

Kaikoura Deviation Scheme Report

Scheme Assessment of Kaikoura Urban Deviation – State Highway 1

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NZ Transport Agency

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Sign-off Sheet

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1 Introduction

Kaikoura is one of the primary tourist destinations in the South Island. It is the home of Whale Watching and has numerous other attractions particularly around nature, wildlife and outdoor pursuits.

However, the main commercial and tourist access into central Kaikoura has a significant crash risk. Some of the customer insights obtained during this study identified that users felt very unsafe. At this location, the highway intersects with three local roads in close proximity, the highway is on a poor alignment, and there are very limited and deficient pedestrian and cycle facilities.

The highway layout results in poor visibility, inadequate capacity for turning movements, and pedestrians crossing at unsafe locations. Accordingly, drivers, cyclists and pedestrians (including school children) are putting themselves at risk when travelling through this area, and they are not able to manage their own risk due to the highway layout and poor visibility.

Kaikoura is growing as a tourist destination, and further development should be encouraged by having a safe and accessible town centre for use by tourists and locals alike. State Highway 1 is busy carrying just under 8000 vpd, and this significantly increases during peak tourist season in summer. The through traffic, especially heavy vehicles, reduces the main street amenity.

NZ Transport Agency commissioned Stantec (formally known as MWH) to investigate and produce a preliminary design for the Kaikoura deviation using the designation provided in the Kaikoura District Plan.

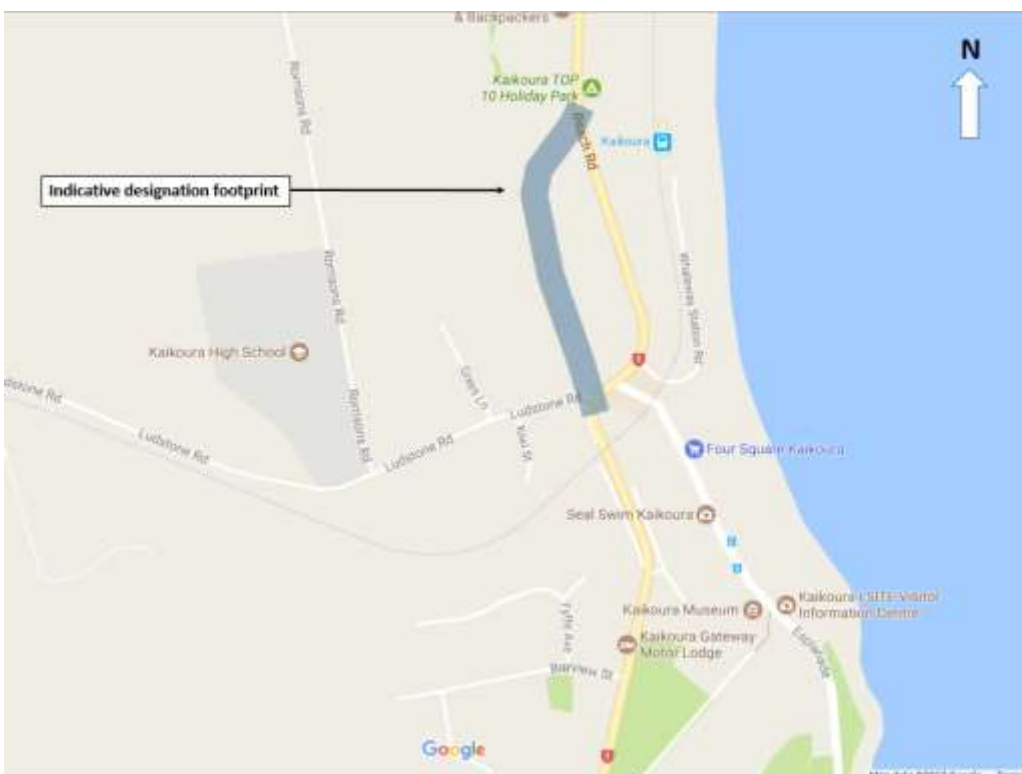


Figure 1: Site Location (Base map source: Google Maps)

2 Previous Information

This section of the report outlines and introduces relevant previous reports, strategies and plans undertaken in Kaikoura and around the site location. The reports provide a background to the problems and opportunities faced and some of the measures that have been used in response.

2.1 Previous Reports

Previous Studies	Consultant/Council	Outcomes / Recommendations (relevant to this scheme report)
Kaikoura Land Use Integration Transport Study	Abley Transportation Engineers	<ul style="list-style-type: none"> • Development of a walking and cycling strategy • Investigation of a shared walking and cycling path from West End to the retail centre to the north. • Implementation of a standard urban design cross section on Beach Road • Greater provision of end user facilities for walking and cycling and better quality existing facilities • Provision of pedestrian islands within the road reserve at high pedestrian crossing locations. • Installation of signage targeted at informing pedestrians and cyclists. • Relocation of street trees and expansion to the • Improvement to the quality of street lighting. • Improved footpath surfacing. • Relocation of service poles out of the footpath to the property boundary or underground. • Development of gateway treatments • Greater neighbourhood amenity
Strategic Transport Study – Kaikoura District	RMG – Resource Management Group Ltd	<ul style="list-style-type: none"> • Implementation of Kaikoura deviation (Beach Road to Churchill Street). • Investigation and possible future protection of a route for a heavy vehicle bypass around the Kaikoura urban limits given the predicted growth rate (land use and population) expected within the district. • Provision of additional pedestrian and cycle infrastructure. • The widening of Beach Road to facilitate improved cycle and pedestrian facilities. • Continued maintenance and upgrade works to state highway and local roads in district.
Presentation – Beach Road/West End Intersection	Abley Transportation Engineers	<ul style="list-style-type: none"> • Upgrades to Lyell Creek Bridge • Design changes to existing street furniture • Removal of parking or rationalisation of parking spaces within carriageway and at intersections. • Relocation of control signs. • Design changes to road geometry
Draft Kaikoura Walking and Cycling Strategy	Kaikoura District Council	<ul style="list-style-type: none"> • This is currently in draft only; with no completed network plan.

2.1 District Plan

The Kaikoura District Plan has provision for an urban deviation of State Highway 1 from Ludstone Street to Beach Road (Designation 39), refer to Figure 2 and Figure 3.



Figure 2: Kaikoura District Planning Map 44



Figure 3: Kaikoura District Planning Map 45

Designation 39 is listed in Appendix B of the District Plan as:

- D39 Transit New Zealand State Highway Purposes - State Highway 1: Kaikoura Deviation (Beach Rd to Churchill St). As shown on Planning Maps.

The designation information in the District Plan did not reveal any designation conditions. The designation is due to lapse on 23 June 2018.

3 Problems, Opportunities and Constraints

This section of the report discusses the problems, opportunities, and constraints facing Kaikoura on SH1 and local roads from the Adelphi Street / SH1 intersection to about 200m north of the northern end of the existing bypass designation.

3.1 Safety

3.1.1 Design Workshop

The following problems were raised and noted during the design workshop on 14/06/2017. Some of these issues have been explored in greater detail in the following sections of this report.

