JCDecaux

LIGHTING IMPACT ASSESSMENT - EXTERNALLY ILLUMINATED OUTDOOR SIGNAGE AT M7 WESTLINK (NEAR ASH ROAD) PRESTONS, NSW

16th July, 2024
Ref: 1096.135

Lighting Impact Assessment
Externally Illuminated Outdoor Signage at
M7 Westlink (near Ash Road) Prestons, NSW

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
16/07/24	REV A	For Information	CB	RS
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1. INTRODUCTION

Electrolight have been appointed by JCDecaux to undertake a Lighting Impact Assessment on the proposed permit extension of the existing externally illuminated pylon signage at M7 Westlink (near Ash Road) Prestons, NSW. The objective of the assessment is to report on compliance with the State Environmental Planning Policy (Industry and Employment) 2021, NSW Transport Corridor Outdoor Advertising and Signage Guidelines, and AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting.

2. DEFINITIONS

2.1 Illuminance

The physical measure of illumination is illuminance. It is the luminous flux arriving at a surface divided by the area of the illuminated surface. Unit: lux (lx); 1 lx = 1 lm/m2.

(a) Horizontal illuminance (Eh) The value of illuminance on a designated horizontal plane

(b) Vertical illuminance (Ev) The value of illuminance on a designated vertical plane

Where the vertical illuminance is considered in the situation of potentially obtrusive light at a property boundary it is referred to as environmental vertical illuminance (Eve).

2.2 Luminance

The physical quantity corresponding to the brightness of a surface (e.g. a lamp, luminaire or reflecting material such as the road surface) when viewed from a specified direction. SI Unit: candela per square metre (cd/m2) – also referred to as “nits”.

2.3 Luminous Intensity

The concentration of luminous flux emitted in a specified direction. Unit: candela (cd).

2.4 Dynamic content

Where the luminous image, pattern, colour or direction of light changes over an interval of less than 60 seconds

2.5 Obtrusive Light

Spill light which, because of quantitative or directional attributes, gives rise to annoyance, discomfort, distraction, or a reduction in ability to see essential information such as transport signals

Note 1 to entry: Obtrusive light includes the impact on humans and environmental receivers.

2.6 Threshold Increment

The measure of disability glare expressed as the percentage increase in luminance contrast threshold required between an object and its background for it to be seen equally well with a source of glare present

NOTE: The required value is a maximum for compliance of the lighting scheme.

2.7 Environmentally Sensitive Area (ESA)

Area of ecological value including, bushland, waterways and marine and coastal areas

2.8 AGI32 Light Simulation Software

AGI32 (by U.S. company Lighting Analysts) is an industry standard lighting simulation software package that can accurately model and predict the amount of light reaching a designated surface or workplane. AGi32 is a has been independently tested against the International Commission On Illumination (CIE) benchmark, CIE 171:2006, Test Cases to Assess the Accuracy of Lighting Computer Programs.

2.9 Upward Light Ratio Luminaire (ULR_L)

The ratio of the luminous flux of a luminaire that is emitted, at and above the horizontal, divided by the total luminaire flux when the luminaire is mounted in its designed position, and excluding reflected light from surfaces or obstructions.

3. SITE DESCRIPTION AND SCOPE

The existing double sided externally illuminated pylon signage is located on M7 Westlink, near Ash Road, Prestons, NSW. The signage consists of two signs, Face A and Face B. Face A is oriented towards the inbound direction of traffic on M7 Westlink, and Face B is oriented towards the outbound direction of traffic on M7 Westlink. As part of the permit extension, Face A is proposed to be removed whilst Face B is to be retained. As such, the scope of this assessment only includes Face B of the signage. The total illuminated area Face B of the signage is 42.41m2. Refer to Appendix A for the signage location plan, elevations and photographs.

The existing pylon signage is illuminated using four floodlights mounted on bracket arms fixed to the top of the signage. The signage lighting operates all night and is switched off during the day. The signage does not include any dynamic content.

