In the matter of	the Resource Management Act 1991 ("the Act")
and	of a submission by NZ Transport Agency (Waka Kotahi) (submitter 82, further submitter 36) on the Proposed Porirua District Plan

Statement of Evidence of

Robert Swears for Waka Kotahi - Transport Engineering

Date: 21 January 2022

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1 Qualifications and Experience

Credentials

1.1 My full name is Robert Clive Swears. I am employed as a Technical Principal - Road Safety and Traffic Engineering in the Hamilton Office of WSP New Zealand Limited. I have been in this role for approximately seven years.

1.2 My qualifications include a New Zealand Certificate in Engineering, a Bachelor of Engineering degree with Honours from the University of Canterbury, and a Master of Engineering Science degree (Transport) from the University of New South Wales. I am a Chartered Member of Engineering New Zealand (CMEngNZ), and a Member of the Engineering New Zealand (EngNZ) Transportation Group.

1.3 I am a Chartered Professional Engineer (CPEng) with an assessed practice field of "Transportation".

1.4 I have been carrying out professional engineering tasks related to the investigation, design, and construction of roading and highway projects for 32 years. I have worked on a variety of transportation projects throughout my career for various clients including public agencies (such as Waka Kotahi and local authorities) and, to a lesser extent, private individuals and / or organisations. I have been involved with the development of various proposed district plans and plan changes throughout my engineering career. Most recently, I provided extensive advice to Waka Kotahi in relation to their submissions, further submissions, and Environment Court appeals regarding the Thames Coromandel District Council Proposed District Plan (PDP).

1.5 I have been engaged by Waka Kotahi to prepare transportation engineering evidence in relation to the Waka Kotahi submission and further submissions regarding the Porirua City Council Proposed District Plan (the PDP). My evidence is complementary to the statements prepared by Claudia Jones and Luke Braithwaite for Waka Kotahi.

Code of Conduct

1.6 I confirm that I have read, and am familiar with, the Environment Court's Code of Conduct for expert witnesses and agree to abide by that Code. This evidence is within my area of expertise, except where I state that I am relying on the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2 Summary of Evidence

2.1 In summary, my evidence considers the following matters:

(i) Clarification of the definition for annual average daily traffic.

(ii) I have recommended dimensions for separating advertising signs from each other and advertising signs from safety critical components of the transport network. I also support a method for "measuring" the content of an advertising sign as set out in my evidence.

(iii) In relation to the reference sources to be used for designing facilities for walking and cycling, rather than referring to specific documents, I have suggested that the District Plan refers to specific authors with priority given to guidance produced by Porirua City Council.

(iv) In relation to parking and cycling widths I have suggested wider parallel parking spaces where there is not a cycle lane, and narrower parking spaces where there is a cycle lane.

(v) I have proposed specific parameters for making sight distance measurements.

(vi) I have recommended a definition for equivalent car movements as integer values of movements completed by a range of vehicle types. For example, that one truck movements should be regarded as three equivalent car movements.

(vii) I support the Waka Kotahi submission in relation to the equivalent car movement threshold above which analysis of transport engineering effects of a proposal is required.

3 Definitions

Annual Average Daily Traffic

3.1 Waka Kotahi submitted that the definition for "Annual Average Daily Traffic Movement" is changed to refer to "volume" instead of "movement". The section 42A report recommends accepting this change and I support this.

4 Signs

SIGN-S6

4.1 Waka Kotahi made a submission (82.201) in support of this standard and sought amendments in regard to signage compliance and restrictions where signs are visible from a state highway. The Section 42A Report recommends acceptance in part with regard to reflectivity, however, does not accept the other changes recommended by Waka Kotahi. I respond to the

transport related issues below (and note that the planning related issues are in the evidence of Mr Braithwaite).

