

BEFORE THE DUNEDIN CITY COUNCIL

UNDER

the Resource Management Act
1991

IN THE MATTER

an application for resource consent
of SUB-2016-90 and LUC-2016-
459

BY

DIANNE REID

Applicant

BRIEF OF EVIDENCE OF ANDREW DAVID CARR

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Introduction

1. My full name is Andrew (Andy) David Carr.
2. I am a Chartered Professional Engineer and an International Professional Engineer (New Zealand section of the register). I hold a Masters degree in Transport Engineering and Operations and also a Masters degree in Business Administration.
3. I am a member of the national committee of the Resource Management Law Association and a past Chair of the Canterbury branch of the organisation. I am also a Member of the Institution of Professional Engineers New Zealand, and an Associate Member of the New Zealand Planning Institute.
4. I have more than 27 years' experience in traffic engineering, over which time I have been responsible for investigating and evaluating the traffic and transportation impacts of a wide range of land use developments, both in New Zealand and the United Kingdom.
5. I am presently a director of Carriageway Consulting Ltd, a specialist traffic engineering and transport planning consultancy which I founded in early 2014. My role primarily involves undertaking and reviewing traffic analyses for both resource consent applications and proposed plan changes for a variety of different development types, for both local authorities and private organisations. I am also a Hearings Commissioner and have acted in that role for Greater Wellington Regional Council, Ashburton District Council, Waimakariri District Council and Christchurch City Council.
6. Prior to forming Carriageway Consulting Ltd I was employed by traffic engineering consultancies where I had senior roles in developing the business, undertaking technical work and supervising project teams primarily within the South Island.
7. I have carried out numerous commissions which have involved assessing the traffic and transportation effects of small subdivisions and in particular the safety-related issues regarding the provision of new vehicle crossings. In respect of vehicle crossings, past projects have ranged from assessing private driveways to residential lots, to major private driveways serving unit-type developments, to public vehicle crossings to supermarkets and other commercial premises.
8. I have carried out transportation-related commissions for a variety of new developments in the Dunedin area for more than 12 years.
9. As a result of my experience, I consider that I am fully familiar with the particular traffic-related issues associated with the development of sites of the nature proposed.
10. I have read the Code of Conduct for Expert Witnesses in the Environment Court Consolidated Practice Note 2014. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of Evidence

11. I have been asked by counsel for Ms Dianne Reid to evaluate and assess the transportation aspects of the s42A report of Ms Lianne Darby, a planner with Dunedin City Council. In particular, I have been asked to comment on the matter of the sight distances at the proposed vehicle crossings.
12. In order to do this, I have:
 - (a) Reviewed the report of Ms Darby;
 - (b) Spoken with Mr Fisher, the Council's transport planner; and
 - (c) Revisited the site to check sight distance and vehicle speed measurements.
13. I have also been asked to consider the comments made by submitters in respect of traffic and transportation matters.

Background

14. I have been involved with this project since January 2016. At that time, I visited the site to review the locations of the then-proposed vehicle crossings with a particular emphasis on ensuring that adequate sight distances were provided at each. I produced a letter (dated 20 February 2016) that addressed this.
15. I have not repeated the full text of this analysis within my evidence but in brief:
 - (a) I measured the speeds of vehicles on Saddle Hill Road as 60km/h, but based on my own driving of the route, considered that a speed environment of 70km/h was more plausible;
 - (b) Since the operative Dunedin City Plan does not include any requirement to provide sight distances at private driveways, I used the emerging second generation District Plan to determine that a sight distance of 92m was appropriate for the prevailing traffic speeds; and
 - (c) Based on this, determined that the proposed driveway locations were appropriate for Lots 1 and 4 (the eastern and western lots respectively), but that minor relocations of the driveways were required for Lots 2 and 3 (the centre-east and centre-west lots respectively).
16. Since that time, the Council's transport planner, Mr Fisher, has reviewed the driveway locations and has reached an alternative view.
17. As set out in the s42A report (paragraph 100 onwards) the Council holds data for a speed survey undertaken in 2014 around 120m to the east of the eastern boundary of the application site, which shows an operating speed of 79km/h. Mr Fisher considers that such a speed is also possible past the application site. He therefore concludes that increased sight distances are required at the vehicle crossings to ensure that they will operate safely.

