

Mirvac Pty Ltd

LIGHTING IMPACT ASSESSMENT -
OUTDOOR SIGNAGE AT CORNWALLIS AND MARIAN STREET, SOUTH EVELEIGH, NSW

21st October 2020
Ref: 2619.3

Lighting Impact Assessment
Outdoor Signage at Cornwallis and Marian Street, South
Eveleigh, NSW

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1. INTRODUCTION

Electrolight have been appointed by Mirvac to undertake a Lighting Impact Assessment on the proposed entrance marker signage at Cornwallis and Marian Street, South Eveleigh, NSW. The objective of the assessment is to report on compliance with the State Environmental Planning Policy No. 64 – Advertising & Signage (SEPP 64), NSW Transport Corridor Outdoor Advertising and Signage Guidelines, AS4282-2019 Control of the Obtrusive Effects of Outdoor Lighting, and the Sydney Development Control Plan (Signs and Advertisements) 2012.

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 (E_h) The value of illuminance on a designated horizontal plane

(b) Vertical illuminance (E_v) 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 (E_{ve}).

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 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 luminous 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 entrance marker signage is located at the intersection of Cornwallis and Marian Street, Eveleigh. The signage consists of 3 different illuminated elements. The first element is a digital screen with a total active display of 1.23 m². The second element is an internally illuminated “South Eveleigh” sign with a total approximate illuminated area of 0.66m². The third element is a series of linear LEDs integrated within each internal face of the clad metal framing structure. The digital signage is to be operated from 6am to 11pm. The internally illuminated letters are to operate at the levels nominated in section 5 from night until 11pm and is dimmed to 50% of that level from 11pm to 12am. The linear LEDs are only to be operated at night time until 12pm. Refer Appendix A for proposed signage location plan and elevations.

The existing area has a medium level of illumination and associated pedestrian activity, with street lighting, illuminated signage and light from adjacent buildings and also Redfern Station contributing to the overall night time environment. Given the existing environment and the relatively small illuminated area of the signage, the impact on the environment should not be significant. A further detailed assessment of the lighting impact can be found in Sections 5 and 6 of this report.

The proposed digital screen 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. The specification of the digital screen is as outlined in Appendix B. The digital screen must include baffles which mitigate upward waste light, resulting in an Upward Light Ratio (ULR) of not more 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.

The internally illuminated “South Eveleigh” letters utilise white LEDs as the light source. The specification of the LED sources is not known, however, for the purpose of this report, the luminance of the signage is not to exceed the luminance values shown in this report. The light sources are to be dimmable to ensure compliance with this assessment.

The specification of the linear LEDs illuminating the internal faces of the frame structure is not known, however for the purpose of this report, the linear LED strip diffuser is not to exceed 300cd/m². The linear LEDs are to be dimmable to ensure compliance with this assessment.

4. DESIGN GUIDELINES AND STANDARDS

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

- State Environmental Planning Policy No. 64 – Advertising & Signage SEPP 64 (Refer Appendix C).
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017
- AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.
- Sydney Development Control Plan (Signs and Advertisements) 2012.

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 A4 under AS4282, therefore the maximum night time luminance is 350 cd/m2.

Luminance Assessment - Digital Screen

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 3, which is described as an area with medium off-street ambient lighting, e.g. some small to medium shopping/commercial centres. The maximum luminances for the various lighting conditions of the digital signage within Zone 3 is 6000 cd/m2 during daytime (typical sunny days), 700 cd/m2 during twilight and inclement weather, and 350 cd/m2 during night time.

The Sydney Development Control Plan (DCP) 2012 also outlines maximum permissible luminance limits for various lighting conditions. Under the DCP, the proposed digital screen is classified as being within a Business or Industrial Zone within 100m of accommodation land use. The maximum luminances for the various lighting conditions of the digital signage under the DCP is 6000 cd/m2 during daylight hours, 600 cd/m2 during twilight hours and inclement weather, and 200 cd/m2 during night time hours.

Table 2 outlines the maximum luminance levels to comply with AS4282, the Transport Corridor Outdoor Advertising & Signage Guidelines, and the Sydney DCP 2012 for the various lighting conditions listed below:

TABLE 2 - LUMINANCE LEVELS FOR DIGITAL SCREEN		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Day Time Luminance (typical sunny day)	6000	✓
Morning and Evening Twilight and Overcast Weather	600	✓
Night Time Pre-Curfew (Before 11pm)	200	✓
Night Time Post-Curfew (After 11pm)	N/A (OFF)	✓

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

Luminance Assessment - Internally Illuminated "South Eveleigh" Letters

The proposed internally illuminated signage is classified as being within Zone 3 under the The Transport Corridor Outdoor Advertising & Signage Guidelines. The night time luminance for internally illuminated signs within Zone 3, with an illuminated area between 5m2 and 10m2, is limited to 250 cd/m2.

