JCDecaux

LIGHTING IMPACT ASSESSMENT -

OUTDOOR SIGNAGE AT PRINCES HIGHWAY, LOFTUS, NSW (OUTBOUND)

22nd March 2022
Ref: 3023.15

Lighting Impact Assessment
Outdoor Signage at Princes Highway, Loftus, NSW (Outbound)

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
22/03/22	REV C	For Information	NL	RS

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CONTENTS

1. INTRODUCTION

Electrolight have been appointed by JCDeacaux to undertake a Lighting Impact Assessment on the proposed outbound digital signage at Princes Highway, Loftus, 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 AS4282-2019 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 Obtrusive Light

Spill Light which, because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information.

2.5 Threshold Increment

The measure of disability glare expressed as the percentage increase in contrast required between a standard object and its background (the carriageway) for it to be seen equally as well with the source of glare present as with it absent, derived in the specified manner. This metric is directly related to Veiling Luminance.

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

2.6 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.

2.7 Upward Light Ratio (ULR)

The ratio between the luminuous flux emitted above the horizontal plane to the total flux emitted by a light source. The ULR is used as a measure to limit direct spill light to the sky.

3. SITE DESCRIPTION AND SCOPE

The proposed digital signage is located at Princes Highway, Loftus, NSW. The signage faces the outbound traffic on Princes Highway. The total active display (illuminated) area of the proposed signage is 39.94 m2. The digital signage it to be in 24 hour operation. Refer to Appendix A for proposed signage location plan and elevations.

The proposed digital signage is illuminated using LEDs installed within the front face. The brightness of the LEDs shall be controlled to provide upper and lower thresholds as required as well as automatically via a local light sensor to adjust to ambient lighting conditions.

For the purpose of this report the proposed manufacturer of the digital signage is noted as Big Screen Video model type BSV-YATR-10 with performance parameters as outlined in Appendix B. The signage include baffles which mitigate upward waste light, resulting in an Upward Light Ratio (ULR) of less than 50%. Alternative digital sign manufacturers may be used for this installation as long as they have equivalent lighting and performance characteristics and are commissioned as described in this report.

4. DESIGN GUIDELINES AND STANDARDS

The Lighting Impact Assessment will review the proposed digital signage against the following Criteria, Design Guidelines and Standards.

- State Environmental Planning Policy (Industry and Employment) 2021 (Refer Appendix C)
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017
- AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting

5. 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 NIGHT TIME AVERAGE LUMINANCE FOR SIGNAGE		
Environmental Zone	Description	Max Average Luminance (cd/m2)
A4	High district brightness e.g. Town and city centres, commercial areas, and residential areas abutting commercial areas	350
A3	Medium district brightness e.g. suburban areas in towns and cities	250
A2	Low district brightness e.g. sparsely inhabited rural and semi-rural areas	150
A1	Dark e.g. relatively uninhabited rural areas. No Road Lighting	0.1
A0	Intrinsically Dark e.g. Major Optical Observatories. No Road Lighting	0.1

Note: Where the signage is viewed against a predominantly dark background (e.g. night sky) then the maximum applicable environmental zone is A2

Based on an assessment of the surrounding environment, the proposed signage is located within Environmental Zone A2 under AS4282, therefore, the maximum night time luminance is 150cd/m2.

AS4282 does not include limits for daytime operation of illuminated signage. However, the Transport Corridor Outdoor Advertising & Signage Guidelines outlines maximum permissible luminance limits for various lighting conditions, including daytime. Under the Guidelines, the proposed signage is classified as being within Zone 4, which is described as an area with Generally low off-street ambient lighting, or areas that have residential properties nearby. The maximum night time luminance of a digital signage within Zone 4 is 200 cd/m2.

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

TABLE 2 - LUMINANCE LEVELS FOR DIGITAL ADVERTISEMENTS		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Full Sun on face of Signage	No Limit	✓
Day Time Luminance (typical sunny day)	6000	✓
Morning and Evening Twilight and Overcast Weather	500	✓
Night Time	150	✓

The signage is to be dimmed on site to ensure the maximum luminance nominated above is not exceeded.

