

# **Appendix H**

## **Traffic Impact Assessment (Opus)**



# McPherson Quarry Traffic Impact Assessment

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## Contact Details

**Name:** *Kristoffer Hansson*

Opus House, Level 3,  
Princes Street  
Hamilton 3240  
New Zealand

Telephone: +64 7 838 9344  
Mobile: +64 21 244 3593

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*Prepared By*



Kristoffer Hansson  
Transport Planning Team Leader (Hamilton)

*Reviewed By*



Matthew Evis  
Senior Transportation Planner (Palmerston  
North)

*Approved for Release By*



Rebecca Francis  
Project Manager

# Contents

Contact Details.....	1
Name: Kristoffer Hansson.....	1
Document Details:.....	1
Contents.....	i
1 Introduction.....	2
2 Existing Intersection.....	2
2.1 Traffic Environment.....	3
2.2 Crashes.....	3
2.3 SH2 Potential Realignment.....	4
3 Proposal.....	5
4 Traffic Assessment.....	5
5 Mitigation.....	7
6 Conclusions.....	7

## 1 Introduction

McPherson Quarry (the Applicant) has engaged WSP-Opus to assist them with their resource consent to formalise and expand their operation of the quarry. The quarry has operated on this site for several decades under existing use rights. Last year the quarry transported approximately 400,000 tonnes of quarry material out of their gate. McPherson Quarry now applying for resource consent for their quarry operation and for the extraction and movement of 490,000 tonnes of quarry material leaving the site annually.

This Traffic Impact Assessment (TIA) assesses the traffic effects for the proposal and will form part of the resource consent application.

The existing site is located on McPhersons Road, within the Waikato District Council (WDC). McPherson Road intersects with SH2 approximately 3km east of the SH1/SH2 Interchange. As such WDC is the controlling authority with NZ Transport Agency being an affected party. The NZ Transport Agency is in general support of the proposal on the condition of the implementation of a number of mitigation measures, as detailed within this report.

## 2 Existing Intersection

The McPherson Road/SH2 intersection (Figure 1) is a priority controlled "T" intersection, with traffic movements on SH2 traffic having priority. SH2, at this location, is formed with one through lane in each direction of approximately 3.5 m width and a shoulder of 2-2.5 m on both sides of the carriageway. No right turn bay is provided into McPherson Road from SH2. Approaching the intersection, SH2 has a slight uphill gradient eastbound, and McPherson Road has a slight downhill gradient. The existing intersection is located on the outside of a curve (right hand curve, eastbound) on SH2. McPherson Road deviates to the left on approach to the intersection to bring the approach angle onto SH2 closer to 90 degrees. The posted speed limit on SH2 is 90 km/h.

Grahams Bridge is located 135m south of the McPherson Road intersection and is formed with one lane in each direction and narrow shoulders.

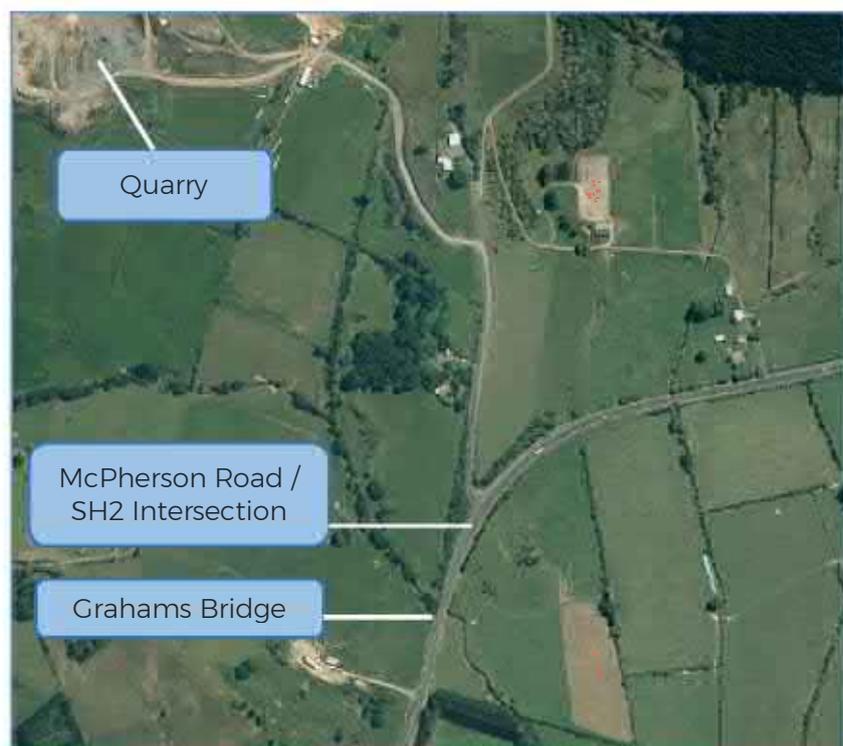


Figure 1: McPherson Road and State Highway 2 Intersection.

