

**Before Independent Hearing Commissioners
In Ngāruawāhia**

Under the Resource Management Act 1991

In the matter of of a submission by NZ Transport Agency (Waka Kotahi)
(submitter 742, further submitter 1202) on the Proposed
Waikato District Plan

Statement of evidence of Robert Swears for Waka Kotahi - Transportation

29 September 2020

1 Qualifications and experience

- 1.1 My full name is Robert Clive Swears. I am employed as a Principal Road Safety / Transport Engineer in the Hamilton Office of WSP. I have been in this role for approximately five and a half 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 have been carrying out professional engineering tasks related to the investigation, design, and construction of roading and highway projects for 30 years. I have worked on a variety of transportation projects throughout my career for various clients including Waka Kotahi and local authorities.
- 1.4 I have provided various advice to Waka Kotahi in relation to their submissions on district plans and in the application of district plan provisions to land use activities having the potential to affect the road transport network and, in particular, the state highway portions of the network. Most recently, I have provided extensive advice to and representation for Waka Kotahi in relation to their submissions and subsequent Environment Court appeals regarding the Thames-Coromandel District Council (TCDC) Proposed District Plan.
- 1.5 My evidence is given on behalf of Waka Kotahi in relation to the provision of integrated transportation assessments ('ITAs'), and other transportation infrastructure issues in the Proposed Waikato District Plan ('**Proposed Plan**').

2 Code of conduct

- 2.1 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 it in the preparation of this summary statement and during expert witness conferencing. I also confirm that the matters addressed in this statement are within my area of expertise, except where I rely on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

3 Scope of evidence

3.1 My evidence relates to transport infrastructure issues in the Proposed Plan. In particular, it addresses:

- a The inclusion of a requirement in the Proposed Plan for ITAs to be prepared to support applications involving higher traffic generation activities (742.105: oppose);
- b Traffic generation rates (742.118: oppose);
- c Tracking curves (742.101: support);
- d Separation distances (742.110 and 742.111: support); and
- e Sight distances (742.112 and 742.113: support).

3.2 I have read the planning evidence prepared by Mr Wood on behalf of Waka Kotahi and the s42A report prepared on behalf of Waikato District Council.

4 Summary of evidence

4.1 In summary, I consider that:

- a The Proposed Plan should include provision for appropriate levels of transportation assessment for land use activities. These provisions should be based on a traffic volume versus road hierarchy matrix such as the approaches adopted by Hamilton City, Waipa District, and Thames-Coromandel District. Transportation assessment should not be based on a “one size fits all” approach. The proposed ITA rule described in Mr Wood’s evidence provides resource consent applicants with clear guidance as to when an ITA will be required, as well as the level of assessment required.
- b The trip generation rates included in the notified version of the Proposed Plan are only partially aligned with the trip generation rates generally accepted by transportation experts. Including a copy of the Waka Kotahi research report 453 trip generation rates table in the Proposed Plan would ensure the requirements of the Proposed Plan are aligned with the most frequently used industry source.
- c Tables in the Proposed Plan that have “speed limit” or “design speed” as a column heading should have those headings changed to “85th percentile operating speed (or if not known, posted speed limit +10 km/h)”.

- d For determining the effects of a land-use activity on the transport network, trip generation should be considered in terms of equivalent car units ('**ECU**')¹ rather than in terms of vehicle movements. The reason for this is that heavy vehicles have a larger impact than light vehicles and this impact is recognised through the application of ECU.

5 Requirement for ITAs (submission point 742.105)

- 5.1 Waka Kotahi lodged a submission (742.105) on the Proposed Plan requesting that ITAs should be required to support applications involving high traffic generating activities,² and seeking the inclusion of a new definition of 'integrated transport assessment' that is consistent with the Waikato Regional Policy Statement ('**RPS**').³
- 5.2 From a transport engineering perspective, evaluation of transportation effects should be carried out for as large an area of developable land as practicable to allow the transportation effects associated with the entire development of an area to be determined and mitigated as appropriate.
- 5.3 However, given that development areas are not always in common ownership, transportation assessments often need to be carried out in a more piecemeal fashion. A key shortcoming with this type of piecemeal approach is that the analysis considers the incremental adverse effects associated with land use development rather than the cumulative effects attributable to a complete development area. Acknowledging that District Plan provisions cannot require different parties to work together to consider the effects of their development on the transport network, I consider the most appropriate secondary method of evaluation is for the transportation effects of land use development to be carried out for activities which on their own have the potential to adversely affect the safety and / or efficiency of the transport network.
- 5.4 Unless appropriate analysis is carried out, it is not practicable to determine the transportation effects of new development, whether particular land use activities should proceed and (as appropriate) to identify the transportation related mitigation that may be required for the activity.
- 5.5 In general terms, the higher the volume of traffic using particular portions of the transport network the greater the effects of additional traffic from new development on that network. To illustrate this point, I have created a model of a

¹ Sometimes referred to as equivalent car movements (ECM).