Environmental impact assessments, including the management of artificial light for the protection of specific entities protected by environmental legislation, is beyond the scope of this assessment.

4. DESIGN GUIDELINES AND STANDARDS

The Lighting Impact Assessment will review the existing externally illuminated signage against the following Criteria, Design Guidelines and Standards.

- State Environmental Planning Policy (Industry and Employment) 2021 (Refer Appendix C) (**SEPP Industry and Employment**)
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017 (**Transport Guidelines**)
- AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting (**AS4282)**

5. LUMINANCE ASSESSMENT

Luminance Assessment

The maximum permissible night time luminance of the signage is determined by the existing lighting environment of its surroundings. AS4282 outlines maximum average luminances for different Environmental Zones as shown in Table 1 below:

TABLE 1 - MAXIMUM AVERAGE NIGHT TIME LUMINANCE FOR SIGNAGE		
	Description	Max Average Luminance (cd/m2)
A4	High district brightness e.g. Town and city centres and other commercial areas, residential areas abutting commercial areas, industrial and Port areas and Transport Interchanges	350
A3	Medium district brightness e.g. Suburban areas in towns and cities, generally roadways with streetlighting through suburban, rural or semi-rural areas	250
A2	Low district brightness e.g. Sparsely inhabited rural and semi-rural areas, generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections	150
A1	Dark e.g. Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas), generally roadways without streetlighting through rural areas	50
A0	Intrinsically Dark e.g. UNESCO Starlight Reserve, IDA: Dark Sky Parks, Reserves or Sanctuaries, major optical observatories, other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ ecosystem protection, lighting for safe access may be required	0.1

Based on an assessment of the surrounding environment, the existing signage is located within Environmental Zone A3 under AS4282, therefore, the maximum night time luminance is 250cd/m2.

AS4282 does not include limits for daytime operation of illuminated signage. However, the Transport Guidelines outlines maximum permissible luminance limits for various lighting conditions, including daytime. Under the Transport Guidelines, the proposed signage is classified as being within Zone 3, which is described as an area with generally medium off-street ambient lighting e.g. small to medium shopping/commercial centres. The maximum night time luminance of externally illuminated signage within Zone 3 with an area over 10m2 is 200cd/m2 (taken to be 25% of the maximum daytime limit as outlined in the previous revision of the Guidelines). The luminance limits for operation of the signage during the daytime are not applicable as the signage is switched off during the day.

Luminance Assessment Summary

Table 2 outlines the maximum luminance levels to comply with AS4282 and the Transport Guidelines for the various lighting conditions listed below:

TABLE 2 - COMPLYING LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED ADVERTISEMENTS (FACE B)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Daytime	N/A - OFF	✓
Night Time	91*	✓

* The maximum permissible Night time luminance allowable to comply with the Transport Guidelines and AS4282 is actually 200 cd/m2. The lower luminance limit shown is based on the existing operating luminance limit of the signage, which was measured by Electrolight - refer Measurement Report in Appendix D. It is intended that the night time luminance of the signage remain unchanged for the permit extension.

6. ILLUMINANCE, THRESHOLD INCREMENT & UPWARD LIGHT ASSESSMENT

The existing signage (Face B) has been assessed against the lighting criteria and requirements outlined in AS4282.

AS4282 provides limits for different obtrusive factors associated with dark hours (night time) operation of outdoor lighting systems. Two sets of limiting values for spill light are given based on whether the lighting is operating before a curfew (known as "pre-curfew" operation) or operating after a curfew (known as post-curfew or curfewed operation). Pre-curfew spill lighting limits are higher than post-curfew values, on the understanding that spill light is more obtrusive late at night when residents are trying to sleep. Under AS4282, the post-curfew period is taken to be between 11pm and 6am daily. As the signage operates all night, the signage will be assessed against the more stringent post-curfew limits.