SIGN-S6 Clauses 1 and 2

4.2 Waka Kotahi sought for these standards to apply to signs where they are "visible" from a state highway. The s42A report rejected Waka Kotahi's submission. I support the inclusion of standards applying to signs where they are "visible" from a state highway for the following reasons:

(i) Clause 1: If the arbitrary distance of a sign from a road is 100 m (for example) rather than 10 m (as applies under Clause 2), the likely effects of an animated sign will be less than those associated with the sign closer to the carriageway. However, I consider that Clause 1 of SIGN-S6 should focus on whether a sign is visible from a road rather than the distance the sign is from a road.

(ii) Several questions arise in relation to the manner in which the message associated with the sign is displayed. While we have an understanding of current methods used for displaying advertising messages, some of the methods presently used were not widely available 10 years ago (for example, digital billboards). Therefore, I consider it preferable for the PDP to be worded in a manner that will address the potential for new methods to be developed for creating signs.

(iii) Clause 2: Depending on the nature of the carriageway and the position of that carriageway within the road reserve boundaries, 10 m may be very close to the paths along which road users travel.

(iv) Clause 2: The 10 m distance included in the PDP is fairly arbitrary because, from an effects perspective, there would be very little difference if a sign is located 9.9 m from a carriageway when compared with 10.1 m from a carriageway. The key point that I consider the PDP needs to address is whether a sign is visible from a carriageway, rather than defining the minimum acceptable distance for a sign to be separated from the carriageway of a road.

4.3 As noted above, the distance a sign is located from the carriageway of a road is not my primary concern, but rather it is the visibility of that sign and its potential to distract road users that is important from a road safety and transport engineering perspective. However, I accept that distraction is subjective.

SIGN-S6 Clause 4

4.4 The fourth clause of SIGN-S6 requires that signs positioned at right angles to the road must be positioned no closer than the longitudinal separation distances specified in SIGN-Table 3. However, based on the wording of the PDP, if signs are not located at right angles to the road, it appears that the separation requirements of SIGN-Table 3 do not apply. Therefore, I recommend that the reference to right angles is removed.

4.5 The Waka Kotahi submission sought that the standard applies to signs where they are "visible" from the State highway (or located on a site adjoining or at right angles to the road). The Council Officer does not support the changes proposed by Waka Kotahi. With regard to separating advertising signs from traffic control devices, Waka Kotahi (2011b, pp. 5-5) states that

"To help avoid safety issues, advertising signs [… should be appropriately separated from the following]

- intersections
- permanent regulatory or warning signs
- curves (with chevron signing)
- pedestrian crossings."

4.6 In my opinion, the reference in the PDP to "any existing traffic sign" is too broad. The Waka Kotahi submission includes safety critical components of the transport network. Therefore, the PDP should be amended to incorporate the principles in the bullet points above and avoid the potential for more onerous conditions in the PDP than may be necessary.

4.7 Clause 4 also refers to "[…] any existing traffic sign […]", however, some traffic signs are more important from a road safety perspective than others. For example, a sign advising road users of the distance to an information centre is unlikely to have the same level of importance as a sign advising road users of the presence of a pedestrian crossing.

4.8 In order to avoid the potential for semantic arguments in relation to the precise angle at which a sign is oriented relative to the carriageway, and the naming conventions used to refer to particular signs, I consider the wording needs to be updated to relate to any sign "visible" from a State highway, delete reference to right angles, and refer to additional measurement points. The updated wording is contained in the evidence of Mr Braithwaite.

SIGN-S6 New clause proposed (content controls)

4.9 In its submission, Waka Kotahi proposed a new clause (Clause 6) to require "Any sign visible from a state highway shall contain a

maximum of six elements." The s42A report rejected the submission and notes the potential for ambiguity in relation to the term "element" which is not defined in the PDP.

4.10 I support the amendment proposed by Waka Kotahi, however, I agree with the Council Officer (Porirua City Council, 2021a, p. 35) that the term "element" is ambiguous.

4.11 The Traffic Control Devices Rule (Ministry of Transport, 2021), and the Traffic Control Devices Manual ((Waka Kotahi, 2011a) and (Waka Kotahi, 2011b)) describe limitations on the content of signs that are intended to be visible to road users. However, these documents do not define the term "element".

