

## Technical Memorandum

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Job N<sup>o</sup>: 13182.06

**Subject: Assessment of right turn ban impacts, New North Road to Mt Albert Road**

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This technical memorandum provides a short summary overview of several related work streams TDG undertook to support Auckland Council / Auckland Transport's work on the Mt Albert Town Centre upgrade and in particular, the potential ban (or peak hour ban) of right turns to Mt Albert Rd.

### 1. Traffic Model, Interpeak Period, Mt Albert Road / New North Road / Carrington Road

#### 1.1 Background & traffic surveys

To assist with assessing the potential impact of a right turn ban (or peak-hour only right turn ban) from New North Road into Mt Albert Road during the interpeak hours (earlier work having assessed the peak hours), TDG undertook an interpeak survey at the intersection of Mt Albert Road / New North Road / Carrington Road. This occurred on Tuesday 11 October 2016 (after the school holidays had concluded), between 11:00am and 14:00pm.

The chosen (highest) peak hour within this period was 12:30am to 13:30pm. The full data sets of the intersection survey can be found in **Appendix A**.

#### 1.2 Interpeak traffic modelling

For the chosen interpeak hour, the performance of three different layouts was then traffic-modelled in SIDRA. Except for all existing / proposed clearways operating as parking for this interpeak model, the layouts and model assumptions were identical to those assessed and reported on in the previous stage of the traffic modelling reported to Auckland Council and Auckland Transport on 15 February 2016, and shown in **Appendix B**:

- "Base" (current layout)
- "Scenario 1 – right turn banned"
- "Scenario 2 – right turn into Mt Albert retained"

Lane allocations for traffic distributions at short lanes downstream and upstream of clearways were estimated by TDG with the assistance of SIDRA's standard settings for lane allocation of short lanes, which were considered appropriate for these conditions. Other settings were not changed from previously agreed modelling parameters, for example the setting that 60% of the prohibited right turn traffic in Scenario 1 becomes straight through traffic, whereas the remaining 40% is removed from the intersection (turning at earlier intersections instead).



The results – and the results of the original modelling for AM and PM peak – are provided below in **Table 1**, with more extensive summaries (for the interpeak only) in **Appendix C**:

Layout / s cenario	AM peak hour		Interpeak peak hour		PM peak hour	
	Delay (s)	LoS	Delay (s)	LoS	Delay (s)	LoS
Base	106.7	F	47.2	D	78.4	E
Scenario 1 (right turn into Mt Albert banned)	92.9	F	36.9	D	49.3	D
Scenario 2 (right turn into Mt Albert retained)	157.8	F	116.8	F	284.7	F

**Table 1: Intersection performance**

In summary, the right turn being retained during the interpeak hours still has a significant negative effect on overall congestion.

This is considered largely due to the fact that even over the midday interpeak, volumes at this intersection remain high (2,483 vehicles/hour demand flow in the interpeak traffic base model, versus 2,980 vehicles/hour in the morning peak traffic base model for comparison).

On the more positive side, and as expected, the prohibition of the right turn, if implemented would result in a good level of capacity performance during the interpeak hours (for such a busy intersection), and delays would reduce from those in the base model.

## 2. Local Street Survey and Traffic Diversion Estimation

### 2.1 Background

The potential right turn ban into Mt Albert Road would lead to redirection of some traffic currently undertaking this movement along nearby side streets. There are a variety of options available to drivers re-routing in response, the most important ones being the following:

Local trip options

- Lloyd Avenue -> Allendale Road (North of Mt Albert Road) -> Mt Albert Road
- McLean Street -> Allendale Road (South of Mt Albert Road) -> Mt Albert Road, and
- Richardson Road-> Allendale Road (South of Mt Albert Road)-> Mt Albert Road

Regional trip options

- Richardson Road -> Owairaka Avenue -> Mt Albert Road (eastbound)

