

Proposed Digital Billboard

47 The Esplanade, Lower Hutt

PREPARED FOR MEDIAWORKS OUTDOOR LTD | JANUARY 2022



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1 Introduction

This report provides an assessment of a proposal by MediaWorks Outdoor Ltd to establish a double-sided free-standing, variable-image digital billboard at 47 The Esplanade in Petone, Lower Hutt. The billboard will be V-shaped and portrait-orientated.

The proposed billboard will be located on the northern side of The Esplanade, west of the Nevis Street / The Esplanade left-in-left-out intersection.

The proposed billboard will have LED digital display screen dimensions of 3.5m width by 7m height.

The billboard will display general commercial graphics for third-party advertisers.

The City of Lower Hutt District Plan (**District Plan**) requires a discretionary activity consent to enable the establishment of this digital billboard. This assessment therefore addresses the following matters:

- The characteristics of the traffic environment within which the billboard is located.
- General road safety matters relating to advertising signage.
- A description of the proposed design and operational characteristics of the digital display, and a traffic safety assessment of the proposal within the context of the surrounding traffic environment.
- An assessment of the extents that the design and operations of the billboards are in accordance with the relevant provisions of the District Plan.
- An assessment of the extents that the design and operation of the billboards are consistent with the relevant guidance provided by the Waka Kotahi New Zealand Transport Agency (**Waka Kotahi**) "*Traffic control devices manual, 2011, Part 3 Advertising signs*" (**TCDM3**).

These and other relevant matters are discussed in the detail of this report to follow. By way of a summary of the analyses that will be described, it is concluded that the establishment of the proposed digital billboard can be achieved in a manner that ensures less than minor adverse effects to the performance and safety of the local traffic environment.

2 The Site

2.1 Billboard location

The proposed billboard will sit within the site at 47 The Esplanade, on that site's southern boundary. This location is on the northern side of The Esplanade about 28m west of the Nevis Street / The Esplanade intersection, and about 365m from the State Highway 2 Hutt Road Slip off-ramp (**Hutt Road**) roundabout (as measured from the centre of the roundabout).

Figures 2-1 and 2-2 below show the location of the billboard within the context of surrounding street details and wider road network.



Figure 2-1: Billboard location – Wider area

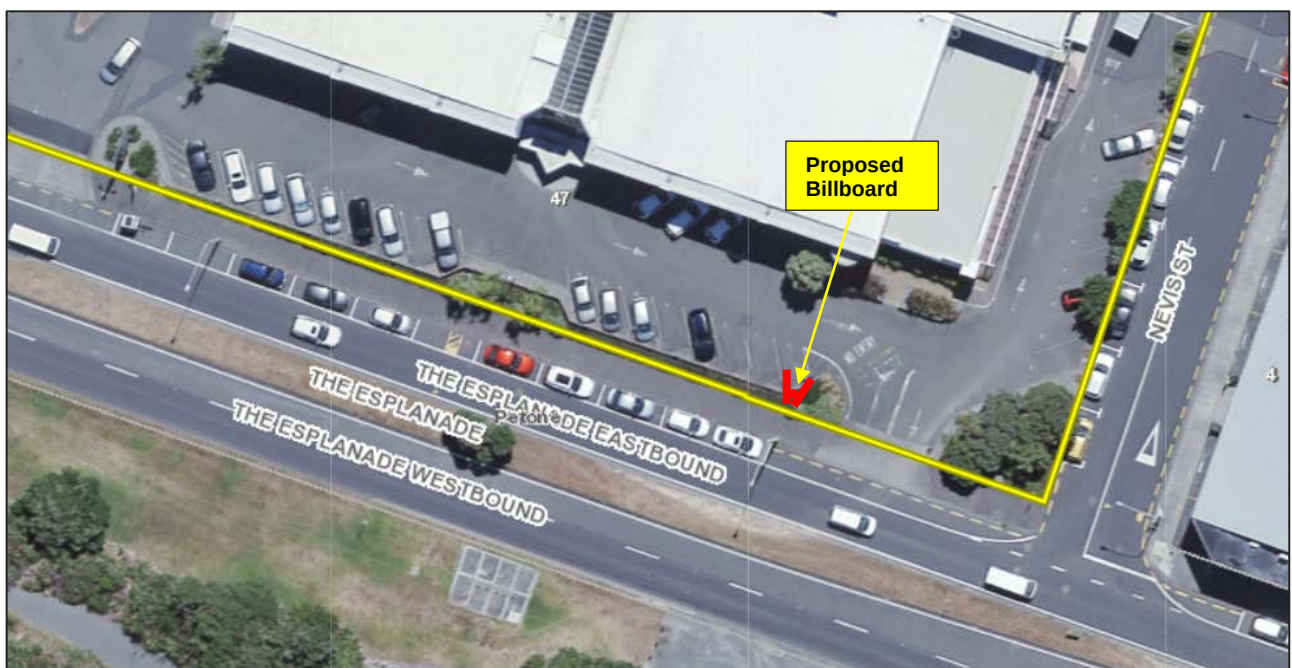


Figure 2-2: Billboard location – Local area

The Esplanade is classified as an Arterial Road in the District Plan. It runs in a generally east-west direction, and provides the arterial road 'base' to Petone that is defined by SH2 on its western side, and the Hutt River on its eastern side. It also provides part of the arterial road connection between Wainuiomata and SH2, and the eastern bays and SH2.

The subject site is zoned Petone Commercial – Area 2.

2.2 The traffic environment

In the vicinity of the subject site, The Esplanade generally accommodates a single general traffic lane in each direction. In the westbound direction there is a second lane (lane 2) that operates as a weekday morning peak period taxi and bus lane, and outside of the weekday morning peak periods operates as a second westbound general traffic lane. Each direction of travel on The Esplanade is separated by a raised central median, with median openings provided at key intersection along the road.