Problems
<ul style="list-style-type: none"> • Noted that crash history not severe, but a wide range of problems and a high number of near-misses. Many non-injury crashes not reported. • Sight distance is well below standards for many movements at the intersections. • Three intersections too close together. • Inadequate stacking space in right turn bays. • No forward visibility of right turn into West End; vehicles can block lane and cause rear-end crashes. • Pedestrians crossing in many different places. • Sunstrike in winter. • Speed of traffic coming down the hill into this area.

3.1.2 Customer Insights

The Transport Agency has gathered some insights from various customers (refer Table 1). The insights highlight the safety issues that are not immediately obvious from the recent crash record. Generally, most comments reflect concerns for pedestrians on the current alignment and the potential for pedestrian – vehicle conflict in future. The available sight distance was noted, and children often ‘dodge’ traffic. Driver compliance is also another concern with vehicle speeds, intersection confusion.

Table 1: Customer Insights Collected by the NZ Transport Agency

Customer	Comments
School Bus Driver	<ul style="list-style-type: none"> • “Extra careful and cautious”. • Has no issue with sight distance when turning right into Ludstone Road from Beach Road, but have to be extra careful and take it extra slow. • People fail to slow down to the 35km/h advisory speed limit at the bottom of the hill on Churchill Street. • Like the idea of the proposed new alignment. • Concerned that there is currently no protection for pedestrians. • “People appearing out of nowhere” as you drive down the hill on Churchill St and approach the corner. • Very rare to see drivers giving way to pedestrians at the pedestrian crossing. • Does not think the transverse road markings on Churchill St are effective in slowing drivers down the hill.

Customer	Comments
Mother with two young children on scooters	<ul style="list-style-type: none"> • Mostly walks around town, almost never drives. • Described the intersection as "terrifying" and "scary". • Half the trucks stop for her and her kids when they are waiting to cross at the pedestrian crossing and half don't. She wished they didn't stop for her and her kids because it can be confusing as to who is giving way. • She does not want gravel on the pedestrian path at the West End approach to be swept, as it is good for slowing her kids on scooters approaching the pedestrian crossing. • Thought a pedestrian overpass would be safer for her and her kids, although her kids would not want to use them while on their scooters. • Difficult to see up the hill for oncoming vehicles when waiting at the pedestrian island. • "Not sure where everyone is turning" at the intersection, causing uncertainty when trying to cross the road. • Would appreciate having school patrols with lollipop signs at the pedestrian crossing.
Policeman	<ul style="list-style-type: none"> • "No crashes, but lots of near misses". • "Kids dodging cars". • Speeding issues down the hill on Churchill Street. • Have issued many tickets to drivers not stopping at the Stop sign. • Tourists get confused at the intersection at the bottom of the hill, and stop in the middle of the road trying to figure out how to go to West End from SH1. • Thinks the red pedestrian crossing marking is confusing.
Kaikoura High School Principal	<ul style="list-style-type: none"> • Lots of students use the pedestrian crossing to get to and from school. • "Have to look through all approaches to see what is coming", very complicated. • Considers the current pedestrian island to be inadequate. • The pedestrian crossing is a major safety issue, but there have been no incidents. • "Have to be really, really, careful". • Thinks the safest option may be an overpass – but expressed concerns over whether people would actually use it, as kids and mums with prams are likely to take the easiest route. • Would not favour an underpass due to crime/security issues. • Thinks that on street pedestrian crossing may be the most efficient and open option. • Anticipation of the corner at the bottom of the hill on Churchill St slows them down. However, the proposed new alignment will not slow drivers coming down the hill. • Many students go home by bus. • Some live by Beach Rd end – "Only a handful live on the other side of town". • Some students cut through Davidson Terrace. • Likes the idea of the SH going straight through as per proposal, it would be a bonus for everyone. • Commercial advantage for getting tourists to West End and it would be quieter. • Commercially not significantly affected as trucks mainly stop at BP and the bakery on Beach Road.

3.1.3 Crash Record

In the period 2011-2016 inclusive there has been ten crashes (one minor injury, nine non-injury crashes) on State Highway 1 between the Adelphi Terrace / SH1 intersection and approximately 100m north of the northern end of the designation. There has also been five crashes (one minor injury, four non-injury crashes) in close proximity (within 50m) to SH1 on West End. Figure 4 shows the location of crashes that have occurred over the 2011-2016 inclusive time period. Most of the crashes are concentrated around the Ludstone Road / SH1, West End / SH1 intersections.

