en.wikipedia.org/wiki/List_of_motorways_and_expressways_in_New_Zealand

LOS C: stable operating conditions but with manoeuvring becoming more restricted and motorists experience appreciable tension in driving.

LOS D: conditions border on a range in which small increases in flow can significantly reduce travel speed. All drivers are severely restricted in their freedom to select their desired speed.

LOS E: traffic volumes are at or close to capacity and there is virtually no freedom to select desired speeds. Flow is unstable and minor disturbances within the traffic stream will cause break down in conditions.

LOS F traffic approaching the point under consideration exceeds that which can pass it. Flow break down occurs and queuing and delays result.

Typically for planning purposes, a LOS C is designed for the design year, although this is often case specific, for example, motorists in built up areas will often be accepting of a LOS D, whereas in rural areas, a higher LOS is expected.

For the four-lane expressway, the theoretical maximum traffic volume that could be accommodated, whilst maintaining a LOS C would be some 2,540 vehicles per hour per direction (assuming a 100 kph design speed, >2 m lateral clearance, 10% trucks, 3.5 m wide lanes and commuter/regular users). The following table that summarises the future traffic predicted for Option 2 (East) on the expressway identifies a flow of 1,643 vehicles per hour on the expressway south of Poplar Avenue for 2026. Through Paraparaumu and Waikanae the peak flow is around 900 vehicles per hour. If it is assumed that geometric growth occurs from 2026, then the expressway could accommodate an extra 60 years growth at around 0.9% growth per annum, or an extra 27 years growth at 2% per annum, based on the predicted traffic flow south of Poplar Avenue.

Table 1: Traffic Model Future Traffic Flow Predictions for Option 2 (East) (source: Opus)

	2026 AADT[5]	2026 AM[6] vph[7]		2026 PM[8] vph	
	2-way vpd	Northbound	Southbound	Northbound	Southbound
SH1 north of Peka Peka Road	24,173	903	1,050	1,158	889
SH1 between Otaihanga Road and Peka Peka Road	17,083	588	723	893	673
SH1 between Poplar Avenue and Otaihanga Road	15,481	436	811	848	502
SH1, south of Poplar Avenue	28,661	907	1,416	1,643	882

Different traffic volumes are predicted for LOS C for a four lane undivided highway, which is assumed to have less side clearance than an expressway. Assuming a rural environment, the theoretical maximum traffic volume that could be accommodated, whilst maintaining a LOS C, would be 2,220 vehicles per hour per direction (assuming level terrain and that the driver population comprises commuter/regular users). Gradients will affect the capacity, particularly when considering the proportion of heavy vehicle traffic.

[5] AADT – annual average daily traffic
[6] AM – morning commuter peak period
[7] vpd – vehicles per hour
[8] PM – evening commuter peak period

Assuming a suburban environment, then 1,870 vehicles per hour per direction would be the theoretical maximum volume. The number of intersections that connect with the highway and the subsequent effects of traffic decelerating from and accelerating into the through traffic stream affect these theoretical volumes. More importantly, any at grade intersections that directly affect the operation of the highway (eg traffic signals or roundabouts) can become the critical aspect in the assessment of capacity.

A two lane undivided highway is predicted to have a LOS C with up to 870 vehicles per hour in both directions. The predicted volumes for 2026 would not be able to be accommodated on a two lane highway and maintain a LOS C.

Based on the above assessment, a four lane highway or four lane expressway should be able to provide for a LOS C with the traffic volumes predicted from the Opus 2026 traffic models. However, any at grade intersections on the highway would affect capacity of the through traffic, particularly if this requires the through traffic to slow or stop (eg at traffic signals or roundabouts). Such effects could be assessed using the Opus traffic models.

2.5 Connectivity

Connectivity involves connections within the area as well as to and from the area.

The lack of the mid section of the Western Link will result in existing local roads being used for inter-regional travel. This is discussed further in Section 3 below.

With regards to the number and location of connections to and across the expressway, there are several transport planning matters, some of them conflicting, that need to be considered. These include the following:

- Fewer interchanges will benefit state highway through traffic, with regards to safety, journey time reliability and preservation of highway capacity. They will also discourage short local trips being made on the expressway. However, an expressway with few intersections can lead to additional travel time and distance to local residents accessing the expressway.
- More interchanges improve accessibility but increase capital costs of a project and can encourage local trips being made on the expressway. Traffic loadings on local roads are spread, often meaning that other modes of transport can be better catered for at the interchanges.
- Cross expressway routes (whether they are via interchanges or under/overpasses) need to be of sufficient number and capacity to accommodate not only the normal cross traffic but also the traffic diverted from the other streets terminated by the expressway and the traffic generated by access connections to and from the expressway.
- The distances required for safe merging, weaving, deceleration and signage generally dictate the minimum spacing of interchanges. Typically minimum interchange spacing is 1.5 km in urban areas and 3 km in rural areas[9]. The Scoping Document[10] prepared by Opus for NZTA with regard to the expressway design notes that "*it is proposed that the strategy will be developed on the assumption of a minimum spacing of about 5 km is provided between interchanges*".
- Interchanges located immediately adjacent to town centres may load unacceptable volumes of traffic onto main streets, unless sufficient interchanges are provided to spread the traffic. High traffic volumes would make it difficult to provide a safe and amenable environment for pedestrians and cyclists.

[9] A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 2004

[10] Transit NZ SH1 Kapiti Strategic Study, Scoping Report, Opus International Consultants, July 2008

- Interchanges located too far from town centres can result in ad hoc land development occurring close to the interchange, due to better accessibility for expressway traffic. This can affect sustainability of town centres.
- Legibility of connections to and from an adjacent area and the impact of split or incomplete interchange connections.

Other matters, such as environmental effects, noise, cost, etc also play a key role in determining the number and location of interchanges.