In the eastbound direction, a kerbside parallel parking lane is provided. No kerbside parking is permitted on the westbound side of the road.

There is a formed footpath on the northern side of The Esplanade that runs alongside the kerb. Pedestrian volumes using the footpath have not been recorded, but have been observed to be typically low in volume.

On the seaward side of The Esplanade there is a wide off-road shared foot and cycle way which is part of the Te Aranui o Pōneke shared path. In the vicinity of the site, the path is well separated (both physically and visibly), from The Esplanade traffic carriageway.

In the vicinity of the proposed billboard, The Esplanade intersects with Nevis Street by way of a left-in-left out T-intersection which is about 28m east of the proposed billboard. There are no proximate intersections to the west of the billboard until the Hutt Road roundabout intersection some 365m away.

The Esplanade has a straight and relatively flat alignment, apart from the S-shaped curvature associated with the Hutt Road roundabout approaches.

On the eastbound approach to the site, The Esplanade accommodates one traffic lane which varies in width. There is a short right turn pocket lane provided for vehicles that wish to turn right onto Great Harbour Way. As one approaches the subject site frontage on the straight eastbound section of The Esplanade, the carriageway narrows from a wide 6.7m lane to a 4.2m lane.

In the vicinity of the billboard, The Esplanade carries around 17,300 vehicles per day¹(vpd) eastbound and 11,900 vpd westbound.

The Esplanade has a posted speed limit of 50 km/h.

There are a number of on-premise signs in the general area along the northern side of The Esplanade. There are no other proximate billboards.

2.3 Road safety

A search of the Waka Kotahi Crash Analysis System (CAS) has been undertaken for the five-year period from 1 October 2016 to 1 October 2021², for all reported crashes that occurred within a 100m either side of the proposed billboard location. The search revealed a total of four crashes. The crash search area and the grouped locations of the crashes are shown in Figure 2-3 below.

¹<https://mobileroad.org/desktop.html> - ADT from survey undertaken on 22/05/2021 (eastbound) and 22/08/2011 (westbound)

² Search date – 24th November 2021

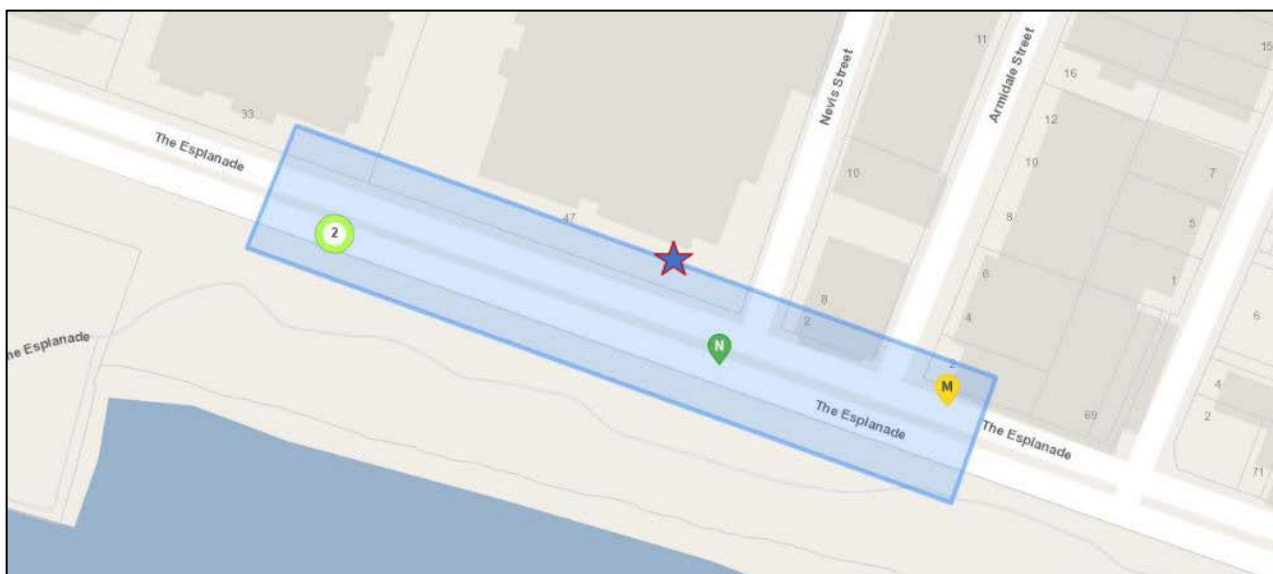


Figure 2-3: Crash search area

The CAS plain English listing of each individual crash is provided in Table 2-1 below.

Table 2-1: CAS output crash list

Crash road	Distance	Direction	Side road	ID	Date	Description of events	Crash factors	fatal	severe	minor
THE ESPLANADE		I	ARMIDALE STREET	201964163	15/08/2019	Car/Wagon1 EDB on THE ESPLANADE hit parked veh, Car/Wagon1 hit parked (unattended) vehicle	CAR/WAGON1, alcohol test below limit, attention diverted by passengers, too far left	0	0	1
THE ESPLANADE	240	W	TE PUNI STREET	2020173567	6/11/2020	Van1 NDB on THE ESPLANADE overtaking Car/Wagon2	VAN1, incorrect merging/diverging manoeuvre	0	0	0
THE ESPLANADE	225	W	TE PUNI STREET	2020158566	17/07/2020	Van1 WDB on HUTT ROAD, PETONE, LOWER HUTT overtaking Car/Wagon2	VAN1, alcohol test below limit	0	0	0
THE ESPLANADE	118	W	TE PUNI STREET	2021199727	14/01/2021	Car/Wagon1 WDB on THE ESPLANADE hit rear end of Van2 stop/slow for queue	CAR/WAGON1, following too closely	0	0	0

Of the four crashes, one involved a minor injury, and the remainder were non-injury.

