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19 April 2012

Milford Dart Limited
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Attention: Mike Sleigh

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Dear Mike

ASSESSMENT OF POTENTIAL ROUTEBURN ROAD UPGRADE

Further to our recent discussions, we have carried out an assessment of the potential upgrade that may be required for Routeburn Road as a result of the operation of the proposed tunnel between Routeburn Road and the Lower Hollyford Road.

This letter provides an overview of the present roading conditions and traffic environment in and around Routeburn Road. We have assessed the potential upgrading of the road that may be required to accommodate an increase in traffic due to the proposed tunnel.

Background Information
In preparing our assessment we have been cognisant of the following documents which you provided to us:

- Tourism Resource Consultants (TRC) report to Milford Dart Limited 'Assessing the Potential Impact of the Milford Dart Proposal on the Visitor Market to Milford Sound', final report August 2007, pp44
- Hutchison D and Major N (Hutchison and Major) report to Queenstown Lakes District Council (QLDC) 'Greenstone-Kinloch Road: Condition Report and Recommendations', 1 July 2006, pp19
- Trafficplan Limited (TPL), report to Milford Dart Limited 'Road Safety Audit and Traffic Report on Roading', July 2007, pp19 (this report includes a road centre line survey and legal road location undertaken by Clark Fortune McDonald and Associated undertaken in January 2007),
- URS Limited (URS) drawing C203 'Routeburn portal port construction' January 2011
- Michael Wardill, QLDC Network Operations Engineer, report to Infrastructure Services Committee for meeting of 20 March 2012, Programme Overviews and Copy of submission sent for Dart Passage Tunnel, 28 February 2012, pp16.
- Gabites Porter Consultants Limited (GPCL) report to Milford Dart Limited, 'Milford Sound and Te Anau Traffic', July 2007, pp28.

We also carried out a site visit on 13 April 2012 to the full length of road under consideration. This was to ensure that we are familiar with the prevailing environment

and to take additional measurements particularly of carriageway widths. During the site visit, we noted that works were being carried out to improve the culverts on the road.

