

5 Options for Providing a SH1 Expressway MacKays Crossing to Peka Peka

The Scoping Report identified the desired cross sections and design principles for a four lane expressway concept for SH1 through Kapiti Coast District. The Scoping Report also identified the key opportunities and constraints associated with the development of SH1 within the district.

One of the most significant conclusions was that geographical separation of the North Island Main Trunk (NIMT) railway and SH1 at some locations resulted in two occurrence of east-west severance. Aligning SH1 immediately adjacent to the NIMT railway would mean a single major barrier to east-west movement in the District rather than two.

Another significant but conflicting aspiration is for the expressway to bypass town centres, thus avoiding the negative effects associated with roads in urban areas. At present SH1 and the NIMT railway pass directly through Paraparaumu and Waikanae. As a result Paraparaumu has already turned its back on the transport corridor. Over time, KCDC plan to shift Paraparaumu town centre away from the existing SH1 alignment. Land west of the civic centre buildings is designated in the district plan as town centre development.

Four options for a SH1 expressway between Peka Peka and MacKays Crossing were developed. Each option meets the aspirations of avoiding severance or passing through town centres with varying degrees of success. The options are:

- Option 1 upgrade the existing SH1 alignment
- Option 2 follow WLR designation
- Option 3 follow rail corridor; and
- Option 4 avoid future town centres.

This chapter presents the key features and considerations for each option. All of the options would restrict access to the expressway. In places, service roads would be provided to maintain property access. Each option includes three new grade separated interchanges:

- (a) south of Paraparaumu,
- (b) at Otaihanga Road, and
- (c) north of Waikanae.

Locating grade separated interchanges outside urban areas minimises the impact on the communities they are designed to serve. There are several variations relating to the location of interchanges. These variations and the implications for local access are presented in Chapter 6.

Options 1, 3 and 4 all follow the existing SH1 in Paraparaumu. Because all connections between the upgraded SH1 expressway and local arterials are relocated to be outside

urban areas, the present connection between Kapiti Road and SH1 will be closed. Although vehicles can make local trips across the SH1 expressway in an underpass, they cannot access the State Highway. This imposes longer journey times for many local trips which must travel further on congested roads to reach their destination. The dis-benefit of this re-assignment and congestion is forecast to be more than \$40M. Building the WLR between a southern interchange and Kapiti Road would fully mitigate these dis-benefits. Options 1, 3 & 4 therefore all include this part of the WLR. We acknowledge that sections of the WLR north of Kapiti Road would further increase the total network benefits, but are not essential for the SH1 project to proceed.

5.1 Option 1 - Upgrade the Existing SH1 Alignment

Figure 5.1 shows an option for upgrading the existing SH1 alignment. The existing SH1 corridor would need to be widened along its entire length. Re-alignments are necessary at several locations in order to build to expressway standards and to mitigate existing safety problems. This would require changes to the existing designation. Several new structures are required and many existing structures would need to be re-built.

Interchanges

Three new grade separated intersections are proposed.

- (a) south of Paraparaumu;
- (b) at Otaihanga Road; and
- (c) north of Waikanae.

There is currently a grade separated intersection providing access to Lindale and Nikau Palm Road. The existing interchange would not be safe if SH1 became an expressway. The interchange would need to be re-built to expressway standard. The wider carriageway and longer entry / exit ramps would mean that additional land would be required.

Other Structures

Other structures would be needed to maintain road connections between the east and west of the district and to cross rivers or the NIMT railway. Grade separated connections east-west across the expressway and NIMT railway are proposed within Paraparaumu at Kapiti Road and within Waikanae town centre connecting Te Moana / Elizabeth Streets.

Paraparaumu rail overbridge would need to be reconstructed. The new bridge would be wider, providing two lanes in each direction and shoulders at the side of the road. It would also have larger horizontal radii enabling higher vehicle speeds and reducing the risk of crashes.