Only one of the four crashes occurred in a location where the driver at fault would have had visibility of the proposed billboard location. This occurred in the westbound direction generally opposite Nevis Street, and involved a non-injury rear-end incident with the back of a queue.

The minor injury crash occurred in the eastbound direction east of Armidale Street, and involved a driver who was distracted by a crying baby in the back seat. When the driver looked back to check on the baby, the vehicle drifted into the back of a parked car.

The other two crashes (both non-injury) involved 'overtaking' manoeuvres that occurred in the westbound direction west of the site, (ie the drivers would not have had visibility of the billboard had it existed). Both crashes occurred at the point where the dual westbound lanes on The Esplanade converge into a single westbound lane.

There were no crashes where distraction due to an external environmental cause was cited, and certainly none that referred in any way to any of the existing on-premise signs in the area.

There were no crashes involving either pedestrians or cyclists.

This road safety history on this section of The Esplanade is a good one. There is nothing about the crash history that reveals any inherent road safety defect along this section of road, (apart from perhaps the westbound merge from two lanes to one that occurs west of the site and out of view of the billboard). In terms of this application, there is certainly no road safety issue that is likely to impact the ability to establish the proposed digital billboard as intended.

3 Billboard Safety Assessment Considerations

The traffic safety considerations as they relate to digital billboards can be considered as broadly encompassing four potential traffic effects:

- *The potential creation of a visibility obstruction or a direct roadside hazard:*

This relates to the physical presence of the billboard structure, rather than what is displayed on the screen. The important aspects here are that the billboard structure should not physically impact on driver visibility of the road, or other road users, or any traffic control device; nor should it create a physical impediment or obstruction to the movement of people.

- *The potential creation of driver confusion through image effects such as the mimicking of an official road sign or instructing drivers to do something:*

This concerns the design of image content to ensure that it does not mimic official traffic signs or direct drivers to undertake particular manoeuvres. This is consistently applicable to all billboards, whether they utilise static or digital methods of display. In this regard, Section 6 of this report provides a recommended condition of consent to ensure that image content does not cause confusion with traffic control devices.

- *The potential creation of driver distraction where a driver looking at the billboard may fail to notice real or potential hazards on the road:*

Image content is largely self-managed by the advertisers through an industry code of practice, and more significantly by the need for advertisers to keep messages simple and easily legible. This enables the image displays to effectively get a message across within the brief time that drivers are willing to allow advertising to become a component of their normal driving task.

- *The potential creation of direct driver distraction through display effects such as glare, or as a result of the transitions between images:*

A digital image can change while a driver is looking at the message, potentially encouraging a driver's glance to be extended, or to potentially catch a driver's attention due to the transition itself. Controlling the frequency and method of image change is important for managing and minimising any potential for distraction during image changes. These points are addressed by way of recommended conditions relating to the operation of the billboard that are described in Section 6 of this report, and which have the objective of ensuring that digital billboard operations avoid any potential for hazardous driver distraction.

Each of these categories have been assessed for the proposed digital billboard as described in section 5 below. It is noted that the first three categories above apply to any sort of advertising sign, while the fourth category is largely specific to digital billboards as they operate with variable messages.

In considering each of the four categories above, reference has been made to standards and guidelines that apply in New Zealand, along with guidance from international reports and research papers. In this regard, recent empirically based research papers, (including those that have been cited in Appendix B to this report), along with the practical experience now available from the growth of digital billboard operations in New Zealand and internationally, are together confirming that digital billboards are not inherently hazardous to road safety, and are not producing any identifiable adverse safety effects.

In regard to the latter point above, Appendix C describes a crash search for all of New Zealand for the past nine full years of data, with a specific search for the crash factor that relates to distraction by signs. That search found no evidence to indicate any degradation of road safety due to the presence of digital billboards since their inception in Auckland in 2012, despite the presence now of well over 540 digital advertising screens throughout the country.

4 The Proposal

4.1 Design and operation

As noted, the proposed double-sided billboard will be directed towards eastbound and westbound traffic on The Esplanade. It will not be visible for vehicles travelling along any other road including Hutt Road nor SH2. Figures 4-1 and 4-2 below show mock-ups of the proposed billboard as viewed in the eastbound and westbound approaches respectively.



Figure 4-1: Proposed billboard mockup – eastbound



Figure 4-2: Proposed billboard mockup - westbound

As previously described, the proposed digital screens will be portrait oriented and arranged in a V-formation. Screen dimensions will be 3.5m width by 7m height. The bottom edge of the display screens will be 2.5m above ground level, with a clear space beneath the billboard structure of at least 2m. The billboard will be free-standing and located within a landscaped area so that the screen remains clear of the frontage footpath, and clear of on-site pedestrian and vehicular manoeuvre areas.

It is proposed that the digital screen will operate with a minimum image display time of 8-seconds and a 0.5-second dissolve transition between images. Further discussion on the proposed 8-second dwell time is provided in Section 4.2 below.

The LED screens will operate with lumination levels that will be within the maxima prescribed by the District Plan, and that while operating within these maxima, will be automatically managed so that the screens are responsive to changes in ambient lighting conditions, i.e. lumination will increase in brighter conditions and decrease in duller conditions. New Zealand experience has now shown that the managed lumination of the LED screens as proposed enables the displays to largely emulate what would be seen with static image billboards, ensuring that they will not create unnecessary glare that could otherwise potentially create distraction or dazzle of drivers. When compared to the existing static billboard, images displayed on the digital screen will be more clearly legible in all lighting conditions.

These operational characteristics have largely become industry standards in New Zealand and have now been well proven to enable safe operations. This is fully consistent with the requirements and recommendations of the District Plan and TCDM3 respectively.