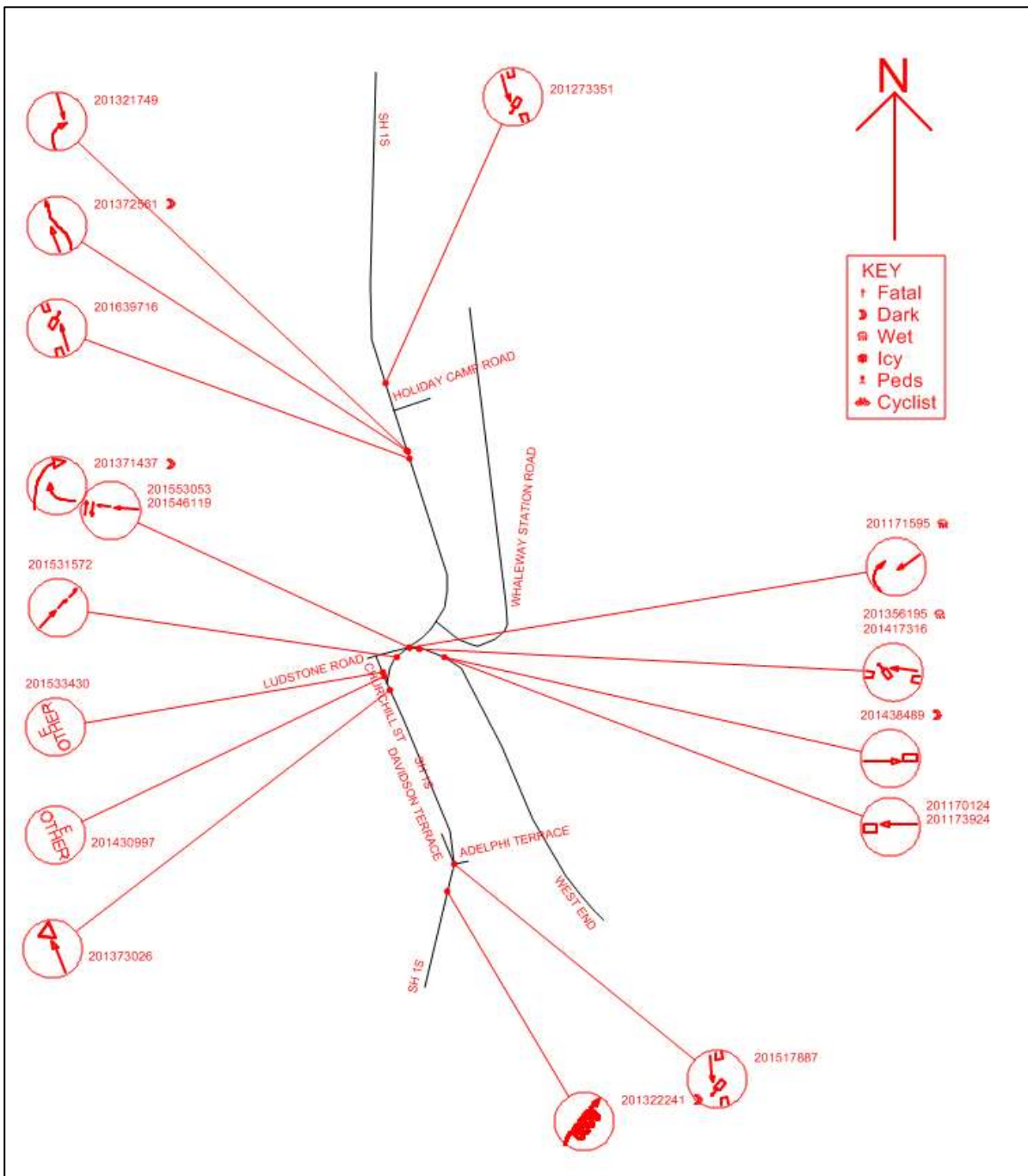


Figure 4: CAS Collision Diagram (2011-2016 inclusive crashes)

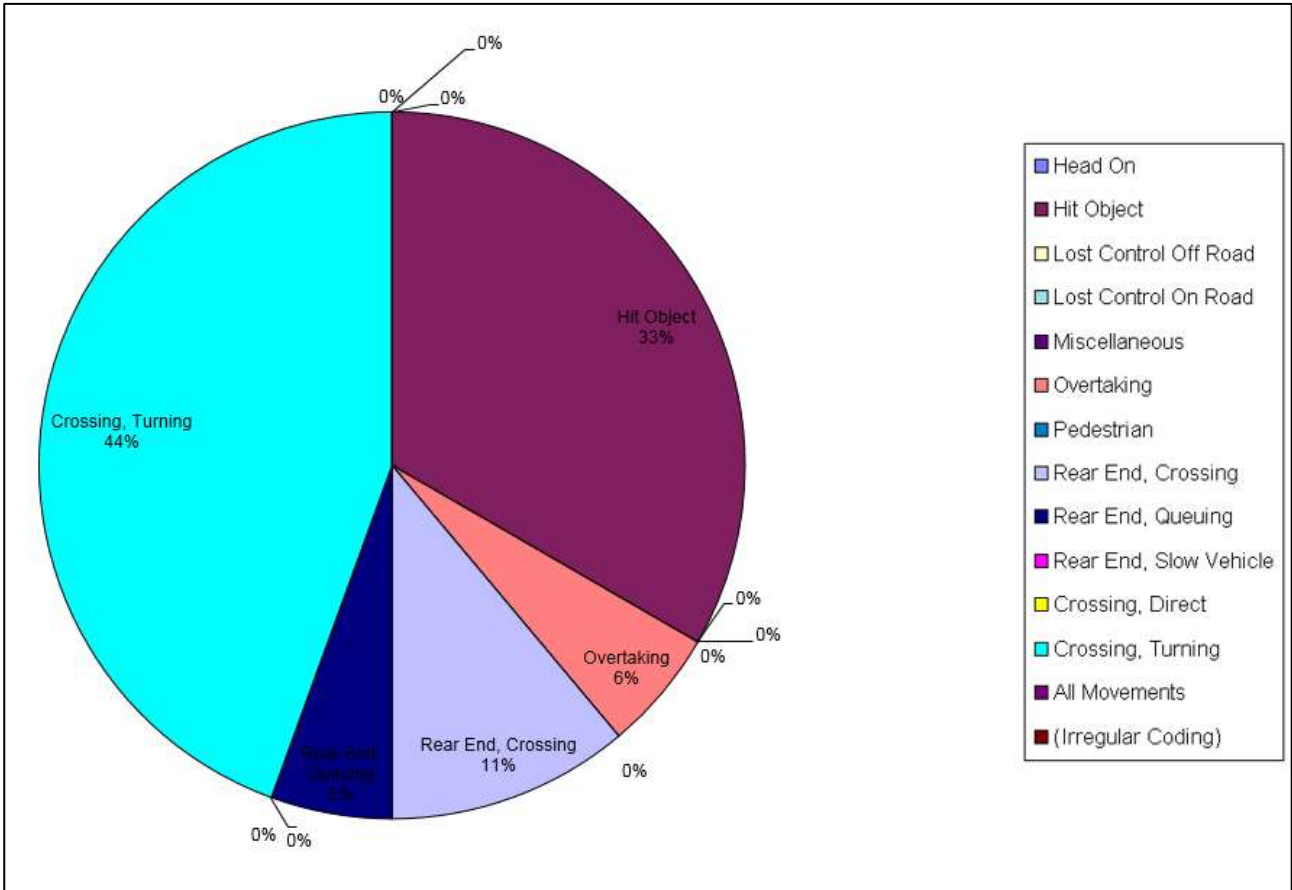


Figure 5: Pie Chart of Crash Movement

The majority of the crash movements from the recorded crashes were 'Crossing, Turning' (44%), and 'Hit Object' (33%).

3.1.4 Available Sight Distance

An initial assessment of the sight distance available to and from the local roads Whaleway Station Road, West End, and Ludstone Road, to State Highway 1 is shown in Figure 6. The red lines show sight lines that are non-compliant with the required standards. The sightline for vehicles exiting West End is the most deficient, this is combined with a steep upward gradient on the intersection approach and faster approaching speeds for vehicles heading North of SH1. Note, this assessment is best-case as it has been made on a 2D map therefore does not account for vertical alignment.

