ROAD SAFETY AUDIT REPORT

M2 Motorway, Epping – Digital Signage

Prepared for NSW Department of Planning and Environment

July 2023

turnbull

Document Information

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A	Draft Report for internal review	M. Dixon B. Meng	D. Lowe	D. Lowe	29/06/2023
B	Draft Report	M. Dixon B. Meng	D. Lowe	D. Lowe	30/06/2023
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Document Approval

Author signature		Approver signature	
Name	Michael Dixon	Name	David Lowe
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Disclaimer

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1. Road Safety Audit Summary

1.1. General

Audit details are provided in Table- 1 below.

Table- 1 - Audit details

Report number	**M2DSRSA-BULL-NWW-SF-RPT-000001-C**
Audited project	M2 Motorway, Epping – Digital Signage
Audit for	NSW Department of Planning and Environment
Address	12 Darcy St, 4 Parramatta Square, Parramatta, NSW 2150
Telephone	02 9274 6127
Project Manager	Janith De Silva
Auditors	David Lowe Michael Dixon
Audit type	Concept Design
Commencement meeting	Internal between audit team
Audit Date	19th June 2023
Previous audit number	20406 (Report by TTPP on 1/12/2020)

1.2. Formal Statement

This road safety audit has been undertaken by suitably qualified, independent road safety auditors from Turnbull Engineering, using the references and documentation detailed in this report.

While the road safety audit may provide recommendations about possible remedial measures in response to identified deficiencies, it is ultimately the responsibility of NSW Department of Planning and Environment to determine how best to respond to each identified safety deficiency.

The audit has been undertaken for the sole purpose of identifying any safety-deficient features and road safety risks for the audited section of road. Every effort was made to ensure that all relevant safety issues were considered. The findings are the opinion and judgement of the following team:

David Lowe

Road Safety Audit Team Leader

29.06.2023

Michael Dixon

Road Safety Audit Team Member

29.06.2023

2. Introduction

2.1. Project Description

The road safety audit is to provide a review of the concept design for a digital advertising sign proposed to be mounted on the eastern side of the railway bridge over the M2 Motorway in Epping, NSW, facing westbound motorists.

In December 2020, Sydney Trains submitted a Development Application (DA 10649) to the Department of Planning and Environment (DPE), seeking approval for the installation of two digital signs on the railway overpass bridge above the M2 Motorway in Epping. The application included a Road Safety Assessment (RSA) prepared by TTPP. In April 2021, TPP provided a Response to Submissions, followed by an Additional Response to Submissions in June 2021. In July 2021, Sydney Trains made amendments to the DA, deleting one of the signs (i.e., the sign facing eastbound motorists on the western side of the railway bridge). Throughout this process, the Department received three submissions from City of Parramatta Council (CPC) and four submissions from TfNSW, all expressing concerns about road safety relating to the eastbound and westbound digital signs.

Turnbull have been engaged by DPE to provide an independent road safety audit of the remaining digital sign, on the eastern side of the railway bridge facing westbound motorists.

The RSA focuses on the perspective of road users and considers the potential road safety risks so that road managers can mitigate or eliminate any risks identified by the proposal.

Key elements examined, but were not limited to included:

- Road user behaviour
- Signage and delineation
- General road layout
- Driver attention
- Visibility and sight distances

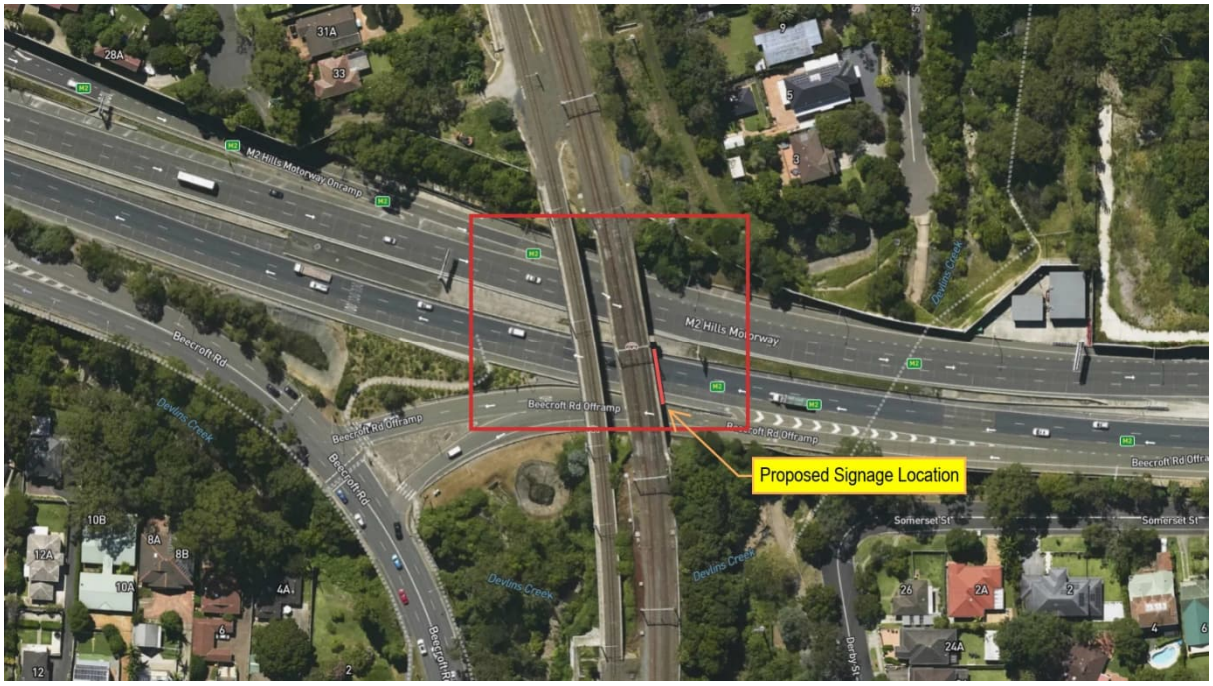

Figure 1 Aerial View, M2 Motorway, Epping

Source: Metromaps, Imagery, 2023, Accessed 24th May 2023

2.2. Scope of this Report

This design-based Road Safety Audit report aims to identify any potential risks for road users following the installation of the digital signage to the eastern side of the railway bridge. The proposed signage on the western side has since been removed from the development application by Sydney Trains and as such, does not form part of the on-site road safety audit

This report also identifies potential risks to road safety in the context of day and night site visits undertaken by the auditors on Monday 19th June 2023.

The report also includes a peer review of the initial road safety assessment provided by TTPP, as well as the subsequent responses to the original submission.

2.3. Road Safety Audit Reference Materials

The supplied information was audited in accordance with:

- Austroads Guide to Road Safety Part 6: Road Safety Audit, 2022
- Roads and Traffic Authority Guidelines for Road Safety Audit Practices, 2011

2.4. Future Road Safety Audits

No further Road Safety Audits are proposed for this project.

3. Road Safety Audit

3.1. Commencement Meeting

A project commencement meeting was held between the audit team to discuss the previous findings and issues to be observed during the site inspection.

3.2. Audit Team Details

Table-2 - Audit Team Details

Name	Role	Level	Auditor ID
David Lowe	Lead Auditor	3	RSA-02-0165
Michael Dixon	Senior Auditor	2	RSA-02-0842

3.3. Audit Site Inspection

An inspection was undertaken on the afternoon and evening of the 19th of June 2023.

- A daytime inspection was conducted at 3:30pm. Conditions were fine.
- A night-time inspection was conducted at 5:30pm. Conditions were fine.

3.4. Audit Materials

The following documents were provided by the Department of Planning and Environment for peer review:

- TTPP Digital Signage Safety Assessment
- TTPP Response to Submissions (14/04/21)
- TTPP Response to Further Submission by City of Parramatta Council (17 June 2021)

3.5. Risk Assessment Process

Based on the Roads and Traffic Authority *Road safety assessment methods: deciding which one to use (TSR 11/01)*, the following guidelines are referenced to select the most appropriate method/s for assessing road safety for a project or situation:

- Austroads Guide to Road Safety Part 6: Road Safety Audit, 2022.
- Roads and Traffic Authority Guidelines for Road Safety Audit Practices, 2011.

Further to the above, the following document has guided our risk assessment:

- Austroads Guide to Road Safety Part 7: Road Safety Strategy and Management, 2021

Of the abovementioned guides, Section 10.5.1 of the *Austroads Guide to Road Safety Part 6: Road Safety Audit* provides an indication of the level of risk and how to respond to it. Details of these are reproduced in Tables 3 to 6 below.

Table-3 - How often is the problem likely to lead to a crash?

Likelihood	Description
Almost certain	Occurrence once per quarter
Likely	Occurrence once per quarter to once per year
Possible	Occurrence once per year to once every three years
Unlikely	Occurrence once every three years to once every seven years
Rare	Occurrence less than once every seven years

Table-4 - What is the likely severity of the resulting crash type?

Severity	Description	Examples
Fatal	At scene or within 30 days of the crash	High-speed crash between motor vehicles or between motor vehicle and infrangible roadside object Car runs into pedestrian or cyclist at moderate or higher speed Collapse of a bridge or tunnel
Serious	Admitted to hospital	Medium-speed crash between motor vehicles Medium-speed collision with an infrangible roadside object Pedestrian or cyclist struck by a car at low to moderate speed
Moderate	Major first aid and/or presents to hospital (not admitted)	Low to medium speed crash between motor vehicles Low speed collision with an infrangible roadside object Pedestrian or cyclist struck by a car at low speed
Minor	Minor first aid	Some low-speed vehicle collisions Cyclist falls from bicycle at low speed Left turn rear-end crash in a slip lane
Insignificant	Property damage	Some low-speed vehicle collisions Pedestrian walks into object (no head injury) Car reverses into post

Table -5 - The resulting level of risk

		Severity				
		Insignificant	Minor	Moderate	Serious	Fatal
Likelihood	Almost Certain	Medium	High	High	Extreme (FSI)	Extreme (FSI)
	Likely	Medium	Medium	High	Extreme (FSI)	Extreme (FSI)
	Possible	Low	Medium	High	High (FSI)	Extreme (FSI)
	Unlikely	Negligible	Low	Medium	High (FSI)	Extreme (FSI)
	Rare	Negligible	Negligible	Low	Medium (FSI)	High (FSI)

Table-6 - Priorities for mitigation

Risk rating	Mitigation action (priorities)
Extreme	Must be corrected regardless of cost
High	Should be corrected or the risk significantly reduced, even if the treatment cost is high
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
Low	Should be corrected or the risk reduced if the treatment cost is low
Negligible	No action required

4. Road Safety Audit Findings

4.1. Previous Road Safety Audit

The following RSA material was provided to Turnbull for an independent peer review:

1. TTPP Road Safety Audit dated 1 December 2020 *(Appendix A)*
2. TTPP letter response to submissions dated 14 April 2021 *(Appendix B)*
3. TTPP letter response to further submissions by City of Parramatta Council dated 16 June 2021 *(Appendix C)*

Turnbull is in general agreeance with the assessments made by TTPP regarding comments around sight distance, sign luminance, relevant studies and driver distraction for the proposed westbound signage. However, Turnbull supports Council & TfNSW's position and assessment around driver distraction, risk and safety for the proposed eastbound signage due to the proximity to VSLS, merging traffic and the cyclist crossing. A summary of road safety issues raised by City of Parramatta Council and Transport for NSW is provided in Table . Turnbull has provided an independent peer review and commentary regarding the discussions raised by all stakeholders.

Table -7 - Peer Review Summary

Submission	Authority	Comment	TTPP Response	Turnbull Review
TTPP Road Safety Audit				
			TTMM suggests that the installation of the digital signage would be acceptable. This conclusion was made on the basis that the proposed digital signage would not be expected to: - Obstruct/ reduce visibility of any traffic control devices - Give incorrect information on the alignment of the road - Affect road safety at the off-ramp merge and exit points - Interfere with a driver's ability to rear, interpret and react to information displayed by variable speed limit signs - Compromise safety for road users in the vicinity	Turnbull has peer reviewed the original road safety audit and finds agreement with the assessment made by TTPP. A further discussion will be noted for the concerns raised by the City of Parramatta Council and Transport for NSW
TTPP Letter Response				
1	Parramatta	The Merge Point of the M2 On Ramp (Eastbound)	- Proposed signage on the on-ramp will not impact road safety as it will be out of view for drivers - A crash analysis of existing digital signs, including on the M4 Motorway in Homebush, shows minimal distraction potential and no negative impact on road safety - the assessment suggests that while the proposed signage may be a distraction during the approach to the main traffic lanes, motorists should still have sufficient cognitive capacity to observe the road without an increased risk of collision.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be visible within the influence area of the merge and visible to both merging and mainline drivers. This presents an increased risk of drivers failing to select an appropriate gap and the potential for side impact / rear impact crashes.
2	Parramatta	Cyclists Crossing Point (On Ramp, Eastbound)	- Cyclists yield and observe oncoming traffic from their give-way point (250m sight distance) - No crashes reported in the past five years on the on-ramp merge lane. - Proposed signage on rail bridge complies with guidelines, maintaining safe sight distance.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be visible to drivers on the on ramp and has the potential to distract the driver from any hazards around the cyclist crossing point.

Submission	Authority	Comment	TTPP Response	Turnbull Review
3	Parramatta	Variable Speed Limit Signs (Eastbound)	- Primary variable speed signs located 360m before digital signage, minimal impact during brief overlap with secondary signs. - Minimal potential for overlap or obscuring of speed sign by digital signage. - Proposed digital signage avoids colours and shapes resembling speed signs. - No additional crashes attributed to digital signage on M4 Motorway. - Proximity of digital signage and speed signs does not lead to missed information or unsafe driving conditions.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be directly in the line of sight of the variable speed limit signs and creates the potential for drivers to fail to recognise a reduction in speed limit which may be implemented in response to an incident in the tunnel. The placement of the Variable Speed Limit Signs in this location are directly related to the operational management of the Norfolk Tunnel and are critical to its safe operation.
4	Parramatta	M2 Exit Ramp (Westbound)	- Digital signage complies with the safe sight distance guideline - Beecroft Road exit sign fully visible and readable at the diverge point, while digital signage is not readable from that distance - Motorists' attention is drawn to the visible exit sign, unlikely to be distracted by digital signage - Average eye fixation duration on digital billboards is below perception-reaction time to unexpected events. - Ample distance for motorists to safely change lanes and exit after noticing digital signage. - Existing guidance sign prior to tunnel informs motorists of upcoming Beecroft Road exit	Turnbull agrees with the assessment made by TTPP, no safety issues relating to the proposed digital signage above the westbound lanes were identified during the site inspection.

Submission	Authority	Comment	TTPP Response	Turnbull Review
5	Parramatta	Cyclist Crossing Point (Off Ramp)	- Proposed digital signage complies with the safe sight distance guideline - Cyclists are required to give-way and find a suitable gap before crossing the traffic stream. - Sufficient sight distance from cyclist give-way point to tunnel exit for observing safe gaps - Sight distance of 240m towards oncoming traffic from the tunnel exit.	Turnbull agrees that the assessment made by TTPP, the road geometry facilitates sufficient sight distance for oncoming traffic when exiting the tunnel to identify cyclists. The proposed digital signage is not expected to negatively impact the safety at the cyclist crossing point.
6	Parramatta	Interchange Sequence Signs	- Research studies indicate that digital signage does not distract drivers from observing the road environment - Existing examples on M2 Motorway and Military Road show coexistence of digital signage and interchange sequence signs without information overload.	Turnbull agrees with the assessment and TTPP's use of the noted studies. Example provided for the M2 motorway sufficiently demonstrate safe coexistence of digital signage with interchange sequence signs
1	TfNSW	THML advertising consent	- Outside of RSA Scope	NA
2.1 & 2.2	TfNSW	Merging traffic distraction (Eastbound)	- See response to Parramatta Council Submission #1	See Turnbull review comments above
2.3 & 2,4	TfNSW	Potential interference to the VSLS (Eastbound)	- See response to Parramatta Council Submission #3	See Turnbull review comments above
3.1	TfNSW	Exit Lane Decision Point (Westbound)	- See response to Parramatta Council Submission #4	See Turnbull review comments above
3.2	TfNSW	Exit tunnel crash concern (Westbound)	- See response to Parramatta Council Submission #4	See Turnbull review comments above
3.3	TfNSW	Unfamiliar drivers exiting tunnel	- See response to Parramatta Council Submission #4 & 6	See Turnbull review comments above
4	TfNSW	Increased crash probability (Westbound)	- See response to Parramatta Council Submission #3, 4 & 6	See Turnbull review comments above

Submission	Authority	Comment	TTPP Response	Turnbull Review
5	TfNSW	Evaluation of lighting impact	- Outside of RSA Scope	NA
6	TfNSW	TfNSW Review Inputs	- Noted by TTMM	NA
TTPP Letter Response to Further Submissions by City of Parramatta Council				
1.1	Parramatta	The Merge Point of the M2 On Ramp (M4 Motorway Example)	- The council's comments on the M4 Motorway being under construction are acknowledged. TTPP maintains that the M4 Motorway is a comparable example. - The roadworks speed limit during construction was 80 km/h, similar to the usual speed limit of 90 km/h post-construction. - Roadworks and changes in traffic conditions have the potential to distract motorists from the road or vehicle ahead.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be visible within the influence area of the merge and visible to both merging and mainline drivers. This presents an increased risk of drivers failing to select an appropriate gap and the potential for side impact / rear impact crashes.
1.2	Parramatta	M4 Merge Point Example	- The council's comment on the added travel lane further downstream is acknowledged. However, the digital signage is located within the length of the merge between the two on-ramp lanes, which is considered a "decision-making point" according to the Transport Corridor Outdoor Advertising and Signage Guidelines	See comment 1.1 above
1.3	Parramatta	M4 Motorway Signage Example	- The council's comment regarding the former static signage on the M4 Motorway is acknowledged, but the sign is not considered a distraction as it can be viewed within the driver's peripheral vision. - Historic crash data near the digital signage on the M4 Motorway shows a low number of non-casualty crashes, which does not warrant a crash "blackspot" investigation - A Digital Sign Traffic Safety Assessment for a similar digital sign on the Pacific Highway in Gordon confirms that distractions from external advertising signage are not a common cause of crashes.	See comment 1.1 above

Submission	Authority	Comment	TTPP Response	Turnbull Review
1.4	Parramatta	Samsa Study (Relevance)	- Study's findings remain relevant, digital billboards do not dangerously distract drivers or affect their safe driving habits	Turnbull agrees with TTPP's findings and use of the Samsa Study
1.5	Parramatta	Samsa Study (Limited to daylight hours)	- The regulatory guidelines ensure that luminance levels of digital signs are safe for motorists both during the day and at night, and the proposed digital signage would comply with these guidelines	Turnbull agrees with TTPP's commentary, compliant digital signage is not expected to negatively impact driver safety due to luminance
1.6	Parramatta	Samsa Study (Young & Senior Drivers)	- The study conducted by Samsa Consulting and the research from the Monash University Accident Research Centre indicate that the potential for digital signs to cause distraction and contribute to crashes is low.	Turnbull agrees with TTPP's findings and use of the studies. Noting however, that while the studies indicate a low distraction potential, any signage non-critical to the function/safety of the road should be avoided in higher risk areas where driver attention should be mainly focused on traffic.
2.1	Parramatta	Cyclists Crossing Point Distraction (On Ramp)	- The study by Samsa Consulting found that drivers have enough cognitive ability to react to unexpected events on the road while viewing digital signage - The road geometry of the M2 Motorway on-ramp allows for a clear view of the cycle crossing, with advanced warning signage in place. - Cyclists on the M2 Motorway are typically experienced riders who can judge the distance and speed of oncoming traffic, making safe crossing decisions. - Both cyclists and motorists have sufficient sight lines to make safe judgments and react appropriately to a cyclist crossing the travel lane.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be visible to drivers on the on ramp and has the potential to distract the driver from any hazards around the cyclist crossing point. Any additional signage within the eastbound on ramp area with the potential to distract drivers should be avoided.

Submission	Authority	Comment	TTPP Response	Turnbull Review
2.2	Parramatta	Cyclist Crossing Point Safe Sight Distance	- The proposed signage placement is compliant with the Transport Corridor Outdoor Advertising and Signage Guidelines - Stopping sight distance is the distance required for a driver to perceive, react, and brake to a stop before reaching a hazard. A cyclist in the shoulder lane would be within the peripheral vision of a driver on the on-ramp from approximately 165m before the cycle crossing point. - Drivers entering the motorway would be able to anticipate and react appropriately to a cyclist approaching the crossing point, as they can see the cyclist from a distance, and it is not an unexpected or sudden event. - The proposed signage is not considered a distraction for motorists, as it can be viewed alongside the road within their peripheral vision without diverting their attention from driving.	Turnbull disagrees with this assessment. The proposed digital signage on the eastbound lanes will be visible for the on-ramp traffic, a motorist's ability to react to a cyclist/hazard at the crossing will be potentially impaired due to distraction
3	Parramatta	Variable Speed Limit Signs (Eastbound)	- The primary VSLS, approximately 355m away, will not be obstructed by the digital signage. - The secondary VSLS may be positioned in front of the digital signage at times but will still be visible to motorists. - The M4 Motorway example demonstrates that variable speed limit signs can be located prior to digital signage without causing visual impediment. - The proposed digital signage will not display colours and shapes that could be mistaken for variable speed limit signs, complying with the guidelines.	Turnbull disagrees with this assessment. A digital sign facing eastbound traffic would be directly in the line of sight of the variable speed limit signs and creates the potential for drivers to fail to recognise a reduction in speed limit which may be implemented in response to an incident in the tunnel. The placement of the Variable Speed Limit Signs in this location is directly related to the operational management of the Norfolk Tunnel and are critical to its safe operation.

Submission	Authority	Comment	TTPP Response	Turnbull Review
4	Parramatta	M2 Exit Ramp (Westbound)	- The proposed digital signage, installed on the rail bridge after the diverge point and exit ramp, complies with the guideline's requirement of safe sight distance. - There is a guidance sign prior to the tunnel indicating the Beecroft Road exit, providing advance information to motorists. - The end of the exit lane and diverge point is approximately 120m away from the proposed digital signage, but motorists tend to enter the exit lane earlier than this point.	Turnbull agrees with TTPP's assessment regarding the diverge point for the exit ramp.
5	Parramatta	Cyclist Crossing Point (Off Ramp, Westbound)	- Motorists approaching the Beecroft Road exit have a clear view of the cycle crossing point - There is a bicycle warning sign located on the south side of the off-ramp, providing advance warning to motorists about cyclists in the area - Adequate sight lines exist between the crossing point and oncoming vehicles on the off-ramp, allowing cyclists to judge when it is safe to cross the travel lane - Motorists also have sufficient sight lines to the crossing point, enabling them to make safe judgments and react appropriately if a cyclist crosses the travel lane ahead of them.	Turnbull agrees that the assessment made by TTPP, the road geometry facilitates sufficient sight distance for oncoming traffic when exiting the tunnel to identify cyclists. The proposed digital signage is not expected to negatively impact the safety at the cyclist crossing point.
6.1	Parramatta	Interchange Sequence Signs (Samsa Study)	- The potential for the signs to cause distraction is low - This conclusion is supported by various sources, including the Road Safety Assessment, previous RTS, additional sites crash study, research by Samsa Consulting, and Monash University Accident Research Centre	See comment for Item 1.6 above

Submission	Authority	Comment	TTPP Response	Turnbull Review
6.2	Parramatta	Interchange Sequence Sign Importance	- A similar example of existing digital signage on the M2 Motorway near an interchange sequence sign shows that both signs can coexist without overwhelming drivers - Examples on Military Road in Neutral Bay and Mosman demonstrate the coexistence of digital signage and lane directional signs without causing information overload. - Less confident drivers on motorways tend to travel in the left lane, reducing the need for sudden lane changes to take upcoming exits	Turnbull agrees with TTPP's assessment and supporting examples, digital signage is not expected to interfere with the interchange sequence signage, driver wayfinding and safety.

4.2. Current Road Safety Audit

Table-8 – Road Safety Audit Findings

Ref No	Location *[Chainage]*	Description of risk to road safety *[By Lead Road Safety Auditor]*	Reason why risk to road safety is considered to be an issue	Likelihood	Severity	Risk Level
1		No road safety risks were identified during the day & night site inspection by the audit team				

4.3. Conclusion

This road safety audit of the proposed digital sign, on the eastern side of the railway bridge facing westbound motorists was conducted through on-site and desktop investigations, considering issues and concerns raised by CPC & TfNSW.

