# FORESTRY TRUCK ROUTES FOR MAKARAU & PUHOI

## TRANSPORTATION ASSESSMENT

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20 October 2011

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# 1 EXECUTIVE SUMMARY

This report has been commissioned by Auckland Transport following a number of meetings with residents and requests initially from individual residents and the Krippner Road Residents Association and subsequently from Rt Hon Lockwood Smith. Their main concerns are understood to include: increased potential for 'dangerous incidents' to occur, increased road deterioration, inappropriate use of local roads.

Two forestry trucking routes in the Puhoi and Makarau regions of Auckland have been analysed in respect of their suitability to accommodate forestry truck traffic. Specifically, the traffic impact of forestry trucks using the local roads on each of the routes have been investigated from a traffic engineering, traffic safety and haulage operating cost perspective.

Currently, the forestry truck operator favours one route over the other because it is shorter and saves them $61 dollars per round trip. This equates to a cost savings for their entire harvesting operation in the Puhoi and Makarau region of $0.3-0.4 million.

From a *traffic safety* perspective both routes exhibit similar roading constraints that are not ideal, and therefore in this regard no preferred route has been identified.

When *all of the roading characteristics (including the lengths of the routes)* are considered, collectively no one route stands out as being substantially better than the other.

From an 'exposure-to-conflict' perspective (i.e. chance of local residential traffic encountering a logging truck on a narrow section of road) each route has a similar potential.

Regarding the ability of the routes to accommodate the combined use of local residential traffic and forestry truck traffic, each route has been identified with a similar number of roading constraints with none of these constraints having been identified as being sufficiently serious to warrant immediate changes being required.

Overall, with both negative and positive traffic engineering aspects having been identified for each route tending to balance one another out, and the only clear outcome being a cost saving for using the current route (savings to the trucking operators), it is determined that there is no sufficiently significant traffic engineering reason to not continue using this route.

However, when a secondary access to the forestry block is used, which is understood to be for 25-30% of the harvesting, the costing calculations then indicate savings are achievable when the alternative route is used. On this basis, increasing the utilisation of the alternative route to reduce the impact on the current route is recommended when this secondary access is used.

Another scenario that is recommended to be explored is to operate a one-way system where one route is used for inbound forestry traffic and the other is used for outbound forestry traffic.

It is therefore suggested that a trial of the alternative route scenarios is carried out for a period of several months to establish if a (more) acceptable outcome can be achieved for all road users.

## 2 INTRODUCTION

This transportation assessment investigates the impact on local roads by the transporting of pine logs harvested in the Makarau and Puhoi regions of Auckland to the Marsden Point Port in Whangarei.

This assessment builds upon work undertaken by Traffic Planning Consultants and reported on in the "Krippner Road Route Assessment for Forestry Trucks" report dated October 2004. It also has been prepared in response to local resident complaints to Auckland Transport about safety concerns regarding the movement of logs out of the area.

Two route options have been identified for assessment. Both of these routes have the shortest travel distances and travel times when compared to other route options, and therefore are the most attractive and practical options from a traffic engineering and operational perspective. The two route options are easily defined as a route to the west via Tahekeroa Road, Makarau Road and State Highway 16, and a route to the east via Krippner Road, Puhoi Road and State Highway 1.

In undertaking this assessment, consultation has been carried out with the principle logging operator in the area so that their operational requirements can be fully appreciated and considered. Local residents concerns have also been considered, with these concerns relayed through correspondence had with Auckland Transport. The local residents are represented by a local residents group and their main concerns are understood to include:

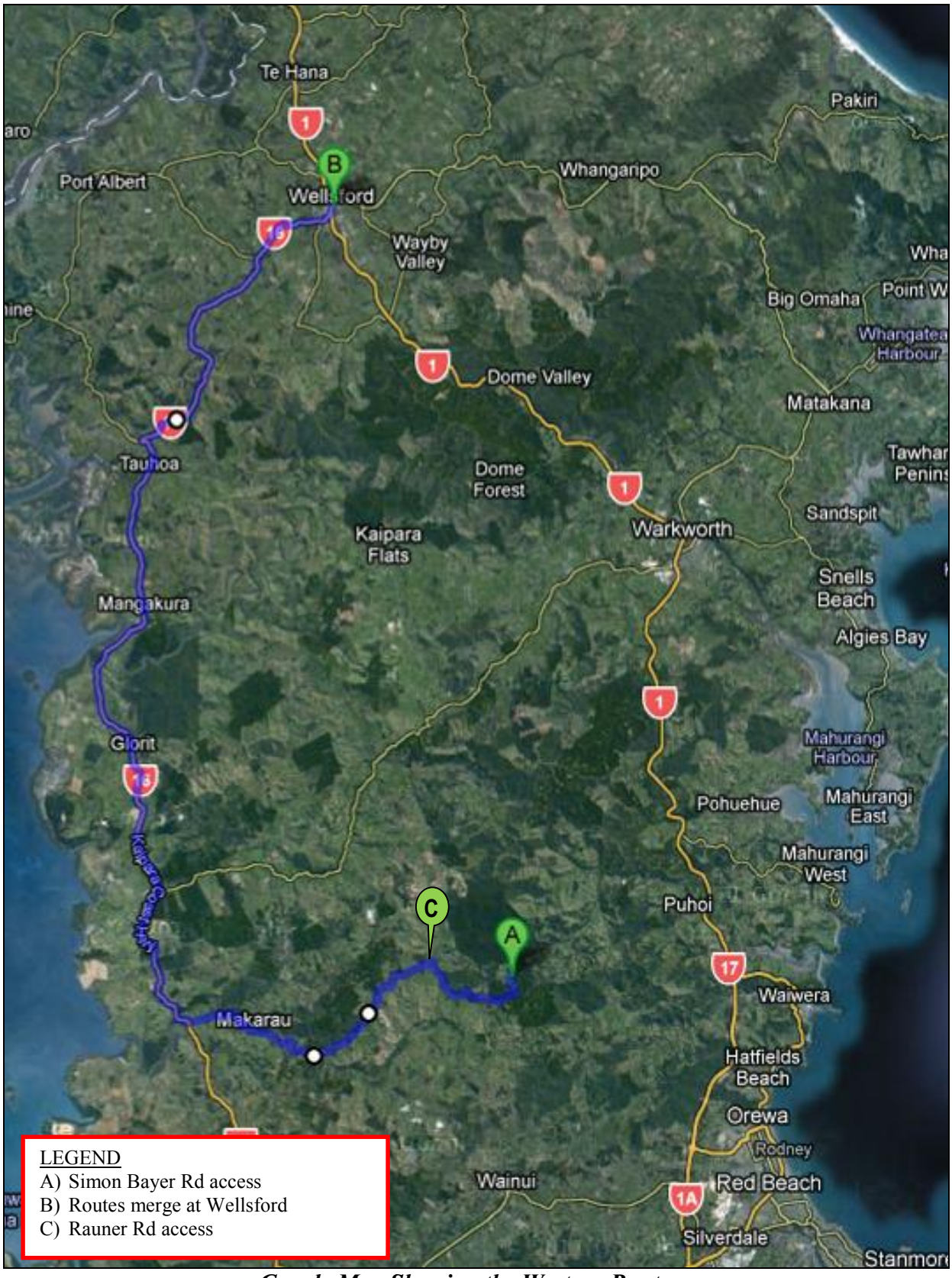
- increased potential for "dangerous incidents" to occur,
- increased road deterioration,
- inappropriate use of local roads.

The main core of the forestry blocks anticipated to be harvested in the next few years is located approximately midway between State Highway 16 and State Highway 1, in the Makarau and Puhoi regions of Auckland. Both of the identified routes converge at Wellsford from where the route to Marsden Point Port is the same.

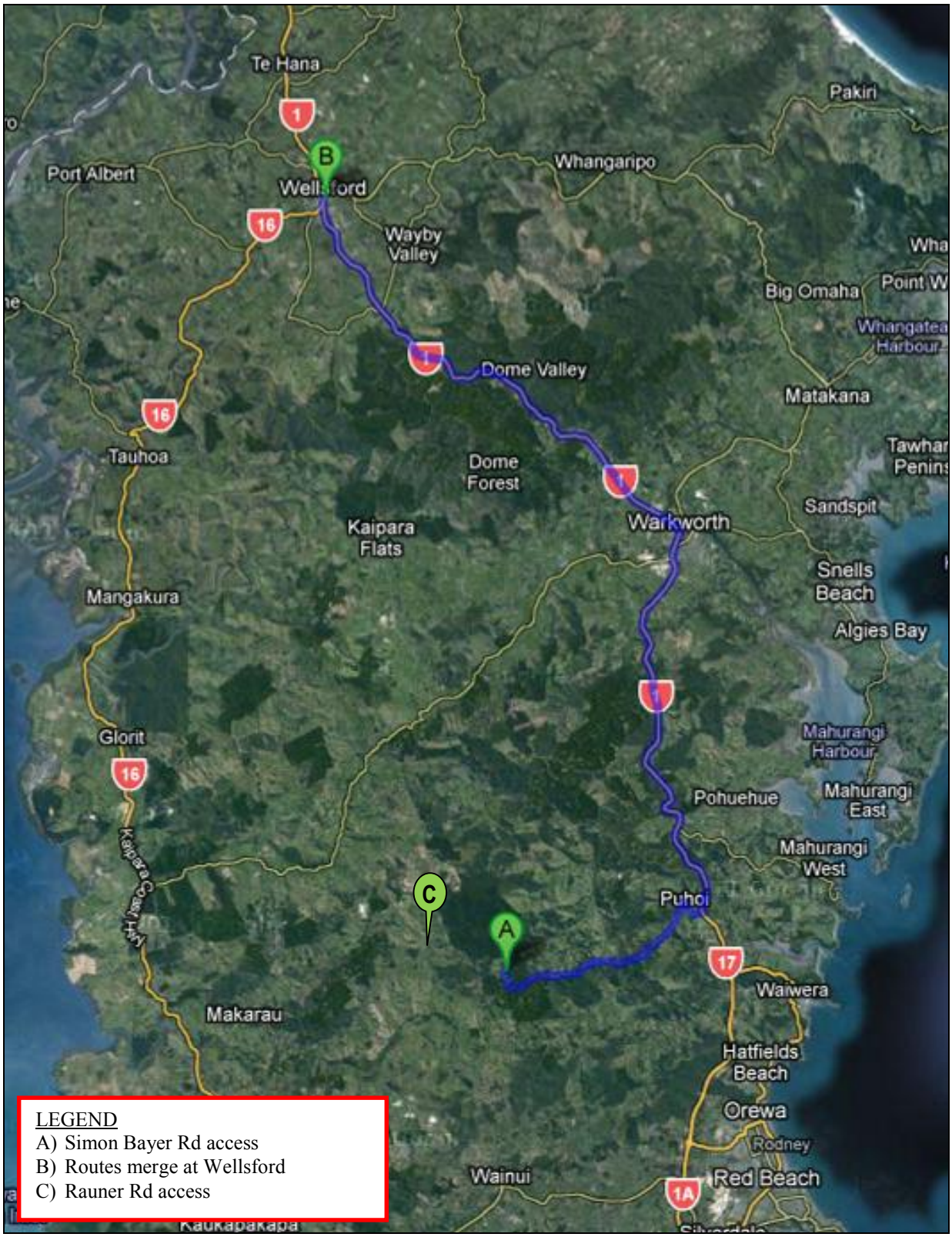
The forestry area being harvested has two points of access. The main access, where 70-75% of the harvesting will be accessed is via Simon Bayer Road. The remaining 25-30% will be accessed via Rauner Road. Rauner Road is located approximately midway between State Highway 16 and State Highway 1, and Simon Bayer Road is located approximately 4km east of Rauner Road, which places it closer to State Highway 1. The route details of the two options from Simon Bayer Road to Wellsford are summarised in the following table[1]. Following the table are two aerial maps showing the two preferred routes and they also identify the Rauner Road Access Position.

| | Western Route | Eastern Route |
|---|---|---|
| Roads | Simon Bayer Rd-Krippner Rd–Tahekeroa Rd–Makarau Rd–SH16 | Simon Bayer Rd–Krippner Rd–Puhoi Rd–SH1 |
| Distance | 53.4km | 43.1km |
| Travel Time | 62min | 50min |

[1] The travel times are of actual loaded truck and trailer trips collected using GPS data loggers. The distances were sourced from Google Maps and verified using available RAMM data.