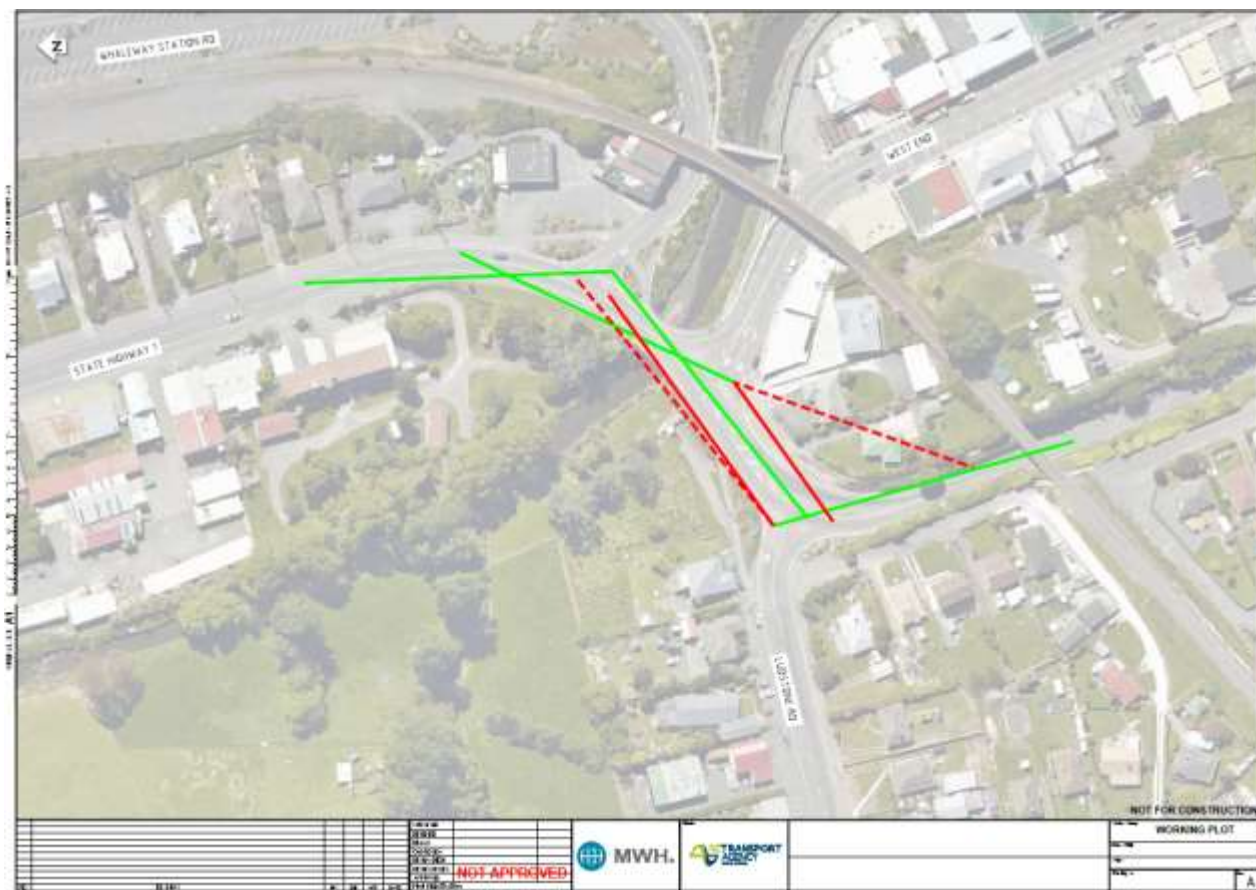


Figure 6: Sight Distance Available at the local road intersections with State Highway 1

Figure 7 also shows the limited available sight distance from the West End / State Highway Intersection looking west towards Ludstone Road, and the pedestrian median island on State Highway 1.



Figure 7: View west towards the existing Ludstone Road / State Highway intersection.

3.2 Accessibility

There are existing pedestrian desire lines from the western side of SH1 to West End; the hub of commercial activities in Kaikoura. Two schools and a church are located on Ludstone Road so school children can be required to cross State Highway 1 around the greater Ludstone / West End / SH1 intersection complex. Figure 8 shows the broad land-uses and transport generators in the wider area surrounding the site.



Sourced from the LINZ Data Service <https://data.linz.govt.nz/layer/2602-canterbury-03m-rural-aerial-photos-2014-15/> and licensed by The Canterbury Aerial Imagery (CAI) consortium for re-use under the Creative Commons Attribution 3.0 New Zealand licence.

Figure 8: Kaikoura Transport Network and Generators (Base Map Source: LINZ)

The previous reports summarised in Section 2.1 outline actions and plans to promote active modes, improve connectivity and accessibility, and safety of these modes. The specific accessibility issues noted at the preliminary design workshop are listed in the following sub-headings.

3.1.5 Pedestrian crossing is unsafe due to speed, visibility, and turning traffic

There is currently only one formalised pedestrian crossing facility available across State Highway 1 in Kaikoura (refer **Error! Reference source not found.**). The crossing facility is located at the intersection between Ludstone Road and SH1 on the southern side of the Ludstone Road. The crossing has a median refuge, and red pavement markings. The crossing links pedestrian movement between West End and two local schools on Ludstone Road.



Figure 9: View looking east at the western side of the existing pedestrian crossing facility.

3.1.6 Poor path and lack of signage for Adelphi Terrace footpath

There is currently a path that leads from Adelphi Terrace beneath the railway line and down to road level near the West End / SH1 intersection. The path is narrow with vegetation, and people unfamiliar with the path are likely to miss it.

3.1.7 Footpath under bridge too constrained

In addition to Section 0, the path under the railway underpass is narrow at just over 1m in places. Local desire is to provide a shared facility along this route that will require widening and localised lowering of the path under the rail bridge.

3.1.8 School kids on both sides of the road, but footpath only on one

The SH1 pedestrian crossing facilities leads to the southern side of Ludstone Road, which is the only side with a footpath, but on site it was noted the school children from the two schools on Ludstone Road used both sides of the street when walking to the town centre.

The need for improved pedestrian facilities relates closely to safety concerns and tourism opportunities outlined in Section 0 and 0.

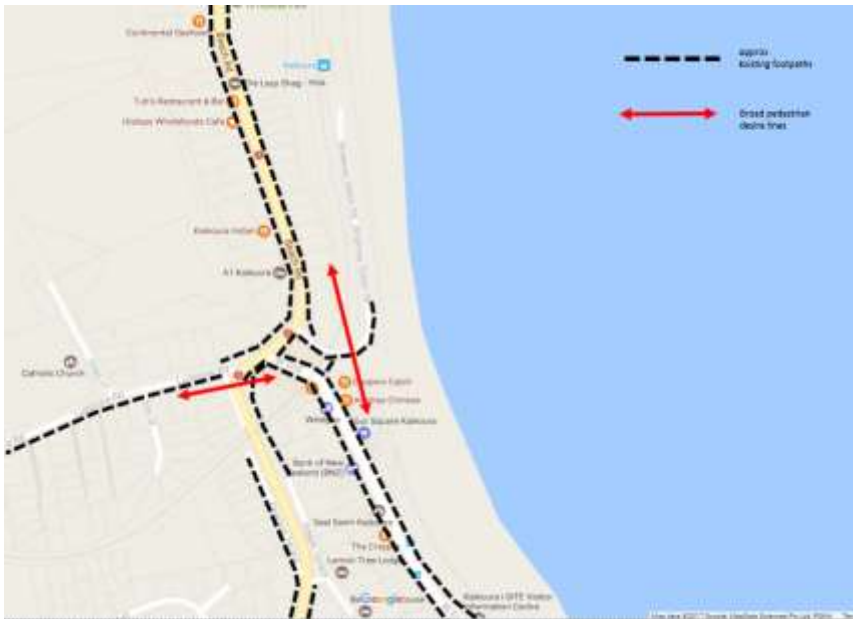


Figure 10: Kaikoura footpaths and broad pedestrian desire lines (Base Map Source: Google Maps)

3.3 Tourism (Opportunity)

Kaikoura is one of the major tourist destinations of the South Island. However the current road network is not conducive to simple access to key attractions, particularly on foot. The presence of heavy vehicles and through traffic in the southern end of Beach Road also reduces the amenity of this section of Kaikoura.