4.3.1. Westbound Signage

Turnbull noted no road safety risks were identified for westbound traffic from the proposed digital sign on the eastern side of the railway bridge. In addition, from reviewing the past road safety audit and letters, Turnbull is in general agreeance with the road safety rationale provided by TTM. In summary:

- the proposed digital signage is not expected to negatively impact the safety at the cyclist crossing point as the road geometry facilitates sufficient sight distance for oncoming traffic when exiting the tunnel to identify cyclists.
- compliant digital signage is not expected to negatively impact driver safety due to luminance
- digital signage is not expected to interfere with the interchange sequence signage and driver wayfinding as the decision point and signage for the off-ramp is positioned sufficiently away from the proposed digital signage

As such, it is recommended that DPE accept the proposal from a road safety perspective. While Turnbull notes no issues relating to road safety, this assessment is limited to the road safety aspect of the signage, Turnbull does not endorse approval of the signage on any other conditions outside of the road safety perspective.

4.3.2. Eastbound Signage

The proposed signage on the western side has been removed from the development application by Sydney Trains and as such, does not form part of the on-site road safety audit. Turnbull has assessed the past road safety audit and letters provided by DPE and is in agreeance with CPC and TfNSW, in summary:

- Having a digital sign facing eastbound traffic within the merge zone could lead to drivers failing to choose a suitable gap, increasing the risk of side or rear-end collisions.
- Placing a digital sign facing eastbound traffic directly in the line of sight of variable speed limit signs could cause drivers to overlook speed limit reductions prompted by incidents in the tunnel. These variable speed limit signs are crucial for the safe operation of the Norfolk Tunnel.
- A digital sign facing eastbound traffic would be visible to drivers on the on ramp and has the potential to distract the driver from any hazards around the cyclist crossing point.

4.3.3. Conditions for Approval

Turnbull assumes that in approving the westbound facing sign, that an approved specification will be stipulated that is consistent with the other existing digital advertising signs facing westbound traffic at upstream locations on the motorway. This assumption forms the basis of our assessment and were the proposed sign capable of other types of display such as animation or high frequency flashing this would alter the outcome of this assessment.

Turnbull suggests the inclusion of the following conditions for approval to ensure that displayed material does not distract or otherwise impair a drivers ability to make appropriate decisions within the motorway environment:

Advertising displayed on digital signage shall not:

- conflict with Lane Usage (LUS) and Variable Speed limit Signs (VSLS) within the Norfolk Tunnel
- shall not be of moving pictures nor animations;
- shall not incorporate high frequency flashing.

Appendix A TTPP Road Safety Audit

M2 Motorway - Epping
Digital Signage Safety Assessment

Prepared for:

Ethos Urban

1 December 2020

The Transport Planning Partnership

M2 Motorway - Epping

Digital Signage Safety Assessment

Client: Ethos Urban

Version: V02

Date: 1 December 2020

TTPP Reference: 20406

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
V01	30/11/20	Kenta Lam	Santi Botross	Wayne Johnson	
V01	01/12/20	Kenta Lam	Santi Botross	Wayne Johnson	

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APPENDICES

1 Introduction

1.1 Overview

Sydney Trains is seeking approval for the installation of LED digital illuminated signs on an existing overhead railway bridge above the M2 Motorway in Epping. The proposed signage is to be located on both sides of the railway bridge, aligned to face the eastbound and westbound carriageways on the M2 Motorway.

Transport for NSW (TfNSW), formerly Roads and Maritime Services, requires a signage safety assessment to be completed for the proposed signage.

The Transport Planning Partnership (TTPP) has been commissioned by Ethos Urban, on behalf of Sydney Trains, to undertake a signage safety assessment. This assessment has been carried out in accordance with Department of Planning and Environment's *Transport Corridor Outdoor Advertising and Signage Guidelines*, November 2017 (Guidelines) and State Environmental Planning Policy No. 64 – Advertising and Signage (SEPP 64). The Guidelines outline best practice for the planning and design of outdoor advertisements in transport corridors. The SEPP 64 sets out rules regarding outdoor advertising signage for permissible locations and exempt developments.

1.2 Purpose of this Report

The aim of this assessment is to determine the suitability of the digital signage and provide recommendations on mitigation measures to alleviate impacts on the M2 Motorway corridor. This report sets out the findings of TTPP's signage safety assessment for the proposed digital signage above the M2 Motorway in Epping.

The following items have been considered in this report:

- Potential for the signage 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 diverge points.
- Potential for the signage 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.

1.3 References

In preparing this report, reference has been made to the following:

- An inspection of the signage location from a driving viewpoint along the M2 Motorway carried out on Friday 13 November 2020.
- 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 No. 64 – Advertising and Signage (SEPP 64).
- Design plans of the proposed digital signage dated 29 September 2020.

2 Proposal Description

2.1 Location Details

A new digital signage is proposed to be installed off the side of the overhead railway bridge across the M2 Motorway in Epping. The railway bridge is used by trains travelling on the T9 Northern Line between Epping station and Cheltenham station.

The proposed digital sign boards will be situated on the eastern and western facades of the railway bridge. Currently, there are no sign boards placed on the railway bridge.

In the vicinity of the proposed signage location, the M2 Motorway has three travel lanes in each of the eastbound and westbound directions. In addition, the on-ramp and off-ramp to Beecroft Road is located near the railway bridge.

An aerial image of the signage location and surrounding environs are shown in Figure 2.1.

Figure 2.1: Signage Location

Map Source: Nearmap aerial imagery dated 26 September 2020

2.2 Description of Proposed Signage

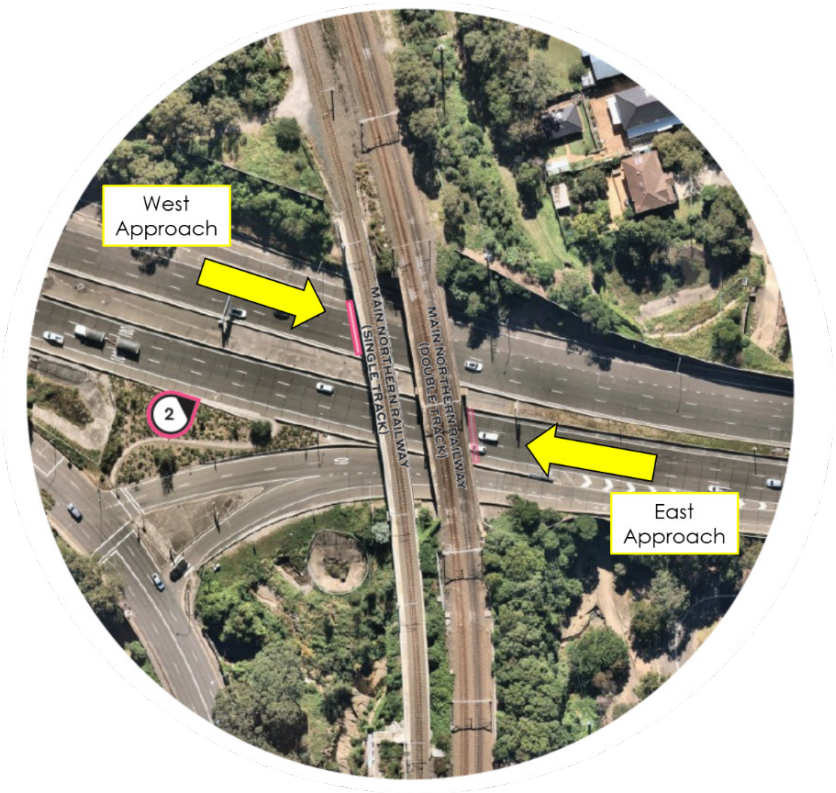
Each signage board will have a length of 15.5m and height of 3.3m, and a visual screen with a length of 12.4m and height of 3.2m (39.7m^2 area). The screen would be set upon a black cladding which will visually appear as a plain border around the visual screen. The base of the signage board will be 5500mm above the road.

The digital signage with LED panel will be installed on both sides of the railway bridge which face the eastbound and westbound travel lanes on M2 Motorway. The proposed digital signage will be used for promoting Sydney Trains and its sponsors, and third-party advertising. The digital signage will contain text and images.

2.3 Signage Exposure

The proposed digital signage would be visible to traffic travelling on the M2 Motorway on the east approach and west approach, as shown in Figure 2.2. A site visit was undertaken on Friday 13 November 2020 to inspect driver sight distances on both approaches to the proposed signage location and observe any potential crash hazards likely to result from the proposed digital signage. A description of the site investigation findings is provided herein.

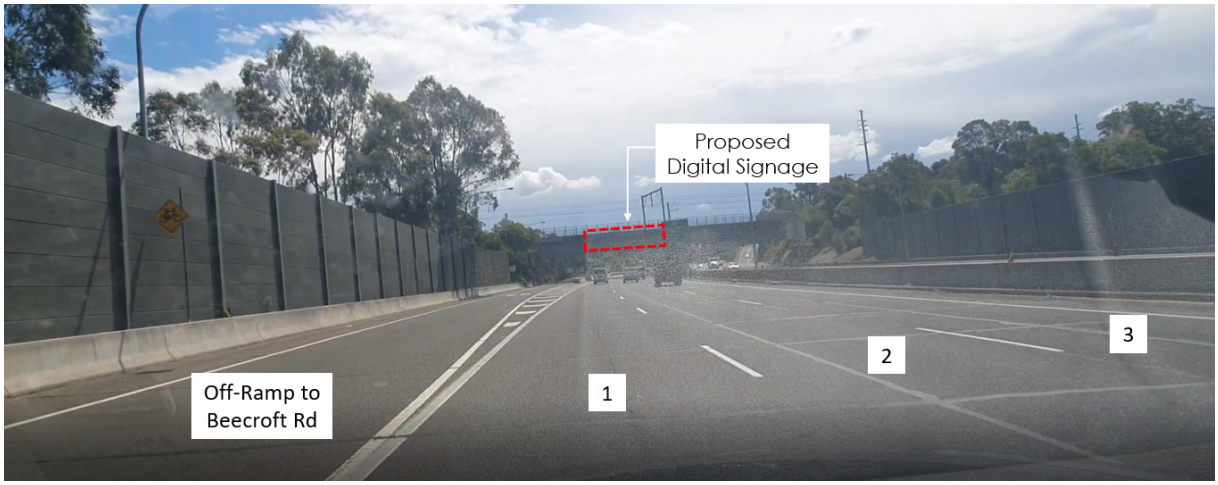
Figure 2.2: M2 Motorway Approaches



2.3.1 M2 Motorway East Approach

The lane configuration on the M2 Motorway east approach in the vicinity of the proposed signage location is shown in Figure 2.3. Travel lanes are numbered from 1 to 3 starting from the travel lane adjacent to the exit off-ramp lane to Beecroft Road.

Figure 2.3: M2 Motorway East Approach Lane Configuration



Source: Photograph taken by TTPP on 13/11/2020

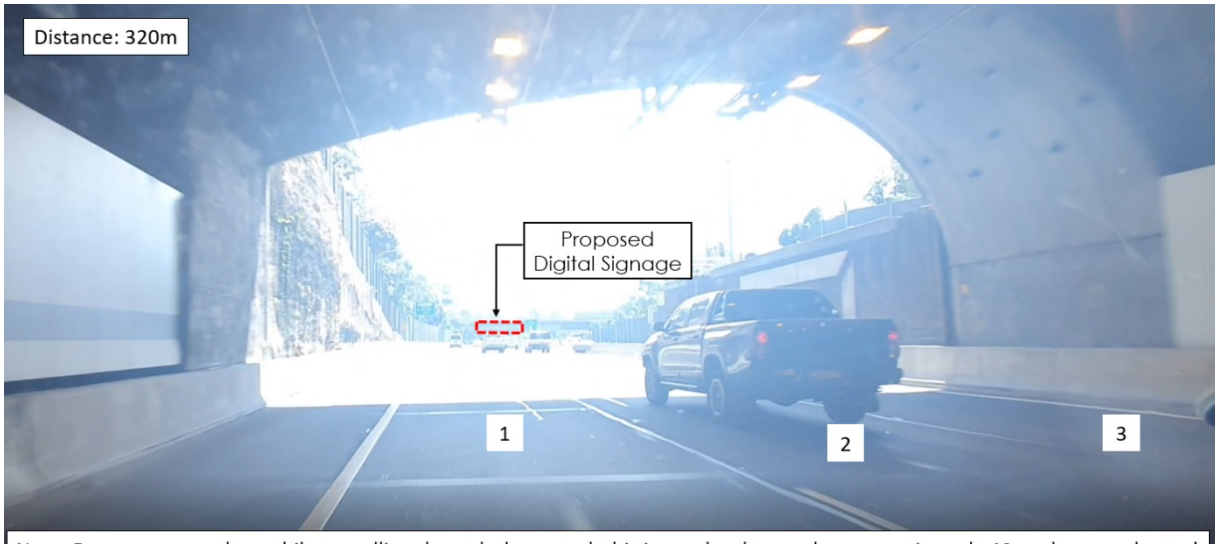
- The east facing digital signage would be visible to motorists on M2 Motorway travelling westbound.
- The digital signage would likely be visible in traffic lanes as follows:
  - In Lane 1 (through lane), 320 m from the sign on the east approach.
  - In Lane 2 (through lane), 320 m from the sign on the east approach.
  - In Lane 3 (through lane), 280 m from the sign on the east approach.
  - In the off-ramp lane to Beecroft Road, 240m from the sign on the east approach. However, the sign would be visible prior to changing lanes from Lane 1.
- In all lanes, the digital signage would become out of driving view approximately 10m south of the proposed signage.

Figure 2.4 shows the perspective of the designer's impression of the concept design at the proposed signage location. Likely visible distances on the M2 Motorway east approach are shown in Figure 2.5 to Figure 2.8.

Figure 2.4: Designer's Impression on East Approach

Source: Ethos Urban Pty Ltd dated 29/09/20

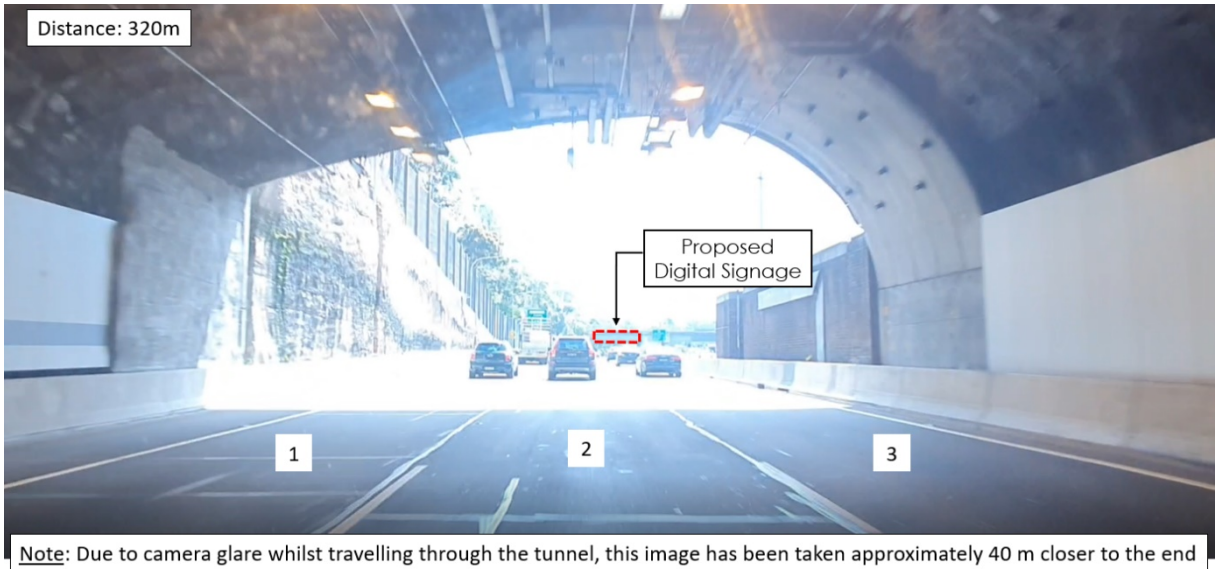
Figure 2.5: East Approach Signage Exposure – Lane 1



Note: Due to camera glare whilst travelling through the tunnel, this image has been taken approximately 40 m closer to the end of the tunnel i.e. 40m closer to the signage location.

Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.6: East Approach Signage Exposure – Lane 2

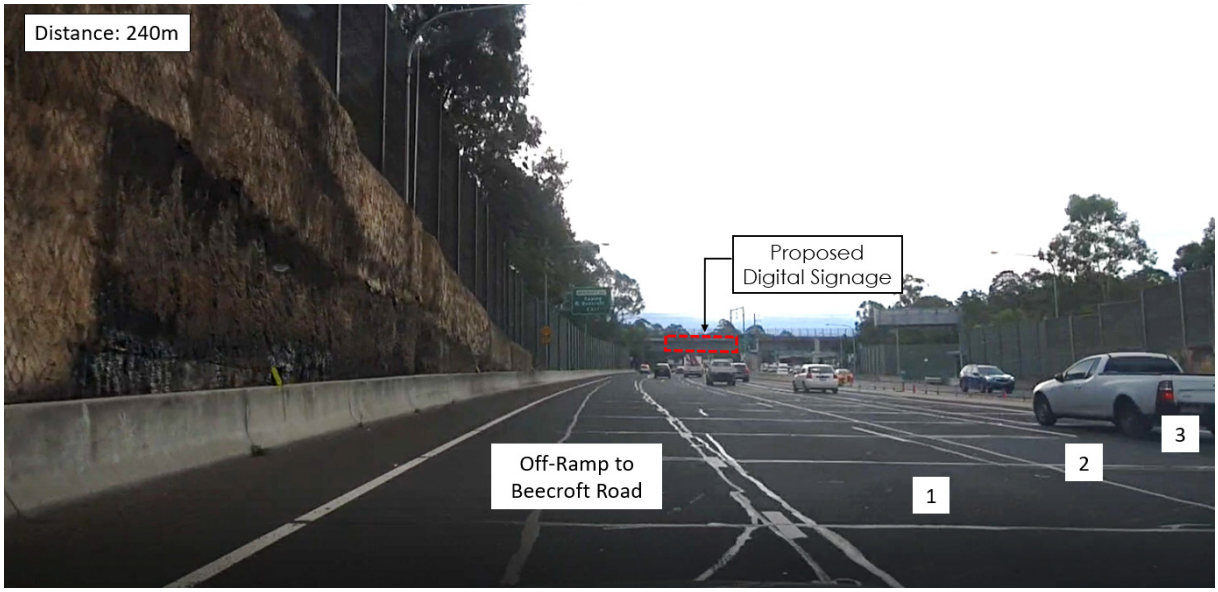


Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.7: East Approach Signage Exposure – Lane 3

Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.8: East Approach Signage Exposure – Off-Ramp to Beecroft Road



Source: Photograph taken by TTPP dated 13/11/2020

2.3.2 M2 Motorway West Approach

The lane configuration on the M2 Motorway west approach in the vicinity of the proposed signage is shown in Figure 2.9. There are three travel lanes and an on-ramp lane (from Beecroft Road) on approach to the proposed signage location.

Figure 2.9: M2 Motorway West Approach Lane Configuration

Source: Photograph taken by TTPP on 13/11/2020

- The west facing digital signage would be visible to motorists on the M2 Motorway travelling eastbound.
- The digital signage would likely be visible in traffic lanes as follows:
  - In Lane 1 (through lane), 400 m from the sign on the west approach.
  - In Lane 2 (through lane), 380 m from the sign on the west approach.
  - In Lane 3 (through lane), 380 m from the sign on the west approach.
  - In the on-ramp lane from Beecroft Road, 310 m from the sign on the west approach.
- In all lanes, the digital signage would become out of driving view approximately 10m west of the proposed signage.

Figure 2.10 shows the perspective of the designer's impression of the concept design at the proposed signage location. Likely visible distances on the M2 Motorway west approach are shown in Figure 2.11 to Figure 2.14.

Figure 2.10: Designer's Impression on West Approach

Source: Ethos Urban Pty Ltd dated 29/09/20

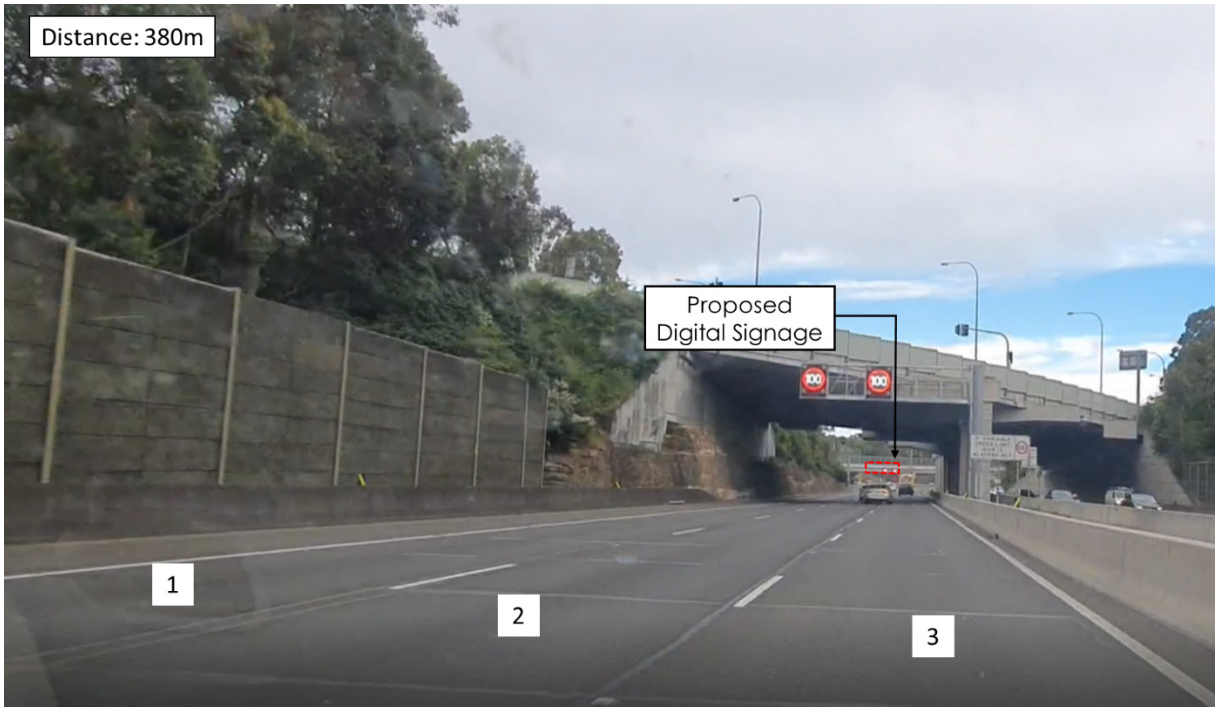
Figure 2.11: West Approach Signage Exposure – Lane 1

Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.12: West Approach Signage Exposure – Lane 2

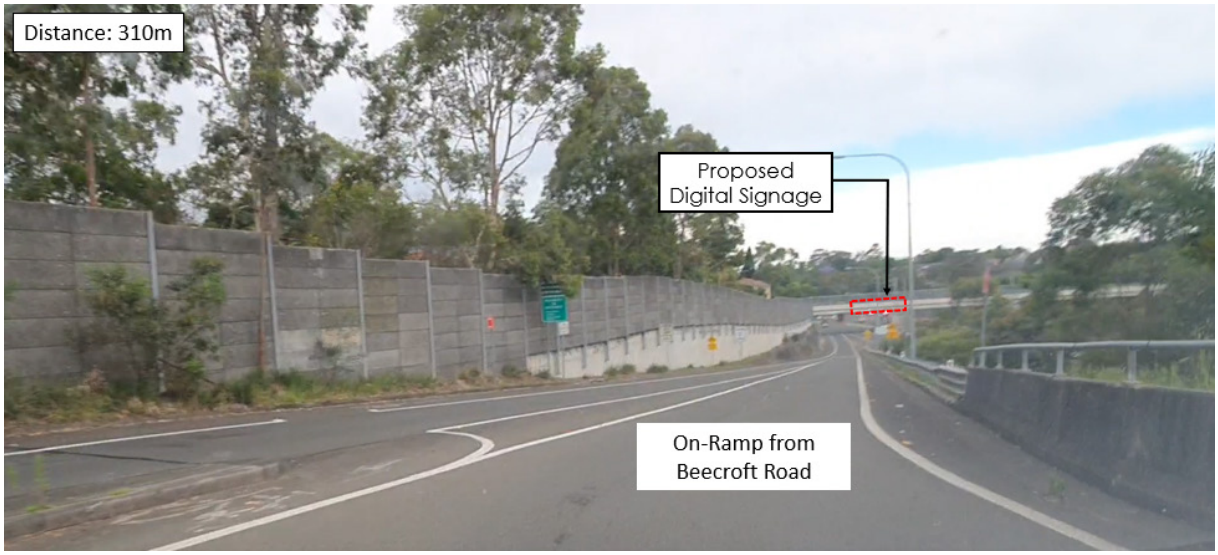
Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.13: West Approach Signage Exposure – Lane 3



Source: Photograph taken by TTPP dated 13/11/2020

Figure 2.14: West Approach Signage Exposure – On-Ramp from Beecroft Road



Source: Photograph taken by TTPP dated 13/11/2020

2.4 Crash History

Historic crash data has been obtained from Transport for NSW (TfNSW) and assessed for incidents on the M2 Motorway within the viewable distance of the proposed signage location. Based on site observations (as detailed in Section 2.3), the proposed signage location is visible from a distance of approximately up to 320m away on the east approach and up to 400m away on the west approach.

