TRAFFIC ENGINEERING

Department of Planning and Environment

Proposed advertising sign on north-western corner of Pacific Highway/ Government Road intersection, Hornsby

Peer review of Safety Assessment Report

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Peer review of Safety Assessment Report

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This report has been prepared for Department of Planning and Environment.

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1 Introduction

JCDecaux is seeking approval for a digital advertising sign on the north-western corner of the Pacific Highway / Government Road intersection, Hornsby. The proposed digital sign would face south and be visible by northbound road users on Pacific Highway as well as eastbound (outbound) drivers from Government Road. The sign would have an approximate display area of 14.93m^2.

A Signage Safety Assessment (herein referred to as the "Safety Assessment") was prepared by TTPP and documented in the report entitled:

> *Pacific Highway, Hornsby –Digital Sign Safety Assessment*, marked as version V04 and dated 1/2/2024.

The Department of Planning and Environment has requested DC Traffic Engineering Pty Ltd (DCTE) to carry out a peer review of the above report. This report details the peer review findings in these respects.

It is important to note that in any road safety review, there will always be an element of subjectivity and professional judgement. The assessment carried out by TTPP is subjective, and likewise, this peer review is also subjective. However, it is hoped that this peer review will offer additional confidence in the decisions that are ultimately made regarding this project. This report should act as a "second opinion".

To simplify the peer review and to avoid misrepresenting the assessment from the TTPP report, this peer review has been structured in a side-by-side format. The table in Section 2 of this report contains the original report extracts, reproduced verbatim in the left-hand column. This is accompanied by the peer review assessment by DCTE in the right-hand column.

In venturing into this peer review, DCTE would like to express that this peer review was carried out objectively and with respect for TTPP as technical advisors and consultants. Any critique contained within this report is not intended to disparage the work carried out by TTPP and this peer review is confined to technical commentary and justifications as much as practicable.

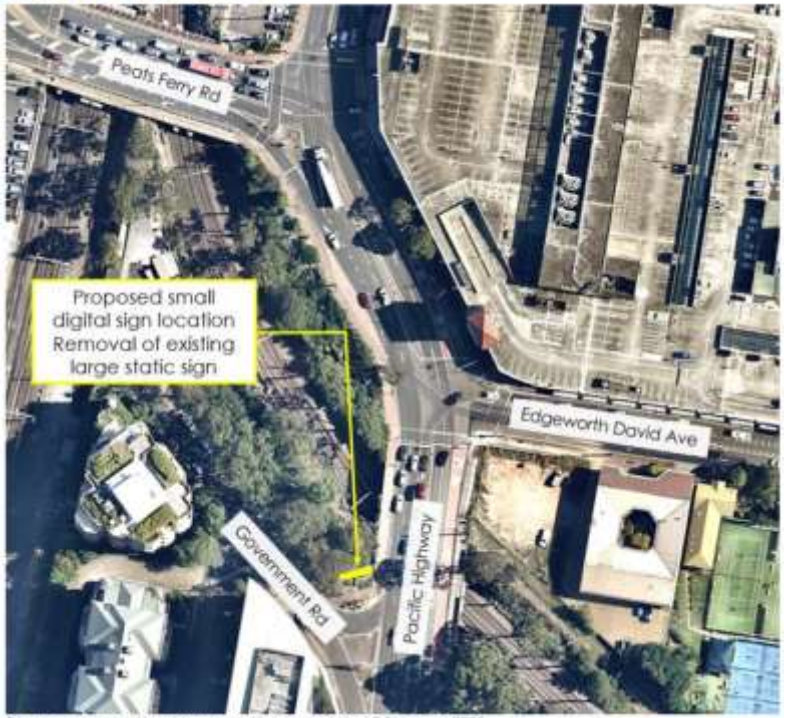
2 Peer review commentary on the Safety Assessment report

The original extracts from the TTPP report and the DCTE peer review comments are provided in the left and right-hand columns of Table 1 respectively.

Table 1 Original report extracts from TTPP report (Safety Assessment report) and peer review commentary.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
1 Introduction 1.1 Overview JCDecaux is seeking approval for the installation of a LED digital illuminated sign on the north-western corner of the Pacific Highway and Government Road intersection located in Hornsby. The proposed sign would face northbound travel lanes on Pacific Highway. The Transport Planning Partnership (TTPP) has been commissioned by JCDecaux to undertake a signage safety assessment. This assessment has been carried out in accordance with Department of Planning's Transport Corridor Outdoor Advertising and Signage Guidelines, November 2017 (Guidelines) and State Environmental Planning Policy - Industry and Employment (Industry and Employment SEPP). The Guidelines outline best practice for the planning and design of outdoor advertisements in transport corridors. The Industry and Employment SEPP sets out rules regarding outdoor advertising signage for permissible locations and exempt developments.	No further comments.
1.2 Purpose of this Report The aim of this assessment is to determine the suitability of the proposed digital sign and provide recommendations on mitigation measures to alleviate impacts on the surrounding road network. This report sets out the findings of TTPP's signage safety assessment for the proposed digital sign on Pacific Highway. The following items have been considered in this report: • Potential for the sign to obstruct or distract a driver's view of the road, traffic control devices, and merge/diverge points at entry and exit ramps. • Distance from upstream or downstream decision points such as merge and exit ramps. • Potential for the sign to distract at a critical or for an extended period of time. • Location relative to the carriageway and its potential to be a physical obstruction for vehicles or other road users. • Appropriate dwell times based on the speed environment. • Location in relation to other signage.	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
1.3 References In preparing this report, reference has been made to the following: • An inspection of the sign location from a driving viewpoint along the Pacific Highway carried out on Thursday 2 February 2023. • Austroads Guide to Road Design Part 3, Geometric Design, 2016. • Transport Corridor Outdoor Advertising and Signage Guidelines, November 2017 by Department of Planning and Environment. • State Environmental Planning Policy - Industry and Employment (Industry and Employment SEPP)	No further comments.
2 Proposal Description 2.1 Location Details A new digital sign is proposed to be installed on the north-western corner of the Pacific Highway and Government Road intersection in Hornsby. There is an existing non-digital (static) sign in the same location as the proposed digital sign. The existing static sign which is backlit, and has a width of 12.660 m and a height of 3.350 m (42.41 m^2 area). The sign is located on the Pacific Highway corridor which has a posted speed limit sign of 60 km/h. In the vicinity of the proposed sign, Pacific Highway has two northbound through travel lanes and one short dedicated right turn lane approximately 220 m in length extending from Edgeworth David Avenue. A short left turn slip lane from Pacific Highway to Government Road commences approximately 60m south of the proposed digital sign. An aerial image of the sign location and surrounding environs is shown in Figure 2-1.	The northbound right-turn lane to Edgeworth David Avenue should not be referred to as “short”. This is 250m from diverge taper to the hold line which is a significant road length allowing deceleration, queueing, stop-start in response to the traffic signal controls, and diverge/ lane changing movements when accessing this lane. The proposed advertising sign would be visible from the start of this right turn lane when the diverge/ lane changing movements would tend occur. It would remain visible for a further 190m covering the likely deceleration zone as well as the queuing space. For context the 220m length of this lane that has full-width and no taper would be able to accommodate 36 passenger cars assuming a maximum length of 5m per car and 1m of buffer to the vehicle in front.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-1: Signage Location  Basemap source: NearMap, aerial imagery dated 8 February 2023	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
2.2 Description of Proposed Signage As per the Industry and Employment SEPP, the advertising display area is defined as follows: *"advertising display area means, subject to subclause (2), the area of an advertisement or advertising structure used for signage, and includes any borders of, or surrounds to, the advertisement or advertising structure, but does not include safety devices, platforms or lighting devices associated with advertisements or advertising structures."* On the above basis, the advertising display area of the proposed digital sign would be 14.93 m² (3.172 m width by 4.708 m height). The visual display area (the screen alone) would be 14.16 m² (3.072 m width by 4.608 m height). The digital screen would be installed on a column (a monopole-like structure) set upon a steel cladding which would visually appear as a thin border around the visual screen. The base of the sign will be elevated approximately 3.35m above the road surface of Pacific Highway. The proposed digital sign would be used by JCDecaux to promote its sponsors and third-party advertising. The digital sign would contain text and images.	No further comments.
2.3 Signage Exposure The proposed digital sign would be visible to northbound traffic travelling on the Pacific Highway near Government Road, as shown in Figure 2-2. A site visit was undertaken on Thursday 2 February 2023 to inspect driver sight distances on approach to the proposed digital sign location and observe any potential crash hazards likely to result from the proposed digital sign. A description of the site investigation findings is provided herein.	The sign would also be visible by a driver and road users heading eastbound and westbound on Government Road. The sign would be visible by (mostly) northbound pedestrians and cyclists on the western footpath of Pacific Highway. Path users on the eastern side of Pacific Highway would also be able to see the sign.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-2: Pacific Highway Northbound (approaching Edgeworth David Avenue)  Source: Photograph taken by TTPP on 02/02/2023	No further comments.
2.3.1 Pacific Highway South Approach (Northbound Direction) The lane configuration on the Pacific Highway northbound carriageway in the vicinity of the proposed digital sign is shown in Figure 2-3. The northbound through travel lanes and dedicated turn lanes are numbered and shown in Figure 2-3.	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-3: Pacific Highway Northbound Lane Configuration  	No further comments.
• There is no digital sign within 150m from the proposed digital sign location. • Beyond the proposed sign in the northbound direction, small static advertising signs are located on both sides of the Pacific Highway bridge as well as on the Westfield Shopping Centre's building façade. • There is an advance directional and information sign on an overhead gantry structure located approximately 20 m prior to the proposed digital sign facing northbound traffic. Based on our site inspection, the directional and information sign on the overhead gantry and the existing static sign do not overlap for motorists travelling northbound on Pacific Highway, hence the proposed digital sign would not obscure visibility of the directional and information sign. • Treating the observed conditions during the site inspection as the typical conditions in the area, the digital sign would likely be visible in traffic lanes as follows: o In northbound through lane 1, 100 m from the sign o In northbound through lane 2, 105 m from the sign o In northbound right turn lane, 115 m from the sign o The Government Road left turn slip lane, 60m from the sign.	Although the directional sign and the proposed advertising sign would not overlap each other. These are in the same field of view for the northbound motorist. The proposed advertising sign, its displayed content and the transitions to new displayed content could "out-compete" the directional sign and the traffic signals for the driver's attention. Drivers would also need to be vigilant of dynamic traffic conditions including slow-moving queues, stop-start conditions and changing headways, and lane changing movements.
The likely visible distance and readable distance in each lane on approach to the sign is shown in Figure 2-4 to Figure 2-6.	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-4: Northbound Approach Sign Exposure – Through Lane 1 	No further comments.
 Source: Photograph taken by TTPP dated 02/02/2023	No further comments.