Additionally, the following goals were noted during the preliminary design workshop;

- Kaikoura has a vision to be a destination for visitors to have a three night stay. There is a large desire to improve the town centre.
- There is an opportunity to facilitate development on Beach Road between West End and the Holiday Park.
- There is a need to improve walking and cycling connections between key attractions and facilities.

3.4 Constraints

3.4.1 Overview

The NZ Transport Agency (the Transport Agency) is currently investigating options to realign State Highway 1 (SH1) where it passes through the north Canterbury township of Kaikoura. The changes are needed to improve the safety and function of the State highway, and connectivity with the local road network, including in respect of vehicular, pedestrian and cycle modes.

This document provides an initial assessment of the potential regulatory constraints that may apply, and which should be considered in undertaking consultation and when progressing the concept design. This assessment should be confirmed and / or amended as the design progresses, and / or as actual and potential construction and operational phase effects are confirmed.

Table 2: Summary of constraints

Constraint	Comments
Designation D39	<p>No conditions. Lapses 23 June 2018.</p> <p>Sets aside District Plan Rules only, for activities that are consistent with the specified purpose.</p> <p>Will need to be altered to incorporate all works and areas associated with the current concept.</p>
Kowhai River and Lyell Creek Flood Hazard	<p>A large ponding area for the Kowhai River is defined on planning maps to the west of the true right bank of Lyell Creek. Lyell Creek is also known to flood. The embankment and bridges will need to be designed and positioned to avoid or minimise significantly impacting the current flood risk.</p>
National Environmental Standards	<p>Several HAIL sites have been identified within the designation. These will need to be investigated to determine whether further detailed investigations and / or consents under the NESCS are required.</p>
Regional Resource Consents	<p>Various resource consents are expected to be required from ECan, mainly associated with the construction phase, and with operational stormwater discharges. The rules and policy framework may not support a traditional stormwater management solution if water quality cannot be shown to be maintained or enhanced despite the discharge.</p>
Structures in Riverbeds	<p>DoC requires the assessment of the effect of structures on fish passage before providing affected party approval for MA processes. This can add a substantial amount of time to the approval process.</p>
Railway designation and bridges	<p>The railway designation and bridges in proximity to the site present a legal and physical constraint respectively. The existing SH1 bridge also presents a physical constraint, particularly in respect of flood passage.</p>
Te Runanga o Kaikoura	<p>Iwi values will need to be taken into account in the design, construction and operation of the deviation, particularly in respect of the effects on Lyall Creek.</p>

4 Constraints Assessment

4.1 Kaikoura District Council

The Kaikoura District Council's (KDC) District Plan planning maps 44 and 45 show Designation D39 as providing for the deviation of the State highway as proposed. The designation was secured in 2008, and lapses 23 June 2018 unless given effect to¹ beforehand.

The effect of the designation is to set aside the application of the district plan rules that would otherwise be relevant, provided that the activity within the designation is consistent with its specified purpose:

- *D39 Transit New Zealand State Highway Purposes - State Highway 1: Kaikoura Deviation (Beach Rd to Churchill St). As shown on Planning Maps.*

In this case, the proposal is aligned with the specified purpose, and the effect of the designation applies in respect of the construction and operation of the deviation within the existing designation boundary. Any works outside that boundary will be subject to the district plan rules unless the Transport Agency successfully alter the designation boundary to incorporate all affected land.

The effect of the designation does not set aside the applicability of the provisions of any relevant National Environmental Standard, or any relevant regional plan rules. Resource consents under those provisions will be required regardless, and are considered elsewhere in this document.

For the purposes of this assessment, it is assumed that an alteration to the designation will be required in order to accommodate the concept design. Requiring authorities may give notice of a requirement to alter a designation at any time. Under s181 of the Resource Management Act 1991 (RMA), a territorial authority may alter a designation in its plan if the alteration:

- Involves only minor changes to the effects of the use of the land, or minor alterations to the boundaries of the designation (as in this case); and
- All owners and occupiers of land affected by the change have provided written affected party approval; and
- The territorial authority agrees with the alteration.

Matters defined in the District Plan, and from the site visit which need to be taken into account when considering the deviation include:

- Lyell Creek – a recognised inanga spawning habitat, and flood prone
- Moderate Flood Hazard rating for the proposed SH embankment west of Lyell Creek
- An esplanade reserve (adjacent to Ludstone Rd / SH1 intersection) and scenic reserve (currently the campground) in the vicinity

¹ This may not necessary mean all works need to be complete, or even that physical works have commenced, but that the Transport Agency will need to be able to demonstrate that substantial progress toward doing so has been made. It is recommended that this is discussed and defined with the Kaikoura District Council early.

- The railway designation and over-bridges in proximity to the deviation
- The existing SH1 bridge: will be retained, and presents a 160cumec barrier to flood flows
- Existing schools to the west of the deviation, and community connectivity. Access to these schools, as well as a child care centre and adjacent businesses and residences on Ludstone Road will need to be maintained during construction.
- Access to from the realigned SH to lower (southern) Beach Road, and West End, including residences and businesses, the Railway station, and Whalewatch etc.

The KDC is also the consent authority responsible for administering the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011 (the NESCS). The NESCS applies to the disturbance of soil on land where activities that are identified on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) are or have previously been undertaken, and which may have resulted in soil contamination.

An initial search of Environment Canterbury's (ECan) Listed Landuse Register (LLUR) indicates that several sites within the current designation are recorded as HAIL sites, and therefore the disturbance of these sites will be subject to assessment, and potentially approvals (consents) under the NESCS. These sites should be subject to a Preliminary Site Investigation to determine the likely scale and nature of any contamination, and whether consent under the NESCS is required.

4.2 Environment Canterbury

The works will be subject to the rules of the relevant regional plans. While some assumptions can be made around the likely consents needed for the construction and operational phases, these assumptions should be tested as the design and construction approach is firmed up. Also, compliance with the rules (or otherwise the need for consents) is dependent on meeting the conditions within the rules, which may not be known at this early stage.

An initial assessment indicates that resource consents from ECan may be required in respect of:

- Excavation over an unconfined or semi-confined aquifer.
- Earthworks (excavation and filling) and vegetation clearance in proximity to a water body.
- Discharges:
 - construction and operational stormwater to water, and / or to land where it may enter water
 - dewatering water to water, and / or to land where it may enter water.
- Dewatering groundwater.
- Temporary stream diversion (Lyell Creek).
- Structures over a water body (two bridges).
- Structures that divert / deflect or impound flood waters.

Discharges will need to be considered in the context of how the regional plan responds to the National Policy Statement for Freshwater Management (NPSFM) which requires regional plans to be prepared in a manner which promotes the maintenance or enhancement of water quality in freshwater bodies. Essentially, this will mean that traditional methods of managing stormwater (eg. discharging directly to a stream) are unlikely to comply with the plan rules, or align well with the relevant objectives or policies. Similarly, the effect of the embankment and bridges on flood passage and ponding (if any) and the risk to the Kaikoura settlement downstream will need to be addressed at a rules and policy level.