***Google Map Showing the Western Route***




***Google Map Showing the Eastern Route***

## 3 ROUTE CHARACTERISTICS

Each of the two routes identified encounter a variety of road classifications and road standards when moving from the forestry block through the local roading network and then onto the strategic arterial State Highway network.

In general, the State Highway Network is able to accommodate forestry truck movements without unduly impacting on its primary traffic function, which is to provide for the safe and efficient movement of vehicles including the movement of large trucks. It is for this reason that these State Highway routes have not been discussed in detail in this assessment.

There are however differences between State Highway 16 and State Highway 1 that need to be stated, as these differences influence the logging operator's choice of a preferred route. These differences are summarised as follows:

- State Highway 16 carries less traffic than State Highway 1 (differences are in the order of 15,000 vehicles per day);
- State Highway 16 has more horizontal and vertical curvature compared to State Highway 1;
- State Highway 16 has less passing opportunities than State Highway 1;
- State Highway 16 travels through fewer townships than State Highway 1.

From our discussions with the haulage operators working on the forestry block currently being harvested (Smith & Davies) they indicated a preference for using State Highway 1 because of its shorter distance, and shorter travel time resulting in an overall cost savings to them.

With regard to the local roading network making up the two route options (the non-State Highway roads) these roads range from sealed two-way roads to narrow unsealed roads and are either classified as 'Collector' roads or 'Local' roads. The existing traffic flows are reflective of the road classifications and are typically made up of local traffic and truck movements associated with farming and forestry activities in the area.

Sections of the local roading network have significant geographical and topographical constraints which limit the feasibility of upgrading these sections of road to desirable engineering design standards.

The desirable road standards are as per those specified in the Council's Rural Road Design Table 3.6, which is provided below for information.

**Table 3.6 Rural Roads – Geometric Standards**

| Indicative Volume (v.p.d.)1 | Topography [2] | Design Speed (kh/h) | Carriageway Width [3] (m) | Kerb & Channel | | Footpath | | Surfacing [4] | Bridge Width [5] (m) length | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CSL (R) | CSL (T) | CSL (R) | CSL (T) | | <6m | 6m-30m | >30m |
| <30 | Level<br>rolling<br>mountainous | .<br>.<br>. | 6 | .<br>.<br>. | . | .<br>.<br>. | .<br>.<br>. | seal/metal | 3.7 | 3.7 | 3.7 |
| 30 - 100 | Level<br>rolling<br>mountainous | .<br>.<br>. | 6 | .<br>.<br>. | 1 side | .<br>.<br>. | .<br>.<br>. | seal/metal | 7 | 3.7 | 3.7 |
| 100 - 250 | Level<br>rolling<br>mountainous | 80<br>70<br>50 | 7<br>7<br>6 | .<br>.<br>. | 2 sides | .<br>.<br>. | 1 side | seal | 7 | 7 | 3.7 |
| 250 - 500 | Level<br>rolling<br>mountainous | 80<br>70<br>50 | 7<br>7<br>6 | .<br>.<br>. | 2 sides | .<br>.<br>. | 1 side | seal | 7 | 7 | 7 |
| 500 - 2500 | Level<br>rolling<br>mountainous | 80-100<br>80<br>50 | 8<br>8<br>7 | .<br>.<br>. | 2 sides | .<br>.<br>. | 1 side | seal | 8 | 8 | 8 |

Notes:

1. Assessed at 10 v.p.d. per title served, including future potential development and extensions.
2. Level topography includes level to gently rolling country which offers few obstacles to the construction of a road having continuously unrestricted horizontal and vertical alignment.
   Rolling topography includes rolling, hilly or foothill country, where the slope generally rises or falls gently to moderately and where occasional steep slopes may be encountered. It will offer some restrictions in horizontal and vertical alignment.
   Mountainous topography includes rugged hilly and mountainous country and river gorges. This class of country involves definite restrictions on the standard of alignment attainable and often involves long steep grades and limited sight distances.
3. Refer to Council Drawing 18000 Sheet 3.24 for definition of carriageway width.
4. Metalled surfacing shall not be used in Countryside Living (Rural), Countryside Living (Town), Rural Settlement 1 Zones or on gradients > 12.5%.
5. Bridge width is the minimum between kerbs.
6. For AADT > 2500 vpd. refer to Austroads Rural Road Design Guide.
7. CSL(R) = Countryside Living (Rural); CSL(T) = Countryside Living (Town).
8. For 'Low Intensity Residential' and 'Landscape Protection' Zones use this Table for carriageway width, kerb and channel and footpath requirements. For all other requirements refer Table 3.1.

In many locations the existing local roads do not achieve the standards specified in the above table.

Where specific road constraints have been identified which have the potential to compromise the ability of the road to function safely for the combined movement of forestry truck and other local road traffic (as is determined by this assessment), the details of these locations and the constraints have been included as Appendices to this report.

### *Western Route Collector & Local Roads*

The Collector & Local roads on the western route starting at Simon Bayer Road consist of Krippner Road, Tahekeroa Road and Makarau Road, then onto State Highway 16.

Auckland Transport's Road Asset and Maintenance Management (RAMM) data for these roads is summarised in the following table:

| **Western Route** | | | | |
|---|---|---|---|---|
| Roads listed in order from Simon Bayer Rd to SH16 | Section Distance | Sealed or Unsealed | Width | Flow (ADT) |
| Krippner Rd (to Upper Waiwera Rd) | 2200m | Unsealed | 4m | 130veh/day |
| Tahekeroa Rd (from Upper Waiwera Rd) | 7708m | Unsealed | 4m | 130veh/day |
| Tahekeroa Rd | 327m | Sealed | 6.2m | 130veh/day |
| Makarau Rd | 210m | Sealed | 6.2m | 100veh/day |
| Makarau Rd | 2670m | Unsealed | 4.5m | 100veh/day |
| Makarau Rd | 3150m | Sealed | 6m | 300veh/day |
| *Unsealed Distance (total)* | *12578m* | | | |
| *Sealed Distance (total)* | *3687m* | | | |
| ***Total Distance*** | ***16265m*** | | | |

As shown in the above table, there is a combination of sealed and unsealed sections of road along this western route. On the unsealed sections the narrow carriageway widths on most occasions require some yielding to occur if a forestry truck were to encounter an oncoming vehicle. This yielding might require one or both vehicles to yield, or at least slow down, to allow safe passing to occur.

In very low traffic flow conditions this yielding situation is considered to be acceptable provided there is sufficient sight distance available for motorists to observe, react and appropriately manoeuvre their respective vehicles. This might involve waiting at a suitably wide section of road to allow the other vehicle to pass, or pulling over where there are good road shoulders.

The traffic flows recorded in the RAMM database range between 100 and 300 traffic movements (trips) per day, which are considered very low from a traffic engineering perspective.

With regard to the amount of road-side development along this western route the surrounding land is typically comprised of rural farming, forestry and residential lifestyle properties.

From the study of the western route eight locations have been identified where there are concerns about insufficient road width and visibility. Each of these locations was rated using one of the following three categories:

1. Minor Concern – a concern that does not require immediate action, but should be included as part of overall route improvement works or studies,
2. Moderate Concern – a concern that requires consideration of changes to improve the situation,
3. Serious Concern – a concern that should be addressed to avoid serious safety problems.

The locations on the western route are listed in Appendix A.

In summary, of the eight locations or sections of road identified as having concerns, none were of a serious concern, three were of a moderate concern, and five were of a minor concern.

A search of the 'CAS' crash database maintained by the New Zealand Transport Agency for the most recent 10 year period (2001-2010 inclusive) returned five crashes. The collision diagram and crash listing of these crashes are attached as Appendix C. In summary these five crashes consisted of:

- two motorcycle crashes where the motorcyclist either swung wide or cut a corner and collided with an oncoming vehicle. Both crashes resulted in serious injury.
- two crashes where the driver lost control of the vehicle. One was attributed to a tyre blowout and the other involved the driver being proven to be under the influence of drugs. One of these crashes resulted in minor injuries.
- one crash where the driver lost control on a bend and hit an oncoming vehicle. No injuries were sustained.

### *Eastern Route Collector & Local Roads*

The Collector & Local roads on the eastern route (starting at Simon Bayer Road) consist of Krippner Road and Puhoi Road, then onto State Highway 1.

The Auckland Transport's RAMM data for these roads is summarised in the following table:

| **Eastern Route** | | | | |
|---|---|---|---|---|
| Roads listed in order from Simon Bayer Rd to SH1 | Section Distance | Sealed or Unsealed | Width | Flow (ADT) |
| Krippner Rd | 2849m | Unsealed | 3.8m | 155 veh/day |
| Krippner Rd | 308m | Sealed | 6m | 250 veh/day |
| Krippner Rd | 190m | Unsealed | 3.8m | 160 veh/day |
| Krippner Rd | 295m | Sealed | 5m | 250 veh/day |
| Krippner Rd | 253m | Unsealed | 3.8m | 250 veh/day |
| Krippner Rd | 147m | Sealed | 5m | 200 veh/day |
| Krippner Rd | 1781m | Unsealed | 3.8m | 200 veh/day |
| Krippner Rd | 2044m | Sealed | 5.3m | 350 veh/day |
| Puhoi Rd | 972m | Sealed | 5.8-8.9m | 1000-1860 veh/day |
| *Unsealed Distance (total)* | *5073m* | | | |
| *Sealed Distance (total)* | *3766m* | | | |
| ***Total Distance*** | ***8839m*** | | | |

As shown in the above table there is a combination of sealed and unsealed sections of road along this eastern route. On the unsealed sections the narrow carriageway widths on most occasions require some yielding to occur if a forestry truck were to encounter an oncoming vehicle. This yielding might require one or both vehicles to yield, or at least slow down, to allow safe passing to occur.

In very low traffic flow conditions this yielding situation is considered to be acceptable provided there is sufficient sight distance available for motorists to observe, react and appropriately position their respective vehicles. This might involve waiting at suitably wide sections of road to allow the other vehicle to pass, or pulling over where there are good road shoulders.

On the road sections from Rauner Road to Puhoi Road the traffic flows recorded in the RAMM database range between 130 and 350 traffic movements (trips) per day – which are considered to be very low from a traffic engineering perspective. On the section of Puhoi Road the trips per day are higher ranging between 1000 and 1860 trips per day.

From the eastern route study there were ten locations identified where sight distance restrictions were considered insufficient to allow safe passing to occur. Again, each location was rated using one of the three following categories:

1. Minor Concern – a concern that does not require immediate action, but should be included as part of overall route improvement works or studies,
2. Moderate Concern – a concern that requires consideration of changes to improve the situation,
3. Serious Concern – a concern that should be addressed to avoid serious safety problems.

These locations are listed in Appendix B.

Of these locations none were of a serious concern, two were of a moderate concern and eight were of a minor concern.

A search of the CAS crash database maintained by the New Zealand Transport Agency for the most recent ten year period (2001-2010 inclusive) returned 10 crashes. The collision diagram and crash listing of these crashes are attached as Appendix D. In summary these 10 crashes consisted of:

- Two head-on crashes involving a motorist cutting a corner or swinging wide on narrow bends. One of the crashes resulted in a minor injury.
- Five crashes involving loss of control and hitting or going over a bank. One of these crashes involved a truck and one involved swerving to avoid an object. Two of the crashes resulted in minor injuries.
- Three crashes involved motorists entering intersections without giving way and colliding with motorists who had the right of way.

With regard to the amount of road-side development along this eastern route the surrounding land is typically comprised of rural farming, forestry and residential lifestyle properties.