Illuminance Assessment

The AS4282 assessment includes a review of nearby residential dwellings and calculation of the amount of illuminance (measured in Lux) that the properties are likely to receive from the signage during night time operation.

The acceptable level of illuminance will in part be determined by the night time lighting environment around the dwellings. AS4282 categorises the night time environment into different zones with maximum lighting limits as shown in Table 3 below:

TABLE 3 - MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

	Max Vertical Illuminance (lx)		Description
	Pre-curfew	Post-curfew	
A4	25	5	High district brightness e.g. Town and city centres and other commercial areas, residential areas abutting commercial areas, industrial and Port areas and Transport Interchanges
A3	10	2	Medium district brightness e.g. Suburban areas in towns and cities, generally roadways with streetlighting through suburban, rural or semi-rural areas
A2	5	1	Low district brightness e.g. Sparsely inhabited rural and semi-rural areas, generally roadways without streetlighting through suburban, rural or semi-rural areas other than intersections
A1	2	0.1	Dark e.g. Relatively uninhabited rural areas (including terrestrial, marine, aquatic and coastal areas), generally roadways without streetlighting through rural areas
A0	0	0	Intrinsically Dark e.g. UNESCO Starlight Reserve, IDA: Dark Sky Parks, Reserves or Sanctuaries, major optical observatories, other accreditations for dark sky places for example astrotourism, heritage value, astronomical importance, wildlife/ ecosystem protection, lighting for safe access may be required

It can be seen that no residential dwellings fall within the exclusion zone. The signage therefore complies with the maximum post-curfew vertical illuminance of 2 lux for Zone A3. The existing signage (Face B) therefore complies with the relevant illuminance limits for nearby residential dwellings.

In addition, the following Environmentally Sensitive Area/s with potential views to the sign were also assessed:

Address	Zone
ESA- M7 Westlink North	A3
ESA- M7 Westlink South	A3

The existing signage (and surrounding environment) was modeled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the existing signage. The floodlights are required to be fitted with baffles, to prevent direct illumination from the luminaires being emitted into nearby areas. As such, the only potential illuminance will be from reflected light from the signage surface. Photometric data for the signage was therefore based on a diffused light panel (approximating a lambertian emitter) with the maximum luminance corresponding to the night time limits outlined in Section 5. Appendix C shows the lighting model and the results of the calculations.

Environmentally Sensitive Areas

It can be seen from the lighting model that the maximum illuminance to the Environmentally Sensitive Areas in Zone A3, on the northern and southern sides of the M7 Westlink, is 0.67 lux. This illuminance level above complies with the maximum AS4282 limits of 2 lux for Zone A3. There are no Environmentally Sensitive Areas identified in any other zones.

Threshold Increment Assessment

The Threshold Increment was also calculated for the northbound traffic approach on M7 Westlink. The calculation grids were located at 1.5m above ground level with a viewing distance of between 10m to 200m from the signage and a windscreen cutoff angle of 20 degrees (as outlined in AS1158). The calculation results show that the Threshold Increment does not exceed 1.54% for any traffic approach (the allowable maximum under the standard is 20%).

In order for the signage to comply with the Threshold Increment requirements for traffic on the M7 Westlink, the floodlights should be fitted with baffles (glare shields) to prevent obtrusive illumination from being visible to all traffic approaches.

Upward Waste Light Assessment

In order to reduce light pollution and associated environmental impacts, AS4282 includes requirements that limit upward waste light into the night sky from signage. Clause 3.3.3.4.c) of AS4282 states that externally lit signs and billboards shall be lit from the top and shall have a ULR_L or URL_S of no greater than 0.02. In order to comply with this requirement, baffles shall be installed on to the floodlights to ensure a ULR of 0.02 or less.