Crash history data has been assessed on both approaches to the proposed signage location between 1 January 2015 and 31 December 2019 (5-year finalised data). The location of historical crashes in the vicinity and a description of the incident are shown Figure 2.3.

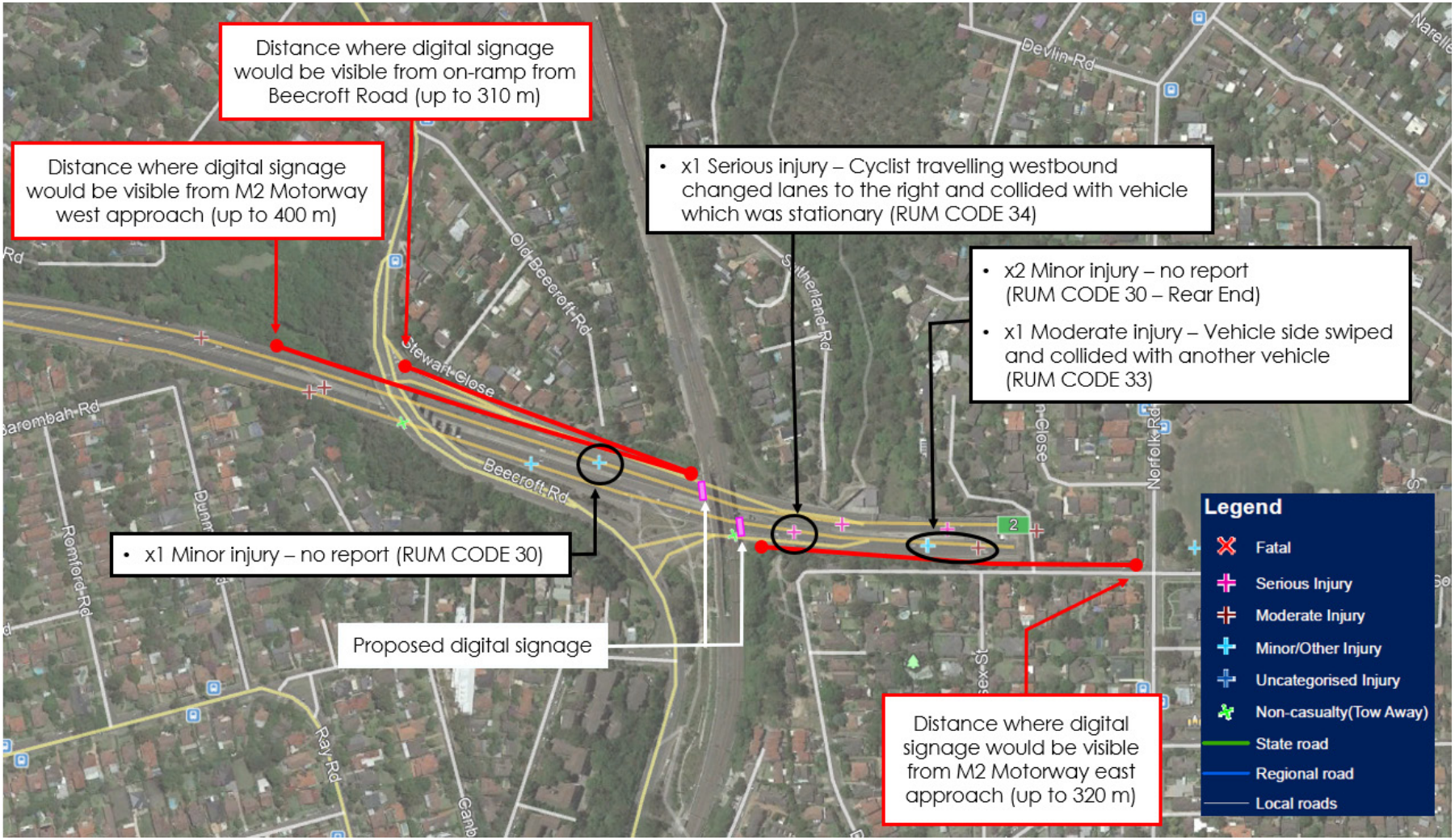
A summary of the crashes in the vicinity of the proposed digital signage is presented in Table 2.1.

Table 2.1: Crash Type and Severity

Location	Crash Type	Crash Severity (No. of Crashes)				
		Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Within visible distance of digital signage on M2 Motorway east approach (up to 320 m away from signage)	Rear End (RUM CODE 30)				2	
	Same Lane Side Swipe (RUM CODE 33)			1		
	Lane Change Right (RUM CODE 34)		1			
	Sub-total		**1**	**1**	**2**	
Within visible distance of digital signage on M2 Motorway west approach (up to 400 m away from signage) -	Rear End (RUM CODE 30)				1	
	Sub-total	**0**	**0**	**0**	**1**	**0**

Source: Transport for NSW

Figure 2.15: Crash Locations in Recent 5-Year Period



Source: Transport for NSW

Four incidents were recorded in westbound direction (320 m visible distance) and one incident was recorded in the eastbound direction (400 m visible distance). Of these five accounts, one crash resulted in a serious injury while the remaining incidents were classified as moderate injury or minor injury.

The most common incident to occur in the vicinity of the proposed signage is a rear end crash type (RUM CODE 30) i.e. three out of five crashes. The crash which resulted in a serious injury was classified as a lane change right (RUM CODE 34), and involved a cyclist and a vehicle.

3 Statutory Requirements

This section of the report assesses the compliance with the road safety assessment criteria established in the Guidelines and SEPP 64 requires analysis as to whether the proposal will 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 above key road safety assessment criteria, a series of detailed criteria are set out in Section 3, *Advertisements and Road Safety* of the Guidelines.

3.1 Sign Location Criteria

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 digital signage will not physically obstruct any vehicle, pedestrian and cyclist movements as it will be placed on the side of the railway bridge above the M2 Motorway. The digital signage will not protrude below the underside of the railway bridge, and hence the vertical clearance will be maintained as per existing conditions.

The concept design for the signage and its positioning on the sides of the railway bridge are shown in Appendix A.

(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 digital sign boards will be installed on both sides of the railway bridge which is positioned above the M2 Motorway carriageway and outside of the clear zone. Hence, it would not require an RMS-approved crash barrier.

(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.

The digital sign boards will not be located within the clear zone.

A minimum vertical clearance of 5 m will be maintained as per the existing conditions.

(d) All signs that are permitted to hang over roads or footpaths should meet wind loading requirements as specified in AS1170.1 and AS 1170.2. 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 proposed signage will be designed in accordance with Australian Standards AS1170.1 and AS1170.2 to meet the requirements for wind loading, whilst having consideration for height of the sign boards when under maximum vertical deflection.

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 digital signage will be positioned at the height of the railway bridge, not impeding the motorists' visibility of the road alignment. The digital signage would not protrude below the underside of the railway bridge, and hence would not be obstructing visibility to any vehicles and cyclists on the M2 Motorway.

(b) An advertisement must not obstruct a pedestrian or cyclist's view of the road.

The proposed digital signage will not obstruct cyclist's view of the road. Pedestrian access along the M2 Motorway is prohibited.

(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 proposed digital signage will be positioned at the same height as the railway bridge which would not impede a driver's visibility on the alignment of the road. The digital signage would not indicate misleading information or information contrary to the existing roadway. This is supported by the designer's impression of the proposed signage as depicted in Figure 2.4 and Figure 2.10.

(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 signage would be located within a driver's line of sight for both eastbound and westbound movements on the M2 Motorway with visible distances of up to 400 m and up to 320 m, respectively. In addition, the digital signage would be placed above the road therefore, a driver would not be required to turn away from the road in order to view the digital signage.

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.***

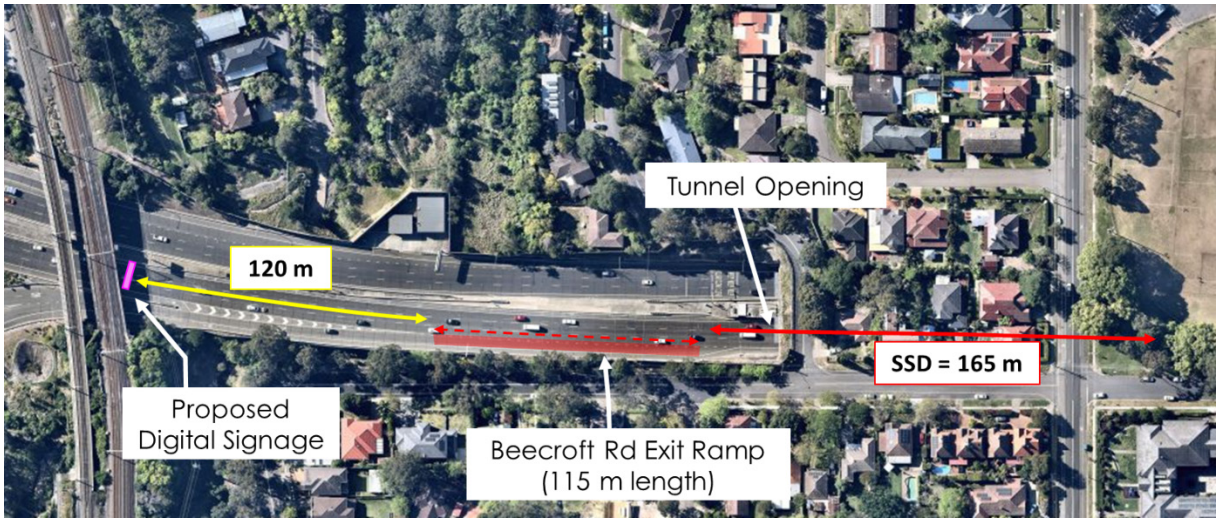
The existing diverge point/ exit ramp for Beecroft Road is 115 m in length; the western end of the diverge would be located 120 m in front of the digital signage. The proposed digital signage would be located beyond the exit ramp, and thus, would not be situated within the safe sight distance. This arrangement is shown in Figure 3.1.

As per Austroads Guide to Road Design Part 4A, the minimum Stopping Sight Distance (SSD) refers to the distance to enable a normally alert driver, travelling at the operating speed on wet pavement, to perceive, react and brake to a stop before reaching a hazard on the road ahead. This distance is dependent on the operating (85th percentile) speed of the road, road gradient and other road characteristics.

For the purpose of this assessment, an operating speed of 100 km/h has been used to calculate the minimum SSD. According to Austroads, the minimum safe stopping sight distance for a 100 km/h speed zone is 165 m.

As per the criteria, the digital advertising sign will not be located within the SSD from the Beecroft Road off-ramp, as shown in Figure 3.1.

Figure 3.1: Off-Ramp Exit to Beecroft Road



Map Source: Nearmap

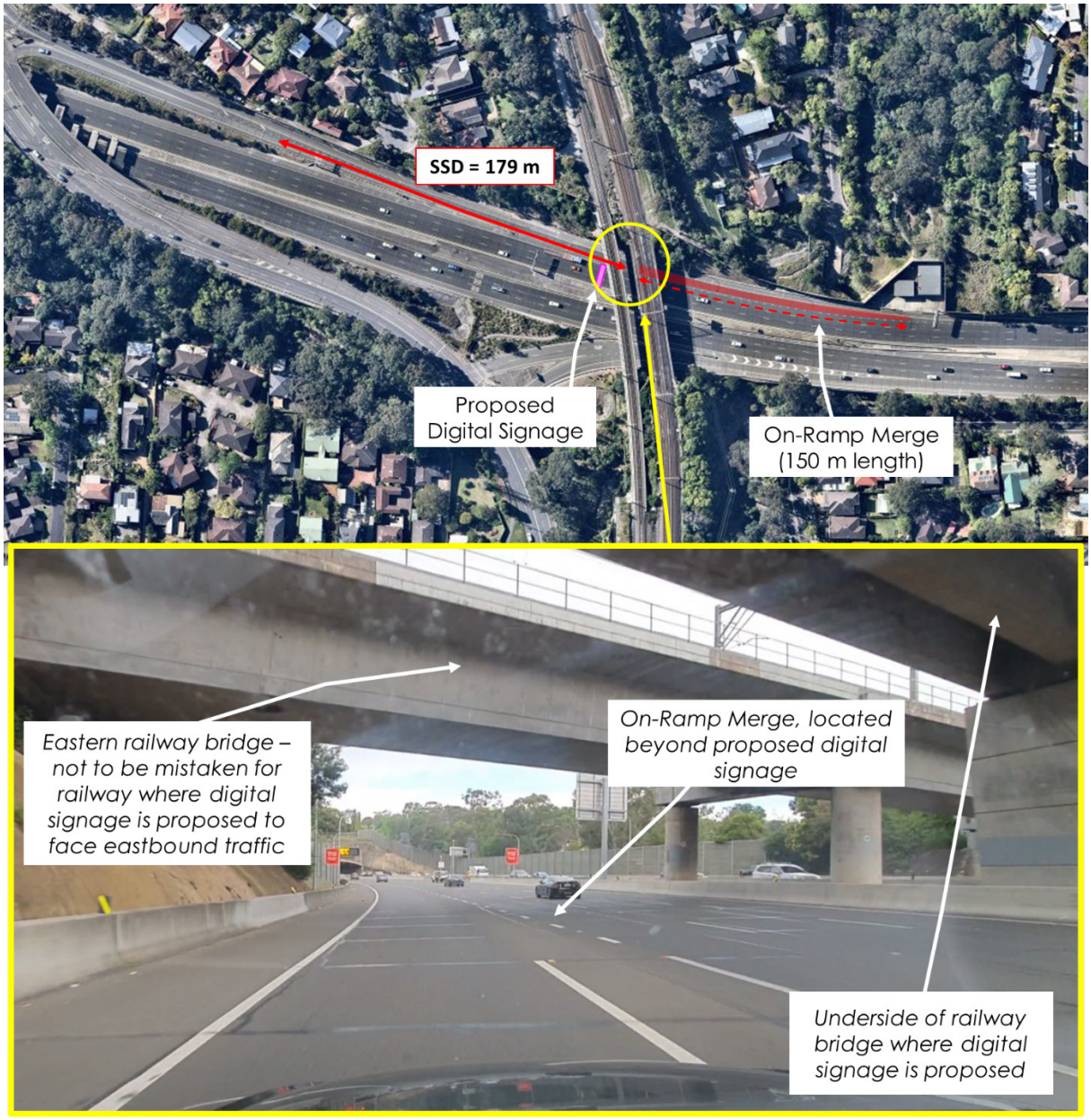
The existing merge point for the on-ramp (from Beecroft Road) is approximately 150 m in length. Notably, the beginning of the merge point is located beneath the railway bridge and beyond the visible distance of the digital signage, as shown in Figure 3.2.

The on-ramp has a variable speed limit with a typical posted speed limit of 100 km/h. Also, the on-ramp has a downward slope towards the M2 motorway road level. The average decline has been measured off Nearmap at approximately 3.6%. Where there is a slope on the approach, the Austroads Guidelines specifies a grade correction factor be applied. In this case, a correction of 14 m is added to the 165 m minimum SSD. Thus, the SSD towards the beginning of the merge point would be 179 m as shown in Figure 3.2.

As described in Section 2.3.2, the digital signage would be visible for a distance of 310 m on approach whilst travelling along the on-ramp. Therefore, a driver will have a long exposure time on approach to the digital signage. The point where a driver can merge from the on-ramp lane to Lane 1 is located beneath the railway bridge upon which the digital signage is proposed to be installed. At this point, a driver's attention will not be focused on the signage since it will be out-of-view for the driver; rather, the driver's attention would be focused on the merge point that is ahead as shown in Figure 3.2.

Based on the above, the proposed signage would not be expected to affect road safety as a result of its location.

Figure 3.2: Off-Ramp Entry from Beecroft Road



Map Source: Nearmap. Photograph taken by TTPP dated 13/11/2020

(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.

An existing cycle crossing point is located on the M2 Motorway on-ramp from Beecroft Road. As observed on-site, there is currently no advisory signage for riders however, Google Street View imagery from September 2020 shows that previously such advisory signage did exist. The advisory signage from Google Street View is shown in Figure 3.3. At this location, a cyclist is

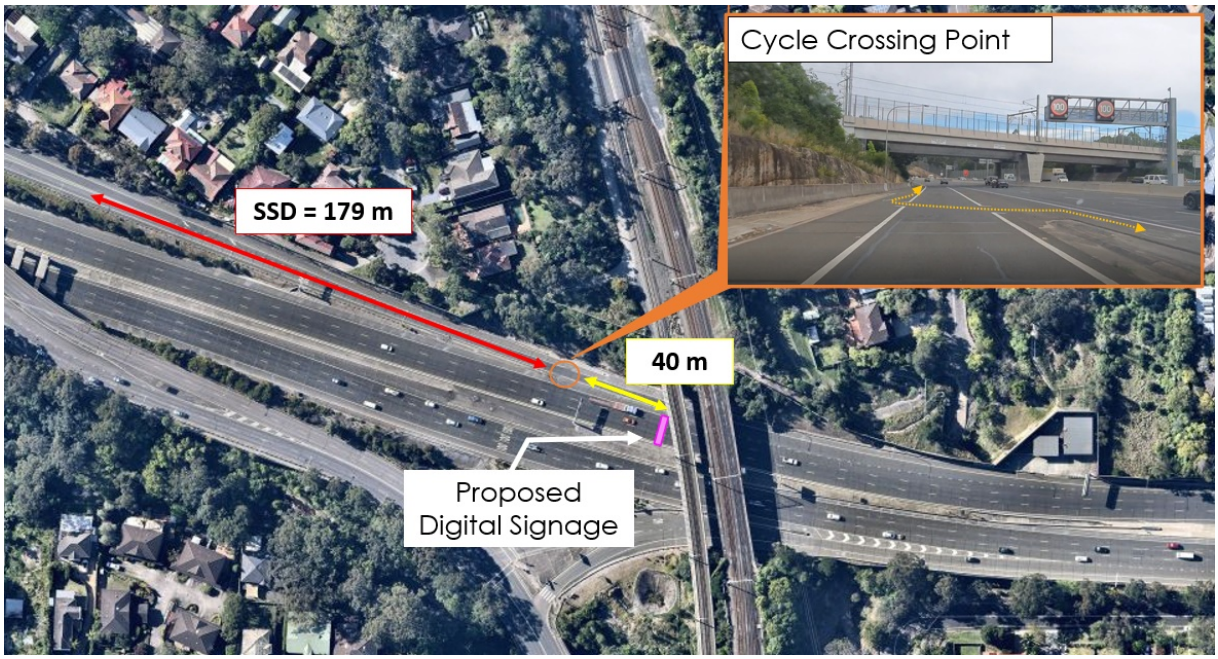
required to give-way to traffic and cross once there is a suitable gap to safely cross the road. As such, vehicles travelling along the on-ramp have priority over cyclists.

Notwithstanding this, the minimum Stopping Sight Distance (SSD) on approach to the crossing point is required. The SSD is 179 m at this location. The digital signage location is beyond the cycle crossing point and would not be positioned within the minimum SSD, as shown in Figure 3.4.

Figure 3.3: Cycle Crossing Point Signage

Source: Google Street View, imagery dated September 2020

Figure 3.4: Cycle Crossing Point - On-Ramp from Beecroft Road



Map Source: Nearmap

Similarly, there is an existing cycle crossing point located on the off-ramp to Beecroft Road. The off-ramp has a posted speed limit of 60 km/h and a flat grade on approach to the cycle crossing point. The minimum SSD in a 60 km/h speed zone is 64 m. As shown in Figure 3.5, a minimum SSD of 64m extends beyond the posted 60 km/h area (as shown by the "60" pavement line marking). Therefore, to be conservative, an SSD for the prior speed zone (100 km/h) has been adopted to calculate the SSD. On this basis, the minimum SSD on approach to the cycle crossing point is 165 m. The proposed digital signage is located outside the minimum SSD as shown in Figure 3.5.

Figure 3.5: Cycle Crossing Point – Off-Ramp to Beecroft Road

Map Source: Nearmap

(iii) So that it is visible from the stem of a T-intersection.

There are no T-intersections in the vicinity of the proposed digital signage.

(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 decision is required, implying that a road safety implication could occur if a driver was distracted at this time.

The proposed digital signage on the east approach would be positioned on the existing railway bridge. An interchange sequence sign is located in the M2 Motorway median

adjacent to the proposed digital signage, as shown in Figure 3.6. For motorists travelling westbound on the M2 Motorway, the digital signage would not obstruct a driver's view of the interchange sequence sign.

Figure 3.6: Driving View of Existing Signage on East Approach

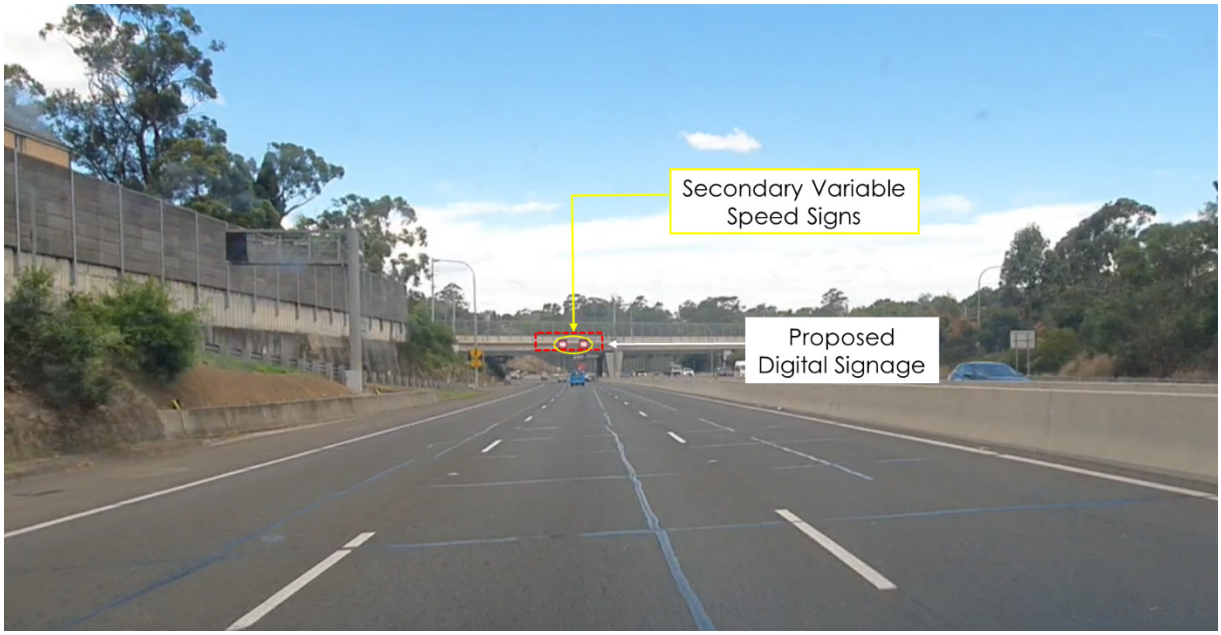
Source: Photograph taken by TTPP dated 13/11/2020

On the west approach, the digital signage will be positioned on the railway bridge above the roadway and the primary variable speed limit signs as shown in Figure 3.7. The digital signage is positioned behind the secondary variable speed limit signs as shown in Figure 3.8.

Figure 3.7: Driving View of Primary Variable Speed Sign on West Approach

Source: Photograph taken by TTPP dated 13/11/2020

Figure 3.8: Driving View of Secondary Variable Speed Sign on West Approach



Source: Photograph taken by TTPP dated 13/11/2020

Three vertical clearance signs are located on the railway bridge from the west approach. Two vertical clearance signs will be relocated directly below the digital advertising sign, as shown in Figure 2.10.

3.1.4 Sign Spacing

(a) 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 will be assessed by RMS as part of their concurrence role.

There are no other digital signs or static billboards placed within 150m of the proposed signage in both directions.

3.2 Sign Design and Operation Criteria

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?***

Details of the advertisement/s are not yet known since the project is still within the concept design stage. However, based on the example advertisements as depicted in the designer's impression (Figure 2.4 and Figure 2.10), the signage would not display colours and shapes which could be mistaken for a traffic signals or traffic control devices.