Providing appropriate and reasonable access/connectivity within and to and from the Kapiti Coast area is necessary to spread traffic loads on the local roads, be better able to accommodate pedestrians and cyclists and to help achieve land use-transport integration outcomes.

The proposed spacing comprises approximately 6.4 km between the Poplar Avenue and Otaihanga Road interchanges and 7.9 km between Otaihanga Road and Peka Peka Road. If an interchange was provided at Te Moana Road with Option 1 (West), then the interchange spacing between Otaihanga Road and Te Moana Road would be approximately 2.8 km, with 5.1 km between Te Moana Road and Peka Peka Road.

The proposed interchange at Otaki comprises four ramps separated over a distance of some 4.2 km. The northbound ramps would be some 2.8 km apart and the southbound ramps some 1.6 km apart, with:

- the northbound off ramp commencing from around the location of Addington Road and tying into the old state highway
- the northbound on ramp joining the expressway in around the location of where County Road currently joins the existing state highway
- the southbound off ramp to the south of Taylors Road and
- the southbound on ramp commencing at the intersection of County Road and Rahui Road.

Whilst local drivers will get used to the connections to the expressway, those who do not drive often and visitors to Otaki could be confused by the separation and illegibility of the layout. Accordingly, it is recommended that further investigations be undertaken with regards to legible and efficient interchange configurations for Otaki.

The proposed interchange (south facing ramps) at Poplar Avenue will serve the Raumati area, and with the Western Link between Poplar Avenue and Kapiti Road, also provide access to the central and southern Paraparaumu area. The proposed interchange at Otaihanga Road will serve the northern Paraparaumu area and also any Raumati and Paraparaumu expressway traffic travelling to or from the north. A potential interchange at Te Moana Road will allow connections with the Waikanae Beach community and a 3 km link via Te Moana Road to the Waikanae town centre. Without this interchange, the Waikanae Beach community will need to travel via Waikanae and the existing state highway to access the expressway at Otaihanga Road to travel to or from the south.

The location of interchanges closer to the Waikanae and Paraparaumu town centres would help to spread traffic loads and should result in less ad hoc development close to the other interchanges. However, the locations of the interchanges should be considered carefully with regards to balancing local connectivity, safety, network efficiency, social, environmental and economic objectives and the ability to create transit oriented development close to the rail stations.

The appropriateness of an interchange at Otaihanga Road may need to be reconsidered if an interchange is provided closer to the Paraparaumu town centre. It could encourage short local trips to be made on the expressway, to the detriment of expressway through traffic. However, the provision of the Western Link

Road between Kapiti Road and Otaihanga Road would alleviate this potential problem and help to spread traffic to and from the expressway, especially once development occurs at the Council landfill. An assessment balancing accessibility with network efficiency, safety, cost and environmental concerns will be required to make a fully informed judgement.

In Otaki, the proposal includes separated ramps, with the northbound off ramp south of the Otaki River, the northbound on ramp north of Mill Road, the southbound off ramp north of Waitohu Valley Road and the southbound on ramp from Rahui Road. This mix of ramp locations can be confusing for drivers who are not familiar with the area. Connections are provided alongside the expressway to cater for local movements, but this does result in longer travel distances for some movements.

2.6 Severance

New or existing transport schemes that cuts through a community can limit peoples' ability or desire to move about the area, which can reduce accessibility to key services, such as health, education, retail and employment opportunities, and in turn, can damage local social networks and community cohesion. In particular, high speed or limited access roads can be a psychological as well as physical barrier to movement. UK research[11] indicates that the severing effects of roads will not diminish over time.

Both options would have a severing effect on the Paraparaumu community. Option 1 (West) would additionally have a severing effect on the Waikanae and Waikanae Beach communities.

2.7 Summary and Comparison of MacKays Bridge to Peka Peka Options

Strategic transport planning issues, including land use-transport integration, severance, journey time reliability, capacity, connectivity and spatial location of interchanges, and network security have been considered for each option in the MacKays Crossing to Peka Peka section, as follows.

Table 2: Summary and comparison of options – strategic transport planning issues

Issue	Option 1 (West) (SH1 expressway avoiding town centres)	Option 2 (East) (SH1 expressway with local supporting roads)
Land use – transport integration	Location of high volume, high speed route through Waikanae/Waikanae Beach adversely affects communities (for example severance, accessibility, noise, pollution, social cohesion, etc). Interchange locations provide opportunities for transit oriented design around rail stations at Paraparaumu and Waikanae, albeit that the expressway will separate the Paraparaumu train station and town centre and access between the station and town centre will be via a vehicle/pedestrian/cycle underpass. Interchange locations may increase demand for development about the interchange locations rather than in town and local centres. Opportunities for integrated local network are limited by the exclusion of the Western Link Road between Kapiti Road and Otaihanga Road.	Interchange locations provide opportunities for transit oriented design around rail stations at Paraparaumu and Waikanae, albeit that the expressway will separate both train stations and their town centres, with access between them being via vehicle/pedestrian/cycle underpasses. Interchange locations may increase demand for development about the interchange locations rather than in town and local centres. Opportunities for integrated local network are limited by the exclusion of the Western Link Road between Kapiti Road and Otaihanga Road.