² Submission on rule 14.12.

³ Submission on 13 – Definitions.

hypothetical simple stop-controlled crossroads intersection using SIDRA⁴ traffic modelling software. The example intersection has one lane for each approach with all through and turning movements on those approaches occurring from the single approach lane. This model demonstrates that relatively small increments in peak hour traffic can have significant effects on the performance of an element of the transport network. The diagram below illustrates the configuration of the intersection.

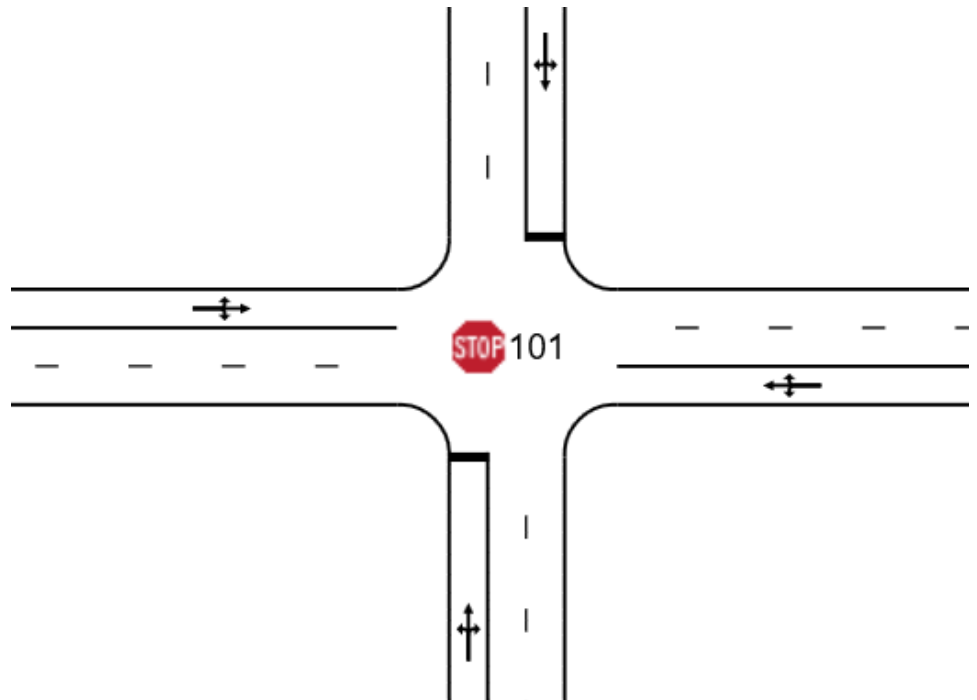


Figure 1: Stop-controlled crossroads intersection used for traffic modelling example

5.6 For each approach to the intersection the base traffic volumes are as described in Table 1. I have also set the proportion of heavy vehicles at 14% so that it falls under the 15% threshold for many of the zones / precincts listed in Rule 14.12.1.4 of the Proposed Plan.

Table 1: Base traffic volumes on approach legs

Approach	Turning volumes (vph) ⁵		
	Left	Through	Right
North	50	100	50
South	50	100	50
West	100	200	100
East	100	200	100

5.7 To illustrate the effect of a single new development on the intersection, I added 5 vehicles per movement to the base case traffic volumes on the South approach to

⁴ Modelling was carried out using default parameters from the SIDRA software.

⁵ vph = vehicles per hour. For context, as a rough rule of thumb, peak hour trip generation is typically around 10% of daily trip generation.

give a total increase across the left, through, and right turning volumes of 15 vehicle movements. This change would result in an outbound trip generation of about 150 vehicle movements per day for a non-residential activity⁶. Allowing for distribution of inbound and outbound movements, this represents afternoon peak hour trip generation of slightly less than 200 vehicle movements per day. Based on the current provisions Rule 14.12.1.4 in the Proposed Plan, this development example would be a permitted activity for the locations listed in Table 2.