The Sydney Development Control Plan (DCP) 2012 also outlines maximum permissible night time luminance limit for internally illuminated signs of 300 cd/m2.

Table 3 outlines the maximum luminance levels to comply with AS4282, the Transport Corridor Outdoor Advertising & Signage Guidelines, and the Sydney DCP 2012 for the lighting conditions listed below:

TABLE 3 - LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED LETTERS		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Day time	N/A (OFF)	✓
Night Time Pre-Curfew (Before 11pm)	200*	✓
Night Time Post-Curfew (11pm until Midnight)	100*	✓
Night Time Post-Curfew (Midnight until 6am)	N/A (OFF)	✓

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

* The maximum permissible luminance allowable under AS4282, Transport Corridor Outdoor Advertising & Signage Guidelines, and the Sydney Development Control Plan 2012 is actually 250 cd/m2. The luminance limit shown above was derived as a result of the calculation and assessment in Section 5 and 6, to ensure compliance with other criteria of AS4282 and any additional lighting requirements as described in this report.

Luminance Assessment - Linear LEDs inside clad metal framing structure

For the purpose of this assessment, the linear LEDs inside the metal framing structure are treated as internally illuminated signage. Under the Transport Corridor Outdoor Advertising & Signage guidelines, the night time luminance for internally illuminated signage within Zone 3, with an illuminated area between 0.5m2 and 2m2, is limited to 400 cd/m2.

The Sydney Development Control Plan (DCP) 2012 also outlines maximum permissible night time luminance limit for internally illuminated signs of 300 cd/m2.

Table 4 outlines the maximum luminance levels to comply with AS4282, the Transport Corridor Outdoor Advertising & Signage Guidelines, and the Sydney DCP 2012 for the lighting conditions listed below:

TABLE 4 - LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED LEDS		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Day time	N/A (OFF)	✓
Night Time Pre-Curfew (Before 11pm)	300	✓
Night Time Post-Curfew (11pm until Midnight)	300	✓
Night Time Post-Curfew (Midnight until 6am)	N/A (OFF)	✓

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

Summary

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 AND SYDNEY DEVELOPMENT CONTROL PLAN ASSESSMENT

The proposed signage has been assessed against AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting and the Sydney Development Control Plan (DCP) 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 it is intended that the signage be illuminated from 6am until midnight, the signage will be assessed against both the pre-curfew and post-curfew limits.

Illuminance Assessment (AS4282)

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 5 below:

TABLE 5 - 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

Based on an assessment of the surrounding areas, the nearest dwellings with potential views to the signage are at the following locations:

Address	Zone
32 Cornwallis Street	A4
1 Marian Street	A4

As such, the dwelling above will form the focus of the illuminance assessment.

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 proposed signage. Photometric data for the signage was based on a diffused light source (approximating a lambertian emitter) with luminances corresponding to the night time limits outlined in Section 5. Appendix D shows the lighting model and the results of the calculations.

It should be noted that some of the houses are shielded by mature vegetation which effectively obstructs the spill light of the signage. However calculations were undertaken assuming there was no vegetation present.

During night time operation, it can be seen from the lighting model that the maximum illuminance to dwellings in Zone A4 is 1.02 lux for pre-curfew operation at 1 Marian St and 0.03 lux for post-curfew operation at 1 Marian St. These illuminance levels comply with the maximum AS4282 limits of 25 lux for pre-curfew operation and 5 lux for post-curfew operation for Zone A4 as outlined in Table 5.

Illuminance Assessment - Digital Signage (Sydney DCP)

Table 3.9 of the Sydney DCP outlines maximum illuminance limits on windows on habitable rooms of accommodation uses in the vicinity of digital (electronic) signage. The maximum illuminance from the digital screen to windows of habitable rooms of accomodation uses is not to exceed 2 lux.

The proposed digital signage (and surrounding environment) was modelled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the proposed digital signage only (excluding the other illuminated elements). Photometric data for the screen was based on a diffused light source (approximating a lambertian emitter) with a 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 from the lighting model that the maximum illuminance to dwellings from the digital screen

only is 1.02 lux at 1 Marian Street. This illuminance level complies with the maximum Sydney Development Control Plan 2012 illuminance limit of 2 lux for digital (electronic) signage.

Threshold Increment Assessment

The Threshold Increment was also calculated for the traffic on Marian Street approaching Cornwallis Street, and the Railway approaches at Redfern Station. The calculation grids were located at 1.5m above ground level for general traffic approaches and at 2m for rail approaches, with a viewing distance of between 10 m to 200 m from the sign. The calculation results show that the Threshold Increment does not exceed 0.39% for pre-curfew operation and 0% for post-curfew operation for any traffic approach (the allowable maximum under the standard is 20%).