Luminous Intensity

AS4282 nominates Luminous Intensity limits where a light source (such as a floodlight) can be directly viewed from a residential dwelling, shown in Table 4 below:

TABLE 4 - MAXIMUM LUMINOUS INTENSITIES PER LUMINAIRE FOR EXTERNALLY ILLUMINATED SIGNAGE			
Environmental Zone	Non-Curfew L1 luminous intensity (cd)	Non-Curfew L2 luminous intensity (cd)	Curfew luminous intensity (cd)
A4	25000	50000	2500
A3	12500	25000	2500
A2	7500	12500	1000
A1	2500	5000	500
A0	For A0, I shall be as close to zero as practicable without impacting safety considerations.	For A0, I shall be as close to zero as practicable without impacting safety considerations.	0

There are no residents in the area with direct view of the light sources. The signage therefore complies with the Luminous Intensity requirements.

Summary

It can therefore be seen that the existing externally illuminated pylon signage (Face B) complies with all relevant requirements of AS4282.

7. SEPP ASSESSMENT

Table 5 below outlines the illumination assessment criteria from the SEPP Industry and Employment Schedule 5 - Clause 7 Illumination. While the SEPP only applies to sites located on classified roads, our assessment references the guidelines as a best practice document in NSW. In addition to the criteria, responses have been included demonstrating that the existing signage is in compliance.

TABLE 5
7. ILLUMINATION ASSESSMENT CRITERIA

Assessment Criteria	Response	Compliant?
Would illumination result in unacceptable glare?	The proposed signage complies with the Threshold Increment limits of AS4282, demonstrating that the illumination will not cause unacceptable glare.	✓
Would illumination affect safety for pedestrians, vehicles or aircraft?	The proposed signage complies with the Threshold Increment limits of AS4282, demonstrating that the illumination will not cause unacceptable glare. The small size of the signage and its relatively low intensity limits the risk to pedestrians, vehicles or aircraft.	✓
Would illumination detract from the amenity of any residence or other form of accommodation?	The proposed signage, when installed according to this report, complies with the illuminance (spill lighting) limits of AS4282, demonstrating that the illumination will not detract form the amenity of any residence or other form of accommodation	✓
Can the intensity of the illumination be adjusted, if necessary?	The dimming level of the floodlights cannot be adjusted, however the luminance level is less than half of the allowable maximum. As such, it is deemed unnecessary to dim the signage from its current level.	N/A
Is the illumination subject to a curfew?	The proposed advertising signage, when installed according to this report, complies with the limits required during curfewed operation under AS4282 (nominally between the hours of 11pm and 6am). This means that a curfew is not required.	N/A

8. SUMMARY

- The existing externally illuminated signage (Face B) to be installed at M7 Westlink (near Ash Road) Prestons, NSW, shall operate at the following maximum luminances:

COMPLYING LUMINANCE LEVELS FOR EXTERNALLY ILLUMINATED ADVERTISEMENTS		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day	N/A - OFF	✓
Night Time	91	✓

- In order to comply with Illuminance, Threshold Increment and Upward Light Requirements, baffles shall be installed on to the floodlights in accordance with this report.
- The existing externally illuminated pylon signage (Face B) has been found to comply with all relevant requirements of AS4282, the Transport Guidelines and SEPP Industry and Employment.
- In complying with the above requirements, the externally illuminated pylon signage (Face B) shall not result in unacceptable glare nor shall it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the signage shall not cause any unacceptable amenity impacts to nearby residential dwellings or accommodation.

9. DESIGN CERTIFICATION

The existing externally illuminated pylon signage (Face B) at M7 Westlink (near Ash Road) Prestons, NSW, if commissioned according to this report, complies with the following criteria, guidelines and standards:

- State Environmental Planning Policy (Industry and Employment) 2021
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017
- AS/NZS 4282:2023 Control of the Obtrusive Effects of Outdoor Lighting

