

PREPARED FOR: Commute  
BY: Meagan Barfoot / Noel Tunnicliffe  
DATE: 13-Nov-17  
PROJECT: Peka Peka Connectivity SSBC  
PROJECT NO: 17016  
TN NO: 002  
SUBJECT: Shortlisted Options Refinement

## 1.0 Overview

Following our previous work, as reported in TN001, further analysis and refinement has been undertaken to shortlist two final options. Further consultation has been carried out with a public Open Day held in Otaki and Te Horo on the weekend of 28<sup>th</sup> and 29<sup>th</sup> October. The findings from both our further design work and the information gathered, has enabled the project team to identify two options which are preferred. The concept designs of these two options are described herewith.

This Technical Note provides further details for the two shortlisted options, following detailed geometric design assessments. Our assessments have considered the geometric requirements and constraints, and has enabled us to develop the most effective outcome for each option. Our design solutions also include discretionary “parts” that could be included, where our assessment has identified constraints that may require mitigation.

Design has been undertaken to a level of detail sufficient to enable confidence in both the feasibility of the geometric solution and the high-level pricing for each option. We have worked with NZTA’s road safety team and the designers of the existing Peka Peka Interchange to gain understanding of their rational and opinion. We have also worked with CM Bond to provide relevant quantity information required to further develop pricing. The quantity information, as has been provided to CM Bond is included as attachment 2.

For descriptions of all options previously considered, and fuller discussion of constraints, this Technical Note (TN002) should be read in Conjunction with TN 001, dated 3 October 2017.

## 2.0 Shortlisted Options

Although the locality of additional accessibility options to/from the expressway were considered across the area covered by both the recently completed MacKays to Peka Peka section of the Wellington Expressway and the currently underway section Peka Peka to Otaki, both the final two options are located at the current Peka Peka partial-interchange. Our geometric design work has shown that the design solutions at this location are more cost effective and less disruptive to implement, generally fitting within the existing NZTA designation(s), and/or within land currently owned by NZTA.

Both shortlisted options incorporate a northbound off-ramp, to enable traffic travelling from Wellington to the Kapiti Coast area to exit the expressway at Peka Peka; and a southbound on-ramp, to enable Kapiti Coast traffic to enter the expressway at Peka Peka and travel towards Wellington.

The northbound off-ramp is consistent in both shortlisted options. The two options differ in the location of the southbound on-ramp. The two shortlisted options are described below.

Both options provide connectivity for the currently “missing” south-facing ramps not provided for in the current Peka Peka partial interchange, effectively creating a full interchange with all four movements at Peka Peka.

Option 1 (refer PP-DRG-GA-00-005)

Option 1 is the combination of the northbound off-ramp previously referred to as 'Option P5' and the southbound on-ramp previously referred to as 'Option P7' in the earlier option identification (refer TN 001), as illustrated below (Figure 1).