Speed Environment

18. In view of Mr Fisher's comments regarding the speed environment, I visited the site in January 2017 to obtain additional measurements of speeds to supplement the earlier observations. However, due to the low volume carried by the road, I was only able to collect a further four measurements. This data supported my earlier views of the prevailing speeds, but it remains a small sample and in my view is unlikely to be helpful in resolving the differences between myself and Mr Fisher.
19. While on site, I reviewed the location where the Council's speed data was collected. The section of road that was surveyed has an almost straight horizontal alignment over a length of 300m, and has a gentle and consistent gradient. By way of comparison, Saddle Hill Road adjacent to the site has three horizontal curves (as discussed further below), and a series of vertical crest and sag curves. In my experience, a road geometry with a greater number of curves will result in drivers travelling more slowly than on a road with a straighter alignment.
20. Accordingly, I do not consider that the recorded speed on Saddle Hill Road to the east of the site is likely to be representative of the speeds at the site frontage. Rather, I remain of the view that Saddle Hill Road adjacent to the site will have slower speeds than further to the east due to the different geometry.
21. In addition to the difference in geometry, there is presently a 55km/h advisory speed limit at the curve towards the eastern boundary of the application site. This means that a proportion (but not all) of drivers will slow on the approaches to the curve, and therefore will be travelling more slowly in the vicinity of the eastern parts of the site.
22. There is also a curve towards the western boundary of the site. This does not have any advisory speed limit posted. However the curve radius is in the order of 120m, compared to a curve radius of 170m at the easternmost curve. In other words, the western curve is tighter than the eastern curve, meaning that vehicles must slow to a greater extent. Accordingly, in my view drivers in the vicinity of the western parts of the site will also be travelling more slowly.
23. While these factors will, in my view, result in a lower speed environment, I consider that the low traffic volumes presently carried by this section of Saddle Hill Road mean that an automatic traffic count adjacent to the site itself will be required to resolve the difference in opinions between myself and Mr Fisher. Unfortunately, within the timeframes available, it has not been possible to arrange for a counter to be set out, collected, and the results processed.
24. Mr Fisher has kindly made the data from the Council's survey available to me. For completeness, I have reviewed this and confirm the calculation of the observed 85th percentile speed (that is, the speed that 85% of drivers travel at or below) as 79km/h.
25. In summary then, I remain of the opinion that the speed environment on the section of Saddle Hill adjacent to the site is in the order of 70km/h. The Council's data was, in my view, collected on a section of road that does not have the same physical characteristics as the section of road onto which the application site has frontage. Given this

difference in geometry, I consider that the vehicle speeds recorded by the Council (an 85th percentile speed of 79km/h) will be higher than those past the application site. However this also then means that any design or layouts for the application site that are based on the higher of the two values represent the 'worst case' scenario and therefore will be robust.