### 2.2 Local street traffic surveys

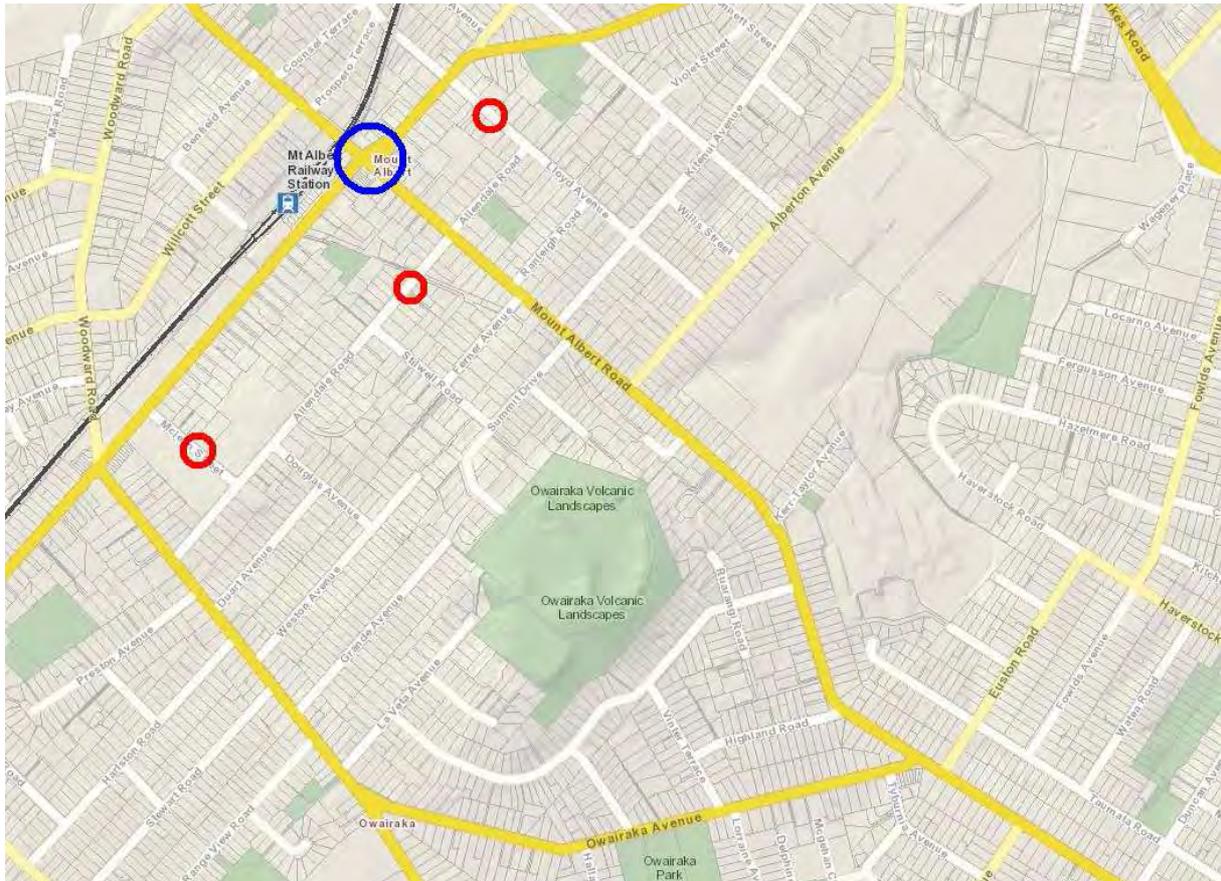
Auckland Transport requested traffic surveys of the side streets that could potentially be affected by the “Local trip” option traffic being redirected.

Surveys were undertaken on Tuesday 11 October 2016 (after the school holidays had concluded), between 7:30am and 9:30am and between 4:30pm to 6:30pm at the following three intersections:

- McLean Street / Allendale Road (South of Mt Albert Road)
- Stilwell Road / Allendale Road (South of Mt Albert Road)
- New North Road / Lloyd Avenue (NNR movements itself were not counted as per instructions, only turning movements)

The full data sets of these intersection surveys can be found in **Appendix A**.

This technical memorandum as instructed only provides a high level summary of the existing traffic flows, which is provided in **Table 2** below. **Diagram 1** shows the location of the links.



**Diagram 1: Main intersection (blue) and local street sections with flows summarised (red)**

Road segment (flows derived by summarising all turns into or out at the nearby surveyed intersection)	AM peak hour flow [vehicles / hour] both directions combined	PM peak hour flows [vehicles / hour] both directions combined
<u>McLean Street</u> , west of Allendale Road (South)	257	135
<u>Allendale Road</u> (South), between Stilwell Rd and Mt Albert Rd	280	287
<u>Lloyd Avenue</u> , between NNR and Allendale Road (North)	141	71

**Table 2: Total link flows on three local streets segments**



The above volumes are in line with expectations. Assuming a typical distribution over the day, and a “rule of thumb” peak hour estimated volume of 10% of the daily volumes, this would place all these streets into 1,000-3,000 cars per day categories, i.e. typical for low-to-medium flow residential Local Streets.

### 2.3 Possible diverted trip volumes

As set out in the above “Local trip options” and “Regional trip options” discussion, drivers have a variety of options to divert around the right turn ban. In the main traffic modelling assessment, it was assumed that 60% of all right turn ban traffic would continue north (straight on New North Road, past Mt Albert) and then turn right at Lloyd Avenue.

To ensure conservative assessment, we have retained this 60% factor for all local roads assessed, even though this is not actually possible in reality to occur at the same - i.e. if 60% of the diverted traffic uses Lloyd Avenue, only the remaining 40% (not another 60%) could use McLean Street / Allendale Road or vice versa.

Also, all these scenarios would assume 0% of the drivers currently turning right at NNR / Mt Albert would choose the “regional trip option” via Owairaka Avenue. In practice some will (especially if advance signage is provided encouraging this) reducing local street impacts.