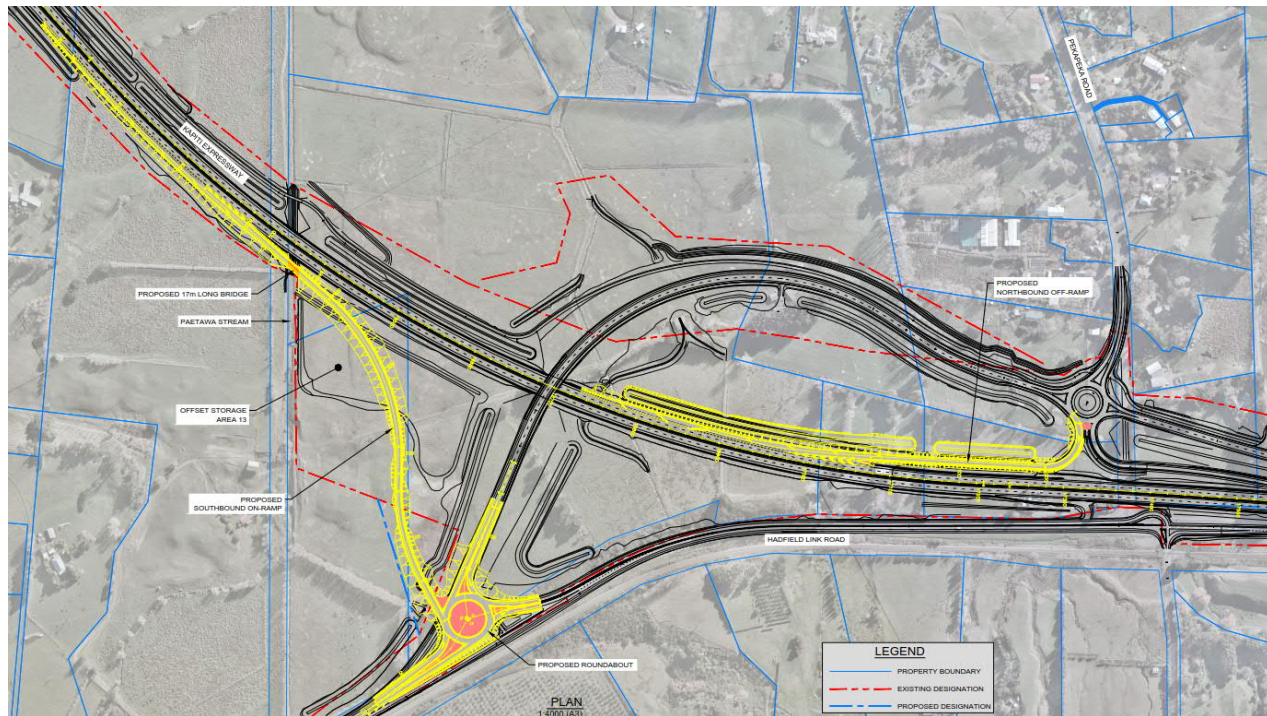


Figure 1. Plan illustrating the layout of Option 1, proposing two new ramps (in yellow) in addition to the existing roading network (in black)

#### Northbound Off-ramp

The Northbound Off-ramp (previously Option P5) is a single auxiliary lane exit developing from the existing northbound carriageway. The proposed off-ramp will terminate at the existing roundabout at the intersection with the new arterial road, Peka Peka Road and the northbound on-ramp. The termination location is immediately adjacent to beginning of the on-ramp, providing a readable interchange layout. This off-ramp design provides a simple and effective solution for adding the exit provision, with minimal changes to the existing road layout and within the existing designation for the expressway.

Geometrically, the design for the off-ramp meets all required geometric standards. The biggest constraint to developing this option is the bridge length of the underpass prior to (south of) the off-ramp which limits the sight distance to the exit. An auxiliary lane exit was chosen over a taper exit at this location so that a greater length for deceleration could be provided prior to the sharp left hand curve which joins into the roundabout. Using an auxiliary lane exit enables the use of a reduced sight distance (7 seconds) which in turn allows the exit gore area to be closer to the underpass. In discussion with James Hughes it was thought this would provide a better balance between sight distance and deceleration than a taper only exit.

As identified in the earlier optioneering, and raised in TN 001, the existing drainage devices located immediately adjacent to the carriageway require relocation. The design illustrates equivalent sized devices in a comparable location, though we have not sought a detailed assessment of the stormwater system to verify the adequacy of this change.

#### Southbound On-ramp

The southbound on-ramp (previously Option P7) avoids the constraint of the existing expressway underpass by locating the on-ramp to the south of the main arterial road. It is proposed that the existing intersection of Hadfield Link Road (which also carries the southbound off-ramp traffic) with the main road would be modified to include access to the new on-ramp. The design currently incorporates a new roundabout at this location, almost mirroring the layout for the opposite movements, but the operational requirements of this would need to be validated during further traffic assessment.



This option will require an alternation to the existing designation as the permanent works required for the first 140m of the on-ramp extend outside of the NZ Transport Agency designation, although we understand that this area of land is currently owned by the NZ Transport Agency. All of the other permanent works directly related to the road infrastructure will be within the exiting designation. A new single-lane bridge will be required, adjacent to the existing bridge on the expressway, to carry the on-ramp traffic over the Paetawa Stream.