Luminous Intensity

The luminous intensity limits nominated in the AS4282 standard are not applicable for internally illuminated / digital signage.

Additional Requirements:

Where the signage content can change (for e.g. the digital screen), 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.

Summary:

It can therefore be seen that the signage complies with all relevant requirements of AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting and Sydney Development Control Plan (Signs and Advertisements) 2012.

7. SUMMARY

- The digital screen of the proposed signage at Cornwallis and Marian Street, South Eveleigh, shall be commissioned on site to yield the following maximum luminances

LUMINANCE LEVELS FOR DIGITAL SCREEN		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day Time Luminance (typical sunny day)	6000	✓
Morning and Evening Twilight and Overcast Weather	600	✓
Night Time Pre-Curfew (Before 11pm)	200	✓
Night Time Post-Curfew (After 11pm)	N/A (OFF)	✓

- Where the signage content can change, 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.
- The manufacturer is to ensure that the signage includes baffles or any other upward light mitigation technology to ensure compliance with AS4282.
- The internally illuminated "South Eveleigh" letters of the proposed signage shall be commissioned on site to yield the following maximum luminances:

LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED LETTERS		
Lighting Condition	Max Permissible Luminance (cd/m2)	Compliant
Day time	N/A (OFF)	✓
Night Time Pre-Curfew (Before 11pm)	200	✓
Night Time Post-Curfew (11pm until Midnight)	100	✓
Night Time Post-Curfew (Midnight until 6am)	N/A (OFF)	✓

- The Linear LEDs illuminating the Metal cladding of the proposed signage, shall be commissioned on site to yield the following maximum luminances:

TABLE 4 - LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED LEDS		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Day time	N/A (OFF)	✓
Night Time Pre-Curfew (Before 11pm)	300	✓
Night Time Post-Curfew (11pm until Midnight)	300	✓
Night Time Post-Curfew (Midnight until 6am)	N/A (OFF)	✓

- The proposed Entrance Marker signage has been found to comply with all relevant requirements of AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting and the Sydney Development Control Plan (Signs and Advertisements) 2012.
- In complying with the above requirements, the proposed Entrance Marker signage should not result in unacceptable glare nor should it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the proposed signage should not cause any reduction in visual amenity to nearby residences or accommodation.