Table 2: Permitted traffic generation

Zone	Maximums for compliance		Rule ref: 14.12.1.4 (l)
	Traffic volume	Heavy vehicles	
Business zone	300 vpd	15%	(c)
Rural	200 vpd	15%	(d)
Industrial and heavy industrial	250 vpd	15%	(e)
Huntly Power Station	750 vpd ⁷	300 vpd	(f)
Te Kowhai Airpark (Precincts A and B)	250 vpd	15%	(i)

5.8 Table 3 below illustrates that adding four new developments, which are permitted activities (less than 200 vehicle movements per day), to the South approach will result in a level of service on that approach which is likely to be acceptable (level of service (LoS) C). Adding another four new developments, which are permitted activities (to give a total increment of 40 additional vehicles per movement⁸), takes the performance of the South approach to the approximate threshold between LoS D and LoS E; at these levels I expect mitigation would be required. Table 3 illustrates that adding a total of 10 new permitted developments (to give a total increment of 50 additional vehicles per movement) to the South approach takes the level of service to LoS E. While it is not illustrated in Table 3, adding another permitted activity development (taking the total to 11 developments) contributing traffic to the South approach reduces the level of service on that approach to LoS F⁹. In Table 3, I have used colour coding to differentiate between good levels of service (green shading) and poor levels of service (red shading); levels of service highlighted with orange shading are generally acceptable, but tending towards unacceptable.

5.9 The point of this theoretical modelling exercise is to demonstrate that under the currently proposed rules in the Proposed Plan, permitted activities can be developed without an ITA being required. The higher the existing traffic volumes

⁶ For a residential activity, the trip generation would be related to the morning peak hour period.

⁷ Noting that these values are cumulative totals that include existing lawfully established trip generation.

⁸ Four developments, plus for developments, multiplied by five additional vehicles per movement.

⁹ LoS F is the worst level of service, however, it is an open-ended scale.

on any given road, the greater the potential for land-use activity to adversely affect that road (and / or intersections with that road).

Table 3: Level of service deterioration based on traffic volume increase

Additional vehicles per movement per hour on South approach	Approach			
	South	East	North	West
0	C	A ¹⁰	C	A
5	C	A	C	A
10	C	A	C	A
15	C	A	C	A
20	C	A	C	A
25	D	A	C	A
30	D	A	C	A
35	D	A	C	A
40	D	A	C	A
45	E	A	C	A
50	E	A	C	A

- 5.10 From a District Plan perspective, if the thresholds at which an ITA (or similar) analysis is required are based solely on trip generation for the land-use activity (as currently required by the Proposed Plan), rather than also considering the existing traffic volumes, the potential exists for that activity to result in significant deterioration in the performance of the road network. Roads at higher levels within the roading hierarchy tend to carry higher volumes of traffic; therefore, the effects of additional traffic being added to those corridors can result in potentially significant adverse effects. For many locations, the deterioration is most readily determined at intersections, however, the performance of intersections also influences the performance of the midblock sections in between.
- 5.11 As shown in Table 3, relatively small increases in traffic volumes may not result in significant adverse effects from a level of service perspective. However, as the underlying traffic volumes increase and the level of service deteriorates, small increases in traffic volumes may, in some instances, result in significant adverse effects. For example, if the total traffic volume on the South approach increases by more than 50%¹¹ from the base case the level of service deteriorates from LoS C to LoS D. However, if the total traffic volume on the South approach then increases by only another 10%¹² the level of service deteriorates from LoS D to LoS E.

¹⁰ Strictly speaking, the level of service for the approach is not LoS A, however, the level of service for each movement on the approach is LoS A.

¹¹ From the base level of 200 vehicle movements per hour to a total of 305 vehicle movements per hour (200 vph + (3 approaches x 35 vehicle movements per hour per approach)).

¹² From 305 vehicle movements per hour to a total of 335 vehicle movements per hour with the addition of 10 extra vehicle movements per turning direction per hour.

