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.

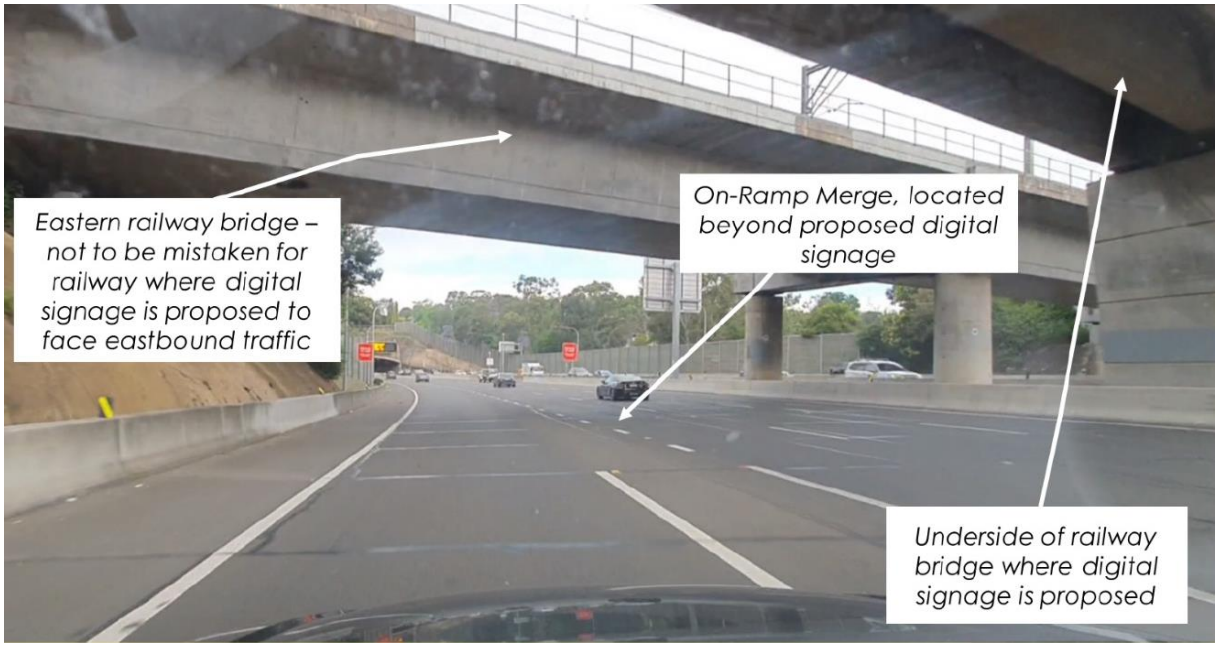
Figure 1: Existing Digital Signage on M4 Motorway, Homebush

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

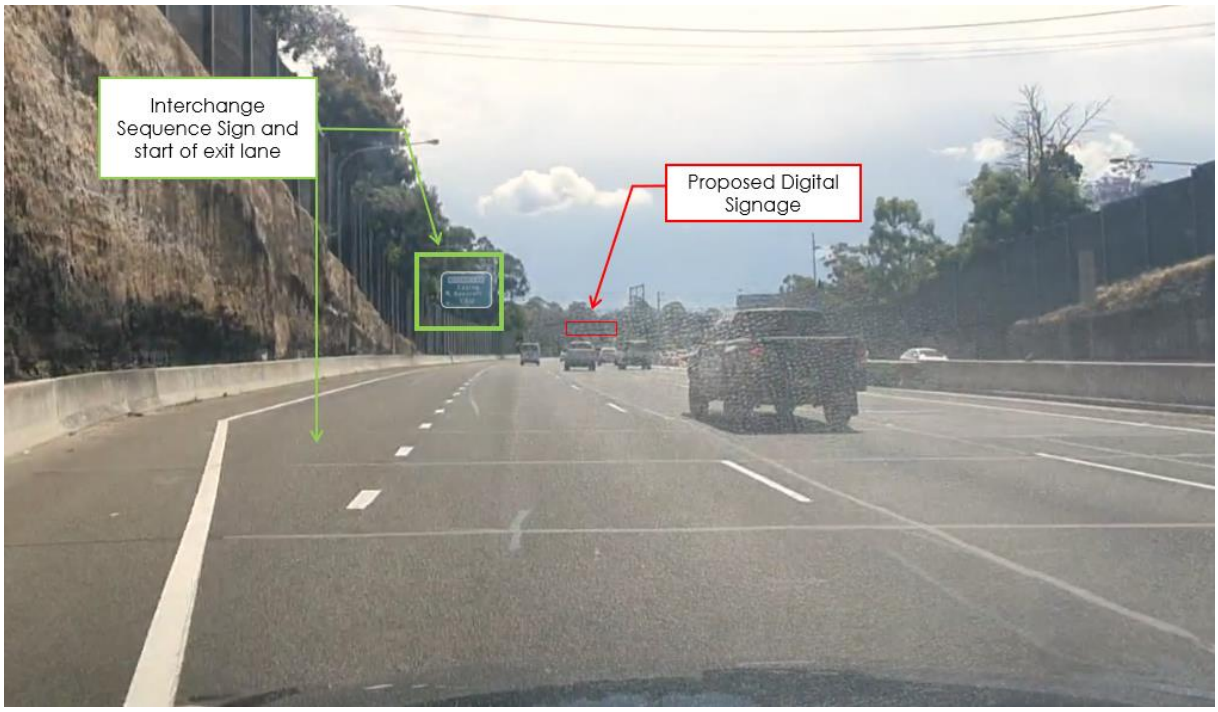
iii. so that it is visible from the stem of a T-intersection."