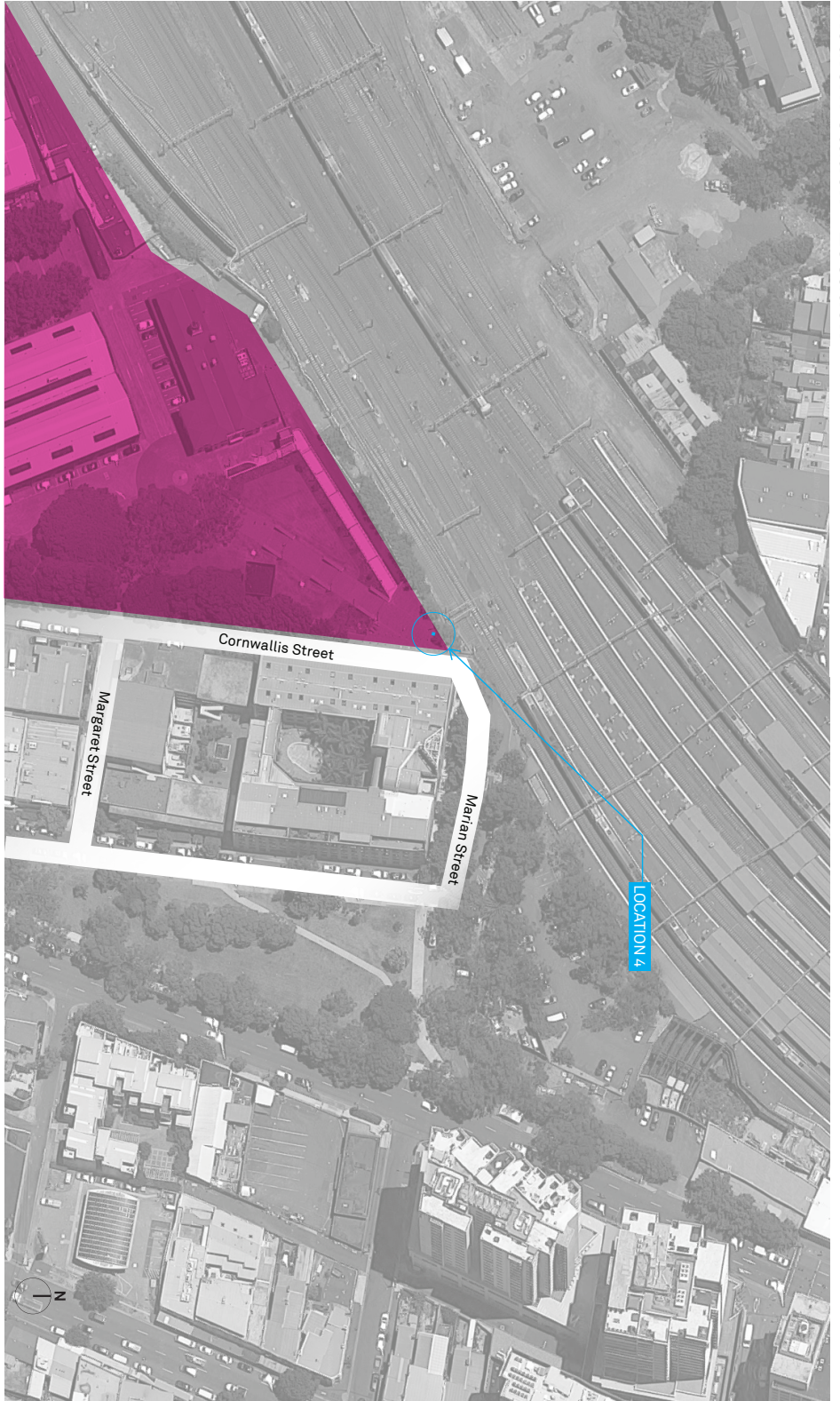
8. DESIGN CERTIFICATION

The Entrance Marker signage proposed to be installed at Cornwallis and Marian Street, South Eveleigh, NSW, if commissioned according to this report, complies with the following criteria, guidelines and standards:

- State Environmental Planning Policy No. 64 – Advertising & Signage SEPP 64 (Refer Appendix B).
- Transport Corridor Outdoor Advertising & Signage Guidelines 2017.
- AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.
- Sydney Development Control Plan (Signs and Advertisements) 2012.



Ryan Shamier
Senior Lighting Designer
Electrolight Sydney
21/10/2020



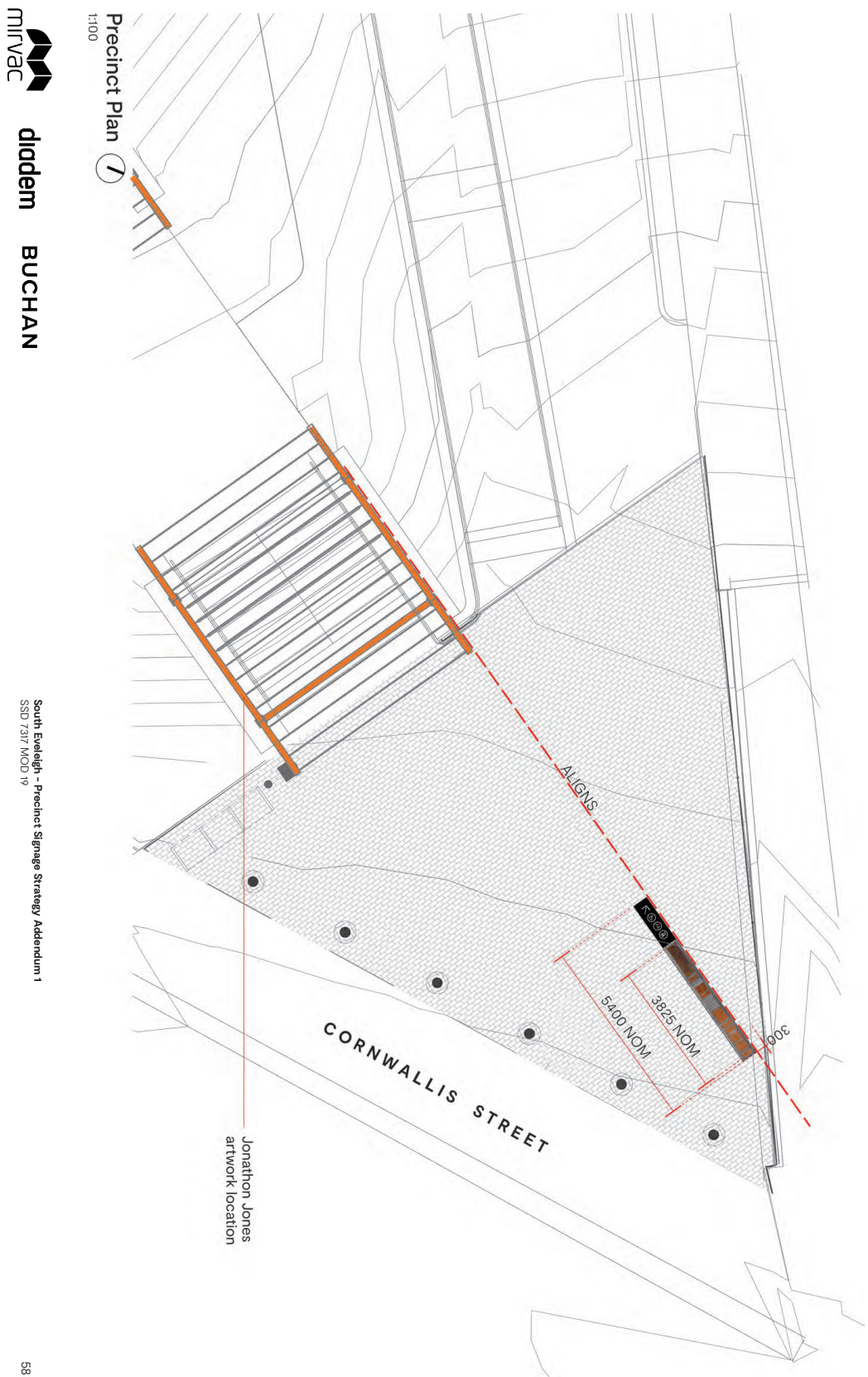
SIGN LOCATION 4 - REDFERN STATION
SCALE 1:1000



