

IN THE MATTER of the Resource Management Act 1991
(RMA)

AND

IN THE MATTER of an application by New Zealand
Fruitgrowers' Charitable Trust to the
Wellington City Council for a resource
consent to reinstate a sign on the building
located at 2 Jervois Quay, Wellington (**the
Application**)

**EVIDENCE OF BRETT HARRIES
ON BEHALF OF NEW ZEALAND FRUITGROWERS' CHARITABLE TRUST**

(Traffic)

22 November 2022

1. QUALIFICATIONS AND EXPERIENCE

- 1.1** My full name is Brett Harries.
- 1.2** I am a Market Leader - Transport for Stantec (NZ) Limited. Prior to my current position, I was Managing Director of Traffic Design Group Limited (TDG), a specialist transportation engineering consultancy.
- 1.3** I am a New Zealand Chartered Professional Engineer and am registered as an International Professional Engineer / APEC Engineer.
- 1.4** I hold a bachelor's degree in civil engineering (1982) from the University of Auckland. I have 40 years' post graduate experience as a practising specialist traffic and transportation engineer. I am:
- (a) A Fellow of Engineering New Zealand;
 - (b) A Fellow of the Institute of Transportation Engineers (USA);
 - (c) A Life Member of the Association of Consulting and Engineering (NZ); and
 - (d) An Associate Member of the NZ Planning Institute.
- 1.5** Throughout my 40 years' as a specialist transport engineer, I have been engaged by both public and private sector clients from throughout New Zealand, Australia

and the Pacific, to provide designs, assessments and advice on all manner of traffic engineering and transport planning projects.

- 1.6** As part of this broader experience, I have also gained significant experience and expertise in human factors associated with driver behaviour, and the safety-related driver responses to various traffic environments. Much of this expertise has been obtained through my involvement as an expert vehicle crash analyst. I have qualifications in vehicle crash analysis from Northwestern University in Chicago, and am one of a small handful of professional engineers in New Zealand that through qualifications and experience has been accepted as an expert vehicle crash analyst in the High Court of New Zealand.
- 1.7** I describe this background in crash analysis because it is directly relevant to the assessments I undertake in relation to how drivers might respond to a whole range of visual stimuli that make up the traffic environment, including those that are directly related to the driving task (for example, traffic control devices, other vehicles, etc.), and some of which form parts of the fabric of the wider driving environment (such as surrounding activities, people, scenery, buildings, and of course advertising signs and billboards).
- 1.8** With regard to experience that is particular to the assessment of the road safety effects of signs and billboards, I have provided formal assessments of over 200 digital signs and billboards, and many more assessments of other types of roadside advertising signs.
- 1.9** In addition to the assessments undertaken for consenting purposes, I have also been involved in numerous post-consent reviews of road safety performance at operating billboard sites as part of monitoring consent conditions.
- 1.10** I maintain my knowledge of the traffic safety implications of digital billboards through extensive reading of published papers on the subject; and through regular attendances at international conferences where research relating to the traffic safety effects of digital billboards are presented, the latest being the “*5th International Conference on Driver Distraction and Inattention*” held in France in November 2021.
- 1.11** I also participated in a 2012 trial of digital billboard operating characteristics (dwell times, image transition methods and times, and lamination levels) which was held in Auckland during daytime and night-time conditions, and was also attended by

various experts from, and consultants representing, Auckland Council, Auckland Transport, and billboard operators.

2. INVOLVEMENT IN THE PROJECT

2.1 I was engaged by the New Zealand Fruitgrowers' Charitable Trust in November 2020 to lead the preparation of a road safety assessment of their proposal to establish a digital billboard on the Huddart Parker Building at 2 Jervois Quay. The assessments were provided in a traffic engineering report dated 8 April 2022 (**TER**).

2.2 In preparing my evidence I have reviewed the section 42A report prepared on behalf of the Wellington City Council (**Council**). I understand that none of the submissions have raised traffic effects as being a concern.

3. CODE OF CONDUCT

3.1 I have read the Code of Conduct for Expert Witnesses outlined in the Environment Court's Practice Note (2014) (**Code**) and have complied with it in preparing this evidence. I also agree to follow the Code when presenting evidence to the Independent Hearing Commissioner. I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state that I rely upon the evidence of other expert witnesses. I also confirm that I have not omitted to consider material facts known to me that might alter or detract from my opinions.

4. SCOPE OF EVIDENCE

4.1 My evidence will describe the traffic operations and road safety implications of the proposed billboard. In providing this evidence, I do not intend to re-traverse all matters of technical detail that have been addressed in the TER. Rather, my evidence will focus on the following:

- (a) A brief description of the surrounding traffic environment (Section 6);
- (b) A brief summary of the key elements of the proposal (Section 7);
- (c) The basis for the assessment of digital billboards including reference to international research with a particular focus on the research that is applicable to New Zealand conditions and digital billboard operations; and an examination of New Zealand's road safety history associated with digital billboards (Section 8);

- (d) An assessment of traffic operations and road safety effects including consideration of advance visibilities, potential effects to vulnerable road users, an assessment against the provisions of the operative Wellington City Council District Plan (**Operative Plan**), and an assessment against the recommendations provided within the Waka Kotahi Traffic Control Devices Manual Part 3 – Advertising Signs (**TCDM3**) guideline (Section 9);
- (e) A response to some traffic-related comments made in Council's Section 42A Report (Section 10);
- (f) Comments on the recommended conditions of consent if the Application is granted (Section 11); and
- (g) My conclusions (Section 12).

4.2 A summary of my evidence is provided in Section 5 to follow.

5. SUMMARY OF EVIDENCE

5.1 In my road safety assessments of this proposal, my starting point has been to reference relevant international research that is applicable to the manner that digital billboards operate in New Zealand, and to then build upon and ground that knowledge by examination of digital billboard safety performances from the New Zealand recorded crash database.