It is our opinion that signage that is illuminated to the maximum luminances outlined above would be visually consistent with the existing ambient lighting and suitable for the local area. A more detailed night time lighting assessment is provided in Section 6.0.

6. AS4282 ASSESSMENT

The proposed signage has been assessed against AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting as outlined in Section 4.

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

Environmental Zone	Max Vertical Illuminance (lx)		Description
	Pre-curfew	Post-curfew	
A0	0	0	Intrinsically Dark e.g. Major Optical Observatories. No Road Lighting
A1	2	0.1	Dark e.g. relatively uninhabited rural areas. No Road Lighting
A2	5	1	Low district brightness e.g. sparsely inhabited rural and semi-rural areas
A3	10	2	Medium district brightness e.g. suburban areas in towns and cities
A4	25	5	High district brightness e.g. Town and city centres, commercial areas, and residential areas abutting commercial areas

The proposed signage (and surrounding environment) was modelled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the signage. Photometric data for the screen was provided by the screen manufacturer*, with the maximum luminance corresponding to the night time limit outlined in Section 5. Appendix D shows the lighting model and the results of the calculations. It can be seen that no residential developments fall within the exclusion zone. The signage therefore complies with the maximum post-curfew vertical illuminance limit of 1 lux for Zone A2.

* Electrolight takes no responsibility for the accuracy of third party provided photometric data.

Luminous Intensity

The luminous intensity limits nominated in the standard are not applicable for internally illuminated signage.

Threshold Increment Assessment

The Threshold Increment was also calculated for the south-west bound traffic approach on Princes Highway (outbound) and south-west Trainline approach. The calculation grids were located at 1.5m above ground level for general traffic approaches and 2m above ground for rail approaches, with an approach viewing distance of between 10 m to 200 m from the sign and a windscreen cutoff angle of 20 degrees (as outlined in AS1158). The calculation results show that the Threshold Increment does not exceed 8.1% for any traffic approach (the allowable maximum under the standard is 20%).

Additional AS4282 Requirements:

The signage operator must ensure that the average luminance difference between successive images does not exceed 30% to ensure compliance with AS4282. The dwell time shall be 10 seconds or greater to comply with the minimum requirements of AS4282.

Summary

It can therefore be seen that the proposed digital signage complies with all relevant requirements of AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.

7. SUMMARY

- The proposed digital signage to be installed at Princes Highway, Loftus, NSW shall be commissioned on site to yield the following maximum luminances:

LUMINANCE LEVELS FOR DIGITAL ADVERTISEMENTS (FACE A)		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Full Sun on face of Signage	No Limit	✓
Day Time Luminance (typical sunny day)	6000	✓
Morning and Evening Twilight and Overcast Weather	500	✓
Night Time	150	✓

- The signage operator must ensure that the average luminance difference between successive images does not exceed 30% to ensure compliance with AS4282. The dwell time shall be 10 seconds or greater in order to comply with the requirements of AS4282.
- The proposed digital signage has been found to comply with all relevant requirements of AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.
- In complying with the above requirements, the proposed digital signage should not result in unacceptable glare nor should it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the signage should not cause any reduction in visual amenity to nearby residences or accommodation.