4.12 While the Waka Kotahi submission refers specifically to signs that are visible from a State highway, I do not consider that the designation of a given road is the factor that influences the potential for signs to adversely affect road user behaviour. But rather, it is the content of the sign and the potential for the sign to draw road user attention away from the driving task.

4.13 I am not aware of a simple method for limiting sign content based on the use of a term such as "element". However, I consider that any of the following definitions would be appropriate:

(i) A single word equals one element. The number of elements included in words joined together without spaces is equal to the number of words. For example, "wordsjoinedtogetherwithoutspaces" equals five elements.

(ii) An established simple single logo equals one element.

(iii) An image equals four elements.

4.14 By extension, as suggested by Mr Braithwaite, for interpretation purposes the District Plan could include wording which makes

clear that an element refers to each individual item which includes:

(i) Each word used = 1;

(ii) An email address = 1;

(iii) A website URL = 1

(iv) A phone number = 1

(v) An image = 4; and

(vi) A logo = 1.

4.15 While I am not advocating that such billboards should be visible from a State highway, the examples below explain the application of my proposal for defining elements.

4.16 Figure 1 comprises four elements; namely a portion of the McDonald's "M" logo and the words "on your left".

Figure 1: Advertising sign containing four elements (image source: (Famous Campaigns, 2022))

4.17 Figure 2 comprises 12 elements; namely the logo (1 element), the image of the product (4 elements), the words “build strong teeth” (3 elements), and the main image (4 elements).

Figure 2: Advertising sign containing 12 elements (HubSpot, 2022)

SIGN-Table 1: Freestanding sign separation distances

4.18 The s42A report (Porirua City Council, 2021a) rejects the Waka Kotahi submission to add the term “minimum” separation distances, and introduce a speed limit of 51-70 km to the table. I do not agree with the s42A report and consider Table 1 needs to be updated in order to be aligned with road safety and transport engineering approaches applied to signs that are visible from the road network.

4.19 The effect of a sign on a road user's ability to focus on the driving task is unlikely to be a function of whether a sign is freestanding.

4.20 Although Waka Kotahi has used the term "speed environment" in its submission, I consider it preferable that the term is not used in the PDP because of the potential for confusion. In my opinion, it would be better to refer to "speed limit" (as per the column heading of SIGN-Table 1) or to "operating speed", as defined in the Definitions section of the PDP.

4.21 I consider that there should be a minimum separation distance between any and all signs along the road. If signs are placed too close to one another road users will not have adequate time to consider (and respond) to the messages presented by the signs.

4.22 With regard to advertising signs Waka Kotahi (2011b) refers (Table 5.3; replicated below as Table 1) to minimum distances between adjacent roadside advertising signs. The table also refers to desirable spacings.

Table 1: Minimum distances between adjacent roadside advertising signs (source: (Waka Kotahi, 2011b))

Posted speed limit (km/h)	Minimum recommended spacing (m)	Desirable spacing (m)
50	50	80
60	55	100
70	60	150
80	70	200
100	80	250

4.23 It is important to have an understanding of the basis behind minimum distances. In transportation design and analysis we refer to reaction times, which typically range between 1.5 and 2.5 seconds depending on the environment in which a driver is travelling. Typically, as operating speeds increase driver reaction

times increase. Essentially, the SIGN-Table 1 separation distances provide little opportunity for road users to "recover" from their reaction to one advertising sign before needing to consider the next advertising sign. I consider that it would be better to adopt the desirable spacings described by Waka Kotahi (2011b) as shown above in Table 1 of this statement.

4.24 In my opinion, the table proposed in the PDP is too coarse in its level of detail and is focused on permitting distraction for road users.

4.25 The other matter that I consider needs to be addressed is the separation criteria that applies if adjacent signs are not freestanding. If the position of sign relative to a road user is identical for two cases, but in one case the sign is freestanding and any other case the sign is mounted on a building, I do not expect that the distractive effect on the road user would vary. Therefore, the separation criteria should be the same whether the sign is free-standing or not.