A critical issue associated with this on-ramp option is that the existing drainage infrastructure associated with the Mackays to Peka Peka section of the expressway, especially around Paetawa Stream and the area identified as 'Offset Storage Area 13'. We understand that the stormwater management is a very sensitive item and forms part of the designation conditions. It may not be acceptable or permitted for the existing scenario to be modified, and even if it could be physically changed, it is unlikely that the alternative could be provided within the existing designation.

One solution that we have considered to the above issue, is the extend the proposed 16m long bridge at the Paetawa Stream to a 220m long structure, effectively spanning the area nominated as 'Offset Storage Area 13'. This would add significant cost but would mitigate or even eliminate the stormwater issues related to this issue.

Another issue that this option presents is the possible noise impact to residential properties located on private land immediately adjacent to, and to the south of, the NZ Transport Agency land in which the ramp would be located. Advice from acoustic specialists indicates that the noise impact could be mitigated through use of a solid TL4 concrete barrier located on the south side, and/or provision of an OGPA surface, for the 500m length of the on-ramp. Like the bridge solutions discussed above, quantities for these proposed mitigation measures, if required, have been provided to CM Bond to include in the high-level pricing exercise.

#### Option 2 (refer PP-DRG-GA-00-002)

Option 2 is the combination of the northbound off-ramp previously referred to as 'Option P5' (as with Option 1) and the southbound on-ramp previously referred to as 'Option P1' in the earlier option identification (refer TN 001), as illustrated below (Figure 2).