Figure 5.1 – Option 1 - Upgrading the Existing SH1 Alignment



South of the Waikanae River, SH1 currently passes under the NIMT railway. It would not be feasible to create an expressway following the existing horizontal and vertical alignments for a number of reasons. The distance between the supports for the NIMT rail overbridge is not sufficient to accommodate four-lanes and the horizontal and vertical alignment is not adequate for a 100km/h speed zone. There is also a need to connect Kebbel Drive with the local road network. Therefore a new rail overbridge is proposed immediately south of Kebbel Drive. The SH1 expressway would follow the western side of the NIMT railway over a new Waikanae River bridge before reconnecting with the upgraded SH1 alignment in Waikanae.

The existing SH1 alignment between Waikanae and Kebbel Drive would become a local access road. A new rail underpass and a short section of new road would need to be constructed to connect Elizabeth Street with the existing SH1 alignment and Kebbel Drive.

Properties

Depending on the outcomes of any future detailed design, Option 1 is expected to affect around 250 - 350 land parcels. A high number of properties would be affected because a greater amount of sub-division has occurred adjacent to SH1 where most access is currently provided.

Local Access

Access to properties adjacent to the existing SH1 alignment would be maintained through the provision of two-lane service roads adjacent to the expressway. Service roads would need to be provided along the Raumatī straight and close to the new Otaihangā Interchange.

Creating an expressway along the existing SH1 alignment and limiting local connections makes the WLR between a southern interchange and Kapiti Road a necessity. This concept was explained in chapter 3.

Considerations

The following issues should be considered in more detail if Option 1 is progressed:

- Limiting SH1 expressway connections to Poplar Avenue, Otaihangā Road and Peka Peka is likely to increase the value of land close to the interchanges.
- Likely to be lengthy disruption to SH1 traffic during construction. This would impact on efficiency of freight movements and travel for business.
- If the WLR river crossing is not built, the SH1 expressway will provide the only route for motorists travelling between the north and south parts of the district which will erode its ability to perform its highway function (which is similar to the existing).
- Any increase in traffic noise is expected to be small.
- The SH1 expressway is likely affect the amenity of Waikanae town centre.
- Creating a SH1 expressway along the existing alignment without an additional local Waikanae River crossing (i.e. WLR) forces the provision of a grade separated interchange with north and south facing ramps in Waikanae town centre.

- Improving the connection between SH1 and Otaihanga Road will create opportunities for future land development close to Otaihanga Road.
- Land situated between the NIMT railway and SH1 expressway north and south of Otaihanga Road will be difficult to access. This may restrict further development opportunities and affect land values for the areas furthest from the interchange.
- Removing connections to the SH1 expressway within Paraparaumu town centre and along Raumati straights results in severe congestion and delays within Paraparaumu town centre. However, the WLR between Poplar Avenue and Kapiti Road would mitigate this.
- This option has greatest length of new service road to the need to provide access to properties currently fronting SH1.

5.2 Option 2 - Expressway follows WLR Designation

Figure 5.2 shows an option for building a SH1 expressway within the WLR designation. The existing state highway would become a local road. Links between the east and west sides of the new expressway will be maintained with grade separated connections. It is likely that these would need to be supplemented with pedestrian / cyclist bridges.

It is likely that the expressway will pass outside the designation at three locations if a 110kmph design speed is to be maintained along the entire length. These locations are:

- (a) south of Poplar Avenue at the southern end;
- (b) immediately north of the new Waikanae River Crossing; and
- (c) at the northern end south of Peka Peka Road.

On the northern side of the Waikanae River crossing, the expressway would pass close to an Urupa and the Christian Holiday Camp. Work undertaken as part of this study has found that if the expressway is built within the designation south of the river and north of Waikanae, it will be difficult to avoid the Urupa. If the expressway were built outside the designation for a longer length it may however be possible to avoid this site. Further work is needed to confirm the details of an alignment in this area.