### *Comparison of the Western & Eastern Routes*

The differences between the western and eastern routes are summarised in the following table:

| Simon Bayer Used as Access Point | | | |
|---|---|---|---|
| **Characteristic** | **Western Route** | **Eastern Route** | **Comparison** |
| Travel Distance to Wellsford | 53.4km | 43.1km | Western route is 10.3km further |
| Unsealed Distance | 12.6km | 5.1km | Western route has 7.5km more unsealed road |
| Travel Time | 62min | 50min | Western route takes 12min longer |
| Typical Sealed Width (local roads) | 6.2m | 5m | Western route typically has wider sealed roads |
| Typical Unsealed Width (local roads) | 4.5m | 3.8m | Western route typically has wider unsealed roads |
| General Roading Alignment (local roads) | Moderately winding & undulating | Moderate to severe winding & undulating | Western route local roads typically have less severe alignment |
| General Roading Alignment (State Highway) | Moderately winding & undulating | Gently winding & undulating with a few long steep sections | Western route State Highway is more winding and undulating. Steep sections are shorter than eastern routes |
| General sealed pavement condition (local roads) | Average | Average/Poor | Western route local roads typically have better sealed pavement condition |
| General unsealed pavement condition | Average to good | Average/poor | Western route local roads typically have better unsealed pavement condition |
| General subgrade strength (local roads) -based on observed pavement performance | Average | Average/Poor | Western route local roads typically have better subgrade strength |
| Number of serious concerns (local roads) | 0 | 0 | Western & Eastern route have no serious concerns |
| Number of moderate concerns (local roads) | 3 | 2 | Western route has 1 more moderate concern |
| Number of minor concerns | 5 | 8 | Western route has 3 less minor concerns |
| Number of roadside dwellings (within a few hundred metres of the road) | 40 approx | 40 approx | Western route has a similar number of road side dwellings |
| Existing Traffic - local Roads | 100-300 trips per day | 130-350 trips per day (1000-1860 on Puhoi Rd) | Western route has less traffic |
| Existing Traffic - State Highway Roads | 1100-2100 trips per day | 11000-18000 trips per day | Western route has significantly less traffic |
| Crash Data | 5 recorded crashes | 10 recorded crashes | Western route has less recorded crashes |

As can be seen from examining the table above, the comparison between the two routes does not highlight any characteristics that are *substantially* different to the other.

Of interest is comparing the two routes if Ranuer Road is used as the access point, refer to the following table in this instance.

| Rauner Road Used as Access Point | | | |
|---|---|---|---|
| **Characteristic** | **Western Route** | **Eastern Route** | **Comparison** |
| Travel Distance to Wellsford | 49.3km | 47.2km | Both routes have essentially the same travelling distance (2.1km difference) |
| Travel Time | 53.5min | 58.5min | Western route is 5min shorter |
| General Roading Alignment (local roads) | Moderately winding & undulating | Moderate to severe winding & undulating | Western route typically has less severe alignment |
| General Roading Alignment (State Highway) | Moderately winding & undulating | Gently winding & undulating with a few long steep sections | Western route State Highway is more winding and undulating. Steep sections are shorter than eastern routes |
| General unsealed pavement condition | Average to good | Average/poor | Western route typically has better unsealed pavement condition |
| General subgrade strength (based on observed pavement performance) | Average | Average/Poor | Western route typically has better subgrade strength |
| Number of serious concerns | 0 | 0 | Western & Eastern route have no serious concerns |
| Number of moderate concerns | 1 | 4 | Western route has 3 less moderate concerns |
| Number of minor | 5 | 8 | Western route has 3 less minor concerns |

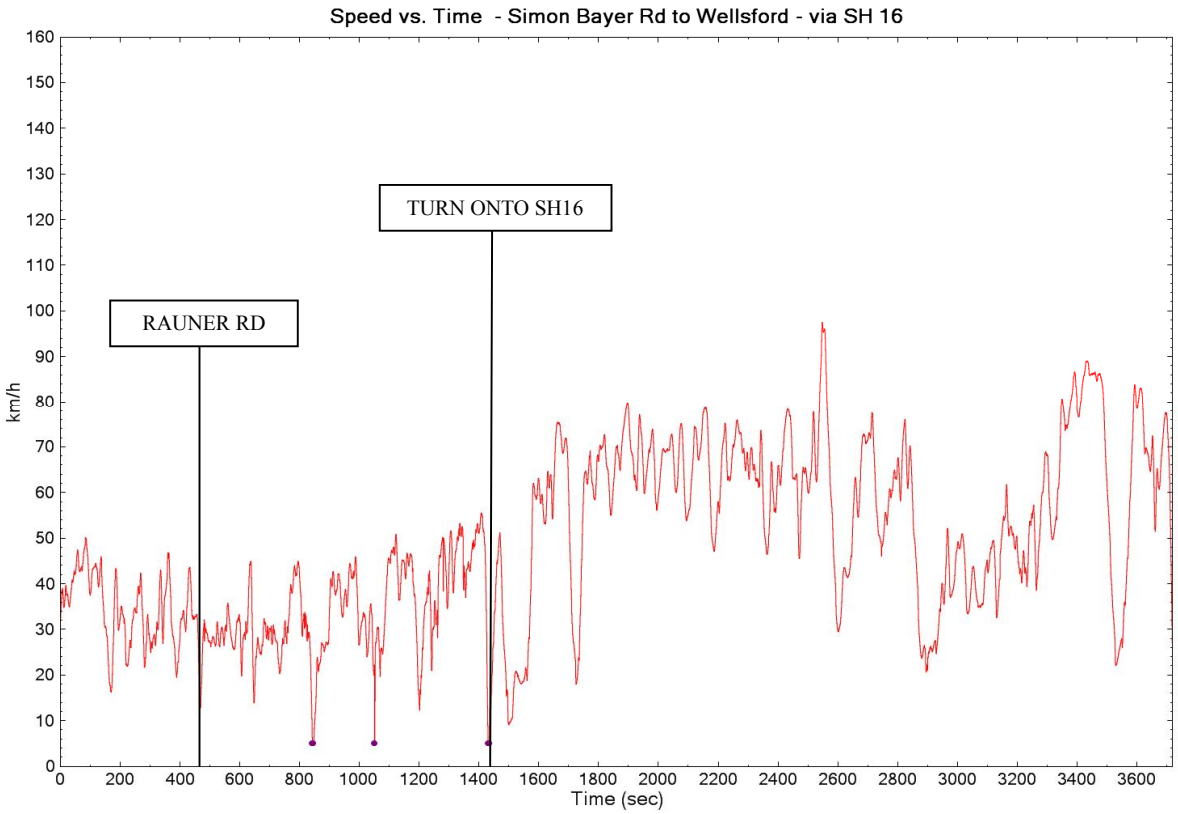
From a transport route perspective the greatest differences exist in the travel distances and travel times. In this regard the western route is the longer and has the greater travelling time when considering access from Simon Bayer Road.

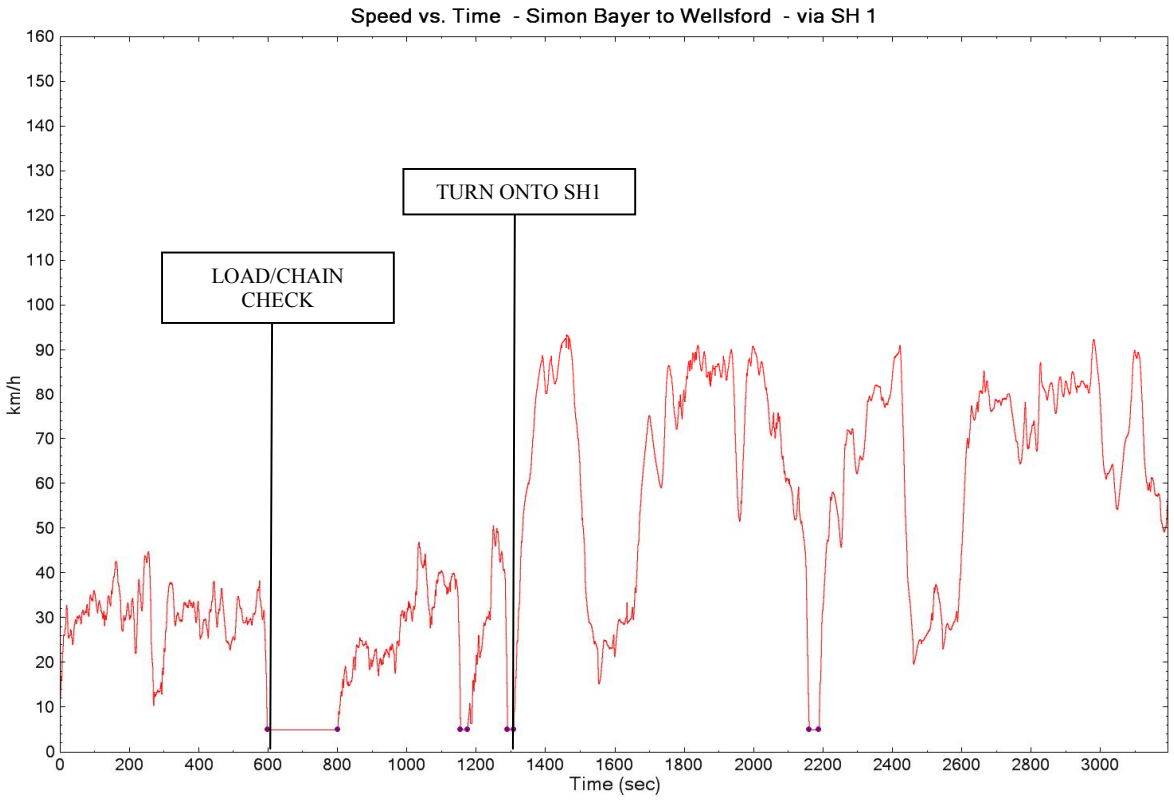
However, it must be noted that the travel distance and travel time differences between the two routes will change depending on the point of access being used.

When Rauner Road is being used for access (understood to be for 30% of the harvesting) the travel distance changes by 8.2km (change to the western route is 4.1km shorter and the eastern route is 4.1km longer = difference of 8.2km). The resulting travelling distances of the two routes when Rauner Road is used, are very similar (minimal 2.1km difference).

The western route's travel time therefore reduces, and the eastern route's increases. From GPS data of a laden truck travelling from Simon Bayer Road to Rauner Road the travel time of this journey is eight and a half minutes. The changes to the overall travel time for the two routes results in the western route being 5 minutes shorter than the eastern route (previously the western route was 12 minutes longer).

Refer to the following speed profile graphs derived from the GPS data recorded of loaded forestry truck and trailer units on each route travelled (noted that speeds below 5km/hr are recorded as 5km/hr):



As can be seen from comparing the above graphs the speeds on the local roads tend to range between 20km/hr and 50km/hr. On the western route these speeds are slightly higher and occur over a longer duration. Specifically, travel time on the western route's local road section takes 24 minutes (1400 seconds) compared to 18 and a half minutes (1100 seconds) on the eastern route's local road sections (not included on the eastern route was the time taken to perform a three and a half minute load check that occurred).

Once on the State Highway the speeds increase and typically range between 50km/hr and 90km/hr. There are a few locations on both routes where the speeds are significantly less. On the western route these slow sections are due to steep gradients and on the eastern route they are also due to steep gradients such as at Schedewys Hill and Dome Valley. Slow speeds on the eastern route also occur when travelling through Warkworth Township where there is a 50km/hr speed zone and also two signalised intersections which can result in additional delays.

From a *traffic safety* perspective both routes exhibit similar roading constraints that are not ideal, and therefore in this regard there is no preferred route.

When the *roading characteristics* of each route are considered, it is concluded that the western route appears to have an advantage over the eastern route. Although this may be due in part to the better pavement condition on the local roads through the reduced number of trucks presently using it, it is also a route with a slightly wider and better alignment.

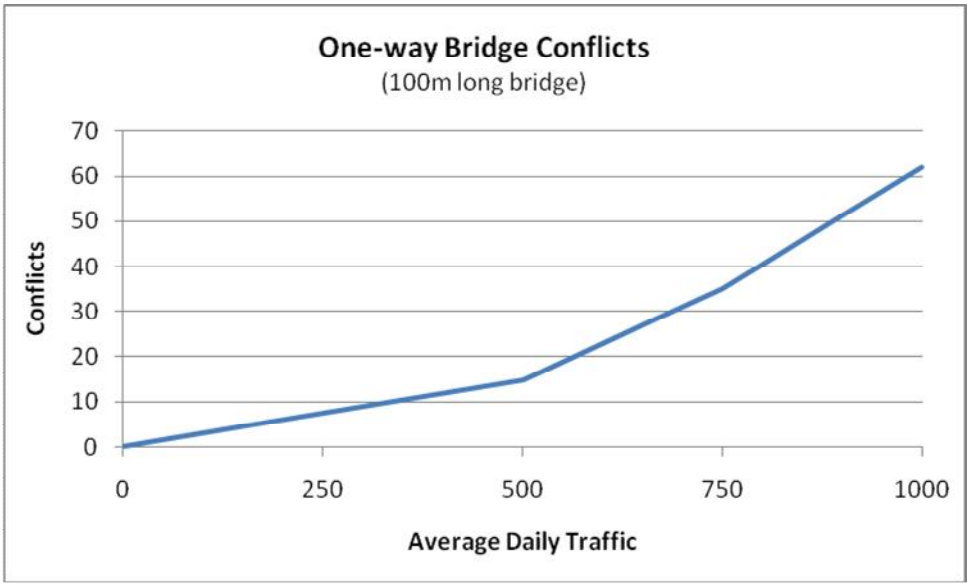
However, when *all of the roading characteristics (including the lengths of the routes)* are considered, collectively no one route stands out as being substantially better than the other.

