Before Central Otago District Council

Under	the Resource Management Act 1991 (the Act)
In the matter of	the requested change to the Central Otago District Council's Operative District Plan – Plan Change 13 (PC13)
and in the matter of	The New Zealand Transport Agency Submitter 254

Statement of Evidence of Matthew Charles Gatenby

Dated

16 May 2019

1 Qualifications and Experience

1.1 My full name is Matthew Charles Gatenby. I am a Principal Engineer Transportation in the Dunedin office for WSP Opus New Zealand.

1.2 I hold the qualifications of Master of Civil Engineering (Honours) from the University of Nottingham, UK. I am a member of Engineering New Zealand, and the Transportation sub-group.

1.3 I have over 23 years of transportation planning, traffic engineering and transport modelling experience. I have used my skills across projects in transport planning, development planning, traffic and revenue forecasting, public transport initiatives and road safety schemes. I have led teams on key projects across London and the wider UK, the Middle East, and North and South America.

1.4 My current role at WSP Opus involves maintaining a key technical role on a range of transportation planning projects in New Zealand and Australia, but most of my work concentrates on transportation projects in Queenstown, Dunedin and across Otago.

1.5 In relation to the Plan Change 13, I have been asked by the Transport Agency to provide evidence in relation to transportation matters. My evidence considers the traffic and transportation impacts of Plan Change 13, specifically where it impacts on the functionality, efficiency and safety of the State Highway network.

1.6 While this matter is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2014). I have complied with the Code in the preparation of this evidence, and will follow it when presenting evidence at the hearing.

1.7 Unless I state otherwise, my evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2 Scope of Evidence

2.1 My statement will address the following matters:

a The transport network within the locality of the proposed Plan Change 13 area (River Terrace).

b The Transportation Assessment (TA) associated with the River Terrace development.

c The operation of the State Highway 6/Sandflat Road intersection, and the effects that increased residential development as a result of Plan Change 13 could have on this.

2.2 I have read the Section 42A Planning Report (of W D Whitney) for CODC, and the Transportation Assessment and subsequent evidence provided by Mr Andy Carr for River Terrace Developments Limited. My evidence comments on relevant parts of their evidence where appropriate.

3 Executive Summary

3.1 SH6 Kawarau Gorge Road is an important transport link, providing the key route between Frankton/Queenstown and most of the rest of the South Island, Therefore, it is of utmost importance that this section of SH6 operates in an efficient and resilient state.

3.2 Plan Change 13 would result in a significant level of additional development related trips on the road network, the majority of which would be expected to access the State Highway at the SH6/Sandflat Road intersection.

3.3 The evidence of Mr Carr provides a prediction of the likely operational level of this intersection, for two differing trip distribution patterns:

a 60% traffic to/from Queenstown (original Transportation Assessment).

b 10% traffic to/from Queenstown (Annexure A of Mr Carr's evidence), as a sensitivity test based on the distribution used for the Wooing Tree Plan Change 12 request. Other revisions to the original assumptions in regard to trip generation and trip assignment were also made.

3.4 The results of the analysis of both sets of assumptions, show a significantly different level of operation of the SH6/Sandflat Road intersection. As such, there is some uncertainty over the layout improvements that are required at the intersection to result in satisfactory operation.

3.5 As proposed by Mr Carr, it would be sensible to amend proposed Rule 20.7.7(ii) to provide more flexibility in the potential layout design of any intersection improvements to mitigate the effect of traffic generated by the River Terrace development. Consequently, I consider that the change in Rule 20.7.7(ii) as suggested in paragraph 23 of Mr Carr's evidence to provide for more flexibility in

the intersection improvements required to mitigate the effects of the development should be incorporated into Section 20 of the District Plan.

3.6 A similar issue has been raised in Annexure A of Mr Carr's evidence, as regards the operation of the SH6/McNulty Road intersection. It is predicted that a satisfactory level of performance is not achieved for the right turn out of McNulty Road in both peak hours, for the sensitivity trip distrubtion. It is acknowledged that this sensitivity test does not represent the current view of the Plan Change proponents (which expects a majority of commuter trips to travel to/from Queenstown) – but was the accepted distribution for Plan Change 12. The operation of this intersection was not considered as part of the original Transportation Assessment.