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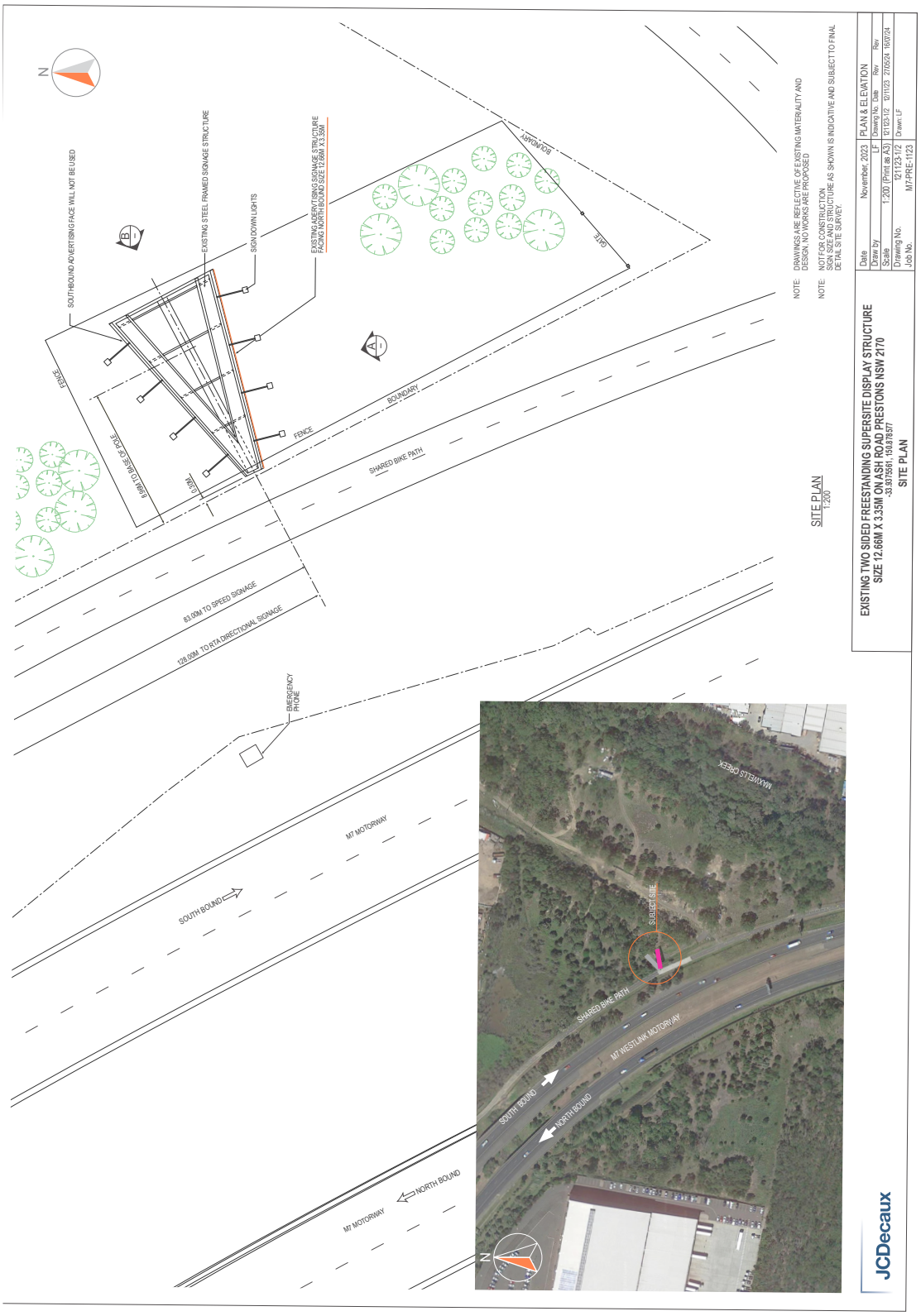
APPENDIX A
EXISTING SIGNAGE LOCATION, ELEVATIONS & PHOTOMONTAGES