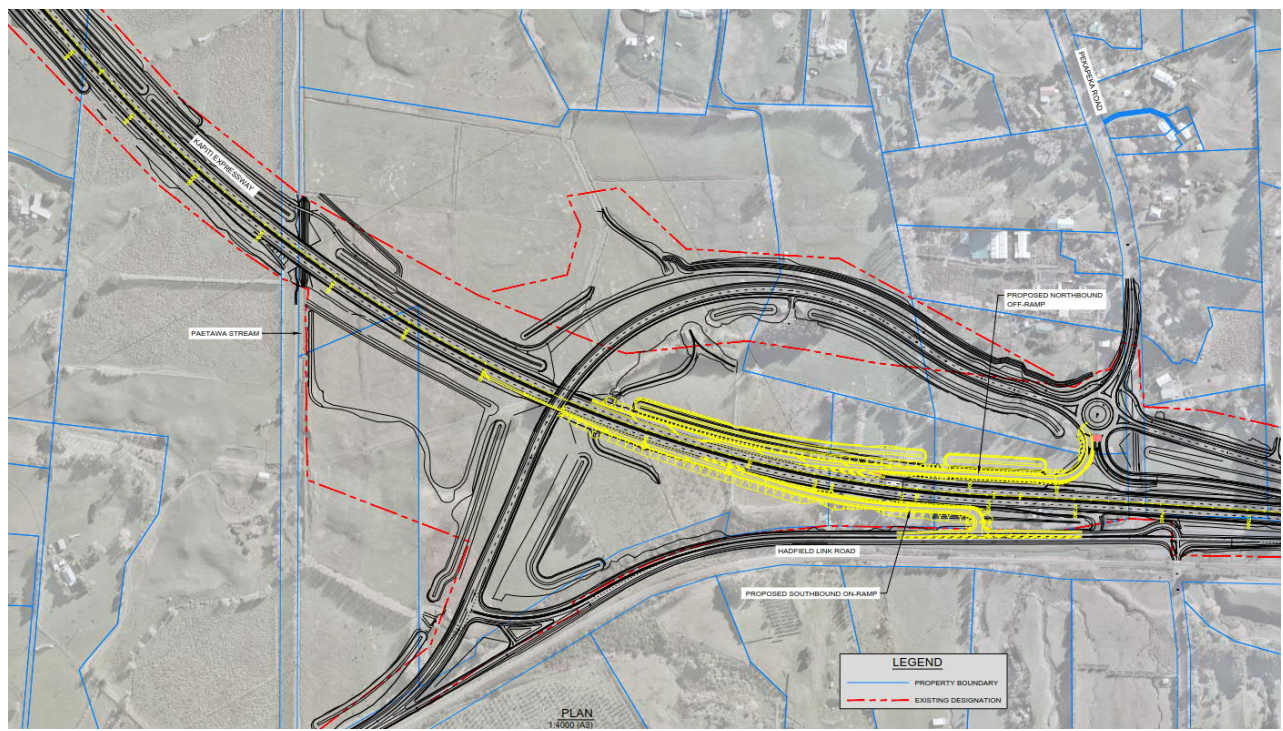


Figure 2. Plan illustrating the layout of Option 2, proposing two new ramps (in yellow) in addition to the existing roading network (in black)

### Northbound Off-ramp

The Northbound Off-ramp is identical to that in Option 1, as described above.

### Southbound On-ramp

The Southbound On-ramp (previously Option P1) passes beneath the existing expressway underpass. The ramp intersection with Hadfield Link Road has been located as far north as possible in order to enable the maximum possible acceleration length from the on-ramp intersection with Hadfield Link Road. The design incorporates a new intersection with a free left turn, and a give way controlled right turn bay into the ramp, from Hadfield Link Road.

This on-ramp design provides a cost-effective solution, requires minor changes to the existing road layout (discussed further following) and is within the existing designation for the expressway.

Geometrically, the design for the off-ramp meets all required geometric standards, except a departure would be needed for a reduced left-side shoulder width under the existing underpass. The shoulder width at its narrowest point would be 1.0m, 2.0m less than the required 3.0m width. It would not be possible to provide the full shoulder requirement without widening the SH1 underpass, which would probably require reconstruction of the bridge and southern abutment.

The proposed layout for the on-ramp has been subject of discussion with James Hughes, to understand the NZ Transport Agency's opinion on this option. Whilst the reduced shoulder width was not raised as an issue, the on-ramp layout, particularly the use of Hadfield Link Road for on-ramp traffic was raised as a concern.

Hadfield Link Road is a two-lane road running adjacent to the expressway, with the dual-purpose of providing access to/from Hadfield Road, and also to carry the southbound off-ramp traffic to the main arterial road. It was designed and built as part of the MacKays to Peka Peka section of the expressway, to both retain access to a limited number of residential properties to the north/north east that would have otherwise been severed by the new expressway, and to carry traffic from the southbound off-ramp after the intersection which is also where the new link road intersects with the old Hadfield Road.