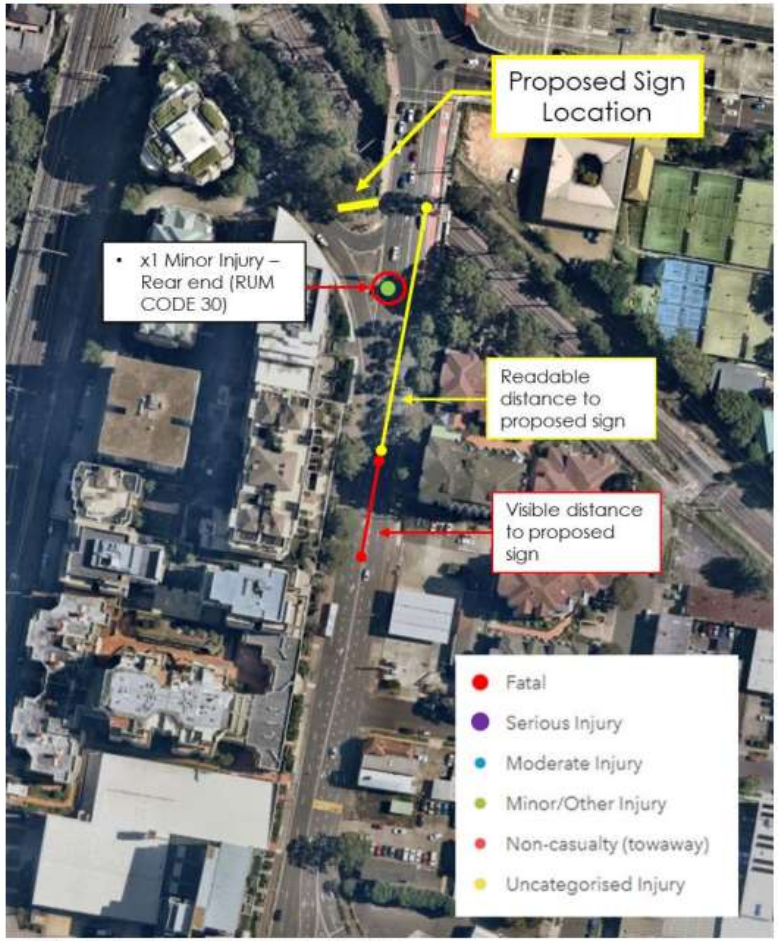
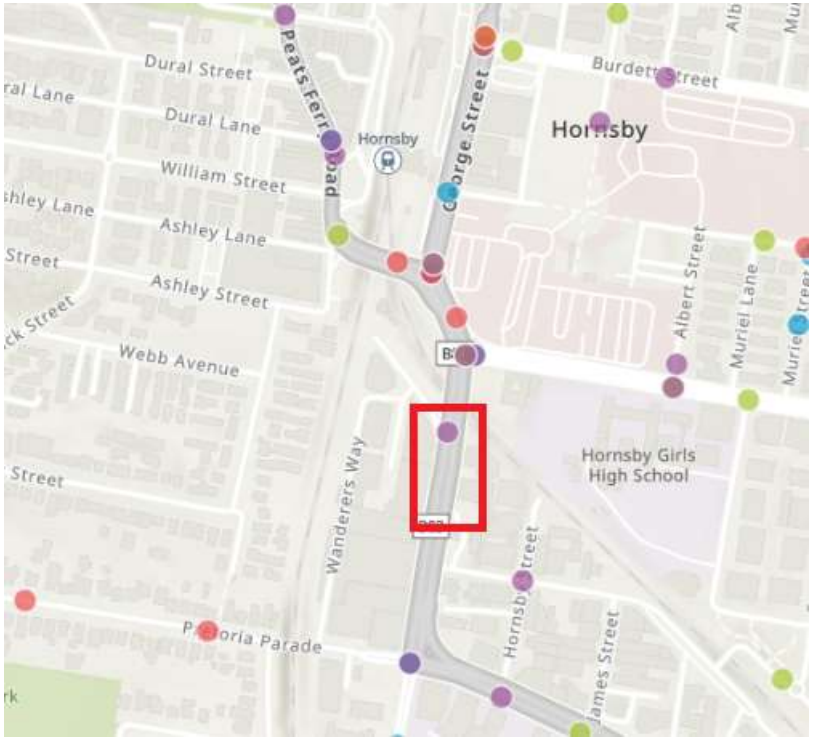
Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-5: Northbound Approach Sign Exposure – Through Lane 2 	No further comments.
 Source: Photograph taken by TTPP dated 02/02/2023	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-6: Northbound Approach Sign Exposure – Right Turn Lane 	No further comments.
 *Source: Photograph taken by TTPP dated 02/02/2023*	No further comments.
The visible and readable distance for the left turn slip lane to Government Road is the same, as the lane commences approximately 60 m from the Pacific Highway kerbside northbound through lane.	No further comments.

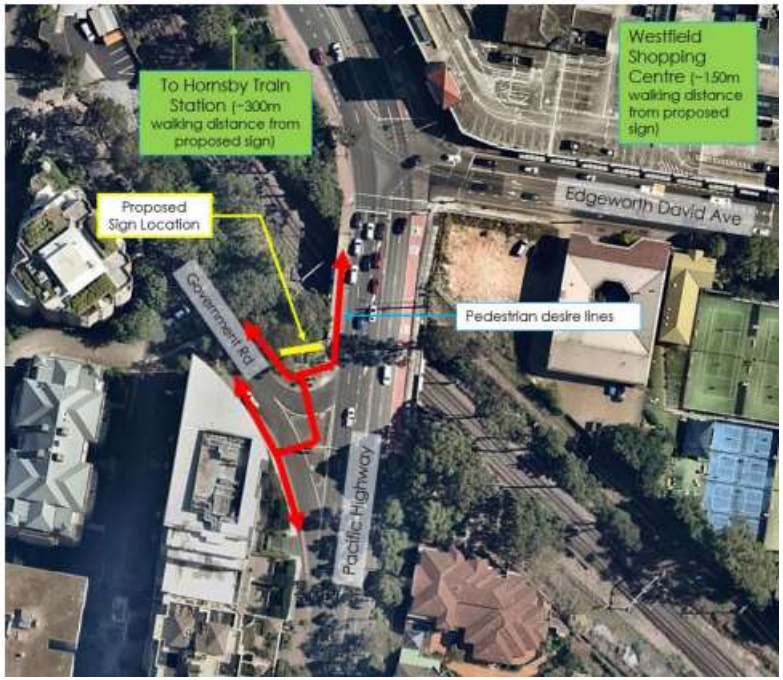
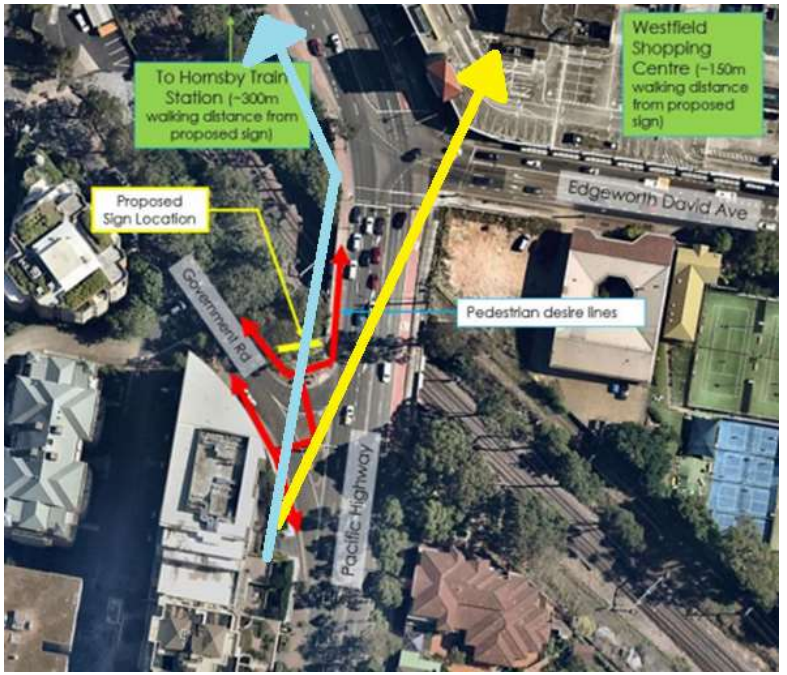
Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
2.4 Crash History Historic crash data has been obtained from Transport for NSW (TfNSW) Sydney Crash Data and assessed for crash incidents on the Pacific Highway northbound lanes on approach to the proposed digital sign. The left turn slip lane from Pacific Highway into Government Road, as well as the left turn slip lane from Government Road into Pacific Highway were also reviewed. Crash history has been assessed for the most recent five-year period for data collated and published by TfNSW. This period is between 1 January 2017 and 31 December 2021. Crash data has been reviewed within the **readable** distance of the proposed sign location which is up to approximately 95 m from the proposed digital sign. Within the readable distance in the northbound direction, there was only one crash record that resulted in a minor injury.	Crash data analyses have significant limitations, especially when attempting to use these to support proposals for advertising signs. The peer reviewer raises the following issues: ▪ Despite widespread perceptions on roads and their road safety performances, in reality, crashes are still relatively rare events. As rare events, a low frequency of crashes at a given location should not be dismissed as a lack of a problem. For example, at this site, there was one reported crash in the five-year crash dataset period. This is downplayed as a small number, ie. "there was only one crash…" However, given that there should be little public tolerance for any crashes at all, the occurrence of one crash indicates that there is in fact a problem, and a likelihood of recurrence. ▪ The occurrence of one singular crash is not surprising since the study length of road was severely limited to the "readable" distance of the digital sign. A more comprehensive analysis would have examined the likelihood of crashes in the wider environment and concluded that such crashes could easily occur at the subject site. There is also an incorrect assumption that once the subject digital advertising sign is installed, it will only affect road users during the "readable" distance. This is flawed since the driver will be able to *see* the sign for a greater length prior to being able to *read* the sign. Any image content or colouring could be distracting. This could also conflict with other signs and traffic control devices (eg. traffic signals). Also, the analyst assumes that if the driver cannot see the sign, they cannot be distracted by its content. By contrast, the advertised content may have a momentum effect and create a lasting impression, with the potential distraction continuing long after the driver has seen the sign. ▪ The analyst has also made an assumption that the crash locations were accurately geocoded. This is often not the case, especially when crashes occur in midblock sections. In such circumstances, the police compiling the crash report would often estimate the distance of the crash event to an identifying feature such as a side road. This is a major source of error when analysts put their trust in the geocoded locations of crashes. Geocoding of crash locations is also somewhat misleading as it most often represents where the crashed vehicles came to rest. In reality, a trigger for a crash event may occur at a finite point (eg. where a driver was distracted), and the error made by the driver was unrecoverable, with the actual crash event occurring a significant distance downstream, which was then recorded as the crash location and "where the crash happened". ▪ The limitation of the study length to the "readable distance" has little logic. The analyst is attempting to prove that this is a relatively low risk road environment to introduce an additional risk such as a digital advertising sign. However, the subject advertising sign, in the proposed form as a digital sign, does not yet exist and has not yet had the opportunity to distract or affect road users. The crash history should only be used as background context, and nothing more. This report, and any future report should take that position.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
There was no other crash incident between the **visible distance** and the readable distance (i.e. remainder of the segment within the visible distance). The two slip left lanes along Government Road do not have any historic crash record as well within the 5-year period. A summary of the crashes is presented in Table 2.1, while the crash location and incident description are illustrated in Figure 2-7. **Table 2.1: Crash Type and Severity** See table below.	See previous page.

Location	Crash Type	Crash Severity (No. of Crashes)				
		Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Within **readable** distance of digital sign on Pacific Highway (approximately 5 - 95 m from proposed digital sign)	Rear End (RUM CODE 30)				1	
Within **visible** distance of digital sign on Pacific Highway (approximately 95 - 115 m from proposed digital sign						
		NIL	NIL	NIL	1	NIL

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 2-7: Crash Location in Recent 5-Year Period  *Data Source: Transport for NSW's Sydney Crash Data*	Further to the second bullet point above, the apparent low-frequency of crashes was largely due to the limited spatial coverage of the crash study, being a 95m length of road upstream of the proposed sign. This study length is boxed in red below. However, as shown by the numerous other dots (crash events), a wider spatial coverage indicates a propensity for crashes across the wider network. If a more macroscopic view was taken, and an appreciation that crashes in the wider network could have just as easily happened at the subject location, a much different narrative would be created, ie. that the subject site is in fact a moderate to high risk site to begin with.  Extract from the Transport for NSW interactive crash map, showing crashes in the wider network for the five year dataset period from 2018 to 2022.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
3 Statutory Requirements This section of the report assesses the compliance with the safety assessment criteria established in the NSW Guidelines and the State Environmental Planning Policy – Industry and Employment (Industry and Employment SEPP). It requires analysis as to whether the proposal would reduce the safety of: ▪ Any public roads ▪ Pedestrians and cyclists ▪ Pedestrians by obscuring sight lines from public areas. The proposed design has been assessed against the relevant statutory requirements and guidelines. In order to assess any new installation against the key safety assessment criteria, a series of detailed criteria are set out in Section 3.2 *Advertisements and Road Safety* of the NSW Guidelines.	No further comments.
3.1 Industry and Employment SEPP – Schedule 5 Clauses 1 to 7 of the Industry and Employment SEPP – Schedule 5 refer to aspects that are unrelated to road safety, as outlined in Appendix A. However, Clause 8 is related to road safety, and thus, is covered under this signage safety assessment as follows: ***(a) Would the proposal reduce the safety for any public road?*** ***(b) Would the proposal reduce the safety for pedestrians or bicyclists?*** ***(c) Would the proposal reduce the safety for pedestrians, particularly children, by obscuring sightlines from public areas.*** The digital sign is proposed to be located on the western side of Pacific Highway, and on the northern side of Government Road. Site observation indicates that the existing static sign does not obscure visibility of both pedestrians and motorists. Based on our site observation, pedestrian activity in the vicinity of the proposed sign is moderate due to the proximity to Hornsby Train Station and Westfield Shopping Centre.	Clause 7 is not unrelated to road safety. It questions the following: ▪ Would illumination result in unacceptable glare? ▪ Would illumination affect safety for pedestrians, vehicles or aircraft? These issues have not been examined in the safety assessment.
Within the vicinity of the proposed sign, the pedestrian desire lines are indicatively shown in red in Figure 3-1. A pedestrian footpath is provided along Pacific Highway, whilst no formalised crossing facilities are provided across the Government Road left turn slip lanes. The crash analysis discussed in Section 2.4 indicates that there was no crash incident that involved pedestrians or cyclists during the most recent 5-year period, indicating no crash in the vicinity that can be specifically associated with the existing static sign. Since the proposed digital sign would be maintained at the same position, the proposal is not likely to reduce safety for motorists, pedestrians or cyclists.	The link between existing safety performance (based on the crash history) and the likely post-project safety performance is not valid. The existing sign is a static, back lit sign analogous to a poster drawing someone's attention. The proposed device will be a digital media sign with changing frames. It would be analogous to a mobile phone or computer screen drawing someone's attention. In modern times, digital screens tend to out-compete static images in winning a person's attention. Furthermore, the change of display frames would attract attention and beg persons to view the sign, even if momentary. The nature of the distraction of the proposed digital sign would be quite different to that of a static sign. In these respects, the peer reviewer does not agree with the concluding statement "the proposal is not likely to reduce safety for motorists, pedestrians or cyclists."