[11] Understanding Community Severance I: Views of Practitioners and Communities, TRL Limited

Table 2: Summary and comparison of options – strategic transport planning issues

Issue	Option 1 (West) (SH1 expressway avoiding town centres)	Option 2 (East) (SH1 expressway with local supporting roads)
Severance	Follows railway line to Paraparaumu Domain then diverts to join Western Link Road at Otaihanga Road, extending from Te Moana Road to Peka Peka Road. This route will result in additional severance of the communities that it passes through, particularly Waikanae and Waikanae Beach.	Follows railway line, which already has had an impact on land use development. However, this option could increase severance effects between the eastern and town centre areas of Paraparaumu.
Connectivity within the area	Three local connections across the expressway are provided at Kapiti Road, Otaihanga Road and Te Moana Road (east). These connections should provide for all modes, with special consideration for pedestrians and cyclists. Further investigations into additional connections are recommended for all modes of travel, particularly as this route results in greater severance of developed or planned development areas.	Three local connections across the expressway are provided at Kapiti Road, Otaihanga Road and Te Moana Road. These connections should provide for all modes, with special consideration for pedestrians and cyclists. Further investigations into additional connections are recommended for all modes of travel.
Journey time reliability	Faster journey times, improved journey time reliability and capacity for state highway through movements compared to do minimum.	Faster journey times, improved journey time reliability and capacity for state highway through movements compared to do minimum.
Network Performance	Overall travel time approximately 8% to 15% faster than "do minimum" in 2026. Total distance travelled approximately 2.5% to 3.4% greater than "do minimum" in 2026.	Overall travel time approximately 13% to 23% faster than "do minimum" in 2026. If Western Link is included also between Kapiti and Otaihanga, overall travel time approximately 14% to 24% faster than "do minimum". Total distance travelled approximately 3% to 3.6% less than "do minimum" in 2026. If Western Link is included also between Kapiti and Otaihanga, overall distance travelled approximately 4.4% to 5.2% less than "do minimum".
Expressway Capacity	The expressway south of Poplar Avenue is expected to carry in the order of 28,400 vpd in 2026. Between Poplar Avenue and Otaihanga Road it is expected to carry some 15,100 vpd, between Otaihanga Road and Peka Peka Road 14,200 vpd and north of Peka Peka Road 24,100 vpd. A four lane carriageway is more than capable of carrying these volumes.	The expressway south of Poplar Avenue is expected to carry in the order of 28,700 vpd in 2026. Between Poplar Avenue and Otaihanga Road it is expected to carry some 15,500 vpd, between Otaihanga Road and Peka Peka Road 17,100 vpd and north of Peka Peka Road 24,200 vpd. A four lane carriageway is more than capable of carrying these volumes.
Local Road Capacity	Increased capacity for local traffic is provided by the partial provision of the Western Link (Poplar to Kapiti). Arawhata Road is expected to carry up to 17,500 vpd in 2026 and Mazengarb Road 21,200 vpd. These volumes are high for residential streets. The existing state highway south of Peka Peka Road is expected to carry in the order of 24,500 vpd, which is high for a two lane road. The traffic model outputs indicate that sections of	Increased capacity for local traffic is provided by the partial provision of the Western Link (Poplar to Kapiti and Otaihanga to Te Moana). However, sections of Arawhata Road and Mazengarb Road are expected to carry in the order of 19,800 vpd and 22,900 vpd in 2026, which is high for a local residential street. The inclusion of the Western Link between Kapiti Road and Otaihanga Road would result in lower volumes of up to 13,300 vpd in 2026.

Table 2: Summary and comparison of options – strategic transport planning issues

Issue	Option 1 (West) (SH1 expressway avoiding town centres)	Option 2 (East) (SH1 expressway with local supporting roads)
	Kapiti Road and Rimu Road are expected to carry high volumes in 2026 (up to 24,000 vpd on Rimu Road and 27,200 vpd on Kapiti Road). Four lanes with additional lanes at intersections are likely to be required to accommodate volumes typically in excess of 24,000 vpd.	The traffic model outputs indicate that sections of Kapiti Road and Rimu Road are expected to carry high volumes in 2026 (up to 23,400 vpd on Rimu Road and 27,900 vpd on Kapiti Road). The inclusion of the Western Link between Kapiti Road and Otaihanga Road would result in lower volumes of 22,600 vpd on Rimu Road and 23,700 vpd on Kapiti Road. Four lanes with additional lanes at intersections are likely to be required to accommodate volumes typically in excess of 24,000 vpd.
Connectivity to state highway	The proposed roading upgrades generally provide good connections for local traffic to access the expressway and move about the local area, provided that an interchange is located at Te Moana Road, as detailed below. Further investigations of alternative and/or additional interchanges is recommended, taking into account local and regional traffic effects, effects on the local economy as well as environment, cultural, social and community effects.	The proposed roading upgrades generally provide good connections for local traffic to access the expressway and move about the local area, as detailed below. Further investigations of alternative and/or additional interchanges are recommended, taking into account local and regional traffic effects, effects on the local economy as well as environment, cultural, social and community effects.
Paraparaumu – Waikanae movements	Vehicle traffic can use old state highway on east of railway to eastern end of Te Moana Road or Mazengarb Road-Expressway to western end of Te Moana Road, provided an interchange is provided with Te Moana Road. Increased traffic on Mazengarb Road (15,500 vpd in 2026).	Vehicle traffic can use old state highway on east of railway to eastern end of Te Moana Road or Mazengarb Road-Western Link Road to western end of Te Moana Road. Increased traffic on Mazengarb Road (from predicted 11,500 vpd in 2026 with do minimum scenario to 18,200 vpd).
Paraparaumu - South movements	Vehicle traffic can access and exit expressway at Poplar Avenue (south facing ramps only). Western Link Road provides necessary connection to Paraparaumu. Development controls around the Poplar Avenue interchange will be needed to maintain growth of the Paraparaumu town centre.	Vehicle traffic can access and exit expressway at Poplar Avenue (south facing ramps only). Western Link Road provides necessary connection to Paraparaumu. Development controls around the Poplar Avenue interchange will be needed to maintain growth of the Paraparaumu town centre.
Paraparaumu - North movements	Vehicle traffic can access and exit expressway at Otaihanga Road. Increased traffic on Mazengarb Road (from predicted 11,500 vpd in 2026 with do minimum scenario to 15,500 vpd).	Vehicle traffic can access and exit expressway at Otaihanga Road. Increased traffic on Mazengarb Road (from predicted 11,500 vpd in 2026 with do minimum scenario to 18,200 vpd).
Waikanae - South movements	Vehicle traffic can access and exit expressway at Te Moana Road if interchange is provided at Te Moana Road, or at Otaihanga Road via old state highway on the east of the railway. Interchange at Te Moana Road is required to provide connection for Waikanae Beach traffic.	Vehicle traffic can access and exit expressway at Otaihanga Road via old state highway on east of railway to eastern end or via Western Link Road from Te Moana Road. Increases vehicle traffic on Te Moana Road underpass around railway station, potentially limiting transit orientated design in this location.