APPENDIX A
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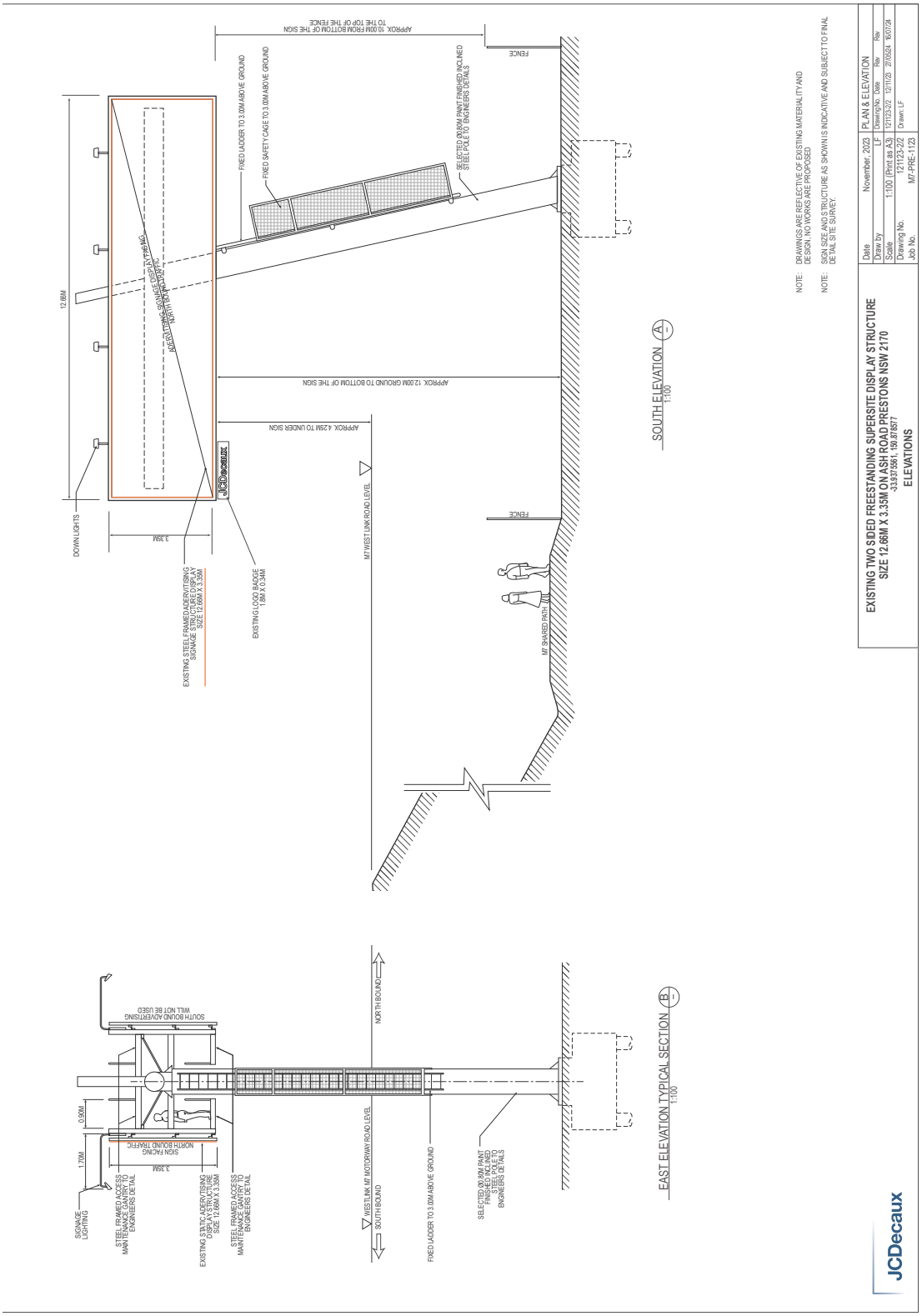

APPENDIX A

EXISTING SIGNAGE LOCATION, ELEVATIONS & PHOTOMONTAGES

APPENDIX B

State Environmental Planning Policy (Industry and Employment) 2021

Schedule 5 Assessment criteria

(Clauses 8, 13 and 17)

1. Character of the area

- Is the proposal compatible with the existing or desired future character of the area or locality in which it is proposed to be located?
- Is the proposal consistent with a particular theme for outdoor advertising in the area or locality?