The more difficult elements are likely to be the ECan requirements / regional plan response to building in a flood plain / impounding water / damming or diverting floodwaters. It will likely be necessary to show (through modelling) that the embankment in this location will not divert or deflect flood waters into adjacent properties, exacerbate flooding, etc. The project team will need to engage early with ECan to work through how they view the embankment (would it be considered a dam or a “defence against water” for example, in which case the *Canterbury Regional Council Flood Protection and Drainage Bylaw 2013* may come into play as well as any relevant regional plan rules). The LWRP rule 5.137 standards include:

8. For any bridge:

(a) there are no piers within the bed; and

(b) the bridge and the approaches are designed so that a 5% Annual Exceedance Probability flood event does not cause any increase in upstream water levels; and

(c) the soffit (underside) of any bridge is higher than the top of the river bank, and at least 500 mm above the 5% AEP flood level; and

(d) the bridge abutments are constructed parallel to the flow;

This will be a good starting point even though the post-quake levels have not yet been determined. A degree of conservatism and some well-founded rationale for a given design height will be needed, and will need to be established in discussions with ECan in order to support any resource consents needed.

4.3 Department of Conservation

It should be noted that the Department of Conservation (DoC) has recently started to apply the Fresh Water Fisheries Regulations 1983 in respect of the effect of structures in rivers such as culverts, on fish passage. DoC are requiring applications to be sought for Fish Passage Permits (or waivers where appropriate) in respect of such structures, even where it is demonstrated that there is no impediment to fish passage. The statutory timeframes for FFPs are substantially longer than for consents under the RMA, and this should be taken into account when considering the placement of structures in riverbeds.

4.4 Te Runanga o Ngai Tahu / Te Runanga o Kaikoura

Te Runanga o Ngai Tahu have a clear association with Lyell Creek / Waikoa extending to pre-European settlement. Te Runanga o Kaikoura is the kaitiaki Papatipu Runanga for the Kaikoura District.

While there are no recognised sites or items of archaeological interest noted in the vicinity of the designation, the works may uncover or disturb previously unknown sites. It is recommended that an Archaeological Authority is sought prior to the commencement of physical works, and that works should be carried out accordance with a standard accidental discovery condition.

Similarly, the discharge of stormwater to Lyell Creek is unlikely to be accepted by iwi without some form of treatment (eg. swale or wetland).



Figure 11: View of State Highway 1 looking south towards the Main South Line / State Highway 1 intersection.



Figure 12: View of the northern side of State Highway 1 at the Lyell Stream Bridge.

4.5 Environmental and Social Responsibility Screen

An environmental and social responsibility screen has been undertaken for this project. The screen is located in Appendix B.

5 Option Analysis

Whilst the alignment of the Kaikoura Deviation is relatively set by the designation, there are two particular areas where different options are possible. These are intersection form and pedestrian connectivity.

5.1 Intersection Form

The following options were discussed at the preliminary design workshop held on 14/06/2017. It was agreed that an at-grade T-intersection at the Ludstone Street / SH1 intersection was the best intersection form to proceed with into the preliminary design due to the problems noted with the alternative options (refer

Table 3).

Table 3: Alternative Option Analysis

Ludstone Road / State Highway 1 Options	Dis-benefits
Roundabout	<p>Accommodating Beach Road, Whaleway Road and West End intersections so close to roundabout would be very difficult and would likely cause travel delays and safety issues.</p> <p>Requiring northbound State Highway traffic to give way may be a safety hazard due to current speeds downhill</p> <p>Economic Efficiency dis-benefits due to State Highway traffic delays</p>
Signalised Intersection	<ul style="list-style-type: none"> • Not all roads could directly join the intersection due to the river and rail constraints. • Requiring northbound State Highway traffic to give way may be a safety hazard due to current speeds downhill. • Economic Efficiency dis-benefits due to State Highway traffic delays. • Increased crash risk due to red light running in off peak period. • Maintenance burden.
Priority Controlled Cross Roads	<ul style="list-style-type: none"> • Not all roads could directly join the intersection due to the river and rail constraints. • Safety concerns with this form of intersection.
Grade Separation	<ul style="list-style-type: none"> • Impossible without significant change to the location of the rail line.

However the following issues were also noted for the at-grade T-intersection treatment;

- Increased travel time between Ludstone Road and West End.
- Possible loss of through traffic business on Beach Road.

These issues are not fundamental safety or implementability concerns therefore the at-grade T intersection is the preferred option. The remaining issues will need to be addressed during the consultation and later design phases.

5.2 Pedestrian Connectivity

Three levels of pedestrian connectivity were considered:

1. Providing for uncontrolled at-grade crossing to suit current desire lines, as illustrated on the current Concept Design – General Layout Plan (80509764-01-001-SK001). See Appendix A.
2. Option 1 plus crossing facilities across all arms at the northern intersection
3. Option 2 plus grade separated facilities underneath the highway at the northern Lyell Creek Bridge and the southern intersection This option is dependent of the site constraints allowing a safe all user connection to the CBD and surrounding area

It was agreed that Option 3 would only be pursued once the preferred road design had been developed and the headway under the bridges investigated for adequacy.

Option 2 is currently not part of the design as the crossing facility would be in the middle of a right turn bay, which is not considered safe.

Accordingly Option 1 has been progressed. All at-grade crossings are to be uncontrolled but with good facilities (e.g. flag lighting and median islands).

6 Preliminary Design

A preliminary design workshop was held on 14 June 2017, and was attended by Stantec, the Transport Agency, and KDC staff. At the workshop the design was considered and key design forms agreed upon.

6.1 Preliminary Design Features

Other than the intersection form at the Ludstone Road / State Highway 1 intersection specific design parameters were discussed and agreed during the workshop. These included:

- 3.25m lanes.
- 0.5m wide centreline.
- 1.0m shoulders – to be confirmed following review of cyclist numbers.
- Earthworks slopes of 1:3 to be used until geotechnical information is obtained.
- Kerb and channel with swale for stormwater treatment before discharge into Lyell Creek, swale to be located at eastern toe of the embankment.
- Beach Road / West End is the over-dimensional route for large vehicles avoiding the railway underpass, therefore this movement needs to be allowed for.
- Guardrail will be provided on approach to bridge parapets (may lead to continuous length due to small separating distance between bridges). Minimum offset 1.1m from traffic lane.
- 8m strip will be provided between top of Lyell Creek and toe of eastern embankment to provide for shared path, creek maintenance, swale and relocation of rising main.

These parameters have been included in the preliminary design.

6.2 Problem Mitigation

This section briefly outlines how the preliminary design mitigates the problems raised in Section 3.

6.2.1 Safety

- Simplification of the Ludstone Road / SH1 / West End intersection, and alignment.
- Removes through traffic from bypassed section of Beach Road.
- Provides improved pedestrian facilities.