Table 2: Summary and comparison of options – strategic transport planning issues

Issue	Option 1 (West) (SH1 expressway avoiding town centres)	Option 2 (East) (SH1 expressway with local supporting roads)
Waikanae - North movements	Vehicle traffic can access and exit expressway at Te Moana Road if interchange is provided at Te Moana Road, or via proposed new service road extending from Parata Street to Peka Peka Road interchange. Interchange at Te Moana Road is required to provide connection for Waikanae traffic. Requires new service lane alongside expressway.	Vehicle traffic can use proposed new service road extending from Parata Street to Peka Peka Road interchange. Requires new service lane alongside expressway.

3 ISSUES ARISING FROM INCOMPLETE WESTERN LINK

Neither of the options for the MacKays Crossing to Peka Peka section includes the Western Link Road as a whole, with both excluding the section between Kapiti Road and Otaihanga Road. Option 1 (West) precludes the Western Link from even being completed due to it following the route of the Western Link between Otaihanga Road and Te Moana Road, but in the form of an expressway rather than local road.

Whilst the expressway may perform well without the missing Western Link connection between Kapiti Road and Otaihanga Road, those persons using the local network will incur additional travel time and travel greater distances than they would if the connection between Kapiti Road and Otaihanga Road is completed. This is identified in the network performance statistics provided via Council from Opus. To understand more fully the effects on not providing this link select link analyses using the traffic model could be undertaken.

Without the mid section of the Western Link, local traffic movements will use existing roads such as Arawhata Road, Langdale Avenue, Mazengarb Road and Ratanui Road. The traffic volume predictions show that the Western Link Road will help alleviate these roads from high traffic volumes that might otherwise be in the order of 20,000 vpd. It is unlikely that the traffic models are sophisticated enough to account for travel mode changes that are anticipated to occur as a result of Council's Western Link land use proposals. However, from a transport planning point of view, the benefits to all travellers will be marginalised by the omission of this link. The anticipated economic and community benefits associated with the Western Link Road will also not be fully achieved if this link, and the Council's anticipated form for it and associated land use proposals are not implemented.

Spreadsheets of the economic evaluation of road user (travel time, vehicle operating, congestion values and carbon dioxide costs) and capital costs of the options have been provided by Opus. Whilst there would appear to be some anomalies in the spreadsheets, the results indicate that both options would have benefit cost ratios less than 1. A comparative assessment of Option 2 (East) with a similar option that includes the Western Link between Kapiti Road and Otaihanga Road indicates that it would have greater road user benefits. Whilst the construction cost would be greater, the incremental benefit cost ratio between these options would be in the order of 2.5, meaning that it is more economically efficient (based on road user costs and road capital costs) to construct the full Western Link to Te Moana Road if Option 2 (East) is proceeded with.

It is recommended that the traffic models developed for the study be reviewed to fully understand how the outputs from the traffic models have been used to determine dollar values for the travel time, vehicle operating, congestion relief and carbon dioxide costs for the options. Also, to understand if any anomalies

may affect the assessment, for example, the traffic models predict only 20 to 30 vpd for 2026 on the south facing ramps at Peka Peka with Option 2 (East).

4 SPECIFIC LOCAL ROAD IMPACTS

Effects of the proposals on local roads within the Kapiti area have not been considered and should have been. The proposals will have some quite significant effects on some local roads, with expected traffic volumes being much higher than would otherwise be expected.

Four local roads have been reviewed, as detailed below.

4.1 Marae Lane (Waikanae)

Marae Lane forms a north south link between Te Moana Road and Ngaio Road, along the western side of the Waikanae town centre, as shown below.

With Option 2 (East), there will be no connection from the expressway to the Waikanae town centre and it is expected that Marae Lane will form a key connection into the centre.

Traffic predictions indicate a change from 2,400 vpd in 2026 if the proposals do not proceed, compared to 8,800 vpd with Option 2 (East) and 1,500 vpd with Option 1 (West). Marae Lane provides a service road/local connector function and the traffic volumes expected to eventuated with Option 2 (East) would need careful consideration as to how they would be managed.

Figure 1: Location of Marae Lane

4.2 Ruahine Street (Paraparaumu)

In both options, Ruahine Street will provide the connection between the old state highway and Kapiti Road underpass. The traffic model also includes Hinemoa Street, which the traffic model indicates will also provide a route for drivers travelling between the old state highway and Kapiti Road.

Comparative traffic predictions for 2026 across both these roads are:

- 5,900 vpd for the do minimum
- 8,340 vpd for Option 2 (East)
- 11,800 vpd for Option 1 (West)
- 7,200 for Option 2 (East) with the addition of the Western Link Road between Poplar Avenue and Te Moana Road.

As expected, with fewer connections onto the state highway, all expressway options will result in higher traffic volumes on Ruahine and Hinemoa Streets. Currently Ruahine Street is mainly residential in nature and provides a local road function. The additional traffic expected to travel along the street will increase traffic noise and pollution effects, particularly in the case of Option 1 (West), which is predicted to have significantly higher traffic volumes than the do minimum scenario.