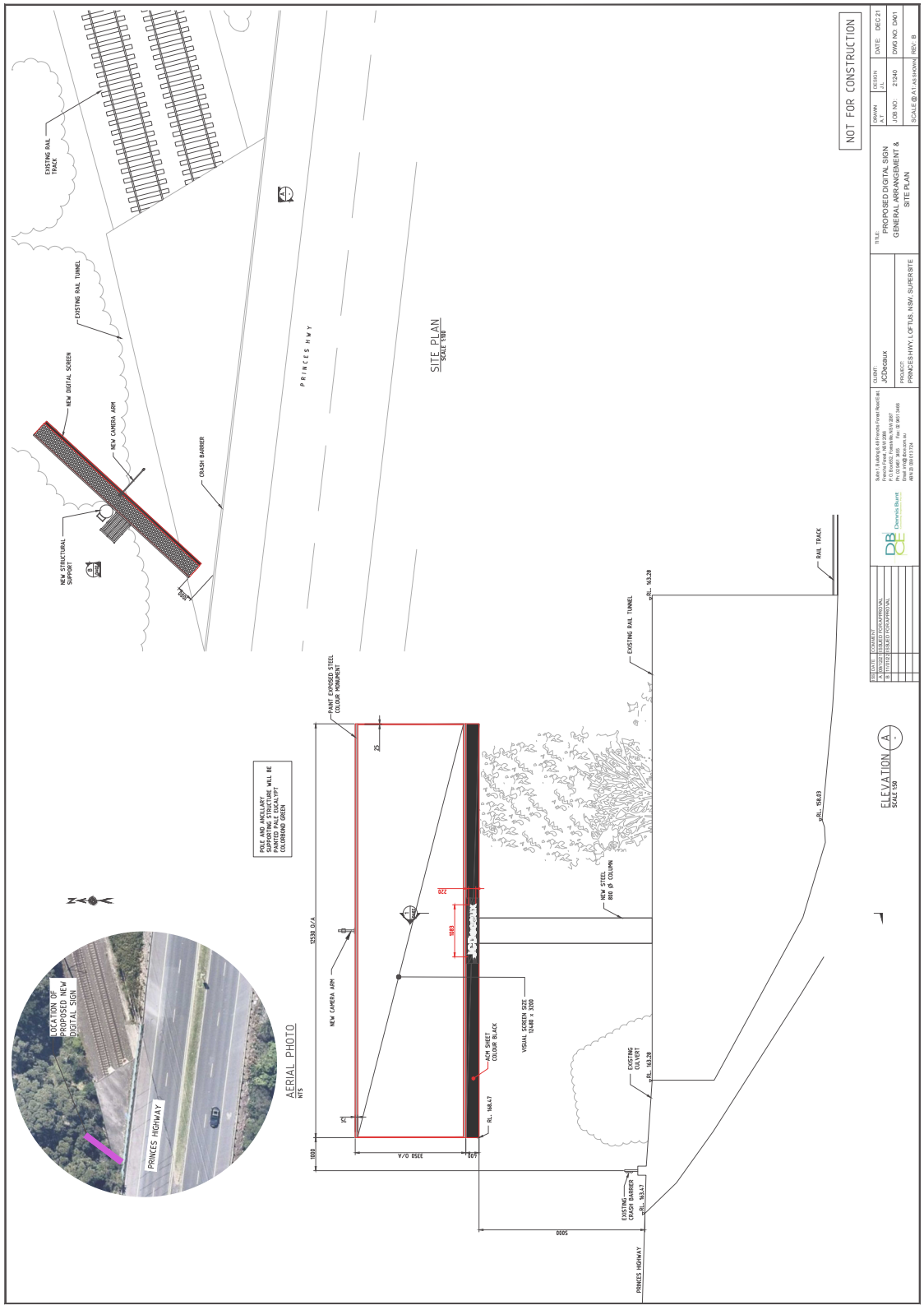
8. DESIGN CERTIFICATION

The proposed outbound digital signage to be installed at Princes Highway, Loftus, NSW, if commissioned according to this report, complies with the following criteria, guidelines and standards:

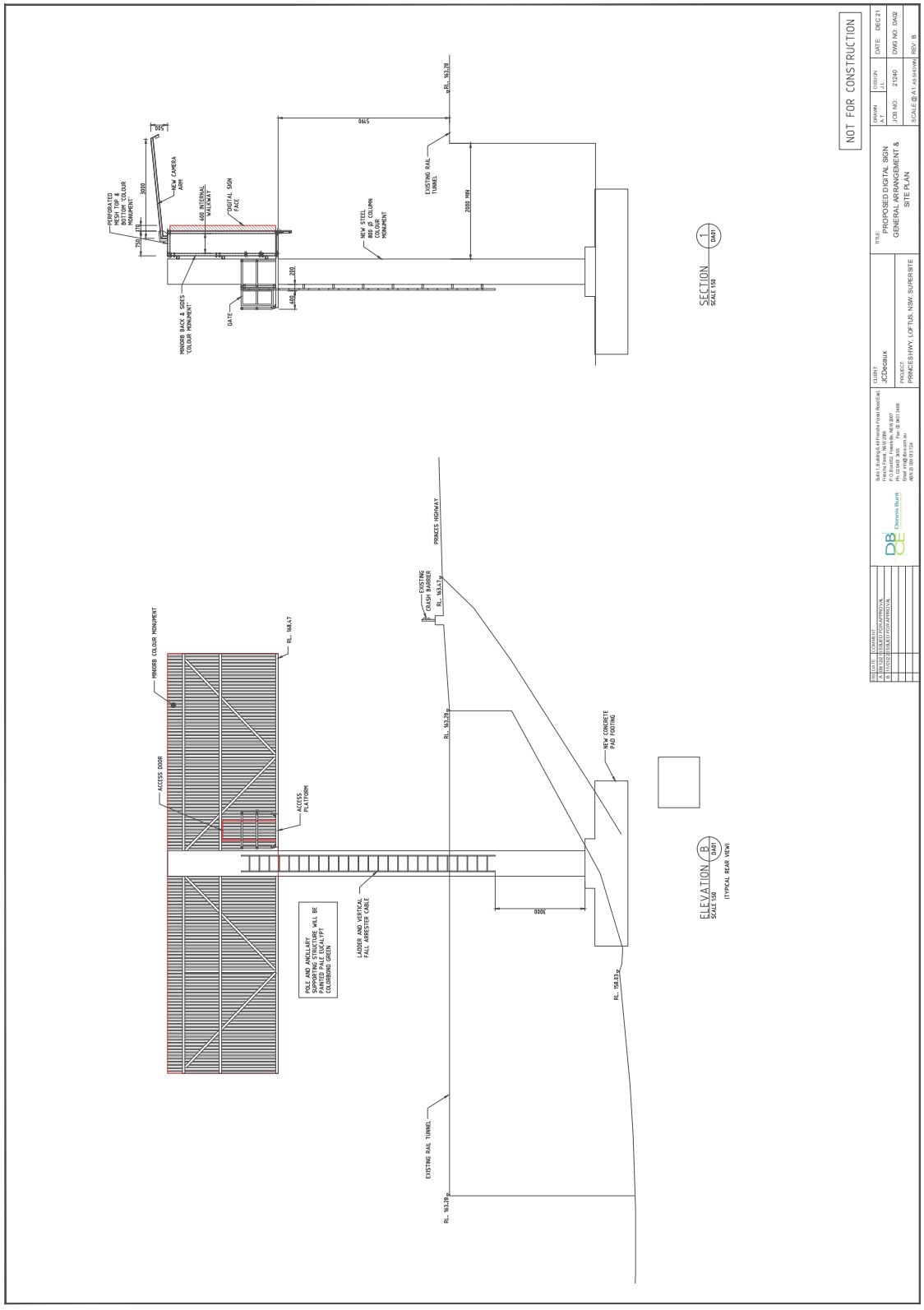
- State Environmental Planning Policy (Industry and Employment) 2021 (Refer Appendix C)
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017.
- AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.

Senior Lighting Designer
Electrolight Sydney
22/03/22

APPENDIX A
SIGNAGE LOCATION



APPENDIX A
SIGNAGE LOCATION



Big Screen Video

Display Specification.