4.2 Dwell time

As noted, a minimum image dwell time of 8 seconds is proposed in this case, this being the industry-accepted dwell time that is typically adopted in New Zealand.

By bringing together the accumulated practical observations and monitoring of the operations of many of the over 540 digital advertising screens that have been established throughout New Zealand over the past nine years³; the accumulated knowledge gained from New Zealand and overseas research related to the road safety effects of dwell times; and the accumulated experience gained from New Zealand industry best practice for digital billboards in 50 km/h environments, it becomes readily apparent that image dwell times of 8 seconds can be safely applied in this location.

It is noted that the District Plan contains no standards for dwell time. However, TCDM 3 refers to variable message advertising sign operational characteristics, and states only that the minimum time for any separate display should be greater than five seconds. The proposed 8 seconds readily satisfies this recommendation.

Since the first ever digital billboard was established in New Zealand in 2012, the operational characteristics described above have been widely utilised, observed and evaluated; and in general, accepted and/or required as conditions of consent, for the vast majority of digital billboards in New Zealand.

As will be described in Appendix A, a recent study published by Goodsell *et al* from the Australian Road Research Board (ARRB)⁴ involved an evaluation of the impact on driving performance of new digital billboard installations at two traffic signalised intersections in Queensland. The study is particularly relevant to this assessment of dwell time, because at each of the two digital billboard sites that were evaluated in detail, three different dwell times were examined at each (being 8-seconds, 16-seconds and 24-seconds at one; and 10-seconds, 20-seconds and 30-seconds at the other).

An extract from its findings are provided as follows:

“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 added]

³ The 540+ digital billboards in New Zealand consist of around 300 digital advertising screens associated with bus stop shelters and pedestrian shelters, and 240+ large digital billboards.

⁴ Goodsell R, Dr Roberts. P “On-Road evaluation of the driving performance impact of digital billboards at Intersections” Project No. PRS17074 - ARRB

What this ARRB research is in effect saying, is that digital billboards are not inherently hazardous to safety performance, and that no road safety benefit (in terms of driver safety performance), is achieved through longer dwell times. This is an important and particularly relevant finding as it is the only empirically based research that has assessed the relative road safety performances of different dwell times.

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. The now well-established research⁵ 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.

It is also relevant that in 50km/h locations such as this, drivers would have little interest in the subject billboard until within about 100m to 80m of the billboard, which is the distance range that image content becomes legible for a screen of the size proposed in this sort of environment. This means that if moving at 50km/h, approaching drivers will never see more than one image change within that 100m to 80m of legibility distance if a minimum dwell time of 8-seconds is applied. Of course, if traffic is moving appreciably slower than 50km/h, (as occurs for example, in the westbound direction during the morning peak period), then it might be that drivers will see more than one image change. However, at these much slower speeds, the ability to respond to, and the likely consequences of, image change effects are much less of an issue. In fact, experiences of billboards in highly congested conditions (many examples of which exist in Auckland in particular), reveal benign effects to road safety.

Overall then, it is apparent that the need in this case for a dwell time that extends beyond the proposed 8-seconds would be an overly conservative response for a billboard at this location. With the benefits now available from observation and experience of a large database of digital billboards and signs in New Zealand, with support from recent and relevant international research, it is apparent that the use of 8-second minimum dwell time in this case is entirely appropriate and acceptable from both traffic operations and road safety perspectives.

Accordingly, and having considered the particular traffic environment within which the subject billboard sits, the proposed 8-second dwell time is in this case considered appropriate and acceptable. It is fully supported by research and practical trials; it is consistent with industry best practise in New Zealand; and it will ensure that appropriate levels of road safety are maintained.

⁵ 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

5 Billboard Assessments

5.1 Approach views

5.1.1 The Esplanade eastbound

On The Esplanade's eastbound approach, the digital screen will begin to become apparent from a distance of around 300m (i.e. from just east of the Hutt Road roundabout). From this distance however, while drivers may become aware of the presence of the billboard, the content of images will not be readily legible from that distance.

As noted, clear legibility of screen content will occur from about 100m to 80m from the screen. This extent of advance visibility is more than adequate to provide a driver with the opportunity to glance at the billboard should that driver be inclined to do so, and it readily satisfies the 80m minimum forward visibility distance as recommended by TCDM3.

The photographs in Figure 5-1 below show the eastbound The Esplanade approach to the billboard from distances of nominally 150, 100m and 50m to the billboard.



Eastbound view from ~ 150m



Eastbound view from ~ 100m



Figure 5-1: The Esplanade eastbound from ~ 150m, 100m & 50m

5.1.2 The Esplanade westbound

On The Esplanade's westbound approach, drivers will become aware of the presence of the digital screen from a distance of around 230m (which is from about 80m east of the Te Puni Street intersection), but again, legibility of image content will not be practically available until within about 100m to 80m of the billboard.

On the westbound approach, the billboard sits to the right of a driver's central field of vision. The photographs in Figure 5-2 below show the westbound approach to the billboard from distances of nominally 150, 100m and 50m to the billboard.





The Esplanade westbound - approximately 100m



The Esplanade westbound - approximately 50m

Figure 5-2: The Esplanade westbound from ~ 150m, 100m & 50m

It is significant that at no point on either the eastbound or westbound approaches, is there any potential for the proposed billboard to conflict with or detract from any traffic control device, including the 50km/h speed limit sign located within the central median immediately west of Nevis Street.

5.2 Vulnerable road users

The location of the site is such that pedestrian volumes are generally low, although they can be higher in summer when people are drawn to Petone Beach. Even then however, most of the pedestrian movements are associated with the Te Aranui o Pōneke shared path.