3.7 It is considered that further analysis is required to determine more certainty over likely trip distribution patterns for development related trips, so as to ensure that the SH6/McNulty intersection can safely and efficiently accommodate these additional trips on the road network.

4 Strategic transport network in Cromwell

4.1 The main arterial roads that run through Cromwell are:

a State Highway 6 Kawarau Gorge Road (towards Queenstown)

b State Highway 6 Luggate-Cromwell Road (towards Wanaka)

c State Highway 8B (linking SH6 and SH8)

d State Highway 8 Cromwell-Clyde Road (towards Alexandra)

e State Highway 8 Tarras-Cromwell Road (towards Omarama)

4.2 In terms of the River Terrace development, SH6 Kawarau Gorge Road is likely to be affected the most of these strategic roads, with direct access from the development site predominantly via the existing intersection at SH6/Sandflat Road, and to a lesser extent SH6/Pearson Road.

4.3 SH6 Kawarau Gorge Road is classified as a Regional road by the Transport Agency One Network Road Classification ('**ONRC**'), which indicates that:[1]

> "the road makes a major contribution to the social and economic wellbeing of a region, and connect to significant places, industries,

[1] [http://www.nzta.govt.nz/assets/Road-Efficiency-Group/docs/functional-classification.pdf]

ports or airports. They are also major connectors between regions and in urban areas may have substantial passenger transport movements"

4.4 As such, the SH6 Kawarau Gorge Road caters for a range of vehicle classifications and types:

a Heavy goods vehicle movements, in particular from Port Otago, Lyttelton and freight depots in Cromwell, to Queenstown, Frankton and beyond;

b Tourist trips throughout the area, travelling to and from Queenstown, from Cromwell and beyond;

c Some level of commuter trips to and from the main employment centres of Frankton and Queenstown; and

d Local work-related trips, largely related to the agriculture sector.

4.5 Consequently, SH6 is an important transport link, providing the key route between Frankton/Queenstown and most of the rest of the South Island, Therefore, it is of utmost importance for this section of SH6 to operate in an efficient and resilient state.

4.6 Kawarau Gorge Road itself is generally a single lane road in each direction, although local widening is provided on the approaches to and exits from some intersections.

4.7 In the vicinity of the River Terrace development, the following intersections are located on SH6 Kawarau Gorge Road, and are likely to attract development related trips:

a Pearson Road/Ripponvale Road – conventional priority controlled T-intersection with channelised right turn facility;

b Sandflat Road - conventional priority controlled T- intersection with channelised right turn facility

c McNulty Road – conventional priority controlled T- intersection with channelised right turn facility; and

d SH8B –priority controlled T- intersection with channelised right turn facility, median separated left turn lane into SH8B, and separate left and right turn lanes on the SH8B approach.

4.8 Posted speed limits through the Kawarau Gorge Road section are 100kph to a point around 300m southwest of the SH6/SH8B intersection. To the northeast of this section, an 80kph speed limit is in force, which continues along the whole section of SH8B.

4.9 The Transport Agency's Queenstown to Rangitata Corridor Management Plan provides that the section of SH6 Kawarau Gorge Road through the area is characterised by having a Medium-Low (4-star) collective and personal risk rating. The desired customer level of service for Regional roads is Medium (3-star), and so the provision in this section of route is satisfactory in this regard.

5 Transportation Assessment

5.1 A Transportation Assessment **("TA")** was originally provided in support of the Plan Change by Carriageway Consulting, dated 14 December 2017, as undertaken by Andy Carr. Stantec undertook a review of this TA, dated 14 February 2019, and is included as Appendix A of the Section 42A Report. Subsequently, the evidence of Mr Carr for River Terrace Developments, dated 22 April 2019, includes a response to the Stantec review, as an Annexure A to his evidence.

5.2 The Stantec review highlighted a number of issues that required further clarification within the original TA. These included:

a Use of old or unreliable traffic counts for assessment purposes

b Lack of clarity on background traffic growth assumptions

c Concerns over trip generation assumptions

d Little consideration of alternative local road routes for trips to and from the development to and from Cromwell

e Little justification for trip distribution assumptions

f Little consideration of other modes, and the ability to reduce single occupancy private car trips generated by the development

5.3 The evidence and supporting Annexure A of Mr Carr directly address these issues.

5.4 Of particular interest to the operation of the State Highway network, are the assumptions relating to trip distribution. These assumptions are related to the

forecast assignment of trips onto the network, and in particular the balance of trips to/from Queenstown (i.e. to/from the west), longer distance trips to/from Wanaka and Alexandra (i.e. to the north and east), and shorter trips to/from Cromwell (via the State Highway and local roads).

