JCDecaux

LIGHTING IMPACT ASSESSMENT -

OUTDOOR SIGNAGE AT WESTERN DISTRIBUTOR, PYRMONT, NSW.

25th May 2022
Ref: 3023.26

Lighting Impact Assessment
Outdoor signage at Western Distributor, Pyrmont, NSW.

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
25/05/22	REV A	For Information	LC	RS

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1. INTRODUCTION

Electrolight have been appointed by JCDecaux to undertake a Lighting Impact Assessment on the proposed pylon digital signage at Lot 1012 DP870307, Pyrmont, 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, 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 (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 pylon digital signage is located at Lot 1012 DP870307, Pyrmont, NSW. The signage is oriented towards the northwest bound direction of traffic on the Western Distributor. The total active display (illuminated) area of the proposed digital signage is 39.94 m2. The digital signage is 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 includes 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
- 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 350cd/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 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 a digital signage within Zone 3 is 350cd/m2.

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 100 m of an accommodation land use. The maximun luminances of the various lighting conditions of the digital signage under the DCP are: 6000cd/m2 during daytime, 600cd/m2 twilight hours and inclement weather and 200cd/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 (luminance limits) 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	6000	✓
Day Time Luminance (typical sunny day)	6000	✓
Overcast Weather	600	✓
Twilight	600	✓
Night Time	200	✓

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

The digital signage has a maximum brightness (luminance) of 7000cd/m2. The screen shall be commissioned on site to yield a maximum screen luminance of 6000cd/m2 when full sun strikes the face of the sign, 6000cd/m2 during normal daytime operation, 600cd/m2 during inclement/overcast weather, 600cd/m2 during twilight and 200cd/m2 during night time. See Section 6 for further requirements imposed by the Sydney DCP 2012 and AS4282.

6. AS4282 ASSESSMENT 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 the signage operates all night, the signage will be assessed against the more stringent 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 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

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

Address	Zone
52 Bulwara Rd	A3
54 Bulwara Rd	A3
60 Bulwara Rd	A3
62 Bulwara Rd	A3

64 Bulwara Rd	A3
66-68 Bulwara Rd	A3
70 Bulwara Rd	A3
74 Bulwara Rd	A3
76 Bulwara Rd	A3
80 Bulwara Rd	A3
82 Bulwara Rd	A4

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

The proposed signage (and surrounding environment) was modeled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the proposed signage. Photometric data for the screen was provided by the screen manufacturer* with luminances corresponding to the night time limit outlined in Section 5. Appendix D shows the lighting model and the results of the calculations.

During night time operation, it can be seen from the lighting model that the maximum illuminance is 0.2 lux to dwellings within Zone A3 and 0.1 lux to dwelling within Zone A4 when the signage operates at 200cd/m2. The illuminance level complies with the maximum AS4282 limit of 5 lux for Zone A4 and 2 lux for Zone A3 as outlined in Table 3.

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

Illuminance Assessment (Sydney DCP)

Table 3.9 of the Sydney DCP outlines maximum illuminance limits on windows on habitable rooms of the accommodation uses in the vicinity of digital (electronic) signage. The maximum illuminance from the digital sign to windows of habitable rooms of an accommodation use is not to exceed 2 lux or not be greater than the illuminance from existing advertising structure (whichever is less). As there is no existing illuminated signage on the site, the maximum vertical illuminance to windows of habitable rooms is 2 lux.

It can be seen from the lighting model that the maximum illuminance to habitable windows from the proposed digital signage is 0.2 lux. This illuminance is less than the level 2 lux maximum outlined in Table 3.9 of the DCP.

Threshold Increment Assessment (AS4282)

The Threshold Increment was also calculated during night time operation for the traffic approaches on Western Distributor (westbound) and Light Rail (westbound). The calculation grids were located at 1.5m above ground level for general traffic approaches and 2.5m above ground level for the Light Rail approaches, with an approach viewing distance of between 10m to 200m from the sign, using an adaptation Luminance of 5 cd/m2 for night time. The calculation results show that the Threshold Increment does not exceed 0.48% for any traffic approach (the allowable maximum under the standard is 20%).