Figure 2: Location of Ruahine Street

4.3 Realm Drive (Paraparaumu)

Realm Drive provides a connection between Kapiti Road and Mazengarb Road, via Langdale Avenue and Te Roto Drive. Without the Western Link between Kapiti Road and Otaihanga Road it will carry greater traffic volumes. The traffic model predicts these will be 3,100 vpd in 2026 with the "do minimum" scenario, 5,600 vpd with Option 2 (East) and 6,300 vpd with Option 1 (West). If the Western Link was also provided between Kapiti Road and Otaihanga Road with Option 2 (East), then it would carry in the order of 2,100 vpd.

Figure 3: Location of Realm Drive

4.4 Rahui Road (Otaki)

Rahui Road provides a direct connection to the southbound on ramp onto the expressway, and via the old state highway, also to the northbound off ramp, northbound on ramp and southbound off ramp. It also provides a direct connection across the expressway to the Otaki retail centre.

It is likely to see an increase in traffic compared to the current scenario where several roads from the development to the east of the state highway intersect directly onto the state highway, although drivers can also still join the old state highway to connect with the retail centre and expressway ramps.

Figure 4: Location of Rahui Road

5 IMPACTS ON ACCESSIBILITY OF PUBLIC TRANSPORT

The increased capacity of State Highway 1 could result in an increase in car travel, simply because people may see car travel as a viable option if traffic congestion eases. This could have a detrimental effect on public transport travel, given the relationship between use of public transport and its financial viability.

Several bus routes serve the Kapiti Coast, including route 70 (Otaki), 77 (Waikanae and Waikanae Beach) and 71, 72, 73, 74 (Paraparaumu and Raumati). The train line provides for the Overlander, Palmerston North to Capital Connection, and Paraparaumu Line (to/from Paraparaumu-Wellington).

The routes for these bus services will be affected by the proposed interchanges with the expressway. Buses will not be able to directly connect to the Paraparaumu or Waikanae centres from the expressway. Those buses travelling between Paraparaumu and south will likely use the Western Link Road to connect with the town centre. Access to/from Waikanae will be via the Otaihanga Road interchange and then along the Western Link Road to Waikanae Beach or the old state highway to Waikanae.

In Paraparaumu both expressway options would separate the rail station from the town centre and main residential and commercial development areas, and there will be challenges to provide a pleasant pedestrian environment for those walking to and from the rail station and to provide nearby park and ride and kiss and ride facilities.

With Option 2 (East) the expressway will also separate Waikanae from the rail station. Again, a pleasant environment should be provided for those walking or cycling to and from the rail station. Park and ride facilities are proposed at Waikanae rail station and it will be important to ensure that they are located close to the rail station to minimise the distance needed to walk and thus encourage more rail travel. Option 1 (West) will allow the Waikanae centre to embrace the rail station as part of a transit oriented development.

6 IMPACTS FOR CYCLING AND WALKING

The Council's proposed form for the Western Link Road provides excellent facilities for pedestrian, cyclists and horse riders. Without this form, or the complete link, the ability to create an integrated network for these travellers and help influence travel modes, health, the environment and community and social interaction will be marginalised.

The severance and connectivity issues described above also apply to cyclists and pedestrians. Cross streets over/under the expressway should also provide for the expected pattern and needs of pedestrians and cyclists. Generally pedestrians and cyclists are accommodated on structures that also service vehicular traffic. As additional travel distance is more acceptable for vehicular travel, it may be appropriate to add separate pedestrian/cycle crossings where there are a large numbers of pedestrians, such as near schools, churches, rail stations and public transport interchanges.

The remaining sections of existing state highway can be designed to better provide for pedestrians and cyclists making local trips, with lower speed environments, footpaths, cycleways and bridleways. In Otaki, appropriate treatment will be needed to slow traffic exiting from the expressway onto the local streets.

7 VARIATION OF OPTION 2 (EAST)

Council has suggested that a variation of Option 2 (East) where the alignment of the expressway passes to the east of the Paraparaumu and Waikanae town centres could be possible. With regards to transport planning issues, this option would have the same attributes as Option 2 (East) but with the benefit of not separating the Paraparaumu and Waikanae train stations from the town centres. This will allow the creation of transit oriented development at the town centres and improve accessibility to the train stations, providing viable options for people who would rather travel by train.

8 CONCLUSIONS AND RECOMMENDATIONS

The NZTA's proposed roading upgrades in Kapiti Coast include an expressway that will aptly serve as a road of national significance for through and freight traffic. Opportunities will be available to provide better facilities for pedestrians and cyclists on the remaining sections of the existing state highway. However, access to the hinterland through Kapiti is limited and proposed local roading improvements do not complete the Council's Western Link Road project, which will adversely impact on the expected economic and community benefits that are anticipated from the Western Link and associated land use changes and will also result in high traffic volumes through existing local streets.

The inclusion of the Western Link between Poplar Avenue and Te Moana Road will provide local traffic movements with a viable alternative to using existing roads and the expressway for short trips. It also provides benefits with regards to accessibility and will enable more active trips to be undertaken, provided that its form follows that proposed by the Council.

The introduction of interchanges closer to the Waikanae and Paraparaumu town centres would help to spread traffic loads and should result in less ad hoc development close to the other interchanges. However, the locations of the interchanges should be considered carefully with regards to balancing local connectivity, safety, network efficiency, social, environmental and economic objectives and the ability to create transit oriented development close to the rail stations.

Option 1 (West) will result in greater distances being travelled compared to Option 2 (East). Without an interchange at Te Moana Road, those travelling to or from Waikanae Beach have much longer journeys to make to reach the expressway.