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.

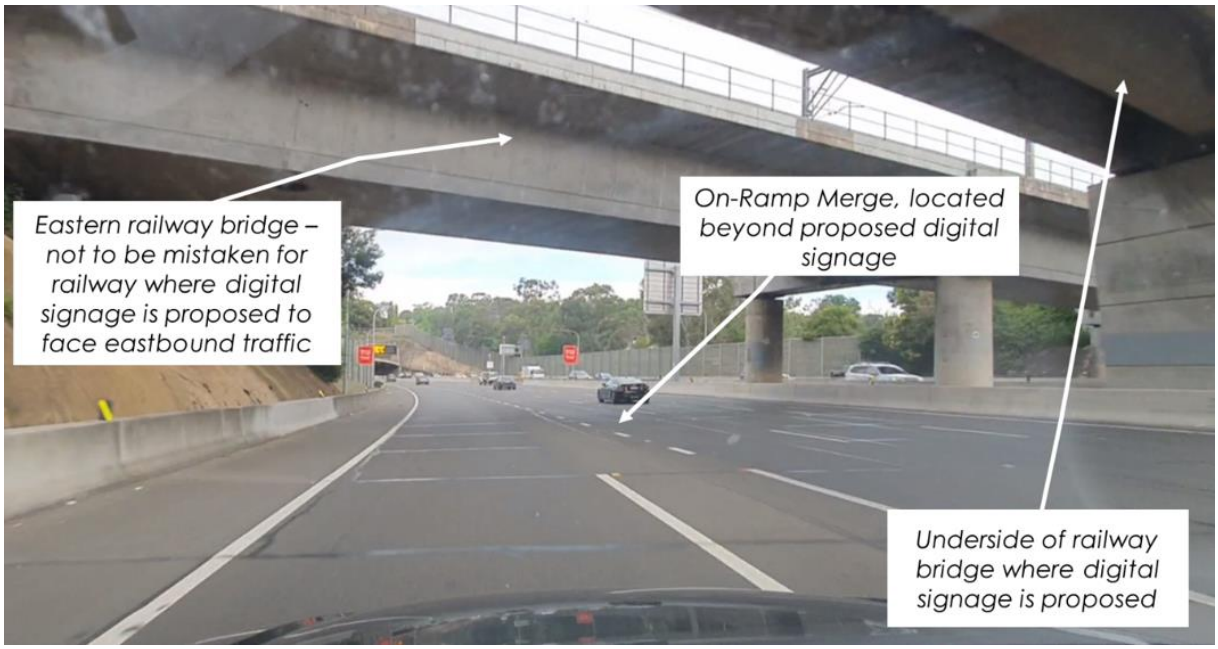
Full details are provided in the response to City of Parramatta Council Submission #1.

- ***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.

