Report

Golden Triangle Route Preference Study 2013-2015

Prepared for Ministry of Transport
Prepared by Beca Ltd (Beca)

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## Revision History

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## Document Acceptance

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1 Purpose

The purpose of this study is to identify the route preference of commercial/freight vehicles travelling between Auckland and Tauranga.

2 Methodology

The study has been undertaken using commercial vehicle GPS data hosted and interrogated using Beca TeamView Clarity bespoke software. The software makes it possible to identify aggregate statistical information on the use of the road network, however, it is not possible to provide information linking this data back to specific vehicle operators.

For the purposes of the study, we have extracted all of the commercial vehicles in the source data as they cross specific screen line locations, including:

- On SH1 south of Pukekohe, Auckland;
- On SH2 and SH29 as they approach Tauranga; and
- At various locations across the Waikato, suitable for identify route preference.

The bespoke Beca software has a matching function built into it. However, this was thought to be too limited for the purposes of this study, due to the distances involved and the likelihood that vehicles would be filtered out as they made stops en route. Previous studies by Beca have also identified that route preference across the Waikato could be influenced by the need to stop along the way, as part of a trip-chain. For this reason, all of the commercial vehicles were extracted at each screen line location, and then matched by an analyst, rather than using the Beca software. The vehicles were matched if they were identified at more than one location on the same day. The source data provides a good indication for the movement of freight as it relates purely to commercial (freight) vehicles, and does not include any privately owned cars.

2.1 Limitations

One limitation with the approach is that the vehicle is only identified the first time it crosses a screen line. If a vehicle makes multiple trips between Auckland and Tauranga on the same day, it would only be counted once per route choice for each direction. A return trip Auckland to Tauranga plus a delivery is likely to take seven hours or more. It is unlikely that a single driver could make two return trips and come under their maximum allowable driving hours. However, a vehicle that is on the road with a roster/shift system for multiple drivers could make multiple trips using different drivers during a 24 hour period. As a result, it is likely that there will be a slight under-reporting of the total movements between the two centres.

It is not possible to identify if a vehicle is laden or not using the source data. It is likely that loading has an impact on route choice, particularly where there is a significant gradient, or where there are routes with restrictions on maximum weights. However, the source data would not be suitable for informing enforcement activity related to loading restrictions, as the laden status cannot be determined.

2.2 Sample Size

The study was undertaken from a sample of 124,000 observed commercial vehicle trip movements, captured at the various screen lines. These movements were identified from March 2013, 2014, and 2015.
2.3 Screen Lines/Route Logic

For the initial study, eight locations were selected as part of a logic process developed to identify trip preference. Following initial feedback from the Ministry, a ninth screen line was added to identify vehicles travelling via Thames. For each screen line, every vehicle in the sample data was extracted, and then matched to other screen lines if the same vehicle appeared at both locations on the same day. This means that the vehicles would be matched, regardless of whether or not they stopped en route (e.g. to refuel).

The logic process was then identified to determine observed route preference. For example, a match at screen lines on SH2 but NOT SH25/SH26, it can be inferred that the vehicle travelled between Auckland and Tauranga, without stopping at Thames.

Figure 2-1 shows the four major routes between Auckland and Tauranga (note we did not set out to identify the split between SH1 and SH1B).
3 Findings

3.1 Interaction between Auckland and Tauranga

The study identified the following insight into the significance of the freight movements between Auckland and Tauranga:

- Of the vehicles observed leaving the Auckland region (on SH1 south of Pukekohe), almost 1 in 5 (19%) were identified arriving in Tauranga on the same day;
- Of the vehicles leaving Tauranga (via either SH2 or SH29) 28% were identified as arriving in the Auckland region on the same day; and
- Note, there may be a slight under counting, as the methodology only counts a vehicle once each day in each direction. A vehicle with multiple drivers could make the journey more than once in a 24 hour period.

These findings suggest significant interconnected economic activity between Auckland and Tauranga.

3.2 Route Preference Findings

The following key findings were identified from the route preference freight study:

- The split between SH2 and the various possible SH29/Kaimai routes is roughly half and half
- Roughly 5% of vehicles travelling between Auckland and Tauranga travel via the Thames District (SH2 and SH25/SH26). As this is an indirect route, it can be inferred that the decision to travel via SH2 + Thames is informed by the need to undertake specific trip-chains involving stopping within the Thames District.
- Excluding Thames, about 45% of trips cross the Golden Triangle via a direct route via SH2
- Roughly one in five (20%) of trips cross the Golden Triangle via SH27 to the SH29 Kaimai’s (the main alternative to SH2)
- Roughly 15% of trips cross the Golden Triangle remaining on SH1 as far south as Huntly. Previous studies have identified that this trip pattern is likely to be informed by the need to stop in the Waikato, as there is significant time penalties in traversing the Golden Triangle via SH1.
- Roughly 15% of trips cross multiple screen lines in a manner that suggests multiple journeys across and around the Golden Triangle. While they have been matched at both the Auckland and Tauranga screen lines, they have been matched in a manner that is inconsistent with a single direct route (or even the same route repeated more than once). It can therefore be inferred that at least 12% of the trips identified involve a variety of different trips across the Golden Triangle as part a day’s activity.

As a result of the above, the following can be inferred:

- Roughly 35% of trips take an indirect route, and are therefore likely making route decisions determined by the need to make stops along the way (15% SH1, 5% Thames, 15% crossing a variety of indirect screen lines);
- Roughly 45% travel on SH2, without making indirect screenline crossings;
- Roughly 20% travel via SH27/SH29, without making indirect screenline crossings; and
- For those travelling directly between Auckland and Tauranga, there is a clear preference for travelling on SH2. Although even for the direct routes, some of the SH2 and SH29 trips are likely to be informed by a need to stop along the way (e.g. stopping on route in Ngatea, Matamata, Katikati, etc).
3.3 Other findings

Further analysis has identified that for vehicles classified as very heavy (although not necessarily laden), indicates a difference in route preference from general freight. There is an asymmetry in the data that suggests a number of very heavy vehicles prefer to travel south on SH2 and north on SH29. This could be influenced either by the difference in gradient crossing the Kaimai’s (the gradient is less steep traveling west/north) or it could be due to vehicles avoiding weight restrictions once laden.

For the very heavy vehicles, there is also an increase in the number of vehicles that cross screen lines in a manner that suggests multiple trips across the Waikato, which is consistent with the nature of these vehicles making multiple trip chains as the usual course of their business.