SIGN-Table 3: Separation distances from features of transport network

4.26 The Council Officer (Porirua City Council, 2021a) has rejected the Waka Kotahi submission in relation to separation distances between advertising signs and features on the transport network where there are higher demands on driver decision-making.

4.27 While I agree with the point made by the Council Officer (Porirua City Council, 2021a, p. 50) that sign separation distances may be difficult to achieve in some locations, I do not agree that the Waka Kotahi submission should be rejected. I consider it important that there is adequate separation between safety critical elements of the transport network and signage not

associated with those critical elements that may otherwise distract road users from the driving task.

4.28 If the SIGN-Table 3 separation distances described in the PDP are retained, and there is no change to SIGN-Table 1, the District Plan will indicate that the level of importance given to safety critical components of the road network, where speed limits are less than or equal to 70 km/h, will be no greater than the level of importance given to advertising signs.

4.29 I consider it reasonable for the separation distance between advertising signs and safety critical components of the transport network to be at least twice the minimum separation distance between advertising signs (refer to Table 1 of this statement). This approach is more conservative in some cases, and less conservative in others, than the approach described by Porirua City in SIGN-Table 3 of the PDP. The amended SIGN-Table 3 is contained in the evidence of Mr Braithwaite, based on this doubling approach.

4.30 Alternatively, to keep things simple, the separation distance could be taken as twice the numeric value of the speed limit of the road.

4.31 The table below illustrates the two approaches.

Speed limit of road (km/h)	Separation distance (m)	
	2 x SIGN-Table 1	2 x speed limit
0-50	100	100
60	110	120
70	120	140
80	140	160
>80	160	-
90	-	180
100	-	200

110	-	220

5 Infrastructure

INF-S23: Clause 5

5.1 The Waka Kotahi submission proposes that the fifth clause of INF-S23 is amended to remove reference to the Austroads Guide to Road Design Part 6A (Austroads, 2021b) and replace that with reference to the Waka Kotahi Cycling Network Guidance (CNG) (Waka Kotahi, 2022a) and "Pedestrian Planning [and] Design Guide (Waka Kotahi, 2009). The s42A report (Porirua City Council, 2021c) agrees in part and has recommended to retain reference to "[…] the Austroads Guide as well as referring to the Waka Kotahi Pedestrian Planning Design Guide."

5.2 I agree that is difficult to clearly reference the latest guidance available, therefore, if the PDP refers to a specific reference source (such as AGRD6A-17) the application of design guidance throughout the City may become out of date over the life of the District Plan. There are also issues with using the correct name of the relevant documents (for example, the correct name for the Waka Kotahi document is the "Pedestrian Planning and Design Guide") and the correct versions of documents (for example AGRD6A-17 is available as the second edition (Austroads, 2017b) and Edition 2.1 (Austroads, 2021b)).

5.3 Acknowledging that neither Waka Kotahi nor Porirua City Council can predict the names and dates that will be given to documents over the life of the District Plan, I consider that a clause such as the one below would address the referencing

difficulties and ensure that the design guidance applied is the most recent available:

5. Pedestrian walkways, cycleways and shared paths in a road must be designed in accordance with the most recent version of applicable walking and cycling design guidance. Priority of application of the guidance must be given firstly to guidance produced by Porirua City Council, then Waka Kotahi, and finally Austroads.

INF-Table 1 - Parking Width

5.4 The PDP as notified refers in INF-Table 1 to a parking width of 2.5 m for all zones listed in the table. While Waka Kotahi did not submit in relation to parking widths, the parking provision has an influence on cycle lane widths on which Waka Kotahi did submit.

5.5 The amended INF-Table 1 (Porirua City Council, 2021c, pp. 87-88) reduces the parking width from 2.5 m to 2.1 m for target operating speeds of 40 km/h and less. This approach is commensurate with the Austroads Geometric Design Guide (Austroads, 2021a) and the Australian Standard (Standards Australia, 2020) for on-street parking.