5.5 In the original TA, the trip distribution was heavily weighted towards trips to and from Queenstown. Such a distribution is justified within the evidence of Mr Carr, paragraph 6.2.7 of Annexure A:

> "…it should also be noted that the distribution in the Transportation Assessment is not just based on existing patterns but also patterns which may emerge in future. In this regard, the CODC Infrastructure Strategy sets out that "Central Otago's growth is influenced largely by increasing demand in the Queenstown area, and the relative affordability of property in Central Otago relative to Queenstown. In addition to the growth from Queenstown, there is a strong local economy with many people moving to the district for work and business opportunities. The influence of demand from the Queenstown Lakes area is reflected in terms of the geographic spread of population growth in Central Otago. The fastest rate of growth has been experienced in the Cromwell ward…" (page 12). It is therefore not unreasonable in our view to anticipate a strong movement to/from Queenstown, rather than the low proportion suggested by Stantec. This is also what the plan change proponents expect."

5.6 Notwithstanding the above, the evidence then includes a reworking of the analysis with a revised trip distribution (plus revision of some other assumptions), using the distribution accepted by CODC for the Wooing Tree Plan Change 12 application.

5.7 The table below (also included in the evidence of Mr Carr) shows the difference between these assumptions, and those suggested by Stantec in the previous review of the TA.

Destination	TA	Stantec	Wooing Tree
Cromwell (local)	25%	64%	75%
Queenstown	60%	9%	10%
Wanaka	7.5%	3%	5%
Alexandra/Omarama	7.5%	6%	10%
Dunstan Area Unit	-	18%	-

5.8 Whilst the external trips to the north, east and south are all relatively minor in all three sets of assumptions, there is a large difference between the allocation of

trips to Queenstown and Cromwell, between the original TA and Wooing Tree/Stantec assumptions.

5.9 It should also be noted that the updated analysis also includes some changes in the assumptions of trip re-assignment onto routes to and from Cromwell, with the updated analysis assuming that the 75% split uses three routes:

a 30% via Bannockburn Road

b 35% via McNulty Road

c 10% via SH8B

5.10 This is different from the original TA, which included a 50/50 split between McNulty Road and SH8B routes (with zero allocated to Bannockburn Road).

5.11 Whilst it is considered that the undertaking of sensitivity tests provides valuable analysis to the potential outcomes under different assumptions (and the consideration of uncertainty), the significant difference presented in the analysis between the TA and subsequent evidence gives concern that the level of uncertainty is difficult to manage. This level of uncertainty, in both trip distribution and trip assignment, represents a significant risk to the planning of road infrastructure and the appropriateness of particular physical improvement works, particularly when viewed for the specific example of the SH6/Sandflat Road intersection.

5.12 This is considered in more detail in section 6 below.

6 State Highway 6/Sandflat Road intersection improvements

6.1 SH6/Sandflat Road provides the most direct access from the proposed development site onto the strategic road network, as well as the most direct/quickest route for a proportion of local trips to and from Cromwell (depending on the specific origin/destination location).

6.2 As set out in Section 5 above, there is a significant difference in the trip distribution of development related trips between the original TA and Annexure A of Mr Carr's evidence. Consequently, this leads to a significantly different assignment of trips onto the network between the two cases, particularly at the SH6/Sandflat Road intersection.

6.3 The table below sets out the resultant forecast flows at future year 2029[2] in these two scenarios, in both the AM and PM peak hours (in vehicles per hour for each turning movement). It should be noted that the two datasets also include some other assumption differentials such as updated background turning movements (from updated traffic counts), revised trip generation rates and a difference in the allocation of trips between AM/PM peak versus interpeak periods – but these additional differences are relatively minor when compared against the difference in trip distribution assumptions.