Notwithstanding this, it is recommended that the content of the proposed signage be reviewed against Table 5 of the Guidelines to avoid any content that may be construed as imitating a traffic control device.

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 image display must not be less than:
- ***(i) 10 seconds for areas where the speed limit is below 80km/h***
- ***(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 signage is proposed to contain text and images. Based on the Guidelines, the minimum dwell time for content displayed on the digital signage would be 25 seconds.

The proposed digital signage is not located near a school zone.

3.2.3 Illumination and Reflectance

(a) Luminance levels must 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 signage 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.

3.2.4 Interaction and Sequencing

(a) The advertisement must no 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 signage would not contain interactive technology or technology that enables opt-in direction communication with motorists. The digital signage would not be designed to make motorists anticipate information.

3.3 Digital Signs

Transport Corridor Advertising Signage Guidelines specify criteria which are directly applicable to the assessment of digital signs. The criteria have been assessed in Table 3.1.

It is noted that most 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.

Table 3.1: Digital Signs

	Criteria	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.*	A dwell time of 25 seconds would be suitable for the proposed digital signage.
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 signage would be classified as Zone 4, with maximum illuminance levels of: i. Day Time – 6,000 cd/sqm ii. Morning/ Evening – 500 cd/sqm iii. Night Time – 200 cd/sqm The signage would be classified as Zone 4 given that the location is primarily surrounded by residential dwellings.
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.
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.
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.*	Noted.

	Criteria	Comments
	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.	
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 will be assessed by RMS as part of their concurrence role.*	*Noted.*
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.*	The proposed digital signage would maintain the same vertical clearance as the existing rail bridge which is 5 m. The vertical clearance signs would be visible beneath the digital advertising signs.
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.*	Noted.
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.*	Noted.

4 Conclusion

Having consideration for the assessment and discussions presented within this report, the analysis suggests that the installation of a digital signage off the side of the existing railway bridge across the M2 Motorway would be acceptable.

Three vertical clearance signs are located on the railway bridge from the west approach. Two vertical clearance signs will be relocated directly below the digital advertising sign.

This conclusion is made on the basis that the proposed digital signage would not be expected to:

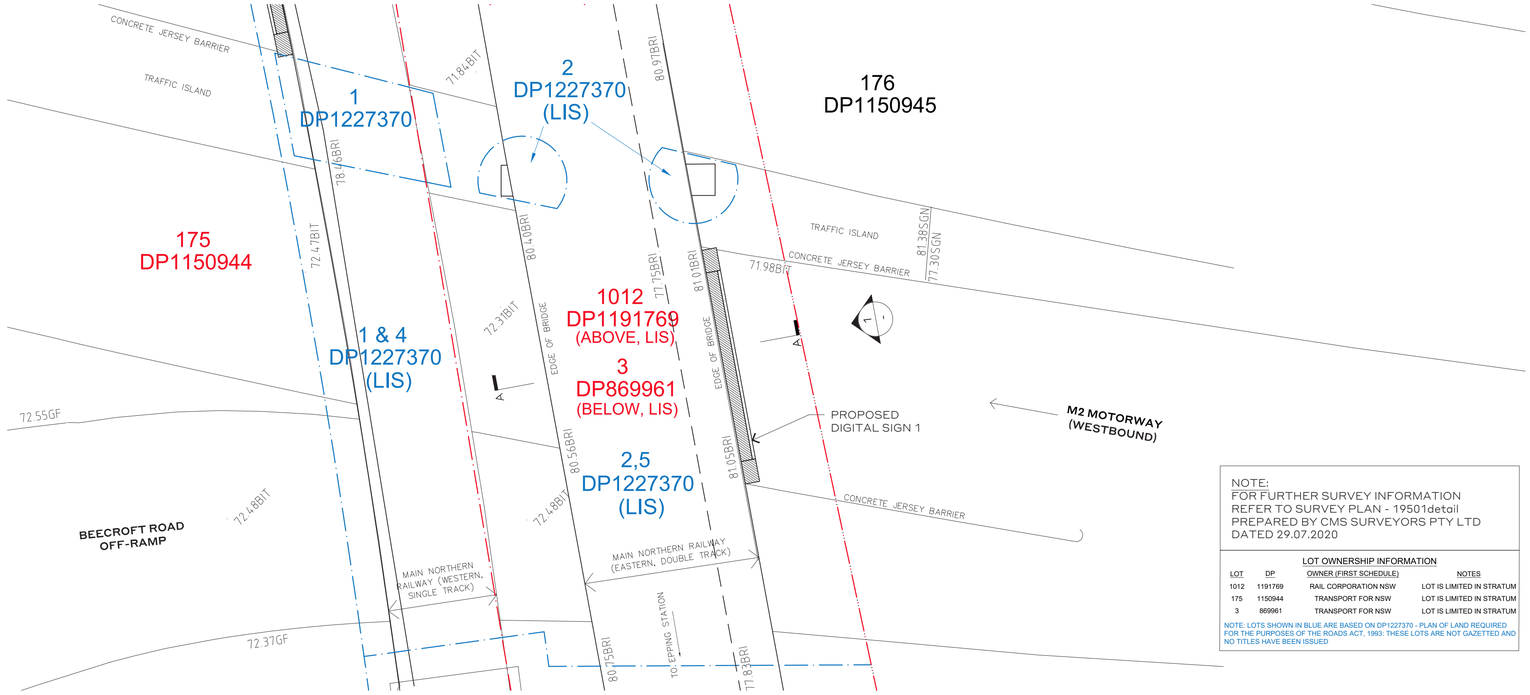
- Obstruct/ reduce visibility of any traffic control devices
- Give incorrect information on the alignment of the road
- Affect road safety at the off-ramp merge and exit points.
- Interfere with a driver's ability to read, interpret and react to information displayed by variable speed limit signs.
- Compromise safety for road users in the vicinity.

Appendix A

Concept Design Plans

LOCATION PLAN - AERIAL PHOTO

NTS



NOTE:
FOR FURTHER SURVEY INFORMATION
REFER TO SURVEY PLAN - 19501detail
PREPARED BY CMS SURVEYORS PTY LTD
DATED 29.07.2020

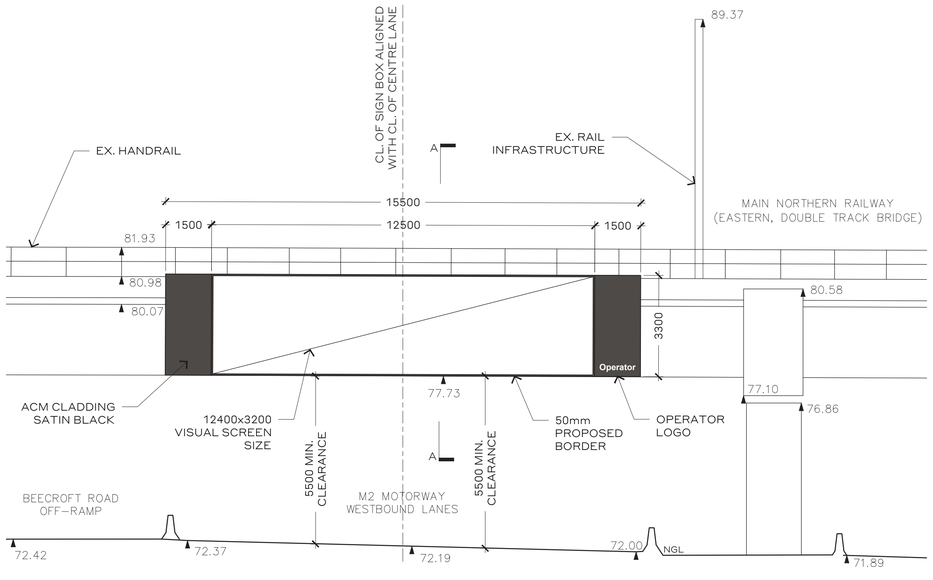
LOT OWNERSHIP INFORMATION

LOT	DP	OWNER (FIRST SCHEDULE)	NOTES
1012	1191769	RAIL CORPORATION NSW	LOT IS LIMITED IN STRATUM
175	1150944	TRANSPORT FOR NSW	LOT IS LIMITED IN STRATUM
3	869961	TRANSPORT FOR NSW	LOT IS LIMITED IN STRATUM

NOTE: LOTS SHOWN IN BLUE ARE BASED ON DP1227370 - PLAN OF LAND REQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993. THESE LOTS ARE NOT GAZETTED AND NO TITLES HAVE BEEN ISSUED

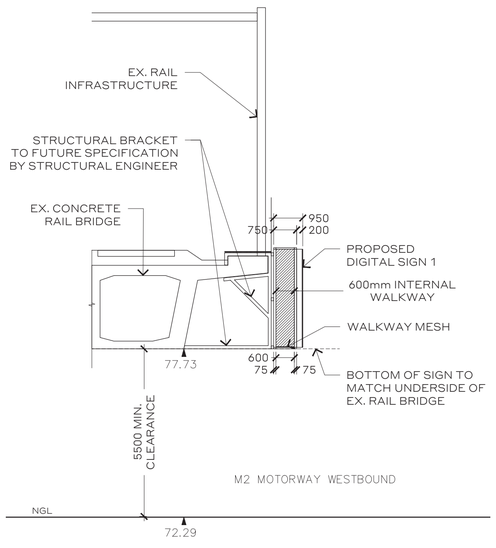
SITE PLAN

SCALE 1:200 @ A1



EAST ELEVATION

SCALE 1:100 @ A1



SECTION A-A

SCALE 1:100 @ A1

PHOTOMONTAGE - VIEW 1

View from Constance Close looking west

NOT FOR CONSTRUCTION

ETHOS URBAN

Ethos Urban Pty. Ltd.
ABN 13 615 087 931 ACN 615 087 931
www.ethosurban.com
173-185 Sussex Street Sydney NSW 2000
t +61 2 9956 6962

LEGEND / NOTES

- Site boundary
- Photomontage location
- Proposed sign (NTS)

ACM Aluminium composite material
LIS Limited in stratum
NGL Natural ground line

ISSUE	DATE	REVISION	REVISION BY	APPROVED BY
A	30.11.20	DA Issue to DPIE	PN	SM

DEVELOPMENT APPLICATION ISSUE TO DPIE

PROJECT

DOOH Development Applications
Prepared for Sydney Trains

SCALE
AS SHOWN @ A1

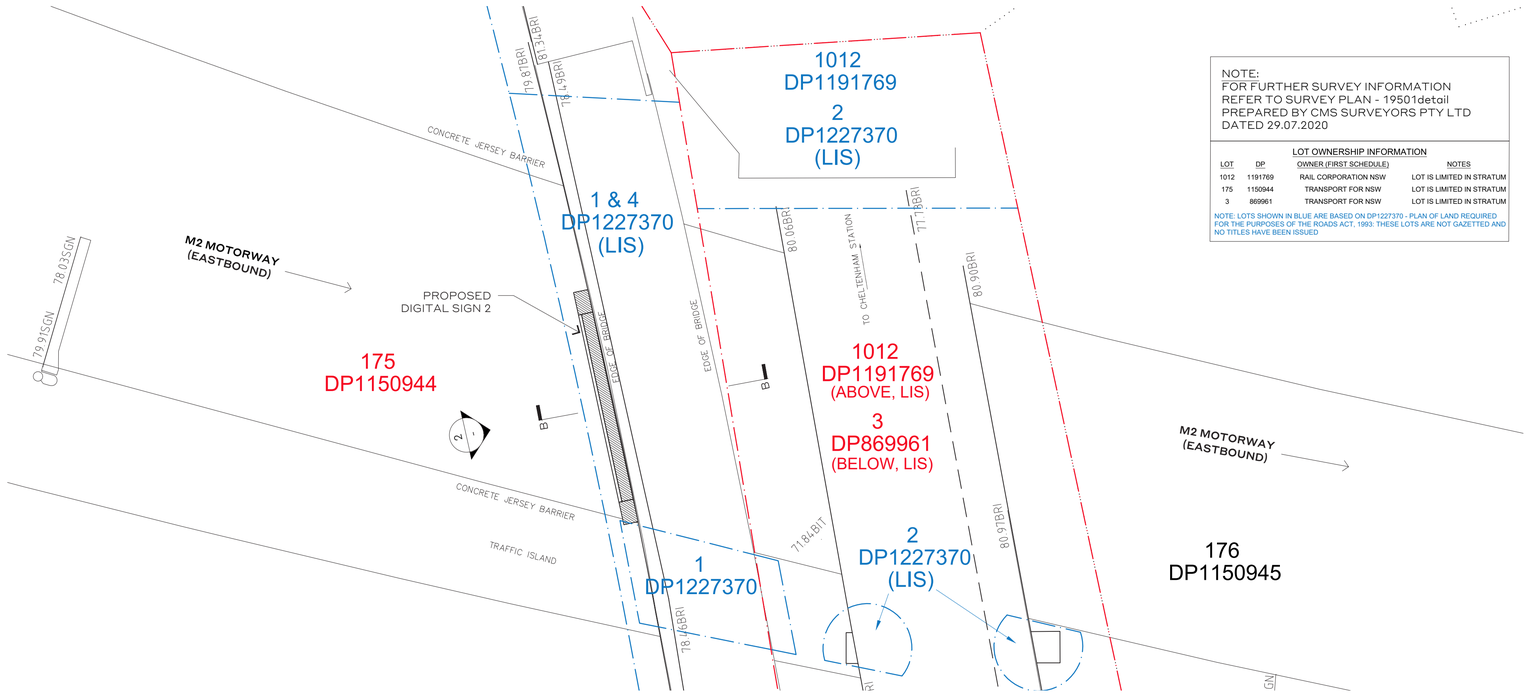
DRAWING

Site Plan & General Arrangement 1 **A-5.1**
Site 5 - Epping M2 (Eastern Side) - Sign 1 /A

JOB NO.	DWG NO.	ISSUE	DATE	DRAWN BY
2200249	A-5.1	A	30.11.20	PN

LOCATION PLAN - AERIAL PHOTO

NTS



NOTE:
FOR FURTHER SURVEY INFORMATION
REFER TO SURVEY PLAN - 19501detail
PREPARED BY CMS SURVEYORS PTY LTD
DATED 29.07.2020

LOT OWNERSHIP INFORMATION

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175	1150944	TRANSPORT FOR NSW	LOT IS LIMITED IN STRATUM
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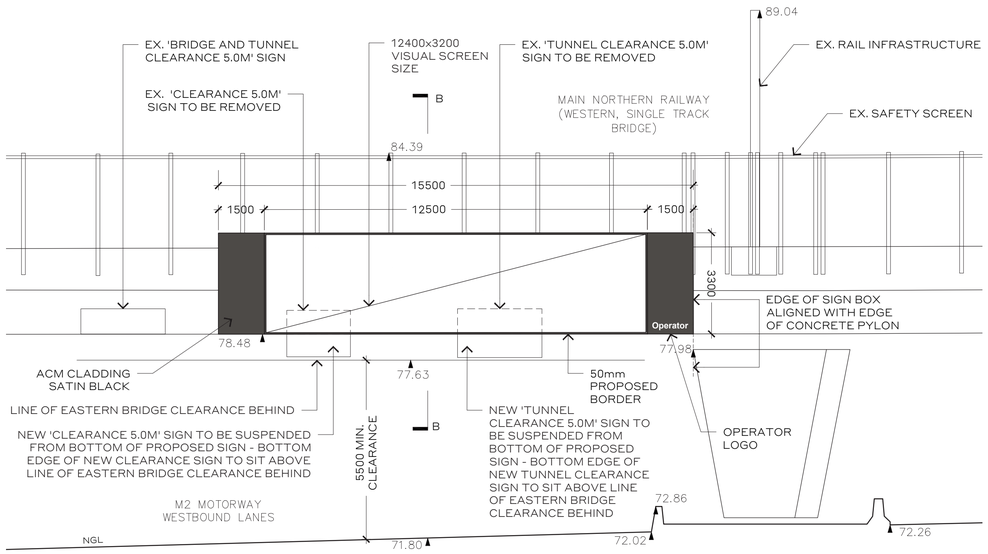
NOTE: LOTS SHOWN IN BLUE ARE BASED ON DP1227370 - PLAN OF LAND REQUIRED FOR THE PURPOSES OF THE ROADS ACT, 1993. THESE LOTS ARE NOT GAZETTED AND NO TITLES HAVE BEEN ISSUED

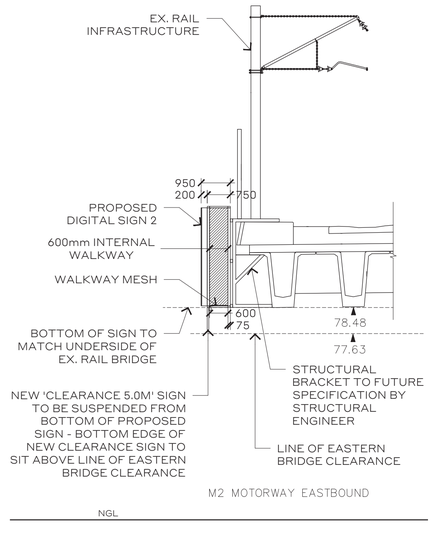
SITE PLAN

SCALE 1:200 @ A1



WEST ELEVATION

SCALE 1:100 @ A1



SECTION B-B

SCALE 1:100 @ A1

PHOTOMONTAGE - VIEW 2

View from M2 looking East

NOT FOR CONSTRUCTION

ETHOS URBAN

Ethos Urban Pty. Ltd.
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www.ethosurban.com
173-185 Sussex Street Sydney NSW 2000
t +61 2 9956 6962

LEGEND / NOTES

- Site boundary
- Photomontage location
- Proposed sign (NTS)

ACM Aluminium composite material
LIS Limited in stratum
NGL Natural ground line

ISSUE	DATE	REVISION	REVISION BY	APPROVED BY
A	30.11.20	DA Issue to DPIE	PN	SM

DEVELOPMENT APPLICATION ISSUE TO DPIE

PROJECT

DOOH Development Applications
Prepared for Sydney Trains

SCALE
AS SHOWN @ A1

DRAWING

Site Plan & General Arrangement 2 **A-5.2**
Site 5 - Epping M2 (Western Side) - Sign 2 /A

JOB NO.	DWG NO.	ISSUE	DATE	DRAWN BY
2200249	A-5.2	A	30.11.20	PN

The Transport Planning Partnership
Suite 402 Level 4, 22 Atchison Street
St Leonards NSW 2065

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St Leonards NSW 1590

02 8437 7800

info@ttpp.net.au

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Appendix B TTPP Letter Response

Our Ref: 20406

14 April 2021

Ethos Urban
173 Sussex Street
SYDNEY NSW 2000

Attention: Mr Gareth Bird

Dear Gareth,

RE: DIGITAL SIGNAGE – M2 MOTORWAY, EPPING
RESPONSE TO SUBMISSIONS

As requested, please find herein The Transport Planning Partnership (TTPP)'s Response to Submissions to road safety queries made by government agencies for the proposed digital signage on the M2 Motorway in Epping.

Background

Sydney Trains is seeking approval to install two new digital sign boards off the sides of the existing overhead railway bridge above the M2 Motorway in Epping. The proposed digital signage is to be located on both sides of the rail bridge, facing eastbound and westbound travel lanes on the M2 Motorway.

A Development Application for the proposal has been submitted and is currently on public exhibition. Submissions were received from City of Parramatta Council (Council) dated 12 February 2021 and Transport for NSW (TfNSW) dated 31 January 2021. TTPP has reviewed the submission and provide the following responses.

Notably, Hornsby Shire Council reviewed the application and provided no submissions regarding road safety.

The Transport Planning Partnership
Suite 402, 22 Atchison Street
ST LEONARDS NSW 2065

Submissions by City of Parramatta Council

Submission 1: For the on ramp, the Road Safety Assessment for eastbound traffic states that "the beginning of the merge point is located beneath the railway bridge and beyond the visible distance of the digital signage" and that "driver's attention will not be focused on the signage since it will be out-of-view for the driver" to argue that the signage will not be expected to affect road safety. However, the decision making and gap finding occurs on the ramp on the approach to the main traffic lanes occurs and on the approach to the proposed sign. The sign would be a distraction during this approach.

This applicant's assessment also does not consider the merging on the on-ramp where vehicles merge into one lane. The proposed sign will be in view of the driver at the point where they may be required to make a decision to merge on the ramp.

TTPP has undertaken an analysis of crashes in the vicinity of existing digital signs like the digital signage that is proposed on the M2 Motorway. The supplementary crash analysis investigates seven (7) digital signs located across the Sydney road network. The aim of the crash analysis at additional sites is to determine whether the operation of digital signs at these locations has resulted in any safety impacts to road users. Attachment One of this letter contains the crash analysis of additional sites.

The supplementary crash analysis indicates that the distraction potential due to the presence of a digital signage is minimal and evidently has not contributed to creating a road environment that is any less safe for road users. However, a practical example which can be used to draw such conclusion is the existing digital signage on the M4 Motorway in Homebush.

Of the sites assessed by the supplementary crash analysis, the proposal would be most comparable to the digital signage on the M4 Motorway in Homebush where there is a nearby on-ramp merge to the mainline traffic on the M4 Motorway.

The digital signage in Homebush, which was installed in July 2016, is located on the eastern side of an overhead railway bridge above the M4 Motorway as shown in Figure 1. There is an on-ramp merge lane for motorists entering from Centenary Drive. Motorists travelling westbound on the ramp are exposed to a variable speed limit signage prior to approaching the digital signage as well as a merge point on the on-ramp itself, as shown in Figure 2.

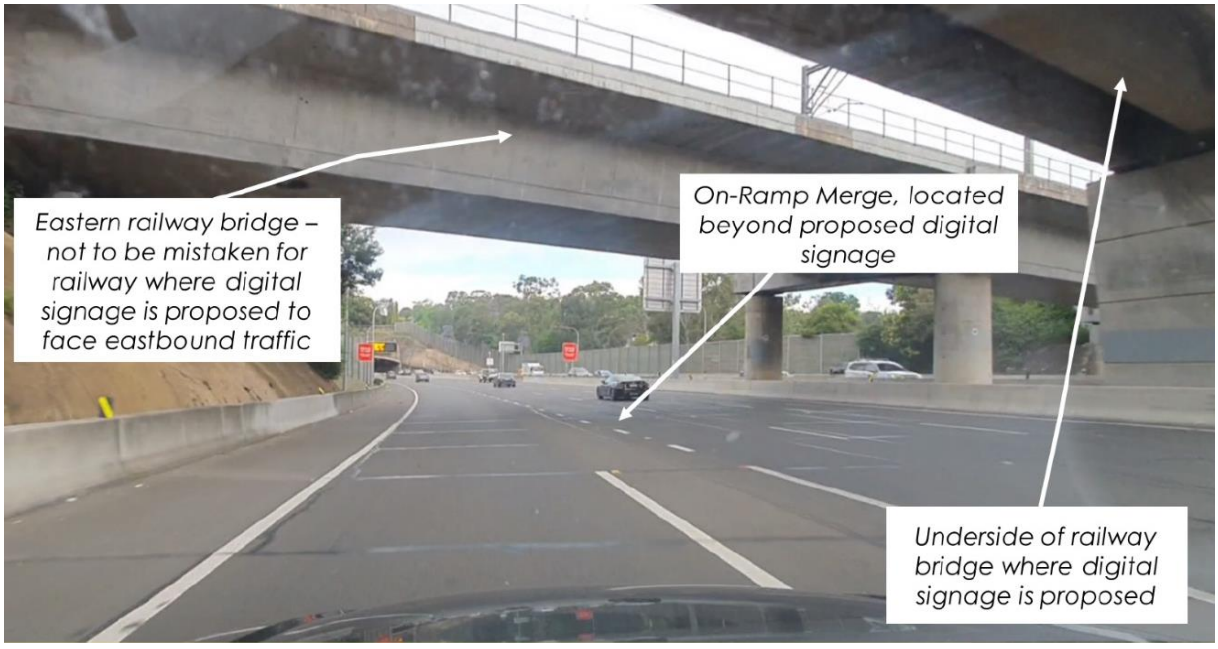
Figure 1: Existing Digital Signage on M4 Motorway, Homebush

Figure 2: Motorist's View of Digital Signage from M4 Motorway On-Ramp Entry

Unlike the proposed signage on the M2 Motorway, the on-ramp merge point with the adjacent through lane on the M4 Motorway is located prior to the signage at which point the digital signage is visible to motorists. This is shown in Figure 3. On the M2 Motorway, the merge point is located beyond the proposed digital signage as shown in Figure 4.

Figure 3: M4 Motorway (Homebush) On-Ramp Merge Point

Figure 4: M2 Motorway (Epping) On-Ramp Merge Point



In addition, the M4 Motorway example includes a merge prior on the on-ramp (prior to the merge with the mainline traffic) which is similar to the M2 Motorway. This is shown in Figure 5.