5.2 Without a sound appreciation of either the complexities associated with the interpretation of the research data, or the applicability of that research to New Zealand conditions, it might seem at first glance that some of the research is contradictory, and sometimes unsupportive of digital billboards from a road safety perspective. However, when appropriate weight is given to empirically derived research that is applicable to the New Zealand context, the picture becomes much clearer. The research I describe in my evidence reveals, amongst other things, that:

- (a) Even at complex signalised intersections, digital billboards are not inherently distractive to drivers to the extent that they cause a deterioration in road user behaviours or driver performances that could then lead to road safety effects. Indeed, Australian research that I will describe reveals that drivers are inherently able to regulate and prioritise their attention to the matters necessary for the driving task (such as the road geometry and the presence of other road users, for examples); and will de-prioritise their attention to matters that are unnecessary for that task (such as looking at

advertising, for example). This enables drivers to safely negotiate complex intersections that have adjacent digital billboards with little or no apparent reduction in driving performance.

(b) While some drivers can and do glance at digital billboards, those glance durations are little different from those made to any other sort of potential visual attractor (such as on-premise signs, people, buildings, roadworks, roadside activities and so on), and such glances are not of a duration that results in any measurable adverse road safety effects.

5.3 A complementary tool that is available to actually measure the road safety implications of digital billboards in New Zealand is the Waka Kotahi Crash Analysis System (**CAS**), which is a database of all recorded crashes (both non-injury and injury) that have occurred in New Zealand. While this database records only those crashes that were reported to or attended by the New Zealand Police, it is an invaluable source of crash information from which crash statistics and road safety patterns can be derived. This database is routinely referred to and applied by all road controlling authorities throughout New Zealand.

5.4 I have examined the CAS database for the whole of New Zealand for the period since digital advertising screens first appeared in New Zealand in 2012 (noting that there are now around 700 digital roadside advertising screens in New Zealand), by using the searchable crash factor “attention diverted by advertising or signs”. That search revealed zero crashes that were attributable to digital advertising screens. That outcome, in and of itself, speaks volumes regarding the relative safety of digital billboards in New Zealand.

5.5 This proposal is not revolutionary or unique, and in fact the local traffic environment is well suited to a digital billboard that will be located and operated as intended. Accordingly, the evidence-based approach I have adopted by reference to relevant research and recorded crash data enables the proposed billboard to be evaluated against the approximately 700 existing digital advertising screens that currently operate in New Zealand.

5.6 While this proposal requires a discretionary activity (restricted) assessment under the Operative Plan, an examination of the relevant traffic-related objectives and policies reveals that the proposed billboard will be consistent with its intent. Mr Alistair Aburn provides a full planning assessment of the proposal.

5.7 A further assessment of the recommendations contained within the guidance provided within the TCDM3 reveals just two matters of inconsistency, being in

relation to the recommended 50m separation from other signs, and the recommended 100m separation from an intersection or traffic control device. However, neither recommendation has any material relevance within a central city location, simply because neither are typically able to be achieved given the density of first-party (on-premise) signs and third-party signs that are intrinsic elements of any commercial centre; and because urban block lengths are typically not long enough to enable 100m separation of signs from an intersection or traffic control device.

- 5.8** Taken overall, application of general research on the road safety effects of digital billboards, along with detailed examinations of the site-specific implications of the billboard proposed in this case, together enable me to confirm that it is unlikely to adversely influence road user performances or behaviours to the extent that it could create a road safety hazard.

6. THE SURROUNDING TRAFFIC ENVIRONMENT

- 6.1** Section 2 of the TER describes the proposed billboard's location, the nature of the traffic environment within which it will sit, and its existing road safety characteristics. The key points to note are as follows:

- (a) The billboard is proposed to be established on the northern face of the Huddart Parker Building at 2 Jervois Quay, which puts it about 20m west of the Jervois Quay / Post Office Square / Queens Wharf signalised intersection, and about 35m east of the Customhouse Quay / Grey Street give-way controlled intersection.
- (b) It will be primarily directed to southbound traffic on Customhouse Quay and Jervois Quay, with incidental views to eastbound road users emerging from Johnston Street and Panama Street.
- (c) Customhouse Quay north of Panama Street, and Jervois Quay are classified in the Operative Plan as Arterials; while Customhouse Quay south of Panama Street is classified as a Collector.
- (d) Customhouse Quay north of Panama Street, and Jervois Quay have posted speed limits of 50km/h. Customhouse Quay south of Panama Street has a speed limit of 30km/h; as do Grey Street and Panama Street.
- (e) Examinations of the CAS database of recorded crashes that occurred in the vicinity revealed none that were due to distraction by elements external to the vehicle, and certainly none that referred in any way to existing

signage in the area. Overall, there was nothing about the crash history that revealed any inherent road safety defect with this section of Customhouse Quay and Jervois Quay, nor any road safety issue that will likely to impact on the ability to establish the proposed billboard as intended.

7. THE PROPOSAL

7.1 Figure 1 below shows the relationship of the proposed digital billboard to its surrounding traffic environment, while Figure 2 shows a mock-up of the billboard as viewed southbound from Post Office Square.



Figure 1: Proposed billboard location



Figure 2: Proposed billboard viewed from Post Office Square

7.2 Section 4.1 of the TER describes the proposal. Its key elements include:

- (a) A landscape-oriented north-facing display screen of 13m width by 4m height that will be established at parapet level on the Huddart Parker building.
- (b) The screen will operate with minimum image display times of 8-seconds, and with 0.5-second dissolve transitions between images. These operational characteristics have largely become industry standards in New Zealand and have now been well proven to enable safe operations.
- (c) The screen will operate with lumination levels that will be automatically managed so that screen brightness will be responsive to changes in ambient lighting conditions.

8. BASIS FOR THE ASSESSMENT OF DIGITAL BILLBOARDS

Relevant Research

8.1 The available international research that relates to the road safety effects of digital billboards varies significantly in terms of its age, relevancy, and the extent that it has been validated to actual operations. This has led to what can often appear to be inconsistent, if not sometimes contradictory, research outcomes. Without empirical validation and practical experience, assessments of billboard proposals based solely on what can be found by internet searches can result in skewed outcomes with sometimes diametrically opposed opinions based on the research.