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 3-1: Pedestrian Desire Lines Near the Proposed Digital Sign 	The desire lines depicted in Figure 3-1 largely assume that all pedestrians will comply and be sensible. The true desire lines are based on the relative attractiveness of end destinations, and how much "gravity" each individual destination has. The major attractors and generators in the local area would be the local schools, the train station and the shopping centre. Using the shopping centre and the train station as selected examples, the desire lines are more likely to be represented by the yellow and blue arrows. These desire lines are based on the "pull direction" of each attractor/ generator. Pedestrians/ walking is the most fluid and unrestricted transport mode and assuming no mobility and visibility constraints, and traffic conditions that can accommodate, many pedestrians will use the shortest route available, even if it is a non-conforming route. 

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
	As an uncontrolled crossing, the onus is on the pedestrian to check for conflicting traffic that could be moving into and out of Government Road. When crossing from south to north over the inbound lane of Government Road (the foreground of the photo to the left), the pedestrian would need to look to their right shoulder to check for oncoming northbound left-turning traffic. The proposed advertising sign is a potential distractor in this regard. If the pedestrian fixates on the advertising sign, and fails to check (and re-check) to the right, they could step onto the road when there is an insufficient gap. This could give rise to a left-turn on pedestrian crash. Similarly, when the same south-to-north pedestrian wishes to cross the outbound lane of Government Road, they would need to look to their left (down the hill) for suitable gaps in Government Road. If they are distracted by the advertising content, they could step onto the road without observing outbound vehicles. This could give rise to a *vehicle-pedestrian* crash. If the pedestrian's optical sense is compromised through distraction by the advertising sign, there would be increased reliance on other senses, such as audible sense. The increase in electric vehicles means there are many more "silent vehicles" on the road network. Along with bicycles, e-bikes and e-scooters, these are all sources of quiet, yet fast-moving conflicting vehicle movements. As such, the *vehicle-pedestrian* crash risk is also exacerbated through the natural shift to electric-powered vehicles.
Assessment of the proposal in accordance with the Department of Planning's Transport Corridor Outdoor Advertising and Signage Guidelines has been undertaken in the following section.	No further comments.
3.2 Transport Corridor Outdoor Advertising and Signage Guidelines – Digital Signs Criteria (Section 2 of Guidelines) The Transport Corridor Outdoor Advertising and Signage Guidelines specify criteria which are directly applicable to the assessment of digital signs. The criteria have been assessed in Table 3.1. Some of the criteria are related to signage content and would need to be addressed by the operator. In addition, these criteria should be included as part of the consent conditions for the proposal to ensure future compliance.	The deferment of responsibility to the advertising device operator is not acceptable. If this assessment is limited to whether the advertising device (with no consideration of display/ content) is safe or not, the risks would be extremely downplayed. For example, the risks of an advertising device as a blank screen would be limited to issues such as (i) whether the device is a crash hazard, (ii) whether the device is an obstruction hazard. The risks could be portrayed as being relatively benign, especially in an urban and hence relatively low-speed environment. This fails to acknowledge that the device, is the medium on which a more impactful risk might be introduced into the road transport system, ie. the medium on which image and text content would be displayed, and where, in most cases, the content is totally unrelated to the operation of the road. The very essence of advertising is to attract attention (even if this means distracting viewers from their previous task). Advertising content is crafted to pique interest and curiosity and even provoke viewers. It is often created from a long consultative and workshopped process to influence viewers and leave a lasting impression. Based on the nature of advertising content in these respects, the assessment MUST assume a worst-case scenario. That is, that the viewer would be extremely distracted by the advertising content, regardless of what content is displayed. The distraction potential of the advertising content is one and the same with the advertising medium/ device. Therefore, whilst individual content (that does not yet exist) cannot be assessed, the assessment should assume that it will be highly distracting in nature, and even use previous advertising content as examples.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Table 3.1: Digital Sign Criteria (Section 2 of Guidelines)	Responses to A, B and C should be: A condition of consent should be stipulated to this effect. A condition should also be issued that failure to comply will result in termination of the advertising rights and possible decommissioning of the device. The response to C should also stipulate as a condition of consent, that a post-installation and operational period road safety audit should be completed. The requirements for G and H should be captured via a condition of consent. Criteria H should be quantified, ie. no more than X pieces of information on the advertising sign and no more than 1 line of text with Z characters. It should be noted that in the northbound direction leading up to the proposed advertising sign, there is a directional sign with seven pieces of information, traffic signals with six aspects, three traffic lanes with variable queue length and congestion conditions, and dynamic traffic conditions. The amount of information on the advertising signs should be severely limited with strict conditional guidelines, eg. no phone numbers, minimal words and lettering, simple and straightforward imagery etc.

	Criteria, for Signs greater than or equal to 20 m²	Comments
A	*Each advertisement must be displayed in a completely static manner, without any motion, for the approved dwell time as per criterion (d) below.*	Relates to sign content only.
B	*Message sequencing designed to make a driver anticipate the next message is prohibited across images presented on a sign and across a series of signs.*	Relates to sign content only.
C	*The image must not be capable of being mistaken:* *i. for a prescribed traffic control device because it has, for example, red, amber or green circles, octagons, crosses or triangles or shapes or patterns that may result in the advertisement being mistaken for a prescribed traffic control device, or* *ii. as text providing driving instructions to drivers.*	Relates to sign content only.
D	*Dwell times for image display are:* *i. 10 seconds for areas where the speed limit is below 80 km/h.* *ii. 25 seconds for areas where the speed limit is 80 km/h and over.*	As detailed in Section 3.3.2.2 a dwell time of 10 seconds would typically be suitable for the proposed digital sign. However, it is recommended to increase the dwell time (e.g. up to 15 seconds) for the digital sign given that it is in close proximity to traffic signals.
E	*The transition time between messages must be no longer than 0.1seconds, and in the event of image failure, the default image must be a black screen.*	An almost instantaneous transition is likely to reduce the additional distraction potential for digital signs. It is assumed that this operational requirement would be met.
F	*Luminance levels must comply with the requirements in Section 3 (Transport Corridor Advertising Signage Guidelines).*	This sign would be classified as Zone 3. Zone 3 covers areas with generally medium off-street ambient lighting e.g. small to medium shopping/ commercial centres. Refer to the lighting assessment report for further information.
G	*The images displayed on the sign must not otherwise unreasonably dazzle or distract drivers without limitation to their colouring or contain flickering or flashing content.*	It is assumed that this operational requirement would be met.
H	*The amount of text and information supplied on a sign should be kept to a minimum (e.g. no more than a driver can read at a short glance).*	Relates to sign content only.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering

	Criteria for Signs greater than or equal to 20 m²	Comments
I	Any signs that is within 250 metres of a classified road and is visible from a school zone must be switched to a fixed display during school zone hours.	The sign is not visible from within a school zone, and therefore, would not be required to be conditioned as so.
J	Each sign proposal must be assessed on a case by case basis including replacement of an existing fixed, scrolling or tri-vision sign with a digital sign and in the instance of a sign being visible from each direction, both directions for each location must be assessed on their own merits.	Noted.
K	At any time, including where the speed limit in the area of the sign is changed, if detrimental effect is identified on road safety post installation of a digital sign, RMS reserves the right to re-assess the site using an independent RMS-accredited road safety auditor. Any safety issues identified by the auditor and options for rectifying the issues are to be discussed between RMS and the sign owner and operator.	Noted.
L	Sign spacing should limit drivers' view to a single sign at any given time with a distance of no less than 150m between signs in any one corridor. Exemptions for low speed, high pedestrian zones or CBD zones would be assessed by RMS as part of their concurrence role.	Not applicable as the sign is less than 20 m². Criteria is applicable to signs greater than 20 m².
M	Signs greater than or equal to 20sqm must obtain RMS concurrence and must ensure the following minimum vertical clearances: i. 2.5m from lowest point of the sign above the road surface if located outside the clear zone ii. 5.5m from lowest point of the sign above the road surface if located within the clear zone (including shoulders and traffic lanes) or the deflection zone of a safety barrier if a safety barrier is installed. If attached to road infrastructure (such as an overpass), the sign must be located so that no portion of the advertising sign is lower than the minimum vertical clearance under the overpass or supporting structure at the corresponding location.	Not applicable as the sign is less than 20 m². Criteria is applicable to signs greater than 20 m².

The proposed advertising sign would be approximately 220m north of and outside the Pacific Highway school zone associated with Barker College. The Edgeworth David Avenue school zone associated with Hornsby Girls High School is also 75m east of the Pacific Highway, and a mere 130m walking distance from the subject advertising sign. Although the sign is strictly outside the spatial extents of both school zones, the spirit/ philosophy of the guidelines should be considered and followed. The guidelines are attempting to minimise safety and distraction risks in environments where and when there are (i) a high volume of children-pedestrians about and (ii) a high volume of school-based road traffic. The presence of children-pedestrians and school-based road traffic does not terminate at the boundaries of the school zones and significant carry over traffic and movements would be expected. For example, many school children from both schools would continue walking on footpaths and make road crossing movements long after moving out of the school zones. The railway station and the shopping centre would be two major attractors and both of these end-destinations (or start-destinations in the case of trips to school) are outside the school zones' boundaries. Based on the high carry over traffic, the advertising sign should be considered to be within a school environment and the still-framed requirement of item I should apply.

Further to item J, the replacement of a fixed advertising sign with a digital media device is not considered a like-for-like replacement. The 15 second dwell time (and maximum 0.1 second transition time), means that up to 5721 individual advertising frames could be displayed in a single 24-hour day. Most drivers would have the opportunity to see at least two display frames coupled with the anticipation/ curiosity to wait and observe the next coming frame. The mere fact that this is a digital display also makes it more inviting. In the modern time, digital displays such as mobile devices, tablets, TVs and computer screens tend to be more appealing and eye-catching compared with printed material.

Item K reserves the right for a post-installation road safety audit, which is meritorious. However, this may be too late and after the fact. The development assessor should consider a requirement by applicants to produce a simulated drive-through animation showing the changes in advertising display as a driver is negotiating the route. The "artists impression" imagery in the application documents do not sufficiently showcase the potential distraction to drivers and road users. Further to this point, item K suggests that the post-installation identified risks would be managed and mitigated. There is no acknowledgement that Transport for NSW, as the delegated road authority has powers to remove the advertising sign altogether. This is important as it encourages applicants to "get it right the first time".

The response for item M is accepted. However, both applicant and assessor need to be aware of the philosophy and spirit of the guidelines. Objects that are placed less than 5.5m vertical clearance from the road surface are potential clash hazards for tall vehicles. If a sign, or any part of it, had less than a 5.5m vertical clearance and above a traffic lane (or within the clear zone run out space), it could be impacted by a vehicle. This would be a hazard regardless of whether it is larger than or smaller than 20 square metres. The reference to 2.5m vertical clearance for areas outside the clear zone refers to minimum space required for pedestrians to pass under the sign without head clashes. Such a sign would be a head clash hazard regardless of whether it was larger than or smaller than 20 square metres. Later on in this peer review, it is demonstrated that the clear zone requirement for this road is in fact, at least 5m as a minimum. This means the proposed advertising sign and its proposed position lies in the clear zone and that it should observe a 5.5m vertical clearance.