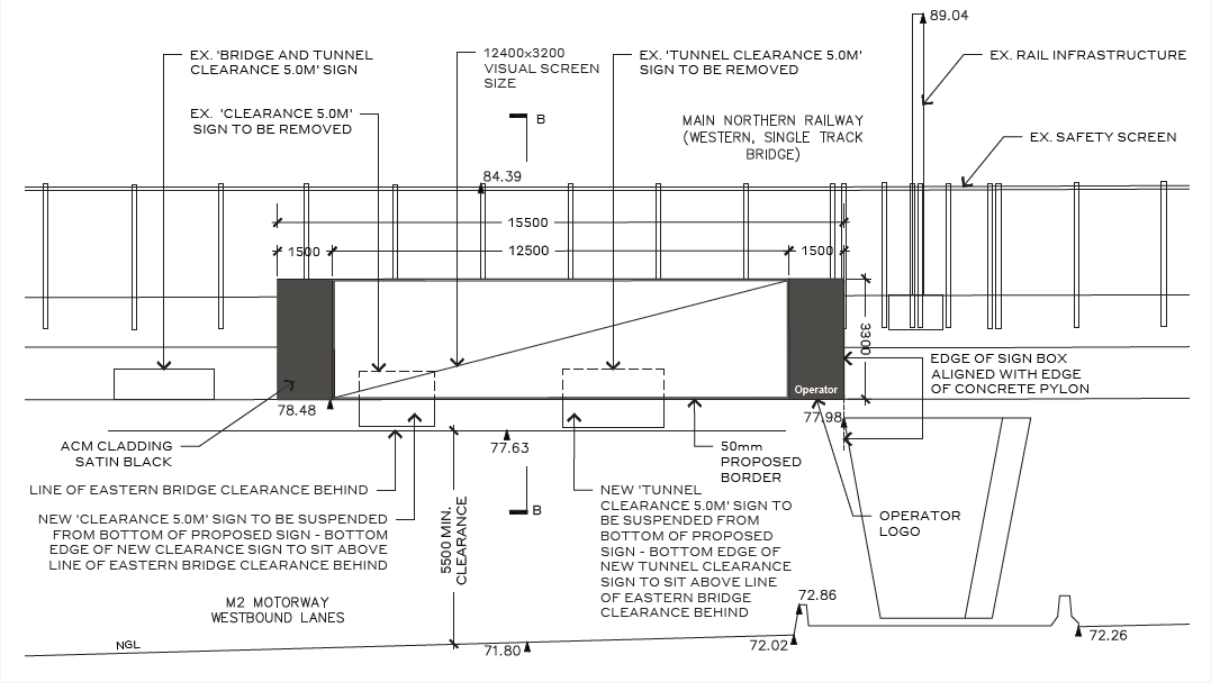
Full details are provided in the response to City of Parramatta Council Submission #3.