From a strategic transport perspective, Option 2 (East) is considered to be preferable, compared to Option 1 (West), mainly due to the ability to still provide the Western Link and associated land uses, however, this is tempered by the need for further work with regards to the expressway route, the number and location of interchanges, the impacts on local roads and the inclusion of the complete Western Link Road. Accordingly, it is recommended that the NZTA:

- review the route of the expressway to avoid, remedy or mitigate the effects of severing the Paraparaumu and Waikanae town centres from the train stations
- review the number, location and layout of interchanges
- review the need for an expressway north of Peka Peka
- review the impacts on local roads and means to avoid, remedy or mitigate adverse effects, and
- review the inclusion of the Western Link between Poplar Avenue and Te Moana Road in conjunction with land use proposals that are planned for the Kapiti area.

APPENDIX A NZTA Concept Plans for MacKays Crossing to Peka Peka

Figure 5: NZTA Concept Plan, Option - SH1 Expressway with Local Supporting Roads

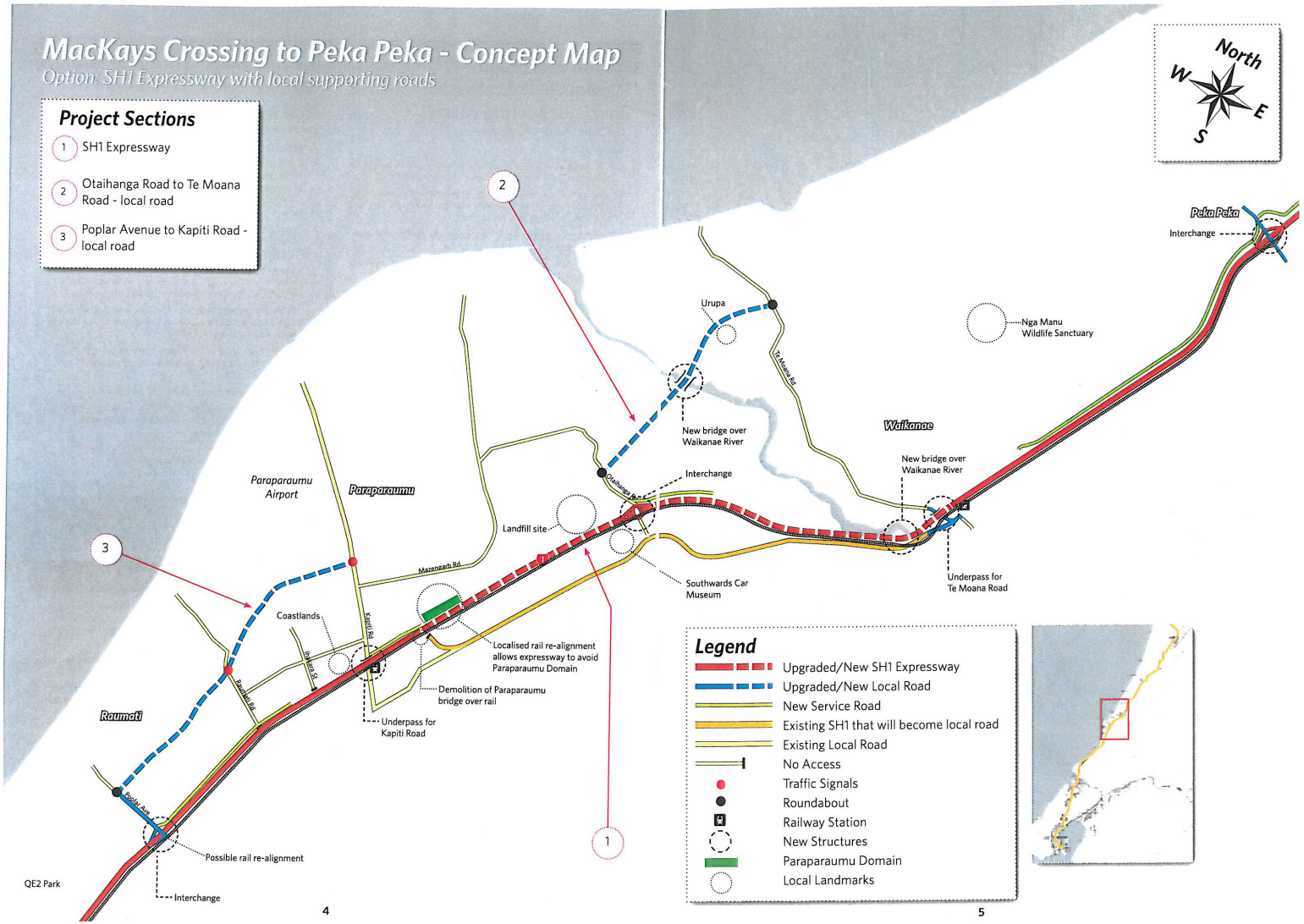


Figure 6: NZTA Concept Plan, Option - SH1 Expressway that avoids Town Centres

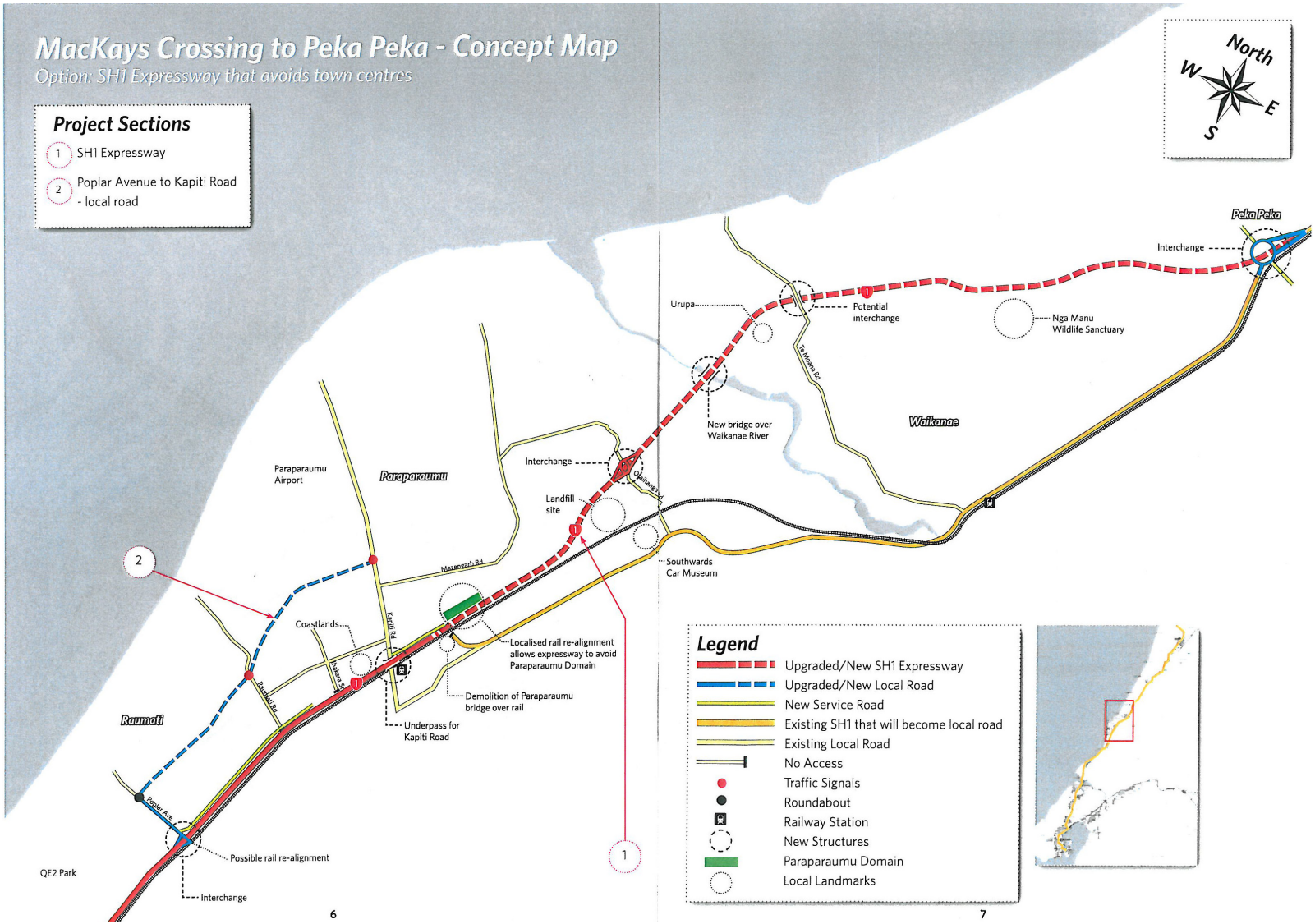
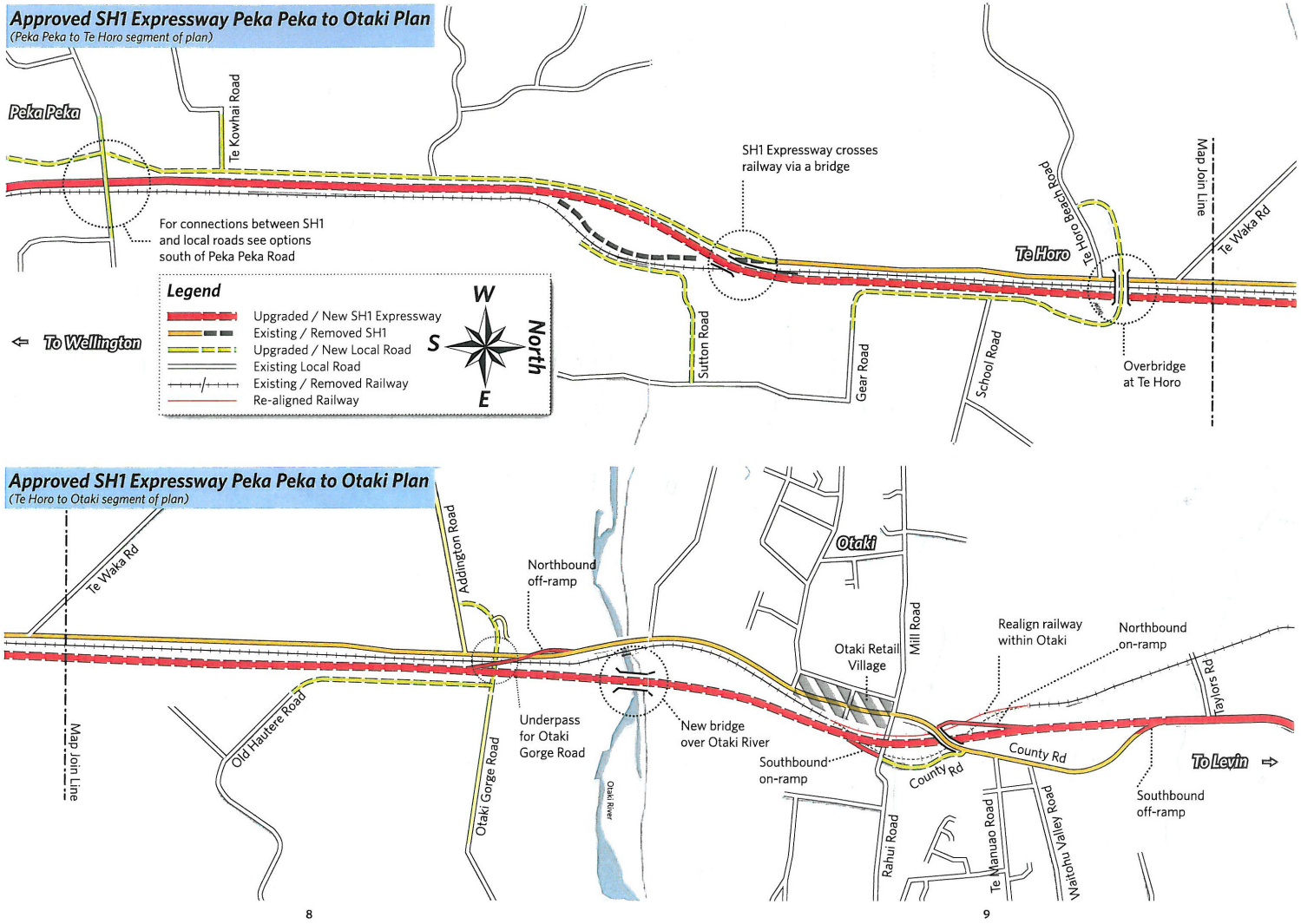