Figure 5: M4 Motorway Merge on On-Ramp

The findings of the supplementary crash analysis during the pre-installation and operational periods for the digital signage on the M4 Motorway are summarised in Table 1.

Table 1: Crash History Summary on M4 Motorway, Homebush

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (18 February 2012 - 24 July 2016)					
Rear End (RUM CODE 30)				1	7
Accident or Broken Down (RUM CODE 62)		1			
Struck Object (RUM CODE 66)			1		
Load or Missile Struck Vehicle (RUM CODE 91)					1
Sub-total	**0**	**1**	**1**	**1**	**8**
Total	**11**				
Operational Period (25 July 2016 – 31 December 2020)					
Rear End (RUM CODE 30)					1
Other Same Direction (RUM CODE 39)					1
Sub-total	**0**	**0**	**0**	**0**	**2**
Total	**2**				

The findings of the crash analysis on the M4 Motorway suggests that the presence of a digital signage does not result in an unsafe amount of information exposure and/or driver distraction that is likely to result in further crashes. This conclusion is based on there being no additional crashes following operation of the digital signage on the M4 Motorway. In particular, there has been a significant reduction in the number of incidents overall since the digital signage has been operational.

Generally, there is a perception that a digital signage would cause an unsafe level of distraction for a motorist which is likely to result in a crash incident. A study was carried out in November 2015 by Carolyn Samsa, Level 3 Road Safety Auditor at Samsa Consulting, which assessed whether digital billboards are distracting to motorists.

The study, which was conducted in Queensland, identified that the average eye fixation duration spent by drivers observing a digital billboard is 0.207 seconds. This is well below 0.750 seconds which is considered to be the minimum perception-reaction time to an unexpected event. The study identified that digital billboards do not draw drivers' attention away from the road for dangerously long periods of time compared to other signage types and drivers maintained a safe average vehicle headway in the presence of such signs. The findings of Samsa's investigation supported international studies which generally found that the presence of billboards did not significantly affect the percentage of time drivers devoted to glancing at the forward roadway.

Conclusively, motorists would have spare cognitive capacity to observe the road environment ahead in the presence of a digital signage without an increased risk of a collision.

Submission 2: In regard to the cyclists crossing point, the Road Safety Assessment argues that the "digital signage location is beyond the cycle crossing point and would not be positioned within the minimum SSD". This point from the report is refuted as the crossing point is only 40m away from the proposed sign and therefore will be in view of the drivers and cause them to fail to detect any cyclist that may be crossing the road.

Firstly, a cyclist is required to give-way to oncoming traffic and find a suitable gap prior to crossing the traffic stream. From this location, a cyclist has sufficient sight distance to the top of the on-ramp to observe a safe gap in the traffic stream. From the cyclist give-way point, a bicycle rider has a sight distance of approximately 250 m towards oncoming traffic on the on-ramp which is shown in Figure 6.

Figure 6: Cyclist's View of M2 Motorway On-Ramp at the Cycle Crossing

It is noted that there have been no crash incidents along the on-ramp merge lane in the most recent five years.

Secondly, the Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states the following:

"a. The sign should not be located:

i. less than the safe sight distance from an intersection, merge point, 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*

iii. so that it is visible from the stem of a T-intersection."

Given that the proposed digital signage would be installed on the rail bridge that is located after the cyclist give-way point, the signage would not be located "less than the safe sight distance" which is in accordance with the Guidelines.

Submission 3: The Road Safety Assessment states that the advertising sign will be positioned behind the variable speed limit sign. This point from the report is noted however, both the variable speed limit sign and the advertising sign are in a similar line of sight and at times may have very similar colour contrast. This will cause the variable speed limit sign to become obscured and may cause the driver to miss the speed limit or be distracted by the advertising.

On the main carriageway the primary variable speed limit signs are located approximately 360m prior to the digital signage at which point the proposed digital signage would not be readable. This is shown in Figure 7. Only momentarily would the secondary variable speed signs overlap with the digital signage behind it. However, given this the secondary set of speed signs and that motorists would have initially observed the speed limit at the primary set of speed signs, the brief overlap of signs would have a minor impact only.

Within the viewable distance of the digital signage from the on-ramp, the variable speed sign would be positioned well above the proposed digital signage as shown in Figure 8. Therefore, there is minimal potential for the signs to overlap and for the speed sign in the foreground to be obscured by the digital signage in the distance.

Furthermore, the contents and images displayed on the proposed digital signage would not utilise colours and shapes (e.g. red, amber or green circles, octagons, crosses or triangles or shapes or patterns similar to speed signs) that may result in the advertisement being mistaken for variable speed limit signs, in accordance with Section 3.3.1 of the Transport Corridor Outdoor Advertising and Signage Guidelines.

Figure 7: Primary Variable Speed Sign

Figure 8: On-Ramp Variable Speed Sign

The location of the proposed digital signage along the M2 Motorway is comparable to that of the earlier example of the M4 Motorway. Within the viewable distance of the digital signage on the M4Motorway there are variable speed signs in front of the digital signage which face the westbound traffic flow as shown in Figure 9. Notably, there is only one set of variable speed signs in the vicinity; the next nearest speed signs are approximately 1 km prior (near Bedford Road side road in Homebush). However, on the M2 Motorway, there are two sets of speed signs which increases the probability of drivers observing the speed zone. The results of the historic crash data analysis for the M4 Motorway show that the presence of the digital signage at this location has not contributed to further crashes. As such, it could be concluded that motorists approaching a digital signage and speed sign within proximity to each other would not result in missed information and unsafe driving conditions.

Figure 9: Digital Signage and Variable Speed Signs on M4 Motorway

Submission 4: For the exit ramp, the Road Safety Assessment states that the "proposed digital signage would be located beyond the exit ramp, and thus, would not be situated within the safe sight distance". This point is refuted as the diverge point of the exit ramp from the motorway is located at only 120m away from the proposed advertising sign with the sign in clear view of drivers. This means that it is in fact located can be viewed at a point where vehicles can suddenly change lanes to exit the motorway.

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"a. The sign should not be located:

*i. less than the safe sight distance from an intersection, merge point, **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

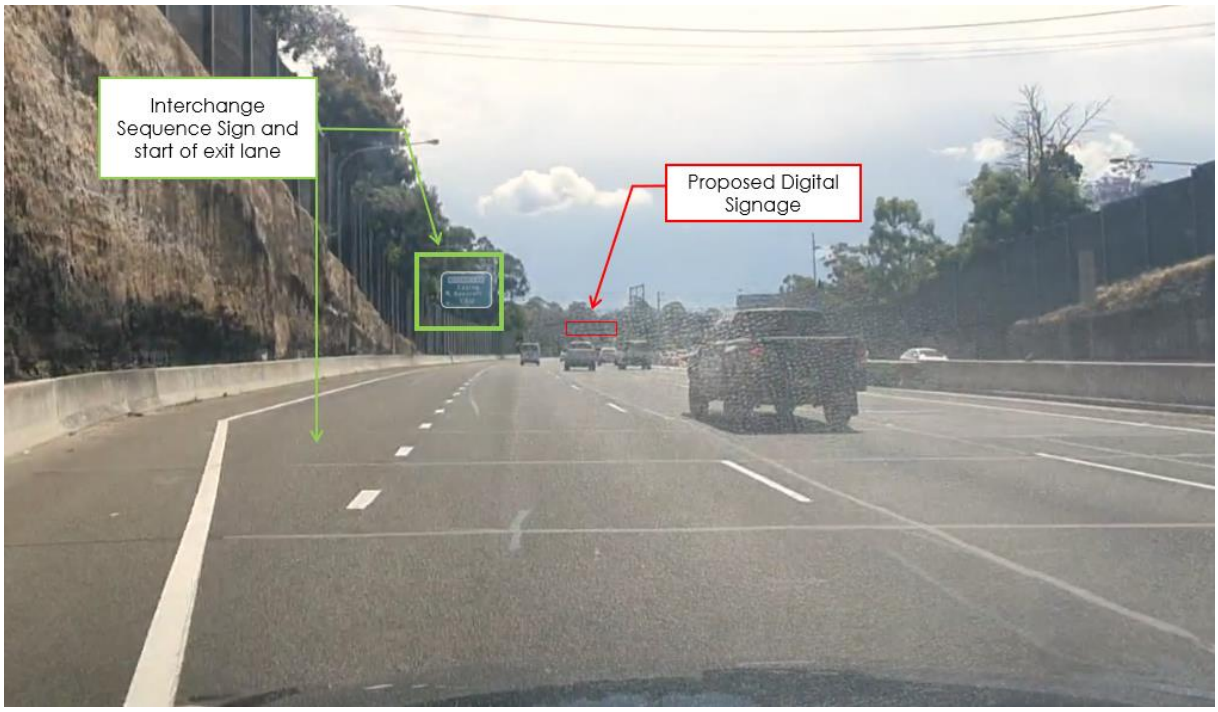
iii. so that it is visible from the stem of a T-intersection."

Given that the proposed digital signage would be installed on the rail bridge that is located after the diverge point and exit ramp, the signage would not be located "less than the safe sight distance" which is in accordance with the Guidelines.

Also, at the diverge point the Beecroft Road exit sign is fully visible and readable by motorists while the digital signage, that is located further in the distance, is not readable (approximately 250 m away from the digital signage). This is shown in Figure 10. Naturally, motorists' attention would be drawn to the Beecroft Road exit sign and diverge point since they are more visible than the digital signage in the background. Therefore, the digital signage is unlikely to distract motorists' attention resulting in a sudden lane change to exit the M2 Motorway.

As discussed in the response to Submission #1, a research study identified that the average eye fixation duration spent by drivers observing a digital billboard is well below the minimum perception-reaction time to an unexpected event. In the small chance that a motorist noticed the digital signage in the distance before the Beecroft Road exit sign, there would be ample distance for the motorist to safely change lanes and exit the motorway.

Figure 10: Beecroft Road Exit Ramp



In addition, there is an existing guidance sign prior to entering the tunnel, as shown in Figure 11. This advanced directional sign would inform motorists of the upcoming exit to Beecroft Road well ahead of the start of the exit lane.

Figure 11: Existing Guidance Sign

Submission 5: In regard to the cyclists crossing point on the off-ramp, the Road Safety Assessment takes the same approach as for the cyclist crossing point for eastbound traffic in that it is located outside of the minimum SSD. As stated above, this point is refuted as the crossing point is located at only 20m away from the proposed sign and located where motorists have a clear view of the sign. Therefore, motorists may become distracted and fail to detect any cyclists that may be crossing the road.

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"a. The sign should not be located:

i. less than the safe sight distance from an intersection, merge point, 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*

iii. so that it is visible from the stem of a T-intersection."

Given that the proposed digital signage would be installed on the rail bridge that is located after the cycle crossing, the signage would not be located "less than the safe sight distance" which is in accordance with the Guidelines.

As addressed in Submission #2, a cyclist is required to give-way to oncoming traffic and find a suitable gap prior to crossing the traffic stream. From this location, a cyclist has sufficient sight distance to the tunnel exit to observe a safe gap in the traffic stream. From the cyclist give-way point, a bicycle rider has a sight distance of 240 m towards oncoming traffic from the tunnel exit as shown in Figure 12.

Figure 12: Cyclist's View of M2 Motorway from Cycle Crossing near Beecroft Road Exit

Submission 6: In regards to the interchange sequence signs, the report Road Safety Assessment claims that the advertising sign will not obstruct the drivers view. However, although the advertising sign is not physically obstructing the existing sign, it is still in very close proximity and may cause an information overload for the driver causing them to miss key information regarding the approaching road environment to allow them to safely navigate the road.

As addressed previously in Submission #1, there is a general perception that a digital signage will distract motorists and cause them to miss crucial information from other signage in the motorists' peripheral vision. However, research studies show that this is not the case, and that motorists would have spare cognitive capacity to observe the road environment ahead in the presence of a digital signage.

Notwithstanding the above, the nearby signage is a reassurance direction sign which displays distances to the next few suburbs/ areas as shown in Figure 13. The sign does not illustrate diagrammatic information which typically requires greater cognitive capacity to read and interpret when compared to letters and numbers. Therefore, the guidance sign would be visible to motorists and easily interpreted without being obstructed or misconstrued by the digital signage.

Figure 13: Reassurance Direction Sign

Further to the above, it is noted that there is an existing digital signage located on the M2 Motorway that is within close proximity to an interchange sequence sign. This arrangement is located at the Murray Farm Road overhead bridge approximately 1.6 km west of the proposed digital signage. As shown by the driving view in Figure 14 both signs are within the same line of sight yet do not cause information overload for motorists.

Another example can be observed on Military Road in Neutral Bay, where there is a digital signage installed adjacent to a lane directional sign on the overhead footbridge. As shown in in Figure 15, the digital signage and the directional sign are within the same line of sight without causing information overload for motorists.

Figure 14: Existing Digital Signage and Interchange Sequence Sign on M2 Motorway

Figure 15: Existing Digital Signage and Lane Directional Sign on Military Road

Submissions by Transport for NSW

Submission 1: TfNSW noted that subject single-track railway bridge on the western side was built as part of the Epping to Thornleigh Third Track (ETTT) project, and this bridge is still in the M2 lease. As such, consent from The Hills Motorway Limited (THML) is required for advertising on the ETTT Bridge.

TfNSW has consulted THML and was advised that THML is not supportive of another party advertising on the ETTT Bridge.

This matter falls outside of the Road Safety Assessment. Therefore, it has been referred to Ethos Urban and Sydney Trains.

Submission 2: Sign on western elevation (eastbound)

- ***The sign is located just upstream of the entry merge and is visible in the area where merging traffic will be manoeuvring to match the speeds of the mainline traffic. Any form of distraction should be minimised.***

As addressed in the response to City of Parramatta Council Submission #1, the digital signage is unlikely to present an unsafe road condition since motorists would have spare cognitive capacity to still observe the road ahead and drive in a safe manner.

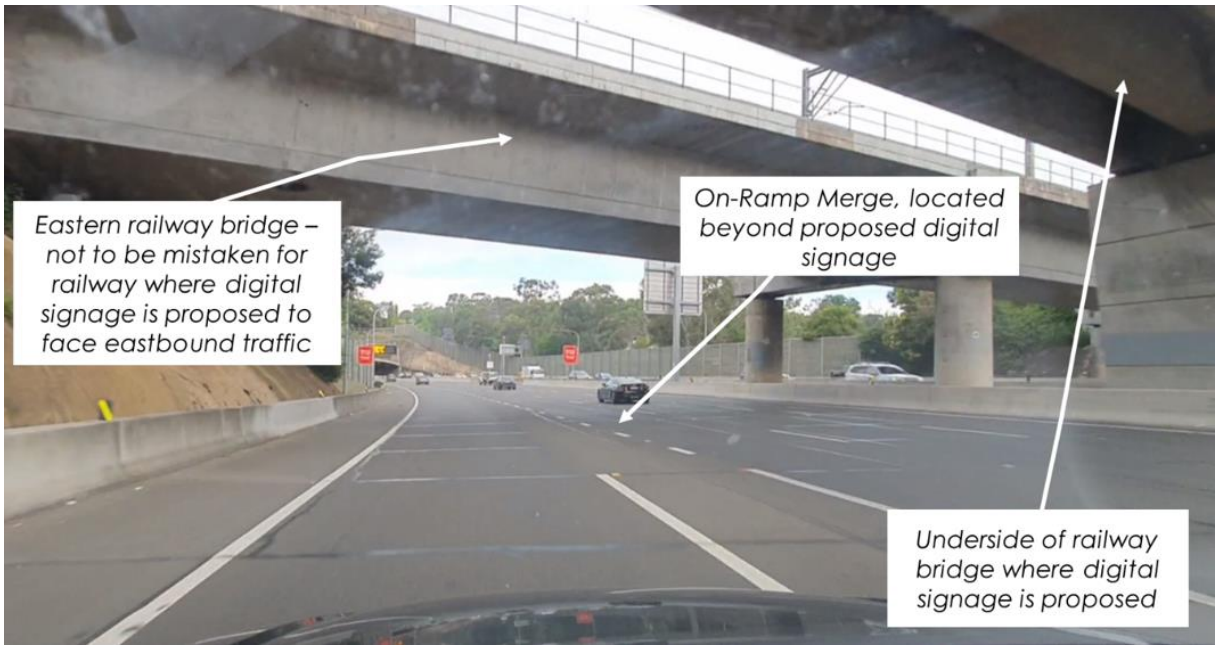
Full details are provided in the response to City of Parramatta Council Submission #1.

- ***The sign is also clearly visible on entry ramp and a possible distraction to motorists who preparing to enter the motorway and concentrating on performing merge into the mainline traffic.***

The beginning of the merge point from the on-ramp to the mainline traffic is located beneath the railway bridge and beyond the visible distance of the digital signage as shown in Figure 16. This is the location where a driver would be observing the mainline traffic and looking over their shoulder to merge into the adjacent lane.

As assessed in the response to City of Parramatta Council Submission #1, a comparable digital signage is located on the M4 Motorway in Homebush. A supplementary crash analysis was undertaken by TTPP of the M4 Motorway in the vicinity of the existing digital signage (the crash analysis is contained in Attachment One of this letter). The findings of the assessment suggest that the presence of a digital signage does not result in an unsafe amount of information exposure and/or driver distraction that is likely to result in further crashes. This conclusion is based on there being no additional crashes following operation of the digital signage on the M4 Motorway. In particular, there has been a significant reduction in the number of incidents overall since the digital signage has been operational.

Figure 16: On-Ramp Entry from Beecroft Road



- ***In this area there are Variable Speed Limit Signs (VSLS) used to manage incidents within the tunnel. There should be no other devices causing potential interference to the VSLS.***

As addressed in the response to City of Parramatta Council Submission 3, the digital signage would not cause an unsafe level of distraction or interference with the variable speed signs.

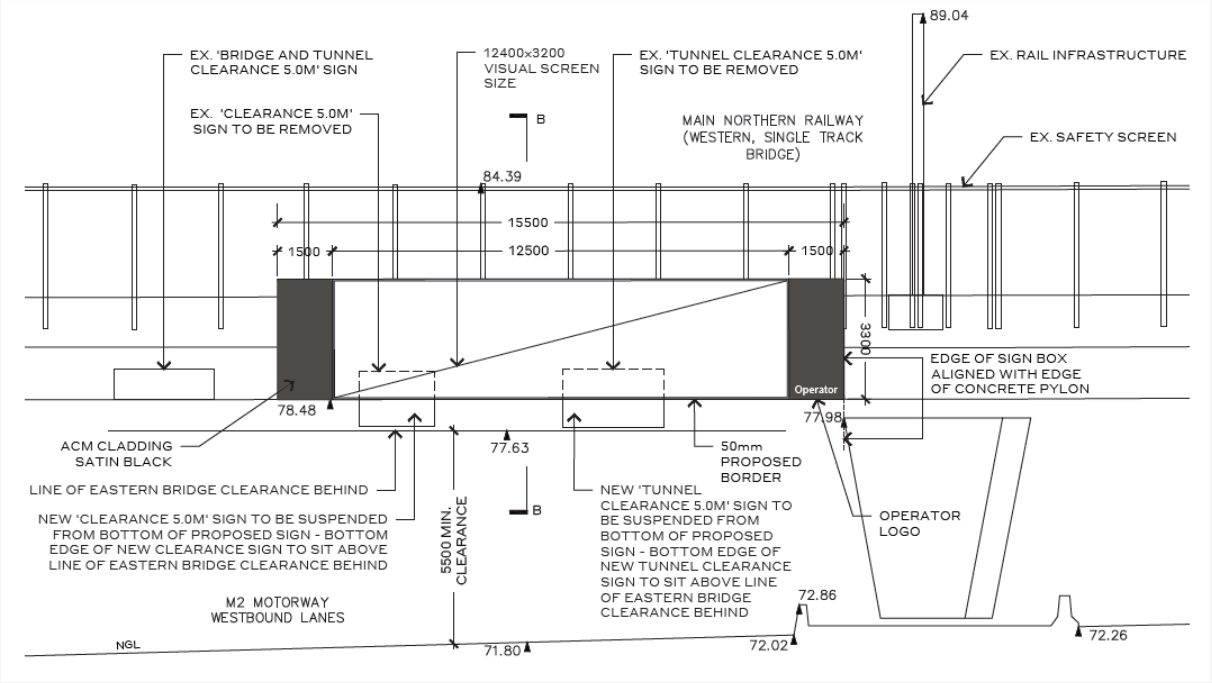
Full details are provided in the response to City of Parramatta Council Submission #3.

- ***Currently there are 3 tunnel clearance signs posted directly on the western face (eastbound) of the rail bridge and there are two VSLS in front of the rail bridge. The proposed advertising signs would likely interfere (depending on exact location) and be a distraction to these tunnel clearance signs and VSLS.***

The three height clearance signs located on the west side of the railway bridge would not be obstructed by the proposed digital signage. The existing clearance signs would be relocated and suspended directly under the proposed digital signage as shown in Figure 17. The suspended clearance signs are to be positioned 5.5m above the road surface of the M2 Motorway eastbound carriageway which is greater than the displayed clearances (namely, 5.0m for bridge and tunnel clearance).

In reference to the variable speed limit signs, this query has been addressed in the response to City of Parramatta Council Submission #3.

Figure 17: Proposed Digital Signage on West Approach



Submission 3: Sign on eastern elevation (westbound)

- ***The sign is proposed in the viewing area where an exit lane commences. In these locations some motorists are required to make decisions for their destinations and potential lane changes if they decide to exit. Any form of distraction should be minimised.***

  Section 3.2.3 of Transport Corridor Outdoor Advertising and Signage Guidelines, November 2017, states as follows:
  'It is important that drivers are not distracted near decision making points or conflict points to allow concentration to be focused on the driving task where the driver's attention requirement are greater.'

As addressed in the response to City of Parramatta Council Submission #4, at the diverge point the Beecroft Road exit sign is fully visible and readable by motorists while the digital signage, that is located further in the distance, is not readable (approximately 250 m away from the digital signage). This is shown in Figure 10. Naturally, motorists who are planning to exit the motorway would direct their attention to the Beecroft Road exit sign and diverge point since they are more visible than the digital signage in the background. Therefore, the digital signage is unlikely to distract motorists' attention resulting in a sudden lane change to exit the M2 Motorway.

- ***Signs are visible to motorists as they exit the tunnel. This area has a history of congestion and rear end collisions. Any form of distraction causing potential accidents should be avoided in this area.***

As addressed in response to City of Parramatta Council Submission #1, there is a general perception of digital signage causing unsafe levels of distraction to motorists and causing an increased likelihood of crashes. Studies carried out by Samsa Consulting as well as the supplementary crash analysis undertaken by TTPP demonstrates that there is no evidence that digital signs result in increased driver distraction and increased safety risk for motorists.

Crash history data shows that in the past five years, there have been two incidents near the tunnel exit. Based on the information obtained from Transport for NSW this area does not appear to be a crash hotspot. There may be some degree of incidents which are not reported to Police, and therefore, not captured in the data provided by TfNSW. However, it is presumed that such incidents would be minor in nature not having resulted in injury, property damage, or a tow-away.

From the tunnel exit, the digital signage would be visible however it would not be readable at such a distance. Naturally, motorists' attention would be drawn to the forward road ahead and signage that is closer and within readable distance. As such, the digital signage would not add a form of distraction for motorists when exiting the tunnel.

- ***The proposed advertising signs will be located on the rail bridge, which is approx. 250m from the tunnel exit. It is concerned that it may cause unfamiliar drivers trying to read and understand the signs and seeking any relevant information on the proposed advertising signs to them. This can potentially cause unsafe behaviours leading to accidents.***

As addressed in response to the dot point above, the digital signage would not add a form of distraction for motorists when exiting the tunnel that would cause an unsafe road environment.

As addressed in response to City of Parramatta Council Submissions #4 and #6, motorists' exposure to advanced guidance signs would be adequate, and motorists would still have a sufficient capacity to read, interpret and respond to signs in a safe manner.

Full details are provided in the response to City of Parramatta Council Submissions #4 and #6.

Submission 4: Any crashes occur directly outside the tunnel going westbound would have an immediate effect back through the tunnel. As such, any advertising sign causing potentially increasing possibility of crashes should be avoided in the area.

As addressed in the response to TfNSW's Submission #3 dot point 2, the digital signage would not add a form of distraction for motorists when exiting the tunnel that would cause an unsafe road environment.

As addressed in response to City of Parramatta Council Submissions #4 and #6, motorists' exposure to advanced guidance signs would be adequate, and motorists would still have sufficient capacity to read, interpret and respond to signs in a safe manner.

Full details are provided in the response to City of Parramatta Council Submissions #4 and #6.