Interchanges

Interchanges are again proposed at the northern and southern ends of the study area with a grade separated interchange between SH1 and Otaihanga Road. No other interchanges are proposed. To enable the expressway to stay within the designation as much as possible it is necessary to locate the north and south interchanges close to Peka Peka Road and Poplar Avenue respectively. Providing a SH1 expressway along the WLR designation requires a different form of interchanges to be able to maintain access to town centres and properties adjacent to the existing SH1.

Figure 5.2 – Option 2 - Expressway follows WLR Designation



Other Structures

In addition to the grade separated interchanges, several bridge structures are needed to maintain connections across the expressway. Keeping local roads at grade with the expressway passing underneath will minimise negative impacts for pedestrians and cyclists. In urban areas it may be necessary to provide pedestrian / cycle bridges at more locations than just the road crossings. Placing the expressway in a trench also help to mitigate additional traffic noise associated with the expressway. Further investigations are needed to ascertain the ground conditions and the engineering feasibility of sinking the expressway. As a minimum, road bridges across the expressway should be provided for the following local arterials:

- Poplar Avenue;
- Raumati Road;
- Kapiti Road;
- Marzengarb Road; and
- Te Moana Road.

The expressway would be carried over the Waikanae River on a new four lane bridge. Options to incorporate an off-road pedestrian / cycle path should be investigated.

To a degree the WLR designation already severs the district. The expectation that the WLR would be constructed has led to development facing away from the designation. At a macro-scale, constructing the expressway along this designation will not increase community severance as much as if the expressway passed through an existing urban area. Nonetheless it is acknowledged that the designation has some permeability for non-motorised transport users. Additional locations for pedestrian / cyclist bridges over the expressway would therefore need to be identified in order to maintain this permeability.

Properties

Much of the land within the WLR designation is owned by KCDC or NZTA. For this reason a small number of privately owned land parcels will be required. Depending on the outcomes of any future detailed design, this option is expected to affect between 20 and 50 privately owned land parcels.

Local Access

In Option 2, the expressway is provided on greenfield land. This means that existing access patterns are completely unaffected. Journeys to Paraparaumu and Waikanae using the old state highway alignment are likely to improve because inter-regional traffic will now use the expressway.

A major advantage of Option 2 is that the expressway bypasses Waikanae town centre. Traffic reductions in Waikanae would improve the amenity of the town centre and could make it a more attractive place for businesses, and for pedestrians who need to cross SH1.

Conversely Option 2 may impact on the proposal to develop an accessible, high quality town centre in Paraparaumu west of Rimu Road. Development at the town centre site and at Paraparaumu Aerodrome is highly dependent on the provision of the WLR. This option would force KCDC to re-visit existing land-use plans and focus the town centre on what is now SH1.

Considerations

The following issues should be considered in more detail if Option 2 is progressed:

- The depowered old SH1 in Waikanae is more appropriate for a town centre environment.
- Allows future provision of high quality transit orientated developments close to Waikanae and Paraparaumu railway station.
- Constrains planned development in Paraparaumu (town centre and airport) that is dependent on WLR.
- This option impacts on the smallest number of private land owners
- Existing designation requires alteration to reflect the altered function of the road.
- KCDC must agree to transfer the land designation to NZTA.
- An Urupa may be affected where the expressway extends outside the WLR designation north of the Waikanae River.
- It is likely that the WLR designations will need to be extended at three locations.
- Minimal improvement for motorists making local trips.
- Difficult to provide east-west pedestrian / cyclist links needed in an urban area.
- The distance between the expressway and adjacent properties will be sufficient to avoid adverse noise effects in most cases. Any increase in traffic noise is likely to be easily mitigated.