## 2.1 Traffic Environment

The posted speed limit on SH2 is 90 km/h and in 2014 average speeds near the site were recorded to under 90 km/h in both directions.<sup>1</sup>

Hourly Traffic profile on SH2 was generated from Mangatawhiri telemetry site located approximately 500m south of McPherson Road. The AADT was recorded at 16,900 vehicles per day in 2017 with a HCV proportion of 12%. Peak period average traffic volumes on SH2 between January to December 2017 were as follows:

- In the increasing (eastbound) direction; 1100-1200 hours - 671 vph,
- In the decreasing (westbound) direction; 1400-1500 hours - 672 vph,
- In both directions; 1400-1500 hours - 1,315 vph,
- The flows in both eastbound and westbound directions are relatively constant throughout the day with no dominant peak periods (see Figure 2).

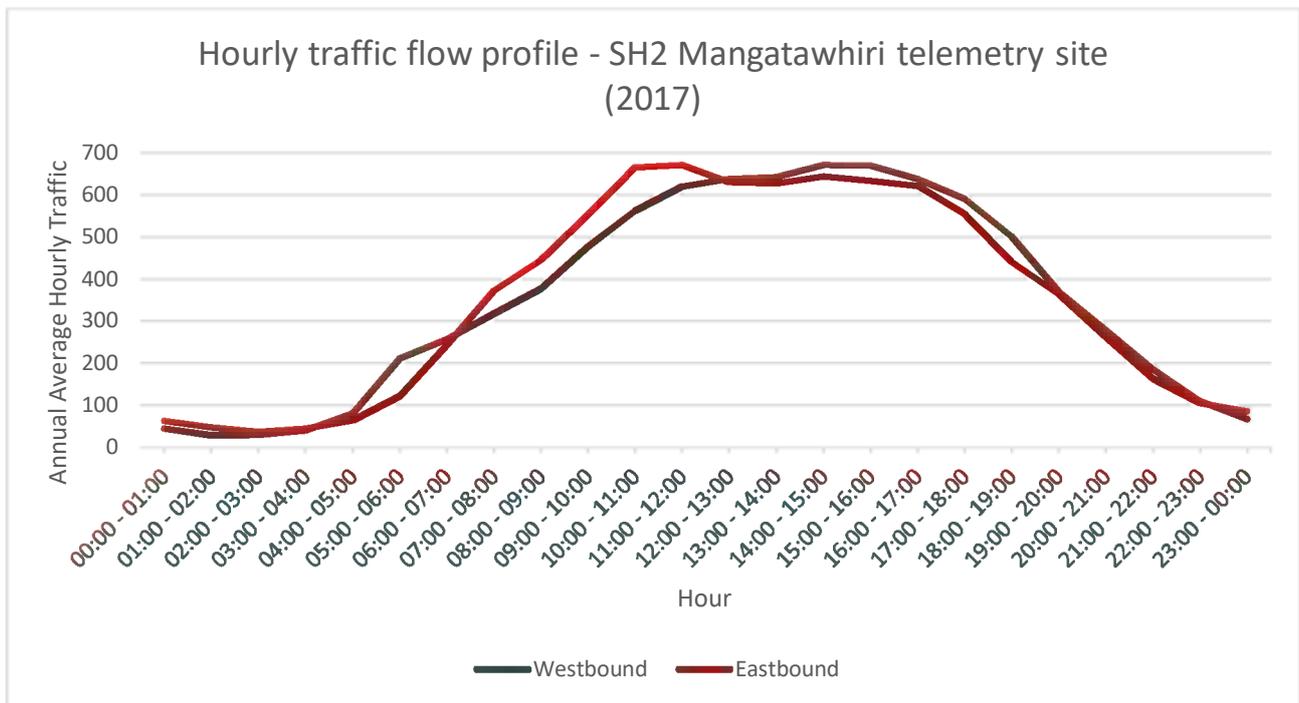


Figure 2: Traffic profile on SH2 at Mangatawhiri.