## 4 DISCUSSION ON TRAFFIC FLOW AND TRAFFIC CONFLICT

The traffic flows recorded in the RAMM database for Makarau Road, Tahekeroa Road and Krippner Road range between 100 and 350 traffic movements (trips) per day. The lower end of this range is considered to be acceptable for the narrower sections of these roads, as the likelihood of encountering an approaching vehicle is low.

As the traffic flow increases, the potential for encountering another vehicle increases at an exponential rate. To assist in the appreciation of the situation reference has been made to the former National Roads Board (now NZTA) research paper *"Delays and Conflicts at One Lane Bridges"*, which provides information on the potential conflicts that will occur on a one lane bridge. This operational situation is akin to that being considered in the narrower parts of the local roads.

The following graph of the numerical information provided in Table 7 of this report shows the number of conflicts per day on a 100 metre[2] long one-lane bridge, when related to the (average) daily traffic flow.




As can be seen from the above graph the conflict potential at a daily traffic volume of 100 vehicles per day is exceptionally low (approx three conflicts per day), and at 250 vehicles per day it is approximately eight conflicts per day. The conflict potential approximately doubles with a doubling of the traffic volume to 500 vehicles per day, and then starts to dramatically increase at higher flows.

Therefore, this one-way bridge scenario demonstrates that the narrow and constrained road sections on the routes being assessed where the traffic volumes are in the region of 100 to 250 trips per day have the potential for traffic conflicts to occur in the order of three to eight times per day.

[2] This distance is considered representative of most constrained sections of short to moderate length. It is also recognised that some of the constrained lengths could be shorter or marginally longer than this distance.

On the occasions when a conflict occurs between approaching vehicles, the situation is considered acceptable provided adequate visibility, advanced signage, and appropriate space is provided in the necessary locations to warn and assist approaching motorists.

## 5 FORESTRY OPERATIONS & TRAFFIC MOVEMENTS

From discussions with the principle trucking company transporting logs from the Makarau and Puhoi region to Marsden Point Port (Smith & Davies), it is understood that at the peak of the harvesting operations a total of eight truck and trailer units will be used, with each vehicle expected to make two round trips per day.

These operations will begin at approximately 5:00am and finish at mid-afternoon on weekdays.

On this basis, the resulting truck movements on the local roads will be 16 inbound trips and 16 outbound trips per day.

The estimated time to complete the harvesting is understood to be three to four years.

At the time of writing, the scale of the forestry operation was approximately half of the anticipated peak (eight truck and trailer loads per day).

In addition to the truck and trailer movements there will be the movement of working crews to and from the forestry block(s). It is understood that these movements consist of four or five inbound vehicles in the morning and the same number of outbound vehicles in the afternoon.

Although this *number* of trips is exceptionally low from a traffic engineering perspective, they will make up a significant *proportion* of the future traffic volumes using the road (as much as 30% of the total volume).

Whilst the *proportion* of the daily flow may be high, it is the *number* of vehicles that is of greatest importance from a traffic engineering perspective in this route study.

# 6 TRAFFIC IMPACT OF FORESTRY OPERATIONS

As a result of the tree harvesting operations that are scheduled to occur over the next few years in the Puhoi and Makarau regions, there will be an increase in the number of truck movements occurring. Associated with the increase in logging truck movements will be an increased potential for existing traffic to encounter logging trucks on the local roads in the region.

Of concern is the increased potential for encountering a logging truck at a location where road width and visibility is restricted.

The logging truck drivers have been observed driving in a courteous fashion and in a manner consistent with the requirements of the route. However, the ability for a logging truck to manoeuvre out of a constrained position to allow another motorist to pass is limited and on this basis the onus is typically placed on the other motorist to manoeuvre into a more suitable position to allow the truck to pass.

This manoeuvring could involve a long reversing manoeuvre or a manoeuvre to position the vehicle on the road shoulder, berm or swale to allow the truck to pass.

In the previous Krippner Road forestry truck study undertaken in 2004 it was recommended that suitable mitigation for forestry truck traffic on Krippner Road would be the trimming and removal of road-side vegetation to improve visibility and increase the warning time to observe approaching vehicles.

It is not known how much trimming or vegetation removal has been carried out since the previous study, but it is noted that more trimming and vegetation removal could be carried out to further improve the visibility and also overcome any regrowth that may have occurred.

These works could complement the provision of additional signage to warn and assist approaching motorists.

To avoid potentially costly upgrades, mitigation may be achieved by travelling on alternative routes.

Determining a better route requires many factors and perspectives to also be considered. For example, wear on the road caused by heavy vehicle traffic will be different on roads with different pavement and subgrade strengths. Therefore it is considered beneficial to undertake a detailed investigation of the subgrade strength of the eastern and western routes to establish in this respect which route is better able to withstand future truck loadings.

# 7 ASSESSMENT OF TRUCKING OPERATING COSTS

An assessment of the operating costs incurred by trucking companies engaged to deliver logs harvested in the Puhoi and Makarau regions to Marsden Point Port has been undertaken and a comparison has been made between using the identified western and eastern routes. This operating cost assessment was prepared by Richard Paling from Richard Paling Consulting

Limited and a summary of the key findings are detailed below, with the complete operating cost assessment attached in Appendix E of this report.

### *Summary and Key Findings of Trucking Operating Cost Assessment*

With the maturation of the forests and favourable prices on world markets, considerable areas of forest are now being felled in northern Auckland and the logs transported to the export port of Marsden Point. One particular location of felling is between Puhoi and Makarau currently focussed on Simon Bayer Road but potentially in the future partially accessed by Rauner Road.

Two possible routes have been identified for the movement of logs away from the areas where they are being harvested to the port. The first is to the east via Krippner Road and Puhoi and then along SH1 via Wellsford and the second is to the west via Tahekeroa Road and Makarau to SH16 to Wellsford and then via SH1 to the north.

The costs of transporting the logs have been estimated on the basis of the approach set out in the NZTA Economic Evaluation Manual, which allows specific allowance to be made for the observed road conditions and travel times and speeds. These figures are broadly consistent with those derived from the National Road Carriers costing model.

The differences in costs which result are set out in Table 7.1 for log transport accessing the road network via Simon Bayer Road.

| Table 7.1<br>Summary of Operating Cost Savings : Logs from Simon Bayer Road | |
|---|---|
| Laden Costs | |
| Costs to Wellsford via western route ($) | 216 |
| Costs to Wellsford via eastern route ($) | 183 |
| Cost savings with eastern route ($) | 33 |
| Unladen Costs | |
| Cost savings with eastern route ($) | 28 |
| Round Trip Costs | |
| Total Round Trip Savings ($) | 61 |
| Average load (tonnes) | 28 |
| Saving per tonne ($) | 2.2 |

The savings in costs would amount to about 8 per cent of the total transport costs to Marsden Point and about 2-2.5 per cent of the value of the logs at the port. Recognising that some logs would be moved via Rauner Road, over the complete felling programme the use of the western rather than the eastern route to transport the logs from the area served by Simon Bayer Road would increase the total transport costs by about $0.3-0.4 million.

Some logs will be harvested in the area served by Rauner Road. The differences in costs for logs accessed via Rauner Road are set out in Table 7.2.

| Table 7.2<br>Comparison of Routes from Rauner Road to Wellsford<br>Total Costs per Loaded Trip | | | |
|---|---|---|---|
| | Western Route | Eastern Route | Saving with Eastern Route |
| Distance to Wellsford (kms) | 49.3 | 47.2 | 2.1 |
| Time (mins) | 53.5 | 58.5 | -5.0 |
| Distance costs ($) | 129 | 133 | -4 |
| Time costs ($) | 57 | 63 | -6 |
| Total costs ($) | 186 | 196 | -10 |

Because the costs of the western route are lower, the operator has confirmed that this would be the favoured route for this traffic

## 8 RECOMMENDATION

Having considered the two routes detailed in this route assessment study, from a traffic engineering perspective and trucking cost perspective each route has benefits and disadvantages.

From an 'exposure-to-conflict' perspective (i.e. chance of local residential traffic encountering a logging truck on a narrow section of road) each route has a similar potential given that:

- one route has more traffic but is shorter in length (eastern route), and
- the other has less traffic, but is longer in length (western route).

Regarding the ability of the routes to accommodate the combined use of local residential traffic and forestry truck traffic, each route has a similar number of constraints of a minor or moderate nature identified, with none of the routes having constraints of a serious nature identified.

In general, the traffic engineering route study has identified that the section of the western route to the west of Upper Waiwera Road has less challenging topography when compared to the more mountainous topography to the east of Upper Waiwera Road. This less challenging topography allows for a better roading standard to be established and also maintained.

From a trucking operators 'time and cost saving' perspective the eastern route is clearly preferred with time savings of 12 minutes per trip being realised (one-way laden trip). This is reflected in an operating cost saving per round trip of $68 or $0.3-0.4 million over the entire harvesting programme.

Overall, with both negative and positive traffic engineering aspects having been identified for each route tending to balance one another out, and the only clear outcome being a cost saving for using the eastern route (savings to the trucking operators), it is determined that there is no sufficiently significant traffic engineering reason to not continue using the eastern route.

However, when Rauner Road is being used for access, the costing calculations indicate savings are achievable by using the western route. On this basis, increasing the utilisation of the western route to reduce the impact on the eastern route is recommended when Rauner Road is used.

Another scenario that is recommended to be explored is to operate a one-way system where one route is used for inbound forestry traffic and the other is used for outbound forestry traffic.

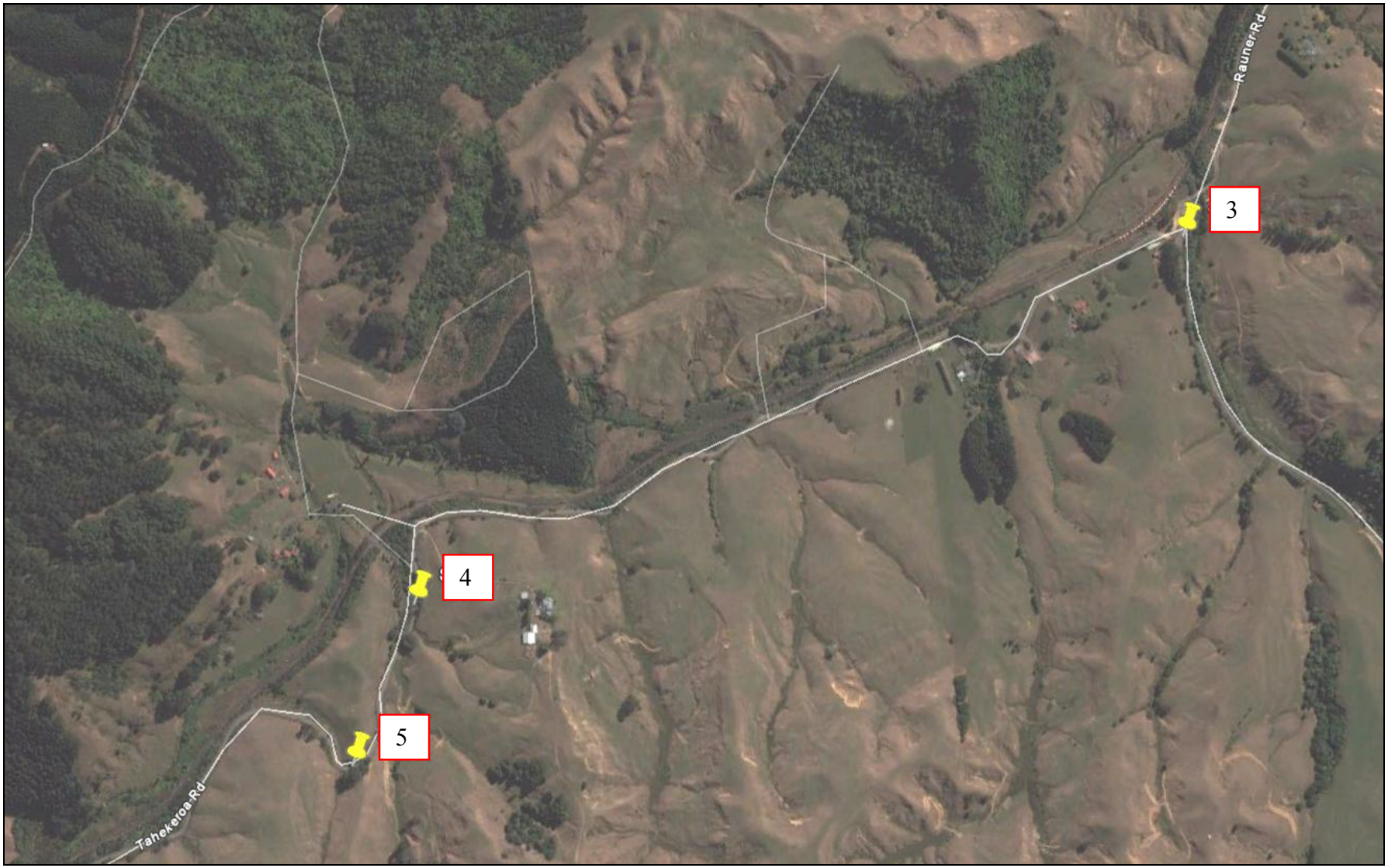
It is therefore suggested that a trial of the alternative route scenarios is carried out for a period of several months to establish if a (more) acceptable outcome can be achieved for all road users.