Product Specifications - 10mm Supersite	
Active Screen Size (WxH)	12.48m x 3.2m
Active Screen Size (Sqm)	39.94sqm
Matrix Size (WxH)	1248 pixels x 320 pixels
Aspect Ratio	3.9:1
Display Weight	2316kg
Display Weight per Sqm	58kg/m2
Total Avg. Power Consumed	8.4kw
Total Max. Power Consumed	24kw
Max. Power Consumption per Sqm	600w/m^2
Current Draw	104 amps max load*
Mains Recommendation	Three-phase rated at 50 amps per phase

*Doesn't allow for in-rush current

Big Screen Video

Specs: Outdoor 10mm SMD

Product Specifications	
Catalogue no.	BSV-YATR-10
Physical Pitch	10mm, physical
Pixel Density	10,000 pixel/m2
Pixel Configuration	SMD LED
Module Dimensions (WxH)	320mm x 160mm
Module Resolution (WxH)	32 x 16 pixels
Cabinet Material	Steel
Viewing Angle	H 140 Deg. / V 140 Deg.
Best Viewing Distance	10+m
Maintenance	Rear access
Protection Degree	IP65 front; IP54 rear
Panel Net Weight	approx. 58kg/sqm
Gray Scale	16-bit Color Processing Depth

Product Specifications	
Refresh Rate	3840+ Hz
Display Control	Synchronous control
Power Supply	220V, 50Hz
Operation Temp.	-20° ~60°
Display Dimming	Auto/Manual, 8~256 Levels
Signal Transfer	Text, image, graphics animations, video
Power Consumption (Max./Avg.)	0.6kw/sqm; 0.2kw/sqm
MTBF	10,000hrs
Luminance	7000 nits
Lifetime (Normal Temp)	100,000Hrs

APPENDIX C

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 D
OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