6.2.2 Accessibility

- Improves pedestrian facilities.
- Better active mode connectivity between transport generators.

6.2.3 Tourism

- Provides pedestrian facilities along key desire lines to help formalise ~~to simplify~~ road crossing movements.
- Improves amenity in central Kaikoura by removing through traffic, especially heavy vehicles.
- Provides opportunity for additional planting, street furniture alongside Lyell Creek, and within the bypassed section of Beach Road.

6.2.4 Constraints

The design works within the existing designation, does not require alteration of the rail line overpass, and considers positioning relative to Lyell Creek.

6.3 Future Design Considerations

Additional features were also discussed at the preliminary design workshop. These features are to be considered and potentially developed at a later stage of the project. Specifically, the future design considerations include:

- Lowering the finished height of the road level immediately beneath the Main North Line / State Highway 1 intersection to enable larger vehicles to pass under the existing Kiwirail overbridge.
- Noise mitigation and lighting design. Lighting design and pavement surfacing to consider Shearwaters.
- Confirmation of bridge soffit levels for flood events.
- Additional pedestrians facility of SH1 south of new Beach Road intersection.
- Grade separated pedestrian crossings at additional locations. (as discussed above).
- Managing vehicle speeds.

7 Consultation Preparation

It is recommended that the NZ Transport Agency engages with the consent authorities and key stakeholders as early in the process as possible, to foster a collaborative approach for the project, build open and effective lines of communication, and create a 'no surprises' environment. This relationship will also be important for identifying further constraints and / or resolving them.

This should include discussions with the consent authorities as the concept continues to develop, to ensure there are opportunities to design around constraints where practicable and appropriate, to help to avoid potential consenting and approvals obstacles, or delays.

Similarly, affected parties and the community are likely to have significant interest in this project as a significant development, with implications for the safety and functionality of the road network, and community connectivity. Early engagement will be important in identifying community concerns and 'constraints', and potentially refining the design to accommodate them where practicable and appropriate, to the benefit of the project and successful outcomes.

A preliminary design and one page investment story will be developed for NZ Transport Agency to use when undertaking consultation.

8 Costs and Benefits

Preliminary costs have been estimated for the scheme design. The total base estimate is \$16,627,590. Refer Table 4 below.

Table 4: Preliminary Costs

Project Estimate			
NZTA KAIKOURA DEVIATION SCHEME DESIGN			
<i>Drawing - received from NZTA on 19 June 2017</i>			
Item	Description		BondCM
D1	Environmental Protection & Monitoring		113,000
D1.1	Demolition		50,000
D2	Earthworks incl site clearance		2,194,000
D3	Ground Improvements		0
D4	Stormwater Drainage & Treatment		487,000
D5	Retaining Structures		0
D6	Bridge Structures		4,288,000
D7	Pavement & Surfacing		545,000
D8	Traffic Services		580,000
D9	Service Relocations and Utility Services		80,000
D10	Landscaping		108,000
D10a	Cycleway		360,000
D11	Extraordinary Construction Costs		
D12	Temporary Traffic Management & Temporary Works		455,000
	Sub-total base physical works		9,260,000
	Confidence Contingency		3,936,500
D13	Preliminary and General		2,639,300
D14	Design		791,790
E	Total Base Estimate		16,627,590
G	Project Expected Estimate		
Base Date of Estimate:			
Estimate prepared by: Bond Construction Management Ltd (McLaren/Scott)			
Estimate internal peer review by:			
Estimate external peer review by:			
Estimate accepted by Client Project Mgr:			

Note: (1) These estimates are exclusive of escalation and GST.
 (2) Investigation and reporting project phase estimates are set to nil as these are now sunk costs.

9 Next Steps

We recommend the following steps are undertaken as quickly as possible:

1. Consultation – preparing a one-page document and discussing with the community, stakeholders and iwi.
2. Property – this is likely to be the critical path for implementation of the scheme so discussions with landowners should be initiated immediately.
3. Site investigations – this includes geotechnical, survey, utilities and services and HAIL sites.
4. Flood modelling – there is a lack of information in this area which is critical to understand when dealing with new bridge construction.
5. Preliminary design road safety audit – to identify any safety concerns prior to detailed design.

APPENDICES

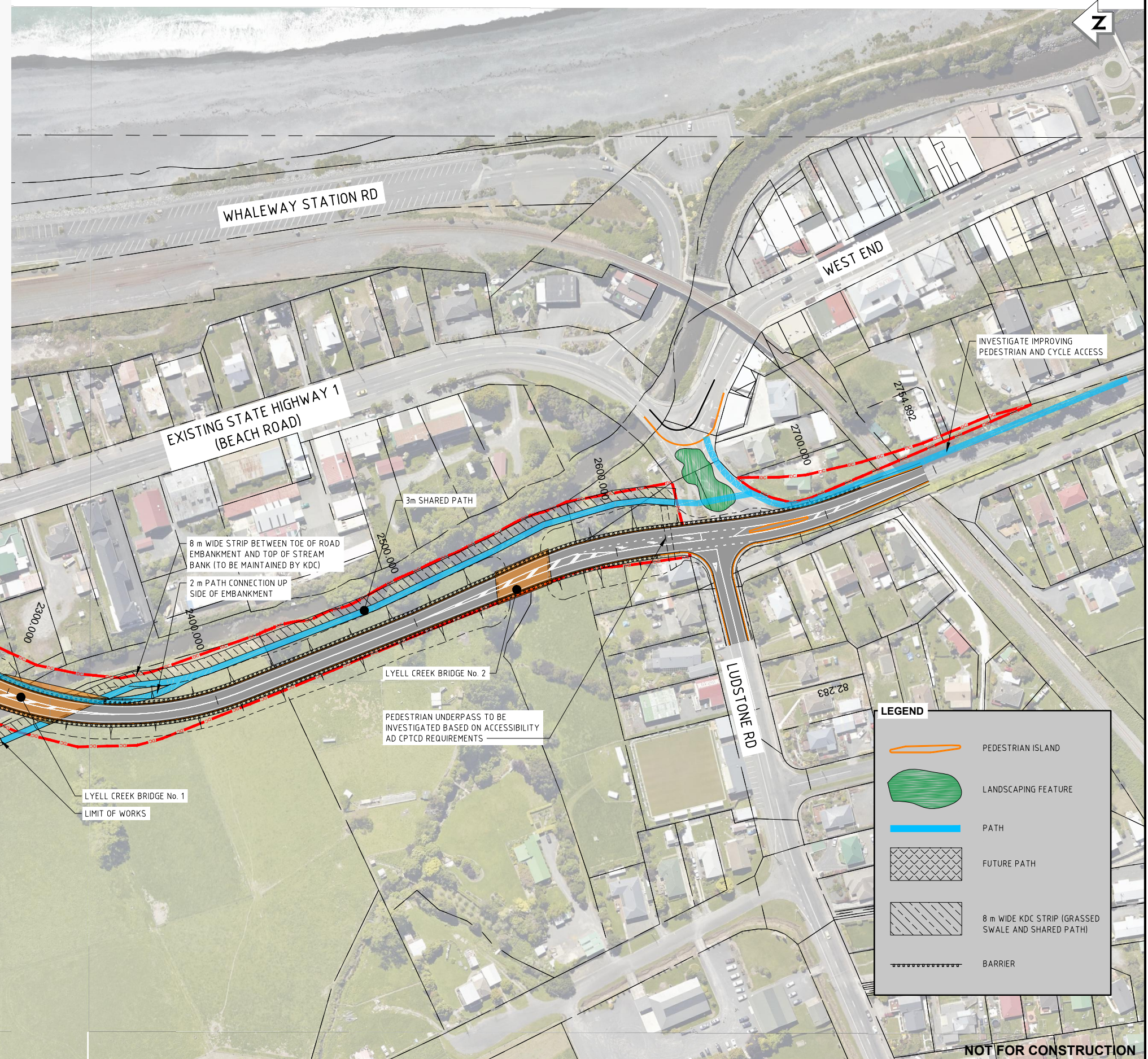
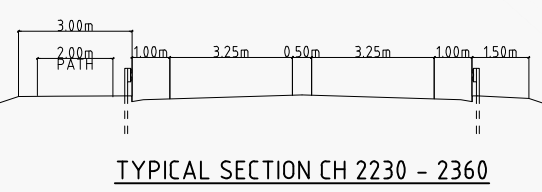
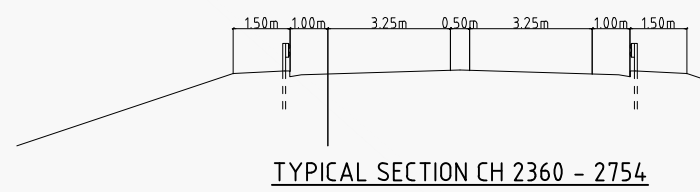