5.6 The Geometric Design Guide (Austroads, 2021a, p. 114) states "[…] parallel parking is best suited to roads with lower speed limits. Where the speed limit is 60 km/h or less, there should desirably be 0.5 m clearance from the nearest moving traffic lane. […]"

5.7 Figure 4.54 of the Guide indicates that for “normal conditions” the width of a parallel parking space should be 2.3 m, however, on a “restricted roadway”, the width can be decreased to 2.1 m. This appears to be the approach adopted by the Council Officer.

5.8 The amended INF-Table 1 (Porirua City Council, 2021c, pp. 87-88) addresses some of the matters regarding which Waka Kotahi

has raised concerns. This includes parking widths being reduced to 2.1 m for some roads. However, specific provision for cyclists has also been eliminated for some roads and cyclists are expected to share traffic lanes. While I do not consider shared facilities to be an issue where volumes of motor vehicles and cyclists are likely to be very low, I consider that as traffic volumes increase the carriageway width available for exclusive use by cyclists should also increase. This is particularly important for locations where the operating speeds of cyclists and motor vehicles are not similar.

5.9 The amended table has also removed reference to facilities for parking where the design speed is 80 km/h; that approach is aligned with Standards Australia (2020).

5.10 The amended table is more complex than the notified table and it appears that for some situations the widths provided for parking would be better assigned for cycling. Below I describe proposed trade-offs between the width available for parking and cycle lanes.

INF-Table 1 - Cycle Lane Width

5.11 I note the following points in relation to the provision of cycle lanes and to cycle lane widths:

(i) Austroads (2021b, p. 102) states "Bicycle lanes not preferred [where there is kerbside parking] due to door zone conflicts […]" [emphasis in original].

(ii) For operating speeds up to 50 km/h, bicycle lanes with no kerbside parking are most appropriate.

(iii) Bicycle lanes are not preferred where the vehicle operating speed is more than 50 km/h.

(iv) Waka Kotahi (Waka Kotahi, 2022a) includes the tables below in relation to cycle lane widths at locations without and with kerbside parking[1].

Table 2: Cycle lane widths next to kerb or road edge or between traffic lanes (source: (Waka Kotahi, 2022a))

	Cycle lane widths (m)		
Speed Limit (km/hour)	≤50	70	100
Desirable Minimum Width	1.6	1.9	2.5

Table 3: Cycle lane widths next to parallel parking (source: (Waka Kotahi, 2022a))

	Cycle Lane width		Parking width
Speed limit (km/hour)	≤50	70	2.0
Desirable minimum width	1.8	2.2	

5.12 I consider that the width criteria included in the PDP for cycle lanes should vary depending on the kerbside activity (parking versus no parking) and the operating speed of the road.

5.13 The amendments to INF-Table 1 increase cycle lane widths where these are required by the District Plan, however, the table

[1] https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/designing-a-cycle-facility/between-intersections/cycle-lanes/#cycle-lanes-next-to-parallel-parking

also indicates that preference should be given to the provision for parking ahead of provision for cyclists.

5.14 While the amended table includes increased widths (from 1.5 m to 1.8 m) for cycle lanes where these are provided, motor vehicles are given clear preference.

5.15 The original version of the table provided for cyclists for all road types and designs speeds ranging from 40 km/h to 80 km/h.

5.16 Both the original table and the amended table require that the minimum widths for traffic "[…] must provide unhindered vehicle access […]", However, the amended table requires that cyclists share the lane with motor vehicle traffic. As a result, cyclists that cannot travel at the speed of motor vehicle traffic, will hinder that traffic and in turn the requirements of the District Plan cannot be met.

5.17 Comparing the original table with the amended table I consider it reasonable for the PDP to permit the wider parallel parking spaces (2.5 m) where there is not a cycle lane, however, I also consider that the PDP should require narrower parking spaces (2.0 m) where there is a cycle lane.