## APPENDIX A – WESTERN ROUTE

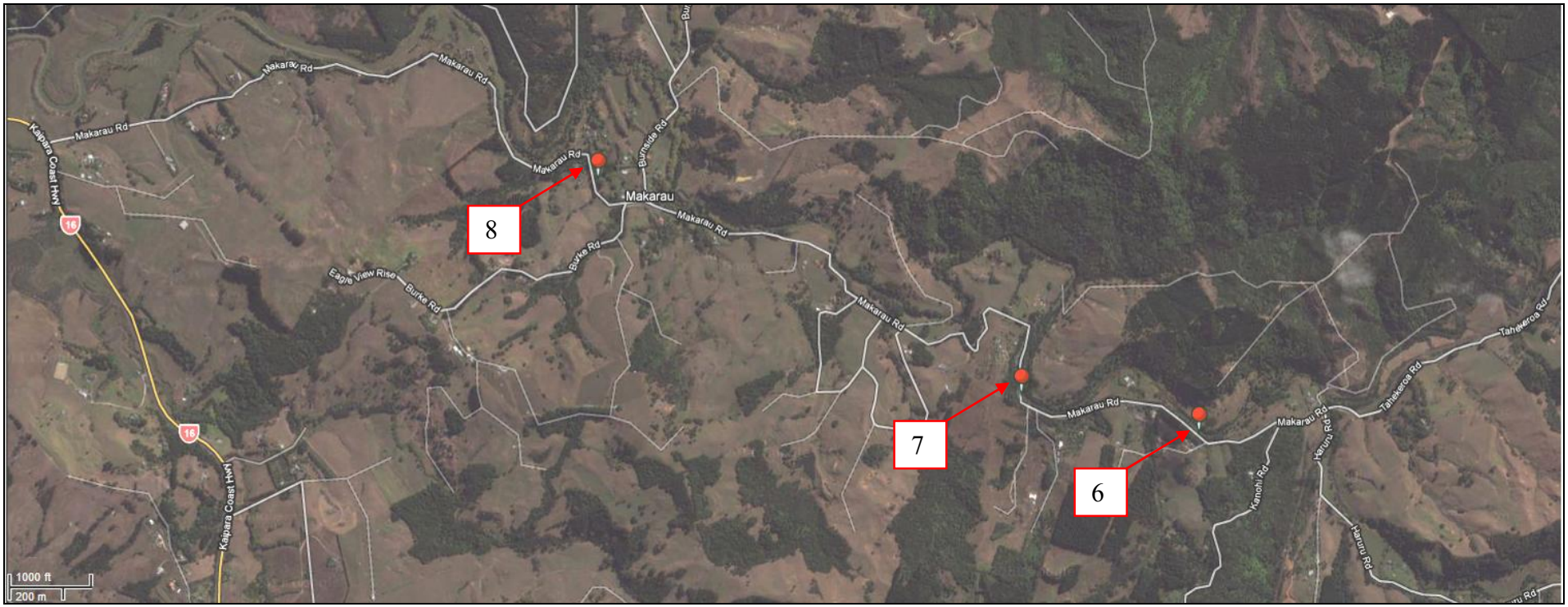
The Western route starts from Simon Bayer Road heading west on Krippner Road, Tahekeroa Road and then onto Makarau Road to State Highway 16.

The GPS coordinates of the identified problematic/constrained areas on Makarau Road are shown on the following map for ease of reference (Sites 1,2,3,4,5,6,7 & 8).


*Section of Krippner Rd between Upper Waiwera Rd and Simon Bayer Rd (relates to sites 1 & 2)*




***Identified Sites on Tahekaroa Rd (Sites 3, 4 & 5)***




***Identified Sites on Makarau Rd (Sites 6, 7 & 8)***

***Site 1 – Western Route –Krippner Rd (west of Simon Bayer Rd & east of Upper Waiwera Rd)***

***Description – Moderate Concern***

The first site on the western route is a narrow bend with limited visibility - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow bend has limited visibility and if a car and truck or truck and truck were to encounter each other at the bend one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

***Site 2 – Western Route –Krippner Rd (west of Simon Bayer Rd & east of Upper Waiwera Rd)***

***Description – Moderate Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

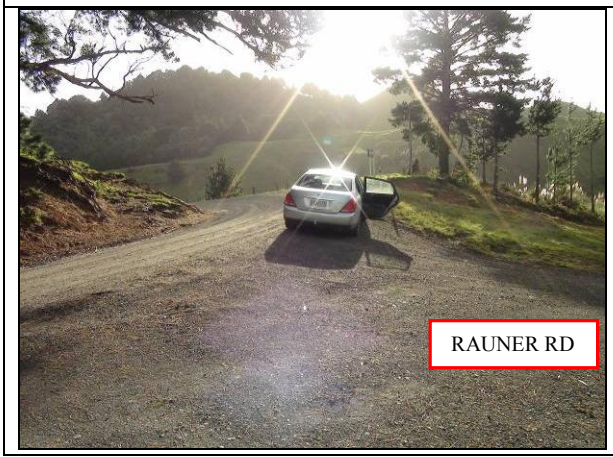
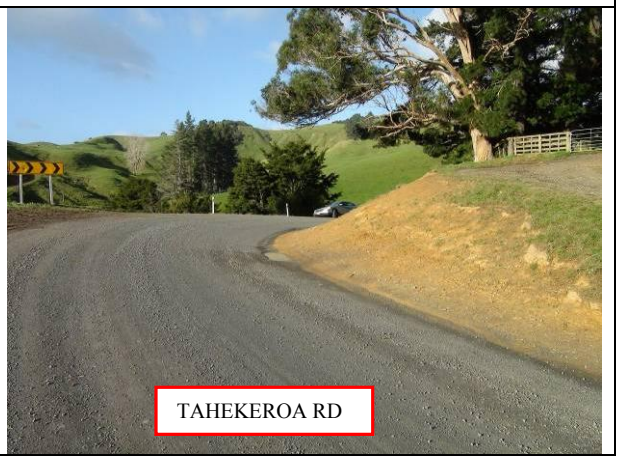
***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

### *Site 3 – Western Route – Intersection of Rauner Rd with Tahekeroa Rd*

***Description – Minor Concern***

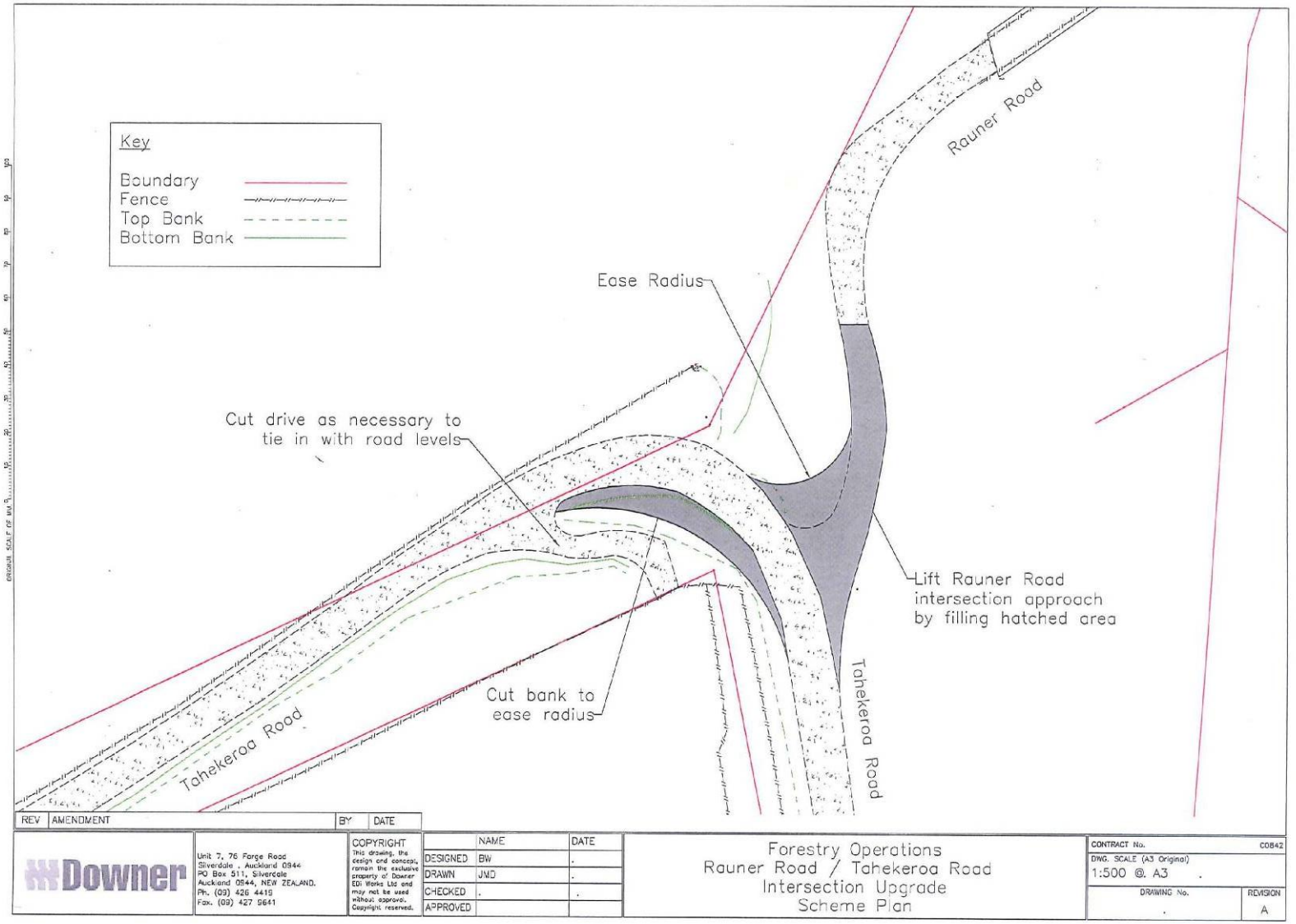
This site is on the western route at the intersection of Rauner Road with Tahekeroa Road - refer to the following photos.

| Westbound Direction | Eastbound Direction |
|---|---|
|   |   |

***Issues:***

This intersection has been reported to have issues for trucks turning left into and right out of Rauner Road.

A concept upgrade plan has been prepared by Downer Works, which is understood to remove these issues - refer to the following scheme plan. It is anticipated that this work will be completed in November 2011.