8.2 One side of opinion regarding the road safety implications of digital billboards is drawn from the perception-based proposition that because digital billboards are designed to attract the attention of viewers, they must inevitably be hazardously distracting to drivers.

8.3 On the other side of opinion is the evidence-based proposition that:

- (a) While drivers might choose to glance at a digital billboard, in the same manner that they might choose to glance at any other element of the external traffic environment, those glances are self-regulated according to the driving task at hand; and
- (b) When they do occur are sufficiently brief to ensure that they do not inherently result in discernible adverse road safety effects.

8.4 With either approach, it is important to recognise the difficulties associated with assuming that all research is relevant. Points to note in this regard are as follows:

- (a) Early implementation of digital billboards (as continues in many countries), typically involved largely uncontrolled operational characteristics that can produce a range of effects that may indeed be distractive when compared to current New Zealand digital billboard operations. The billboard characteristics associated with many studies include:
 - Poor placement and alignment of the billboard; and/or
 - Overly bright displays; and/or
 - Inappropriate image transitions; and/or
 - Dynamic elements, most particularly full-motion video.
- (b) These operational characteristics are often quite different from the much more tightly bound operational characteristics that apply in New Zealand, including limits on levels of lamination; managed lamination that is responsive to ambient lighting conditions; images that are static while being displayed; and 0.5-second dissolve transitions between images.
- (c) This means that early studies, and studies undertaken in countries that can have quite different and variable operational characteristics, can produce results that have only limited relevance to countries like New Zealand.

- 8.5 More recent research now has the benefit of a history of operational billboards to observe and measure and, in some jurisdictions, operational billboard characteristics that are reasonably tightly controlled as they are in New Zealand.
- 8.6 As the research in relation to the road safety effects of digital billboards can be inconsistent, what I have attempted to do in providing the references that I have below, is to give more weight to studies that are based on empirically based evidence in preference to inferred evidence; and (perhaps more importantly), research that relates to the way that billboards operate in New Zealand.
- 8.7 With regard to the latter, I refer predominantly to Australasian research in preference to research from countries that enable different operating conditions for billboards (such as video and / or much brighter lumination), and / or from countries that experience markedly different traffic environments. In this regard, I consider that it is inappropriate to simply adopt an overseas study without proper consideration as to its applicability to New Zealand billboard operations and traffic conditions.
- 8.8 A 2015 Australian study by Carolyn Samsa¹ describes experiments that involved comparative assessments of driver responses to the presence of on-premise advertising signs², static billboards, and digital billboards. The research found that:

"Generally, participants tended to fixate most on the road ahead when driving, which is a positive finding in terms of road safety. There were also no differences in this on-road viewing between the three signage types", [i.e. on-premise advertising signs, standard billboards and digital billboards].

"When participants looked at billboards and on-premise signs, the average fixation durations were all well below 0.75s, which is considered to be the equivalent minimum perception-reaction time to the slowing of a vehicle ahead".

"In regard to driver performance variables, the data showed no significant differences in average vehicle headway for any of the signage types", and "... the headways found in the present study would have given

¹ Samsa, C. (2015) "Digital billboards 'down under': are they distracting to drivers and can industry and regulators work together for a successful road safety outcome?" Proceedings of the 2015 Australasian Road Safety Conference 14 – 16 October, Gold Coast, Australia.

² i.e. first-party signs that relate to the activity within the site on which they are located.

drivers enough time to detect the slowing of a vehicle in front and respond accordingly”.

“... the findings show that digital billboards do not draw drivers’ attention away from the road for dangerously long periods of time compared to other signage types, and drivers maintained a safe average vehicle headway in the presence of these signs”.

[Underlining is mine.]

8.9 The key point to be drawn from Samsa’s research is that digital billboards are no more distractive to drivers than any other signage type, including static billboards, and that when glances are made at billboards, these glance durations are below the threshold that would likely result in road safety issues.

8.10 Another Australian study by Young et al at Monash University relates to situational awareness.³ This research was related to static image billboards in freeway situations, but is pertinent based on its following conclusions:

“Overall, the driving performance and situation awareness results indicated that drivers were not overly distracted by roadside advertising in the freeway environment, as indicated by a lack of serious driving errors being made in the vicinity of the billboards”.

“The billboards examined were a key element of a drivers’ situation awareness when driving demand was low, such as when driving on the freeway under free-flowing, low traffic conditions. However, ... when driving demands increased, drivers focused less attention on the billboards”.

“These results suggest that drivers can self-regulate their attention to billboards, reducing the attention given to them when required to focus on the immediate driving situation”.

[Underlining is mine.]

³ Young K.L., Stephens A.N., Logan D.B., Lenne M.G. “An On-Road Study of the Effect of Roadside Advertising on Driving Performance and Situation Awareness”, Proceedings of the 4th International Driver Distraction and Inattention Conference, Sydney, Australia, 2015.

8.11 The key point to be taken from the Monash study is that as a driving environment becomes more complex, drivers focus more on the driving task and less on the things that are unnecessary to the driving task (such as billboards).

8.12 The ability for drivers to focus on the driving task when driving demands increase was confirmed by New Zealand research undertaken by Burdett et al (2018) and Waikato University.⁴ This research involved a study of mind wandering while driving, which relates directly to situational awareness. The experimental research that was undertaken confirmed that drivers focus more on the driving task at hand when in 'complex' traffic environments:

"Drivers were more likely to report [in the experiments] mind wandering in low risk than in high risk situations, and in situations of low rather than high demand".

"Situations of high demand and the highest crashes rates were places where mind wandering was least likely to be reported [in the experiments], suggesting an inverse relationship between mind wandering and crash risk".

8.13 The ability for drivers to self-regulate 'secondary task' engagement at intersections was also examined by Ismaeel et al (2018) of the Institute of Transport Studies at the University of Leeds.⁵ The conclusion of that study included the following:

"The comprehensive data analysis indicated that the drivers engaged selectively in secondary tasks in accordance with changes in the demands imposed by driving and roadway situations. The drivers exercised self-regulation by reducing their engagement with secondary activities during more demanding driving situations."