Threshold Increment Assessment (Sydney DCP)

The Threshold Increment was also calculated during twilight and night time operation for the traffic approaches on Western Distributor (westbound) and Light Rail (westbound). The calculation grids were located at 1.5m above ground level for general traffic approaches and 2.5m above ground level for the Light Rail approaches, with an approach viewing distance of between 10m to 200m from the sign. For calculation purposes, an adaptation luminance of 10cd/m2 was used for Twilight operation (in accordance with the DCP), however a lower adaptation luminance of 5cd/m2 was used for night time operation (rather than 10cd/m2 as outlined in the DCP) in line with the more conservative requirements

of the current revision of AS4282. The value of Threshold Increment that is calculated with an adaption luminance of 5cd/m2 will be higher than that calculated with an adaptation luminance of 10cd/m2. As such, if the calculated value of Threshold Increment limit complies with the 20% limit at 5cd/m2 adaptation luminance, it will also comply with the 20% limit with an adaption luminance of 10cd/m2. The calculation results show that for twilight operation the Threshold Increment does not exceed 1.18% for any traffic approach, and for night time operation the Threshold Increment does not exceed 0.48% for any traffic approach (the allowable maximum under the Sydney DCP is 20%).

Luminous Intensity (AS4282)

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

Additional Requirements (AS4282)

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 proposed digital 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 Advertisement) 2012.

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

7. SUMMARY

- The proposed pylon digital signage located at Lot 1012 DP870307, Pyrmont, NSW, shall be commissioned on site to yield the following maximum luminances:

LUMINANCE LEVELS FOR DIGITAL ADVERTISEMENTS		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Full Sun on face of Signage	6000	✓
Day Time Luminance (typical sunny day)	6000	✓
Overcast Weather	600	✓
Twilight	600	✓
Night Time	200	✓

- 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 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 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 proposed pylon digital signage located at Lot 1012 DP870307, Pyrmont, 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
- Sydney Development Control Plan (Signs and Advertisement) 2012