## 2.2 Crashes

A search of NZ Transport Agency’s Crash Analysis System (CAS) has recorded 6 crashes within a 250m radius of the SH2 / McPherson Rd intersection between 1 January 2013 and 01 May 2018 (see Figure 3).

Five of the six crashes were non-injury, while the remaining crash involved a single vehicle that hit a pedestrian walking along the road that resulted in a fatality.

All crashes involved single vehicles, with no vehicle to vehicle crashes recorded. One of the loss of control crashes was recorded at the McPherson Road intersection but did not involve any other vehicles. Hence, none of the recorded crashes related to movements to and from McPherson Road at the intersection

<sup>1</sup> <https://www.nzta.govt.nz/assets/resources/research/reports/563/docs/563.pdf>

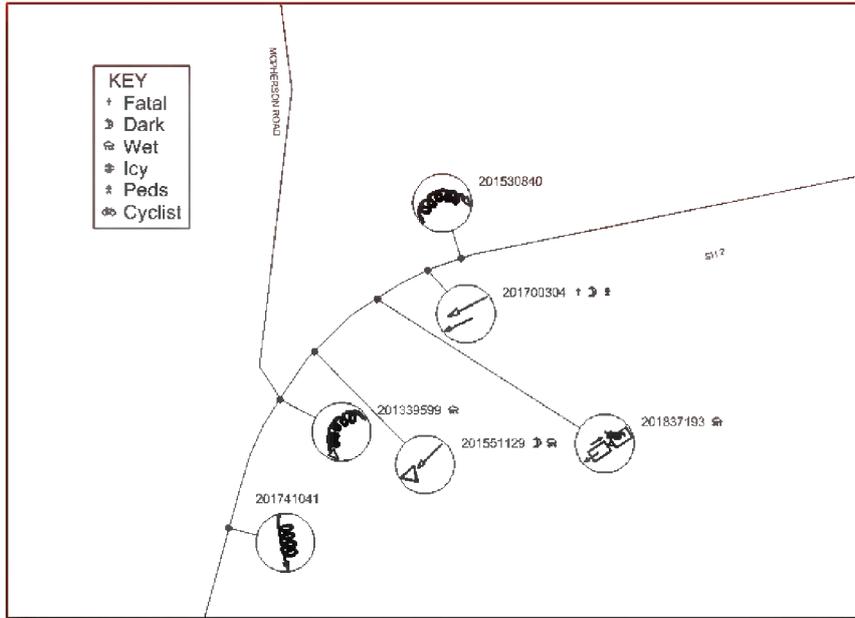


Figure 3: Recorded crashes with 250m radius of McPherson Road Intersection between 1<sup>st</sup> Jan 2013 and 2nd May 2018

### 2.3 SH2 Potential Realignment

The McPherson Road/SH2 intersection forms part of Section A of the proposed Pokeno to Mangatarata Improvements. As part of the Section A improvements, the NZ Transport Agency have proposed to realign SH2 south of McPherson Road to the start of Mangatawhiri Deviation (Section B) further to the east (see Figure 3). Accordingly, if SH2 Section A realignment is constructed, the existing SH2 alignment within the vicinity of the McPherson Road intersection will revert to a local road, primarily providing access to local properties. Traffic volumes on the current SH2 alignment would be expected to reduce significantly as it will no longer cater for regional through movements.



Figure 3: The proposed indicative realignment of State Highway 2 Section A.

### 3 Proposal

The quarry has operated on this site for several decades under existing use rights. Last year, the quarry transported approximately 400,000 tonnes of quarry material out of their gate. Based on the total numbers of transported tonnes in the first 6 months of 2018, the quarry expects to extract and transport around 350,000 tonnes. The applicant seeks resource consent for their quarry operation and for the extraction and movement of 490,000 tonnes annually from the quarry. In addition, the applicant seeks resource consent for importing clean fill on trucks that are leaving the site with quarry material. As such, some trucks to the site will transport clean fill into the quarry before they load up with extracted quarry material and leave the site. Hence, the total number of trucks to and from the site will be the same as if all trucks arrive to the site empty.