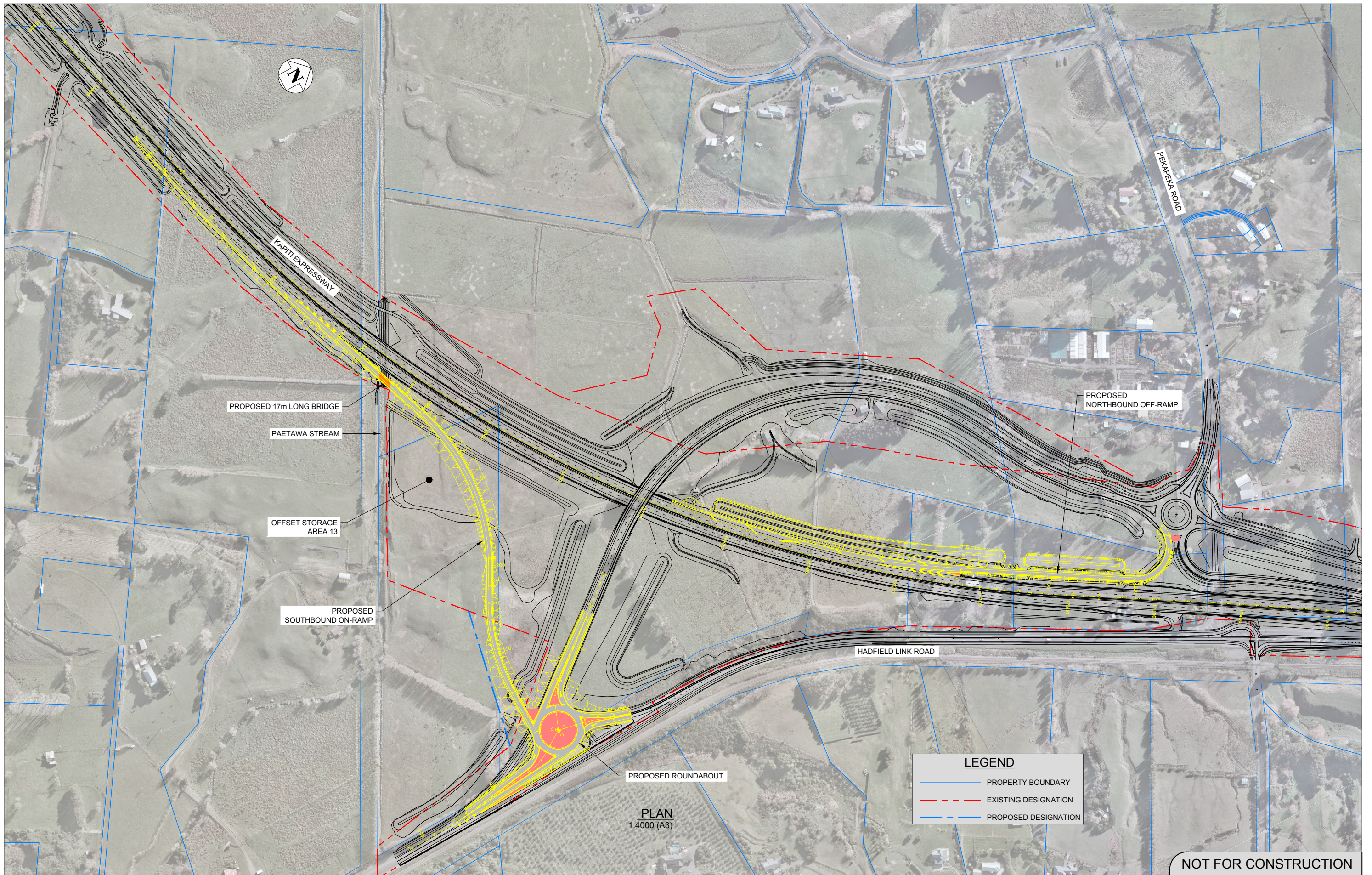
The concern raised by James Hughes is that this link road has not be designed for general two-way traffic, particularly the type and volumes that an on- and off-ramp combination would require. Despite this, our assessment suggests that modification of this road could be undertaken to provide for all traffic movements in a safe and readable manner. While it is unclear where the property boundaries lie between the local authority, NZTA and KiwiRail land, it appears that there would be adequate width to undertake additional safety improvements to the link road within the existing road corridor.

As described in the Option 1 on-ramp discussion, we are aware that stormwater management is very critical in the area adjacent to the Peka Peka Interchange. This on-ramp location, proposed in Option 2, will also affect the existing drainage which will therefore require modification / relocation, though we anticipate that these are minor and therefore the current design does not attempt to resolve stormwater design changes.

### 3.0 ATTACHMENTS:

- Attachment 1 - Concept Design Drawings
  - PP-DRG-GA-00-005 Rev B
  - PP-DRG-GA-00-002 Rev C
- Attachment 2 - High Level Quantities for pricing  
(1x A3 sheet, also provided in MS Excel format)





PLAN  
1:4000 (A3)