5.18 This would highlight for the drivers of motor vehicles the potential presence of cyclists (where parallel parking spaces are marked) and provide cyclists with an additional margin of error,

where a cycle lane is not provided, so that some vehicle door opening would fall within the width of the parking space.

5.19 Additionally, I consider the table should be expanded to include a 60 km/h design speed (and possibly also a 70 km/h design speed).

INF-Figure 4 and INF-Table 5

5.20 I agree with the Council Officer (Porirua City Council, 2021c, p. 38) that INF-Table 5 (numbered as in the notified PDP) does not need to be subdivided into different road types. The time within which a vehicle can travel along a section of road is a function of the speed of the vehicle rather than a function of the hierarchy of the road on which that vehicle is travelling. Therefore, I agree that there only needs to be one set of Distance Y values.

5.21 I also agree that if the intersections illustrated in INF-Figure 4 are all T-junctions, as illustrated in Appendix A of the s42A Infrastructure Report (Porirua City Council, 2021c, p. 93), then it is not necessary to define which road at the intersection is the minor road and which is the major road. The key consideration is the position from which the sight distance observations are made.

5.22 However, neither the notified version of the PDP, nor the Officer recommendations appear to clarify the exact location from which sight distances should be measured. In my opinion, the matters that need to be addressed include the following:

(i) Although the proposed INF-Figure 6 (Porirua City Council, 2021c, p. 25) makes reference to an object height of 1.15 m and an observer height of 1.15 m, the PDP INF-Figure 4 does not define heights. The origin for the 1.15 m heights is unclear, however, I note that Austroads (Austroads, 2017a, p. 19) describes an observer height of 1.1 m and an object

height of 1.25 m. While I have not conducted any analysis, it appears the PDP heights will result in a more conservative outcome than the Austroads heights, however, in any case, I consider heights need to be defined for INF-Figure 4.

(ii) The observer position is consistently defined as a point 5 m back from the continuity line for the edgeline along the major road. However, for any intersections that do not have edgelines, the position from which the sight distance measurements should be taken is unclear. Similarly, if there are any roads in the district that have neither kerb lines nor edgelines, the position from which sight distance measurements should be taken is unclear. It would be useful for the amended INF-Figure 4 to include labels defining the edgelines and also to define the observer position for any intersections where there are no kerb lines and / or edgelines.

(iii) The amended INF-Table 5 recommended by the Council Officer includes provision for operating speeds up to 110km/h and describes the sight distance required from the minor road approach to a major road intersection. However, it appears that the sight distances included in the table are all based on a reaction time of 2.0 seconds. As noted in paragraph 4.23 of this statement, as design speeds increase and the character of a road places fewer demands on road users, reaction times tend to increase. In Table 4 below I have compared the amended PDP sight distances with the SISD (Safe Intersection Sight Distance) for cars described by Austroads (2017a, p. 20) for reaction times of 1.5, 2.0, and 2.5 seconds.

(iv) The table illustrates that in some cases the PDP sight distance requirements are conservative, while in others they are not conservative.

Table 4: Comparison between PDP and Austroads (2017a) sight distance requirements

Design speed (km/h)	PDP sight distance (m)	Austroads SISD (m) for stated reaction times (sec)		
		1.5 sec	2.0 sec	2.5 sec
≤40	75	67	73	-
41-50	100	90	97	-
51-60	125	114	123	-
61-70	155	141	151	-
71-80	185	170	181	-
81-90	215	201	214	226
91-100	250	234	248	262
101-110	285	-	285	300

(v) In order to maintain the conservative approach adopted in the PDP, I consider that for design speeds above 80 km/h it would be preferable to adopt the Austroads (2017a) sight distances associated with a 2.5 second reaction time. Alternatively, Austroads (2017a) Table 3.2 could be replicated in the PDP and any sight distance analysis should include justification of the basis on which a given reaction time has been adopted for a particular situation.

6 Transport

TR-Table 7

6.1 Waka Kotahi has submitted (and I agree) that the trip generation thresholds in TR-Table 7 are relatively high and are likely to result in more than minor adverse effects arising from

some developments whose scale falls below the thresholds described in the table.