Original extract from the Safety Assessment			Peer review commentary from DC Traffic Engineering
N	*An electronic log of a sign's operational activity must be maintained by the operator for the duration of the development consent and be available to the consent authority and/or RMS to allow a review of the sign's activity in case of a complaint.*	Not applicable as sign less than 20 m². Criteria is applicable to signs greater than 20 m².	With respects to item N, again the philosophy of the guidelines needs to be considered. The reasoning for this is to maintain a record of what advertising content was displayed at what time on what day. Digital advertising signs, regardless of size, are potential distractors. In the event of a complaint, or claim that the sign and its content was a distraction factor, it would be necessary to determine which advertising content was responsible for the distraction and allow actions to be taken to remove the content or relocate it to other locations. The threshold of 20 square metre size is irrelevant. An electronic log should be stipulated as a condition of consent. With respects to item O, appropriate bonds/ security should be retained for the 18 month period and beyond to ensure that obligations for the road safety check, and any rectification work are carried out.
O	*A road safety check which focuses on the effects of the placement and operation of all signs over 20sqm must be carried out in accordance with Part 3 of the RMS Guidelines for Road Safety Audit Practices after a 12-month period of operation but within 18 months of the signs' installation. The road safety check must be carried out by an independent RMS-accredited road safety auditor who did not contribute to the original application documentation. A copy of the report is to be provided to RMS and any safety concerns identified by the auditor relating to the operation or installation of the sign must be rectified by the applicant. In cases where the applicant is the RMS, the report is to be provided to the Department of Planning and Environment as well.*	Not applicable as sign less than 20 m². Criteria is applicable to signs greater than 20 m².	
3.3 Transport Corridor Outdoor Advertising and Signage Guidelines (Section 3 of Guidelines) 3.3.1 Sign Location Criteria *3.3.1.1 Road Clearance* ***(a) The advertisement must not create a physical obstruction or hazard. For example:*** ***i. Does the sign obstruct the movement of pedestrians or bicycle riders? (e.g. telephone kiosks and other street furniture along roads and footpath areas).*** ***ii. Does the sign protrude below a bridge or other structure so it could be hit by trucks or other tall vehicles? Will the clearance between the road surface and the bottom of the sign meet appropriate road standards for that particular road?*** ***iii. Does the sign protrude laterally into the transport corridor so it could be hit by trucks or wide vehicles?*** The proposed digital sign would be installed on a column (a monopole-like structure) within the existing vegetated area on the north-western corner of the Pacific Highway and Government Road intersection. The edge of the proposed sign would be offset approximately 1m from the edge of the pedestrian footpath along Pacific Highway and approximately 4m from the road. The proposed sign would be approximately 4m from the edge of the pedestrian footpath along Government Road and approximately 8m from the road. Hence, the sign would not protrude over the pedestrian footpath and road carriageway. The sign would not physically obstruct any vehicle, pedestrian, and cyclist movements.			No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
(b) Where the sign supports are not frangible (breakable), the sign must be placed outside the clear zone in an acceptable location in accordance with Austroads Guide to Road Design (and RMS supplement) or behind an RMS-approved crash barrier. The proposed digital sign would be installed on the western side of Pacific Highway (approximately 4m away), and Government Road (approximately 8 m away). The monopole supporting the sign is located approximately 6m from the edge of the road of Pacific Highway. The Austroads Guide to Road Design Part 6 states that a clear zone is the area adjacent to the traffic lane that should be kept free from features that would be potentially hazardous to errant vehicles. The proposed digital sign is located within an urban area where there is kerb and guttering which would redirect an errant vehicle. Therefore, the proposed sign is deemed to be in an acceptable location according to the Austroads Guide to Road Design.	The safety assessment has concluded that the subject sign is deemed to be in an acceptable location according to the Austroads Guide to Road Design, with respects to clear zone offset. However, this has not been demonstrated or quantified. The guiding document is the Austroads *Guide to Road Design part 6 – Roadside design, safety and barriers*. In particular, Table 4.1 of that Guide provides recommended clear zone distances for each design speed category and design ADT (see table below). For the category of >6000 vehicles per day (ADT), and an embankment/ batter slope of 6H:1V, the minimum clear zone envelope should be 5m. In this respect, the 4m offset of the sign from the Pacific Highway is not sufficient and this would be a clear zone crash hazard. Further to the above assessment, typically when setting minimum design parameters for a road, a design speed of 10km/h higher than the posted speed limit is selected. Since the posted speed limit is 60km/h on the subject section of Pacific Highway, a more conservative design speed of 70km/h should be used. This implies that the clear zone offset should actually be 6.5m (see table below). This means the monopole is also in the clear zone and could constitute a *run off road* crash hazard. The safety assessment also states that since there is kerb and gutter provided, that this provides re-directive capability. This is over-stated. The kerb is 150mm high and cannot act as a safety barrier capable of fully containing and re-directing an errant vehicle. It is true that some degree of re-direction is possible, but this would be at very low speeds such as when vehicles strike the kerb when performing a parallel parking manoeuvre. When vehicles strike the kerb at higher speeds, they are much less likely to be contained and re-directed. Furthermore, the vehicle may launch and separate from the ground surface which means that any corrective steering and braking would be limited due to the reduced tyre-to-ground contact. This is the case for most vehicles and their wheel-suspension capabilities. **Table 4.1: Clear zone distances from edge of through travelled way**

Design speed (km/h)	Design ADT	Clear zone width (m)					
		Fill batter			Cut batter		
		6:1 to flat	4:1 to 5:1	3:1 and steeper[2]	6:1 to flat	4:1 to 5:1	3:1 and steeper[2]
≤ 60	< 750	3.0	3.0	[2]	3.0	3.0	3.0
	750 – 1500	3.5	4.5	[2]	3.5	3.5	3.5
	1501 – 6000	4.5	5.0	[2]	4.5	4.5	4.5
	> 6000	5.0	5.5	[2]	5.0	5.0	5.0
70 – 80	< 750	3.5	4.5	[2]	3.5	3.0	3.0
	750 – 1500	5.0	6.0	[2]	5.0	4.5	3.5
	1501 – 6000	5.5	8.0	[2]	5.5	5.0	4.5
	> 6000	6.5	8.5	[2]	6.5	6.0	5.0

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
(c) Where a sign is proposed within the clear zone but behind an existing RMS-approved crash barrier, all its structures up to 5.8m in height (relative to the road level) are to comply with any applicable lateral clearances specified by Austroads Guide to Road Design (and RMS supplements) with respect to dynamic deflection and working width. As stated in (b), the proposed sign and associated support structure would be located in an acceptable location according to the Austroads Guide to Road Design.	There are no safety barriers proposed and hence the dynamic deflection/ working width requirements are not applicable. See the previously made comments regarding the advertising sign being in fact, a hazard in the clear zone of the Pacific Highway.
(d) All signs that are permitted to hang over roads or footpaths should meet wind loading requirements as specified in AS1170.1 and AS1170.2. All vertical clearances as specified above are regarded as being the height of the sign when under maximum vertical deflection. As part of the detailed design phase, the digital sign would be designed in accordance with Australian Standards AS1170.2 and AS1170.2 to meet the requirements for wind loading, whilst having consideration for height of the sign boards when under maximum vertical deflection.	No further comments.
3.3.1.2 Line of Sight ***(a) An advertisement must not obstruct the drivers view of the road particularly of other vehicles, bicycle riders or pedestrians at crossings.*** The proposed digital sign would not obstruct the view of the road for motorists travelling on Pacific Highway and Government Road. ***(b) An advertisement must not obstruct a pedestrian or cyclist's view of the road.*** The proposed digital sign is not anticipated to obstruct pedestrian or cyclist's view of the surrounding road.	No further comments.
(c) The advertisement should not be located in a position that has the potential to give incorrect information on the alignment of the road. In this context, the location and arrangement of signs' structures should not give visual clues to the driver suggesting that the road alignment is different to the actual alignment. An accurate photo-montage should be used to assess this issue. The sign would be located outside the carriageway boundary. There would be clear definition between the proposed digital sign and the surrounding road network which would not provide misleading information on the roadway alignment.	No further comments.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
(d) The advertisement should not distract a driver's attention away from the road environment for an extended length of time. For example: *i. The sign should not be located in such a way that the driver's head is required to turn away from the road and the components of the traffic stream in order to view its display and/or message. All drivers should still be able to see the road when viewing the sign, as well as the main components of the traffic stream in peripheral view.* *ii. The sign should be oriented in a manner that does not create headlight reflection in the driver's line of sight. As a guideline, angling a sign five degrees away from right angles to the driver's line of sight can minimise headline reflections. On a curved road alignment, this should be checked for the distance measured back from the sign that a car would travel in 2.5 seconds at the design speed.* The proposed digital sign would be located within a driver's peripheral vision whilst travelling northbound on Pacific Highway. Motorists would not be required to turn their heads when spotting the sign, and all motorists would be able to see the road simultaneously when viewing the sign.	The peer reviewer disagrees with the statement that the proposed advertising sign would be in the peripheral field of view. The image below is a simulated scan of the road from a driver in lane 1 of the northbound direction of Pacific Highway. In this lane, the driver would be required to scan numerous elements of the road and verge. The labelled features is just an initial list of features and includes: (A) pedestrians on the south-western verge of the Pacific Highway/ Government Road intersection and possible entries to the roadway for a crossing movement; (B) vehicles in Government Road and their speed and closing headways for possible *rear-end* conflict; (C) vehicles further along in Government Road including those parked or entering/egressing from a parked position; (D) pedestrians on the triangular splitter island of Government Road and possible entries to the roadway; (E) vehicles in lane 1 in the road ahead and the back of queue and potential *rear-end* conflict; (F) vehicles in lane 2 in the road ahead and the back of queue and potential *rear-end* conflict; (G) vehicles in the right-turn lane in the road ahead and the back of queue and potential *rear-end* conflict (note that this lane is likely to have differing queue lengths to the other two lanes); (H) the primary signals at the signalised intersection with Edgeworth David Avenue; (J) dual primary signals at the same intersection; (K) tertiary signals and mast arm supported displays with right-turn controls, (L) the overhead directional sign. The position of the proposed advertising sign in the verge does not automatically make this a peripheral sight target. Rather as shown below, the driver is expected to have a rather wide lateral scan of the road and verge ahead. Similarly wide lateral scans would be required from the other two lanes of Pacific Highway.  ***Above:*** *A simulated view of the road ahead from lane 1 northbound of the Pacific Highway.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Motorists turning left from Government Road into Pacific Highway, would face the opposite direction (look south) in order to find a suitable gap in oncoming northbound traffic on Pacific Highway. Therefore, the proposed sign would not divert drivers' attention on the Government Road approach to Pacific Highway. The positioning and angle of the sign would not be expected to result in headlight reflection or glare.	This is incorrectly stated and hence has contrasting implications from the real-life scenario. The statement should be re-phrased as "motorists turning left from Government Road into Pacific Highway, **should look south** in order to find a suitable gap in oncoming northbound traffic on Pacific Highway. Just because drivers should look to the south, does not mean they will not look to the north either through casual scanning, and/or through distraction by the advertising sign. In fact, a vigilant driver should still look to the north to check for traffic conditions in the road that they are turning into. The safety assessment assumes that drivers will not look to the north and hence there is no opportunity to be distracted by the proposed advertising sign. However, the altered statement has vastly different implications. If the driver does in fact look to the north, and becomes distracted, then their focus would be taken well away from the approach from which the conflicting (northbound) vehicles will come from. The altered statement actually demonstrates that the proposed advertising sign is indeed a potential distraction to outbound drivers in Government Road, by contrast to this being presented as a benign feature. By viewing the proposed advertising sign, the driver's focus could be diverted more than 135-degrees from where they should be looking. It should also be noted that the gap-detection and selection decision-making process from Government Road is not without its own challenges. The outbound left-turning driver needs to assess gaps in lane 1 and probably lane 2 as well if their left-turn movement is likely to encroach into both lanes. Furthermore, they must assess for *coinciding* gaps in these two traffic streams, the individual closing speeds and headways of these two lanes, and whether any vehicles from the right-turn lane (heading to Edgeworth David Avenue) will make a sudden lane change back into lanes 1/2. There may even be occasions where a vehicle in lane 1 visually blocks the gap assessment to lane 2 behind the vehicle. The same could apply to lanes 2 and 3.  ***Above:*** *The outbound left-turning movement has its own challenges with respects to gap detection and selection. This driver (viewing oncoming traffic from the south) would need to detect and accept coinciding gaps in at least lanes 1 and 2 and remain aware of the traffic conditions in lane 3 (right-turn lane to Edgeworth David Avenue).*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering

3.3.1.3 *Proximity to Decision Making Points and Conflict Points*

(a) A sign should not be located:

- ***i. Less than the safe sight distance from an intersection, merge points, exit ramp, traffic control signal or sharp curves.***
- ***ii. Less than the safe stopping sight distance from a marked foot crossing, pedestrian crossing, pedestrian refuge, cycle crossing, cycleway facility or hazard within the road environment.***

As referenced in the Guide to Road Design, Part 3, sight distance refers to the distance required to enable a driver to react and stop before reaching a hazard. This distance is dependent on the operating (85th percentile) speed of the road, road gradient and other road characteristics.

An operating speed of 60 km/h has been used to calculate the safe stopping sight distance (SSD) which is the signposted speed limit on Pacific Highway. Also, it is the speed which motorists were observed to be driving during the site inspection. According to the Austroads guide, the minimum safe stopping sight distance for a 60km/h speed zone is 64m.

A site inspection was undertaken to assess the gradient of Pacific Highway on approach to the signals. The gradient was measured to be between 0.6% to -0.6%. Table 5.5 of the Austroads Guide to Road Design Part 3 provides the SSD correction due to changes in grade. Given corrections to change in grade commences at 2%, no grade correction to the SSD is required on approach to the signals.

In this instance, the nearest signalised intersection at Edgeworth David Avenue is approximately 45 m north of the proposed sign, falling short by approximately 20 m than the required SSD guidelines.