Existing right turn volumes at this intersection, which would be affected by a peak-hour ban, are (as per the traffic modelling reported in February 2016) as per the below **Table 3**:

Right turn flow direction	AM peak hour flow [vehicles / hour]	PM peak hour flows [vehicles / hour]
From NNR into Mt Albert Rd (100%)	72	91
From NNR into Mt Albert Rd (60%)	43	55

**Table 3: Right turn flows affected**

In summary, the increases of **Table 4** below are very likely to be conservative overestimations for any single street:

Road link (flows derived by summarising all turns into or out at the counted intersection)	AM peak hour flow [vehicles / hour] both directions combined	PM peak hour flows [vehicles / hour] both directions combined	AM peak hour flow with 60% right turn ban traffic added [vehicles / hour] both directions combined	PM peak hour flows with 60% right turn ban traffic added [vehicles / hour] both directions combined
<u>McLean Street</u> , west of Allendale Road (South)	257	135	300	190
<u>Allendale Road</u> (South), between Stilwell Rd and Mt Albert Rd	280	287	323	342
<u>Lloyd Avenue</u> , between NNR and Allendale Road (North)	141	71	184	126

**Table 4: Total link flows of three local streets plus affected increases in a 60% scenario**



As can be seen from the projected new totals, none of the streets sees an increase or a projected future traffic volume that could be considered out of place for a local, residential street. Even during the peak hour and in the street that sees the highest percentage increase – Lloyd Avenue during the PM peak – the new projected volumes would represent only approximately 2 vehicles per minute on average.

### 3. Right turn sightline assessment at Lloyd Avenue

#### 3.1 Background

The potential right turn ban from New North Road into Mt Albert Road is considered likely to result in a substantial percentage of this flow to redirect to Lloyd Avenue (though the total numbers are relatively small), unless other measures encourage other diversion routes.

As New North Road starts deviating to the east some 50m north of the point where a right turn would occur from New North Road into Lloyd Avenue, TDG was requested to assess and comment on the available sightlines and stopping distances.

#### 3.2 Site observations & improvement suggestions

The right turn movement from New North Road into Lloyd Avenue can be undertaken from the 2.5m wide flush median that is consistently present along New North Road, north of the intersection with Carrington Road.

As there are no traffic signals north of the intersection for some 1km, platooning effects on New North Road are limited.

The right turn vehicles must cross two lanes of southbound New North Road traffic, which were estimated to be travelling between 50 – 60km/h. Site observations made during a weekday afternoon peak (18<sup>th</sup> October 2016) showed that the southbound volumes were generally continuous with limited traversable gaps in the traffic streams available for right turn movements. Many right turn movements from New North Road into Lloyd Avenue used courtesy gaps offered by drivers in the stationary queues created by the New North Road / Carrington Road traffic signals.

The risk to right turn safety is somewhat increased due to the need to traverse two traffic lanes and expected lower gap-acceptance during periods of higher right turn volumes and delay. The risk is somewhat reduced by the presence of the flush median, which reduces psychological pressure on drivers to take unsafe gaps in southbound New North Road traffic, as could be the case if drivers would perceive themselves as holding up through traffic.

The required sight distance for drivers of vehicles stored in the centre of a road when undertaking a crossing or right-turning movement is the Safe Intersection Sight Distance (SISD) calculated from Section 3.2.2 in AGTRD Part 4A.

As shown in **Diagram 2**, right turn motorists were measured on site to have a practical sight distance of approximately 74m to approaching southbound traffic on the inside lane, which is the most-restricted sight line for a free flow scenario in this location.



**Diagram 2 - Sight distance of motorists on New North Road turning right into Lloyd Avenue**

The SISD requirement is 94m for 50km/h operating speed and 118m for 60km/h. These distances are calculated on the basis of a 5% uphill grade for the approaching New North Road traffic. Therefore, depending on speeds, the sight distance shortfall for the right turn movement into Lloyd Avenue is between 20 – 44m.

The site does meet Approach Site Distance (ASD) respectively Stopping Sight Distance (SSD) requirements of 52m to 68m for 50 km/h respectively 60 km/h operating speeds.

Recommended smaller-scale treatments could include:

- Vegetation cut-back on the inside corner at property no. 852-858 and 850 which currently overhangs into the footpath areas;
- Installation of yellow hatched or ‘Keep Clear’ markings on New North Road at the intersection with Lloyd Avenue;
- Remarking the flush median marking into a Right Turn Bay marking to increase awareness of right turn movements; and
- Remarking of the centreline and limit line at the Lloyd Avenue throat to create space for easier right turn in movements.

Possible further treatments could include:

- Changing kerb lines on Lloyd Avenue at the Lloyd Avenue throat to create space for easier right turn in movements, possibly including a splitter island;
- Advance warning signage, possibly illuminated or similarly conspicuous, to alert drivers of the right turn ban as early as at New North Road / Richardson Road, to ensure more drivers to reroute along Richardson Road -> Allendale (signalised right turn, left turn, left turn) or along Richardson Road -> Owairaka Avenue, for longer-distance movements);
- Installation of pavement surface treatments to induce mild speed calming for the southbound traffic on New North Road around the left hand bend; and
- Reviewing layout changes to the Asquith Avenue / New North Road intersection.

TDG