- ***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

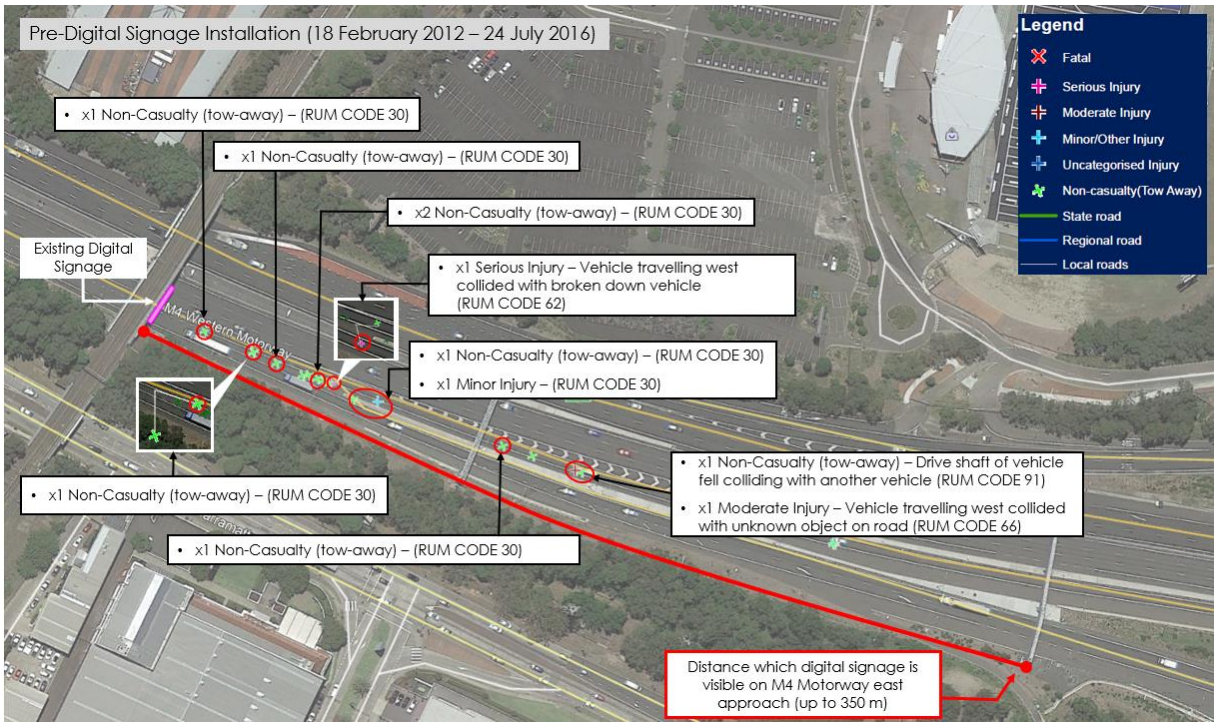
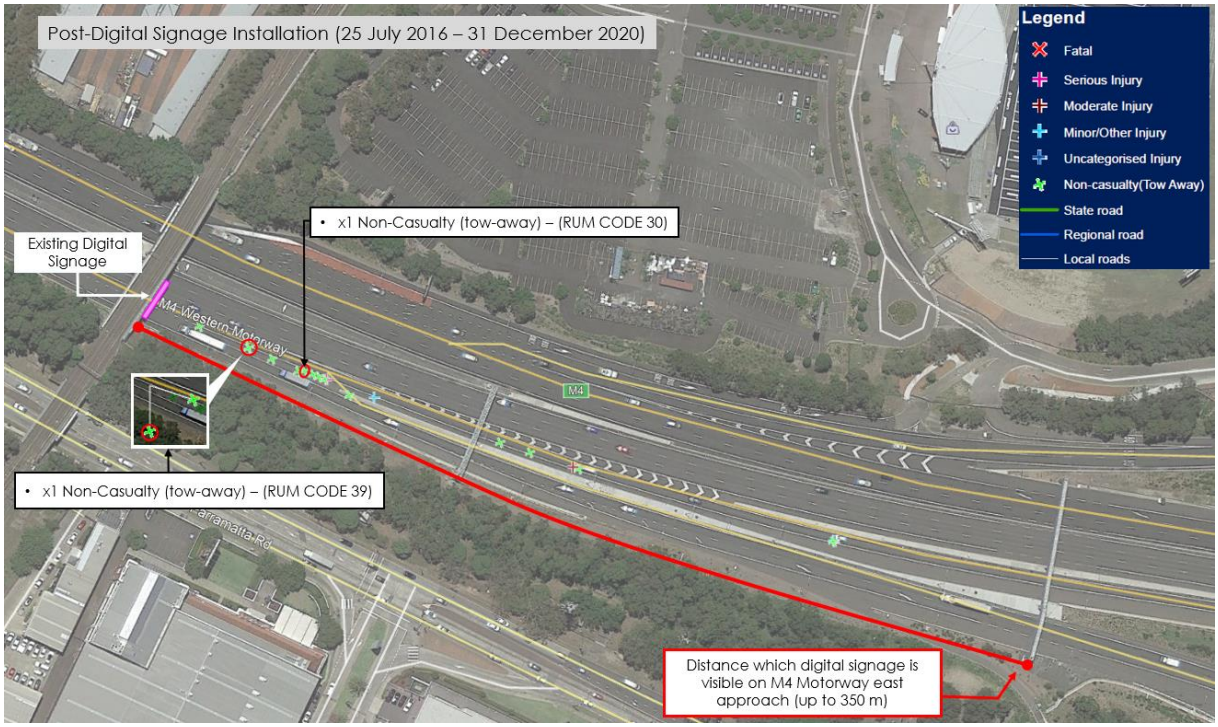