The assessment has already indicated that the subject advertising sign would be positioned within the 64m stopping sight distance of the traffic signals at the Edgeworth David Avenue intersection. As such, this is a significant non-compliance and a significant safety implication. To further elaborate on this, the advertising sign and its content would be visible to a driver at the point in time where they could be required to react to and brake in preparation to stop for a red traffic signal. Any distraction may affect the reaction time and hence the ability of the driver/ vehicle to stop in time.

Further to this, there are additional shortcomings with this assessment as follows:

- Typically, the design speed adopted should be at least 10km/h higher than the posted speed limit. Since the posted speed limit is 60km/h, a more conservative 70km/h should be used as the design speed. This implies a higher stopping sight distance as determined below and when referencing Table 5.5 of the Austroads *Guide to Road Design Part 3* (AGRD03) (extract below).
- The quoted 64m stopping sight distance is based on a driver reaction time of 1.5 seconds. However, footnote 4 to Table 5.5 of the AGRD03 states "a 1.5 second reaction time is only to be used in constrained situations where drivers will be alert…The general minimum reaction time is 2 seconds".

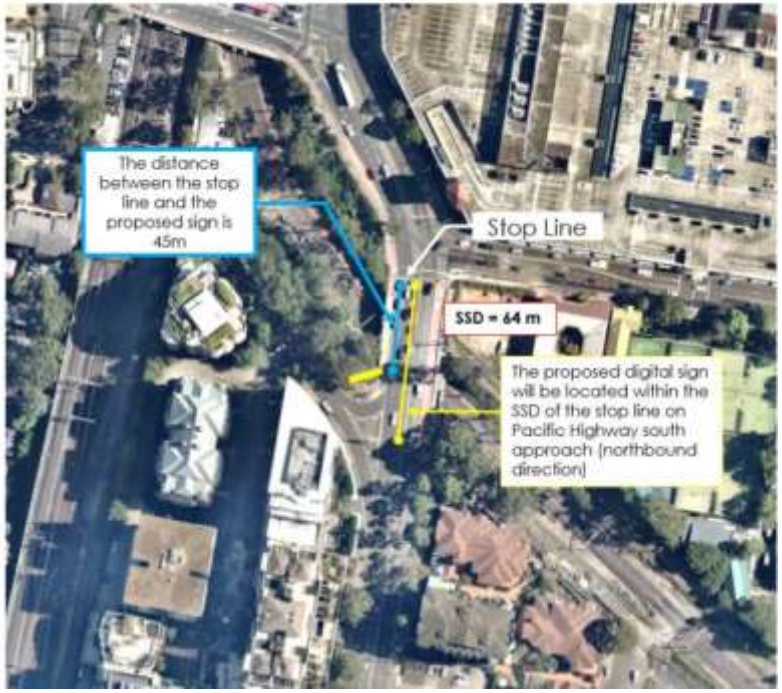
Based on the above two points, a more conservative stopping sight distance would be 92m instead of the adopted 64m. This means the exposure to distraction (via the proposed advertising sign) would actually extend for a 28m longer length than what was considered in the assessment.

Another critical flaw is discussed on the next page.

Table 5.5: Stopping sight distances for cars on sealed roads

Design speed (km/h)	Absolute minimum values Only for specific road types and situations[1] based on $d = 0.46$[2],[3]			Desirable minimum values for all road types based on $d = 0.36$			Values for major highways and freeways in flat terrain[2] based on $d = 0.26$	
	R_t = 1.5 s[4]	R_t = 2.0 s[4]	R_t = 2.5 s	R_t = 1.5 s[4]	R_t = 2.0 s[4]	R_t = 2.5 s	R_t = 2.0 s	R_t = 2.5 s
40	30	36	–	34	40	45	–	–
50	42	49	–	48	56	62	–	–
60	56	64	–	64	73	81	–	–
70	71	81	–	83	92	102	113	123
80	88	99	–	103	114	126	141	152
90	107	119	132	126	139	151	173	185
100	–	141	155	–	165	179	207	221
110	–	165	180	–	193	209	244	260
120	–	190	207	–	224	241	285	301
130	–	217	235	–	257	275	328	346
Corrections due to grade[5],[6]	**–8**	**–6**	**–4**	**–2**	**2**	**4**	**6**	**8**
40	5	3	2	1	–1	–2	–2	–3
50	8	5	3	2	–1	–3	–4	–5
60	11	8	5	2	–2	–4	–6	–7
70	15	11	7	3	–3	–5	–8	–10
80	20	14	9	4	–4	–7	–10	–13
90	25	18	11	5	–5	–9	–13	–16
100	31	22	14	6	–6	–11	–16	–20
110	38	26	17	8	–7	–13	–19	–24
120	45	31	20	9	–8	–16	–22	–29
130	53	37	23	11	–10	–18	–26	–34

4 *Reaction times of 1.5 s cannot be used in Western Australia. A 1.5 s reaction time is only to be used in constrained situations where drivers will be alert. Typical situations are given in Table 5.2. The general minimum reaction time is 2.0 s.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 3-2: Minimum Safe Stopping Sight Distance  	There is another critical flaw in the stopping sight distance assessment. The assessment assumes that a northbound driver will only need to react and stop in response to a red traffic signal. Whilst this is true, there are also many other hazard sources that the driver would need to be wary of and be prepared to stop for. Most notably, is the back-of-queue. The back-of-queue is the last stationary vehicle in a queue, as generated by a forced stop, such as a red light in the road ahead. This back-of-queue could theoretically be positioned at any point in the Pacific Highway northbound approach to the Edgeworth David Avenue intersection. For example, if the back-of-queue was 30m upstream of the stop line (representing approximately 5 passenger cars), then the northbound driver approaching this back-of-queue would need to view this back-of-queue position from the stopping sight distance (92m as determined by the peer reviewer's conservative determination). This means the critical length over which a driver needs to see, react and respond to traffic conditions has a much larger spatial overlap with the viewing time/ opportunity to the proposed advertising sign. In fact, with variable back-of-queue positions, the prevailing stopping sight distance envelope could even extend for the whole visibility and readable distances to the subject advertising sign. The back-of-queue is only one example of an additional source of hazard that drivers need to stop for. Others could include a pedestrian making an uncontrolled crossing over the road, a vehicle from Government Road moving into a small gap etc.
Notwithstanding the above, there are several examples of digital and static sign boards in Sydney that are situated within the minimum safe stopping distance of traffic signals. A digital sign is located on the north side of a pedestrian bridge above King Georges Road in Beverley Hills, as shown in Figure 3-3. The digital sign is located 55 m north of the King Georges Road - Shorter Avenue signalised intersection. Given that King Georges Road has a speed limit of 60 km/h, the minimum SSD is 64m as per the Austroads Guide Part 3. The Traffic Control Signal plan for the intersection indicates that there is a downhill slope of 6.1% on the approach to the digital sign (King Georges Road north approach). Applying a grade correction of an additional 8 m to the SSD, the minimum SSD is 72 m. As such, the digital sign is located within the minimum SSD as shown in Figure 3-4.	Other sites should not be used as precedents for acceptability. These were all approved under their own set of conditions, merits and risks. There may also have been external influencing factors involved such as advertising revenue being used to finance other road safety projects (and hence risk offsets). Also, the other referenced precedent sites all have their own risk factors and are not considered good examples from a road safety perspective. The inclusion of these sites in this report and assessment (and the apparent non-compliances) actually promotes the removal/decommissioning of those other sites, rather than the acceptance of this subject site.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 3-3: Existing Digital Sign on King George Road, Beverley Hills  Source: Google Streetview, imagery dated October 2020	This is not considered a good example from a road safety perspective. King Georges Road is a very busy road with very dynamic road traffic conditions. Drivers would need to be extremely vigilant of ever-changing conditions and be responsive to such conditions. This advertising sign and its content would be a significant distractor on this arterial road.
Figure 3-4: Safe Stopping Sight Distance on King Georges Road 	The SSD envelope is not comprehensive enough. It assumes that the only source of hazard requiring stopping is the red signal at the Shorter Avenue intersection. There are many other features that could generate stopping demand, and hence shift the SSD envelope. These include the back-of-queue, the diverge point to the right-turn lane etc. (SSD = stopping sight distance).