Submission 5: The Evaluation of Lighting Impact only assessed the illuminance resulting from the proposed installation without the cumulative impact of the other lighting in the area which includes how it is impacting the nearby street lighting.

This matter falls outside of the Road Safety Assessment. Therefore, it has been referred to Ethos Urban and Sydney Trains.

Submission 6: Should the proposed development proceed, the following information should be submitted to TfNSW for review:

- ***Structural documentation including drawings/reports of the sign support and connection details to the bridge, including an as-is loading assessment of the existing bridge.***
- ***Construction Traffic Management Plan and installation methodology including any lane or carriageway closure requirements.***
- ***Details of the relocation of the eastbound clearance signage including the support and connection details.***
- ***Visual impact assessment of the relocation of the anticipated adjusted tunnel clearance signage on the eastbound traffic, as the digital advertising signage could be a major distraction from the last tunnel clearance warning prior to the tunnel entrance.***
- ***Pre- and post- dilapidation report for all assets potentially impacted by the construction and operation of the proposed advertising signs.***
- ***Crane loading assessment for the construction of the proposed advertising signs, as the crane will be set up on the existing M2 pavement for construction.***
- ***Inspection and maintenance plan for the proposed advertising signs, detailing the frequency and what routine inspections and maintenance to be carried out on the signage as well as the supporting structure.***

- ***Lighting impact assessment, including the cumulative impact of the proposed advertising signs on the illumination provided by the nearby street lighting?***

The above requirements have been noted, and the relevant documentation will be provided in due course.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Wayne Johnson
Director

Attachment One:

Crash Analysis of Additional Digital Signage Locations

Our Ref: 20406

26 March 2021

Ethos Urban
173 Sussex Street
SYDNEY NSW 2000

Attention: Mr Gareth Bird

Dear Gareth,

RE: DIGITAL SIGNAGE SAFETY ASSESSMENT
EXISTING DIGITAL SIGNAGE CRASH DATA ANALYSIS

As requested, please find herein The Transport Planning Partnership (TTPP)'s crash data analysis at locations along the Sydney Trains network with existing digital signage billboards.

Background

Ethos Urban, on behalf of Sydney Trains, have submitted proposals for a new digital signage at various locations within Sydney NSW. Submissions made by Council and Transport for NSW (TfNSW) have been received which identify concerns for such digital sign boards to cause potential distraction to road users.

There is a perception that digital signage boards would result in an unsafe level of distraction to a motorist or pedestrian which is likely to result in a crash incident. As such, a review has been undertaken of crash data in the vicinity of existing digital billboard signs, like those which Sydney Trains is proposing to implement. The aim of the analysis is to determine whether the digital signage at each location has resulted in any safety impacts to road users within the vicinity of the signage.

This study assessed crash data that has been obtained from TfNSW at seven locations having digital signage owned by Sydney Trains. The crash data has been analysed to compare the number of crashes and severity of crashes for the same duration of time before and after the digital signage was installed. The findings of the analysis as presented herein identifies whether existing digital signs cause sufficient distraction to road users which result in road crashes.

Existing Digital Signage Locations

Existing digital signs which have been assessed as part of this investigation are as follows:

- M4 Motorway, Homebush,
- Parramatta Road, Lewisham,
- City West Link Eastbound, Lilyfield
- City West Link Westbound, Lilyfield,
- Pacific Highway, Pymble,
- Boundary Street, Roseville, and
- Victoria Road, West Ryde.

The location of each digital signage within the context of the surrounding road network is shown in Figure 1 to Figure 6.

Figure 1: M4 Motorway, Homebush

Figure 2: Parramatta Road, Lewisham

Figure 3: City West Link, Lilyfield

Figure 4: Pacific Highway, Pymble

Figure 5: Boundary Street, Roseville

Figure 6: Victoria Road, West Ryde

Crash History Analysis

Historic crash data has been obtained from TfNSW and assessed for incidents at seven locations with digital signage. The crash data analysis includes incidents that have occurred within the visible distance of the existing digital signage. For the purpose of this assessment, the visible distance has been based on desktop observations.

Crash data has been assessed on the approaches to the digital signage for a period prior to its installation and whilst it has been operational. The installation date varies for each signage location (as detailed below). Notwithstanding this, crash data during the operation of each digital signage has been assessed up to 31 December 2020.

M4 Motorway, Homebush

A digital signage is located on the eastern side of an overhead railway bridge across the M4 Motorway as shown in Figure 1. This digital signage, which was installed on 25 July 2016, is visible to motorists travelling on the M4 Motorway east approach within approximately 350m.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 18 February 2012 to 24 July 2016. 4 years, 5 months, 7 days
- Post installation period: 25 July 2016 to 31 December 2020. 4 years, 5 months, 7 days

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 1. The location of crashes recorded during these periods are illustrated in Figure 7 and Figure 8 respectively.

Table 1: Crash History Summary on M4 Motorway, Homebush

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (18 February 2012 - 24 July 2016)					
Rear End (RUM CODE 30)				1	7
Accident or Broken Down (RUM CODE 62)		1			
Struck Object (RUM CODE 66)			1		
Load or Missile Struck Vehicle (RUM CODE 91)					1
Sub-total	**0**	**1**	**1**	**1**	**8**
Total	**11**				
Operational Period (25 July 2016 – 31 December 2020)					
Rear End (RUM CODE 30)					1
Other Same Direction (RUM CODE 39)					1
Sub-total	**0**	**0**	**0**	**0**	**2**
Total	**2**				

Figure 7: Crash Locations at M4 Motorway, Homebush – Pre-Installation

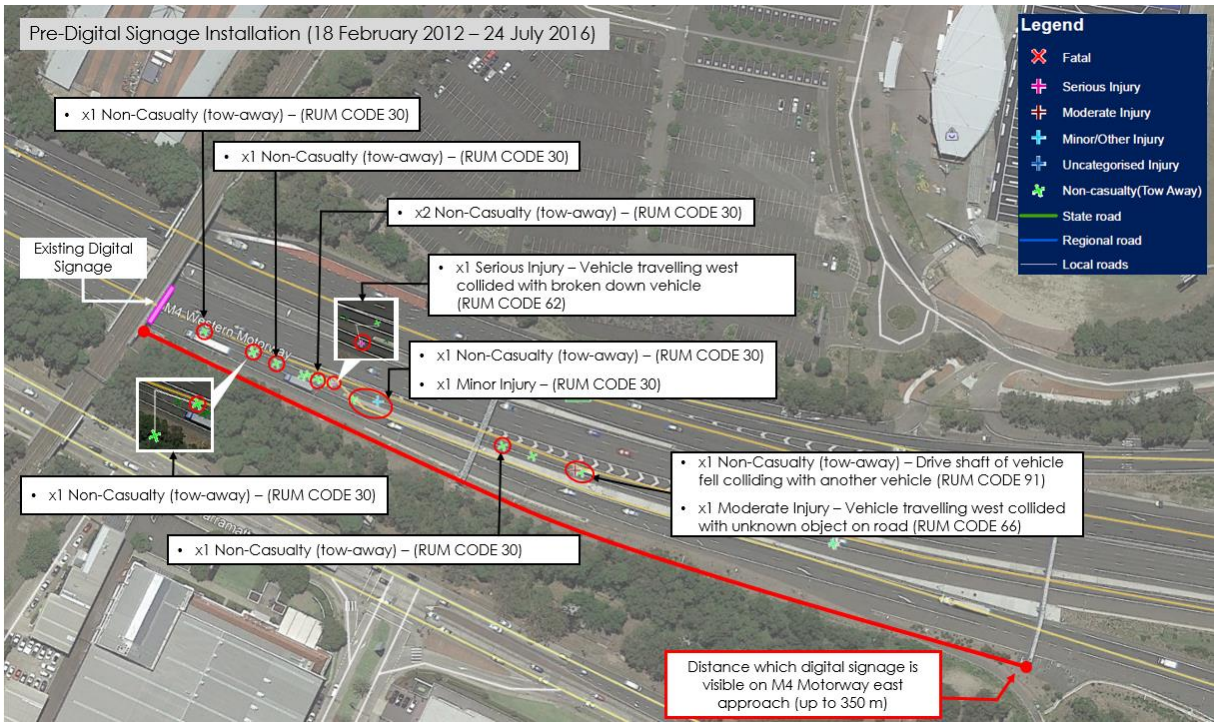
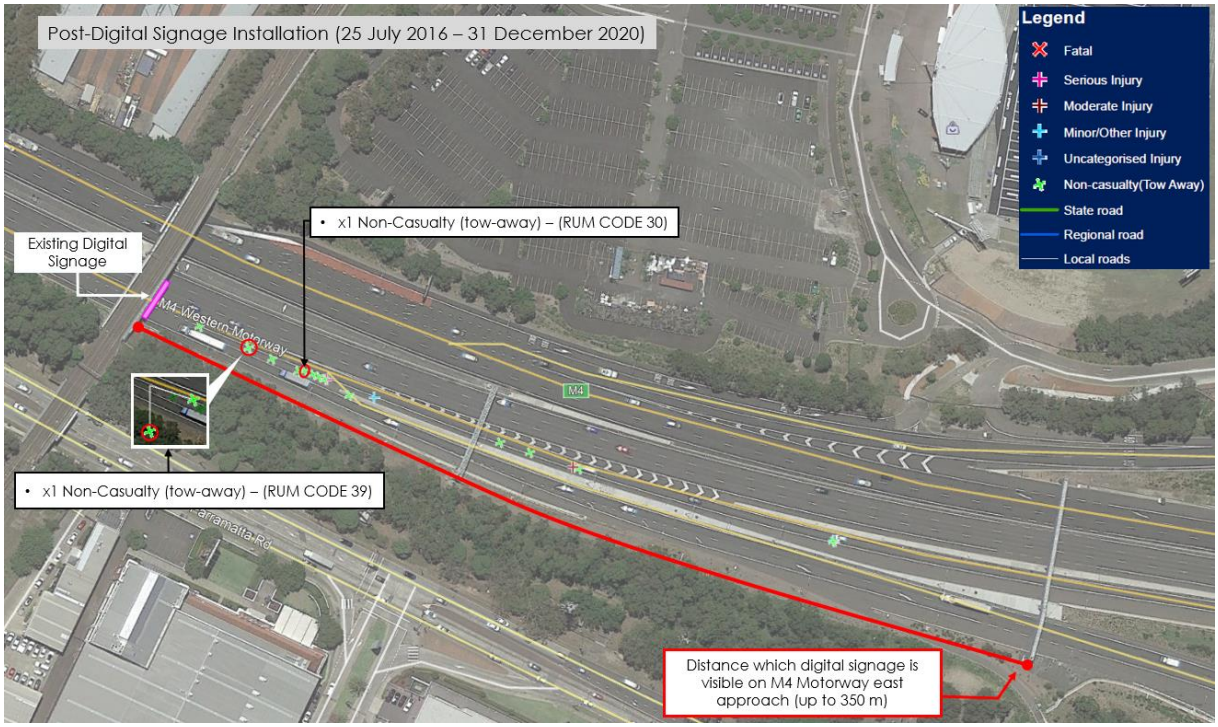


Figure 8: Crash Locations at M4 Motorway, Homebush – Operational



From Table 1, a total of 11 incidents occurred in the time period prior to the digital signage. The majority of the crashes resulted in no injuries or casualties, only vehicles being towed-away; that is, 8 out of 11 crashes. As a result of the crashes, there was one serious injury, one moderate injury, and one minor injury.

The serious injury crash was a result of a vehicle colliding into a broken-down vehicle (RUM CODE 62) on the M4 Motorway. The moderate injury crash occurred when a vehicle collided with an object on the road (RUM CODE 66). The minor injury crash was a result of a rear end collision (RUM CODE 30).

Prior to installation of the digital signage, the most common type of crash was a rear end crash which made up 8 out of 11 crashes.

Once the digital signage was in operation, there was a total of two crashes recorded. Both incidents resulted in a no injuries (tow-away). One incident was a rear end crash and the other was the result of two vehicles travelling in the same direction colliding with one another (RUM CODE 39).

Overall, the number of crashes on the M4 Motorway east approach has not increased following the installation of the digital signage.

Parramatta Road, Lewisham

A digital signage is located on the western side of an overhead railway bridge across Parramatta Road in Lewisham as shown in Figure 2. This digital signage, which was installed on 29 May 2017, is visible to motorists travelling on the west approach on Parramatta Road within approximately 230m.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 26 October 2013 to 28 May 2017. 3 years, 7 months, 3 days
- Post installation period: 29 May 2017 to 31 December 2020. 3 years, 7 months, 3 days

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 2. The location of crashes recorded during these periods are illustrated in Figure 9 and Figure 10 respectively.

Table 2: Crash History Summary on Parramatta Road, Lewisham

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (26 October 2013 - 28 May 2017)					
Rear End (RUM CODE 30)			1	2	1
Left Off Carriageway into Object or Parked Vehicle (RUM CODE 71)		1			
Sub-total	**0**	**1**	**1**	**2**	**1**
Total	**5**				
Operational Period (29 May 2017 - 31 December 2020)					
Right Off Carriageway into Object or Parked Vehicle (RUM CODE 73)					1
Sub-total	**0**	**0**	**0**	**0**	**1**
Total	**1**				

Figure 9: Crash Locations at Parramatta Road, Lewisham – Pre-Installation

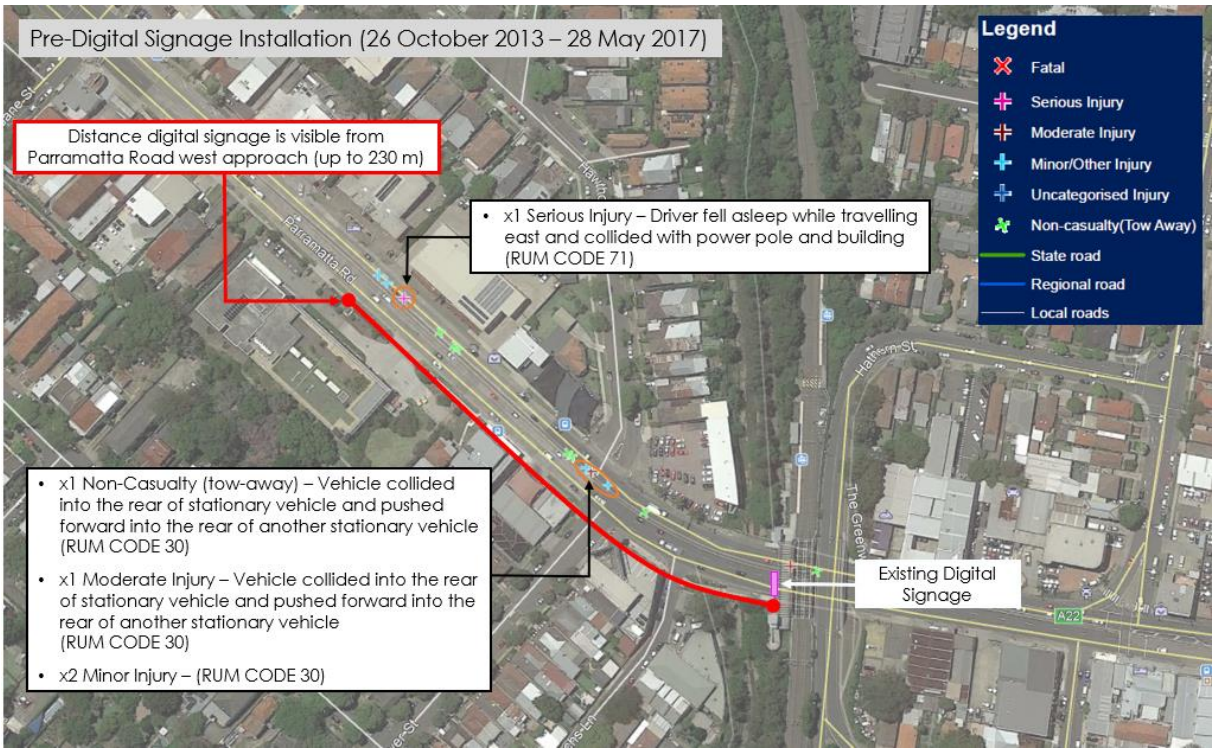


Figure 10: Crash Locations at Parramatta Road, Lewisham – Operational

In the time period prior to the digital signage, there were a total of five crashes recorded within the visible distance of the digital signage. The serious injury crash was the result of driver fatigue which caused the driver to veer from the carriageway and collide into a power pole (RUM CODE 71). The moderate injury crash was related to a rear end incident. There two minor injuries resulting from rear end collisions (RUM CODE 30), and one crash that resulted in no injuries (tow-away).

Since the digital signage has been in operation, a vehicle has veered from the carriageway colliding into a parked vehicle (RUM CODE 73). This crash resulted in the vehicle being towed away, however, no injuries.

Whilst the digital signage has been operational, there has been no increase in the number of crashes within the signage visible distance on Parramatta Road.

City West Link (Eastbound), Lilyfield

A digital signage is located on the northern side of the City West Link carriageway at Lilyfield, facing eastbound traffic as shown in Figure 3. This digital signage, which was installed on 20 April 2015, is visible to motorists travelling on the western approach on Parramatta Road within approximately 350m.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 1 January 2010 and 19 April 2015. (5 years 3 months 18 days)
- Post-installation period: 20 April 2015 and 7 August 2020. (5 years 3 months 18 days)

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 3. The location of crashes recorded during these periods are illustrated in Figure 11 and Figure 12 respectively.

Table 3: Crash History Summary on City West Link (Eastbound), Lilyfield

Crash Type	Crash Severity (No. of Crashes)					
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)	Uncategorised Injury
Pre-Installation (1 January 2010 – 19 April 2015)						
Head On (RUM CODE 20)		1				
Rear End (RUM CODE 30)					2	
Sub-total	**0**	**1**	**0**	**0**	**2**	**0**
Total	**3**					
Operational Period (20 April 2015 – 7 August 2020)						
Other Same Direction (RUM CODE 39)				1		
Sub-total	**0**	**0**	**0**	**1**	**0**	**0**
Total	**1**					

Figure 11: Crash Locations at City West Link (Eastbound), Lilyfield – Pre-Installation

Figure 12: Crash Locations at City West Link (Eastbound), Lilyfield – Operational

A total of three crashes have been recorded during the five-year period prior to the digital signage. One incident occurred east of the City West Link – Catherine Street intersection which was a head on crash (RUM CODE 20) that resulted in a serious injury. The other two incidents were rear end crashes which resulted in vehicles being towed away.

Whilst the digital signage has been operational there has been one crash recorded. This crash resulted in a minor injury which was due to an uncommon crash between two vehicles travelling in the same direction (RUM CODE 39).

Overall, there has been no increase in crashes on City West Link western approach following the installation of the digital signage.

City West Link (Westbound), Lilyfield

A digital signage is located on the northern side of City West Link at Lilyfield, facing westbound traffic as shown in Figure 3. This digital signage is located 100m east of the intersection of City West Link – Catherine Street. The digital signage, which was installed on 31 October 2016, is visible to motorists travelling on the eastern approach on City West Link within approximately 230m.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 30 August 2012 to 30 October 2016. 4 years, 2 months, 1 day
- Post-installation period: 31 October 2016 to 31 December 2020. 4 years, 2 months, 1 day

It is noted that there have been no crashes recorded following installation of the digital signage. A summary of crashes pre-installation of the digital signage is presented in Table 4. The location of crashes recorded pre-installation is illustrated in Figure 13.

Table 4: Crash History Summary on City West Link (Westbound), Lilyfield

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (1 January 2011 – 30 October 2016)					
Rear End (RUM CODE 30)					1
Sub-total	**0**	**0**	**0**	**0**	**1**
Total	**1**				

Figure 13: Crash Locations at City West Link (Westbound), Lilyfield – Pre-Installation

During the time period prior to the digital signage, there was one rear end crash which resulted in no injuries and only the vehicle/s being towed away. Since the signage was installed, there have been no crashes recorded within the visible distance on City West Link in the westbound direction.

Thus, the digital signage has not contributed to any further road crashes in the vicinity.

Pacific Highway, Pymble

A digital signage is located on the eastern side of Pacific Highway in Pymble as shown in Figure 4. This digital signage, which was installed on 23 March 2015, is visible to motorists travelling on the north approach on Pacific Highway. The digital signage would become visible immediately after passing the Pacific Highway - Livingstone Avenue intersection which is approximately 180m from the signage.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 1 January 2010 and 22 March 2015. (5 years 2 months 21 days)
- Post installation period: 23 March 2015 and 13 June 2020. (5 years 2 months 21 days)

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 5. The location of crashes recorded during these periods are illustrated in Figure 14 and Figure 15 respectively.

Table 5: Crash History Summary on Pacific Highway, Pymble

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (1 January 2010 - 22 March 2015)					
Right Through (RUM CODE 21)					1
Rear End (RUM CODE 30)					2
Off Carriageway Left on Right Bend into Object or Parked Vehicle (RUM CODE 81)			1		1
Off Carriageway Right on Left Bend into Object or Parked Vehicle (RUM CODE 85)					2
Sub-total	**0**	**0**	**1**	**0**	**6**
Total	**7**				
Operational Period (23 March 2015 – 13 June 2020)					
Right Through (RUM CODE 21)					2
Rear End (RUM CODE 30)			1		
Lane Change Left (RUM CODE 35)				1	
Sub-total	**0**	**0**	**1**	**1**	**2**
Total	**4**				

Figure 14: Crash Locations at Pacific Highway, Pymble – Pre-Installation

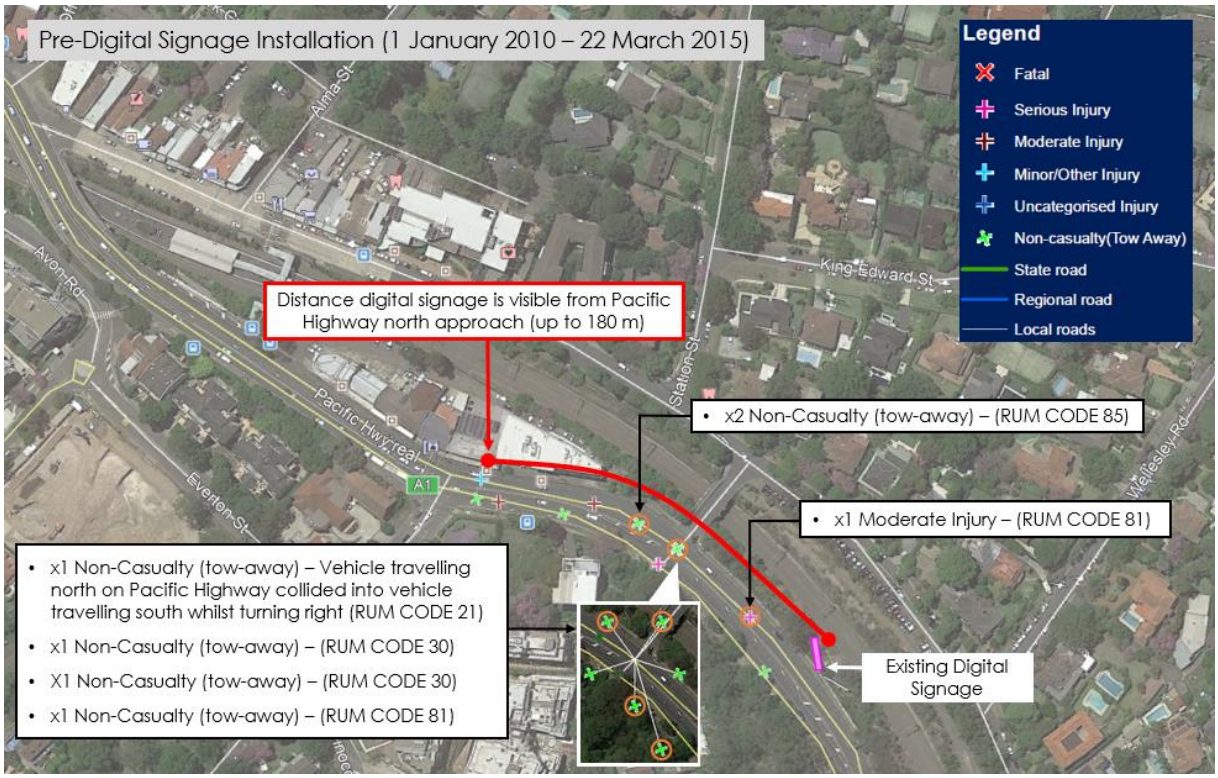
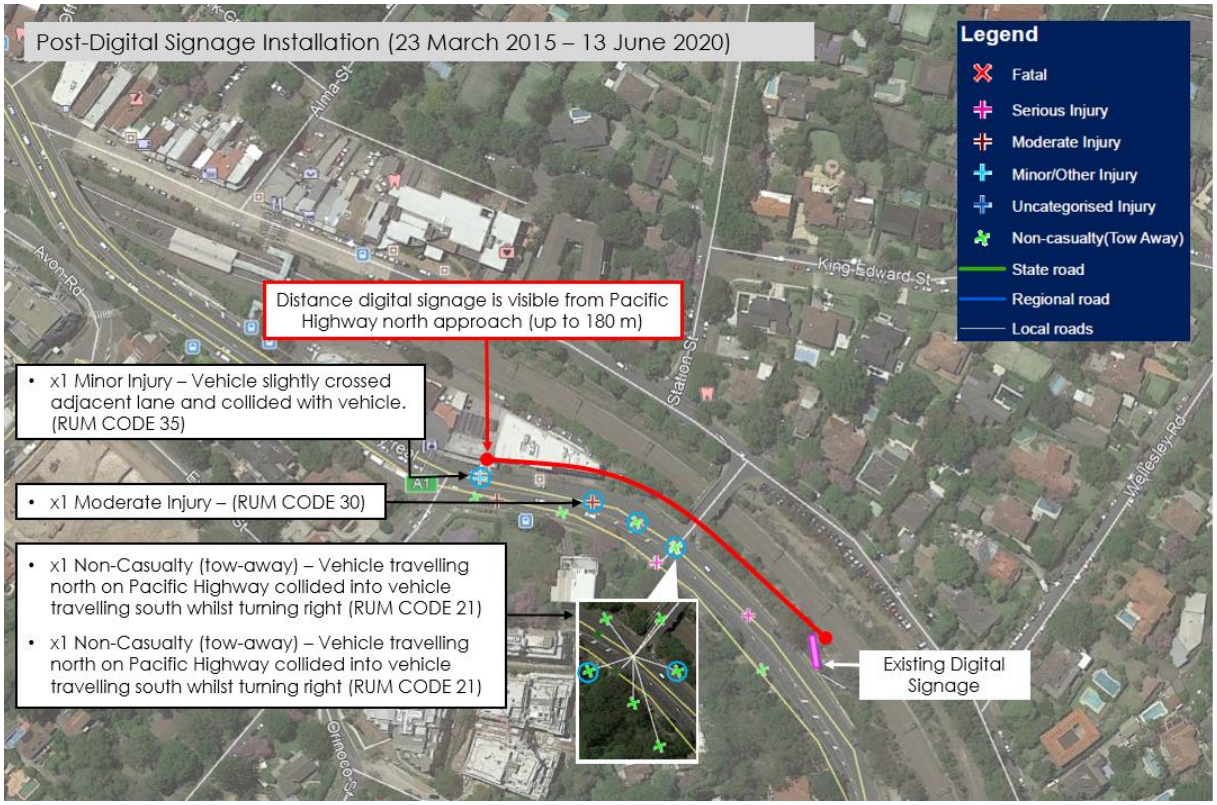


Figure 15: Crash Locations at Pacific Highway, Pymble – Operational



There were seven crashes recorded within the time period prior to the digital signage. Most of these crashes occurred at the intersection of Pacific Highway with the side road bridge crossing towards Grandview Street, and resulted in no injuries. The crashes include two rear end collisions, a vehicle travelling south colliding into vehicle turning right onto the bridge (RUM CODE 21), and three vehicles veering from carriageway at the bend into an object (RUM CODE 81 and RUM CODE 85). A similar incident occurred approximately 40m south of the bridge where a vehicle veered from the carriageway at the bend into an object resulting in a moderate injury.