Figure 8: Crash Locations at M4 Motorway, Homebush – Operational



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

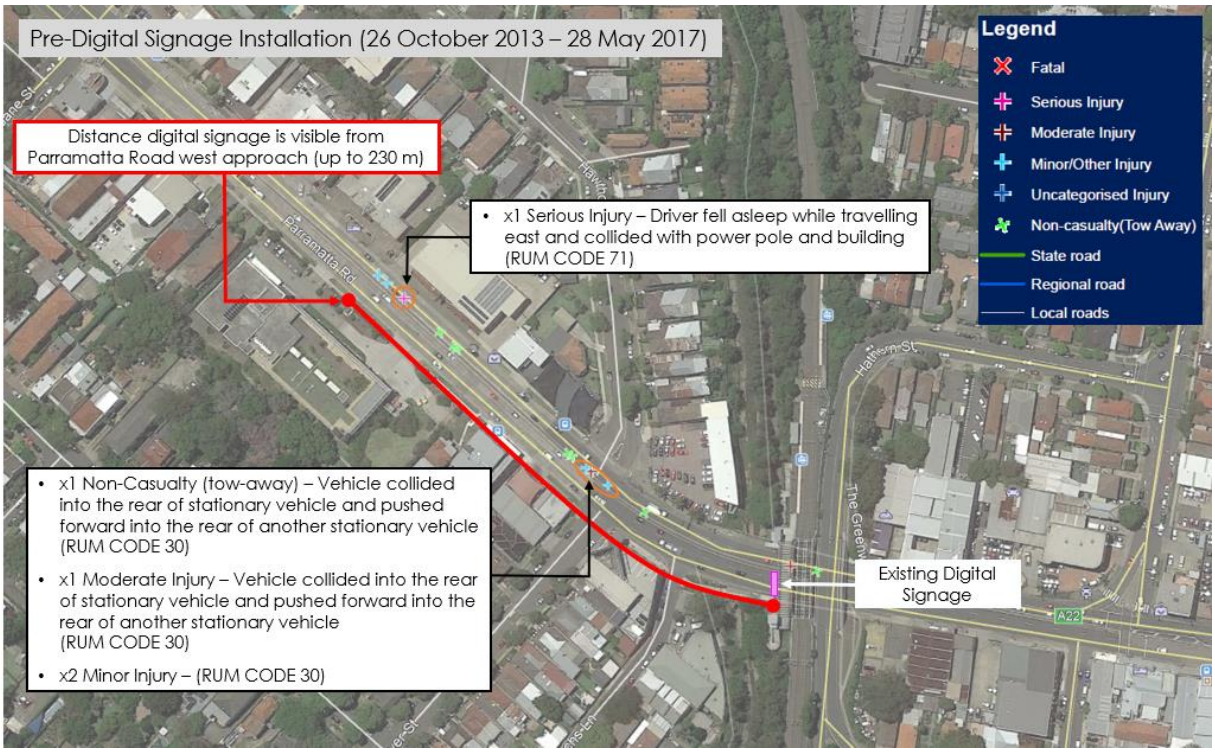


Figure 10: Crash Locations at Parramatta Road, Lewisham – Operational