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Similarly, a digital sign has recently been installed on the south side of the pedestrian footbridge across Pacific Highway in Gordon. The digital sign is located approximately 40 m south of the Pacific Highway - Dumaresq Street signalised intersection as shown in Figure 3-5. Pacific Highway has a posted speed limit of 60 km/h, and therefore, the minimum stopping sight distance to the traffic signals on Pacific Highway south approach is 64 m. Hence, the digital sign is located within the minimum stopping sight distance as shown in Figure 3-6.	This is also not considered a good example from a road safety perspective. A road safety review of this site indicated the following: *There are three northbound lanes on Pacific Highway in approach to the digital advertising sign – Lane 1 as a parking lane, and Lanes 2 and 3 as general purpose lanes. The photos below were taken from a drive-through video using a dash-mounted, hands-free camera. These simulate the view of a driver. As shown in the left-hand image, when the driver is in lane 2 northbound, in the immediate departure from the St. Johns Avenue intersection, the advertising sign is a visually prominent feature in the back-drop of the road ahead. The primary signals of the Moree Street intersection (labelled "PS") are somewhat diluted against this back-drop. The more attractive and bright the visual content of the advertising sign, the greater its impact in "out-competing" the primary signals in winning the driver's attention and focus. Primary mast-arm mounted signals are also provided (labelled "P mast") which were intended to make the primary signal displays more prominent given the curvature of the road and the shop awnings etc. However, these are also significantly "out-competed" by the advertising sign in the background.* *The right-hand image shows a view of the northbound driver in lane 2 when 35m in advance of the Moree Street intersection. There is some degree of spatial overlap between the primary signals (boxed in yellow) and the advertising sign in the background. The signals could be potentially diluted against bright coloured displays, especially if red, amber and green tones are used on the advertising content.*  ***Left:** The view of a driver in lane 2 northbound on the Pacific Highway when in the immediate departure from the St. Johns Avenue signals. Note the impact of the advertising sign, which is visually prominent on the traffic signals. The traffic signals at the Moree Street intersection ahead are almost indistinguishable against the backdrop, especially when a range of colours is used. **Right:** A view of the driver when in the immediate approach to the signals (35m). There is some spatial overlap between the primary signals (boxed in yellow) and the advertising sign beyond.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
	The images below are the equivalent photos from the night time inspection, showing the visual impacts and clashes under night time lighting conditions. The signals are still diluted against the bright backdrop caused by the advertising sign.   ***Left:*** *The view of a driver in lane 2 northbound on the Pacific Highway when in the immediate departure from the St. Johns Avenue ignals under night time lighting conditions. The traffic signals at the Moree Street intersection continue to be diluted against the bright and coloured backdrop created by the digital advertising display. The traffic signals are indistinguishable from this point.* ***Right:*** *A closer view where there is better visibility to the overhead mast-arm supported signals. This is largely due to the colour contrast between the dark sky and the signals. The primary signals on the vertical portion of the post are still somewhat diluted at this point.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
	Continuing northbound along Pacific Highway, the advertising sign also has an impact on the Dumaresq Street-Park Avenue intersections. As shown in the left-hand image, the advertising sign takes a dominant position in the driver's view of the roadscape ahead. This is both in terms of its lateral position being centrally placed, as well as its vertical position. The primary signal to the Dumaresq Street intersection is labelled "PS". The dual primary signals on the median are labelled "dual PS". These signals lack visual prominence and are significantly "out-competed" by the advertising sign. Furthermore, as advertising is deliberately intended to attract attention, provoke viewers and pique curiosity, this is another contributing factor, where the advertising content may win the driver's attention, even momentarily, when compared with the attention that the traffic signals should command. It is emphasised that the traffic signals are regulatory devices with strong legal implications and road rules attached to them. Visibility to these devices and the need to control external distractions is of critical importance. *The signals in the road ahead control vehicle and pedestrian movements at the Dumaresq Street and Park Avenue side road intersections. Any failure to respond to red signal displays could increase the risk of cross traffic and/or vehicle-pedestrian crashes.* *The right-hand photo shows the equivalent view from lane 3 to the road and intersections ahead, with similar safety impacts.*  ***Left:** Looking northbound along lane 2 of the Pacific Highway towards the advertising sign and the signals to the Dumaresq Street-Park Avenue side road pairs. **Right:** Looking northbound along lane 3 of the Pacific Highway towards the advertising sign and the signals to the Dumaresq Street-Park Avenue side road pairs.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
	Similar drive-through inspection were carried out from lane 3 of the northbound direction of Pacific Highway under day and night time lighting conditions. The photos below show that when the driver is in the departure from the St. Johns Avenue intersection, there is some spatial overlap of the primary mast arm signals (associated with Moree Street intersection and a midblock pedestrian crossing) and the digital advertising sign beyond. The signal display lacks prominence against the brighter and larger digital display behind it. Also, even without any spatial overlap, the digital advertising sign would tend to "out-compete" the signals in winning the driver's attention. This could be distracting to drivers who may fail to acknowledge the prevailing signal phasing. This could lead to conflicts with cross traffic movements from Moree Street and the midblock pedestrian crossing.   ***Left:** The primary mast arm signals (labelled as "PS mast") has some overlap with the digital advertising sign beyond when viewed from lane 3 northbound. The digital advertising sign would tend to "out-compete" the signals in winning the driver's attention. Photo taken during the day time inspection. **Right:** A similar photo taken during the night time inspection.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
For the digital sign in Gordon, there was a Land and Environment Court proceeding (Captive Vision Pty Ltd v Ku-ring-gai Council (No 3) [2019] NSWLEC 1472) on 19-20 September 2019. An extract from the court transcripts where TfNSW's expert witness, Ms Samsa, was in support of the proposed digital sign is provided below: • *EXPERT WITNESS SAMSA: Well it was more that there is - when I analysed the crash data, on both approaches there were obviously crashes for both approaches, but on the southbound approach there were more crashes in the approach to the pedestrian bridge than beyond it, whereas the opposite is for the northbound approach. So there's not a lot of crashes towards it, but after you pass the pedestrian bridge there's been crashes, a larger portion of crashes beyond it. So to me that suggests that there's something about that, that northern section around Dumaresq Street and beyond that is causing drivers issues, and I can't qualify what that is. It could be a number of factors, but to me that was just a bit of a, a point to go well I wonder what's happening here that's making it difficult for drivers to negotiate that particular section of road in particular that would be causing those crashes?* • *SENIOR COMMISSIONER: Do I understand your evidence is that you support the north or you don't?* • *EXPERT WITNESS SAMSA: I would support the north approach.* • *SENIOR COMMISSIONER: Irrespective of that conundrum about not understanding the after the sign area, is that right?* • *EXPERT WITNESS SAMSA: I think, I think there's less of a chance for drivers to be distracted or to be thinking of a sign beyond once they've passed it.* • *SENIOR COMMISSIONER: Okay, thank you.* • *ASTILL: Just to clarify, you said north approach, you mean northbound commissioner?* • *SENIOR COMMISSIONER: Yes, northbound.*	This transcript provides no concrete proof regarding the road safety performance of the Pacific Highway at the Gordon site. All it does is highlight the errors as previously pointed out on pages 12-14 of this report. Re-iterating these points in the context of this legal transcript: ▪ Firstly, it should be acknowledged that not all reported crashes are actually attended to by the police. There are criteria which stipulate when a crash becomes a reportable crash, and there are also other (separate) criteria stipulating when a crash event needs to be attended to on site by the police. For low-severity crashes where no road users are killed or injured, or where the property damage is less than a pre-determined amount, and where all parties involved in the crash cooperate and share contact details, the police are not required to attend the crash event. In these situations, the crashes become "self reported" crashes where persons involved in the crash will report these to the police. Most often, the motives behind this are simply to obtain an event number that they can use for insurance claims. This is already a major source of error as there is no quality control on the accuracy of information in a self-reported crash. This includes the exact location of the crash. ▪ It is not valid to put one's faith in the geocoded locations of road crashes. Often the geocoded locations are approximations based on eye witness reports (ie. self-reported crashes as discussed above). Even for police-attended crash events, the police will rarely measure out exact distances of crash events to identifying features. Hence the location of crashes from the spatial plotting of crashes is quite often full of errors. ▪ Thirdly, even if the geocoded location of the crash was in fact accurate, this most often represents the final resting position of the crashed vehicle(s), not the point at which the driver lost control. For example, if the initial trigger/ distraction for a crash event occurred due to a distraction source at point X and the final resting position of the crashed vehicle was at point Y, a location downstream of X, then Y would be the geocoded location. Accepting these sources of error, this means that the geocoded locations of the crashes was erroneous to begin with, which means that the analyst's conclusions on how many crashes happened upstream and how many happened downstream of the advertising sign are also flawed. An experienced analyst would have acknowledged this potential error and examined the higher level findings, such as what is the general likelihood and propensity of crashes happening in the vicinity of the advertising sign, and hence what is the likelihood that advertising sign distraction could be a factor in future crashes.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 3-5: Existing Digital Sign on Pacific Highway, Gordon  Source: Photograph taken by ITPP on 24/05/2021	See previous page comments.
Figure 3-6: Safe Stopping Sight Distance on Pacific Highway, Gordon  	This diagram severely underplays the visual impact of the advertising sign. As indicated by the road safety review provided on pages 28-31, the advertising sign can also be seen when the driver is approaching the Moree Street signals, which is actually well upstream of the advertising sign. This highlights an important point that it is not just where the sign is positioned that is relevant with respects to SSD assessments, it is where the sign can be *seen from*, which is relevant.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Another example is an existing static sign located on the pedestrian bridge above Devlin Street in Ryde. The existing sign is located 14 m north of the stop line at the Devlin Street - Parkes Street - Blaxland Road signalised intersection as shown in Figure 3-7. In the vicinity of the sign, Devlin Street is posted as 60 km/h giving a minimum SSD of 64 m. As such, the sign is located within the minimum SSD to the traffic signals as shown in Figure 3-8. **Figure 3-7: Existing Sign on Devlin Street, Ryde**  *Source: Google Streetview, imagery dated November 2020*	This is also not considered a good example from a road safety perspective.
Figure 3-8: Safe Stopping Sight distance on Devlin Street  A fourth example is the static billboard fixed to the side of the overhead pedestrian bridge on Parramatta Road in Auburn. On the east approach to the Parramatta Road -	Issues have already been covered in responses to other items.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Macquarie Road signalised intersection, there is a sign board located within 25 m of the traffic signals. The driving view on approach to the traffic signals and sign is shown in Figure 3-9. The posted speed limit on Parramatta Road is 60 km/h which gives a minimum SSD of 64m. Thus, the existing billboard is located less than the minimum SSD to the traffic signals, as shown in Figure 3-10. **Figure 3-9: Existing Sign on Parramatta Road, Auburn** 	This is also not considered a good example from a road safety perspective.
Figure 3-10: Safe Stopping Sight Distance on Parramatta Road  Based on the above, there are several instances where there are existing digital and static signs located less than the minimum safe stopping sight distance to traffic signals. Technically speaking, the above examples are also non-compliant with the Transport Corridor Outdoor	Issues have already been covered in responses to other items.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Guidelines. However, these signs do not and would not be expected to cause an unsafe level of distraction for motorists on approach to the respective traffic signals. As detailed in Section 2.4, there has only been one crash in the northbound direction on approach to the proposed digital sign during the most recent 5-year period. Therefore, the existing large static sign has not resulted in reduced safety for motorists travelling northbound on Pacific Highway. As such, for road safety assessments of digital signs, the Signage Guidelines should be applied as general principles rather than standards or warrants.	Stopping sight distance is considered one of the most critical road design elements as it links the visible distance of the driver, to an achievable distance to bring their vehicle to complete rest where, in most cases, the act of stopping would avert a crash event. In these respects, the criticality of stopping sight distance should never be downplayed or taken for granted. Any distraction or "failures" experienced during the reaction and stopping distance could contribute to the likelihood of the crash, its severity / injury potential or both. Furthermore, other sites where the placement of advertising signs in the stopping sight distance envelope has been approved, should not be used as a precedents for future and similar non-compliances. Ultimately, this is a non-compliance against a criteria with significant road safety implications. To further support this point, the prohibition of mobile phone use whilst driving was due to realisation that this form of distraction is unacceptable to a driver controlling a motor vehicle. Similarly, drivers ought to have a road transport system that does not introduce sources of distraction to them. The advertising sign is considered to be an unnecessary distraction and challenge.
iii. So that it is visible from the stem of a T-intersection. The proposed sign is located adjacent to the Government Road to Pacific Highway intersection left turn slip lane. Government Road traffic gives way to northbound traffic on Pacific Highway. Motorists turning left from Government Road on to Pacific Highway look south to find a suitable gap in oncoming traffic. As such, the proposed sign would not divert motorists' attention as Government Road motorists would look towards the south and not towards the proposed digital sign (north). The proposed digital sign would not be visible from Edgeworth David Avenue. As documented in Section 2.4 under crash analysis, there has only been one crash in the northbound direction on approach to the proposed digital sign during the most recent 5-year duration. This infers the existing large static sign has not resulted in reduced safety for motorists travelling northbound on Pacific Highway or entering / exiting Government Road.	The criterion is poorly worded and should be interpreted as such "the advertising sign should not be placed so that it is visible from the terminating leg of a T intersection". *Terminating leg* is referenced as the *stem of the T intersection*. The advertising sign will in fact be visible from the stem of a T intersection, being the Government Road leg to its intersection with Pacific Highway. Regardless of where the drivers in Government Road should be looking, there is no restriction on them seeing and viewing the proposed sign. By viewing the sign, they would be significantly distracted since the viewing angle to the sign is more than 135 degrees from the northbound traffic (to the south) which they ought to be viewing when assessing for gaps to depart this side road. In these respects, this criterion is not met and the proposed advertising sign would be a breach of this condition.
(b) The placement of a sign should not distract a driver at a critical time. In particular, signs should not obstruct a driver's view: ***i. Of a road hazard,*** ***ii. To an intersection,*** ***iii. To a prescribed traffic control device (such as traffic signals, stop or give way signs or warning signs).*** ***iv. To an emergency vehicle access point or Type 2 driveways (wider than 6-9 metres) or higher.*** A "critical time" is understood to refer to a point in time when a driver's decision is required implying that a road safety implication could occur if a driver was distracted at this time. The proposed digital sign would be positioned to the side of the carriageway without obstructing a driver's view of any potential hazards on the roadway.	The criterion presents two broad level requirements – (1) The sign should not DISTRACT a driver at a critical time and (2) the sign should not OBSTRUCT a driver's view to the items listed in (i) to (iv). The response provided in the safety assessment only covers the second requirement. With respects to the first requirement (ie. distraction), the advertising sign will indeed be a potential distractor to a driver at a critical time such as when detecting and responding to red traffic signals, dynamic traffic conditions including variable back-of-queue locations and changes in speeds/ headways, vehicles changing lanes, uncontrolled pedestrian crossing movements over both Government Road and the Pacific Highway. The driver needs to be aware and vigilant of these changing traffic conditions. In these respects, the proposed advertising sign placement does not align with this criteria. As previously discussed, despite the advertising sign being placed in the verge area, this is still part of the road environment that drivers would need to scan to assess for vehicular and pedestrian movements and conditions.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
3.3.1.4 Sign Spacing ***(a) Sign spacing should limit drivers view to a single view to a single sign at any given time with a distance of no less than 150m between signs in any one corridor. Exemptions for low speed, high pedestrian zones or CBD zones will be assessed by RMS as part of their concurrence role.*** There is no digital advertising sign located within 150m of the proposed digital sign. Several small advertising signs and billboards are located on both sides of the Pacific Highway bridge located immediately after the proposed digital sign. In addition, advertising signage is visible on the Westfield Shopping Centre building façade, as shown in Figure 3-11. Notwithstanding this, this is a common scenario along the Pacific Highway and in urban environments where numerous signs are displayed in close proximity to intersections. **Figure 3-11: Sign Spacing within Vicinity of Proposed Sign**  The road alignment within the vicinity of the proposed digital sign is relatively straight, with clear visibility to the signal controls and traffic conditions along Pacific Highway.	There is no mention of the signs (making up the sign spacing) being restricted to digital signs only. It is implied that all advertising signs (static and digital) would need to be considered. Figure 3-11 of the safety assessment acknowledges that there are numerous other advertising signs placed along the railway bridge parapet. There are also name place signs associated with the shopping centre. The co-location of the proposed digital advertising sign and the existing / retained static signs on the bridge parapet would be a breach of this criterion. The overall spirit of the guidelines is trying to limit the number of information processing demands placed on the driver at the same time. Taking this wider interpretation, the overhead directional sign already provides six individual pieces of information. The proposed digital advertising sign would add to this, especially since a typical advertising frame contains several pieces of text and image-based information.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
3.3.2 Sign Design and Operation Criteria *3.3.2.1 Advertising Signage and Traffic Control Devices* ***(a) The advertisement must not distract a driver from, obstruct or reduce the visibility and effectiveness of directional signs, traffic signals, prescribed traffic control devices, regulatory signs or advisory signs or obscure information about the road alignment.*** ***(b) The advertisement must not interfere with stopping sight distance for the road's design speed or the effectiveness of a traffic control device. For example:*** ***i. Could the advertisement be construed as giving instructions to traffic such as 'Stop', 'Halt' or 'Give Way'?*** ***ii. Does the advertisement imitate a prescribed traffic control device?*** ***iii. If the sign is in the vicinity of traffic lights, does the advertisement use red, amber or green circles, octagons, crosses or triangles or shapes or patterns that may result in the advertisement being mistaken for a traffic signal?*** An advance directional and information sign is provided on an overhead gantry structure on the Government Road splitter island. The advance directional and information sign faces northbound traffic and does not overlap the existing static sign, as shown in Figure 3-12. As the existing static sign is located beyond the directional and information sign and at a lower level, motorists would likely have full visibility of the directional and information signage prior to observing the existing static sign.	The response provided in the safety assessment is not complete. The first criterion states that the advertisement should not (1) distract a driver from directional signs, traffic signals and traffic control devices, regulatory signs or obscure information about the road alignment, (2) obstruct visibility to those devices/ features, or (3) reduce effectiveness of those devices/ features. The first paragraph of the response has addressed the second component, ie. whether the proposed advertising sign will obstruct any traffic control devices or critical information regarding the road ahead. However, the other two items, ie. whether the proposed advertising sign will distract a driver, and whether it will reduce effectiveness of those devices has not been examined sufficiently. The peer reviewer teases these two points out as follows: <u>Potential distraction</u> As previously discussed, northbound drivers on Pacific Highway need to be wary of numerous features and conditions in the road ahead. The photo below illustrates many of these and includes: (A) pedestrians on the south-western verge of the Pacific Highway/ Government Road intersection and possible entries to the roadway for a crossing movement; (B) vehicles in Government Road and their speed and closing headways for possible *rear-end* conflict; (C) vehicles further along in Government Road including those parked or entering/egressing from a parked position; (D) pedestrians on the triangular splitter island of Government Road and possible entries to the roadway; (E) vehicles in lane 1 in the road ahead and the back of queue and potential *rear-end* conflict; (F) vehicles in lane 2 in the road ahead and the back of queue and potential *rear-end* conflict; (G) vehicles in the right-turn lane (to Edgeworth David Avenue) in the road ahead and the back of queue and potential *rear-end* conflict (note that this lane is likely to have differing queue lengths to the other two lanes; (H) the primary signals at the signalised intersection with Edgeworth David Avenue; (J) dual primary signals at the same intersection; (K) tertiary signals and mast arm supported displays with right-turn controls, (L) the overhead directional sign. In any one travel lane and path, a driver would need to concurrently process four or more pieces of information. This is a rather dynamic road traffic environment and the addition of a digital advertising sign would add to this information processing demand. Furthermore, the very nature of advertising is to attract attention and pique curiosity. As such, the advertising sign and its content is quite likely to "out-compete" the other visual elements and conditions of the road. 