Cyclist numbers can be described as light to moderate. As with pedestrian traffic, cyclist use of the Great Harbour way shared path increases over summer. There are also appreciable numbers of commuter cyclists who cycle on-road on The Esplanade during the weekday morning (mostly westbound) and evening (mostly eastbound) peak periods, despite that there are no specific on-road facilities for commuter cyclists.

The proposed digital billboard will not extend into the road reserve, nor is not situated above any footpaths. There is, therefore, no potential for the creation of any sort of physical pedestrian or cyclist obstruction or impediment, nor any visibility restrictions for any road user.

Notwithstanding the above, and as noted in Section 2.3 above, there are no inherent road safety defects in relation to either pedestrians or cyclists within the vicinity of the site.

Accordingly, given the lack of any evident pedestrian or cyclist safety issues; and with the operational and physical design attributes of the proposed billboard, the potential for the generation of any change to existing levels of risk exposure to either cyclists or pedestrians as a consequence of the proposal will be indiscernible.

5.3 Assessment against District Plan requirements

The subject site is zoned in the District Plan as 'Petone Commercial – Area 2'. Accordingly, Chapter 14B sets out the relevant requirements that new or amended signs are to be assessed against.

Section 14B.2.1.5 states that signs are a 'Permitted Activity' provided they satisfy the Permitted Activity conditions in all Commercial activity areas. An assessment against these conditions is provided as follows.

Table 5-1: Clause 14B 2.1.5 - Permitted Activity Conditions assessment

Permitted Activity Condition		Comment
a)	Location:	Complies. The proposed digital billboard is free-standing
i.	No sign shall be painted onto the roof of any building.	
(b)	Maximum Height:	Does not comply. The proposed billboard will have a maximum height of 9.5m.
ii.	The maximum height of free standing signs shall be 8m.	
(c)	Maximum Face Area:	Does not comply. Each of the two display screens on the proposed billboard will have a face area of 24.5sqm.
iii.	The maximum face area of free standing signs shall be 20m².	
(d)	Illumination:	Complies. The LED screen will operate with lumination levels that will be within the maxima prescribed by the District Plan
i.	If a sign is to be lit, they shall be lit by constant illumination, and shall not flash. Such signs may be lit by directional illumination or lit from within.	
(e)	Movement:	Complies. Each variable message displayed by the proposed billboard will be static.
i.	No sign shall have any parts which are moving. This shall not preclude however any sign with a variable message, suspended signs or flags.	
ii.	No sign shall be inflated by any means.	
(f)	Temporary Signs:	Not applicable

Due to non-compliance with the conditions relating to the height and area of the proposed billboard, the proposal is not assessable as a Permitted Activity.

Clause 14B 2.2 (d) which relates to 'Controlled Activities' states that:

In all Commercial Activity Areas, ..., excluding the Petone Commercial Activity Area 1:

- (i) *Any sign erected on sites with frontage to the following roads (except where 14B 2.3 (c) applies):*

The Esplanade, Petone.

The exception clause 14B 2.3(c) as referred to in Clause 14B 2.2 (d) relates to signs in Commercial Activity Areas that do not comply with one or more of the Permitted Activity Conditions in 14B 2.1.6.

Clause 14B 2.1.6 relates to:

Permitted Activities – Conditions for signs within all commercial ...areas where signs are within 50m distance of the State Highway and the message is visible from the State Highway.

While the proposed billboard is neither within 50m of nor visible from a State Highway, (which would suggest that Clause 14B 2.1.6 is not applicable to the proposal), assessment against its conditions reveals that it is unable to meet the following conditions within 14B 2.1.6:

- (a) (ii) The sign will not be located on the site to which it relates, (as it is intended to provide for third party advertising)
- (b) (i) The sign height will exceed 8m
- (c) (i) The screen area will exceed 8m²
- (e) (i) The screen operation will not be static

Due to non-compliance with the above Clause 14B 2.1.6 conditions, it is therefore interpreted that the proposal is not assessable as a Controlled Activity.

Accordingly, Clause 14B 2.4 'Discretionary Activities' applies, on the basis that:

- (a) *In all activity areas, excluding the Petone Commercial Activity Area 1:*
 - (i) *Any permitted, Controlled or Restricted Discretionary Activity which does not comply with any of the Permitted Activity Conditions*

Clause 14B 2.4.1 provides the 'Assessment Matters for Discretionary Activities' which include:

- (a) *The matters contained in Sections 104 and 105, and Part II of the Act shall apply*
- (b) *The degree of compliance or non-compliance with any relevant Permitted Activity Conditions*

The Permitted Activity conditions, and extents of compliance of the proposal with those conditions, are listed in Table 5-1 above. The only matters of non-compliance relate to the size and height of the sign. While the conditions related to the size and height of the sign are predominantly matters related to visual amenity, in this case they are also important to road safety in that it is important that the screens are sufficiently large to enable images displayed to be readily viewed and assimilated by an approaching driver without requiring an extended gaze at the image which may then have adverse road safety effects.

There are no other Permitted Activity Conditions that relate to this traffic engineering / road safety assessment. Accordingly, The District Plan's objectives and policies have been considered, as they provide guidance in relation to the expectations of the District Plan. These are provided in 14B 1 'Issues, Objectives and Policies', and in relation to this traffic assessment, particularly 14B 1.2 'Traffic Safety and Visibility'.

The 14B 1.2 objective is

"To ensure that signs do not interfere with the safe and efficient use of all roads, cycle ways and pedestrian ways."

The three policies under this objective are of relevance as follows:

- a) *To discourage all signs being located where they will obstruct a roadway, pedestrian or cycle way, or obstruct drivers vision of an intersection or driveway.*
- b) *To encourage the use of directory boards to avoid a visual clutter of signs on one site.*
- c) *To manage the illumination of signs to ensure they do not distract drivers*

From a driver's perspective, the billboard will not create visual clutter. There are no other third-party advertising signs in the vicinity of the proposed billboard, and only a limited number of on-premises signs.