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

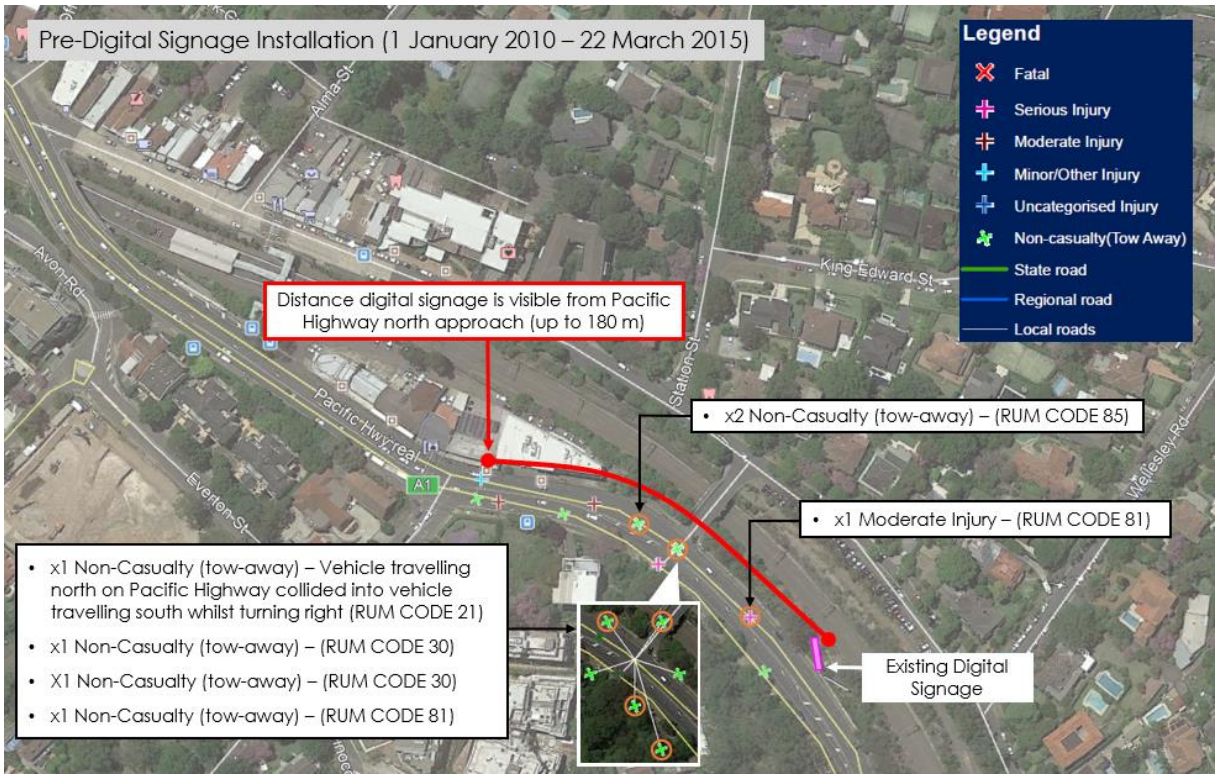
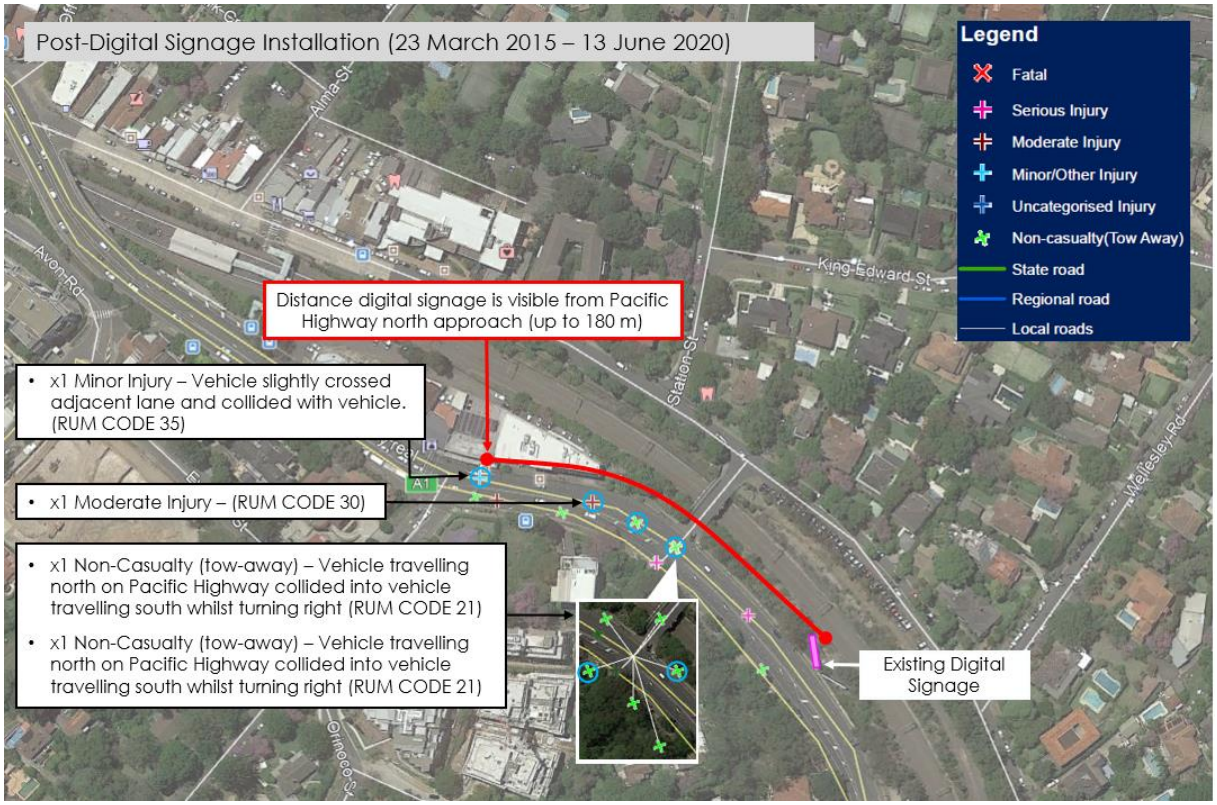


Figure 15: Crash Locations at Pacific Highway, Pymble – Operational



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.