Sight Distances and Vehicle Crossing Locations

26. Since myself and Mr Fisher do not agree on the speed environment, I have adopted a slightly different approach to that set out in my earlier letter when considering the vehicle crossing locations.
27. For clarity, my earlier comments regarding vehicle crossing locations remain current and valid for a speed environment of 70km/h. However, I have reviewed the locations of the vehicle crossings in the event that the operating speed was to be 80km/h. Using the same approach of determining the appropriate sight distances using the second generation District Plan, I conclude that for an operating speed of 80km/h, sight distances of 114m are appropriate.
28. I have then considered the vehicle crossing locations, and identified whether it is possible to locate a crossing to each lot such that the 114m sight distance required for 80km/h is achieved.
29. At Lot 1 (the westernmost lot), I noted in my earlier letter (dated 20 February 2016) that the sight distance towards the left (west) was limited by the boundary of a paddock, but that 145m sight distance was available towards the right (east). Relocating the vehicle crossing from the current location by 4m towards the west means that the sight distance towards the west increases to 114m, and remains well in excess of this towards the east.
30. At Lot 3 (the centre-east lot), the sight distance towards the west is limited by the horizontal and vertical curve in Saddle Hill Road at Sproull Drive. However, locating the vehicle crossing at the eastern boundary of the proposed lot means that a sight distance of 114m is provided towards the left (west) while the sight distance towards the right (east) remains in excess of 130m.
31. In passing, the location of this proposed vehicle crossing would mean that it would be directly opposite the driveway for 430 Saddle Hill Road and thus the sight distances provided at both are almost identical. Having reviewed the accident record at this location, the existing driveway for 430 Saddle Hill Road appears to operate safely.
32. At Lot 4 (the easternmost lot), the sight distance towards the right (east) is presently 105m but 150m is provided towards the left (west). Relocating this vehicle crossing by 9m to the west will therefore achieve the appropriate sight distance. In practice, any location between the western lot boundary and a point 9m west of the currently proposed location will achieve the relevant sight distances in both directions.
33. For Lot 2 (the centre-west lot), the limitations on the sight distances are more significant. There is not only the horizontal curve associated with the Saddle Hill Road / Sproull Drive intersection, but also a crest

curve in this location also. Further to the west, Saddle Hill Road curves northwards which also limits sight distances in this direction.

34. Based on my site visit, I have not been able to identify a location on the frontage of Lot 2 where a vehicle crossing could be sited and achieve a sight distance of 114m in each direction. From site measurements, locating the driveway at the crest curve just west of Sproull Drive means that more than 114m is provided to the west and 90m is provided to the east (that is, the sight distance requirement is met in one direction).

Proposed Approach

35. My analyses show that when allowing for an operating speed of 70km/h on Saddle Hill Road, appropriate sight distances can be provided at each of the four proposed lots. Allowing for an operating speed of 80km/h means that the appropriate sight distances can be provided at three of the proposed lots
36. Since there is insufficient data to resolve the difference of opinions regarding the operating speeds, in my view it is reasonable to adopt a cautious view and at this stage assume the higher operating speed prevails. Accordingly, in my view, the vehicle crossings should be relocated as described above to achieve the appropriate sight distances for 80km/h. For clarity, this would preclude any access being formed directly onto the road from Lot 2, and hence access would need to be achieved via a right-of-way or similar across one of the neighbouring lots.
37. With such an arrangement in place, I conclude that the three remaining vehicle crossings would meet the Council's expectations.
38. However I also consider that it is important to recognise that these locations are based upon a conservative assessment of vehicle speeds. As a result, I consider that there should be specific provision made to facilitate the vehicle crossings being moved in future (and a direct access being formed from Lot 2) *provided that* the speed environment in that location is confirmed by a speed survey.
39. I consider that this can be addressed via a condition of consent, such that:
 - (a) Vehicle crossings to Lots 1, 3 and 4 will be constructed in accordance with the approved plans.
 - (b) No vehicle crossing will be provided to Saddle Hill Road from Lot 2.
 - (c) Vehicle crossings in other locations, or onto Saddle Hill Road from Lot 2, are not to be constructed other than where it can be demonstrated that appropriate sight distances are achieved based on the measured operating speed of the road.
 - (d) Advice Note: the operating speed of the road is to be determined by an automatic traffic counter method, with the counter located in a position to be determined by a suitably qualified professional in consultation from the Council's transportation engineer.

40. I consider that this approach best achieves a balance between protecting the safety of the roading network through the provision of adequate sight distances, while recognising that there is a lack of agreement regarding the speed environment of Saddle Hill Road.