Key
Boundary
Fence
Top Bank
Bottom Bank
Rauner Road
Ease Radius
Cut drive as necessary to tie in with road levels
Lift Rauner Road intersection approach by filling hatched area
Cut bank to ease radius
Tahekeroa Road
Tahekeroa Road
REV
AMENDMENT
BY
DATE
Downer
Unit 7, 76 Forge Road
Silverdale , Auckland 0944
PO Box 511, Silverdale
Auckland 0544, NEW ZEALAND.
Ph. (09) 426 4419
Fax. (09) 427 9641
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NAME
DATE
DESIGNED
BW
DRAWN
JMD
CHECKED
APPROVED
Forestry Operations
Rauner Road / Tahekeroa Road
Intersection Upgrade
Scheme Plan
CONTRACT No.
C0842
DWG. SCALE (A3 Original)
1:500 @ A3
DRAWING No.
REVISION
A

### *Site 4 – Western Route – Tahekeroa Road*

***Description – Minor Concern***

This site is a localised narrow point located a short distance to the west of Rauner Road - refer to the following photos.

| Westbound Direction | Eastbound Direction |
|---|---|
|  |  |

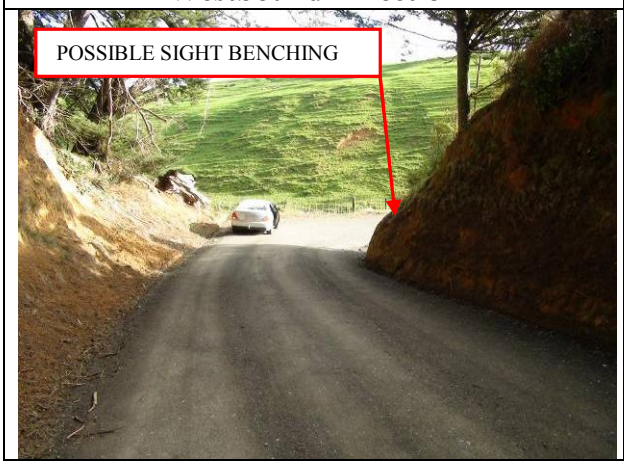
***Issues:***

The localised narrow constraint is out of context on this section and unwary motorists may not react accordingly if encountering an approaching truck.

### *Site 5 – Western Route – Tahekeroa Road*

#### *Description – Moderate Concern*

The second site is a localised narrow point with steep cut batters, moderate to severe crest and moderate bend located a short distance to the west of Site 2 and prior to reaching Makarau Road - refer to the following photos.

| Westbound Direction | Eastbound Direction |
|---|---|
|   |  |

#### *Issues:*

The bend and crest is constrained and has limited visibility which would make encountering a truck and trailer unit difficult to pass.

***Site 6 – Western Route – Makarau Rd***

***Description – Minor Concern***

A localised narrow point on Makarau Road. The narrowing is only slightly marginal at 5.7 metres between a cut batter and post and wire fence. However, the narrowing is located on a faster section of road just prior to a bend which is why it has been identified as a concern - refer to the following photos.

| Westbound Direction | Eastbound Direction |
|---|---|
|  |  |

The location is a short distance from the driveway entrance for 560 Makarau Road.

***Issues:***

The localised narrow constraint is out of context on this section of road and unwary motorists may not react accordingly if encountering an approaching truck.

***Site 7 – Western Route – Makarau Rd***

***Description – Minor Concern***

A series of moderate bends located on a relatively high speed downhill section of road with restricted visibility and narrowing (measured 5.5m carriageway) - refer to the following photos.

| Westbound Direction | Eastbound Direction |
|---|---|
|  |  |

The location is adjacent to 464 Makarau Road.

***Issues:***

Encountering a truck and trailer unit on this section of road has the potential to make it difficult for another motorist to pass.

***Site 8 – Western Route – Makarau Rd***

***Description – Minor Concern***

Cracks in the sealed pavement on the outside wheel path indicate some subgrade instability and continual slippage is likely to occur - refer to the following photos.

| Westbound Direction 1 | Westbound Direction 2 |
|---|---|
|  |  |

The location is adjacent to 239 Makarau Road.

***Issues:***

Pavement and subgrade instability will require continual maintenance and possible retaining wall upgrade if additional heavy truck movements occur.

## APPENDIX B – EASTERN ROUTE

The eastern route starts from Simon Bayer Road heading east on Krippner Road to Puhoi Road and then onto State Highway 16.

The GPS coordinates of the identified problematic/constrained areas on Krippner Road are shown on the following map for ease of reference (Sites 1-10). Some of the sites are indicative of sections of the road rather than specific locations and therefore the generalised route sections are also shown.


***Section of Krippner Rd between Simon Bayer Rd and Wenz Bayer Rd (relates to sites 1 - 3)***

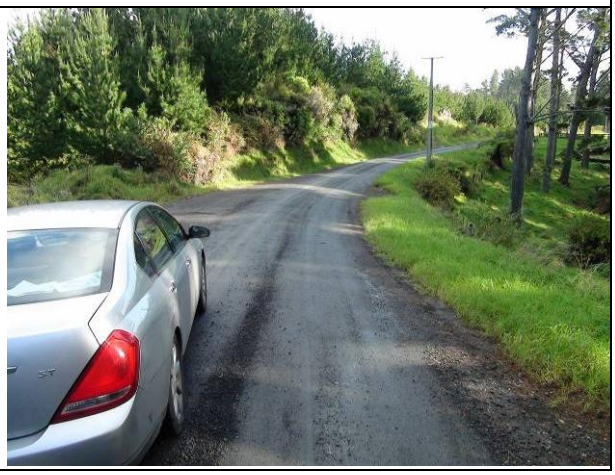

***Section of Krippner Rd between Wenz Bayer Rd & Grant Ridge Rd (relates to sites 4 - 7)***


***Identified Sites on Krippner Rd east of Grant Ridge Rd (Sites 8 & 9)***

*Site 1 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Wenz Bayer Rd)*

***Description – Minor Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

### *Site 2 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Wenz Bayer Rd)*

***Description – Minor Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

### *Site 3 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Wenz Bayer Rd)*

***Description – Minor Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

### *Site 4 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Wenz Bayer Rd)*

***Description – Minor Concern***

Localised narrowing caused by a slip - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The localised narrowing has limited visibility and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. There are adequate locations each side of the slip to yield as a suitable passing location. The western side of the slip has more room for passing.

### *Site 5 – Eastern Route –Krippner Rd (east of Wenz Bayer Rd & west of Grant Ridge Rd)*

***Description – Minor Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

### *Site 6 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Grant Ridge Rd)*

***Description – Minor Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

*Site 7 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Grant Ridge Rd)*

***Description – Minor Concern***

Localised narrowing caused by slip. Priority signage and widening to allow passing at the yield point has previously been installed - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|   |  |

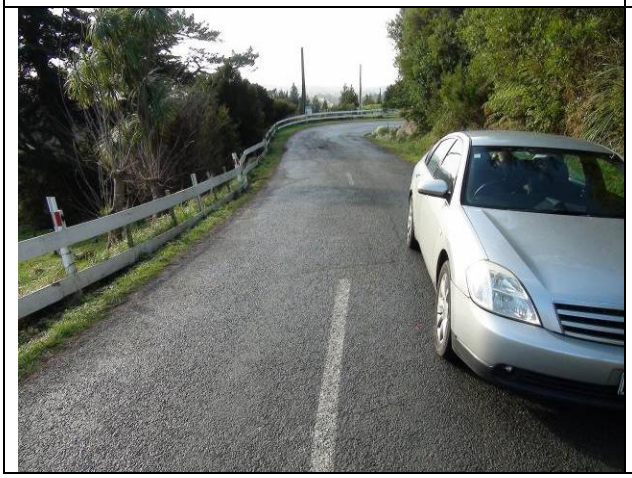
***Issues:***

The localised narrowing is a potential problem if a car and truck or truck and truck were to encounter each other. Although signage and widening treatments have already been installed to improve the situation it is still considered a minor concern.

### *Site 8 – Eastern Route –Krippner Rd (east of Simon Bayer Rd & west of Grant Ridge Rd)*

***Description – Minor Concern***

Short sealed section of road with signs of wear and pavement and/or subgrade movement - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |  |

***Issues:***

The sealed pavement is showing signs of wear that is expected to degrade quickly with increased truck movements.

### *Site 9 – Eastern Route –Krippner Rd (east of Grant Ridge Rd & west of Noakes Hill Rd)*

***Description – Moderate Concern***

Narrow section of road with limited suitable locations for passing - refer to the following photos.

| Eastbound Direction | Westbound Direction |
|---|---|
|  |   |

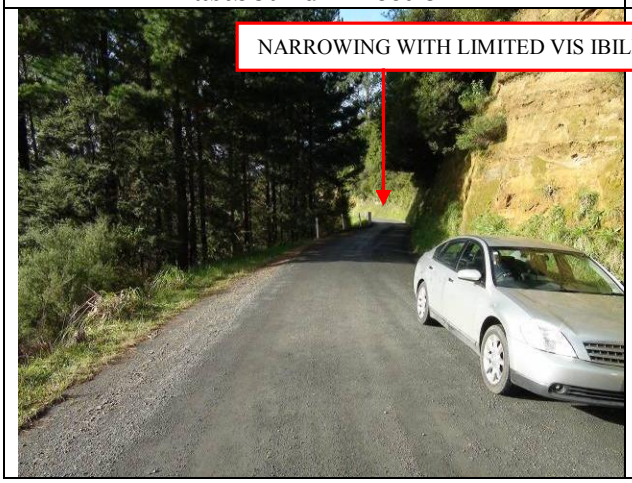
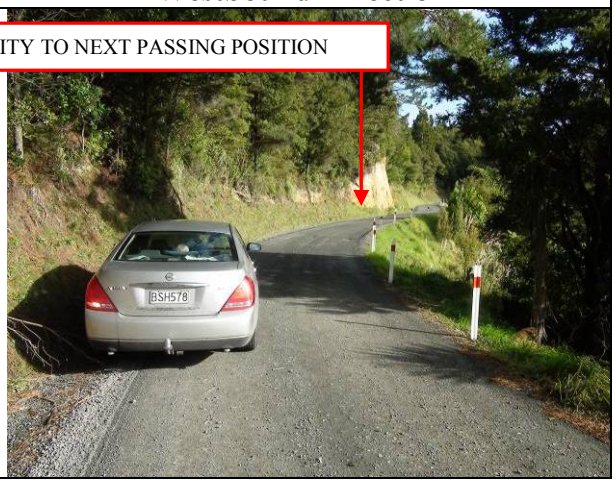
***Issues:***

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

## *Site 10 – Eastern Route –Krippner Rd (east of Grant Ridge Rd & west of Noakes Hill Rd)*

### *Description – Moderate Concern*

Section of road on the ridge to the west of Noakes Hill Road has limited suitable locations for passing and limited visibility between passing locations - refer to the following photos. Noted that there is already some PW-43.1 signs warning of the narrow section.

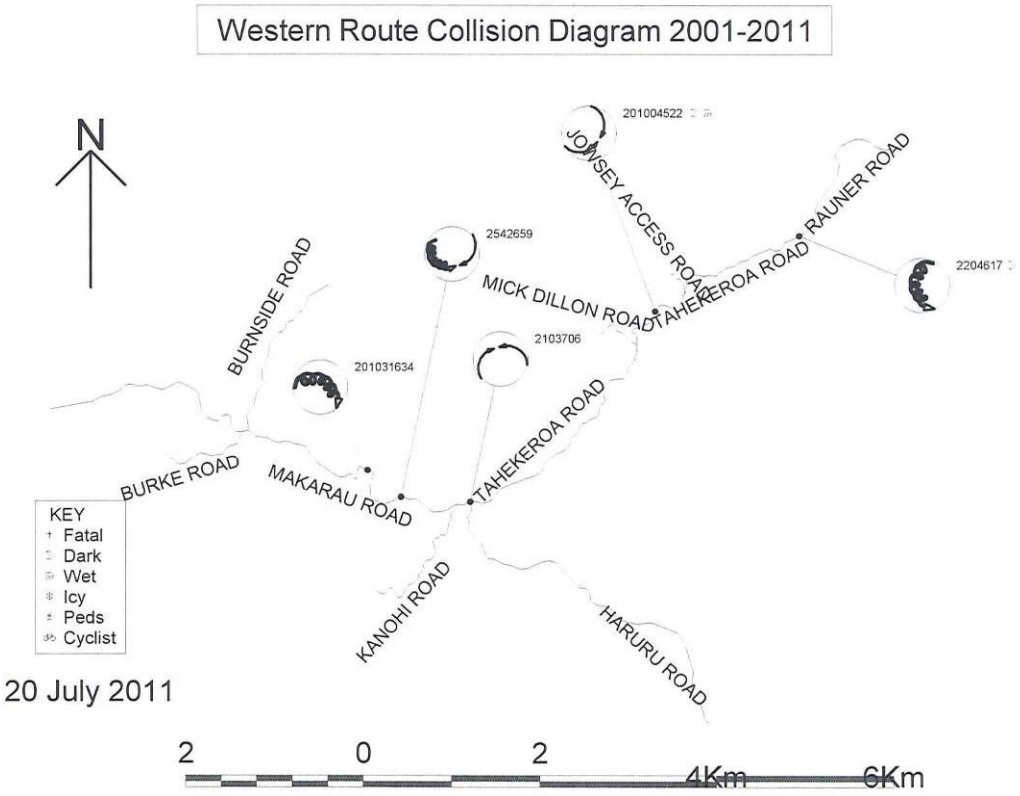
| Eastbound Direction | Westbound Direction |
|---|---|
|   |  |

### *Issues:*

The narrow section has limited suitable locations for passing and if a car and truck or truck and truck were to encounter each other one is expected to yield to allow the other to pass. This situation may need one of the vehicles to pull over close to the steep bank or may need one of the vehicles to reverse to a suitable passing location.