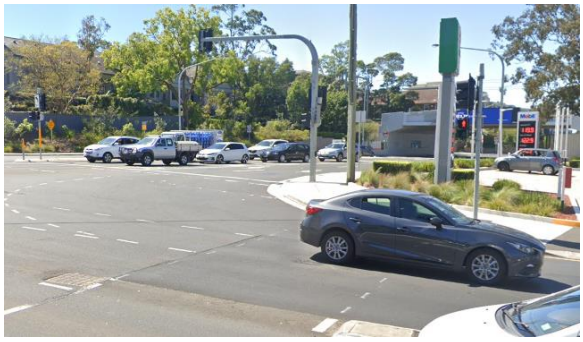
Boundary Street, Roseville

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

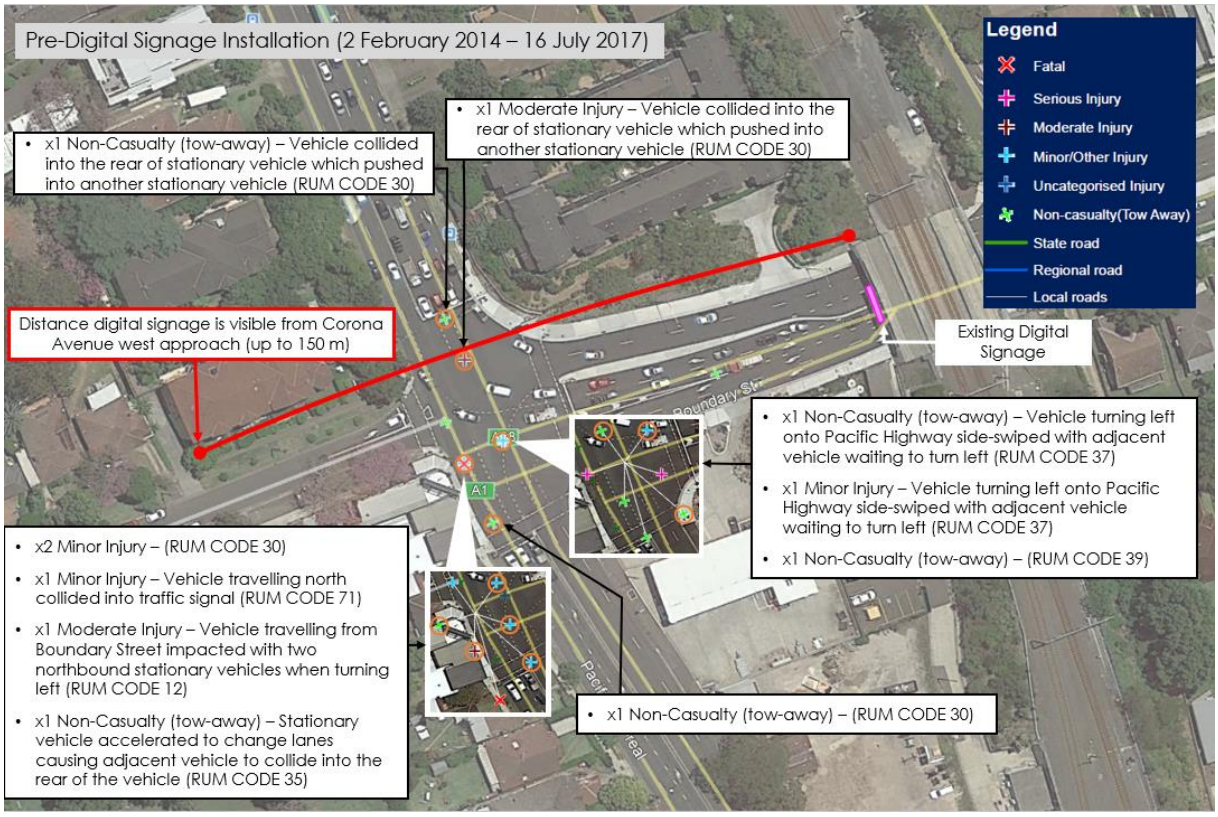


Figure 18: Crash Locations at Boundary Street, Roseville – Operational