Option 2 provides most benefits to inter regional traffic by providing a high speed through route. Because it does not affect existing roading network, local trips are not adversely affected. Nevertheless, it still will be necessary to improve the roading network for local trips in future years. Since this option uses the land set aside for the WLR for the SH1 expressway, additional initiatives will be required to improve capacity for local vehicles. One idea could be to provide additional west-east connections to the old SH1 by linking Arawhata Road with the old SH1 at Lindale, as shown in Figure 3.2. It may also be feasible to provide an additional local crossing of the Waikanae River to the west of the present WLR designation.

5.3 Option 3 - Expressway Follows Rail Corridor

Constructing the SH1 expressway adjacent to the NIMT railway would not introduce any additional severance. Through Raumati and north of the Waikanae River, SH1 is currently located immediately to the west of rail. It would be reasonable for the expressway to follow the western side of the railway between these two town centres. Figure 5.3 shows a SH1 expressway following the western side of the railway.

Figure 5.3 – Option 3 - Expressway Follows Rail Corridor



Interchanges

Interchanges are again proposed at the northern and southern ends of the study area with a grade separated interchange between SH1 and Otaihanga Road. There are two locations where an interchange could be constructed south of Paraparaumu. There are also three locations where an interchange could be constructed north of Waikanae. The factors that will influence decisions regarding the location of Interchanges are similar to those for upgrading the existing SH1 alignment (Option 1) described in chapter 6. No other interchanges are proposed.

Other Structures

Grade separated east-west links below the expressway would be provided in both Paraparaumu (at Kapiti Road) and in Waikanae (at Te Moana Road). These links would maintain a connection between each side of the expressway.

It would be necessary to demolish Paraparaumu rail overbridge in order to accommodate Option 3. This would be necessary whichever side of the NIMT railway the expressway were to follow. Reconstruction of the bridge is not proposed. Motorists wishing to cross between the east and west sides of Paraparaumu could instead use the underpass at Kapiti Road.

A new four lane Waikanae River crossing would be needed. The route north of Kebbel Drive would be the same as if the existing alignment was upgraded. The new bridge would be located to the west of the existing river crossing.

Considerations

The following issues should be considered in more detail if Option 3 is progressed:

- Removing connections to the SH1 expressway within Paraparaumu town centre and along Raumati straights results in severe congestion and delays within Paraparaumu town centre. The WLR between Poplar Avenue and Kapiti Road would fully mitigate this.
- Likely to be lengthy disruption to SH1 traffic during construction of expressway between Raumati and Paraparaumu unless WLR Stage 3 is constructed first.
- Creates an eastern arterial for north-south trips within the district.
- Accommodates the construction of the WLR (north-south local arterial) and a new western river crossing.
- Creates a coherent road hierarchy.
- It is possible to avoid Paraparaumu Domain with local rail re-alignment north of the rail overbridge. If the expressway avoids the domain, properties on Buckley Grove would be affected.
- Any increase in traffic noise is expected to be small and may be easily mitigated.
- The SH1 expressway is likely to affect the amenity of Waikanae town centre.
- Improving the connection between SH1 and Otaihanga Road will create opportunities for future land development close to Otaihanga Road.

Variation: SH1 Expressway Follows Eastern Side of the Expressway

North of Waikanae and south of Paraparaumu, SH1 follows the western side of the NIMT railway. Between the two towns it is possible to construct the expressway on either side of the railway. Both variations are feasible and the transport economic efficiency benefits would be similar for each.

Fewer structures are needed if the expressway follows the western side. If the expressway follows the east of the NIMT railway a rail overbridge would be required to connect with a new Waikanae River bridge. Another bridge would be needed to carry the expressway over the railway somewhere south of Paraparaumu. Although the property impacts differ according to the alignment relative to rail, the number of private land owners affected would be similar.

The preferred alignment will need to be confirmed through a scheme assessment if this option is progressed.