Submissions

41. I have read the key points of submissions received, as set out in Ms Darby's report, and identified those that relate to transportation matters. I consider that my evidence responds to these, but for completeness, have specifically addressed each matter raised below. For clarity, these are not listed in any particular order.

Submitter issue: Driveway locations are hazardous due to the road alignment

42. The driveway locations have been reassessed using the Council's information, and the proposed locations achieve the sight distances required for the Council's measured speeds further east. The way in which sight distances are measured takes into account the road alignment.

Submitter issue: The traffic speeds on Saddle Hill Road have been underestimated

43. When reassessing the driveway locations, I have used the Council's own speed information, which is 10km/h higher than I used previously. Although I consider that this represents a higher speed than occurs in practice, it means that the assessment is robust.

Submitter issue: The proposed driveway locations are not practical

44. The particular matter raised relates to the topography within the site, and the ability to form a driveway that meets appropriate standards. Under Standard AS/NZS2890.1:2004, a private driveway can have a gradient of 1 in 4, or steeper subject to a specific assessment (clause 2.6.2 of the Standard).
45. My assessment has been limited to considering the sight distances available at the vehicle crossings rather than the formation of the driveways within the site, but from my experience in the Queenstown Lakes District, steep driveways are not uncommon in topography such as this, and there are engineering solutions available which enable their construction.

Submitter issue: There is a high number of trucks using Saddle Hill Road

46. The Council's data obtained to the east of the application site shows that trucks form 12.7% of the total number of vehicles using Saddle Hill Road in that location, which equates to 17 such movements per day. The percentage of trucks is not unusual given that this is a rural road, and the number of such vehicles in absolute terms is low.
47. Trucks travel more slowly than light vehicles and truck drivers have better visibility than car drivers because they sit in a more elevated position. Accordingly, I do not consider that the presence of trucks on Saddle Hill Road has a material effect upon my analysis or conclusions regarding the vehicle crossings.

Submitter issue: Traffic volumes on Saddle Hill Road have been underestimated

48. The number of vehicles on Saddle Hill Road has been based upon the data collected by the Council. Importantly though, sight distances are not dependent upon the number of vehicles on the frontage road and thus even if the traffic flows were higher, there would be no effect on the sight distances required.

Submitter issue: More driveways would contribute to an already hazardous situation

49. Although the presence of driveways means that there is a greater theoretical potential for conflict between vehicles, the provision of adequate sight distance mitigates this through ensuring that drivers travelling along a road have appropriate visibility of drivers that are emerging from driveways, and vice versa.
50. In this case, I consider that the sight distances provided are appropriate for the vehicle speeds (at both 70km/h and 80km/h) and I therefore do not consider that the driveways will result in significant adverse road safety effects arising.

Summary and Conclusions

51. There remains a material difference between myself and the Council's transport planner Mr Fisher in respect of the prevailing traffic speeds on this section of Saddle Hill Road. While this is a matter that can be resolved through additional data collection, this could not be accomplished within the timeframes available.
52. Accordingly, I have recommended that at the present time, the proposed vehicle crossings are located in positions that meet the sight distances required under the vehicle operating speeds that Mr Fisher considers to occur on this section of road. Using this figure of 80km/h means that suitable sight distances can be achieved at Lots 1, 3 and 4, and in the case of Lot 2, a right-of-way via one of the neighbouring lots could be put in place.
53. However, to recognise that the operating speed may be lower (and in my opinion, *is* lower), I have also recommended that specific provision is made to allow vehicle crossings in other locations subject to a specific assessment of vehicle speeds and the provision of sight distances that are appropriate to those speeds.
54. Overall then, having reviewed the proposed location of the vehicle crossings, and subject to my comments above, I consider that the proposed subdivision can be supported from a road safety perspective and that there are no road safety reasons why consent could not be granted.

Andy Carr

26 January 2017