### 4 Traffic Assessment

#### Trip Generation

The estimated quarry extraction yield of 490,000 tonnes annually have been established based on potential hourly and daily truck and truck-and-trailer movements. This has been determined from the following assumptions:

- 50% of haulage vehicles are trucks (10 tonne payload) and 50% being truck and trailer units (30 tonne payload), resulting in an average payload of 20 tonnes per haulage vehicle;
- The quarry will operate between 7.00am to 6.00pm (11hrs) for six days per week (Monday to Saturday);
- The quarry will operate 297 days a year (with the facility closed on Sundays, 2 weeks over Christmas and public holidays, equating to 68 days a year);
- Consistent movement of trucks throughout the day; and
- 50/50 split between left and right turning trucks

Using the above assumptions, the daily truck movements would be 165 vehicles per day (approx. 82 inbound and 82 outbound). Averaging the daily flow over the 11 hours, the hourly vehicle movements would be 16 (8 inbound and 8 outbound) assuming consistent movement throughout the day.

As stated in Section 3, some trucks travelling to the quarry will transport clean fill and leave loaded with extracted quarry material. As these trucks will be importing clean fill and exporting quarry material, clean fill operations will not generate additional truck movements to and from the site. The only difference, is that some trucks will arrive to the site loaded instead of empty.

#### Safe Intersection Sight Distance (SISD)

Sight distances have not been measured on site; however, they have been estimated using imagery available online to form an indicative assessment. Sight distances from the existing intersection is estimated to be 250 m to the west and 200 m to the east. Based on Austroads 2017<sup>2</sup> safe intersection sight distance required is 214 m based on 90 km/h operating speed and 2.0 s reaction time.

Comparing the existing sight distance with the Austroads requirements:

- the sight distance towards the west is meeting the requirement; and
- the sight distance to the east has a shortfall of approximately 14 metres.

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<sup>2</sup> Austroads 2017 - Guide to Road Design Part4a: Unsignalised Intersections

The shortfall in sight distance towards the east does not comply with minimum recommendations within Austroads, therefore some mitigation to enhance visibility splays is recommended.

**Approach Sight Distance (ASD)**

The existing intersection only provides approximately 100m forward visibility for westbound traffic to observe and respond to a truck and trailer unit that has turned right out of McPherson Road. Based on Austroads Guidance (reference)2017<sup>3</sup> the stopping distance for a car travelling 90km/h and a driver reaction time of 2.5 sec is 151m. As such, the existing 100m forward visibility through the intersection for westbound vehicles is shorter than the recommended stopping distance for a car outlined within Austroads.

The shortfall in forward visibility is a concern and some mitigation to enhance forward visibility is recommended and shown on drawing 3-39019.00\_SK002 in Appendix A

**Intersection Turning Treatment**

Figure 4 is extracted from Austroads 2017<sup>4</sup> on treatment warrants for intersections. The figure provides guidance on when to apply major road turn treatments for the basic (BA/BA), Auxiliary Lane (AUL) and Channelised Layouts (CHL) intersection treatments. The figure is based on turning treatments on roads with a design speed at or above 100km/h, and thus is appropriate for high speed rural roads.