## APPENDIX C – WESTERN ROUTE CRASH DATA

### *Western Route Crash Diagram*



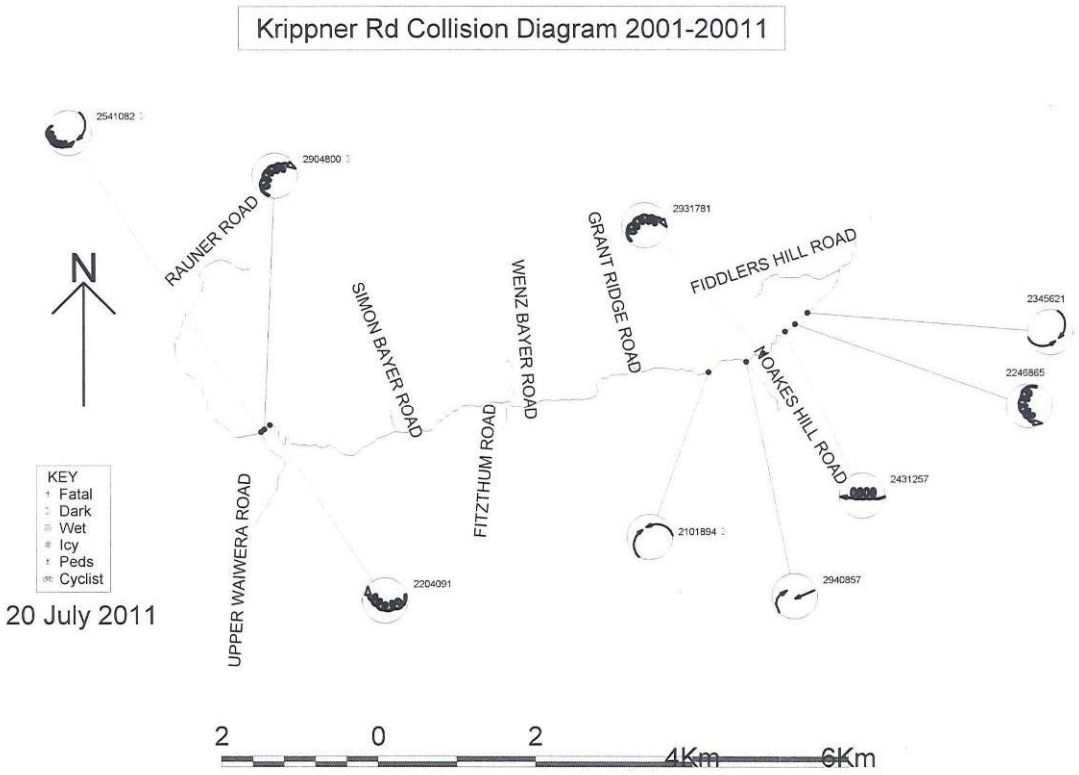
Makarau 10yr

Plain English report, run on 20-Jul-2011 Page 1

| First Street | Distance | D/I/B | Second street or landmark | Crash Number | Date DD/MM/YYYY | Day | Time HHMM | Description of Events | Crash Factors (ENV = Environmental factors) | Road | Natural Light | Weather | Junction | Cntrl | Tot F A T | Inj S E R | M I N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAKARAU ROAD | | I | HARURU ROAD | 2103706 | 13/10/2001 | Sat | 1240 | MOTOR CYCLE1 EBD on MAKARAU ROAD cutting corner hit VAN2 head on | MOTOR CYCLE1 cutting corner on bend ENV: visibility limited by curve | Dry | Bright | Fine | T Type Junction | Nil | | | 1 |
| MAKARAU ROAD | 700W | | KANOHI ROAD | 2542659 | 09/11/2005 | Wed | | CAR1 EBD on MAKARAU ROAD lost control on curve and hit SUV2 head on | | Dry | Overcast | Fine | Unknown | Nil | | | |
| MAKARAU ROAD | 1430W | | KANOHI ROAD | 201031634 | 22/02/2010 | Mon | 1646 | VAN1 EBD on MAKARAU ROAD lost control turning right, VAN1 hit Tree on right hand bend | VAN1 drugs proven, lost control, illness and disability | Dry | Bright | Fine | Unknown | N/A | | | |
| TAHEKEROA ROAD | 100W | | KRIPPNER ROAD | 2204617 | 03/11/2002 | Sun | 2100 | CAR1 SBD on TAHEKEROA ROAD lost control turning left | CAR1 puncture or blowout | Dry | Dark | Fine | Unknown | Nil | | | 2 |
| TAHEKEROA ROAD | 550N | | MICK DILLON ROAD | 201004522 | 22/06/2010 | Tue | 1700 | MOTOR CYCLE1 NBD on TAHEKEROA ROAD swinging wide hit VAN2 head on | MOTOR CYCLE1 swung wide on bend, driving unfamiliar vehicle | Wet | Twilight | Light Rain | Unknown | Nil | | | 1 |

## APPENDIX D – EASTERN ROUTE CRASH DATA

### *Eastern Route Crash Diagram*



| First Street | Distance | D I R | Second street or landmark | Crash Number | Date DD/MM/YYYY | Day | Time HHMM | Description of Events | Crash Factors (ENV = Environmental factors) | Road | Natural Light | Weather | Junction | Cntrl | Tot Inj F A T | S E R | M I N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KRIPPNER ROAD | 1000 | E | GRANT RIDGE ROAD | 2101894 | 05/02/2001 | Mon | 1828 | CAR1 WBD on KRIPPNER ROAD and/or VAN2 cut corner/swung wide and collided head on | ENV: road surface unusually narrow, unknown | Dry | Twilight | Fine | Unknown | Nil | | 1 | |
| KRIPPNER ROAD | 840 | E | NOAKES HILL ROAD | 2246865 | 02/10/2002 | Wed | 0815 | TRUCK1 EBD on KRIPPNER ROAD lost control turning left, TRUCK1 hit Cliff Bank | | Dry | Overcast | Fine | Unknown | Nil | | | |
| KRIPPNER ROAD | 270 | N | NOAKES HILL ROAD | 2931781 | 25/02/2009 | Wed | 0732 | SUV1 NBD on KRIPPNER ROAD lost control turning right, SUV1 hit Cliff Bank, Ditch on right hand bend | SUV1 lost control when turning, lost control due to road conditions ENV: road slippery (loose material on seal) | Dry | Overcast | Fine | Unknown | N/A | | | |
| KRIPPNER ROAD | 1 | | NOAKES HILL ROAD | 2940857 | 22/08/2009 | Sat | 1630 | CAR1 WBD on KRIPPNER ROAD hit SUV2 turning right onto KRIPPNER ROAD from the left | SUV2 failed to give way when turning to non-turning traffic ENV: signs / signals necessary | Dry | Bright | Fine | T Type Junction | Nil | | | |
| KRIPPNER ROAD | 1600 | W | PUHOI ROAD | 2345621 | 21/12/2003 | Sun | 1445 | VAN1 WBD on KRIPPNER ROAD cutting corner hit CAR2 head on | | Dry | Overcast | Fine | Unknown | Nil | | | |
| KRIPPNER ROAD | 2000 | W | PUHOI ROAD | 2431257 | 29/01/2004 | Thu | 1600 | CAR1 SBD on KRIPPNER ROAD lost control; went off road to right, CAR1 went Over Bank | | Dry | Bright | Fine | Unknown | Nil | | | |
| KRIPPNER ROAD | 50 | E | UPPER WAIWERA ROAD | 2904800 | 11/08/2009 | Tue | 1930 | VAN1 EBD on KRIPPNER ROAD lost control turning right, VAN1 went Over Bank, Tree on right hand bend | VAN1 new driver showed inexperience, fatigue (drowsy, tired, fell asleep), illness with no warning (eg heart attack) | Dry | Dark | Fine | Unknown | Nil | | 1 | |
| KRIPPNER ROAD | 150 | E | UPPER WAIWERA ROAD | 2204091 | 23/09/2002 | Mon | 1200 | CAR1 NBD on KRIPPNER ROAD lost control turning right, CAR1 went Over Bank, Tree on right hand bend | CAR1 suddenly swerved to avoid object or for unknown reason | Dry | Bright | Fine | Unknown | Nil | | 1 | |
| PUHOI ROAD | 1 | | KRIPPNER ROAD | 2138130 | 22/07/2001 | Sun | 1115 | VAN1 WBD on PUHOI ROAD hit CAR2 turning right onto PUHOI ROAD from the left | | Dry | Bright | Fine | T Type Junction | Stop Sign | | | |
| UPPER WAIWERA ROAD | 1 | | KRIPPNER ROAD | 2541082 | 27/09/2005 | Tue | 1800 | VAN1 EBD on KRIPPNER ROAD lost control on curve and hit CAR2 head on | | Dry | Twilight | Fine | Y Type Junction | Nil | | | |

## APPENDIX E – ASSESSMENT OF TRANSPORT COSTS BY RICHARD PALING CONSULTING LIMITED

# Forestry Truck Routes for Makarau and Puhoi

## Assessment of Transport Costs for Alternative Routes

Draft Report October 2011

**Richard Paling Consulting**

**October 2011**

**Richard Paling Consulting Ltd**
**120A Riddell Road, Glendowie, Auckland 1071**
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# Forestry Truck Routes for Makarau and Puhoi

## Assessment of Operating Costs for Alternative Routes

### 1 Summary and Key Findings

With the maturation of the forests and favourable prices on world markets, considerable areas of forest are now being felled in northern Auckland and the logs transported to the export port of Marsden Point. One particular location of felling is between Puhoi and Makarau currently focussed on Simon Bayer Road but potentially in the future partially accessed by Rauner Road.

Two possible routes have been identified for the movement of logs away from the areas where they are being harvested areas to the port. The first is to the east via Krippner Road and Puhoi and then along SH1 via Wellsford and the second is to the west via Tahekeroa Road and Makarau to SH16 to Wellsford and then via SH1 to the north. The costs of transporting the logs have been estimated on the basis of the approach set out in the NZTA Economic Evaluation Manual, which allows specific allowance to be made for the observed road conditions and travel times and speeds. These figures are broadly consistent with those derived from the National Road Carriers costing model.

The differences in costs which result are set out in Table 1.1 for log transport accessing the road network via Simon Bayer Road

**Table 1.1**
**Summary of Operating Cost Savings : Logs from Simon Bayer Road**

| | |
|---|---|
| **Laden Costs** | |
| Costs to Wellsford via western route ($) | 216 |
| Costs to Wellsford via eastern route ($) | 183 |
| Cost savings with eastern route ($) | 33 |
| **Unladen Costs** | |
| Cost savings with eastern route ($) | 28 |
| **Round Trip Costs** | |
| Total Round Trip Savings ($) | 61 |
| Average load (tonnes) | 28 |
| Saving per tonne ($) | 2.2 |

The savings in costs would amount to about 8 per cent of the total transport costs to Marsden Point and about 2-2.5 per cent of the value of the logs at the port. Recognising that some logs would be moved via Rauner Road, over the complete felling programme the use of the western rather than the eastern route to transport the logs from the area served by Simon Bayer Road would increase the total transport costs by about $0.3-0.4 million.