In terms of safety, the assessments described in this report show that The Esplanade traffic audiences in both the eastbound and westbound directions will have appropriate and acceptable visibility of the billboard screens to ensure safe traffic operations.

The billboard will be free-standing and will provide sufficient vertical clearance to ensure that it is well clear of any roadway, driveways or footpaths. The proposed digital display will not compromise vehicle or pedestrian safety.

Accordingly, with the adoption of the suite of conditions relating to the operation of the billboard as described in Section 6 of this report, it is assessed that there will be no identifiable adverse traffic safety effects associated with its location or operation. It is therefore concluded that from a traffic engineering and road safety perspective, the proposal aligns with the intent of the District Plan's objective and policies regarding signs.

5.4 Assessment against TCDM3 guidelines

The relevant traffic-related recommendations from the TCDM3 guideline, and the extent of consistency that the proposal has with those recommendations, are summarised as follows:

Table 5-2: TCDM3 assessment against relevant guidelines

Guideline	Comment
5.0 Placement Considerations	
5.3 Visibility of Signs - Field of Vision: signs are to be located within a driver's field of vision as per Figure 5.1. - Sight Distances: 80m visibility required in 50km/h areas - Visibility Obstruction: Clear views through driveways and intersections	Consistent with guidance. For the intended eastbound and westbound The Esplanade traffic, the proposed billboard will sit well within a driver's forward field of vision. Consistent with guidance. As described above, the billboard has advance visibilities of well more than 80m on both the eastbound and westbound The Esplanade approaches. Consistent with guidance. The height to the underside of the structure being at least 2m, and the position of the billboard on private property and within a landscaped area, ensures that it will not obstruct visibility at any driveway or intersection.
5.4 Sign Position Lateral clearance: Minimum lateral clearance between a sign and the edge of the carriageway for a speed limit of 60km/h or less is 1.5 m Signs within or over the state highway not to be located closer than 5 m to the carriageway	Consistent with guidance. The billboard is on private property and will be at least 2.5m from the road carriageway. Not Applicable. The Esplanade is not a state highway.
- Sign height: Minimum vertical clearance of 2.5 m if installed above footpaths - Minimum distances between adjacent roadside advertising signs: Minimum 50 m	Consistent with guidance. The billboard will not sit above a footpath. Consistent with guidance. As noted previously, there are no other proximate advertising signs.
5.5 Location in relation to other road features - Location & orientation relative to road: Sign legible without slowing - Proximity to traffic control devices: Recommended 100 m separation from intersections & traffic control devices	Consistent with guidance. The billboard will be readily legible without slowing. Inconsistent with guidance. As noted in section 2.1, the nearest intersection is at Nevis Street, the centre of which is located 28m to the east.
5.6 Sign Supports Clearance of sign support from through traffic lanes	Consistent with guidance. The billboard will be free standing on private property and well clear of through traffic lanes.
6.0 Sign Design	
6.1 Sign Legibility Signs legible in circumstances in which they are seen	Consistent with guidance. The billboard will be readily legible.

6.2 Sign Message Not imitate traffic signs or traffic control devices; nor give instructions to motorists; nor compete with existing directional signs	Consistent with guidance. Recommendations are provided in section 6 of this report to ensure that images displayed do not conflict with traffic control devices.
6.3 Sign Style Colour of Advertising Signs: Colours not to create a conflict with traffic control devices	Consistent with guidance. Recommendations are provided in section 6 of this report to ensure that images displayed do not conflict with traffic control devices.
6.4 Sign Layout Minimum letter heights (main message) 50km/h: 150mm	Consistent with guidance. Images on billboards routinely incorporate main messages that are intended to be legible, and therefore typically involve letter heights to ensure this.

The analyses set out in the table above demonstrate that apart from the billboard not achieving the recommended 100m separation from an intersection, it is consistent with all other relevant TCDM3 guidelines, and it satisfies the purposes and intents that sit behind the guidelines.

Further commentary in relation to the relationship of the proposed billboard to the Nevis Street intersection is provided in section 5.5 to follow.

5.5 Proximity to the Intersection

As noted in Table 5-3, the proposed digital billboard will be within 100m of an intersection.

The stated intention within TCDM3 for its recommendation of 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.). TCDM3 states that a means of achieving the objective of avoiding driver confusion or distraction is to provide 100m separation between signs and intersections, but it does not state that this is the only means of achieving that objective.

As has been described above, the billboard's location, orientation and operation are set up to avoid adverse interactions with any existing traffic control device, which in this case practically only relates to the speed limit sign located in the central median. In this case, the position and height of the proposed digital displays ensures that the screen will not visually conflict with, or detract from, a driver's ability to observe and comprehend the presence of the Nevis Street intersection ahead.

Given the above points, and especially when considered alongside the recommended conditions of consent for the billboard that are outlined in the next section of this report, it can be concluded that the reasons that have led to the TCDM3 recommendation for 100m separation of signs from intersections are inherently readily met with the design, placement and operation of the billboard as proposed, and in this regard will not be at issue in this case.

In any event, it is noted that TCDM3's 100m separation recommendation is largely impossible to achieve in practice, as urban block lengths are such that there are few locations where 100m separation from an intersection can physically be achieved. If the TCDM3 recommendation was applied literally, there would be very few signs of any kind anywhere in urban environments throughout New Zealand.

Accordingly, this report has assessed the likely implications of the presence of the billboard in relation to the adjacent intersection, taking into consideration the actual likely effects to be generated, based both on current research, and on the experiences of a growing database of billboards (including digital billboards), that are located proximate to intersections. The outcome of this analysis has been that there is little likelihood of any practical adverse impact to the safety of any intersection along The Esplanade as a result of the proposed billboard.