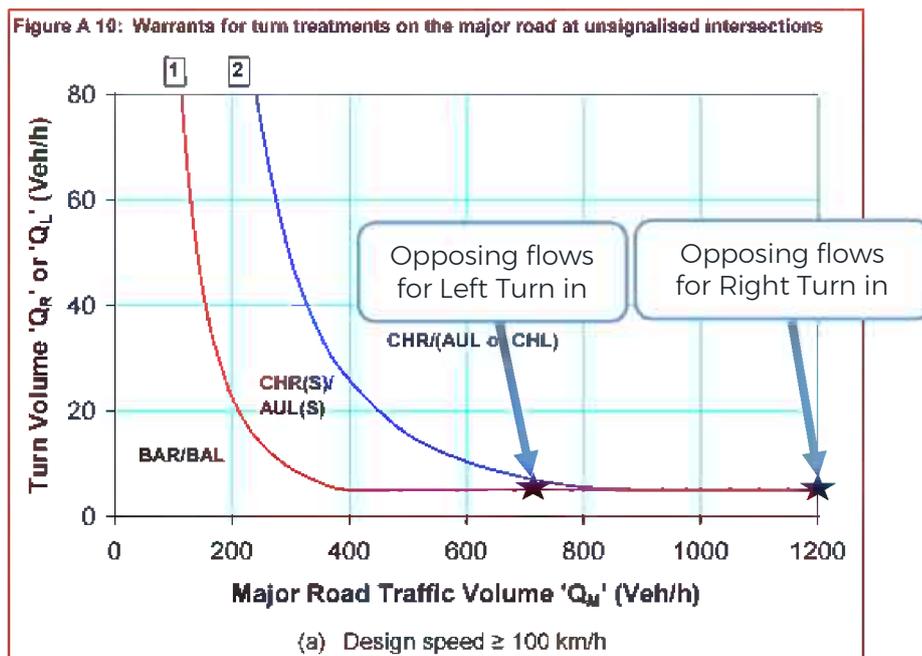


Figure 4: Austroads warrants for intersection treatments (Austroads Guide to Road Design Part 4: Intersections and Crossings General)

As the figure illustrates, the existing volume of traffic on SH2 combined with the turning volumes to and from McPherson Road, a channelised right turn (CHR) treatment and Auxiliary Lane (AUL) for the left turn for turning movements from the SH2 are warranted. The existing intersection does not provide a channelised right turn treatment nor does it provide any auxiliary lanes. As such, it is considered to not be fit for current purpose neither for anticipated future traffic volumes to and from the site.

<sup>3</sup> Austroads 2017 - Guide to Road Design Part4a: Unsignalised Intersections

<sup>4</sup> Austroads 2017 - Guide to Road Design Part 4: Intersection and Crossing General Appendix A

## 5 Mitigation

Over the last year the Applicant has consulted with the NZ Transport Agency (as an affected party) to establish agreement on suitable mitigation measures at the McPherson Street intersection to support proposal. These discussions have considered the existing use right for the quarry and the potential future function of SH2 at the McPherson intersection.

Following the consultation with NZ Transport Agency, the Applicant proposes to implement the following mitigation measures to minimise the potential safety concerns relating the proposal.

1. Modification of the bank and vegetation on the southern side of the McPherson Road/SH2 intersection to provide:
  - a. at least 151 m forward visibility for westbound traffic to observe and respond to a right turning truck from McPherson Road to SH2. NZ Transport Agency states that 151 m *"is the minimum sight distance that should be provided on approach to and through the intersection"*.
2. A 42m right turn bay on SH2 to provide sufficient stacking space for a truck and trailer unit to wait on SH2 in order to undertake safe right turning movements into McPherson Road; and
3. An Auxiliary Lane for left turning vehicles from SH2 to McPherson Road. The axillary lane will be 100m long and commence at the barrier flare approximate 10m east of Graham Bridge. It is recognised that it will be shorter than the MOTSAM requirements for a standard auxiliary lane; however, the auxiliary lane provides an improvement to the existing situation and the length is considered acceptable to NZ Transport Agency.

The above mitigation is considered appropriate to mitigate the effects of the proposal from a traffic perspective. A concept design for the proposed improvements are shown on drawing 3-39019.00\_SK001 in Appendix A.

## 6 Conclusions

McPherson Quarry (the Applicant) is applying for a resource consent to expand their operation of the quarry that currently operates under existing use rights. The application seeks to permit the applicant to extract and transport 490,000 tonnes of quarry material from the site annually. In addition, the applicant seeks resource consent for importing clean fill on trucks travelling to the site. The 490,000 tonnes is equal to approximately 165 (approx. 82 inbound and 82 outbound) vehicle movements a day.