6.2 The Waka Kotahi submission refers to "100 equivalent car movements" and in their assessment (paragraph 76) the Council Officer (Porirua City Council, 2021b, p. 12) also refers to "100 equivalent car movements". However, the recommendation in relation to the amended TR-Table 7 (which is renumbered as TR-Table 9) refers to "100 vehicle trips per day" for "Any activity accessing a national high-volume road or a regional road".

6.3 I have several concerns regarding the wording proposed by the Council Officer.

6.4 From a transport engineering perspective there is a significant difference between the effects created by small vehicles (cars) and those created by larger vehicles (trucks, and multi-unit heavy commercial vehicles (HCVs)). If thresholds are based only on vehicle numbers, the traffic-related effects of some land use activities will not be assessed because the volume falls under the given threshold.

6.5 In my opinion, the PDP should base trip generation thresholds on equivalent car movements (ECMs, sometimes referred to as equivalent car units (ECUs)) which is a theoretical basis by which heavy vehicles are regarded as equivalent to a specified number of light vehicles. Such an approach makes the wording of the District Plan simpler because it refers to ECMs (or ECUs) rather than to a given volume of traffic comprising a given percentage of heavy vehicles. While there is variation between local authorities, the ECM approach has been adopted by (for

example) Palmerston North City Council (2022) and Thames-Coromandel District Council.

6.6 The PDP does not presently define "equivalent car movement", therefore, a definition such as the following would be suitable for inclusion in the PDP. "One equivalent car movement (ECM) = 1 car / light vehicle movement, 3 ECM = 1 heavy commercial vehicle movement, 5 ECU = 1 combination heavy commercial vehicle movement (for example, truck and trailer, tractor unit and semitrailer, B-train, et cetera)".

6.7 I consider it preferable that there is consistent terminology throughout the PDP in relation to vehicle movements. While I anticipate that most transport engineering professionals would understand that one vehicle movement is the same as one vehicle trip, it would be beneficial to provide clarity so that other users of the District Plan do not conclude that one trip is equivalent to two movements.

6.8 There is nothing special about the threshold value of 100 equivalent car movements per day. The effects of a land use development that generates fewer than 100 equivalent car movements per day may be more than minor, however, I recognise that there needs to be some sort of threshold and the proposed threshold appears reasonable.

6.9 Waka Kotahi submitted (82.107) that the trip generation thresholds should be limited to those activities "[…] located on a national high-volume road or regional road." From an effects perspective, depending on the nature of the intersection, a land use activity on a road (that is at a lower level in the hierarchy than national and regional roads) that intersects with a national or regional road could be as significant as if those vehicle movements occur at a crossing place connecting the site to the

national or regional road. However, I accept that it is likely to be difficult to develop a clear and simple rule for the District Plan to address this situation. While the reference to national high-volume road or regional roads is not ideal, it is difficult to suggest suitable alternative wording.

Robert Swears

21 January 2022

Appendix A: References

I have referred to the following sources while preparing my evidence:

- Austroads, 2013. Guide to Traffic Management, Part 3: Traffic Studies and Analysis. Sydney: Austroads.
- Austroads, 2017a. Guide to Road Design Part 4A: Unsignalised and Signalised Intersections. Sydney: Austroads.
- Austroads, 2017b. Guide to Road Design Part 6A: Paths for Walking and Cycling. Second edition ed. Sydney: Austroads.
- Austroads, 2017c. *Guide to Traffic Management Part 11: Parking*. Second edition (January 2017) ed. Sydney: Austroads.
- Austroads, 2017d. *Cycling Aspects of Austroads Guides*. Third edition (June 2017) ed. Sydney: Austroads.
- Austroads, 2021a. *Guide to Road Design Part 3: Geometric Design*. Edition 3.4 (February 2021) ed. Sydney: Austroads.
- Austroads, 2021b. Guide to Road Design Part 6A: Paths for Walking and Cycling. Edition 2.1 ed. Sydney: Austroads.
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