6 Recommended Conditions

The conditions of consent relating to traffic engineering and road safety matters that are recommended for this digital billboard are as follows:

1. Images must have a minimum dwell time of at least 8 seconds.
2. Images must transition from one to the next via a 0.5 second dissolve.
3. Image content must:
 - o be static, and not incorporate flashes, video, emissions, or other dynamic effects.
 - o not use graphics, colours, or shapes either individually or in combination, in such a way that they would resemble or cause confusion with an adjacent traffic control device. For the avoidance of doubt, the purpose of this condition is not to prohibit the use of a particular colour, but to manage the use of those colours to avoid confusion with traffic control devices.
 - o not invite or direct a driver to take some sort of driving action.
 - o not be linked to “tell a story” across two or more sequential images, that is, where the meaning of an image is dependent upon or encourages viewing of the immediately following image.
4. Image lumination must be maintained within the maxima prescribed by the District Plan, and automatically managed to respond to ambient lighting conditions.
5. The consent holder shall ensure that in the event of any malfunction of the LED's or the control system, the screen shall default to a black screen until the malfunction has been repaired.

7 Summary and Conclusions

This proposal anticipates the establishment of a free-standing, double sided digital billboard at 47 The Esplanade in Petone.

Recent research confirms that billboards with variable image digital displays are unlikely to create driver distractions to the extent necessary to generate road safety issues. Indeed, there has been no known study in New Zealand or internationally that has been able to identify either an empirical or statistical relationship between the presence of digital billboards of the type proposed in this application, and a consequential degradation in road safety.

In this regard, there is a wide evidentiary gap between the perception that digital billboards may have an adverse impact on road safety; compared to that which can be experienced, observed and monitored in the actual operation of digital billboards in New Zealand, as amply demonstrated by the fact that there has never been a recorded crash attributable to a digital billboard since their introduction into New Zealand in 2012.

This assessment has found that subject to the recommended conditions of consent as provided in section 6, the establishment of the proposed digital billboard will not generate additional distractive effects to motorists to the extent that such effects would result in any measurable deterioration to the safety, function, or performance of the local traffic environment.

Accordingly, and based on the assessments as described in this report, it is concluded that this proposal can be accepted as being consistent with the intentions of both the District Plan and TCDM3; and able to function with less than minor adverse effects to road safety or traffic operations. There is therefore, no traffic engineering reason to preclude acceptance of this proposal, nor to require additional controls on operation beyond those proposed in this report.

Appendices



Appendix A Research Basis of Assessments

Much of the published research that examines the extent that billboards might cause a distraction to motorists, which in turn might create a hazardous situation for road users, is often inconclusive or contradictory due to:

- Many of the earlier papers were produced before modern digital billboards were in common use. Consequently, they were based on theoretical studies of the distractive potential of such billboards, (often inferred by examining glance behaviours using driving simulators), and were typically unsupported by empirical or statistical analysis.
- A high proportion of the studies involved digital billboard operations that are distinctly different from those typically applied in New Zealand. For examples, the studies involved screens with overly bright displays, and/or without consideration given to image transitions, and/or which included dynamic features such as full-motion video.

More recent research now has the benefit of operational billboards to observe and measure, and in some cases have involved billboard operational characteristics that are reasonably tightly controlled (as they are in New Zealand). This more recent research tends to be more empirically based and is less contradictory.

Examples of such research is provided as follows:

A 2015 Australian paper⁶ by Carolyn Samsa describes experimental research into driver distraction that recorded results and comparisons for on-premise advertising signs, static billboards, and digital billboards. The study 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 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”.*

The key point to be drawn from Samsa (2015) is that digital billboards are no more distractive to drivers than any other sign type including standard billboards and on-premise signage.

An Australian study by Monash University which is relevant to this application, relates to situational awareness⁷. While this research examined driver responses to static image billboards in freeway situations, 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”.*

Research undertaken by Bridget Burdett (2018)⁸ who studied mind wandering, (which also relates to situational awareness), confirmed that drivers focus more on the driving task at hand when in ‘complex’ traffic environments:

⁶ 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

⁷ 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 Bridget RD Burdett, Samuel G Charlton, Nicola J Starkey “Mind wandering during everyday driving: An on-road study”, Accident Analysis and Prevention, 2018

“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”.

A November 2018 research report by ARRB⁹ involved an evaluation of the impact on driving performance of new digital billboard installations at two traffic signalised intersections in Queensland. This evaluation took the form of a video survey of vehicle control with the aim of assessing the impact of the digital billboard when lit. The video data were coded to extract lane drift, ‘stopping over the line’, and incidents.

The concluding paragraphs from the ARRB study are as follows:

“Furthermore, the ‘positive’ impact of digital billboards in the current evaluation did not occur exclusively with respect to lateral control. This effect was also observed (with one exception) for stopping over the line violations. This is important because it rules out the possibility of a very specific and hence less practically significant impact from digital billboards. Stopping over the line suggests a failure to appropriately register the red state of the signals.

This could result from ‘back dropping’ where colour contents in the billboard display are confusable with signal colours (see Austroads, 2013). The decrease in stopping over the line violations in the presence of the billboard suggests that such confusion did not occur in this evaluation. Stopping over the line violations could also result from change blindness for signal changes. While there is considerable evidence that distraction can increase change blindness in driving situations (e.g. McCarley et al., 2004) this research has mostly considered distraction from mobile phone conversations rather than external visual distraction. The decrease in stopping over the line violations in the presence of the billboard suggests that change blindness did not occur in this evaluation. Interestingly, a recent study by Pammer et al. (2014), although not concerned with a driving task per se, did find that under certain conditions in the laboratory that a visual distraction could reduce the incidence of change blindness.

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.”