Approach	Turn	AM Peak Hour		PM Peak Hour	
		TA	Annex A	TA	Annex A
SH6 East	Straight	112	131	423	475
	Right Turn	57	32	315	60
SH6 West	Straight	371	415	250	261
	Left Turn	42	128	217	309
Sandflat Road	Left Turn	417	61	179	46
	Right Turn	282	346	127	179
Total		**1,280**	**1,113**	**1,511**	**1,330**

As can be seen from the table above:

a Through traffic volumes on SH6 are generally higher in the updated assessment, demonstrating a previous underestimate of general traffic levels in the area

b There is a significant difference in the forecast turning volumes on the left and right turns out of Sandflat Road, directly due to the re-assignment in trip destination distribution from towards Queenstown in the original TA, to towards Cromwell (via SH6) in the updated analysis

c There is a significant difference in the forecast turning volumes on the right turns into Sandflat Road (and to a lesser extent the left turn in), again directly due to the re-assignment in trip destination distribution from origins in Queenstown in the original TA, to Cromwell (via SH6) in the updated analysis

d The total intersection volumes are around 12% lower in the revised assignment, largely due to the increase in local trips to/from Cromwell using

[2] Includes 10-years of 4.6% growth on background traffic levels

the Bannockburn Road route (and therefore less appearing on the State Highway)

6.4 Although the total intersection volumes are lower, the revised assignment does result in a higher level of trips on the right turn movement out of Sandflat Road. At a priority intersection of this type, this turning manoeuvre conflicts with (and yields to) three other movements – receiving the least priority of all movements at the intersection, and therefore is often the critical movement in terms of intersection performance.

6.5 The analysis provided in Annexure A of Mr Carr's evidence predicts a Level of Service (LOS) of E in both the AM and PM peak hour periods, with an average delay of 46 and 49 seconds respectively.

6.6 LOS is a concept used by traffic engineers and transport planners to objectively classify the extent of congestion on a roadway or at an intersection. LOS A represents largely free flow conditions and LOS F represents oversaturated conditions (i.e. where demand exceeds supply). At a priority controlled intersection, a Level of Service A to D is generally accepted as satisfactory performance, and so the revised analysis indicates that this level of operation is not met.

6.7 Mr Carr indicates that a relatively minor change in trip distribution to these assumptions would result in operation of this turn at Level of Service D, either due to an increase in trips to Queenstown, or trips to Cromwell using the local road network, or both. As set out in paragraph 6.2.27 of Mr Carr's evidence (Annexure A):

> "In practice, if there is a bias towards the direction of Cromwell rather than Queenstown, we expect that drivers turning east will simply find a route that is appropriate for them, and if they are not willing to wait in the peak hours, then this will make the Bannockburn Road route more popular. In the event that more vehicles turn towards Queenstown, then levels of service will improve commensurately."

6.8 Whilst this is the case, it again raises uncertainty over the form of intersection improvements that are required to accommodate development related trips on the network, and specifically at SH6/Sandflat Road.

6.9 In addition, the Transport Agency follow a Safe System approach to improving the operation of the road network – specifically to reduce deaths and serious injuries, proactively identify the highest road safety risks, and work to reduce or

eliminate them over the whole system. Consequently, any improvements to intersections on the State Highway should provide an optimum layout for both performance efficiency and road safety. The uncertainty over the likely distribution of trips from the development make a Safe System assessment of the optimum intersection layout problematic.

6.10 The Transport Agency has made a submission on Plan Change 13, and specifically the SH6/Sandflat Road intersection, with a suggested amendment to Rule 20.7.7(ii):

> "a) No more than 40 residential lots shall be created within the Resource Area until a median separated left-turn deceleration lane is constructed to the State Highway 6/Sandflat Road intersection to the NZ Transport Agency standards~~. In accordance with Austroads Guide to Road Design Part 4A ("Unsignalised and Signalised Intersections")~~"
>
> "b) No more than 300 residential lots shall be created within the Resource Area until a left-turn acceleration lane is constructed to the State Highway 6/Sandflat Road intersection to the NZ Transport Agency standards~~. In accordance with Austroads Guide to Road Design Part 4A ("Unsignalised and Signalised Intersections")~~"