5.4 Option 4 - Expressway Avoids Future Town Centres

Option 4 is a hybrid of the three previous options. It was developed in an attempt to use the best aspects of the other options. In Paraparaumu the SH1 expressway would be constructed along the existing alignment immediately to the west of the NIMT railway. This option will allow the town centre to develop in accordance with KCDC's land-use plans. The WLR between Poplar Avenue and Kapiti Road would be essential to provide adequate access to the town centre and Paraparaumu aerodrome.

From Otaihanga Road to the north, SH1 would follow the WLR alignment allowing the expressway to avoid Waikanae town centre. This is shown in Figure 5.4. Not only would this avoid the negative effects associated with high capacity roads passing through urban areas, it would also reduce the number of property acquisitions that would be necessary.

The considerations for Option 4 can mostly be drawn from the other options. This option also has the potential to affect an Urupa unless the designation close to the Waikanae River is revised. Where it differs from the other options is between Paraparaumu Domain and Otaihanga Road. Constructing a new road across the landfill site is unlikely to be feasible. Instead it has been possible to bypass the landfill site with a 110kmph design speed and avoid Paraparaumu Domain. This is however at the expense of land parcels on Bluewater Place.

Interchanges

As with other options, three interchanges are proposed. The interchange south of Paraparaumu would be the same as that proposed for Options 1 and 3. The interchange at Otaihanga Road would be similar to that proposed for Option 2. It would be adjusted to accommodate the different alignment between Otaihanga Road and Paraparaumu. An Interchange at Peka Peka could be exactly the same as that proposed for Option 2.

Figure 5.4 – Option 4 - Expressway Avoids Future Town Centres



Other Structures

Several structures would be needed to allow connections between the east and west sides of the expressway. A four lane bridge across the Waikanae River would also be constructed.

To maintain connections between the east and west sides of Paraparaumu, an underpass is proposed at Kapiti Road. The underpass could be used by motorists travelling between Paraparaumu and Waikanae using the old SH1 which will function as an eastern arterial. The underpass will provide the only connection across the expressway in Paraparaumu because the rail overbridge has to be demolished for the expressway to follow the western side of the railway.

It would also be necessary to create a grade separated connection across the expressway at Te Moana Road. This would maintain the connection between Waikanae and the coast.

Local Access

Option 4 maintains existing levels of local access and protects the amenity of the Waikanae Town Centre. Unlike alignments that follow the rail corridor, the local road network remains unchanged from the existing. In other words, there are no improvements to the road network for local trips. Using the WLR designation from north of Otaihanga Road will prevent KCDC from realising current plans for a local river crossing at this location. This may be mitigated by providing a river crossing for the west of the district at another location.

Considerations

The following issues should be considered in more detail if this option is progressed:

- Improving the connection between SH1 and Otaihanga Road will create opportunities for future land development close to Otaihanga Road.
- Removing connections to the SH1 expressway within Paraparaumu town centre and along Raumati straights results in severe congestion and delays within Paraparaumu town centre. The WLR between Poplar Avenue and Kapiti Road would fully mitigate this.
- Likely to be lengthy disruption to SH1 traffic during construction of expressway between Raumati and Paraparaumu unless WLR Stage 3 is constructed first.
- Motorists can use an eastern arterial (old SH1) for north-south trips between Waikanae and Paraparaumu
- The depowered old SH1 in Waikanae is more appropriate for a town centre environment.
- Prevents the construction of a local road river crossing at the WLR designation.
- WLR designation requires alteration to reflect the different function of the road.
- KCDC must agree to transfer the land designation to NZTA.
- An Urupa would be affected if the expressway cannot be accommodated within the designated alignment north of the Waikanae River.

- It is possible to avoid Paraparaumu Domain with local rail re-alignment north of the rail overbridge. If the expressway avoids the domain, properties on Buckley Grove would be affected.
- Properties on Bluewater Place would be affected to enable the landfill to be avoided.
- Any increase in traffic noise is expected to be small.

5.5 Cost Estimates

Indicative costs for each option were estimated using the same methodology and parameters that were applied to the route section between Pukehou Bridge and Peka Peka. The assumptions on which these estimates are based are documented in Appendix B.