Appendix A Concept Design – General Layout Plan

Appendix B Environmental and Social Responsibility Screen

ORIGINAL SIZE A1

200 mm DO NOT SCALE - IF IN DOUBT, ASK



LEGEND

- PEDESTRIAN ISLAND
- LANDSCAPING FEATURE
- PATH
- FUTURE PATH
- 8 m WIDE KDC STRIP (GRASSED SWALE AND SHARED PATH)
- BARRIER

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED		
DESIGNED	Graeme Corin	06/17
DRAWN	Graeme Corin	06/17
CAD REVIEW	James Caufield	06/17
DESIGN CHECK	James Caufield	06/17
DESIGN REVIEW	Phil Peet	06/17
APPROVED	Phil Peet	06/17
PROF REGISTRATION:		



Client: NZ TRANSPORT AGENCY
 SH1 KAIKOURA DEVIATION SCHEME DESIGN
 CONCEPT DESIGN
 GENERAL LAYOUT PLAN

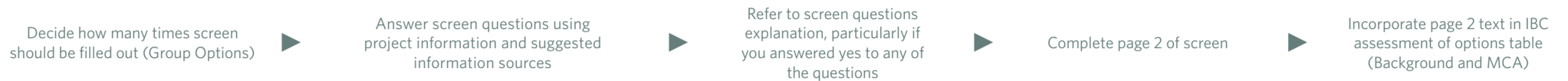
Status Stamp	WORKING PLOT
Date Stamp	16 JUNE 2017
Scales	1:1000 (A1)
Drawing No.	80509764-01-001-SK001
Rev.	A

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Use to assess options in the [Indicative Business Case](#)

Use this screen to identify opportunities and risks and assess options for state highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the [EUD Team](#).

Additional instructions and content, including information sources, to help complete the screen can be found on the [Highways Information Portal Screen pages here](#).



PROJECT LOCATION: PROJECT PURPOSE: DATE: OPTION DESCRIPTION:

CATEGORY	QUESTION	ANSWER	USEFUL INFORMATION SOURCES		
GENERAL	G1 What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants	Rural	Commercial		
		Industrial	Residential		
		High density residential	Parks/open space		
	G2	Does the option disturb previously undisturbed land?	Y	N	
G3	What is the construction timeframe?	>18 months	<18 months		
NATURAL ENVIRONMENT	NE1	Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y	N	NZTA MapHub Environmental and Social Risk Map- Natural Environment Regional Plan Maps and Schedules District Plan Maps and Schedules Department of Conservation
	NE2	Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y	N	
	NE3	Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y	N	
	NE4	Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y	N	
	NE5	Will more than 0.5 hectares of vegetation be removed? What type?	Y	N	
CULTURAL AND HISTORIC HERITAGE	CH1	Are there sites/areas of significance to Maori within 200m of the area of interest?	Y	N	Iwi NZTA MapHub Environmental and Social Risk Map- Culture and Heritage Heritage New Zealand List NZ Archaeological Association District Plan Maps and Schedules Regional Plan Maps and Schedules IPENZ Heritage List NZTA GIS predictive models
	CH2	Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y	N	
	CH3	Are any scheduled, listed or other important heritage buildings/structures within 200m of the area of interest?	Y	N	
	CH4	Will the option affect the setting of any historic building/structure or archaeological site?	Y	N	
	CH5	Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y	N	
HUMAN HEALTH	HH1	What is the One Network Road Classification?	National Arterial	Regional Collector	NZTA MapHub Environmental and Social Risk Maps- Human Health and Community which includes: - Designated airsheds (including one network classification) - Highly sensitive receivers Regional Council Contaminated sites Team
	HH2	Is the area of interest designated as a non-compliant airshed?	Y	N	
	HH3	Are there medical sites, rest homes, schools, child care sites, residential properties, maraes or other sensitive receivers located within 200m of the area of interest?	Y	N	
	HH4	Does land use within 200m of the area of interest include industrial sites, chemical manufacturing or storage, petrol stations, vehicle maintenance, timber processing/treatment, substations, rail yards, landfills or involve other activities that may result in ground contamination? OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y Y	N N	
SOCIAL	S1	Does the option affect access to community facilities i.e. libraries, open space etc (either temporarily or permanently)?	Y Which?	N	NZTA MapHub Project Team District Plan Maps Council and Community Strategy Documents
	S2	Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y	N	
URBAN AND LANDSCAPE DESIGN	ULD 1	Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as walking and cycling?	Y	N	NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Routes) Regional Land Transport Plan Project Team Strategies and District Plan
	ULD2	Does the option enhance the development potential of adjacent land where appropriate?	Y	N	
	ULD3	Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y	N	
	ULD4	Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y	N	

Answers and Comments Refer to [screen questions explanation](#) to help complete this part.

1. Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.

NATURAL ENVIRONMENT:

CULTURAL AND HISTORIC HERITAGE:

HUMAN HEALTH:

SOCIAL:

The responses above will be used in the IBC assessment of options summary table: MCA of the Option.

URBAN AND LANDSCAPE DESIGN:

Incorporate the relevant comments from above into the economy, social and geography sections of the IBC assessment of options summary table.

2. What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.

3. Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?

Completed by

Reviewed by NZTA Project Manager

Incorporated results into IBC assessment of options summary table?

Yes

No