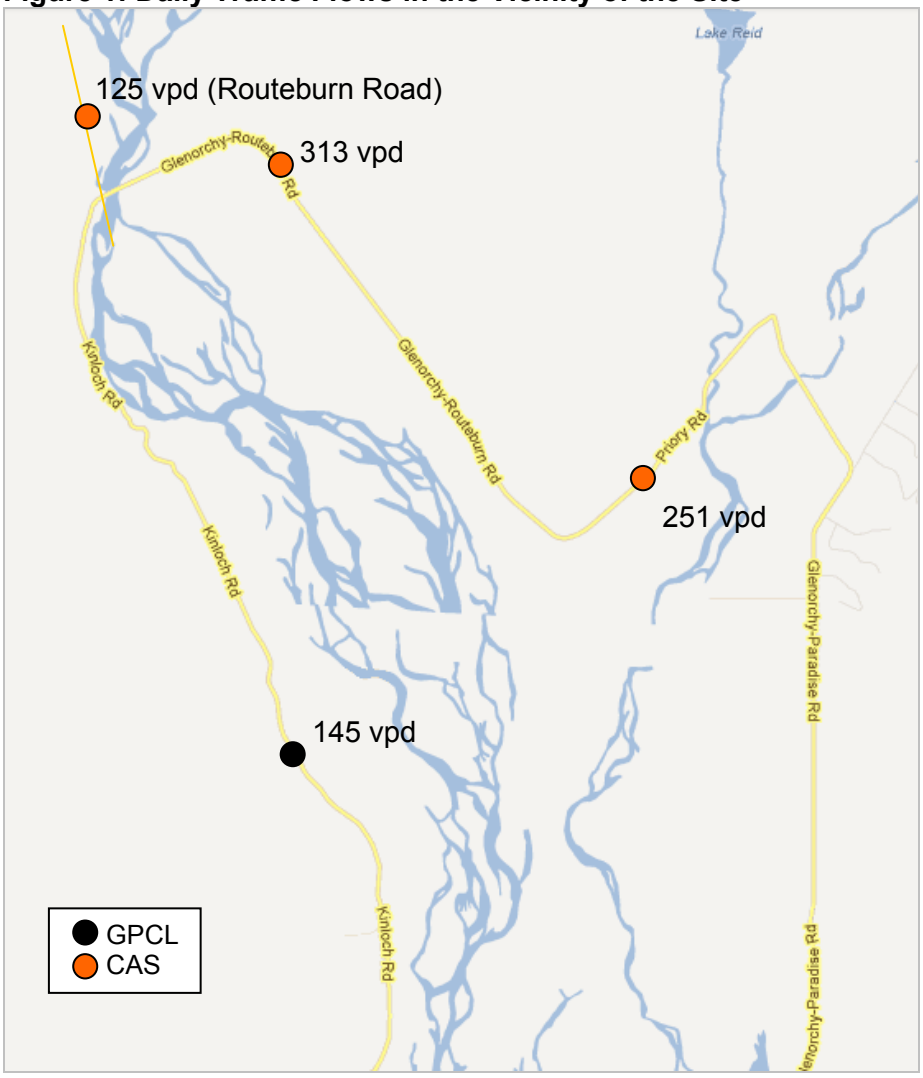
Surrounding Transport Environment

Routeburn Road is classified as a Local Road in the Queenstown Lakes District Plan. It runs with a generally north-south alignment, from its intersection with Glenorchy Routeburn Road and Kinloch Road, some 9.7km northwest of Glenorchy. The District Plan classifies Glenorchy Routeburn Road as an Arterial Roads, with Kinloch Road classified as a Collector Road.

Traffic surveys in the vicinity of the site were undertaken by Gabites Porter Consultants Ltd in February 2007, and we have extracted supplementary traffic flow data from the New Zealand Transport Agency's Crash Analysis System (CAS). These are shown in **Figure 1**, with the volumes shown being the two-way daily flows.

It can be seen that the volumes are very light. Typically a road carries no more than 15% of its daily volume during the busiest hours, meaning that in this particular area there is no more than one vehicle movement every 30 seconds, and less than this over the majority of the network.

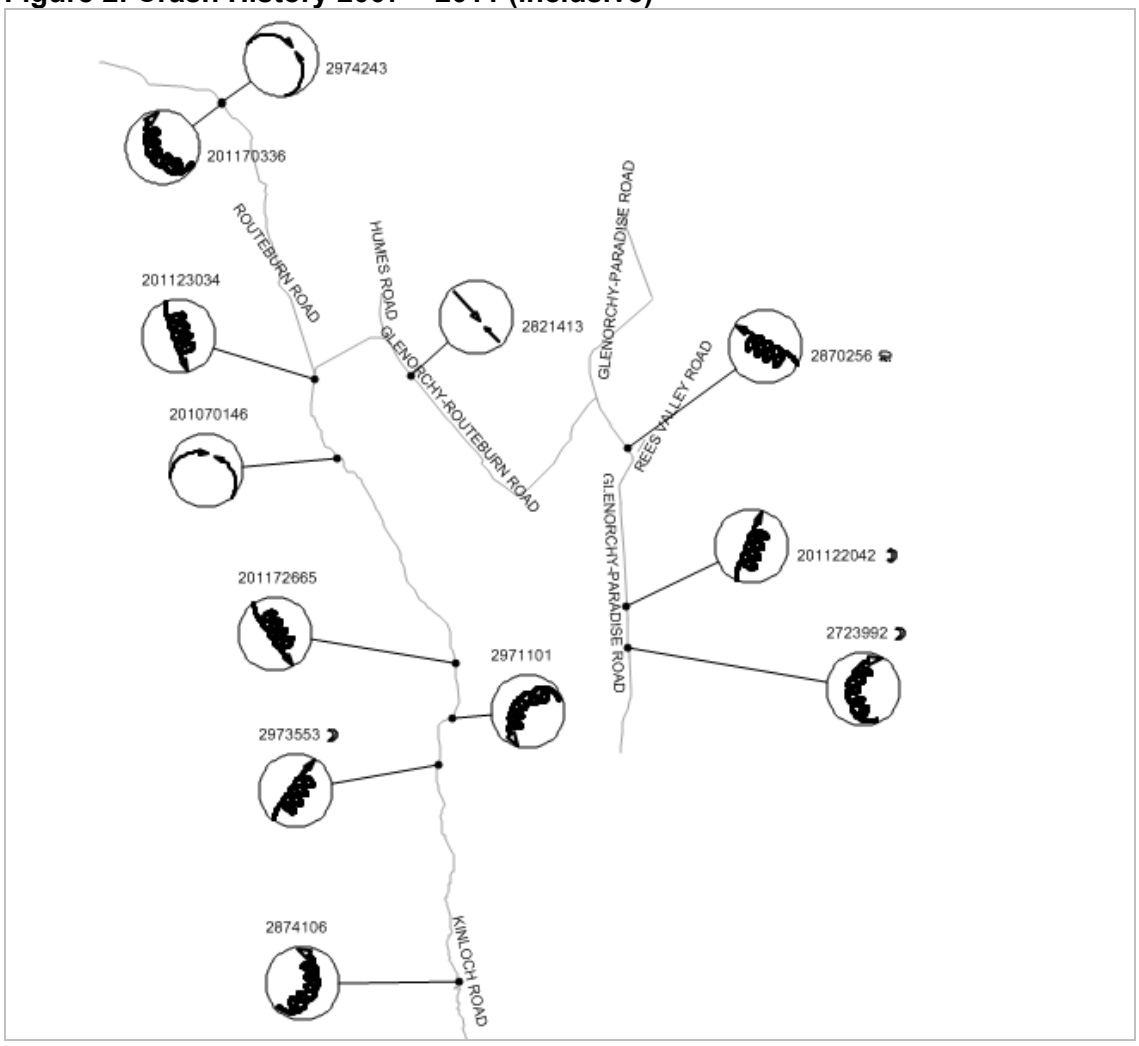
Figure 1: Daily Traffic Flows in the Vicinity of the Site