6.11 Mr Carr's evidence directly references this request at paragraph 22 and 23:

> "NZTA also seeks to amend Rule 20.7.7(ii) such that it does not refer to the State Highway 6 / Sandflat Road intersection being upgraded in accordance with the Austroads Guides, but refers to NZTA standards instead. This is on the basis that it allows for a layout that meets the Agency's requirements at the time that the upgrade is justified"
>
> "I generally support the principle of the point that NZTA makes, but note that the suggested wording does not allow for a situation where the upgrades do not meet the Agency's requirements but the Agency itself is satisfied that the alternative solution will operate safety and efficiently. For this reason, I support in part the submission, but recommend that the wording is amended to "…the State Highway 6/Sandflat Road intersection to the NZ Transport Agency standards **or as otherwise agreed with the NZ Transport Agency"**

6.12 It is considered that given the uncertainties in the calculated traffic volumes highlighted in my evidence, which introduces difficulties in identifying specific physical improvements to the intersection, it would seem prudent to amend this Rule to provide more flexibility in the potential layout design of any intersection improvements to mitigate the effect of traffic generated by the River Terrace

development. **Subsequently, it is considered that the change in Rule 20.7.7(ii) as suggested by Mr Carr should be incorporated into Section 20 of the District Plan if the Plan Change were to be approved.**

6.13 Mr Carr's evidence (Annexure A) also includes analysis of the operation of the SH6/McNulty Road intersection, under the revised trip distribution assumptions. For the right turn out of McNulty Road, a Level of Service E is predicted in the AM peak hour, and LOS F in the PM peak hour – compared to LOS C without the additional development trips in both peak periods. This deterioration in performance is therefore due to additional development related movements at the intersection, which conflict with this right turn movement (even though no development related trips are expected to carry out this specific turn).

6.14 Whilst the reasoning set out in paragraph 6.2.27 of Mr Carr's evidence (Annexure A) that traffic could use alternative routes via local roads (Bannockburn Road or similar) to head east could also be applicable at the SH6/McNulty Road intersection, the composition of vehicles carrying out this turn at this intersection is likely to be different to those at SH6/Sandflat Road given the access to the Industrial Area (freight depots) on or around McNulty Road. It is not desirable that such movements re-assign onto local roads.

6.15 Additionally, paragraph 6.2.29 of Mr Carr's evidence (Annexure A) presents the results of a further sensitivity to determine the trip distribution pattern which results in a Level of Service D (or A to C) on this critical right turn movement – which concludes that this is achieved if the proportion of trips from the development to/from Queenstown is 35% or above. No discussion on potential mitigation measures for this intersection have been put forward within Mr Carr's evidence, should the trip distribution be less heavily weighted towards trips to Queenstown.

6.16 The variation in the forecasted trip distribution of development traffic results in considerable uncertainty over predicting requirements for intersection improvements at SH6/McNulty Road. It is considered that additional analysis needs to be provided for this intersection, to provide more certainty on whether mitigation measures are required, and the likely form such measures would take.

7 Conclusions

7.1 The River Terrace development (Plan Change 13) would result in additional trips on the road network. In terms of the State Highway network, the SH6/Sandflat Road intersection provides the most direct access route to and from the

development onto the strategic road network, for routes to all destinations via SH6, SH8B and SH8.

7.2 Sensitivity tests have been carried out by Mr Carr based on differing trip distribution patterns, of either the majority of trips travelling to/from Queenstown, or the majority of trips travelling to Cromwell. The results show the performance of the SH6/Sandflat Road intersection is sensitive to such trip pattern changes, particularly with a view to determining the optimum intersection improvements.

7.3 As proposed by Mr Carr, it would be sensible to amend Rule 20.7.7(ii) to provide more flexibility in the potential layout design of any intersection improvements to mitigate the effect of traffic generated by the River Terrace development. Subsequently, it is considered that the change in Rule 20.7.7(ii) as suggested by Mr Carr should be incorporated into Section 20 of the District Plan if the Plan Change were to be approved.

7.4 The analysis also indicates that if the trip distribution assumptions are more heavily weighted towards Cromwell and the east (rather than Queenstown), the performance of the SH6/McNulty Road intersection is predicted to deteriorate, particularly for the right turn out of McNulty Road (LOS F in the PM peak hour). This is an additional concern – it is considered that further analysis should be carried out to determine more certainty over likely trip distribution patterns for development related trips, so as to ensure that the SH6/McNulty intersection can safely and efficiently accommodate the additional trips on the road network.