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
The advance directional and information sign is readable at approximately 100 m in Lane 1 (kerbside lane), whist the existing static sign is only readable at approximately 80m due to trees and building awning restricting visibility. Similarly, the advance directional and information sign is readable at approximately 110 m in lane 2, whilst the static sign is not readable until 25m later approaching the sign. Figure 3-12 illustrates the readable distance of the advance directional and information sign prior to the existing static sign in the northbound direction along Pacific Highway.	The assessment response focusses too much on (1) whether the directional sign is still visible and (2) from what distance it would be legible from. The issue is not so much whether the directional sign and proposed advertising sign can be seen and processed in isolation. Rather, the issue is whether the driver will give sufficient attention to the directional sign in the first place. Any time dedicated to viewing the proposed advertising sign (even as a momentary glance) would be a corresponding loss of time/ attention spent viewing other more critical parts of the road traffic system. This includes the directional sign, the prevailing traffic signal phasing, dynamic traffic conditions etc. The assessment also over-simplifies road user requirements in reading directional signs. It is not sufficient to simply view the sign and then achieve the intended objective of the sign. Rather, the process involves viewing the sign, interpreting its directions which have very specific lane-choice implications, and then making the corresponding movements and navigating to the correct lane via gap detection-acceptance-merging. For example, if a northbound driver was in lane 1 and saw the overhead directional sign containing the right-hand destination stating Hornsby Hospital, they would then need to make two lane changes to the right (by picking individual gaps in those lanes). The second lane-change would be midway along the right-turn lane which may already be queued out. This could lead to hesitation, indecision, “hovering” while waiting for a gap, and “forcing a merge” into the already established queue. This is a very complex scenario and a high task loading on the driver. But yet the safety assessment only discusses visibility and legibility of the directional sign. In these respects, the potential impacts of the digital advertising sign are severely downplayed.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
Figure 3-12: Readable Distance of Advance Directional and Information Sign (Lane 1)  Details of the advertisement/s are not yet known since the project is still within the early design stage. However, it is noted that the sign would not display colours and shapes which could be mistaken for traffic signals. Notwithstanding this, it is recommended that the content of the proposed sign be reviewed against Table 5 of the Guidelines to avoid any content that may be construed as imitating a traffic control device.	As discussed above, the driver not only needs to see and read the directional sign, they need to be able to respond to it, which may include multiple lane changing movements. The discussion above regarding the information processing demands and lane-choice is also only just one decision-making requirement. It only considers the competition between the proposed advertising sign and the directional sign. Overall, there are numerous other "competitions" such as: ▪ Attention to advertising sign versus processing headway and closing gap to vehicle in the lane ahead. ▪ Attention to advertising sign versus processing the prevailing traffic signals and preparation to stop (if necessary). ▪ Attention to advertising sign versus assessing whether a pedestrian will enter the roadway. This is particularly the case for pedestrian movements over Government Road. Etc. It is not valid to defer judgement of individual advertising content to the operational stage of the device. The current assessment should assume that any displayed advertising content will be highly distracting in nature and attempt to attract attention, pique curiosity and even provoke viewers. Examples of such advertising content are shown below. Despite the current assessment being on the advertising device and not the displayed content, the assessment needs to consider and assume the typical types of advertising content that are likely to be displayed.   ***Left:*** *Advertising strategies that use exclamatory content to attract attention.* ***Right:*** *Advertising content that begs viewing to reach the punchline. This is a classic technique used where a scenario/ statement is made and followed by a punchline "spend more at the footy". It prolongs the viewing of the sign as the viewer is more likely to seek out the punchline message rather than moving on without closure.*

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
	Continued from previous page…   ***Above:*** *The safety assessment has not sufficiently covered the aspect of competition between advertising content versus other visual elements of the road. If these two signs were placed side by side, the advertising sign (left) is more likely to win the viewer's attention compared with the directional sign.*
3.3.2.2 *Dwell Time and Transition Time* ***(a) Each advertisement must be displayed in a completely static manner, without any motion, for the approved dwell time as per criterion (b) below*** ***(b) Dwell times for the image display must not be less than:*** ***i. 10 seconds for areas where the speed limit is below 80km/hr.*** ***ii. 25 seconds for areas where the speed limit is 80km/h and over.*** ***(c) Any digital sign that is within 250 metres of a classified road and is visible from a school zone must be switched to a fixed display during school zone hours.*** ***(d) Digital signs must not contain animated or video/movie style advertising or messages of image failure, the default image must be a black screen.*** ***(e) The transition time between messages must be no longer than 0.1 seconds, as in the event of image failure, the default image must be a black screen.*** The digital sign is proposed to contain text and images. Based on the Guidelines with a speed limit below 80km/h, the minimum dwell time for content displayed on the proposed digital sign would be 10 seconds. However, it is recommended to increase the dwell time up to 15 seconds for the digital sign given that it is in close proximity to traffic signals. In the northbound direction of Pacific Highway, an "End School Zone" sign was observed 220m prior to the proposed sign, which is located beyond the visible and readable distance of the proposed digital sign.	The Guideline states that for speed zones less than 80km/h, a 10 second dwell time would be acceptable. Despite the wording of the Guidelines, some common sense needs to be applied. The speed limit along this section of the Pacific Highway is 60km/h and during peak periods, this is likely to be as low as 20-30km/h given that there would be queuing and traffic conditions at or near capacity of the road. Taking a 30km/h speed (8.3m/s) and the claimed legibility distance of 115m, a driver at this speed could theoretically have the opportunity to view the digital advertising sign for up to 14 seconds, which means at least 2 individual advertising frames would be seen. This is not considered reasonable or safe. It could also get to a point where the driver (through sheer boredom of moving slowly in traffic) could eagerly wait for the next advertising frame. The proposed increase to a 15 second dwell time is meritorious in these respects. The proposed advertising sign would be approximately 220m north of and outside the Pacific Highway school zone associated with Barker College. The Edgeworth David Avenue school zone associated with Hornsby Girls High School is also 75m east of the Pacific Highway, and a mere 130m walking distance from the subject advertising sign. Although the sign is strictly outside the spatial extents of both school zones, the spirit/ philosophy of the guidelines should be considered and followed. The guidelines are attempting to minimise safety and distraction risks in environments where and when there are (i) a high volume of children-pedestrians about and (ii) a high volume of school-based road traffic. The presence of children-pedestrians and school-based road traffic does not terminate at the boundaries of the school zones and significant carry over traffic and movements would be expected. For example, many school children from both schools would continue walking on footpaths and make road crossing movements long after moving out of the school zones. The railway station and the shopping centre would be two major attractors and both of these end-destinations (or start-destinations in the case of trips to school) are outside the school zones' boundaries. Based on the high carry over traffic, the advertising sign should be considered to be within a school environment and the still-framed requirement of item C should apply.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
3.3.2.3 *Illumination and Reflectance* ***(a) Luminance levels comply with the requirements in Table 6 in Transport Corridor Outdoor Advertising and Signage Guidelines.*** ***(b) The image displayed on the sign must not otherwise unreasonably dazzle or distract drivers without limitation to their colouring or contain flickering or flashing content.*** Section 3.3.3 of the Guidelines details assessment criteria to ensure that illumination and reflectance qualities of the sign do not cause a road safety hazard. It is understood that these criteria would be addressed in a separate specialist report prepared by a qualified consultant.	No further comments.
(a) The advertisement must not incorporate technology which interacts with in-vehicle electronic devices or mobile devices. This includes interactive technology or technology that enables opt-in direction communication with road users. ***(b) Message sequencing designed to make a driver anticipated the next message is prohibited across images presented on a single sign and across a series of signs.*** The proposed sign would not contain interactive technology or technology that enables opt-in direction communication with motorists. The digital sign would not be designed to make motorists anticipate information.	No further comments.
4 Conclusion JCDecaux is proposing to remove an existing large format static sign and install a small digital sign on the northwestern corner of the Pacific Highway and Government Road intersection. The proposal has been assessed against the statutory requirements for digital advertising signage outlined in the following: • Section 3, Advertisements and Road Safety of the NSW Guidelines • State Environmental Planning Policy (Industry and Employment) The following findings and conclusions are made from the signage safety assessment: • The proposed digital sign would not obstruct and/or reduce visibility of any traffic control devices, signage, road alignment or cyclists. • The proposed sign would not give incorrect information on the alignment of the road. • The sign would be located within a driver's peripheral vision for motorists travelling in the northbound direction of Pacific Highway, and does not require motorists to turn their head away from the roadway ahead. • Motorists turning left from Government Road into Pacific Highway would look south to find gaps in oncoming northbound traffic on Pacific Highway. Therefore, motorists turning left from Government Road into Pacific Highway are not distracted by the existing static sign nor the proposed digital sign.	Comments have been provided earlier in this report. However, the peer review summarises as follows: ▪ In response to point 1: The assessment has not covered all the risk items outlined in the Guidelines. Although visibility to the proposed advertising sign and other visual elements was stated to have no clashes, the assessment failed to cover the critical aspect of distraction and competition for the driver's attention. This is particularly critical since this is a dynamic and busy road environment with a high information processing demand placed on the driver. ▪ In response to point 2: Accepted. ▪ In response to point 3: This is not correct. The driver would require a rather wide lateral scan of the road and verge to cover side road traffic, pedestrians in the verge and about to cross the road, as well as the traffic signals and traffic conditions in the road ahead well beyond the advertising sign. The proposed advertising sign is not considered a peripheral visual element. Rather, it is quite centrally placed in the driver's view of the road ahead. ▪ In response to point 4: The correct statement would be that motorists turning left from Government Road into Pacific Highway SHOULD look to the south to check for oncoming gaps. The wording used in the safety assessment implies that they would not look at nor be exposed to the distraction risk imposed by the proposed advertising sign. The converse implication is actually the case. If the driver is distracted by the advertising sign and drawn to look at it, they would be looking more than 135 degrees away from the oncoming northbound traffic (from the south). Under this scenario, the proposed advertising sign actually imposes a major safety risk, instead of being a benign risk as presented in the safety assessment.