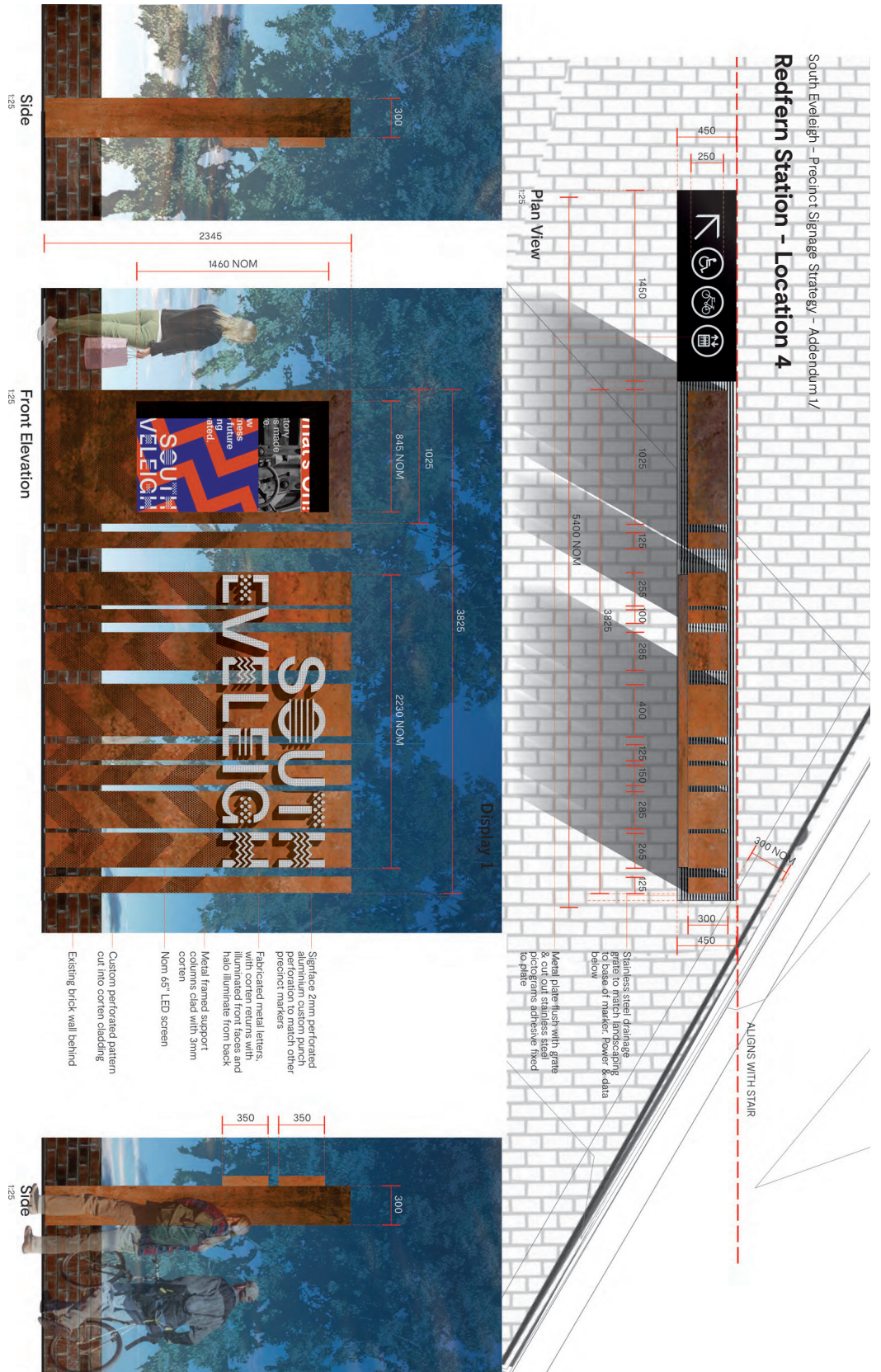
diadem **BUCHAN**

South Eveleigh - Precinct Signage Strategy Addendum 1
SSD 7317 MOD 19

APPENDIX A
SIGN LOCATION AND MOCKUP IMAGE



SIGN LOCATION AND MOCKUP IMAGE



APPENDIX B

DIGITAL SCREEN SPECIFICATION

Module Parameters									
									
Panel Type	4	mm							
Resolution	64	"		32	mm				
Panel Quality	2048								
Connector	284	mm	"	128	mm				
Panel Configuration	P040 1051L								
Control IC	M080024								
Display Mode	1/2.16mm								
Operating Voltage	Constant								
Weight	0.45mm								
Screen Parameters									
Panel Density	42000	dots/mm						3200	dpi
Display Type	44000	dots/mm						-20°C~40°C	
Operating Temperature									