- 5.12 The effects of increased traffic volumes are likely to be most pronounced on those roads carrying the most traffic, which tend to be the roads at the higher levels of the roading hierarchy. While I would prefer the analysis to be based on the roads most affected by a new activity, the simplest approach is to consider the road(s) via which traffic associated with the new activity gains direct access to the wider transport network.
- 5.13 I consider it important for analysis to be carried out for developments that will contribute moderate to high levels of traffic to the road network, with the trip generation thresholds at which the analysis is required reducing as the road hierarchy onto which that traffic gains access increases. For this reason, I do not consider that the zone-based approach described in the Proposed Plan adequately links traffic effects with the transport network.
- 5.14 I do not agree with the s42A report writer's comments in relation to submission point 742.105. The writer recommends rejecting the submission of Waka Kotahi and states that an ITA is not required to address the effects of activities that exceed the permitted traffic generation thresholds.¹³ The writer considers an ITA is a suitable requirement only for a more comprehensive review for larger development as expressed in the RPS.¹⁴
- 5.15 From a transport engineering perspective, one of my key concerns in relation to development is the manner in which incremental development (and the associated incremental adverse effects) can result in cumulative adverse effects that require mitigation. From a structural engineering perspective, adding incremental loads to a structure will at some point result in catastrophic failure of that structure. However, transport engineering does not have sudden points of failure in the system; adding traffic to a congested traffic environment creates more congestion and makes a bad situation worse. The difficulty is that the party responsible for making the situation worse will argue that because the underlying bad situation was not created by them, they should not be responsible for the full mitigation.
- 5.16 If the District Plan does not include provision for appropriate assessment for specific levels of development, the opportunity will not be available for an adequate assessment to be undertaken so mitigation can be identified and provided where appropriate.

¹³ S42A report, 319.

¹⁴ S42A report, 318.

- 5.17 Included as **Appendix A** to this statement are examples from other district plans of trip generation related thresholds. Beyond these thresholds, an appropriate level of transportation analysis is required to consider the effects associated with a development. While there are variations in the examples, they have a consistent approach where low levels of trip generation to roads low in the hierarchy require the least analysis compared with high levels of trip generation to roads high in the hierarchy, which require comprehensive analysis because the potential for adverse effects is greater.
- 5.18 In his evidence, Mr Wood has produced an example of a rule that could be adopted by Council for the Proposed Plan that addresses many of my concerns in relation to the adequacy of transportation assessment for land use development. I consider that his proposed rule provides a mechanism for the level of detail required for transportation assessments to be related to the scale of effects based on the type of road to which traffic associated with an activity gains access. The rule identifies the extent of analysis needed based on the trip generation for the land-use activity and the road from which that activity gains access to the transport network. I do not consider that a land-use activity which will create moderate effects should be analysed in the same level of detail as an activity that will create significant effects; the rule provides for that differentiation.
- 5.19 The content for the ITA analysis should be fit for purpose rather than expecting one type of analysis to suit all types of land-use activity. Mr Wood's proposed rule sets out the content required for a Simple ITA and a Broad ITA; I agree with the criteria he has listed.

6 Trip generation rates

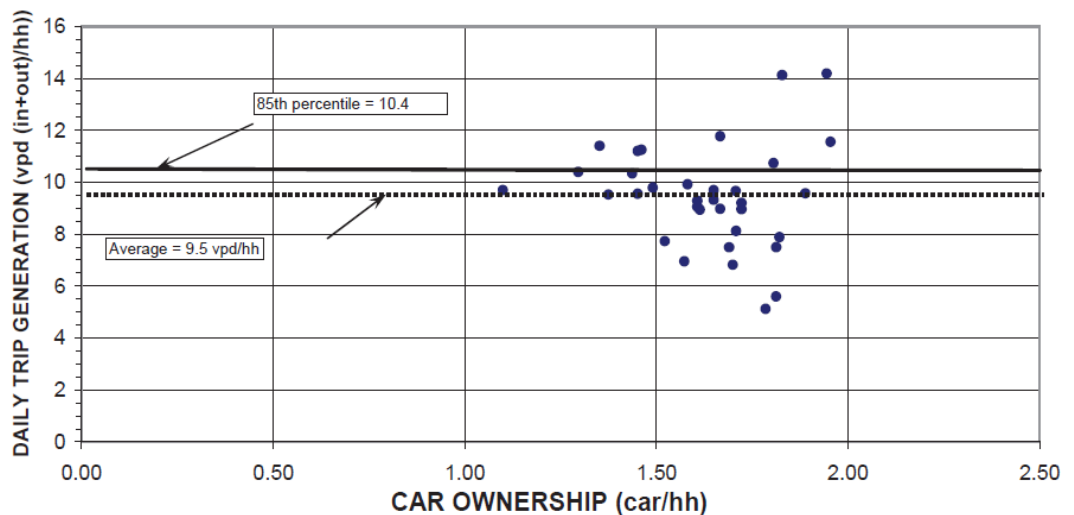
- 6.1 I do not agree with the s42A report writer's comments in relation to submission point 742.118. The submission of Waka Kotahi sought to amend and update trip generation rates in the Proposed Plan by replacing Table 14.12.5.13 with Table 7.4 from Trips and Parking Related to Land Use (2011) (NZ Transport Agency research report 453). The s42A report writer considers that the trip generation rates contained in Table 14.12.5.13 are generally based on Table 7.4, with some differences due to local characteristics, oversimplification or error.¹⁵
- 6.2 The trip generation rates in Table 7.4 are design rates, which means they are the 85th percentile¹⁶ values based on data from a wide range of sources. While, the applicability of the data in the Waka Kotahi table to land-use activity in Waikato