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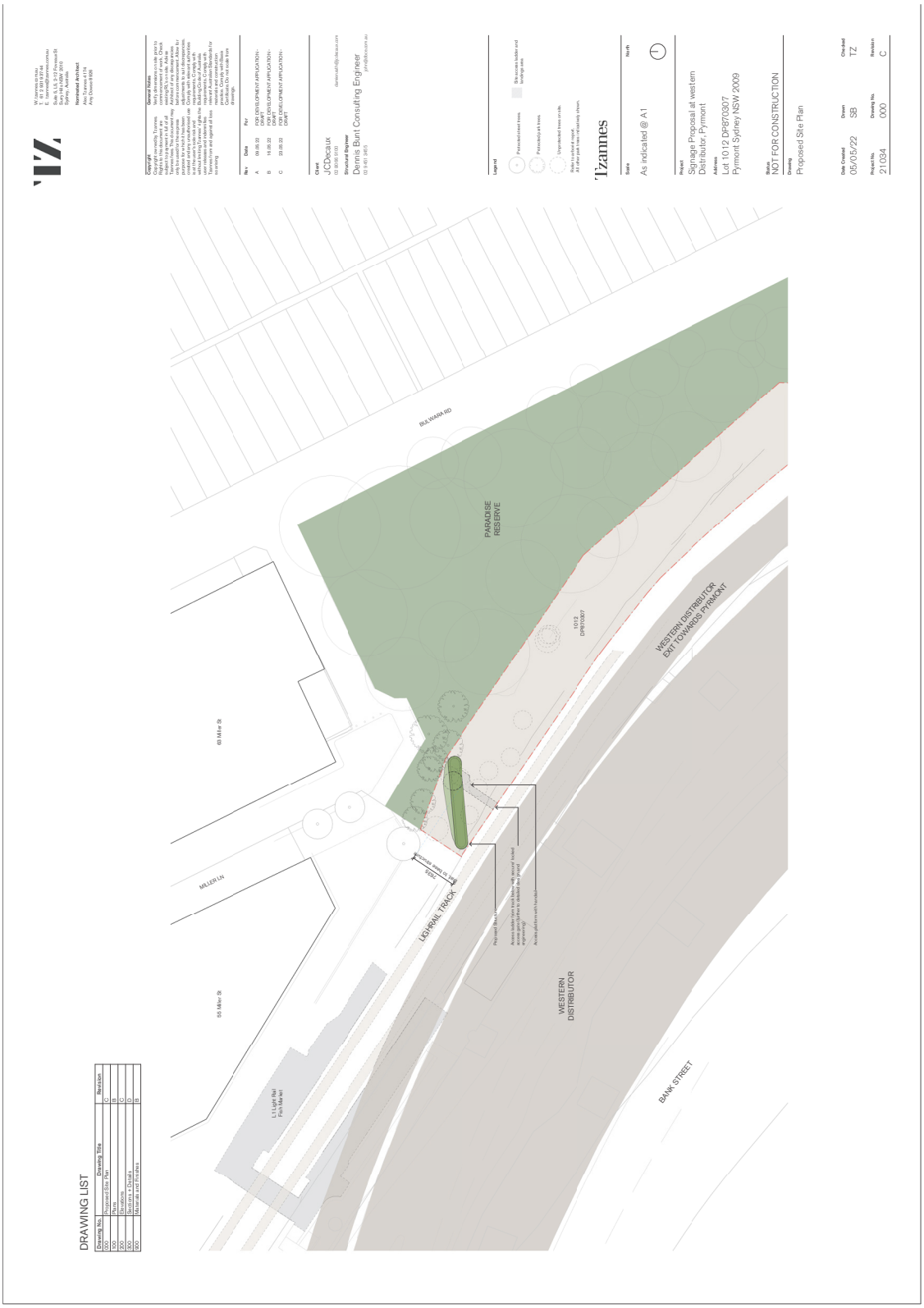