LEGEND	
	PROPERTY BOUNDARY
	EXISTING DESIGNATION
	PROPOSED DESIGNATION

**NOT FOR CONSTRUCTION**



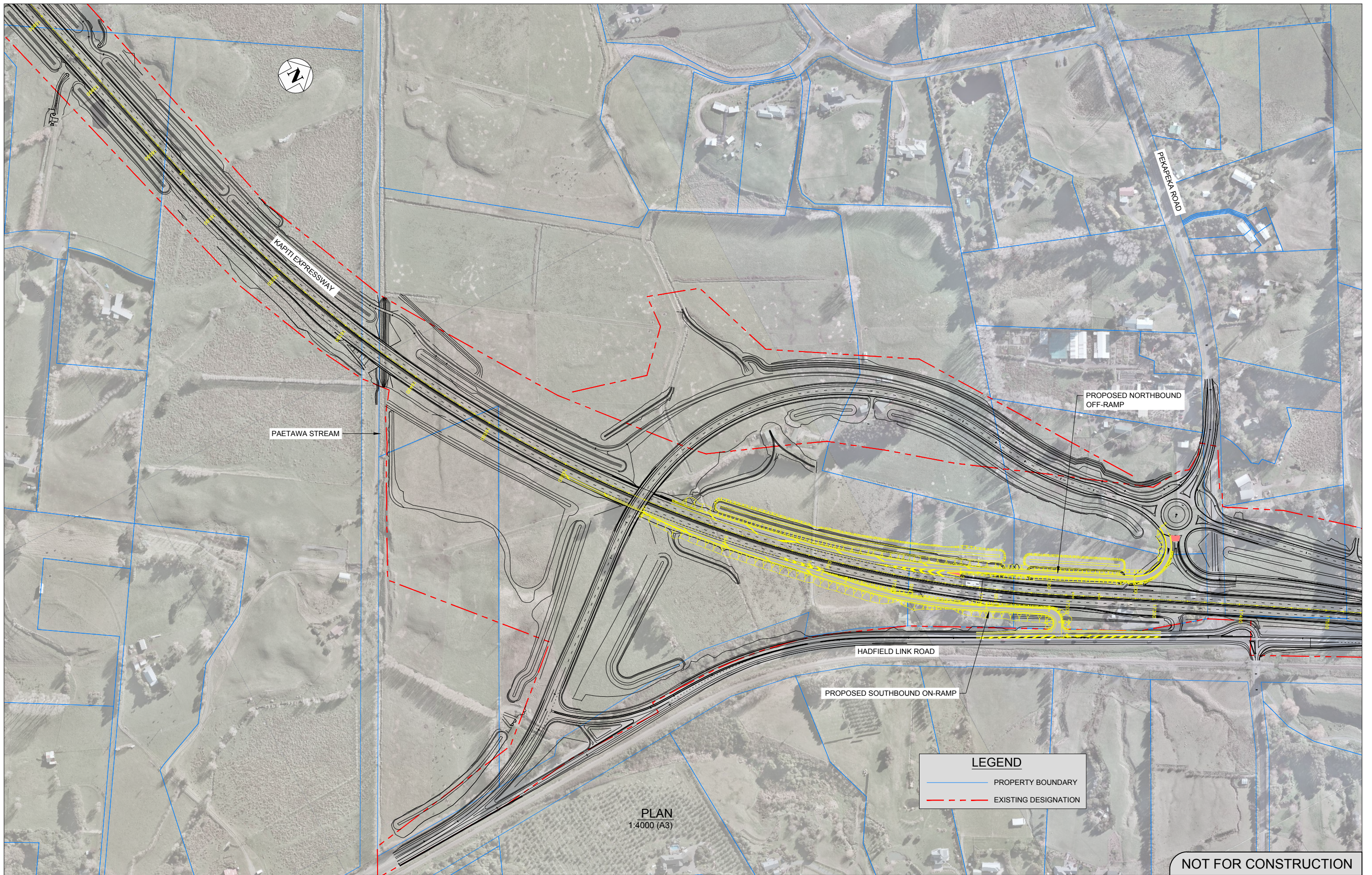
REV	DESCRIPTION	DRAWN	DESIGNED	CHECKED	APPROVED	DATE
B	OPTION SHORTLISTING REFINEMENTS	N.TUNNICLIFFE	N.TUNNICLIFFE	M.BARFOOT	M.BARFOOT	13.11.18
A	PRELIMINARY ISSUE	N.TUNNICLIFFE	N.TUNNICLIFFE	M.BARFOOT	M.BARFOOT	22.09.18