Table 5.1, below presents indicative cost estimate for each option. Costs for Options 1, 3 and 4 include the WLR between Kapiti Road and Poplar Avenue (between \$60M & \$80M).

Table 5.1 – Indicative Cost Estimates

Option ⁵	Cost Indication (\$ Millions)	
	Expected	95 th ile
1. Upgrade the Existing SH1 Alignment	560	700
2. Expressway Follows WLR Designation	380	500
3. Expressway Follows Rail Corridor	500	610 ⁶
4. Expressway Avoids Future Town Centres	410	590 ⁷

The table shows that upgrading the existing SH1 alignment is likely to be the most expensive option. This is because a large number of privately owned land parcels are required. Subdivided land adjacent to the SH1 is also more expensive than other less accessible sections.

The least expensive option would be to construct a SH1 expressway within the WLR designation. NZTA and KCDC already own a significant number of the land parcels that would be needed for this option. The costs are also reduced because approximately half of the length would pass over greenfield that is currently used for agricultural purposes.

5.6 Construction Timetable

Table 5.2 shows a possible construction timeline for each option. For options that have not been previously investigated, it has been assumed that at least two years would be needed prior to construction. This assumes that detailed design would progress in parallel with designations, consenting and property acquisitions. Options that follow all or part of the WLR designation are expected to progress more quickly because fewer land parcels would need to be acquired. Road building outside urban areas is also less constrained and is therefore often faster.

⁵ Costs for Options 1, 3 & 4 include WLR from Poplar Avenue to Kapiti Road.

⁶ If this option was built in several stages, each of these stages would have their own 95th percentile estimate. If we were to sum all of these 95th percentiles, the total cost would be \$770 Million.

⁷. The sum of 95th percentiles for each stage of this option would be \$680 Million.

Table 5.2 – Possible Construction Programme

Option	Earliest Start to Construction	Possible Duration
1. Upgrade the Existing SH1 Alignment	2012	9 Years
2. Expressway Follows WLR Designation	2011	5 years
3. Expressway Follows Rail Corridor	2012	9 years
4. Expressway Avoids Future Town Centres	2012	6 years

5.7 Summary

Work to date indicates that upgrading the existing SH1 alignment (Option 1) would be disproportionately expensive compared to the other options. Option 1 would also affect a large number of landowners because land adjacent to SH1 has been subdivided more than other less accessible sections. Upgrading the existing SH1 alignment would also affect the amenity of Waikanae town centre more than other options. It is reliant on construction of the WLR river crossing or provision of a full diamond interchange in the centre of Waikanae or both.

The three other options are able to consolidate the road and rail corridors to minimise severance or avoid future town centres with varying degrees of success. None are able to fulfil both aspirations completely.

Following the WLR designation (Option 2) is the cheapest option because NZTA and KCDC already own much of the land. This option would however limit development of Paraparaumu town centre and aerodrome, forcing KCDC to revisit land-use plans for the District. Option 2 introduces a further severance within the district, although it is accepted that the designation for the WLR has, in many respects, already created this severance. It is also possible that an Urupa on the northern side of the Waikanae River may be affected.

Following the rail corridor (Option 3) is relatively expensive because of the number and value of land parcels in the Paraparaumu and Waikanae urban areas. Constructing an expressway in Waikanae town centre and limiting connections to the road would impact on the amenity of Waikanae town centre. Option 3 does, however, enable development of Paraparaumu town centre and aerodrome. Locating the expressway adjacent to the NIMT railway avoids adding further severance in the district.

The hybrid option 4 avoids both of the future town centres and follows the rail corridor for a good proportion of its length. It is also expected to be the second least expensive option. Design challenges associated with the Urupa and avoiding the landfill will need to be resolved. Option 4 would also require the support of KCDC who would need to agree to transfer the designation to NZTA.