¹⁵ S42A report, 489.

¹⁶ The 85th percentile value is the value below which 85% of observations in a group of observations falls.

District depends on a range of variables, it is the most applicable trip generation data for New Zealand.

6.3 As an example, the figure below¹⁷ illustrates variation in suburban residential trip generation considered against the variables of car ownership per household and daily trip generation.



6.4 The graph illustrates relatively wide variability in trip generation rates for a single land use. I am not suggesting that the highest values (around 14 trips per household per day) should be adopted, but neither do I consider the lowest or average rates should be adopted. While applying the 85th percentile trip generation rate should provide for conservative analysis, I consider it appropriate for that approach to be taken because it will ensure that appropriate mitigation is identified.

6.5 For transport engineering purposes, there are three “go to” sources for trip generation information¹⁸; these are:

- a Trips and Parking Related to Land Use (2011) (Waka Kotahi).
- b Guide to Traffic Generating Developments, Version 2.2, October 2002 (NSW Roads and Traffic Authority (RTA), now known as Roads and Maritime Services (RMS)).
- c Trip Generation Manual, 9th Edition (2012) (Institute of Transportation Engineers (ITE)).

¹⁷ Figure 4.1 from Waka Kotahi research report 453

¹⁸ Practitioners sometimes also make reference to the UK Trip Rate Information Computer System (TRICS), which is a database of trip rates used in the United Kingdom for transport planning purposes.

- 6.6 The New Zealand trip generation rates are based on information contained in the Trips Database Bureau (TDB)¹⁹
- 6.7 In my view, it is impractical to assume that published trip generation rates will precisely represent the actual trip generation for a given land-use activity, however, the rates should be appropriate for analysis purposes. On this basis, I consider it desirable for the base trip generation data to be as representative as reasonably practicable in order to:
- a Provide a simple and conservative means of identifying the indicative trip generation for an activity; and
 - b Minimise the potential for trip generation to be the prime focus of discussions between independent experts where the necessary focus should be on the effects associated with the land-use activity.
- 6.8 With regard to the rates included in the Proposed Plan, while some of them are reasonable, others are too broad or are significantly different from published sources.
- 6.9 Table 4 below compares the trip generation rates described by the s42A writer with those contained in Table 7.4 of research report 453. In the table I have included a commentary column and highlighted the comments using a green (reasonable), orange (similar, but amendment needed), and red (Proposed Plan value is inappropriate, and amendment is required) colour coding.

¹⁹ Previously known as the New Zealand Trips & Parking Database (NZTPDB)