[Underlining is mine.]

8.14 Research that is specific to digital billboards was undertaken by Goodsell et al (2018) of the Australian Road Research Board ("ARRB"),⁶ and involved an evaluation of the impact on driving performance associated with new digital

⁴ Bridget RD Burdett, Samuel G Charlton, Nicola J Starkey "Mind wandering during everyday driving: An on-road study", Accident Analysis and Prevention, 2018.

⁵ Ismaeel R., Hibberd D., Carsten O., "Prevalence and self-regulation of drivers' secondary task engagement at intersections: An evaluation using naturalistic driving data", Proceedings of the 6th International Conference on Driver Distraction and Inattention (2018).

⁶ Goodsell R, Dr Roberts. P "On-Road evaluation of the driving performance impact of digital billboards at Intersections" Project No. PRS17074 – ARRB, (2018).

billboard installations at signalised intersections (and is therefore directly pertinent to this proposal).

- 8.15** This evaluation took the form of a video survey of vehicle control with the aim of assessing the before and after impacts of the digital billboards when they began operation. The concluding paragraph from the ARRB study is as follows:

"In conclusion, the current evaluation investigated the impact of the presence of digital billboards on vehicle control performance. The sites evaluated were relatively complex signalised intersections. Because of the cognitive demands associated with negotiating a signalised intersection, these are the kinds of sites where it might be expected that drivers would display impairment from distraction. However, there was almost no evidence that the digital billboards at these locations impaired driving performance. Clearly, in real world situations, the impact from the visual distraction from digital billboards is complex, and in some situations such as the installations evaluated here, there can be an apparent positive impact on driving performance from the presence of a digital billboard. If the parameters of how and when this positive impact occurs can be precisely specified, this would prove enormously valuable for all stakeholders."

[Underlining is mine.]

- 8.16** This ARRB research supports other similar research, and demonstrates that digital billboards do not cause a reduction in driver performance that could lead to a deterioration in road safety.
- 8.17** This was further demonstrated in another ARRB study by Cunningham et al (2016) which describes a safety evaluation of a digital billboard mounted over the Kwinana Freeway in Perth.⁷ Comparisons were made between the billboard not operating and then operating; with comparisons also made to a matched control site. This evaluation took the form of a video survey of vehicle movement with a view to quantifying driver performance measures including incidents, lateral control⁸, and

⁷ Cunningham, M., Mitchell, B., Roberts, P., "Bull Creek LFDS Evaluation" ARRB contract report for Department of Transport WA, September 2016.

⁸ Lateral control is the ability to stay in-lane.

headway⁹. The study revealed no incidents in any of the time periods examined; no impact on headway time; and reduced lane drift episodes.

8.18 The discussion from the study included the following extracts:

"There was no evidence that headway time was affected by the illumination of the LFDS [large format digital sign] suggesting that by this measure at least, the LFDS was not having a negative impact on driver behaviour"

"Importantly there was a significant difference in the number of lane drift episodes attributable to the illumination of the LFDS. Unexpectedly, there were less lane drift episodes when the LFDS was illuminated compared to when it was not."

[Underlining is mine.]

8.19 Overall, it is my opinion that the body of New Zealand relevant, empirically based research that is now emerging is increasingly confirming that digital billboards are:

- (a) Little or no different from any other sort of advertising sign including static billboards and on-premise signs;
- (b) Not inherently distracting to drivers to the extent that they are creating any apparent adverse road safety effects; and
- (c) Not inherently hazardous to the traffic environment, even in complex traffic situations.

Examination of road safety effects from crash histories

8.20 As I have previously noted, there are approximately 700 digital advertising screens that have been developed over the past ten years in New Zealand.¹⁰

8.21 In order to demonstrate the effect that these digital advertising screens are having on road safety, I undertook a search of the CAS database that encompasses the whole of New Zealand for the ten-year period 2012 to 2021.¹¹ In this search, I have focussed on a particular crash factor that is able to be coded within each reported

⁹ Headway is the following distance to the vehicle in front.

¹⁰ The approximately 700 digital screens consist of 350+ small-format screens associated with bus shelters and pedestrian shelters, and in excess of 350+ large-format digital billboard screens. A double-sided billboard that has each screen directed at a discrete traffic audience is considered as two screens.

¹¹ The first digital billboard to operate in New Zealand was established in 2012.

crash, which is “*attention diverted by advertising or signs*”.¹² I note in this regard that this code picks up any crash that is related to distraction by any sort of sign, not just advertising signs. These therefore include traffic signs, road works signs, street name signs, directional signs, and so on.

8.22 For the 10-year search period, the CAS database produced a list of 72 sign-related crashes within the whole of New Zealand. On further detailed examination of the comments and witness statements that are contained in each individual ‘Police Traffic Crash Report’ that relate to the 72 crashes (and where necessary cross-referencing to what actually exists at the crash locations), the following breakdown of ‘attention diverted by advertising or signs’ was established:

Category	Nature of sign	Crashes
Third-party advertising billboards	Digital billboard	0
	Static billboard	3
First-party on-premise advertising signs	Commercial (On-premise sign / fuel price board / real estate)	20
	Personal (election sign / roadside stall)	4
Traffic signs	Traffic/roadworks sign / VMS / directional sign / digital speed sign	19
Other	Looking for or at a building or premise	4
	Looking for or at a street name sign	11
	Miscellaneous (e.g., blimp, statue, etc.)	2
	Incorrectly coded or unknown	9
Total		72

Table 1: Attention diverted by advertising or signs 2012-2021

8.23 The table shows that in the whole of New Zealand over the 10 years as examined, there were no crashes that involved a digital billboard, and only three crashes that involved a static billboard. This would seem to clearly demonstrate that the presence of digital signage is not currently creating identifiable road safety issues.