Following the installation of the digital signage, four crashes have been recorded. Two of the crashes were due to a vehicle travelling south colliding into a vehicle turning right onto the bridge. The remainder of incidents were rear end crashes and a vehicle colliding with another vehicle in the adjacent travel lane (RUM CODE 35).

Overall, the number of crashes at this location has not increased following the installation of the digital signage.

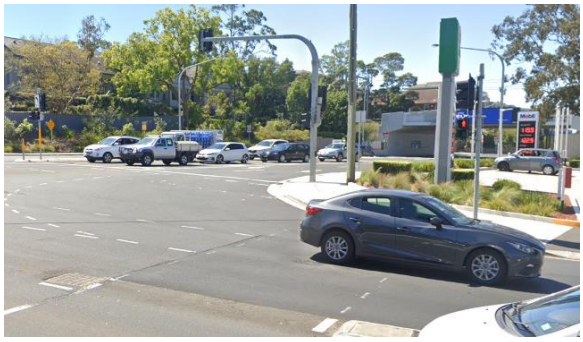
Boundary Street, Roseville

A digital signage is located on the western side of the overhead railway bridge across Boundary Street as shown in Figure 5. This digital signage was installed on 17 July 2017.

On Boundary Road west approach, the signage becomes visible after a motorist has turned left or right from Pacific Highway. The digital signage is not visible on Pacific Highway north approach, and visibility is partially obstructed on the south approach as shown in Figure 16.

Figure 16: Pacific Highway North Approach and South Approach

Motorist's view from north approach



Motorist's view from south approach

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 2 February 2014 to 16 July 2017. 3 years, 5 months, 15 days
- Post installation period: 17 July 2017 and 31 December 2020. 3 years, 5 months, 15 days

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 6. The location of crashes recorded during these periods are illustrated in Figure 17 and Figure 18 respectively.

Table 6: Crash History Summary on Boundary Street, Roseville

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (2 February 2014 - 16 July 2017)					
Left Far (RUM CODE 12)			1		
Rear End (RUM CODE 30)			1	2	2
Lane Change Left (RUM CODE 35)					1
Left Turn Side Swipe (RUM CODE 37)				1	1
Other Same Direction (RUM CODE 39)					1
Left Off Carriageway into Object or Parked Vehicle (RUM CODE 71)				1	
Sub-total	**0**	**0**	**2**	**4**	**5**
Total	**11**				
Operational Period (17 July 2017 - 31 December 2020)					
Pedestrian Far Side (RUM CODE 02)	1				
Cross Traffic (RUM CODE 10)					1
Other Same Direction (RUM CODE 39)					1
Left Off Carriageway into Object or Parked Vehicle (RUM CODE 71)				1	
Sub-total	**1**	**0**	**0**	**1**	**2**
Total	**4**				

Figure 17: Crash Locations at Boundary Street, Roseville – Pre-Installation

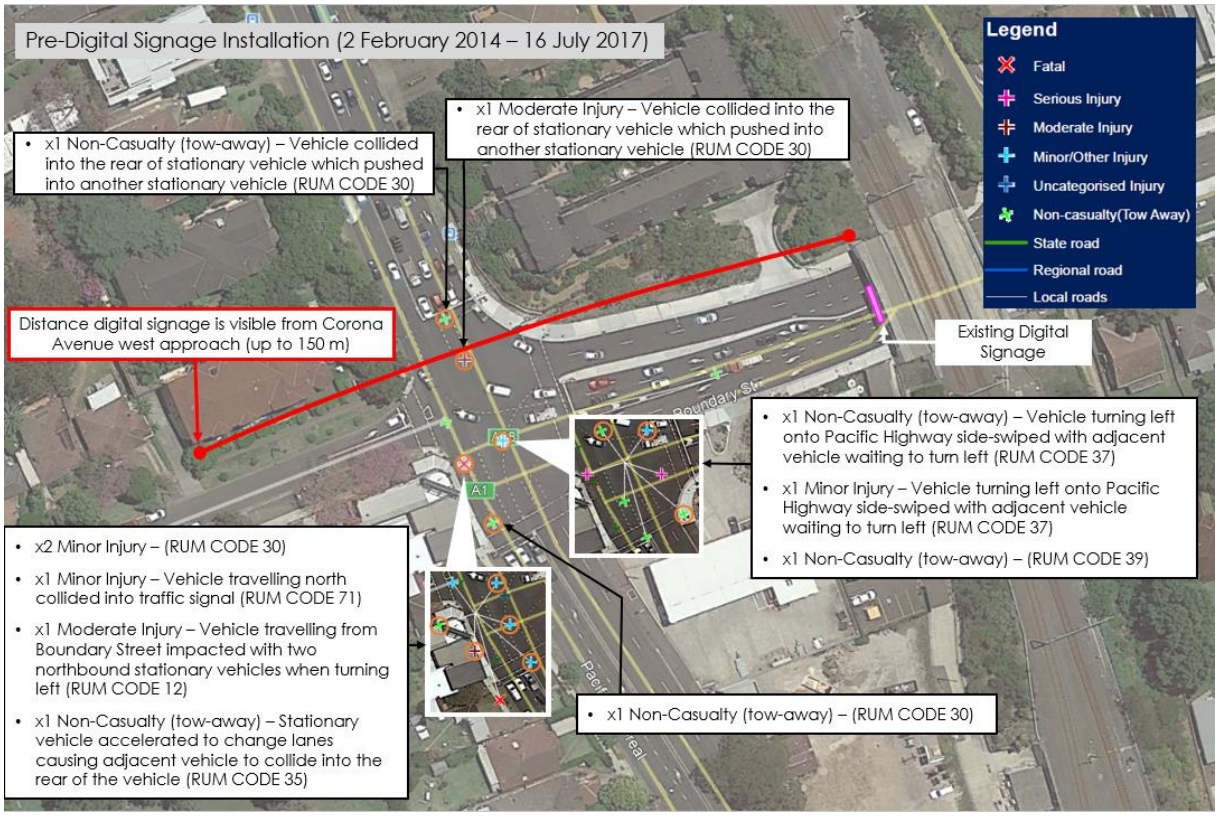


Figure 18: Crash Locations at Boundary Street, Roseville – Operational

From Table 6, the recorded crashes have all occurred at the intersection of Pacific Highway-Boundary Street. There was a total of 11 crash incidents within the time period prior to the digital signage. Of those 11 crashes, there were two moderate injuries, four minor injuries, and five non-casualties (tow-away). It is noted that these crashes occurred at the signalised intersection of Pacific Highway - Boundary Street where vehicles were recorded as travelling north and south through the intersection. Given that the digital signage is partially obstructed or not visible from the north approach and south approach, such crashes would be unrelated to the presence of a digital signage on Boundary Street.

Following the installation of the digital signage, four crashes have been recorded at the Pacific Highway - Boundary Street intersection. Of these incidents, one crash resulted in a fatality, one minor injury, and two non-casualties with vehicles being towed away. The incident which resulted in a fatality involved a pedestrian illegally crossing the intersection from the north-east corner to the south-west corner which resulted in the pedestrian being struck by a vehicle travelling northbound on Pacific Highway. The driver's visibility of the pedestrian was obstructed by a truck waiting to turn right from Pacific Highway to Boundary Street. Since the pedestrian breaking the law by crossing at an unmarked crossing location, this incident is an uncommon situation. More importantly, such incident was unrelated to the digital signage on Boundary Street.

Overall, the number of crashes within the visible distance of the digital signage has not increased since being installed in 2017.

Victoria Road, West Ryde

A digital signage is located on the western side of an overhead railway bridge across Victoria Road in West Ryde as shown in Figure 6 This digital signage, which was installed on 3 October 2016, is visible to motorists travelling on the west approach on Victoria Road from 265m.

Crash history data has been assessed for the periods as follows:

- Pre-installation period: 4 July 2012 – 2 October 2016. 4 years, 2 months, 29 days
- Post installation period: 3 October 2016 – 31 December 2020. 4 years, 2 months, 29 days

A comparison of crashes pre-installation and during operation of the digital signage is presented in Table 7. The location of crashes recorded during these periods are illustrated in Figure 19 and Figure 20 respectively.

Table 7: Crash History Summary on Victoria Road, West Ryde

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (1 January 2011 - 2 October 2016)					
Pedestrian Near Side (RUM CODE 0)		2			
Pedestrian Far Side (RUM CODE 02)		1			
Left Near (RUM CODE 16)		1			
Right Through (RUM CODE 21)					1
Rear End (RUM CODE 30)			1	2	1
Lane Side Swipe (RUM CODE 33)					1
Lane Change Left (RUM CODE 35)			1		
Other on Path (RUM CODE 69)					1
Out of Control on Carriageway (RUM CODE 74)			1		
Off Carriageway Left on Left Bend into Object or Parked Vehicle (RUM CODE 87)					1
Sub-total	**0**	**4**	**3**	**2**	**5**
Total	**14**				
Operational Period (3 October 2016 - 31 December 2020)					
Right Off Carriageway into Object or Parked Vehicle (RUM CODE 73)			1		
Sub-total	**0**	**0**	**1**	**0**	**0**
Total	**1**				

Figure 19: Crash Locations at Victoria Road, West Ryde – Pre-Installation

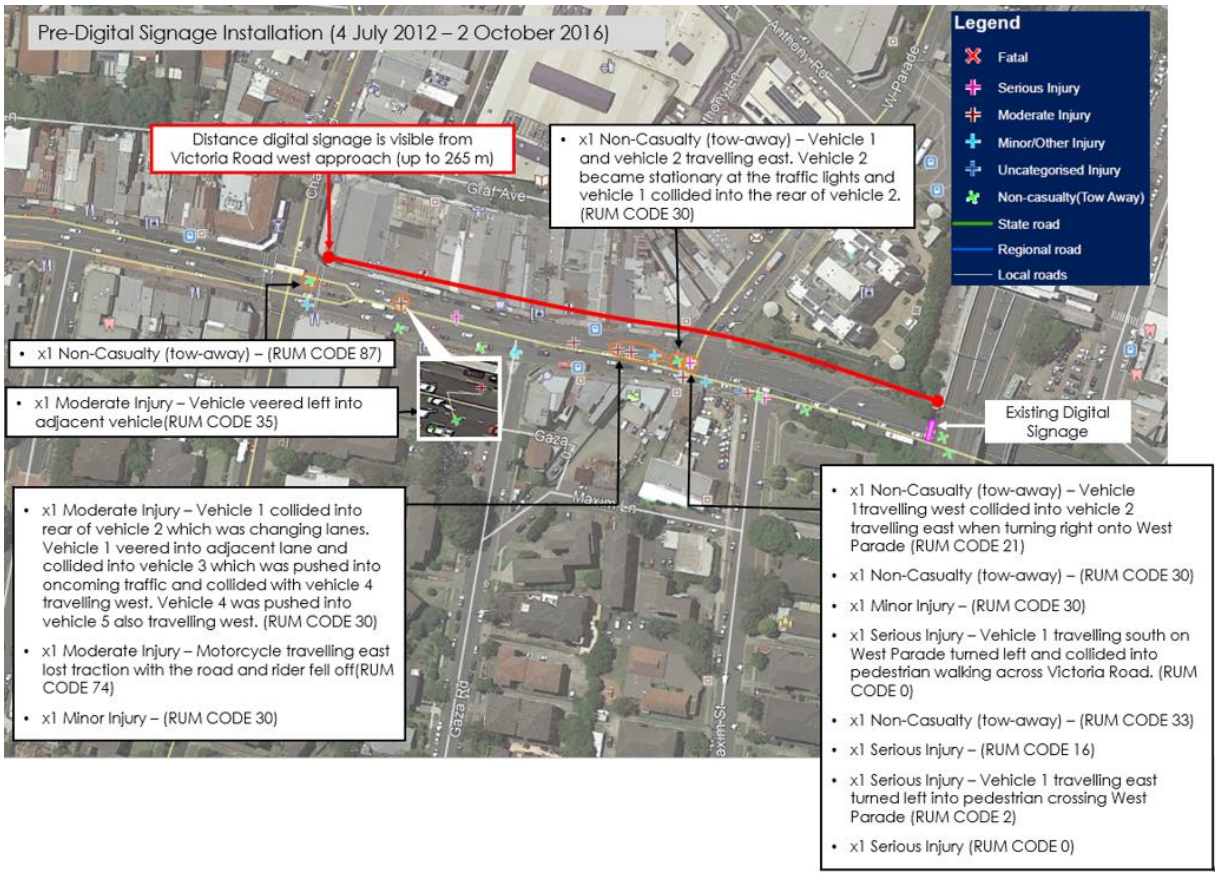
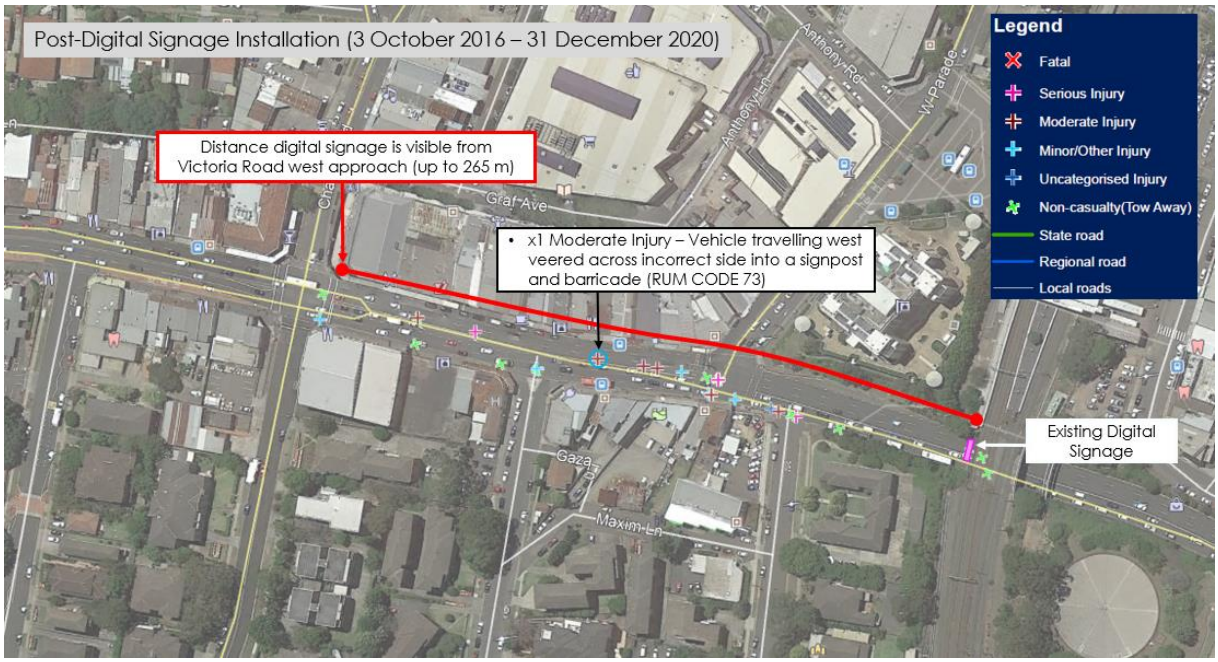


Figure 20: Crash Locations at Victoria Road, West Ryde – Operational



From Table 7, there are a total of 14 crashes recorded in the period prior to the digital signage. Of these incidents, four crashes resulted in serious injuries, three crashes with moderate injuries, and two crashes with minor injuries. Five crashes resulted in no injuries and a vehicle tow-away.

The four incidents resulting in a serious injury occurred at the signalised intersection of Victoria Road - West Parade where three crashes involved a pedestrian (RUM CODE 0 and RUM CODE 02), and one crash involved a vehicle colliding into the rear of a vehicle after turning left from West Parade (RUM CODE 16). The moderate and minor injuries were the result of a rear end, lane change (RUM CODE 35), and loss of control (RUM CODE 74) incidents.

After the digital signage was installed in 2016, there has been one crash recorded within the visible distance on Victoria Road. The crash occurred approximately 20m east of Gaza Road which involved a vehicle travelling eastbound veering to the opposite side of the carriageway causing the vehicle to collide with a signpost and barricade (RUM CODE 73).

Hence, it is concluded that the number of crashes on Victoria Road eastbound has not increased since the installation of the digital signage.

Summary and Conclusion

There is a perception that digital signage boards would result in an unsafe level of distraction to a motorist of pedestrian which is likely to result in a crash incident. As such, a review has been undertaken of crash data in the vicinity of existing digital billboard signs, like those which Sydney Trains is proposing to implement. The aim of the analysis is to determine whether the digital signage at each location has resulted in any safety impacts to road users within the vicinity of the signage.

This study assessed crash data that has been obtained from TfNSW at seven locations having an existing digital signage owned by Sydney Trains. The crash data has been analysed to compare the number of crashes and severity of crashes before and after the digital signage was installed. The findings of the analysis suggest that existing digital signs do not cause distraction to road users which leads to road crashes. In fact, at all site locations, historic crash data indicates that there were a greater number of incidents recorded prior to the installation of each digital signage.

Based on the analysis presented in this letter, it can be concluded that the perceived distraction potential for road users due to the presence of a digital signage is minimal and evidently has not resulted in creating a road environment that is any less safe for motorists, pedestrians, and cyclists.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Wayne Johnson
Director

Appendix C TTPP letter response to further submissions

Our Ref: 20406

17 June 2021

Ethos Urban
173 Sussex Street
SYDNEY NSW 2000

Attention: Mr Gareth Bird

Dear Gareth,

RE: DIGITAL SIGNAGE – M2 MOTORWAY, EPPING
RESPONSE TO FURTHER SUBMISSIONS BY CITY OF PARRAMATTA COUNCIL

As requested, please find herein The Transport Planning Partnership (TTPP)'s response to further submissions to road safety queries made by City of Parramatta for the proposed digital signage on the M2 Motorway in Epping.

Background

Sydney Trains is seeking approval to install two new digital sign boards off the sides of the existing overhead railway bridge above the M2 Motorway in Epping. The proposed digital signage is to be located on both sides of the rail bridge, facing eastbound and westbound travel lanes on the M2 Motorway.

A Development Application for the proposal has been submitted previously, and submissions were received during the public exhibition phase. Submissions were received from City of Parramatta Council (Council) dated 12 February 2021 and Transport for NSW (TfNSW) dated 31 January 2021. Submission from Hornsby Shire Council was received dated 5 February 2021 and made no additional comments on the proposal. TTPP has reviewed the submissions and prepared a letter responding to the submissions dated 14 April 2021.

Additional submissions were made by Council dated 11 May 2021 in response to TTPP's Response to Submissions letter dated 14 April 2021. TTPP has reviewed the submissions and provides the following responses.

The Transport Planning Partnership
Suite 402, 22 Atchison Street
ST LEONARDS NSW 2065

Further Submissions by City of Parramatta Council

Submission 1: The Merge Point of the M2 On-Ramp

- ***The TTPP Traffic Response compared an existing similar situation in Homebush for the M4 Motorway at Centenary Drive where a digital advertising sign was installed in July 2016 and demonstrated that there has not been an increase in crashes since the installation. The assessment is rejected by Council on the following grounds:***
    - ***The M4 Motorway in this location has been subject to significant construction activity since the installation of the digital advertising signs which is shown in the Nearmap screenshots below [provided in Attachment One]. This would mean that there are many be other variables in play such as reduced speed limits, more engaged drivers during the on-going road works and overall safety improvements following completion of the road works. As such, this example should not be used to draw a conclusion that is contrary to accepted standards and guidelines.***

Council's comments on the M4 Motorway being under construction are acknowledged. Notwithstanding, TTPP maintains its position that the M4 Motorway is a comparable example for the following reasons:

- During the construction period of the M4 Motorway upgrade, the roadworks speed limit was 80 km/h (see Figure 1) which is similar to the usual speed limit on the M4 Motorway post-construction i.e. 90 km/h. Therefore, a slightly reduced speed limit would have a minor influence on the number of crashes in this context.