2. Special areas

- Does the proposal detract from the amenity or visual quality of any environmentally sensitive areas, heritage areas, natural or other conservation areas, open space areas, waterways, rural landscapes or residential areas?

3. Views and vistas

- Does the proposal obscure or compromise important views?
- Does the proposal dominate the skyline and reduce the quality of vistas?
- Does the proposal respect the viewing rights of other advertisers?

4. Streetscape, setting or landscape

- Is the scale, proportion and form of the proposal appropriate for the streetscape, setting or landscape?
- Does the proposal contribute to the visual interest of the streetscape, setting or landscape?
- Does the proposal reduce clutter by rationalising and simplifying existing advertising?
- Does the proposal screen unsightliness?
- Does the proposal protrude above buildings, structures or tree canopies in the area or locality?
- Does the proposal require ongoing vegetation management?

5. Site and building

- Is the proposal compatible with the scale, proportion and other characteristics of the site or building, or both, on which the proposed signage is to be located?
- Does the proposal respect important features of the site or building, or both?
- Does the proposal show innovation and imagination in its relationship to the site or building, or both?

6. Associated devices and logos with advertisements and advertising structures

- Have any safety devices, platforms, lighting devices or logos been designed as an integral part of the signage or structure on which it is to be displayed?

7. Illumination

- Would illumination result in unacceptable glare?
- Would illumination affect safety for pedestrians, vehicles or aircraft?
- Would illumination detract from the amenity of any residence or other form of accommodation?
- Can the intensity of the illumination be adjusted, if necessary?
- Is the illumination subject to a curfew?

8. Safety

- Would the proposal reduce the safety for any public road?
- Would the proposal reduce the safety for pedestrians or bicyclists?
- Would the proposal reduce the safety for pedestrians, particularly children, by obscuring sightlines from public areas?

APPENDIX C
OBTRUSIVE LIGHT AND THRESHOLD INCREMENT CALCULATIONS

Calculation Summary			
Project: Signage			
Label	CalcType	Units	Max
M7 Westlink Northbound	Obtrusive - TI	%	1.54

Calculation Summary			
Project: ESA			
Label	CalcType	Units	Max
ESA NE_Ill_Seg1	Obtrusive - Ill	Lux	0.67
ESA NE_Ill_Seg2	Obtrusive - Ill	Lux	0.63
ESA NE_Ill_Seg3	Obtrusive - Ill	Lux	0.14
ESA NE_Ill_Seg4	Obtrusive - Ill	Lux	0.04
ESA NE_Ill_Seg5	Obtrusive - Ill	Lux	0.03
ESA SW_Ill_Seg1	Obtrusive - Ill	Lux	0.00
ESA SW_Ill_Seg2	Obtrusive - Ill	Lux	0.00
ESA SW_Ill_Seg3	Obtrusive - Ill	Lux	0.12
ESA SW_Ill_Seg4	Obtrusive - Ill	Lux	0.16
ESA SW_Ill_Seg5	Obtrusive - Ill	Lux	0.14
ESA SW_Ill_Seg6	Obtrusive - Ill	Lux	0.07
ESA SW_Ill_Seg7	Obtrusive - Ill	Lux	0.03