8.24 In saying this, it is also relevant to put the number of sign-related crashes into perspective. During the 10-year search period there was an overall total of 339,528 recorded crashes in New Zealand. Even if the combined total of 27 crashes involving some sort of advertising is considered (that is, the 3 static third-party advertising signs, and the 24 first-party on-premise signs), they represent only 0.008% of all crashes. The three static advertising sign crashes represent 0.0009% of all crashes.

¹² Contributing cause factor 356 in the CAS database.

- 8.25** The same analysis undertaken for in-vehicle distractions (including by passengers, pets, cell phones, navigation devices, entertainment console, climate controls, food, cigarettes, beverages and other objects), revealed 13,761 crashes. This represents a ratio of 510 in-vehicle distraction crashes to every one advertising sign related crash.
- 8.26** In terms of injuries, one of the three static advertising sign crashes resulted in a minor injury, and nine of the 24 crashes involving on-premise advertising resulted in an injury. For the total of 27 advertising-related crashes, this is equivalent to an average of one injury crash per year for the whole of New Zealand. By comparison, in-vehicle distractions have produced an average of 534 injury crashes per year. If, as some of the research suggests, the presence of digital billboards and digital signs helps to keep a driver looking at the road ahead instead of mind wandering or being distracted by elements within the vehicle, then arguably there may potentially be a net road safety advantage to enabling the presence of roadside digital billboards and digital signs as a means of off-setting these in-vehicle sources of inattention.
- 8.27** A common misconception in this regard is that drivers might be unwilling to admit to, or are unaware of, being distracted by signs in general, and digital billboards in particular. However, there is absolutely no reason why drivers who have been involved in a crash would not want to point to distraction by a billboard, any more or less than they would point to distraction by any other element of the traffic environment, or elements internal to the vehicle.
- 8.28** I also note in this regard that research from Queen's University in Ireland found that while distraction due to objects inside the vehicle (particularly the use of cell phones and in-car technology) are under-reported and hence under-represented as a crash factor, no such difference was found with regard to outside the vehicle distraction.¹³ This further supports the analysis of individual crash records as providing a useful tool to understand the potential impact of third-party advertising on driver attention and safety.
- 8.29** The lack of crashes relating to digital billboards is also evident when a broader examination of crash histories is undertaken (usually in relation to post-implementation monitoring conditions related to consented digital billboards). Such studies often look beyond individual crash causes, to determine whether there have been any identifiable changes to general crash patterns or crash numbers at

¹³ Regev S, Rolison JJ, Feeney A, Moutari S "*Driver distraction is an under-reported cause of road accidents: An examination of discrepancy between police officers' views and road accident reports*", Queen's University, Belfast, presented at Fifth International Conference on Driver Distraction and Inattention, May 2017.

individual digital billboard sites. Based on monitoring studies that I have been involved with, and those that I am aware of that have been undertaken by others, even when examinations are made that look beyond the face of the crash records to overall influences, it has been consistently found that there are no identifiable road safety impacts due to the establishment of digital billboards.

8.30 Based on the above analyses therefore, I am able to draw the following conclusions:

- (a) Digital billboards are not a new phenomenon that we know nothing about. Rather, we now have a significant database of digital billboards to examine, and therefore have the advantage of directly observing, measuring and evaluating their actual effects. In my opinion this is far preferable to inferring potential effects from theoretical studies;
- (b) Digital advertising signs and digital billboards are not featuring at all in the crash statistics;
- (c) Based on numerous monitoring studies that I have been a part of and others that I am aware of, there are no sites where digital billboard operations have resulted in any identifiable adverse change to overall crash numbers, crash patterns, or crash severities; and
- (d) There is no evidential basis for suggesting that drivers do not admit to, or are unaware of, being distracted by an advertising sign, especially given that so many other external and internal distractors have made their way into the crash statistics.

8.31 The key point to be made from all the above is that despite perceptions to the contrary, relevant research and empirical evidence confirms that digital billboards, operated as they do in New Zealand, do not generate identifiable adverse road safety effects, even when concerted efforts are made to find those effects. The evidence therefore strongly indicates that digital billboards present a negligible level of road safety risk to road users.

9. ASSESSMENT OF TRAFFIC OPERATIONS AND ROAD SAFETY EFFECTS

Advance Visibility

9.1 Section 4.2 of the TER describes the advance visibilities that will be available to the billboard. As described therein, the alignment of Customhouse Quay / Jervois Quay enables the presence of the proposed billboard to be discernible to approaching southbound road users from up to 400m away, which is just north of the Whitmore

Street / Waterloo Quay intersection. From this distance however, screen content will be largely indistinct.

- 9.2** As with any billboard of this size, legibility of image content will not occur until within about 100m from the billboard, which occurs mid-block between Brandon and Panama Streets. Figure 3 below shows a driver's view of the proposed billboard location from about 80m from the billboard which is within the optimum viewing area for approaching southbound road users.



Figure 3: Southbound view at ~80m

- 9.3** In the whole length of Customhouse Quay / Jervois Quay between Whitmore Street and the billboard site, there is only one brief instant when a traffic signal lantern visually 'touches' the view of the billboard screen behind. This occurs at one location only, being at a distance of about 180m from the billboard, (i.e. about 30m north of Brandon Street), and only when viewed from Lane 3. Figure 4 below shows the relative viewing positions of the proposed billboard and the overhead traffic signal at Brandon Street at this point. At this viewing location, there is a small visual overlap of the right edge of the screen with the overhead signal's black backing board. Significantly however, the extent of overlap is insignificant, and occurs only momentarily for about 1 second when travelling at a normal mid-block speed. For the reasons explained in detail in Section 4.2 of the TER, the implications of this momentary visual 'touching' of the overhead traffic signal with the billboard behind will be negligible.