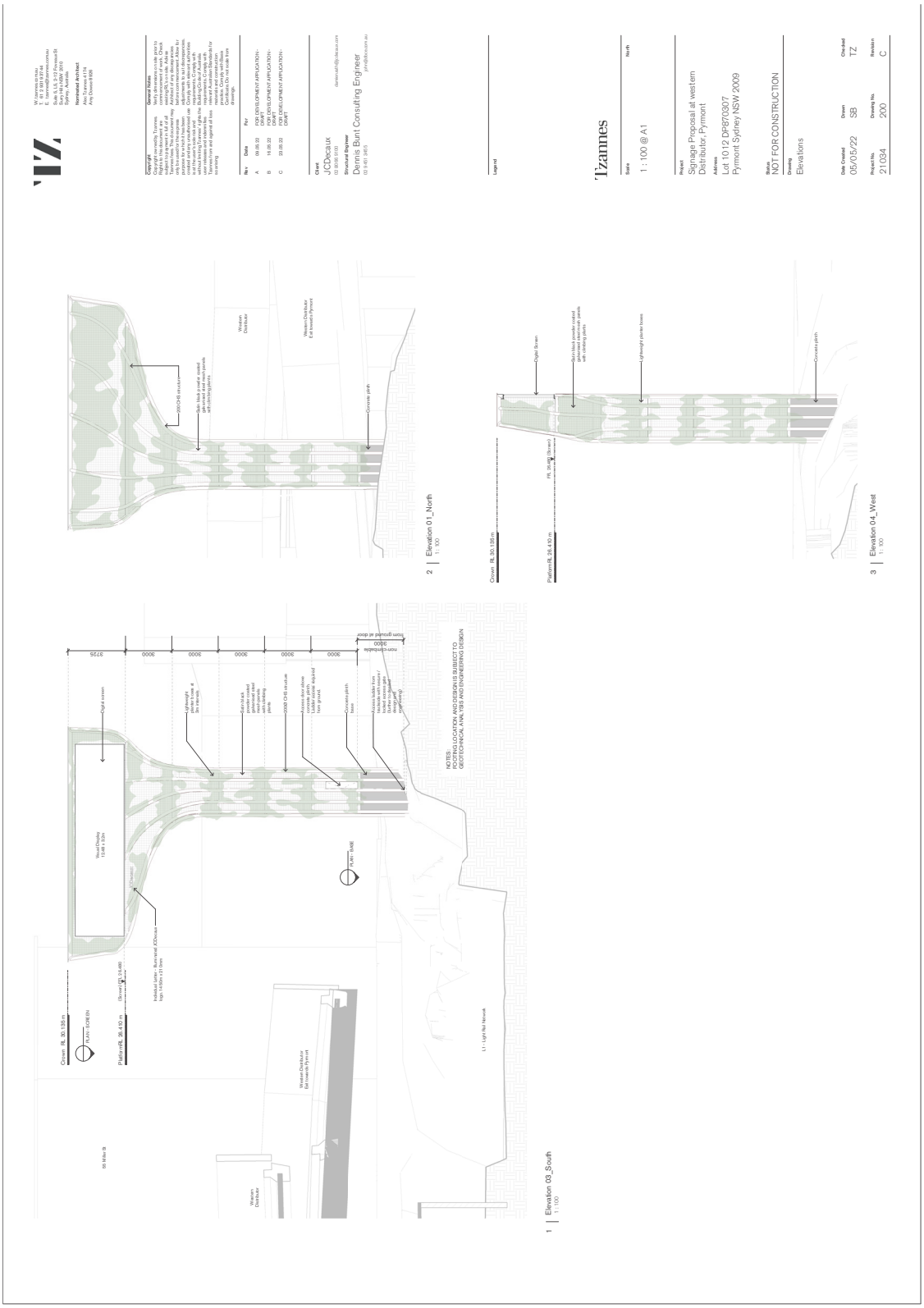
Electrolight Sydney
25/05/22