Original extract from the Safety Assessment	Peer review commentary from DC Traffic Engineering
• The proposed digital sign is located within the safe stopping distance to the traffic signals at the Pacific Highway and Edgeworth David Avenue intersection. However, between the proposed digital sign and the traffic signals is straight and comprises good visibility to the traffic signal lanterns. Further, this is not an uncommon scenario as there are multiple digital and static signs located within the safe stopping distance of traffic signals as presented in Section 3.3.1.3. • Within the vicinity of the proposed digital sign, there is advertising signage provided along both sides of Pacific Highway bridge, as well as billboard advertising signage on the Westfield Shopping Centre's building facade. The signage has not resulted in any known safety issues, evidenced by only one minor incident recorded within the most recent 5-year duration. • An advance directional and information sign is located on an overhead gantry structure prior to the existing static and proposed digital sign. Visibility of the advance directional and information sign does not overlap with the visibility of the existing static sign, hence would not overlap with the proposed digital sign. • Pacific Highway has a posted speed limit of 60 km/h past the proposed digital sign. As such, a dwell time of 10 seconds is required in accordance with the Guidelines. However, increasing the minimum dwell time from 10 seconds to 15 seconds is proposed given the proposed digital sign is in close proximity to traffic signals.	▪ In response to point 5: This is a non-compliance and should not be downplayed or excused. Furthermore, the assessment has assumed that the only source of hazard requiring a stop is the red signals. By contrast, the driver would need to respond to other traffic in the road ahead as well as pedestrians (eg. crossing Government Road). The back-of-queue would be one hazard requiring reaction and stopping. The back-of-queue location could vary depending on traffic conditions. The stopping sight distance envelope would commence from each of these individual hazards and would therefore cover a much longer length of the visibility distance and the readable distance to the proposed advertising sign. Other sites should not be used as precedents as they were approved under their own circumstances. ▪ In response to point 6: The crash data assessment was flawed since there was too much faith put into the geocoded locations of the reported crashes. A more global assessment should have been taken accepting that if crashes happened in the wider network, under similar road and traffic conditions, then they could easily occur and recur at the subject site. ▪ In response to point 7: The assessment fixated on whether the overhead directional sign would remain visible (which it does). However, the assessment failed to examine the competition between the proposed advertising sign (and content) versus the directional sign. The proposed advertising sign is likely to out-compete the more mundane appearance of the directional sign. Also, the assessment failed to consider the driver's need to interpret and respond to the directional sign, such as making lane changing decisions. ▪ In response to point 8: The increase in dwell time has merit.
• The safety at the two left turn slip lanes at Government Road is not anticipated to be further impacted by the proposed digital sign, as there is no evidence of any crash incidents in the past 5-year duration. Having consideration for the signage safety assessment and discussions presented within this report, the analysis suggests that the installation of a digital sign facing northbound traffic along Pacific Highway near Government Road would be acceptable based on the minimal crash rate within the vicinity of the existing static sign and proposed digital sign.	▪ In response to point 9: See the response for point 4. By contrast, the peer review considers that a changing digital display immediately adjacent to a left-turning driver from Government Road, is in fact a major source of distraction and could take the driver's visual field more than 135 degrees away from the oncoming traffic from the south. Overall, this is not considered a suitable location for a digital advertising sign which can change displays. The added risk factor is that in the modern time, people are more drawn to digital displays rather than static displays as demonstrated by mobile device and computer use versus printed material.

3 Conclusions

JCDecaux is seeking approval for a new digital advertising sign on the north-western corner of the Pacific Highway/ Government Road intersection, in Hornsby. The proposed digital sign would be visible by northbound traffic on the Pacific Highway and eastbound traffic on Government Road. A Safety Assessment prepared by TTPP was required to be peer reviewed. This report documents the peer review findings in these respects.

Overall, the peer reviewer considered that the justifications put forth in the Safety Assessment were flawed. Relevant points include:

Impact of the proposed advertising sign on traffic safety in Government Road.

The Safety Assessment report downplays the risk of the proposed advertising sign to inbound and outbound traffic using Government Road. Inbound traffic would need to be wary of traffic conditions in the road ahead including any slowed vehicles, or vehicles moving into or out of kerbside parking spaces. These drivers would also need to be wary of any pedestrians attempting to cross Government Road. In these respects, the proposed advertising sign and its displayed content could be a potential distractor and take the driver's focus away from these potential crash conflicts.

With respects to outbound left-turning traffic from Government Road, the Safety Assessment claims that since the main source of traffic conflict would be to the south (ie. to judge for suitable gaps in the northbound traffic stream), that the driver would not look at or be affected by the proposed digital advertising sign. The peer reviewer considers the opposite to be the case. The digital advertising sign may attract the driver's attention and encourage them to look to the north (to the advertising content) and more than 135 degrees away from the approaching traffic from the south. This is in fact a major road safety impact as the driver may lose sight of the oncoming northbound traffic, accept substandard gaps and be at increased risk of collisions with this northbound traffic. Further to this point, the left-turn movement from Government Road is not always a simple manoeuvre. There are complex decision making requirements. Firstly, the left-turning vehicle from Government Road may need to occupy the two northbound *through* lanes of the Pacific Highway when completing this turn. This means that the individual gaps in lanes 1 and 2 in the northbound direction would need to be assessed, as well as the suitability of *coinciding* gaps in both lanes. Even after completing the left-turn the driver may be attempting to turn right into Edgeworth David Avenue, which requires a gap acceptance and lane changing movement into this right-turn traffic stream. They may also be *forcing* this lane-change movement midway along the queue. Overall, safety impacts to Government Road traffic and pedestrians was not covered in sufficient detail.

Crash data analysis used in the Safety Assessment

The peer reviewer identified significant flaws in the crash data analysis and hence deems the analysis to be unsuitable as a supporting argument for the proposed advertising sign. Firstly, the analysis has put too much faith in the geocoded locations of the reported crashes. Crashes for the length of road corresponding to the nominated readable distance of the proposed advertising sign were identified and the conclusion was made that this was a low frequency crash site. In reality, the geocoded location of crash events are typically inaccurate. Since many crash events are not actually attended to in person by police officers, the location of the crashes is based on a civilian reporting the details to the police. Often the exact location is not established and this is simply approximated.

The peer reviewer showed that when the spatial scope of the area being investigated is increased, there are actually many more crash events in the wider road network. There needs to be acknowledgement that crashes in the wider road network on similar road environments, and with similar demographics and traffic conditions indicates the likelihood, exposure and propensity for such crashes to recur in the study area.

The crash data analysis has also assumed that the safety impact, and distraction potential of the existing static billboard is similar to the distraction potential of the proposed digital advertising sign. This is not a valid comparison. In modern times, digital based imagery and content is much more appealing compared with conventional print media. The same would apply to advertising content. In these respects, it is not valid to concluded that since the crash frequency was low with the current static sign, that it will remain low with the proposed digital advertising sign. The transition in advertising frames is also a major factor, although it is acknowledged that the applicant is proposing an increase in dwell time to 15 seconds, which is meritorious.

In these respects, the peer reviewer does not consider the crash data analysis to be valid nor a compelling case in justifying the proposal.

Deferment of responsibility of individual advertising content to the operational phase

The deferment of responsibility for advertising content to the operational period is not acceptable. The proposed advertising sign is the medium on which the advertising content will be displayed. If the distraction risks are considered a post-installation matter, then this significantly downplays the impact that the digital advertising sign has. Rather than deferring this responsibility, the assessment should have assumed a range of advertising content based on typical advertising strategies and pre-existing examples of advertising material.

Interpretation of school zone and school-based influences

The Safety Assessment has concluded that since the proposed advertising sign is spatially outside the school zones associated with Barker College (to the south) and Hornsby Girls High School (in Edgeworth David Avenue), that the school zone criteria (ie. having fixed displays during school zone periods) should not apply. By contrast, the peer reviewer considers that since school based travel and road usage would still carry over to the location of the proposed digital sign, that it is in essence, a school-zone-like environment. For example, pedestrian movements generated by the school (especially Barker College) could be drawn to major destinations such as the railway station and the shopping centre. Walk-trips to these two end-destinations would result in continued children-pedestrian movements well outside the spatial boundaries of the school zone. Similarly, road vehicle traffic generated by school drop off and pick up operations would also continue outside the spatial boundaries of the school zone. One of the critical school zone criterion was to switch to a fixed display during school zone periods. In the peer reviewer's opinion, the subject site is close enough to, and similarly affected by the nearby schools, that the school zone operational conditions for the advertising sign should still apply.

Clear zone safety

The Safety Assessment has not demonstrated a safe clear zone offset of the proposed digital advertising sign and its support structure. The edge of the sign display is likely to be 4m offset from the edge of the Pacific Highway traffic lanes. The monopole supporting

the sign is likely to be 6m offset from the road. The peer review's referenced Austroads *Guide to Road Design Part 6* indicates that the clear zone required for this section of the Pacific Highway should be 5m at a minimum (based on a design speed of 60km/h being equivalent to the posted speed limit). Furthermore, it is common practice in road design to adopt a higher design speed to make the design more conservative and provide more margin for error. Typically, a design speed 10km/h higher than the posted speed limit would be applied, which means the design speed should be 70km/h. If adopting the 70km/h design speed, the required clear zone offset would actually be 6.5m, which means both the sign display and the monopole structure are within the clear zone and would be potential crash hazards to *run off road* vehicles.

Proposed advertising sign being considered a peripheral sighting object

The Safety Assessment claimed that the proposed advertising sign would be in the peripheral view of a driver, and therefore claimed this as a benign risk. However, the peer reviewer considers that the northbound driver on Pacific Highway would require a wide lateral scan of the road to process all the critical elements. These include pedestrians moving along the verge and across Government Road; stopped or slowed cars in the road ahead including Government Road; queued or slow-moving traffic in the Pacific Highway lanes in the road ahead; the overhead directional sign; and the traffic signals at the Edgeworth David Avenue intersection. Since the driver needs to scan laterally to view traffic in and emerging from Government Road, they would also visually cover the location of the proposed advertising sign in the same field of view. The proposed advertising sign is therefore not a peripheral visual element. It is very much part of the roadscape. Furthermore, if the proposed advertising sign is considered to be peripheral, then the overhead direction sign would be equally peripheral, which it certainly is not.

Stopping sight distance assessment

Stopping sight distance is considered one of the most critical road design elements as it links the visible distance of the driver, to an achievable distance to bring their vehicle to complete rest where, in most cases, the act of stopping would avert a crash event. In these respects, the criticality of stopping sight distance should never be downplayed or taken for granted. Any distraction or "failures" experienced during the reaction and stopping distance could contribute to the likelihood of the crash, its severity / injury potential or both.

The Safety Assessment identified that the proposed advertising sign will be positioned in the stopping sight distance envelope from the traffic signals at the Edgeworth David Avenue intersection. This is a non-compliance and should not be downplayed or excused. Furthermore, the assessment has assumed that the only source of hazard requiring a stop is the red signals. By contrast, the driver would need to respond to other traffic in the road ahead as well as pedestrians (eg. crossing Government Road). The back-of-queue would be one hazard requiring reaction and stopping. The back-of-queue location could vary depending on traffic conditions. The stopping sight distance envelope would commence from each of these individual hazards and would therefore cover a much longer length of the visibility distance and the readable distance to the proposed advertising sign. Other sites should not be used as precedents to justify this non-compliance as they were approved under their own circumstances. The other example sites referenced in the Safety Assessment report where the advertising sign was placed in the stopping sight distance envelopes are all considered to be poor applications with high road safety risk.

The stopping sight distance assessment also used a driver reaction time of 1.5 seconds which is not conservative. Typically, a 2 second reaction time is used for establishing stopping sight distance. Also, the design speed for the sight distance assessment was 60km/h which is also not conservative enough. Typically, the design speed should be 10km/h higher than the posted speed limit. This means that the referenced 64m stopping sight distance envelope should have actually been 92m, a 28m increase. The use of the larger figure means that more of the readable distance of the proposed advertising sign would fall into the stopping sight distance enveloped. That is, the potential distraction imposed by the proposed advertising sign would extend over a longer approach duration and distance.

Ultimately, this is a non-compliance against a criteria with significant road safety implications. To further support this point, the prohibition of mobile phone use whilst driving was due to realisation that this form of distraction is unacceptable to a driver controlling a motor vehicle. Similarly, drivers ought to have a road transport system that does not introduce sources of distraction to them. The advertising sign is considered to be an unnecessary distraction and challenge.

Visibility of the proposed advertising sign from the stem of a T intersection

The Transport Corridor Outdoor Advertising and Signage Guidelines stipulates that advertising signs should not be visible from the stem of a T intersection. At the subject site, the advertising sign would be visible from the Government Road approach, which forms a T intersection with Pacific Highway. As such, the proposal is a breach of this condition.

Distraction potential of the proposed advertising sign

The Safety Assessment fails to examine the distraction potential of the proposed advertising sign. This is a critial omission as the distraction potential is considered to be the most impactful aspect of the sign. Instead, the Safety Assessment fixated on other aspects such as whether other signs and traffic control devices will be visually obstructed by the proposed advertising sign.

The peer reviewer considers that the advertising sign will indeed be a potential distractor to a driver at a critical time such as when detecting and responding to red traffic signals, dynamic traffic conditions including variable back-of-queue locations and changes in speeds/ headways, vehicles changing lanes, and uncontrolled pedestrian crossing movements over both Government Road and the Pacific Highway. The driver needs to be aware and vigilant of these changing traffic conditions. In these respects, the proposed advertising sign does not align with this criteria.

Overall, and with regards to the above, this is not considered a suitable location for a digital advertising sign.

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