Panel Type Configuration	44000	dots/mm						100% 4096x1024	
Colors Base	44000	dots/mm						4~36bit	
Colors Base	44000	dots/mm						30.150°/H, 150°/V	
Colors	44000	dots/mm						32bit	
Colors Depth	44000	dots/mm						16bit/10bit	
Panel Type	44000	dots/mm						1500cd/m	
Panel Frequency	60Hz							>40,000 hours	

APPENDIX C

State Environmental Planning Policy No. 64 - Advertising and Signage

Schedule 1 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

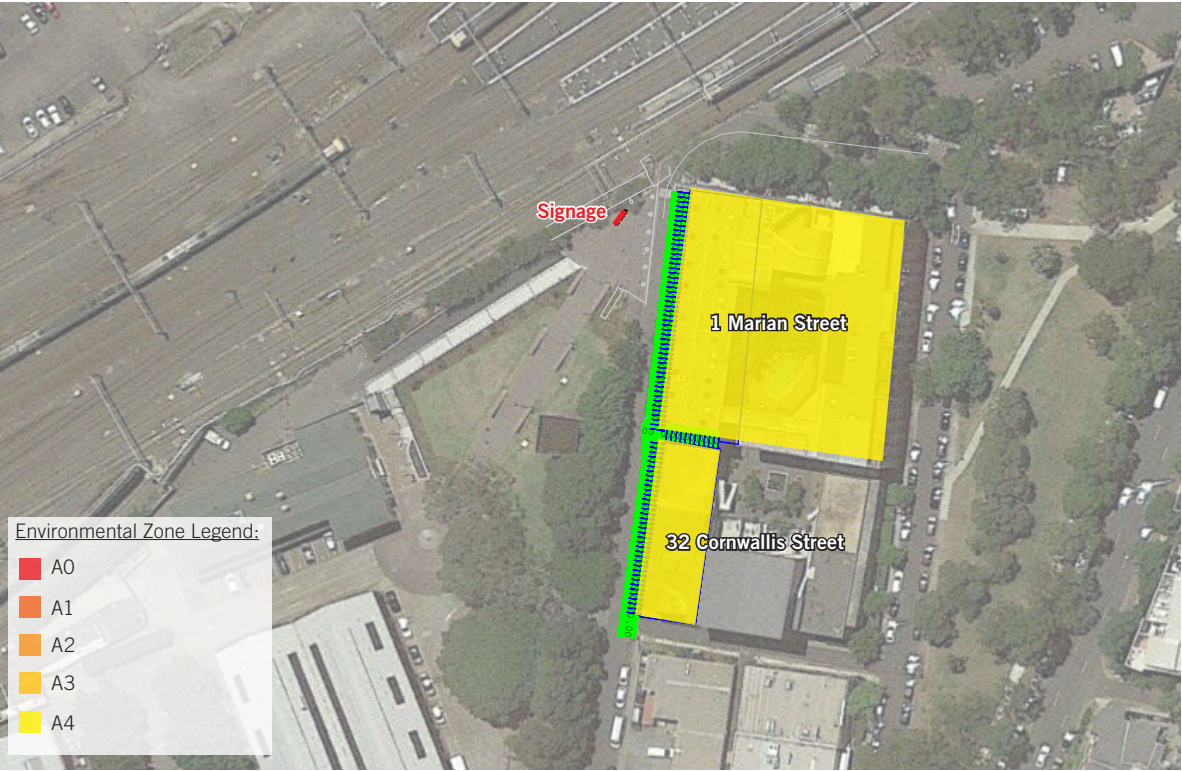
- Would the proposal reduce the safety for any public road?
- Would the proposal reduce the safety for pedestrians or bicyclists?
- Would the proposal reduce the safety for pedestrians, particularly children, by obscuring sightlines from public areas?

APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS

(PRE-CURFEW OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
1 Marian Street_Ill_Seg1	Obtrusive - Ill	Lux	1.02
32 Cornwallis Street_Ill_Seg1	Obtrusive - Ill	Lux	0.00
32 Cornwallis Street_Ill_Seg2	Obtrusive - Ill	Lux	0.00

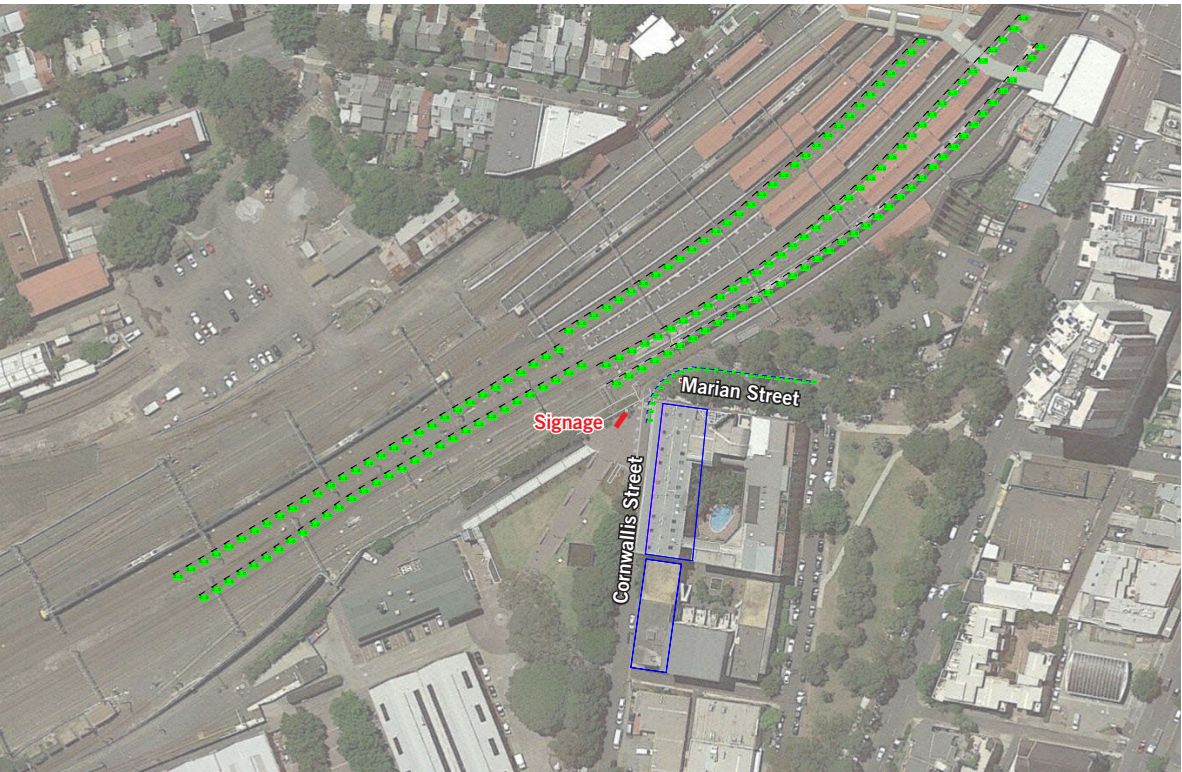


APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS

(PRE-CURFEW OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
Marian Street	Obtrusive - TI	%	0.39
Redfern Railway	Obtrusive - TI	%	0.0
Redfern Railway_1	Obtrusive - TI	%	0.0
Redfern Railway_2	Obtrusive - TI	%	0.0
Redfern Railway_3	Obtrusive - TI	%	0.0
Redfern Railway_4	Obtrusive - TI	%	0.0



- = Threshold Increment less than 20%

PASS

= Threshold Increment more than 20%

FAIL

APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS (PRE-CURFEW OPERATION)

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A4 - High District Brightness, Non-Curfew L1
Filename: 2619.3 Cornwallis and Marian Entrance Markers rev C_Precurfew
20/10/2020 6:49:17 PM

Illuminance

Maximum Allowable Value: 25 Lux

Calculations Tested (3):

Calculation Label	Test Results	Max. Illum.
1 Marian Street_Ill_Seg1	PASS	1.02
32 Cornwallis Street_Ill_Seg1	PASS	0.00
32 Cornwallis Street_Ill_Seg2	PASS	0.00

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (6):

Calculation Label	Adaptation Luminance	Test Results
Redfern Railway	5	PASS
Redfern Railway_1	5	PASS
Redfern Railway_2	5	PASS
Redfern Railway_3	5	PASS
Redfern Railway_4	5	PASS
Marian Street	5	PASS

APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS

(POST-CURFEW OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
1 Marian Street_Ill_Seg1	Obtrusive - Ill	Lux	0.03
32 Cornwallis Street_Ill_Seg1	Obtrusive - Ill	Lux	0.00
32 Cornwallis Street_Ill_Seg2	Obtrusive - Ill	Lux	0.00

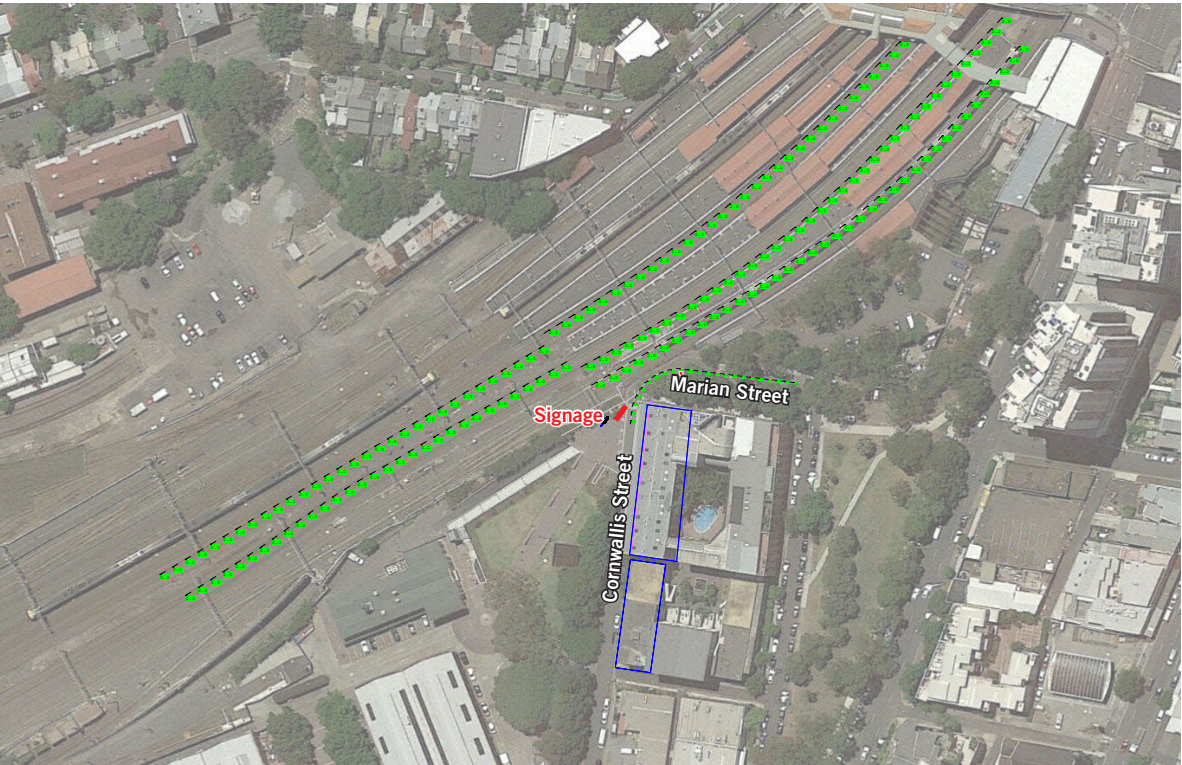


APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS

(POST-CURFEW OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
Marian Street	Obtrusive - TI	%	0.0
Redfern Railway	Obtrusive - TI	%	0.0
Redfern Railway_1	Obtrusive - TI	%	0.0
Redfern Railway_2	Obtrusive - TI	%	0.0
Redfern Railway_3	Obtrusive - TI	%	0.0
Redfern Railway_4	Obtrusive - TI	%	0.0



- = Threshold Increment less than 20%

PASS
- = Threshold Increment more than 20%

FAIL

APPENDIX D

THRESHOLD INCREMENT & OBTRUSIVE LIGHTING CALCULATIONS (POST-CURFEW OPERATION)

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A4 - High District Brightness, Curfew

Filename: 2619.3 Cornwallis and Marian Entrance Markers rev C_Postcurfew
20/10/2020 6:43:58 PM

Illuminance

Maximum Allowable Value: 5 Lux

Calculations Tested (3):

Calculation Label	Test Results	Max. Illum.
32 Cornwallis Street_Ill_Seg1	PASS	0.00
32 Cornwallis Street_Ill_Seg2	PASS	0.00
1 Marian Street_Ill_Seg1	PASS	0.03

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (6):

Calculation Label	Adaptation Luminance	Test Results
Marian Street	5	PASS
Redfern Railway	5	PASS
Redfern Railway_1	5	PASS
Redfern Railway_2	5	PASS
Redfern Railway_3	5	PASS
Redfern Railway_4	5	PASS