Table 4: Comparison of PWDP and report 453 trip generation rates

PWDP Activity	Trip generation rate	Report 453 Equivalent activity	Trip generation rate	Comment
Bulk retail and car yards	45 per 100 m ² gross floor area (GFA)	8.6: Large format retail	45 per 100 m ² gross floor area (GFA)	Same rate as large format, however, car yard is not comparable with bulk retail. For car yards, there would be potentially significant differences depending on whether displayed vehicles are outside or inside a building.
Childcare and day care facility	4 per child the facility is designed to accommodate	3.1: Preschool education	4.1 per child	Similar rate.
Dairies, takeaway food, bottle stores	100 per 100 m ² GFA	8.1: Shop	128.6 per 100 m ² GFA	PWDP rate does not adequately cover range of trip generation rates.
		8.8: Fast food	362 per 100 m ² GFA	
Dwellings	10 per dwelling	7.1.1: Inner-city unit	6.8 per unit	PWDP rates similar to higher-level from report 453, however, conservative elsewhere.
		7.1.2: Suburban dwelling	10.9 per unit	
		7.1.3: Outer suburban dwelling	8.2 per unit	
		7.1.4: Rural dwelling	10.1 per unit	
Garden centres	150 per 100 m ² GFA	8.3: Garden centre	147 per 100 m ² GFA	Similar rate.
Health facility veterinary, and personal services	4 per professional the facility is designed to accommodate	5.1: Medical centre	79.4 per professional staff member	PWDP rate is significantly lower than report 453. I understand the difference is partially due to a data entry error.
Hospitality services (e.g. cafés, bars)	90 per 100 m ² GFA	8.7: Restaurant	6.1 per seat	PWDP rates similar to “bar”, however, not comparable with other land-use activities.
		8.9: Bar	92 per 100 m ² GFA	
Housing for the elderly/residential care	2 per resident the facility is designed to accommodate	7.4.1: Retirement home	2.4 per bed	PWDP rate is low.
Industrial activities	30 per 100 m ² GFA	4.1: Warehousing	2.4 per 100 m ² GFA	PWDP rate similar for some cases but may significantly overestimate trip generation.
		4.4: Manufacture	30 per 100 m ² GFA	
Offices	25 per 100 m ² GFA	2.1: Office	26.1 per 100 m ² GFA	Similar rate.

PWDP Activity	Trip generation rate	Report 453 Equivalent activity	Trip generation rate	Comment
Hospital	15 per patient bed the facility is designed to accommodate	5.2.1: Hospital (small)	13.5 per bed	Similar for small hospital, but significantly different for large hospital.
		5.2.2: Hospital (large)	3.1 per bed	
Retail activity	130 per 100 m ² GFA	8: Retail. Significant variation as described	22 to 487 per 100 m ² GFA	PWDP rate does not adequately capture range of report 453 rates.
School	2 per student the primary school is designed to accommodate, or 1 per student the secondary school is designed to accommodate	3.2: Primary	1.6 per pupil	PWDP rate is conservative.
		3.3: Secondary	0.4 per pupil	
Service stations	700 per 100 m ² GFA	8.10: Service station	718 per 100 m ² GFA	Similar rate.
Supermarket activity	130 per 100 m ² GFA	8.5: Supermarket	129 per 100 m ² GFA	Similar rate.
Tertiary education facilities	2 per student the facility is designed to accommodate	3.4: Tertiary	1.4 per student	PWDP rate is conservative.
Travellers' accommodation	3 per bed the facility is designed to accommodate	7.5: Hostel	2.5 per bed	Some similarity, however, rates cannot be readily compared.
		7.6: Motel	3.0 per occupied unit	
		7.7: Hotel	6.4 per room	

- 6.10 While I have no concerns regarding some of the rates included in the Proposed Plan (shown with green highlights above), there are others that are significantly different to those contained in research report 453 (shown with red highlights above). The s42A writer has stated “[...] there are some differences due to local characteristics, over-simplification or error.” However, the writer has not advised the basis on which the “local characteristics” have been applied to the Proposed Plan rates nor the basis on which there is over-simplification.
- 6.11 From a mitigation perspective, if the trip generation rate(s) adopted for analysis purposes are overly conservative, the mitigation identified may be more significant than that which would be required if an appropriate design trip generation rate is used. In my opinion, while this approach is not problematic from a transport engineering perspective, because the solution provided is likely to be better than would be required if appropriate trip generation rates are used, it does mean that the applicant would be providing more mitigation than is actually needed. However, the converse applies if trip generation rates are lower than appropriate for the land-use activity, the mitigation identified is likely to be less significant than that which should be provided. In my opinion, this is an undesirable outcome.
- 6.12 I accept that trip generation for some activities within Waikato District may be different from the trip generation rates for similar activities elsewhere, however, there is not presently information available from which to draw such a conclusion. In my opinion, because the data contained in research report 453 is widely recognised as being the most applicable source for trip generation rates for land use activities in New Zealand, there should be a robust basis on which departures from those rates are based. For simplicity and consistency with practice elsewhere in New Zealand, I consider that a direct copy of Table 7.4 from research report 453 into the Proposed Plan is the most appropriate course of action.

7 Other transport infrastructure issues

- 7.1 I have reviewed part 14.12 of the s42A report prepared by Waikato District Council (Infrastructure Section D12) and note the following matters with which I agree and disagree.