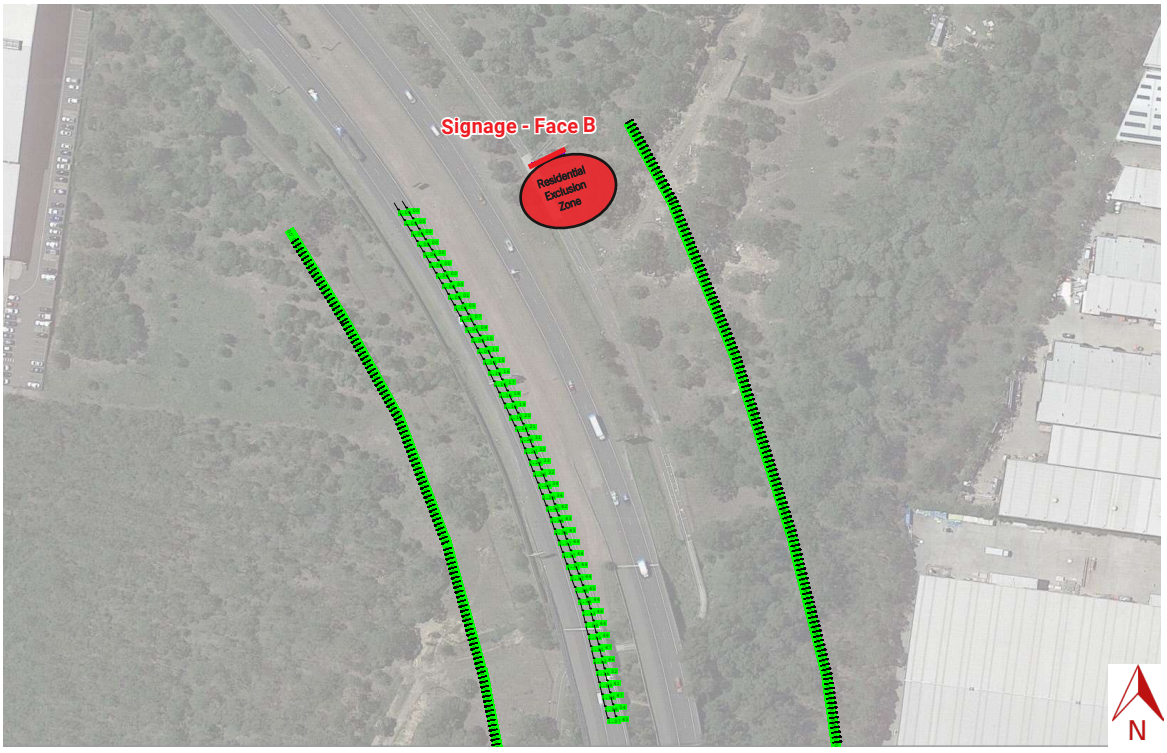

Image: Light Model - Plan showing residential exclusion zone.

"Residential Exclusion Zone" is defined as the region in which the illuminance levels to residential properties would exceed the maximum allowable under the Zone limits in AS4282. If no residential properties are located within the Exclusion Zone then the signage will comply with the illuminance limits in the Standard.

The Zone limit shown is for A3 (2 lux maximum).

APPENDIX C

OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Zone A3 - Medium District Brightness, Curfew

Filename: 1096.135 - M7 Westlink Prestons - Rev B
16/07/2024 12:59:30 PM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (12):

Calculation Label	Test Results	Max. Illum.
ESA NE_Ill_Seg1	**PASS**	0.67
ESA NE_Ill_Seg2	**PASS**	0.63
ESA NE_Ill_Seg3	**PASS**	0.14
ESA NE_Ill_Seg4	**PASS**	0.04
ESA NE_Ill_Seg5	**PASS**	0.03
ESA SW_Ill_Seg1	**PASS**	0.00
ESA SW_Ill_Seg2	**PASS**	0.00
ESA SW_Ill_Seg3	**PASS**	0.12
ESA SW_Ill_Seg4	**PASS**	0.16
ESA SW_Ill_Seg5	**PASS**	0.14
ESA SW_Ill_Seg6	**PASS**	0.07
ESA SW_Ill_Seg7	**PASS**	0.03

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (1):

Calculation Label	Adaptation Luminance	Test Results
M7 Westlink Northbound	1	**PASS**