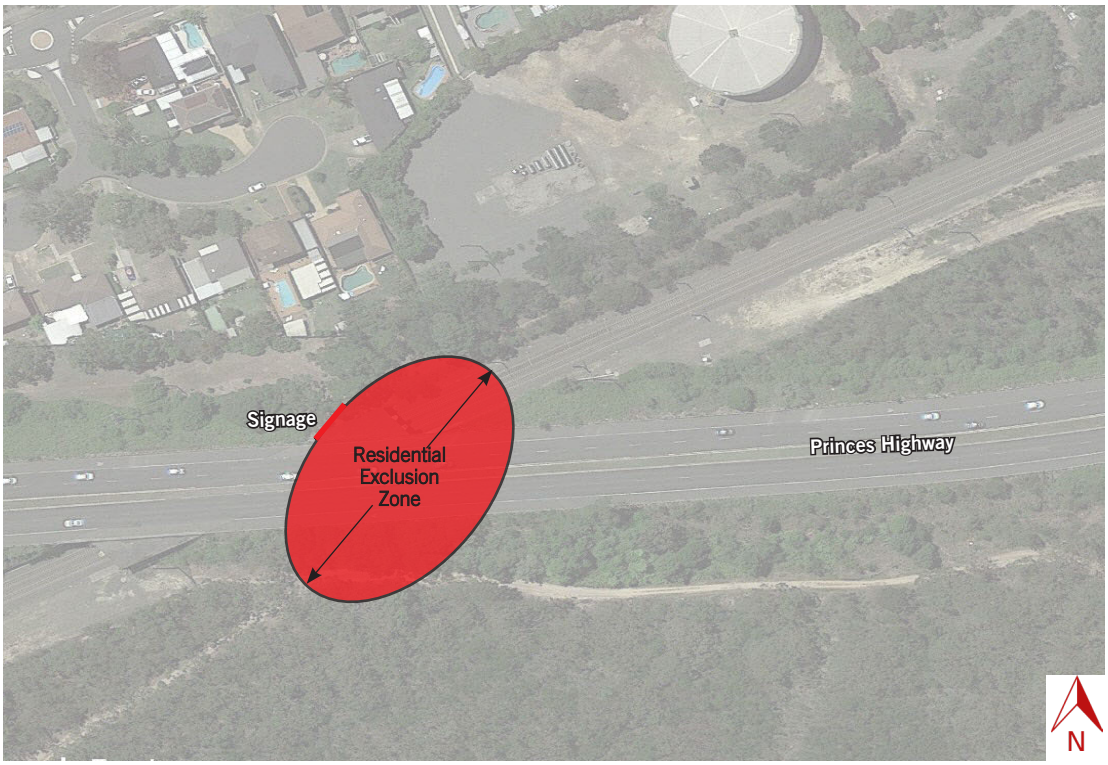


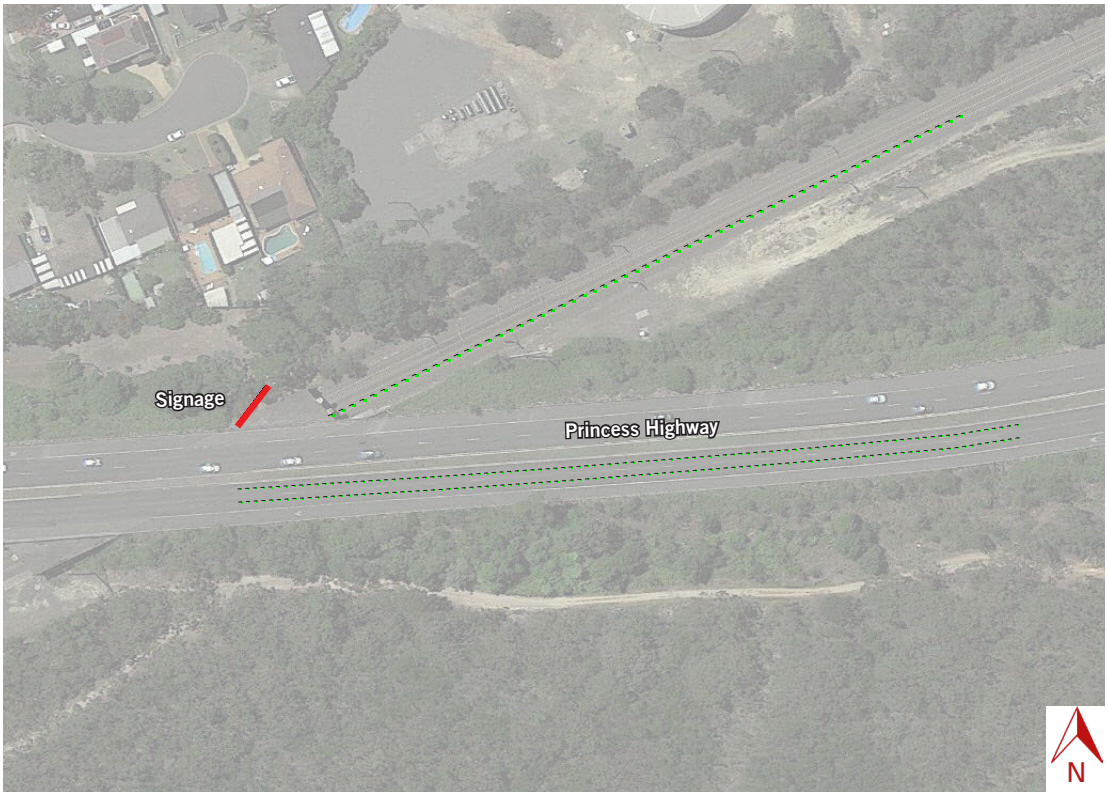
Image: Light Model - Plan showing residential exclusion zone.

"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 A2 (1 lux maximum).

APPENDIX D
OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Calculation Summary			
Label	CalcType	Units	Max
Princess Highway (outbound)	Obtrusive - TI	%	5.5
Trainline (southwest bound)	Obtrusive - TI	%	8.1



APPENDIX D
OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A2 - Low District Brightness, Curfew
Filename: 3023.15 Princess Highway Loftus
21/01/2022 3:16:54 PM

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (2):

Calculation Label	Adaptation Luminance	Test Results
Princess Highway (outbound)	0.2	**PASS**
Trainline (southwest bound)	0.2	**PASS**