On-site manoeuvring and queuing

- 7.2 I agree with the writer's comments and conclusions in relation to the 742.101 submission points of Waka Kotahi relating to onsite manoeuvring and queuing in Rule 14.12.1.3(1)(c):
- a The writer's proposal to accept the Waka Kotahi submission that reference is made to "the largest combination standard configuration heavy vehicle committed permitted on the road(s) to which the site has frontage" is a pragmatic and future proofed solution.
 - b While most vehicle types are permitted to operate on most roads, there are limitations regarding the roads on which some vehicles (such as high productivity motor vehicles (HPMV)) can operate. Inclusion of the Waka Kotahi submission in the Proposed Plan provides simple and clear guidance for analysts as to the types of vehicles for which provision must be considered.

Speed environment, operating speed, and design speed

- 7.3 Waka Kotahi submitted (742.110 and 742.111) in relation to separation distances in Table 14.12.5.1, and Rule 14.12.5.2. In Attachment 1 to its submission, Waka Kotahi proposed an alternative version of Table 14.12.5.1 for the Proposed Plan. That table included "Posted speed (km/h)" and "Speed environment (km/h)" column headings; while the notified table had a "Speed Environment" column heading.
- 7.4 To assist with drafting of the District Plan, I consider that the column heading "Speed environment (km/h)" should be changed to read "85th percentile operating speed (or if not known, posted speed limit plus 10 km/h)", which is the heading used in Table App5B/3 of the Planning Policy Manual, to which Waka Kotahi refers in its submission.
- 7.5 The reasons for my suggested change are as follows:
- a Where an 85th percentile operating speed is not known, the speed limit plus 10 km/h approach includes an element of conservatism in the analysis and is aligned with conventional design practice.
 - b In some locations, it is unlikely an 85th percentile driver will be able to travel as fast as the speed limit.

- c The term “speed environment”, is not a term in common and correct technical use.
- d The s42A report writer states (paragraph 361) they understand “[...] that the speed environment that roads are designed for are required to be higher than the Posted Speed”. While this is true in some cases, it is often not justifiable for the design speed to be the same as the speed environment.
- e Given the technical subtleties of the terminology, I consider it would assist users of the Proposed Plan for the two left-hand columns of Table 14.12.5.1 to be labelled “Posted speed limit (km/h)” and “85th percentile operating speed (or if not known, posted speed limit plus 10 km/h)” respectively.

7.6 With regard to 742.112 and 113 relating to sight distances at Rule 14.12.5.3, Figure 14.12.5.4:

- a Similarly to my point in relation to Table 14.12.5.1, I consider it desirable for the left-hand column of Table 14.12.5.3 to be retitled as “85th percentile operating speed (or if not known, posted speed limit plus 10 km/h)”.
- b Attachment 2 of the Waka Kotahi submission includes the minimum sight distance table on which I provided advice to Waka Kotahi, therefore, I endorse the sight distances described in the table.

Equivalent Car Movements

- 7.7 With reference to Section 5 of this statement, I note that other submitters have made reference to heavy vehicle movements in conjunction with trip generation rates. From a transport engineering perspective there is a significant difference between the traffic effects associated with a passenger car movement and a heavy vehicle movement. For this reason, analysis sometimes makes reference to ECU or equivalent car movements (**‘ECM’**) to provide an indication of the relative effect of heavy vehicles associated with a land-use activity.
- 7.8 In my opinion, Waikato District Council has the opportunity to simplify the Proposed Plan and to make comparisons easier by adopting an ECU approach that can be applied for determining the type of analysis most appropriate in relation to a particular proposed land-use activity. This approach does away with the need to consider percentages of heavy vehicles that may be acceptable as a proportion of the trip generation associated with an activity.

- 7.9 The Waka Kotahi Planning Policy Manual (PPM)²⁰ describes equivalent car movements as follows:
- a 1 car movement is equivalent to 1 car movement;
 - b 1 truck movement is equivalent to 3 car movements; and
 - c 1 truck and trailer movement is equivalent to 5 car movements.
- 7.10 On this basis, if a land-use activity generated 30 vehicle movements per day and 10% of these were truck and trailer movements, the land-use activity would generate $(27 + 3 \times 5 = 42)$ equivalent car movements.
- 7.11 The manner in which this approach has been applied for the Thames-Coromandel District Plan is illustrated in Appendix A of this statement where ECU trip generation thresholds are used for determining the transportation assessment required for a particular activity.