Figure 4: Southbound view at ~180m

Vulnerable road users

- 9.4** There is nothing from the crash history (as described in Section 2.3 of the TER) to indicate that there is any inherent road safety issue for either pedestrians or cyclists in the vicinity of the site.
- 9.5** Somewhat obviously, the elevation of the proposed digital billboard ensures that there will be no potential at all for the creation of any sort of physical obstruction or impediment, nor the creation of any inter-visibility restriction for any road user.
- 9.6** The location and height of the proposed billboard are such that it will be unlikely to create a point of hazardous distraction that could impact on the movements or actions of vulnerable road users in the vicinity, nor create a distraction for drivers at a point where pedestrians are likely to be crossing Jervois Quay. In this regard I note that:
- (a) at the point where pedestrians cross Jervois Quay, the billboard will not be visible to pedestrians; and
 - (b) for southbound vehicles on Jervois Quay the billboard will pass out of a driver's field of vision well before reaching the signalised intersection at Grey Street, and certainly well before the pedestrian crossing facility on the downstream side of the intersection.
- 9.7** This latter point is demonstrated in Figure 5 below which shows a driver's view from the point that the billboard will be fully concealed by the vehicle roof, which is well in advance of the intersection.



Figure 5: Point that visibility of billboard will be lost (approx 30m from limit line)

- 9.8** Accordingly, it is considered that there is nothing about the particulars of the proposed billboard that will likely have any adverse impact on the movement or safety of pedestrians or cyclists. This is certainly not a situation where there is a potential risk (either perceived or actual) that the presence of the billboard could cause a driver not to notice a pedestrian or cyclist.

Operative Plan

- 9.9** Section 4.3 of the TER sets out the traffic-related assessments of the proposal against the requirements of the Operative Plan. As confirmed in the evidence of Mr Aburn, the proposal requires assessment as a Discretionary Activity (Restricted).

- 9.10** Objective 12.2.10 'Signs' seeks:

"To achieve signage that is well integrated with and sensitive to the receiving environment, and that maintain public safety".

- 9.11** In reviewing the various policies designed to achieve this outcome that are applicable to the proposed development, the following is of relevance to transportation:

"12.2.10.2 Manage the scale, intensity and placement of signs to:

- maintain and enhance the visual amenity of the host building or site, and*
- ensure public safety".*

9.12 This policy recognises that whilst signs are an integral part of the central area environment, methods for controlling their design must be achieved through rules, design guides and other legal mechanisms. Where a sign does not fully satisfy the relevant Operative Plan standards (under Rule 13.6.4), then guidance is provided on the matters Council will consider when assessing a proposed sign. The relevant traffic criteria can be summarised as follows:

- (a) Whether an additional sign will result in visual clutter; and
- (b) Whether the size, number, placement, illumination or movement of the sign(s) or sign display will compromise traffic or pedestrian safety.

9.13 From a driver's perspective, the billboard will not create visual clutter. Rather, it sits in an isolated position that will not result in any visual conflict with any other signs in the vicinity.¹⁴

9.14 In terms of safety, the assessments I have previously described demonstrate that:

- (a) The southbound traffic audience will have advance visibilities of the proposed billboard that are appropriate and acceptable for this traffic environment; and
- (b) The proposed billboard will not compromise the safety of vulnerable road users.

9.15 Accordingly, with the adoption of the suite of conditions that have been proposed in relation to the operation of the proposed billboard, it is my opinion that there will be no identifiable adverse traffic safety effects associated with its location or operation. In my opinion, the proposal therefore aligns with the intent of the Operative Plan's traffic-related policies regarding signs.

9.16 In addition to the Operative Plan's traffic-related objectives, policies and rules as described above, also of relevance is the '*Design Guide for Signs*', which includes the following reference:

Note, to minimise road hazards, new signs should be designed in accordance with the objectives and standards of the Land Transport Safety Authority "Advertising Signs and Road Safety: Design and Location Guidelines – RTS-7".

¹⁴ This is apparent from the views displayed in Figures 4-1 to 4-7 of the TER.

- 9.17 I note that the “*Advertising Signs and Road Safety: Design and Location Guidelines - RTS-7*” has now been superseded by TCDM3. An assessment against the relevant criteria included within the TCDM3 guideline is set out as follows.

TCDM3

- 9.18 Section 5.5 of the TER provides a detailed description of the extents of consistency that the proposal has with the recommendations provided by TCDM3. I note in this regard that both TCDM3 and its predecessor noted above are guidelines that provide recommendations – they do not provide standards or rules.

- 9.19 The assessment against the guidelines reveals just two areas of inconsistency, these being in relation to the recommendations for:

- (a) a 50m minimum longitudinal distance between adjacent “roadside advertising signs”, and
- (b) a 100m separation of advertising signs from intersections and traffic control devices.

- 9.20 With regards to the recommendation regarding 50m longitudinal spacings from other signs, this is fully addressed in Section 5.6 of the TER. As noted therein:

- (a) In a central area environment, it is all but unavoidable to have other signs within 50m, which makes the recommendation impracticable and largely irrelevant. This is acknowledged by TCDM3 in its explanation relating to the recommendation which says:

The spacing is based on the time taken for a road user to read and assimilate signs of the maximum recommended complexity. They may not be achievable in many circumstances, such as those in lower speed, urban areas (eg 60km/h or less). However, where they are, both advertisers and road users will benefit from the resulting layout.

[Underlining is mine.]

- (b) I note however, that this TCDM3 explanation refers to providing motorists sufficient ability to “*read and assimilate*” the sign as if it is necessary that motorists must be able to read and assimilate every advertising and on-premise sign they come across. While this might be practicable in rural state highway locations, or be necessary for regulatory signs, there is absolutely no need for every advertising sign “*of the maximum*

recommended complexity” within a commercial area to be read and assimilated. The only consequence of an advertising sign not being able to be read and assimilated is to the advertiser.

9.21 I therefore consider that the TCDM3 recommendation for 50m longitudinal spacing of signs has little or no practical relevance to the circumstances of this proposal, and that regardless of the relevance or otherwise of the recommendation, in my opinion there will be no adverse road safety effects likely as a result of inconsistency with the 50m sign spacing recommendation.