This ARRB research supports other research cited, and further demonstrates that digital billboards are not inherently hazardous to drivers by creating driver distractions, and that despite common perceptions to the contrary, the reality is that their presence in complex driving situations, including signalised intersections, does not in practice result in a deterioration of road safety.

Overall, the emerging body of practical, empirically-based research that is now emerging, is increasingly confirming that digital billboards are little different from any other sort of advertising including on-premise signage; that they are not inherently distractive to drivers to the extent that they creating any observable adverse road safety effects; and that they are not inherently hazardous to the traffic environment even in complex traffic situations such as at signalised intersections.

⁹ Goodsell R, Dr Roberts. P “On-Road evaluation of the driving performance impact of digital billboards at Intersections” Project No. PRS17074 - ARRB

Appendix B Road Safety Effects from Crash Histories

There are currently in excess of 540 digital advertising screens¹⁰ in New Zealand.

In order to understand how digital signs and digital billboards impact upon road safety, an analysis has been undertaken to identify the incidence of reported traffic crashes as a result of advertising signs.

New Zealand now has some nine years' operational experience from which a fairly sound appreciation of the actual road safety implications of digital advertising screens can be gained. Accordingly, a search was made of the Waka Kotahi CAS database that encompasses the whole of New Zealand for the nine-year period since digital billboards have been operating in New Zealand, that is, 2012 to 2020. In this search, contributing cause factor 356 ("*attention diverted by advertising or signs*") has been focussed on. It is noted in this regard that this code picks up any crash that is related to distraction by any sort of sign, not just advertising signs, i.e. including traffic signs, road works sign, directional signs, and so on.

For the nine-year search period, the CAS database produced a list of 66 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 66 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:

Nature of sign	Crashes
Static advertising sign/billboard	2
On-premise sign / building / roadside stall / fuel price board	12
Traffic sign / roadworks sign	17
Directional sign / motorway gantry sign	9
Street name sign	6
Blow-up circus clown (blimp)	1
Incorrectly coded, or the nature of the sign not known but confirmed by on-site details as not a billboard	20
Total	66

Table 1: Attention diverted by advertising or signs 2012-2020

The table shows that in the whole of New Zealand over the nine years as examined, only two crashes were recorded as involving a static advertising billboard. Notably, none involved distraction by any sort of digital advertising sign. This would seem to clearly demonstrate that the presence of digital signage is not currently creating identifiable road safety problems.

In saying this, it is also relevant to put the number of sign-related crashes into perspective. During the nine-year search period there was an overall total of 301,330 recorded crashes in New Zealand. Even if the combined total of 14 crashes involving some sort of advertising is considered (that is, the two static third-party advertising signs, and the 12 first-party on-premise signs), they represent less than 0.005% of all crashes. The two static advertising sign crashes represent 0.0007% of all crashes.

During the same nine-year period, there were also 5,602 crashes that were coded as involving some sort of distraction that was external to the vehicle other than signs or advertising (that is, distraction by scenery, persons outside the vehicle, other traffic, looking for an intersection or house, etc). The 14 advertising-related distraction crashes therefore represent less than 0.25% of all crashes that have involved some sort of distraction that is external to the vehicle.

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 8,247 crashes. This represents a ratio of 589 in-vehicle distraction crashes to every one advertising related crash.

¹⁰ The 540+ digital billboards in New Zealand consist of around 300 digital advertising screens associated with bus stop shelters and pedestrian shelters, and 240+ large format digital billboards. Note that a double-sided billboard that has display screens that are directed to separate approaches are counted as two screens.

In terms of injuries, it is pertinent to note that neither of the two static advertising sign crashes resulted in an injury. Of the 12 crashes involving on-premise advertising, four resulted in an injury. For the total of 14 advertising-related crashes, this is equivalent to an average of 0.5 injury crashes per year for the whole country.

By comparison, in-vehicle distractions have produced an average of 332 injury crashes per year. If, as some of the research suggests¹¹, the presence of digital billboards helps to keep a driver looking at the road ahead instead of being distracted by elements within the vehicle, then arguably there is potentially a net road safety advantage to enabling the presence of roadside digital billboards as a means of off-setting at least some of the comparatively higher number of in-vehicle distraction crashes and injuries that are occurring.

Overall, non-advertising distractions that were external to the vehicle caused 5,602 crashes of which 1,787 resulted in an injury; and in-vehicle crashes caused a further 8,427 crashes of which 2,834 resulted in an injury. These statistics are relevant, firstly because they put the comparatively miniscule number of advertising-related crashes (14) into perspective; but secondly because they remove any argument that drivers are reluctant to admit to, or be unaware of, distraction by advertising signs, when they have no apparent difficulty in admitting to, or recalling, distraction by so many other elements that are either external to, or internal to the vehicle.

It is also noted in this regard that research from Queens University in Ireland¹² 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. 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.

In essence, there is 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.

Based on the above analyses, the following relevant conclusions can be drawn:

- Digital advertising signs and digital billboards are not featuring at all in the crash statistics, (i.e. zero recorded since digital screens were first introduced into New Zealand in 2012). As noted, there are now in excess of 520 digital advertising screens operating in New Zealand.
- Static third-party advertising signs have featured only twice in the past nine years. Neither of them resulted in an injury.
- Even when including on-premise advertising signs that include roadside stalls and service station fuel price boards, there were only 12 recorded crashes over nine years, and these resulted in just four injuries.

The point to be made from all the above is that despite some perceptions to the contrary, empirically based evidence confirms that digital billboards, operated as they do in New Zealand, do not generate discernible road safety effects, even when concerted efforts are made to find those effects.

¹¹ Including Young *et al* (2015), Goodsell *et al* (2018), and the ARRB "Bull Creek LFDS Evaluation" (2016)

¹² 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.

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