Robert Clive Swears

29 September 2020

²⁰ Planning Policy Manual for Integrated Planning and Development of State Highways, page 120, version 1 - effective from 1 August 2007 - for comment, Waka Kotahi (formerly Transit New Zealand).

Appendix A: Thresholds for Transport Assessment Requirements

1. Hamilton City Operative District Plan (18 October 2017)²¹

25.14.4.3 Integrated Transport Assessment Requirements

Any activity that requires an ITA under this rule is also subject to Rule 25.14.3a).

Trip Generation Triggers

a) A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule, in accordance with the following trigger thresholds.				
Activity	Trip Generation of Activity (vpd = vehicles per day) ¹			
	LOW <100 vpd	MEDIUM 100 - 499 vpd	HIGH 500 - 1499 vpd	SIGNIFICANT >1500 vpd
Any activity in the relevant zone (except in the Central City Zone)	-	-	Simple ITA required	Broad ITA required
Any activity in the Central City Zone, excluding the Downtown Precinct	-	-	-	Broad ITA required
Any activity in the Downtown Precinct of the Central City Zone				Downtown Precinct ITA required

²¹ From <https://www.hamilton.govt.nz/our-council/council-publications/districtplans/ODP/chapter25.14/Pages/25-14-4-Rules-General-Standards.aspx>, accessed on 22 September 2020

2. Waipa District Plan (1 November 2016)²²

Rule - Provision of an integrated transportation assessment

16.4.2.25 A Simple or Broad Integrated Transport Assessment (ITA) shall be prepared for activities as required by this rule, in accordance with the following trigger thresholds:

Activity	Measured in Trip Generation of Activity (vpd = vehicles per day) Annual Average Daily Traffic						
	Collector and Local Roads			Major and Minor Arterial Roads (Including State Highways)			All Roads
	LOW <100 vpd	MEDIUM 100 - 249 vpd	HIGH >250 vpd	LOW <100 vpd	MEDIUM 100 - 249 vpd	HIGH >250 vpd	SIGNIFICANT >1500 vpd
Any Permitted or Controlled Activity	Not Required	Not Required	RD Simple ITA required	Not Required See Rule 16.4.1.1(d) for State Highways & Major Arterials	RD Simple ITA required	RD Broad ITA required	RD Broad ITA required
Any Restricted Discretionary Activity	Not Required	Not Required	RD Simple ITA required	Not Required See Rule 16.4.1.1(d) for State Highways & Major Arterials	RD Simple ITA required	RD Broad ITA required	RD Broad ITA required

Assessment will be restricted to the following matters:

- Location and scale of activity; and
- Effects of vehicle generation on functioning of road, road hierarchy and other users; and
- Vehicle access and manoeuvring; and
- Number of car parks provided on site; and
- Consideration of CPTED; and
- Provision for multi-modal transport options (Broad ITA only); and
- Effects on connectivity (Broad ITA only); and
- Vehicle queuing on site; and
- Effects on infrastructure provision; and
- Infrastructure deficiencies, risks or positive effects identified from consultation with the New Zealand Transport Agency where State Highways may be affected (Broad ITA only).

These matters will be considered in accordance with the assessment criteria in Section 21.

²² From <https://www.waipadc.govt.nz/repository/libraries/id:26zqz4o7s1cxbyk7hfo7/hierarchy/our-council/waipadistrictplan/documents/wdp-volume-1/Part%20E%20-%20District%20Wide%20Provisions/Section%2016%20-%20Transportation> accessed on 22 September 2020

3. Thames-Coromandel Proposed District Plan²³

<u>Vehicle Trip Generation</u>	<u>Road Hierarchy</u>			
	<u>Local</u>	<u>Collector</u>	<u>Arterial</u>	<u>Regional</u>
<u>Low (51-100 ECU per day)</u>	<u>n/a</u>	<u>n/a</u>	<u>Traffic Impact Assessment</u>	<u>Traffic Impact Assessment</u>
<u>Medium (101-250 ECU per day)</u>	<u>n/a</u>	<u>Traffic Impact Assessment</u>	<u>Traffic Impact Assessment</u>	<u>Integrated Transport Assessment</u>
<u>High (>250 ECU per day)</u>	<u>Integrated Transport Assessment</u>	<u>Integrated Transport Assessment</u>	<u>Integrated Transport Assessment</u>	<u>Integrated Transport Assessment</u>

²³ From Environment Court consent order dated 7 October 2019