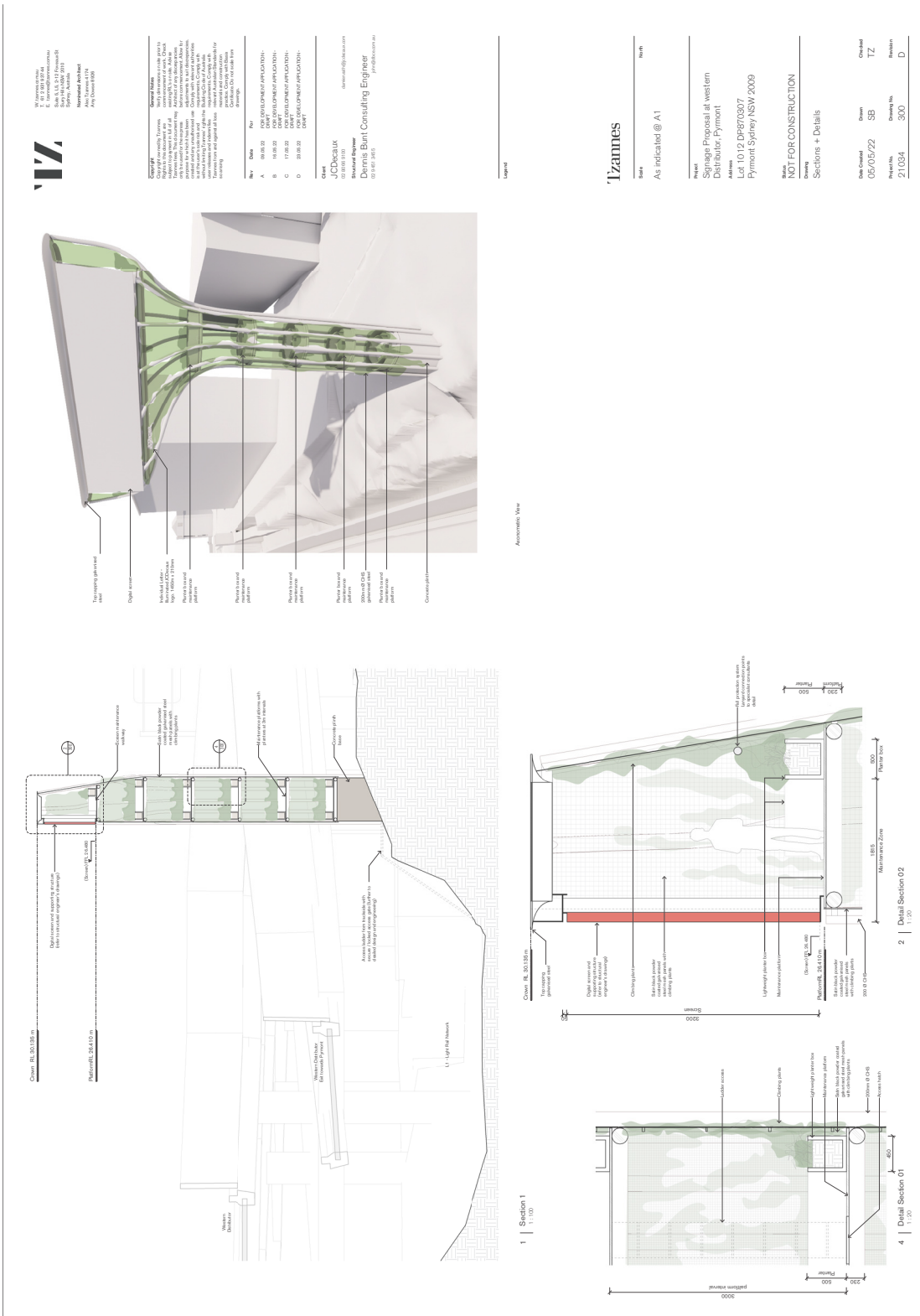
APPENDIX A
SIGNAGE LOCATION PLAN



APPENDIX A
SIGNAGE ELEVATION



APPENDIX A
SIGNAGE ELEVATION



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
THRESHOLD INCREMENT CALCULATIONS (TWILIGHT OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
Train rail Westbound	Obtrusive - TI	%	1.18
Western Distr Westbound_	Obtrusive - TI	%	0.67

APPENDIX D
THRESHOLD INCREMENT CALCULATIONS (NIGHT TIME OPERATION)

Calculation Summary			
Label	CalcType	Units	Max
Train rail Westbound	Obtrusive - TI	%	0.48
Western Distr Westbound_	Obtrusive - TI	%	0.03

APPENDIX D
OBTRUSIVE LIGHTING

Calculation Summary			
Label	CalcType	Units	Max
52 Bulwara Rd_3_Ill_Seg1	Obtrusive - Ill	Lux	0.0
54 Bulwara Rd_2_Ill_Seg1	Obtrusive - Ill	Lux	0.1
60 Bulwara Rd_1_Ill_Seg1	Obtrusive - Ill	Lux	0.1
62 Bulwara Rd_1_Ill_Seg1	Obtrusive - Ill	Lux	0.1
64 Bulwara Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.1
66-68 Bulwara Rd_5_Ill_Seg1	Obtrusive - Ill	Lux	0.2
70 Bulwara Rd_4_Ill_Seg1	Obtrusive - Ill	Lux	0.2
74 Bulwara Rd_2_Ill_Seg1	Obtrusive - Ill	Lux	0.1
76 Bulwara Rd_3_Ill_Seg1	Obtrusive - Ill	Lux	0.2
80 Bulwara Rd_1_Ill_Seg1	Obtrusive - Ill	Lux	0.2
82 Bulwara Rd_Ill_Seg1	Obtrusive - Ill	Lux	0.1

APPENDIX D

OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

NIGHT TIME

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Curfew
Filename: 3023.26_Nighttime Operation
25-May-22 2:59:28 PM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (11):

Calculation Label	Test Results	Max. Illum.
82 Bulwara Rd_Ill_Seg1	**PASS**	0.1
80 Bulwara Rd_1_Ill_Seg1	**PASS**	0.2
76 Bulwara Rd_3_Ill_Seg1	**PASS**	0.2
66-68 Bulwara Rd_5_Ill_Seg1	**PASS**	0.2
52 Bulwara Rd_3_Ill_Seg1	**PASS**	0.0
54 Bulwara Rd_2_Ill_Seg1	**PASS**	0.1
60 Bulwara Rd_1_Ill_Seg1	**PASS**	0.1
62 Bulwara Rd_1_Ill_Seg1	**PASS**	0.1
64 Bulwara Rd_Ill_Seg1	**PASS**	0.1
70 Bulwara Rd_4_Ill_Seg1	**PASS**	0.2
74 Bulwara Rd_2_Ill_Seg1	**PASS**	0.1

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (2):

Calculation Label	Adaptation Luminance	Test Results
Western Distr Westbound_	5	**PASS**
Train rail Westbound	5	**PASS**

TWILIGHT

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (2):

Calculation Label	Adaptation Luminance	Test Results
Western Distr Westbound_	10	**PASS**
Train rail Westbound	10	**PASS**