Road Safety

Crash history for the last five years (2007 – 2011 inclusive) has been extracted from CAS. During this period six crashes were recorded along the route from Glenorchy to the northern end of Routeburn Road including three injury crashes, however only two of these occurred on Routeburn Road itself and neither of these resulted in injuries. One accident occurred when a new driver lost control of their vehicle while negotiating a curve in the road. The other accident occurred when a driver crossed the road into the path of a vehicle coming in the opposite direction.

Figure 2: Crash History 2007 – 2011 (inclusive)



Current Formation of Routeburn Road

Drawing 4012-A (Glenorchy/Routeburn Junction to National Park Boundary') attached to this letter shows the horizontal alignment of Routeburn Road and typical details of existing carriageway widths. These vary between 4.0m (at the single lane Upper Kowhai No 2 bridge) and 6.2m, but generally the width is appropriate for two light vehicles to pass each other slowly and with care. The road is unsealed over the majority of its length, other than for a short section on the immediate approach to its intersection with Glenorchy Routeburn Road and Kinloch Road.

Photograph 1: Typical Cross-section of Routeburn Road

Photograph 2: Carriageway Width and Car Width

Photograph 3: Carriageway Width and Bus Width

QLDC's Development and Subdivision Engineering Standards (2005) set out width requirements for different road types within the district. Table 3.2(a) (Rural General, Rural Lifestyle and Rural Residential Zones – Geometric Roading Standards) of the standards requires a carriageway width of 6.25 m for a two lane public Local Road in a rural area that experiences flows of less than 250 vehicles per day. Note 3 at the bottom of Table 3.2(a) states that "*For single lane roads passing bays are required at a maximum of 100 metre spacing*". Additionally, the standards require that the carriageway is sealed.

Based upon our observations on site, the carriageway is not constructed to this standard being of a lesser width and unsealed. With regard to the latter, Mr Wardill's report to the Council's Infrastructure Services Committee highlighted that a seal extension to the road was proposed. From subsequent discussions however, we understand that this was an error and that no seal extension is in fact proposed.

Anticipated Future Traffic Demand

TPL states that *"additional traffic movements created by the project will be 60 vehicles per day (vpd) (30 in 30 out) on average and 80vpd (40 in 40 out) during peak periods in addition to the Average Daily Traffic (ADT) of 150 vpd on Routeburn Road. This equates to an average of four buses per hour or six buses during peak time"*[1].

Overview of Likely Traffic Effects

The increase in heavy vehicles of up to 80 bus trips is a large percentage difference, but overall represents a small increase in numbers of vehicles and can easily be accommodated on the road network without any change in the level of service provided by the road.

[1] TPL Conclusions page 15

By way of example, we have undertaken a calculation to illustrate the likelihood of two vehicles travelling in opposite directions meeting one another. Assuming an existing 15 vehicles travel north and existing 15 travel south per hour and that the road has a single lane only over a distance of 300m, 1 in every 11 vehicles would encounter another on that section of road. The additional 3 vehicles in each direction that would arise from the proposal results in this changing to 1 in every 10 vehicles encountering another. In our view this is not a significant change.