9.22 With regards to the recommendation for 100m spacing from traffic control devices and intersections, this is fully addressed in Section 5.7 of the TER. As noted therein:

- (a) TCDM3’s stated intention in relation to the 100m separation of all signs from an intersection is to ensure that advertising signs do not create driver confusion or distraction due to the spatial relationship between the advertising sign and any proximate traffic control devices (i.e. traffic signs, traffic signals, etc.).
- (b) The billboard’s location, orientation and operation together inherently ensure no adverse interactions with existing traffic control devices. The billboard does not obstruct or impair the visibility of any traffic control device at either of the Jervois Quay / Post Office Square / Queens Wharf or Grey Street / Customhouse Quay / Post Office Square intersections. I note in particular that there is no visual overlapping of any traffic signal lantern at the Jervois Quay / Post Office Square / Queens Wharf intersection with the billboard behind.
- (c) In any event, I note that TCDM3’s 100m separation recommendation is effectively impossible to achieve in practice in any urban environment, as block lengths are such that there are very few locations (if any within the central area), where 100m separation from a traffic control device or an intersection can physically be achieved. If the TCDM3 recommendation was applied literally, there would be effectively no signs of any kind anywhere within urban Wellington, nor indeed in any urban environment throughout New Zealand.

9.23 Accordingly, I have assessed the likely implications of the presence of the billboard in relation to its traffic environment, taking into consideration the actual likely effects to be generated, based both on current research, and on the experiences of a growing database of digital billboards that are located proximate to intersections.

The outcome of this analysis is that there is no likelihood of any adverse road safety or traffic operational impact to the operation or safety of any intersection in the vicinity as a result of the presence of the proposed billboard.

10. COMMENTS ON COUNCIL REPORTS

10.1 A transport assessment report was prepared for Council by Mr Pungiah¹⁵ (who was then Team Leader Transport Consents). I agree with the assessments and conclusions of that report, including its list of recommended traffic-related conditions of consent.

10.2 Based on that report, and a subsequent confirmation of that report by Council's Transport Engineer and Operations Manager, Council's reporting planner concluded "...*that the effects on traffic and pedestrian safety to be acceptable*".¹⁶ I agree with that conclusion.

11. COMMENTS ON RECOMMENDED CONDITIONS OF CONSENT

11.1 Appendix 6 to Council's S.42A report includes a list of recommended conditions to be applied in the event that the proposal is granted consent. There are several issues associated with the list of conditions as proposed (especially repetitions), which are addressed in the evidence of Mr Aburn.

11.2 However, there are three traffic-related conditions that I would particularly like to comment on, being:

- (a) Condition 12(e) relating to dwell time;
- (b) Condition 13(b) relating to use of colours; and
- (c) Condition 13(g) relating to contact details.

Proposed condition 12(e) - dwell time

11.3 The application for the proposed billboard, and the assessments provided in the TER, were on the basis of a minimum dwell time (that is, a minimum image display time) of 8 seconds.

¹⁵ Anbuselvan Pungiah "*Transport Assessment on Change of Conditions Resource Consent Application*", 9 May 2022.

¹⁶ Council S.42A report, paragraph 67.

11.4 I also note that Council's transport assessment report included specific consideration of dwell time:¹⁷

"The dwell time change recommended by the applicant is consistent with other digital billboards around Wellington. 8 sec is an appropriate dwell time for Jervois Quay as the speed limit is 50 Km/hr."

11.5 Council's transport assessment report also recommended the following condition:¹⁸

"Images shall have a minimum dwell time of 8 seconds".

11.6 Despite the dwell time recommendations provided in the TER and in Council's transport assessment report, and despite the fact that no further discussion or assessments regarding dwell time were provided in Council's S.42A report, proposed condition 12(e) recommends a significantly longer dwell time of 30 seconds. The basis for the suggested 30 second dwell time is unclear; and from a traffic perspective it does not address any particular adverse effect.

11.7 By contrast, the proposed minimum 8 second dwell time as proposed has a sound evidential basis. I note the following points:

- (a) The 8 second dwell time is an industry accepted dwell time that has been applied to the vast majority of the digital billboards that operate in Wellington and throughout New Zealand. As previously described, no adverse road safety effects have been identified with any digital billboard, which supports the view that the dominant use of 8 second dwell times enables safe billboard operations in practice.
- (b) The 8 second dwell time originated from practical trials that were undertaken in 2012 jointly by billboard operators, Auckland Council, Auckland Transport, and consultants. This involved a group of specialists from a wide range of disciplines, (including road safety specialists), who together tested, measured, and assessed various display characteristics in both day and night-time conditions. The outcome of those trials was the identification of practicable and appropriate operational characteristics that would be acceptable both to billboard operators and potentially to consenting authorities throughout New Zealand. Based on those trials, which were informed by international research and experience, the now generally adopted minimum image dwell time of at least 8-seconds was

¹⁷ Council transport assessment report, paragraph 3.5

¹⁸ Council transport assessment report, paragraph 3.1

identified, along with related operational characteristics of 0.5-second dissolve transitions and controls on lamination including responsiveness to ambient lighting conditions.

- (c) Research undertaken by Goodsell *et al* (2018) on behalf of the Australian Road Research Board, examined whether there could be road safety benefits achieved by applying longer dwell times.¹⁹ That research examined digital billboards at two signalised intersections where they applied a range of dwell times, (i.e. 8, 10, 26, 20, 24 and 30 seconds). What the research found was that longer dwell times provide no road safety benefit in terms of driver safety performance. This is an important and particularly relevant finding as it is the only empirical research that has assessed the relative road safety performances of different dwell times. The conclusion of that research report included the following statement:

"Contrary to a hypothesis that digital billboards at demanding locations will inevitably create enough distraction to negatively affect vehicle control performance, the current evaluation found that, at all dwell times, vehicle lateral control performance either improved or was unaffected by the digital billboard's presence".

[Underlining is mine.]

- (d) An occasionally posited perception regarding dwell times is that drivers should see no more than one image change, as it would reduce safety if a driver was exposed to more than one image change. The reality, however, is that there is no evidential basis for that perception. The current use of 0.5-second dissolve transitions (regardless of dwell time duration) ensures subtle transitions that do not catch the involuntary attention of drivers, and therefore do not give cause for drivers to be distracted by an image change. Empirically based research²⁰ is that those drivers who might choose to look at an advertising sign will only glance at that sign for a momentary period of less than 0.75 seconds. Drivers simply do not intently hold their stare at a billboard in anticipation of seeing an image change.