Figure 1: Construction Roadworks Speed Limit on M4 Motorway

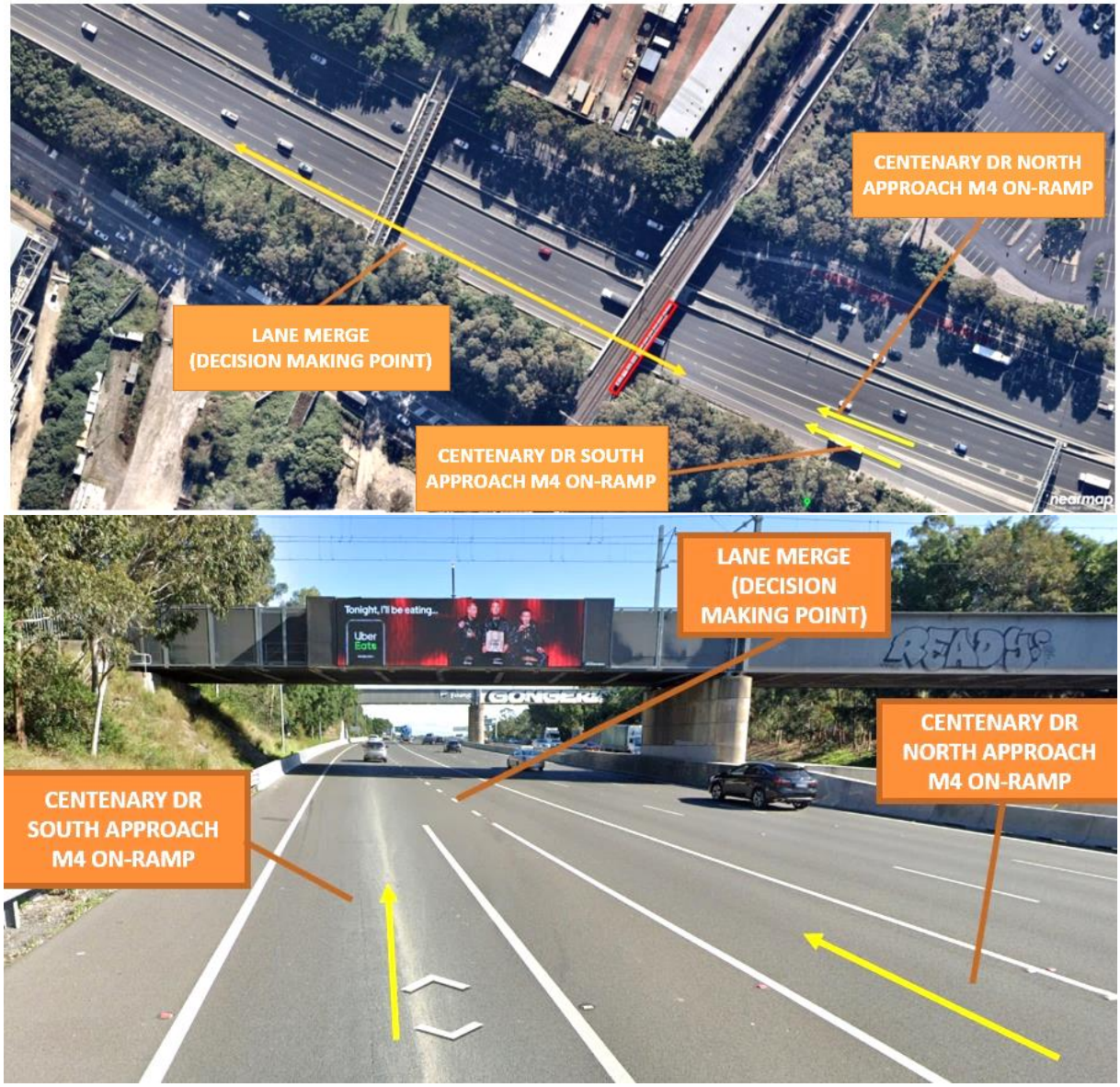
- Roadworks or changes to traffic conditions have the potential to distract motorists, drawing their attention away from the road or vehicle ahead as drivers look at the roadside works. From Figure 1, it can be seen that there is a 0.8-0.9m concrete barrier of which motorists can see above and into the construction works area adjacent to the travel lanes (As per Austroads, driver eye height is 1.1m above ground level). Therefore, in construction roadwork conditions drivers could be less attentive to the road ahead.

- **The merge point in the M4 example is between the two on-ramps for the vehicles coming from different directions in Centenary Drive. Where the on-ramp actually joins the M4 motorway, the on-ramp becomes an added lane rather than a merge point.**

Council's comment on the added travel lane further downstream is acknowledged. However, the point being made here is that there is a merge between the two M4 Motorway on-ramp lanes (from Centenary Drive). The digital signage is located within the length of this merge, and therefore, it is located within a "decision making point" as per the Transport Corridor Outdoor Advertising and Signage Guidelines.

The location of the signage in the M4 Motorway example within the merge length is clearly illustrated in Figure 2 below.

Figure 2: M2 Motorway Merge Location



- ***The location where the digital advertising sign was installed on the M4 Motorway had an advertising sign prior to 2016 which would also be a distraction. Accordingly, this example does not demonstrate the pre and post conditions similar to the M2 Motorway.***

Council's comment on the former static signage in place of the now digital sign on M4 Motorway is acknowledged. However, a driver can view the digital signage (or former static sign) and the road ahead within their peripheral vision. Therefore, such a sign is not considered to be a "distraction" since a distraction is when a driver's attention is taken away from the driving task at hand.

Historic crash data within the visible distance of the digital signage on the M4 Motorway post installation) indicates two crashes in a space of five years (see Table 1). This is a low number of incidents and is below the number of crashes which warrants a crash "blackspot" investigation (i.e. three or more crashes). Furthermore, these incidents are categorised as "non-casualty (tow-away)" crash types which is the lowest crash severity rating.

Table 1: Crash History Summary on M4 Motorway, Homebush

Crash Type	Crash Severity (No. of Crashes)				
	Fatality	Serious Injury	Moderate Injury	Minor Injury	Non-casualty (tow-away)
Pre-Installation (18 February 2012 - 24 July 2016)					
Rear End (RUM CODE 30)				1	7
Accident or Broken Down (RUM CODE 62)		1			
Struck Object (RUM CODE 66)			1		
Load or Missile Struck Vehicle (RUM CODE 91)					1
Sub-total	**0**	**1**	**1**	**1**	**8**
Total	**11**				
Operational Period (25 July 2016 – 31 December 2020)					
Rear End (RUM CODE 30)					1
Other Same Direction (RUM CODE 39)					1
Sub-total	**0**	**0**	**0**	**0**	**2**
Total	**2**				

A Digital Sign Traffic Safety Assessment was prepared by Bitzios Consulting for a digital signage application on Pacific Highway in Gordon, which was recently approved and installed. The Safety Assessment reports on relationships between distraction and crashes, namely:

"There is consensus in the literature that the majority of crashes which occur in urban areas are due to driver error. Victor et al. (2005) highlights that human error is the cause of up to 92.6 percent of accidents on the road. In order to minimise the risk of crashes drivers need to: be aware of external environmental influences, interpret the risks associated with these external environmental influences, make decisions, and carry out actions (Perez & Bertola 2011).

Even though human error is the cause of most crashes, Lam (2002) reviewed NSW crash data and found that out of 414,136 crashes, distraction was a factor in 15,059 (3.6%) of them. Distractions coming from outside the vehicle were determined to be a factor in only 2.5% of all crashes. This low influence of external distractions to crashes was reinforced by the Monash University Accident Research Centre (MUARC) carried out a study on crashes in Victoria and NSW between 2000 and 2011, and found the most common causes of crashes as summarised in Table 6.1."

Percentage of Crashes	Cause
13.5%	Intoxication
11.8%	Fell asleep
10.9%	Fatigued
3.2%	Failed to look
3.2%	Passenger interaction
2.6%	Fell ill
2.6%	Blacked out
1.8%	Feeling stressed
1.5%	Looked but failed to see
1.4%	Animal or insect in vehicle
0.9%	Using a mobile phone
0.9%	Changing CD/cassette/radio
0.9%	Adjusting vehicle systems
0.9%	Looking at vehicle systems
0.3%	Searching for objects

From the above list, it is evident that driver distraction due to the presence of billboards/ advertising signage is not a common cause of crashes.

- ***The TTPP Traffic Response further referenced a 2015 paper by Carolyn Samsa to demonstrate that a digital advertising sign will not create a significant safety hazard. The conclusions drawn by TTPP from this study are disputed on the following grounds:***

    - ***The 2015 Samsa study recommended that further joint research between regulators and the industry to further explore the significance of their study. They did not recommend changes to any standards or guidelines made by regulators.***

Noted. However, the findings of the study still stand that digital billboard do not draw driver's attention away from the road for dangerously long periods of time, and drivers maintained a safe average vehicle headway in the presence of such signs.

    - ***The study was limited to daylight hours and not night time where a digital advertising sign will have higher contrast compared to other traffic control signage and would stand out to drivers more.***

Noted. However, there are regulatory luminance levels for such digital signs so that signage contrast and luminance are at a safe level for motorists in night-time (and daytime) conditions. The proposed digital signage would operate in accordance with the luminance levels as stipulated in Table 6 of the Transport Corridor Advertising and Signage Guidelines.

    - ***The study was limited to people aged 25-54 whereas other studies have shown that young and senior drivers are more likely to be affected by roadside advertising (see Oscar Oveido-Trespalcios, Verity Truelove, Barry Watson, Jane A. Hinton 2019, 'The impact of road advertising signs on driver behaviour and implications for road safety: A critical systematic review', Journal of Transportation Research, No. 122 pp. 85-98 (94)).***

Noted. However, potential for these signs to cause distraction is low as identified in the study undertaken by Samsa Consulting. Furthermore, historically such signs have not been a common cause for crashes as identified by research undertaken by the Monash University Accident Research Centre (as reported in the Digital Sign Traffic Safety Assessment prepared by Bitzios Consulting for a digital signage application on Pacific Highway, Gordon).

Submission 2: Cyclists Crossing Point

- ***In regards to the Cyclist Crossing Point, the first point raised by the TTPP Traffic Response was that cyclists are required to give way to motorists. Though this may be true, it does not take away from the duty of care expected of any reasonable motorists to use caution at points of conflict whether they have the right of way or not. The advertising sign will be a distracting factory causing the driver to divert attention away from their duty of care. Furthermore, this line of argument contradicts with the 'Safe System Approach' advocated with Austroads Guidelines for Road Design and Traffic Management where the road needs to be designed to allow for road user mistakes.***

The study undertaken by Samsa Consulting identified that the average eye fixation on digital signage is less than one third of the minimum perception-reaction time to an unexpected event on the road. As such, motorists entering the M2 Motorway from Beecroft Road on-ramp would have the cognitive ability to react to a cyclist crossing the travel lane with a digital signage in the distance.

Notwithstanding the above, the road geometry of the M2 Motorway on-ramp entry from Beecroft Road is straight with clear view of the cycle crossing from the moment a motorist turns onto the on-ramp. In addition, there is advanced warning signage on both sides of the on-ramp to advise motorists of the upcoming cycle crossing, as shown in Figure 3. As such, there are multiple measures to ensure motorists are aware of the potential of cyclists crossing at this location regardless that cyclists are required to find suitable gaps in traffic.

Figure 3: Existing Cycle Crossing Warning Signs

Source: *The Transport Planning Partnership, date captured 13/11/2020*

Also, it is important to understand the type of riders who are cycling on the M2 Motorway and who would use this crossing. Cyclists travelling on the M2 Motorway typically include experienced commuters (or recreation/sports riders) who are of an "advanced rider level" as classified in the Austroads Cycling Aspects Guidelines. Experienced riders have the ability to observe and make safe judgement of distance (and speed) of oncoming traffic. A cyclist at this location needs to make a judgement on when it is safe to cross, and an experienced cyclist is unlikely to enter the travel lane where there is an approaching vehicle within close proximity of the crossing point. Given the sufficient sight lines between the crossing point and an oncoming vehicle on the on-ramp, a cyclist is able to make this judgement safely without compromising their own safety (see Figure 4). Also, a motorist's sight line to the crossing is sufficient (as shown in Figure 3), and therefore, a driver is able to make a safe judgement should they need to react to a cyclist crossing the travel lane ahead of them.

Figure 4: Rider's View Towards On-Ramp Traffic Flow

Source: Google Street View, imagery dated November 2020

- ***The second point raised by the TTPP Traffic Response was that the digital sign is located after the cyclist crossing point and therefore complies with the Guidelines. As commented in the previous Council submission, the crossing point is only 40m away from the proposed signs and therefore will be in view of drivers and be within safe sight distance away as per the guidelines. As such, the proposed sign could still distract drivers and cause them to fail to detect any cyclists that may be crossing the road. This is shown in Figure 2 below [provided in Attachment Two] which shows a number of critical points that a driver must navigate while within the zone where they could be distracted by the digital advertising signs.***

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"*a.* ***The sign should not be located:***

i. less than the safe sight distance from an intersection, merge point, 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*

iii. so that it is visible from the stem of a T-intersection."

The Guidelines stipulate the placement of the signage infrastructure, and advise that it is to be located outside of the safe sight distance on approach to the crossing point in this instance. Therefore, the design is compliant with the Guidelines.

Stopping sight distance is the distance to enable a driver to perceive, react and brake to a stop before reaching a hazard on the road ahead. A cyclist that is travelling in the shoulder lane of the main carriageway is within the peripheral vision of a motorist travelling on the on-ramp from a distance of approximately 165m before the cycle crossing point. The driving view at this point is shown in Figure 5. When there is a cyclist approaching the crossing point, a driver on the on-ramp would notice the cyclist and would be prepared to react appropriately. A cyclist appearing at the crossing point would not be unexpected or sudden for a driver entering the motorway since the driver would be able to see the cyclist approaching from some distance away and would anticipate a cyclist approaching the crossing point.

Furthermore, the proposed signage is not considered to be a distraction for motorists since a driver can view the digital signage and the road ahead within their peripheral vision without the driver's attention being taken away from the driving task at hand.

Figure 5: Rider's View Towards On-Ramp Traffic Flow

Submission 3: Variable Speed Limit Signs

- ***The Traffic Consultant for the applicant argues that only the secondary Variable Speed Limit Signs (VSLS) are affected by the proposed advertising sign. Furthermore, they argue there will be minimal overlap with the VSLS in the foreground to be obscured by the digital sign. This point is disputed considering the VSLS is located only 35m from the proposed sign meaning that both signs will be in view of the driver for essentially the entire approach. This point is demonstrated in figure 2 above [provided in Attachment Two].***

To clarify, the Digital Signage Safety Assessment report and RTS letters refer to the primary VSLS as the first set of variable speed limit signs the motorists would see on approach to the signs. This first set of VSLS is located approximately 355m west of the proposed digital signage. The secondary VSLS is the second set of variable speed limit signs located approximately 35m west of the proposed digital signage. The location of the primary and secondary VSLS are shown in Figure 6.

Figure 6: Primary and Secondary Variable Speed Limit Signage

Map Source: Google Maps

On approach to the primary VSLS, the digital signage would be further in the distance and a driver would not be able to read/ interpret signage display. Therefore, a driver would not look at the digital signage at this point, rather drivers would have full unobstructed view of the primary VSLS (see Figure 7).

Figure 7: Primary Variable Speed Sign

It is noted that the secondary VSLS may be, at times, positioned in front of the proposed digital signage. However, the speed signs would not be obstructed by the digital signage and the VSLS would be visible to motorists at all times (see Figure 8). The earlier M4 Motorway example demonstrates how variable speed limit signs can be located prior to a digital signage without causing visual impediment (see Figure 9).

Figure 8: Digital Signage and Variable Speed Signs on M4 Motorway

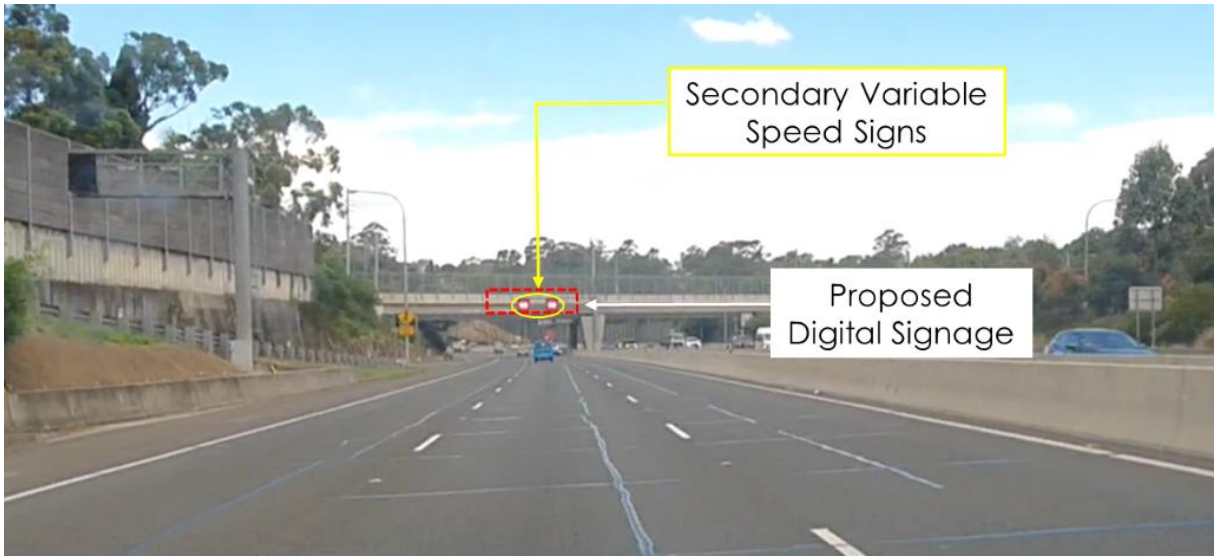


Figure 9: Digital Signage and Variable Speed Signs on M4 Motorway

In addition to the above, the proposed digital signage would not display colours and shapes which could be mistaken for the variable speed limit signs in accordance with the Transport Corridor Outdoor Advertising and Signage Guidelines.

Submission 4: M2 Exit Ramp

- ***Similar to the response to Submission 2, the TTPP report argues that the diverge point is located before the railway bridge where the advertising sign will be located. As stated previously in Council's response above, the exit ramp is located only approximately 120m away from the diverge point and is therefore in view of the drivers at key decision making points and within the safe sight distance. This point is demonstrated in figure 3 below [provided in Attachment Three].***

The Transport Corridor Outdoor Advertising and Signage Guidelines Section 3.2.3 states:

"*a.* ***The sign should not be located:***

i. ***less than the safe sight distance from*** *an intersection, merge point,* ***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

iii. so that it is visible from the stem of a T-intersection."

Given that the proposed digital signage would be installed on the rail bridge that is located after the diverge point and exit ramp, the signage would not be located "less than the safe sight distance" which is in accordance with the Guidelines.

Also, there is a guidance sign prior to the tunnel showing the Beecroft Road exit (see Figure 10). This directional sign would inform motorists of the upcoming motorway exit well in advance of the exit lane.

Figure 10: Advance Guidance Sign for Beecroft Road Exit

The end of the exit lane/ diverge point is located approximately 120m away from the proposed digital signage. However, as observed during the site inspection, motorists enter the exit lane much earlier than this point.

Submission 5: Cyclist Crossing Point

- ***The TTPP Traffic Response provided similar justifications to that for Submission 2. As stated already, these are refuted by Council. Figure 3 above demonstrates how the cyclists crossing point is at a location where a motorist will have clear view of the advertising sign.***

Motorists approaching the Beecroft Road exit have a clear view of the cycle crossing point. In addition, there is a bicycle warning sign provided on the south side of the off-ramp to Beecroft Road, as shown in Figure 11. This signage provides advance warning to motorists to be aware of cyclists in the vicinity.

Figure 11: Existing Bicycle Warning Signage

There are adequate sight lines between the crossing point and an oncoming vehicle on the off-ramp, and therefore, a cyclist is able to make a judgement as to when it would be safe to cross the travel lane (see Figure 12). Also, a motorist's sight line to the crossing is sufficient (as shown in Figure 11), and therefore, a driver is also able to make a safe judgement should they need to react to a cyclist crossing the travel lane ahead of them.

Figure 12: Rider's View Towards Off-Ramp Traffic Flow

Submission 6: Interchange Sequence Signs

- ***The TTPP Traffic Response have referred to the study by Samsa (2015). As discussed already, the way this study has been used by TTPP is refuted.***

The potential for these signs to cause distraction is low as demonstrated throughout this RTS, previous RTS, additional sites crash study, and Road Safety Assessment prepared by TTPP, which are supported by research undertaken by Samsa Consulting and Monash University Accident Research Centre.

- ***The TTPP Traffic Response argues that the sign is off limited importance. However, such signs allow drivers to plan ahead and gradually merge to the left lane when safe should their exit/destination be approaching, particularly for those drivers that may find motorway driving stressful such as seniors. As noted previously, studies have shown that seniors are more likely to be affected by advertising signs and are a demography that was not covered in the study quoted by the within the TTPP Traffic Response.***

As per TfNSW's Guide Signposting guidelines, this purpose of this sign is as follows:

"REASSURANCE DIRECTION (G4-1) signs, reassure road users that they have made the correct turns at any intersections and are traveling towards their intended destination. They are placed beyond intersections that have been signposted with advance direction and intersection direction signs."

The reassurance direction sign displays distances to the next few suburbs/ areas (see Figure 13). It does not illustrate diagrammatic information, as would advance direction lane allocation signs and advance direction signs. Therefore, a reassurance direction sign typically requires less cognitive capacity to read and interpret. Given the simplicity in its messaging, the reassurance direction sign would remain visible to motorists and easily interpretable in the presence of the proposed digital signage.

Figure 13: Reassurance Direction Sign

Further to the above, there is a very similar example of an existing digital signage located on the M2 Motorway within close proximity to an interchange sequence sign. This arrangement is located at the Murray Farm Road overhead bridge approximately 1.6 km west of the proposed digital signage. As shown by the driving view in Figure 14 both signs are within the same line of sight yet do not cause information overload for motorists. Comparatively, the information displayed on this interchange sequence sign provides greater detail than the reassurance distance signage, and is placed at a location which could cause sudden merging by drivers trying to take the Pennant Hills Road exit that is 1km away. On the reassurance direction sign, the next exit is displayed as being 3km away which provides greater distance for drivers to merge into the left lane as required.

Figure 14: Existing Digital Signage and Interchange Sequence Sign on M2 Motorway

Other examples are located on Military Road in Neutral Bay and Mosman, where there are digital signs installed adjacent to lane directional sign as shown in Figure 15 and Figure 16. The digital signage and the directional sign are within the same line of sight without causing information overload for motorists.

Figure 15: Existing Digital Signage and Lane Directional Sign on Military Road, Neutral Bay

Figure 16: Existing Digital Signage and Lane Directional Sign on Military Road, Mosman

To the point of less confident drivers on motorways, such motorists travel in the left lane/s instinctively. Therefore, it is an unlikely situation where such a driver would have to quickly merge across multiple travel lanes to take an upcoming exit. Nonetheless, a digital signage at this location would not hinder a motorist from being able to safely merge across to the far left lane ahead of the next exit which is 3km away.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Wayne Johnson
Director

Attachment One

Figure 1: Nearmap Aerial Imagery to highlight the changes over time that have occurred on the M4 Motorway between 2015 and 2021

Attachment Two

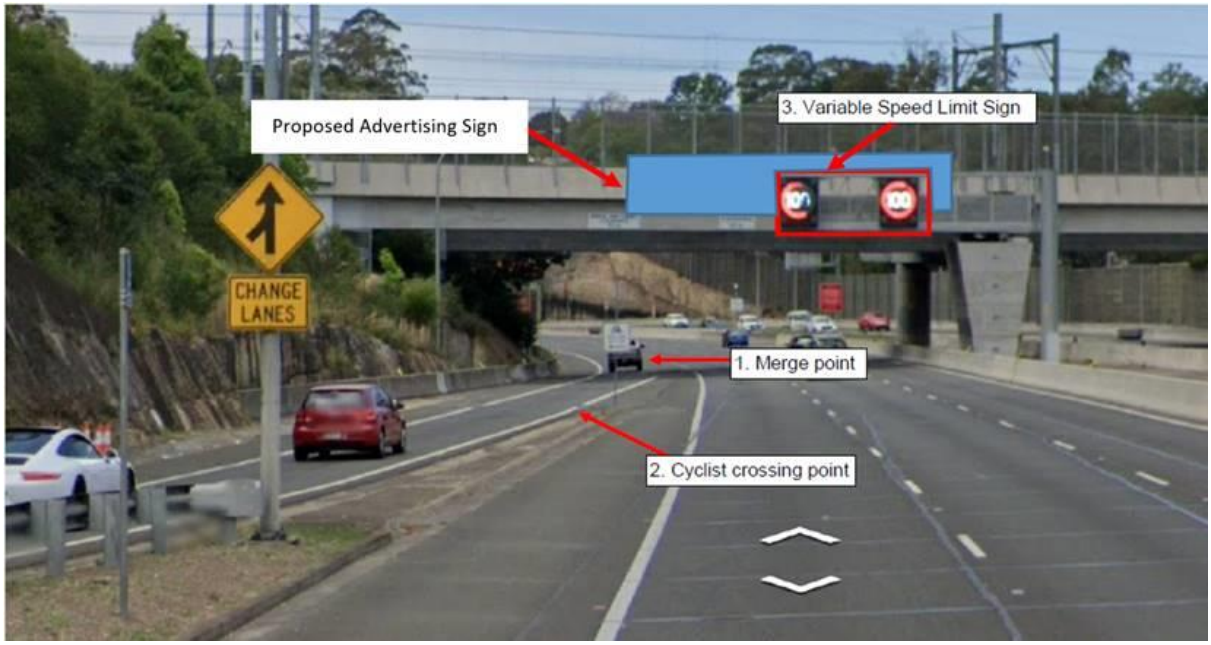


Figure 2: StreetView image of M2 Motorway Eastbound near the proposed advertising sign as well as the location of the critical points near the sign that are impacted by the proposal

Attachment Three

Figure 3: StreetView image of M2 Motorway westbound near the proposed advertising sign as well as the location of the critical points near the sign that are impacted by the proposal