Design of Roading Improvements

Initially, we evaluated the QLDC Development and Subdivision Engineering Standards (2005). Based upon Table 3.2(a) it is clear that if the carriageway was already constructed to the Council's standards, that is, 6.25m wide and sealed, the traffic associated with the proposed development would not be sufficient to justify any improvement scheme. In essence, the standards indicate that a widening would only be required if more than 250 vehicles per day are carried and this threshold will not be exceeded by the proposed development. Moreover, the widening of the traffic lanes which is required is minor (an overall extension of just 0.25m). Further, there is no record of any safety-related issues arising on Routeburn Road, as might be expected if the carriageway width was deficient. Simply speaking, on that basis, we are of the view that a scheme to improve the road to Council's standards is not justified as a part of this proposal.

However, the presence of a greater proportion of heavy vehicles on the road will serve to reduce the amount of locations where one vehicle can pass another. Accordingly, we consider that there is merit in undertaking some improvement measures to widen the carriageway in the more constrained locations. We have therefore devised a scheme whereby as far as possible the present single-lane arrangement of the carriageway is preserved but some widening is provided to enable vehicles to pass. Drawing 4012-B ('Indicative Works National Park Boundary to Tunnel Entrance') shows the horizontal alignment of the road, together with the proposed type of carriageway width. Those cross-sections are shown in detail on Figure 4012-D ('Road Cross Sections at Improvement Locations').

The Queenstown Lakes District Plan defines a 'design' car as being 1.88m wide, and under current legislation, the maximum width of any vehicle is 2.5m (and typically tour coaches are of this width). Accordingly, we have proposed that the carriageway of Routeburn Road is constructed to provide one of two widths, either 3.6m or 5.6m. A width of 3.6m is sufficient to comfortably accommodate a coach and it is also sufficient for one car to pass another provided that they are travelling very slowly and that one car mounts the adjacent grassed verge. A width of 5.6m is suitable for one coach to pass another, again travelling slowly, and with a 600mm separation between them. These widths are consistent with the findings of Hutchison and Major, and TPL.

At this stage we have not formed a view on which side of the road any widening should be constructed. In common with all roading schemes, the optimum design is a balance of various factors which in this case will also importantly include minimising the environmental footprint of the road. Accordingly we suggest that this is undertaken once full topographic details of the existing road alignment are available, together with the locations of proximate trees. A further factor in this instance will be that the locations of the passing places will determine which vehicle stream 'gives way' to the other. We consider there is merit in ensuring that the two are as similar as possible (that is, the number of occasions when northbound vehicles 'give way' to southbound vehicles is about the same as the number of occasions when southbound vehicles 'give way' to northbound vehicles). To give one direction priority over the other over the whole length of the route would in our view have the potential to create driver

frustration, with possible resultant increased safety risks. Our conclusion in this regard is different to that of TPL.

With regard to the road surface, we note that Council's standards require sealing once more than 5 or more lots are served. Assuming each lot contains a residential property, this indicates that sealing is required at around a traffic volume of 30 vehicle movements per day, whereas Routeburn Road already carries around four times as much traffic as this. However this situation is common within the District and there are numerous other roads which carry such volumes. Given this situation, we consider it would be appropriate to maintain the unsealed nature of the road. Note 6 to Table 3.2(a) of the Council standards allows for this to occur, provided that the Council's consent is obtained. Irrespective of the surfacing however, the increased proportion of heavy vehicles is likely to lead to an increased requirement for maintenance both of the surface and also of the road structure itself.

Drawing 4012-C ('Long Section National Park Boundary to Tunnel Entrance') shows the vertical alignment of the carriageway. There are four locations where we consider that there would be benefits in removing crest curves in order to improve forward sight distances for drivers, as shown on the plan.

Conclusions

Routeburn Road does not currently meet Council's standards, but our assessment shows that it operates with a high level of service and there are no evident road safety issues. Moreover, if the Council's standards were to be applied, the same cross-section of carriageway is appropriate for both the prevailing traffic volumes and those which would occur under the proposal. Accordingly we do not consider that there is a requirement to upgrade the road to meet Council's standards as part of this development proposal.

However, given that the proposal gives rise to heavy (and wide) vehicles, in our view there should be some easing of the more constrained sections of carriageway to provide a greater width while endeavouring to maintain the existing single lane nature of the road over as much of the length as possible.

We trust that the above suitably addresses the potential roading upgrades but please do not hesitate to contact us if you have any queries or require any further information.

Regards
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