PROJECT	PEKA PEKA CONNECTIVITY SSBC
TITLE	PEKA PEKA OPTION 1 SOUTHBOUND ON-RAMP AND NORTHBOUND OFF-RAMP

NUMBER	PP-DRG-GA-00-005
STATUS	PRELIMINARY
SCALE	AS SHOWN
REVISION	<b>B</b>

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PAETAWA STREAM



PEAPEKA ROAD

PROPOSED NORTHBOUND OFF-RAMP

HADFIELD LINK ROAD

PROPOSED SOUTHBOUND ON-RAMP

LEGEND	
	PROPERTY BOUNDARY
	EXISTING DESIGNATION

PLAN  
1:4000 (A3)

**NOT FOR CONSTRUCTION**



REV	DESCRIPTION	DRAWN	DESIGNED	CHECKED	APPROVED	DATE
C	OPTION SHORTLISTING REFINEMENTS	N.TUNNICLIFFE	N.TUNNICLIFFE	M.BARFOOT	M.BARFOOT	13.11.18
B	REVISED FOR PRELIMINARY ISSUE	N.TUNNICLIFFE	N.TUNNICLIFFE	M.BARFOOT	M.BARFOOT	27.09.18
A	PRELIMINARY ISSUE	N.TUNNICLIFFE	N.TUNNICLIFFE	M.BARFOOT	M.BARFOOT	22.09.18

PROJECT	PEKA PEKA CONNECTIVITY SSBC
TITLE	PEKA PEKA OPTION 2 SOUTHBOUND ON-RAMP AND NORTHBOUND OFF-RAMP

NUMBER	PP-DRG-GA-00-002
STATUS	PRELIMINARY
SCALE	AS SHOWN
REVISION	<b>C</b>

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Peka Peka Connectivity SSBC - Option Quantities

Option	Earthworks *		Pavement		Bridge			Walls face area (m2)	Barrier				Drainage **		Land req'd (m2)	Comments
	cut	fill	seal area (m2)	islands (m2)	deck area (m2)	span length (m)	widenin g (m2)		TL4	TL5	terminals	transitions	K&C	kerb		
Concept Options (TN001)																
P1	832	11654	3252	-	-	-	-	-	646	60	3	1	57	-	-	Departure required for 1m shoulder adjacent to ramp merge
P2a	1085	19909	4778	-	138	17	-	-	1309	120	3	3	20	-	7396	Alteration to designation required, may require intersection upgrade
P5	2886	9641	4150	45	-	-	-	-	711	-	3	-	107	-	-	
P6***	3142	11148	8374	2470	173	10	21	-	689	128	3	6	826	576	-	Departure required for final 90m of ramp merge having reduced sight distance
P7	462	21574	5035	-	126	16	-	-	1350	120	3	3	20	-	6354	Alteration to designation required, may require intersection upgrade, departure for gore area
School Rd****	-	25021	1017	60	?	?	3.5m	-	-	-	-	-	-	-	-	Regraded and widened to receive ramp intersections (including bridge which becomes 2)
Winiata****	-	3158	-	-	-	-	-	-	-	-	-	-	-	-	-	Regraded due to School Rd regrade
T1	-	14418	2727	-	-	-	-	1348	450	-	1	2	?	-	-	Significant drainage and flood bund impact
T2	-	19693	2965	-	-	-	-	982	480	-	1	2	?	-	-	drainage and flood bund need to be relocated
T5	-	13996	2861	-	-	-	-	2236	480	-	1	2	?	-	5000	Alteration to designation required for railway land, significant drainage impact
T6	-	12488	2833	-	-	-	-	2051	450	-	1	2	?	-	3610	Alteration to designation required for railway land, significant drainage impact
Shortlist Options (TN002)																
Opt1 (P5+P7)	3044	9011	3388	45	-	-	-	-	793	-	3	-	108	-	-	
Opt2 (P5+P1)	589	32737	9664	2470	125	16.5	-	-	1144	120	3	3	713	576	6405	Alteration to designation required

Notes:

- \* Design surface to existing surface, no allowances for pavement/topsoil/settlement/undercut/bulking/etc.
- \*\* Roadside features only, no allowances for pit/pipe/treatment devies
- \*\*\* No allowance for roundabout earthworks
- \*\*\*\* Delta (amount over and above the PP2O current design)