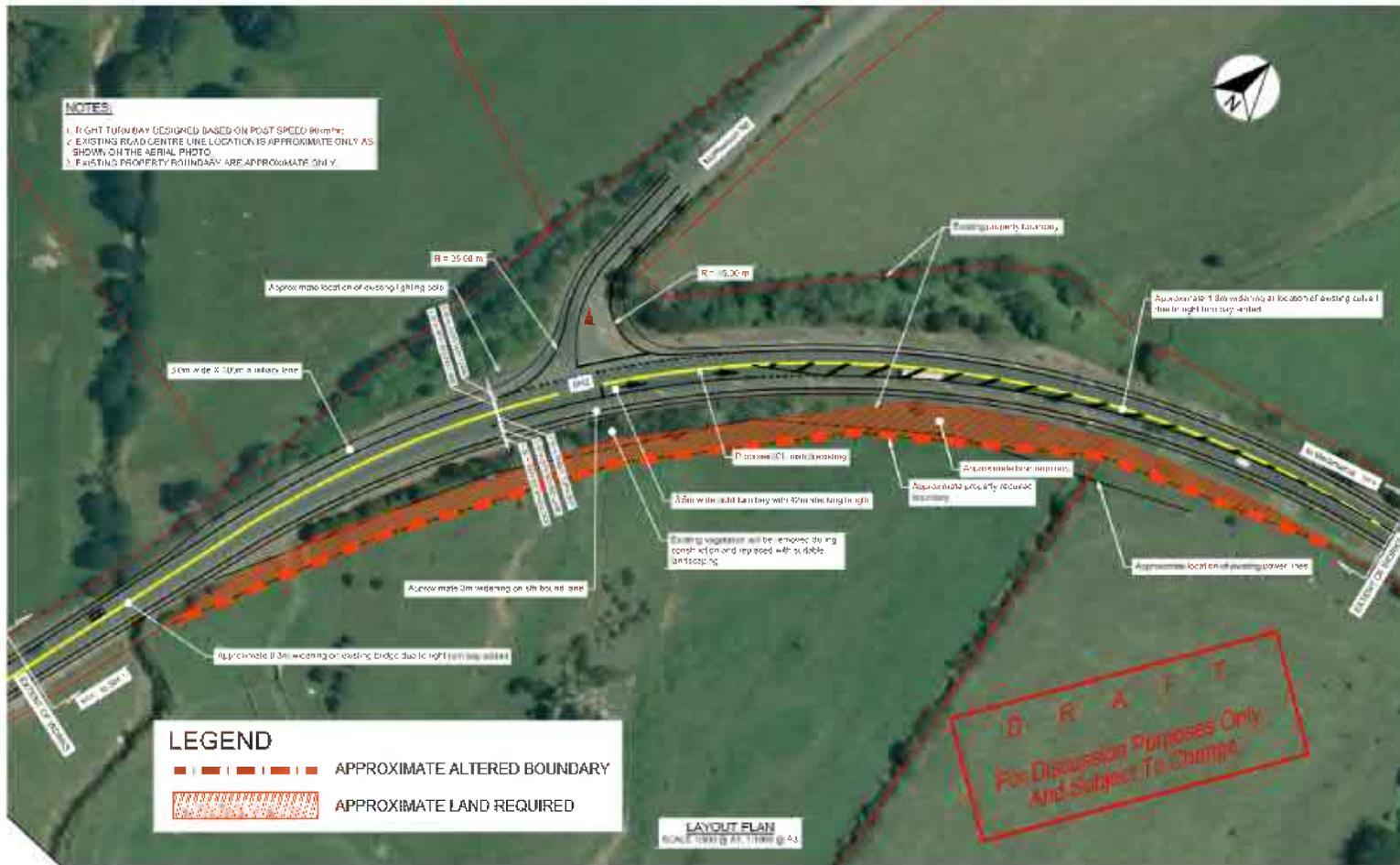
The applicant has consulted with NZ Transport Agency over the last year to agree on suitable mitigation measures for the proposal, taking into consideration the current and potential future function of the frontage road. NZ Transport Agency support the resource application in principal, on the condition that:

1. Modifications to the existing roadside environment are undertaken to provide at least 151 m forward visibility for westbound traffic to safely observe and respond to a right turning truck from McPherson Road onto SH2;
2. A 42m right turn bay on SH2 is provided; and
3. A left-turn auxiliary lane is provided on McPherson Road between Graham Bridge and the intersection.

To conclude, the recommended mitigation measures noted above are considered appropriate for the proposal taking into consideration the potential future function of SH2. The improvements are expected to address the adverse effects of the proposal on the safe and efficient operation of the network from a traffic perspective.

## Appendix A





100%  
 0 10 20 30 40 50 60 70 80 90 100  
 0m 10m 20m 30m 40m 50m 60m 70m 80m 90m 100m  
 Project: 14 July 2018 @ 11:37 AM Path: C:\Users\mca\Documents\Toll\Kahurangi\04\170-2018-MR-DC-TURNBAY\170-2018-MR-DC-TURNBAY.dwg 2018

MCPHERSON ROAD - SH2 JUNCTION  
 RIGHT TURN BAY DESIGN