¹⁹ Goodsell R, Dr Roberts. P "On-Road evaluation of the driving performance impact of digital billboards at Intersections" Project No. PRS17074 – ARRB, (2018).

²⁰ Samsa, C. (2015)

11.8 With the benefits now available from observation and experience of a large database of digital billboards in New Zealand, along with support from recent and relevant international research, it becomes clearly apparent that the use of an 8-second minimum dwell time within this particular traffic environment is entirely appropriate and acceptable from both traffic operations and road safety perspectives. It is fully supported by research and practical trials; it is consistent with industry best practice in New Zealand; and it will ensure that appropriate levels of road safety are maintained.

11.9 Accordingly, it is my opinion that there is no basis for the 30 second minimum dwell time as recommended in proposed condition 12(e), particularly as there is no identified effect to be mitigated by the longer dwell time. Instead, I recommend that the condition be modified to refer to a minimum dwell time of 8-seconds as per the recommended Condition 2 of the Council's transport assessment report.

Proposed condition 13(b) - use of colours

11.10 Proposed condition 13(b) requires that:

"The digital signs must not contain large areas (more than 25%) of the colours green, orange or red"

11.11 I note that this condition was not included in the list of conditions recommended in Council's transport assessment report.

11.12 I also note that there is no discussion or analysis in the S.42A report to describe why this condition is necessary. Given the colours it refers to, I assume it has been proposed to ensure that images do not get confused with a traffic signal. If that is the case, I would suggest that it is hardly possible that the proposed billboard that sits atop a seven-storey building would ever be confused by drivers for a traffic signal.

11.13 In my experience, a condition such as expressed by proposed condition 13(b) can be particularly problematic as it is highly subjective, and often open to a myriad of interpretations. This occurs because of the difficulty of interpreting what shades of a particular colour should apply, and what percentage of an image is covered by that colour.

11.14 The image below demonstrates these difficulties. Defining exactly what is green in the image and not khaki, grey or black is difficult enough, (for example, what colour(s) is the vehicle?), but then measuring what proportion of the image is covered in green is all but impossible. Even if it was possible to define the extent

of the image that is green, I very much doubt that it would ever realistically be interpreted as potentially causing confusion with a traffic signal.



Figure 6: Colours used in a billboard image

- 11.15** In my opinion, the condition is fraught and unnecessary, and I recommend it be deleted. In any regard, I note that there is no need for the condition, as any possibility of an image causing confusion with or detracting from a traffic signal or any other traffic control device is more appropriately addressed by the preceding proposed condition 13(a) which I have no issue with, and which is as follows.

"The digital billboard must not use graphics, colours or shapes that could cause confusion or conflict with any traffic control device or invite or direct a driver to undertake an action that could conflict with any traffic sign or traffic control device".

Proposed condition 13(g) – contact details

- 11.16** Proposed condition 13(g) requires that:

"The digital signs must not contain more than one contact detail (for example phone number, email addresses or web address).

- 11.17** This is a particularly unusual condition to apply to any sort of sign. More than one form of contact is often provided on signs, the two most common being a web address and a physical address, so this restriction would impact on advertisers.

- 11.18** No reasoning has been provided within the S.42A report for the proposed condition. I assume that it has been proposed to address the perceived concern that drivers may attempt to record in some way all available contact details while they are driving

past the billboard. However, I would suggest that such a scenario is so infeasible and impractical that it can be described as fanciful. While I know, (and have had first-hand experience of), passengers recording various details from an image, I have never observed, nor read anything in the literature, regarding drivers attempting to do that while driving.

11.19 In this regard I note that given the existing preponderance of signs (including billboards and on-premise signs) that already contain more than one contact detail, if drivers were attempting to record those details as they passed, then that would almost certainly be indicated by abnormal driver behaviours in the vicinity of those signs. However, I have never observed any such abnormal driver behaviours and I am unaware of any study that has referred to such behaviours. There is certainly nothing from the CAS crash database to suggest that crashes have occurred due to drivers attempting to record any details from sign content.

11.20 Accordingly, for the reasons that the proposed condition will be unnecessarily restrictive to advertisers and will serve no practical road safety purpose, I recommend that proposed condition 13(g) be deleted.

12. CONCLUSIONS

12.1 Based on my examinations of the available relevant research, it is my opinion that the proposed digital billboard, with the operating characteristics that are proposed, can be established without creating any hazardous driver distractions. While some drivers may choose to glance at the digital billboard, the research indicates that those glances will not be of durations that would create any identifiable adverse road safety effects.

12.2 An examination of the CAS crash database for all crashes in New Zealand that have occurred during the ten years that digital advertising screens have been operating reveals zero that have been linked in any way to the presence of a digital billboard; and where before and after studies have been undertaken at particular digital billboard sites, no consequential changes in crash numbers or crash patterns have been identified.

12.3 The relevant research regarding the road safety implications of digital billboards, supported by the 10-years of New Zealand road safety experience with digital billboards, together contradict the often-expressed perception that digital billboards are distractive to road users to the extent that they present a road safety hazard.

12.4 In terms of the subject proposal, I do not consider that there is anything particularly unique about the location of the proposed billboard that would preclude the application of the research and assessments that I have described in my evidence. Rather, it is my opinion that the proposed billboard would be unlikely to result in any material compromise to the welfare or safety of any road user. Confidence in this conclusion can be gained from the knowledge that there is no baseline of recorded crashes due to digital billboards in New Zealand, and with the design and operational attributes that are proposed, there is no credible basis to suggest that there is anything about this particular proposal that will cause it to generate crashes when no other digital billboard in New Zealand ever has.

12.5 From the analyses and assessments that I have outlined in my evidence, supported by the finding of Council's transport assessment report, I am able to confirm the conclusion of the TER that there is no traffic engineering or road safety reason to preclude the establishment of the digital billboard as proposed.

Brett Harries

22 November 2022