Figure 7: NZTA Concept Plan - Approved SH1 Expressway Peka Peka to Otaki



APPENDIX B National Transport Strategy and Funding Policy and Programme

NATIONAL TRANSPORT STRATEGY AND FUNDING POLICY AND PROGRAMME

New Zealand Transport Strategy

An update of the New Zealand Transport Strategy (NZTS) was published in 2008. The Strategy describes the high level vision for transport for the year 2040, along with key components and targets. The overarching vision of this non-statutory document is:

> *"People and freight in New Zealand have access to an affordable, integrated, safe, responsive and sustainable transport system".*

The five objectives are:

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

This 2008 update of the NZTS provides:

- Direction for the transport sector until 2040, in the context of the Government's sustainability agenda and other government strategies in the areas of energy and energy efficiency
- Direction into high-level targets for the transport sector and intermediate targets for sub-sectors (air, sea, road, vehicle fleet, rail, freight, passenger transport, walking and cycling) to help achieve the high-level targets
- Clear guidelines for decisions about funding allocations
- An action plan, including accountabilities for actions, reflecting how the Government intends to reach the transport targets.

The updated NZTS includes a number of targets for the year 2040, including:

- Increase use of passenger transport to 7% of all trips
- Increase walking and cycling and other "active modes" to 30% of total trips in urban areas
- Reduce road deaths to no more than 200 per annum, and serious injuries on roads to no more than 1,500 per annum
- Improve the reliability of journey times and reduce average journey times on identified critical routes (which were not identified at that stage)
- Reduce kilometres travelled by single occupancy vehicles in major urban areas on weekdays by 10% per capita. (Note: this was a target for 2015, not for 2040).

Government Policy Statement on Land Transport Funding

The last government published a Government Policy Statement (GPS) on Land Transport Funding 2009/10–2018/19, in August 2008. This statutory Statement described the government's funding priorities

for the next 6 years and outlined expected expenditure levels by broad transport type (eg by passenger transport).

The GPS included targets that were to be met by 2015, which were consistent with those set out in the NZTS for 2040. These targets related to:

- Reducing greenhouse gas emissions
- Achieving a mode shift for freight, from road based travel to rail and coastal shipping
- Achieving improvements in journey time reliability
- Improving road safety
- Increasing use of passenger transport
- Increasing walking and cycling.

The subsequent change in government in 2008 resulted in the GPS being updated to reflect the priorities of the new National Government. A final version of the update was published in May 2009 and it sets out the aim to align investment in the land transport sector closer with the new government's priorities, being national economic growth, productivity and stimulating economic growth. The changes in the GPS reflect the following:

- The government's priority of investment in transport infrastructure for economic growth
- The modal choices that are realistically available to New Zealanders.

As such, the GPS states that the government's priority is to invest in high quality infrastructure that supports efficient movement of freight and people, with a focus on the State Highway network. The targets of the 2008 GPS have been removed and replaced with a list of impacts that the government wishes to achieve, namely:

- Improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transportation
- 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
- Contributions to positive health outcomes.

The GPS states that government supports mode shift over time, particularly in the major cities, but that it considers that this should not be accelerated to the point where the outcomes are economically inefficient.

2009-2012 National Land Transport Programme

The primary focus of the National Land Transport Programme (NLTP) is to support economic activity and employment across New Zealand. The NLTP proposes a series of targeted investments that aim to address some important issues for New Zealand's land transport infrastructure, in particular including improving journey time reliability on key routes, easing congestion in those areas with serious problems, upgrading important freight and tourism routes, and improving access to markets, employment and areas that contribute to economic growth.

The NZTA gives effect to the GPS (and the Land Transport Management Act) through the NLTP. The 2009-2012 NLTP prioritises activities that make most significant contribution to:

- Roads of national significance and local roads critical to the roads of national significance
- Key freight and tourism routes
- Key urban arterials
- Public transport initiatives to ease severe congestion
- "model" urban walking and cycling communities (providing user friendly environments)
- Making better use of existing transport infrastructure
- Optimising the existing capacity of and service levels on highly trafficked roads

In addition, the NZTA maintains its long standing focus on activities that make a significant contribution to one or more of the following:

- Improving safety
- Relieving urban congestion
- Improving journey reliability and/or capacity on key routes
- Network security and resilience on key routes
- Completing key walking and cycling links to reduce congestion
- Providing transport choice in large urban areas
- Better public transport network and interchange capacity in large urban areas
- Managing adverse environmental impacts from land transport
- Public health outcomes
- Long term integrated and coordinated planning
- Reducing the number of deaths and serious injuries a result of road crashes

The Wellington Northern Corridor (State Highway 1 Levin to Wellington) has been identified as one of seven roads of national significance in the GPS due to its regular congestion and relatively poor safety record, which inhibits the movement of people and freight and restricts economic growth. NZTA will progress detailed investigations with the aim that construction for most of the roads of national significance are completed within ten years.

The Kapiti Western Link Road is identified in the 2009-2012 NLTP but the NLTP notes that the scope of the Western Link Road is likely to be influenced by the detailed investigation works for the Wellington Northern Corridor.