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

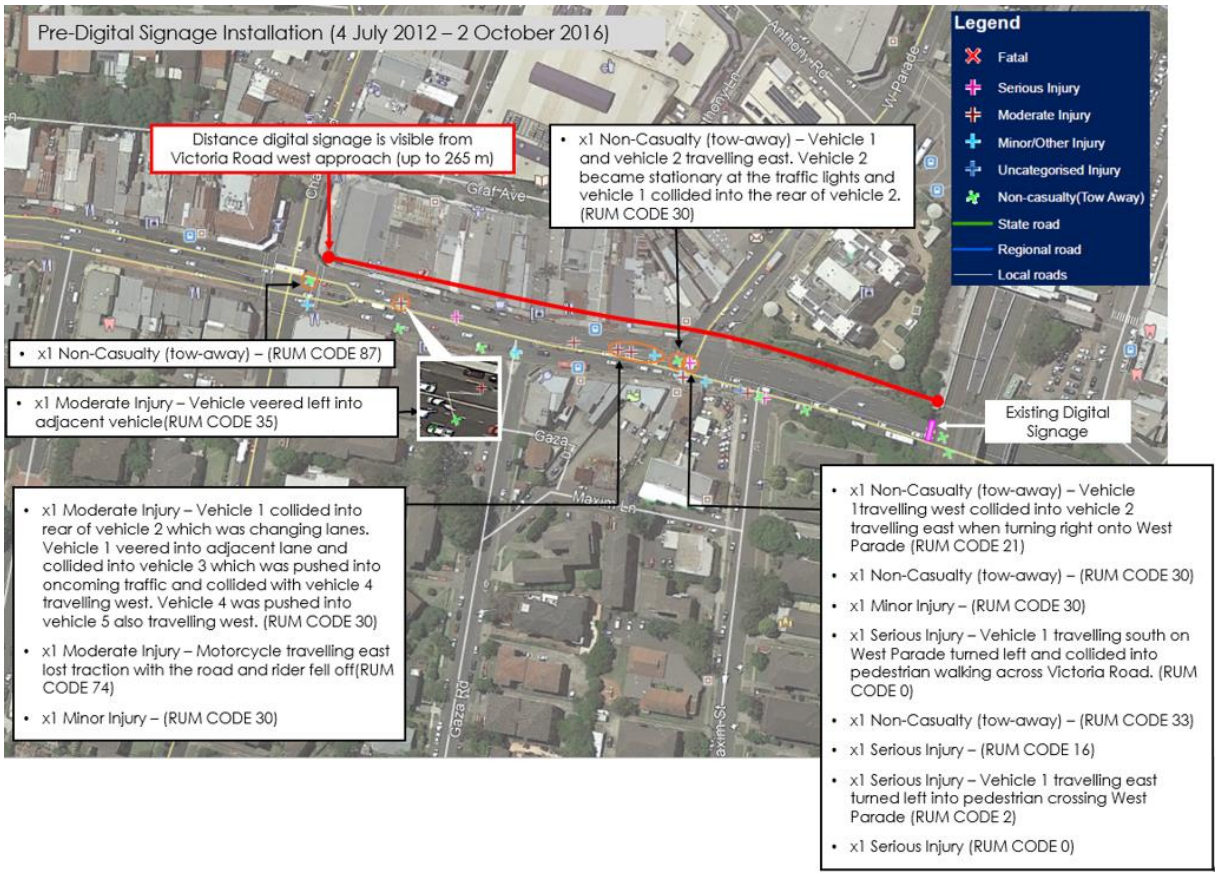
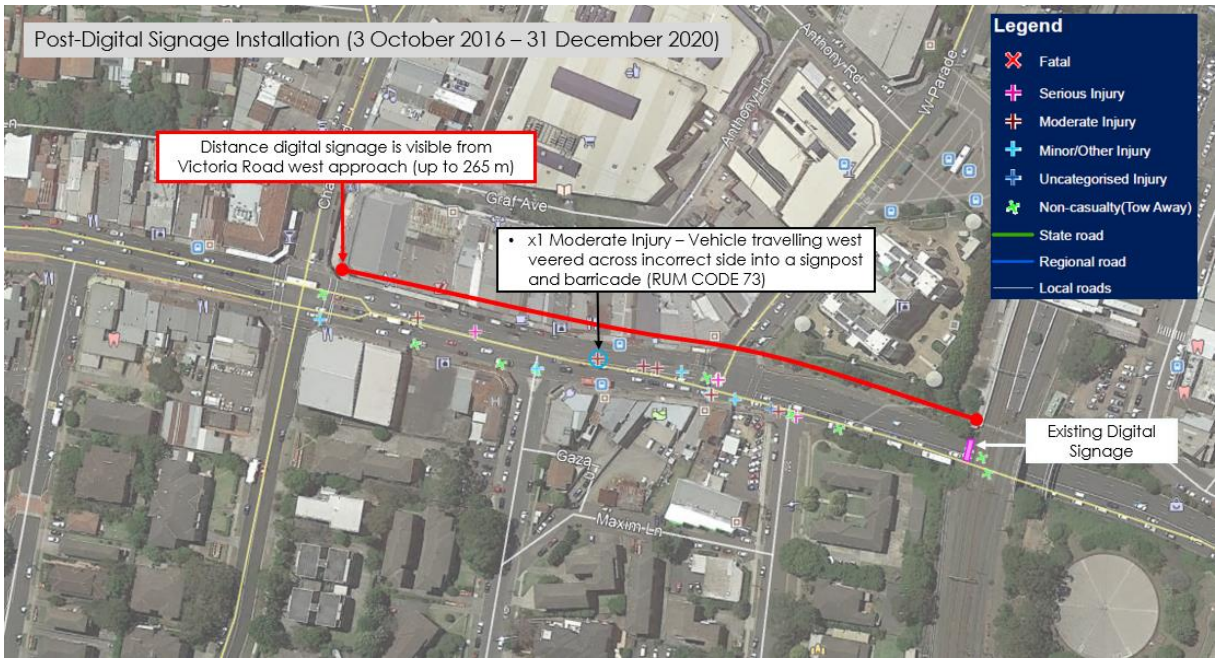


Figure 20: Crash Locations at Victoria Road, West Ryde – Operational



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