Some logs will be harvested in the area served by Rauner Road. The differences in costs for logs accessed via Rauner Road are set out in Table 1.2

**Table 1.2**
**Comparison of Routes from Rauner Road to Wellsford**
**Total Costs per Loaded Trip**

| | Western Route | Eastern Route | Saving with Eastern Route |
|---|---|---|---|
| Distance to Wellsford (kms) | 49.3 | 47.2 | 2.1 |
| Time (mins) | 53.5 | 58.5 | -5.0 |
| Distance costs ($) | 129 | 133 | -4 |
| Time costs ($) | 57 | 63 | -6 |
| Total costs ($) | 186 | 196 | -10 |

Because the costs of the western route are lower, the operator has confirmed that this would be the favoured route for this traffic

# 2 Introduction

With the maturation of the forests and favourable prices on world markets, considerable areas of forest are now being felled in northern Auckland and the logs transported to the export port of Marsden Point. One particular location of felling is between Puhoi and Makerau currently focussed on Simon Bayer Road but potentially in the future partially accessed by Rauner Road.

Two possible routes have been identified for the movement of logs away from the main harvesting areas between Puhoi and Makarau to the port, one to the east via Krippner Road and Puhoi and then along SH1 via Wellsford and the second to the west via Tahekeroa Road and Makarau to SH16 to Wellsford and then via SH1 to the north. The two routes differ in distance with the eastern route via Puhoi being about 106 kms to Marsden Point and the western route being some 10 kms longer. Although longer, the western route to SH16 is considered to have a better general alignment and be in better physical condition. The differences in condition are however small and can change as the road is maintained. Because of the differences between the routes in terms of their length and physical quality, there is a resulting difference in cost in moving the logs to their ultimate destination via the eastern or western alternatives. This note describes the way in which these costs have been estimated and then uses these to assess the resulting differences in the total costs of transport of the logs

It is also likely that as felling progresses, growing use will be made of Rauner Road further to the west than Simon Bayer Road. The costs of using a western or an eastern route for this particular movement have also been examined.

# 3 Differences between the Alternative Routes

## 3.1 Times and distances

The distances of the alternative routes have been determined based on a combination of RAMM data and from the distances along the SH derived from Google Maps. The times for the journeys from Simon Bayer Road to Wellsford have been determined based on observations undertaken for the alternative routes in two logging trucks.

The times and distances determined for the two routes are as follows:-

Table 3.1
Times and Distances of Alternative Routes

| | Western Route | Eastern Route |
|---|---|---|
| Distance to SH | 16.3 | 8.8 |
| Distance along SH to Wellsford | 37.1 | 34.3 |
| Total Distance | 53.4 | 43.1 |
| Time to SH | 24.0 | 18.5 |
| Time along SH to Wellsford | 37.9 | 31.4 |
| Total Time | 61.9 | 49.9 |

### 3.2 Route conditions

The conditions of the alternative routes have been described in detail in the report "Forestry Truck Routes for Makarau and Puhoi Transportation Assessment" by TEAM. In general, this indicates that for the sections of road leading to the nearest State Highway, the western route provides a higher quality alternative in terms of the alignment of the route and the condition of the road surface than the route via the east although the differences are probably small. For the sections of the routes on State Highways, road conditions are considered to be similar. The condition of the road is reflected in the estimated costs of movement which are set out in the following section and described in more detail in Appendix A.

## 4 Costs

### 4.1 Potential Sources of Data

The costs of road transport have been estimated using data from the NZTA Economic Evaluation Manual Volume 1 (EEM1) and have been checked against the results of the operating cost model developed by National Road Carriers as a service for their members. The NZTA EEM1 includes an approach to the calculation of the economic costs of the operation of road vehicles which allows the impacts of speeds, gradients and road condition to be included. These costs however exclude road user charges and other items of taxation and also exclude the overheads and profit, and as a result, adjustments need to be made in order to reflect the prices likely to be charged by operators.

The operating cost model developed by National Road Carriers is based on the experience of a number of operators and this provides an alternative source of information. However, this assumes average conditions and so does not give the facility to reflect explicitly the differences in road conditions associated with the eastern and western options for the movement of the logs

### 4.2 Operating Costs based on the EEM

The estimation of operating costs based on the NZ Transport Agency (EEM) takes into account the observed speeds and typical gradients on the two routes in determining the costs of the alternatives. These costs therefore reflect the particular conditions on the routes. The details of the approach are set out in Appendix A but the total savings for the loaded journey between Simon Bayer Road and Wellsford and the average costs per km are set out in Table 4.1

**Table 4.1**
**Comparison of Routes from Simon Bayer Road to Wellsford**
**Total Costs per Laden Trip**

| | Western Route | Eastern Route | Saving with Eastern Route |
|---|---|---|---|
| Distance costs ($) | 149.4 | 129.7 | 19.9 |
| Time costs ($) | 66.2 | 53.3 | 12.9 |
| Total costs ($) | 215.6 | 182.8 | 32.8 |
| Total distance (kms) | 53.4 | 43.1 | 10.3 |
| Costs per km ($) | 4.0 | 4.2 | 3.2 |

Because of the more difficult terrain and poorer road quality, the overall costs per km are higher for the eastern route than for the western alternative. However, this is more than offset by the shorter distance and travel times of the eastern route giving a reduction in costs of about $32 for the journey to Wellsford.

### 4.3 Operating Costs Based on NRC Data

National Road Carriers (NRC) has a separate vehicle operating cost model which provides values in terms of dollars per km. This covers all the costs but excludes any contribution to profits. For a logging truck, the costs are estimated at about $3.20 per km for a laden trip and $2.70 for an unladen trip with the unladen costs being about 85 per cent of those where the vehicle is loaded. The lower unladen figure reflects the saving with the trailer being loaded onto the powered vehicle saving fuel, tyre costs, other wear and tear and RUCs. The costs from the NRC model for a laden trip of about $3.20 per km are broadly consistent with those derived from the EEM if the NRC costs are increased to allow for the more difficult conditions away from the State Highway and for a contribution towards the profitability of the operation.

# 5 Potential Cost Savings

## 5.1 Savings from Operations Accessing on Simon Bayer Road

Using the operating costs for laden operations set out in Table 4.1 and unladen costs based on the ratio developed by NRC, the potential cost savings from the use of the eastern route from Simon Bayer Road via Puhoi rather than the western route via Makarau are set out in Table 5.1.

**Table 5.1**
**Summary of Operating Cost Savings : Logs from Simon Bayer Road**

| | |
|---|---|
| **Laden Costs** | |
| Costs to Wellsford via western route ($) | 216 |
| Costs to Wellsford via eastern route ($) | 183 |
| Cost savings with eastern route ($) | 33 |
| **Unladen Costs** | |
| Cost savings with eastern route ($) | 28 |
| **Round Trip Costs** | |
| Total Round Trip Savings ($) | 61 |
| Average load (tonnes) | 28 |
| Saving per tonne ($) | 2.2 |

The savings per tonne can be compared with the total cost of transport per tonne between Simon Bayer Road and the export port at Marsden Point including the common section along SH1 and SH15A north of Wellsford. The total transport cost to Marsden Point from Simon Bayer Road via the eastern route would be about $830 in total or $35 per tonne and the saving compared to the western route would be equivalent to about 8 per cent of the total transport costs. It can also be compared with the total export value of the logs of about $120 per tonne (fob).

Over the complete felling period and assuming that 75 per cent of the logs would be moved by Simon Bayer Road, the total increase in cost of using the western route would amount to about $0.3 to $0.4 million.

## 5.2 Savings from Logs Accessing from Rauner Road

While logs are currently being harvested in areas accessed by Simon Bayer Road, the plan is for Rauner Road to be used more extensively as the access point for some of the movements later through the felling programme. It is estimated that this might account for about a quarter of the total volume being logged. Rauner Road is approximately 4.1 kms to the west of Simon Bayer Road and the difference in cost between the two routes would be reduced. Following the same approach as described above, the estimated costs of the western and eastern routes are set out in Table 5.2

**Table 5.2**
**Comparison of Routes from Rauner Road to Wellsford**
**Total Costs per Trip**

| | Western Route | Eastern Route | Saving with Eastern Route |
|---|---|---|---|
| Distance to Wellsford (kms) | 49.3 | 47.2 | 2.1 |
| Time (mins) | 53.5 | 58.5 | -5.0 |
| Distance costs ($) | 129 | 133 | -4 |
| Time costs ($) | 57 | 63 | -6 |
| Total costs ($) | 186 | 196 | -10 |

Discussions with the operator have indicated that because the western route is quicker and less costly, this would be the favoured route for the logs from Rauner Road.

# APPENDIX A

## Details of Estimation of Costs of Alternative Routes

## Details of Estimation of Costs of Alternative Routes

### Vehicle Operating Costs

The key assumptions made for the estimation of vehicle operating costs for vehicles using the eastern and western routes and the results obtained are set out in Table A1.1

**Table A1.1**
**Comparison of Routes from Simon Bayer Road**
**Distance Related Vehicle Operating Costs based on NZTA EEM Values**

| Characteristic | Western Route | Eastern Route | Notes |
|---|---|---|---|
| **Simon Bayer Road to SH** | | | |
| Length (kms) | 16.27 | 8.84 | Based on RAMM data |
| Time (mins) | 24.0 | 18.5 | Based on observed data |
| Average speed (km/h) | 40.6 | 28.6 | |
| Assumed average gradient | 3% | 5% | |
| Marginal Resource costs per veh km (cents) | 184.6 | 227.4 | Based on EEM Table A5.5 and updated to 2011 |
| Total distance related cost ($) | 30.0 | 20.1 | |
| **SH to Wellsford** | | | |
| Length (kms) | 37.1 | 34.3 | Based on Google Maps |
| Time (mins) | 37.9 | 31.4 | Observed data |
| Average speed (km/h) | 58.7 | 65.6 | |
| Assumed average gradient | 4% | 4% | |
| Marginal Resource costs per veh km (cents) | 206.7 | 211.1 | Based on EEM Table A5.5 and updated to 2011 |
| Total distance related cost ($) | 76.7 | 72.4 | |
| **Combined Route : Simon Bayer Road to Wellsford** | | | |
| Length | 53.4 | 43.1 | |
| Total Distance Costs ($) | 106.7 | 92.5 | Saving of $14.1 |

To convert the EEM costs to those faced in practice by the road haulier adjustments have been made to reflect the effects of road user charges and overheads and profit and both these are estimated to add about 20 per cent to the base costs. This would then give the position as set out in Table A1.2

**Table A1.2**
**Comparison of Routes from Simon Bayer Road to Wellsford**
**Adjustments to EEM Costs**

| | Western Route | Eastern Route | Savings with eastern Route |
|---|---|---|---|
| Total Resource Distance Related Vehicle Operating Costs | 106.7 | 92.5 | 14.2 |
| RUC 20% | 21.4 | 18.5 | 2.8 |
| Overheads and profit 20% | 21.3 | 18.5 | 2.8 |
| **Total distance related cost savings** | **149.4** | **129.5** | **19.9** |

### Time Savings

The EEM also provides values to reflect time savings. These are based on the cost of drivers time and the time value of the vehicle and freight. These are set out in Table A1.3 together with the time costs for the different routes.

**Table A1.3**
**Comparison of Routes from Simon Bayer Road to Wellsford**
**Time Related Costs**

| Characteristic | Western Route | Eastern Route | Notes |
|---|---|---|---|
| **Combined Route : Simon Bayer Road to Wellsford** | | | |
| Travel time (mins) | 62 | 50 | Based on observed data |
| Value of time Driver ($ per hour) | 26.7 | 26.7 | Based on EEM Table A4.1 and updated to 2011 |
| Value of time vehicle plus freight | 37.4 | 37.4 | Based on EEM Table A4.2 and updated to 2011 |
| Total value of time ($ per hour) | 64.1 | 64.1 | |
| Total Time Cost ($) | 66.2 | 53.3 | Saving of $12.9 |

NRC have estimated that the costs of unladen operation are about 85 per cent of the costs of laden operation. Using this figures and those set out in Tables A1.2 and A1.3, the differences in costs which result are set out in Table A1.4 for log transport accessing the road network via Simon Bayer Road

**Table A1.4**
**Summary of Operating Cost Savings : Logs from Simon Bayer Road**

| | |
|---|---|
| **Laden Costs** | |
| Total time and distance costs to Wellsford via western route ($) | 215.6 |
| Total time and distance costs to Wellsford via eastern route ($) | 182.8 |
| Cost savings with eastern route ($) | 32.8 |
| **Unladen Costs** | |
| Cost savings with eastern route ($) | 27.8 |
| **Round Trip Costs** | |
| Total Round Trip Savings ($) | 60.6 |
| Average load (tonnes) | 28 |
| Saving per tonne ($) | 2.2 |