Outdoor Systems

LIGHTING IMPACT ASSESSMENT -

OUTDOOR SIGNAGE AT THE PEDESTRIAN BRIDGE OVER WENTWORTH AVE, PAGEWOOD, NSW

26th October 2023
Ref: 3048

Lighting Impact Assessment

Outdoor Signage at the Pedestrian Bridge over Wentworth Ave, Pagewood, NSW

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
26/10/23	REV C	For Information	DSM	RS

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1. INTRODUCTION

Electrolight have been appointed by Outdoor Systems to undertake a Lighting Impact Assessment to accompany a planning proposal to amend the Bayside Local Environmental Plan 2021 (BLEP 2021) to permit the continued use of the existing double sided digital signage ("Sign 1" & "Sign 2") installed at the Pedestrian Bridge over Wentworth Ave, Pagewood, NSW.

The existing digital advertising signs were approved in 2017 (DA05-123/02) by Bayside Council with concurrence provided by Roads and Maritime Services (RMS is now part of TfNSW). The signs were installed in July 2017. RMS's concurrence is for the sign to operate until 31st December 2025, however the Council DA approval for the sign is for the sign to operate until 29th November 2021.

Since the approval in 2017, Bayside Council have adopted the Bayside Local Environment Plan 2021 (BLEP 2021) and of particular note, it prohibits advertising signage land use within land zoned SP2 Infrastructure.

Council have advised Outdoor Systems that a planning proposal will be required to amend BLEP 2021 to add a Clause under Schedule 1 Additional Permitted Uses of the BLEP 2021, that will permit advertising signage.

The purpose of this report is to provide the details of the Lighting Impact assessment that has been undertaken for the existing digital signs, with reference to criteria specified in 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 CASA Manual of Standards Part 139 (Aerodromes) - Section 9.143 and 9.144.

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.

2.8 Flashing Light

A rhythmic light in which every appearance of light (flash) is of the same duration and, except possibly for rhythms with rapid rates of flashing, the total duration of light in a period is clearly shorter than the total duration of darkness (source: International Commission on Illumination CIE).

3. SITE DESCRIPTION AND SCOPE

The existing double sided digital signage (Sign 1 & Sign 2) is located on the north and south faces of the pedestrian bridge (for the Golf Coarse) over Wentworth Ave, Pagewood, NSW. Sign 1 is oriented towards the northbound direction of Wentworth Ave traffic, and Sign 2 is oriented towards the southbound direction of Wentworth Ave traffic. The total active display (illuminated) area of each sign is 42m2. The existing digital signage operates 24 hours a day. Refer Appendix A for the signage location plan and elevations.

The existing digital signage is illuminated using LEDs installed within the front face. The brightness of the LEDs is 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 manufacturer of the digital signage is noted as Prismaflex model type P10 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%.

4. DESIGN GUIDELINES AND STANDARDS

The Lighting Impact Assessment will review the 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.
- CASA Manual of Standards Part 139 (Aerodromes) - Section 9.143 and 9.144 (Refer Appendix F).

5. LUMINANCE ASSESSMENT

AS4282 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 existing signage (Sign 1 & Sign 2) is located within Environmental Zone A3 under AS4282, therefore the maximum night time luminance is 250 cd/m2.

Transport Corridor Assessment

The Transport Corridor Outdoor Advertising & Signage Guidelines outlines lighting requirements for illuminated advertising signage along or adjacent to classified transport corridors. 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 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 images displayed on the signage will not contain flickering or flashing content and the luminance of the signage complies with the Threshold Increment limits of AS4282 (refer Section 6), meaning it will not “dazzle” drivers with unacceptable glare.

* There is no requirement in the Guidelines and Standards listed to assess and/or compare the lighting impact of the proposed signage luminance outlined in this report against the existing signage luminance. Conformance of the proposed signage luminance to the criteria outlined in the Guidelines and Standards is sufficient to demonstrate that there are no unacceptable amenity or safety impacts.

LUMINANCE LIMITS - SUMMARY

Table 2 outlines the maximum luminance levels for signage 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	700	✓
Night time	250	✓

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.

CASA Part 139 MOS Assessment

The digital signage consists of red green and blue LED light sources and is able to display content of various colours. The signage displays a static image for a period of 10 seconds (known as dwell time). The transition between images is less than 0.1 seconds. The dwell time is a significant period (in order for the viewer to comprehend the images shown), meaning the changes in colour from the variable content of the signage are not described as being rapid. As the total duration that the content is displayed is significantly longer than the total time of darkness during the transition time, the signage is not defined as being a flashing light source (refer "Flashing Light" definition in Section 2). However as the signage displays multiple light colours emitting from a single source, the operator must notify CASA in writing of any proposals to use any lighting installation within the aerodrome boundary - refer Section 5 of Section 9.143 and 9.144. This assessment forms part of the notification by the operator for the intent to extend the operation of the existing signage within the Aerodrome.

In addition to the above requirements, the CASA Manual of Standards Part 139 (Aerodromes) Manual of Standards 2019 - Section 9.144 has maximum light intensity limits spanning across four different Zones (A,B,C & D) which are determined by proximity to the runway and its approaches.

Zone	Max Intensity at 3 degrees above horizontal
Zone A	0 cd
Zone B	50 cd
Zone C	150 cd
Zone D	450 cd

The digital signage location was assessed against the three runways at Sydney Airport (16R/34L, 16L/34R and 07/26) to determine the applicable Zone limits (refer Appendix F). It can be seen that Runway 16R/34L has no Zone limits, Runway 16L/34R has no limits and Runway 07/26 is in Zone C. The signage must therefore comply with the Zone C limits, with a maximum intensity of 150 cd above 3 degrees.

Based on the luminance limit of 250 cd/m2 for the signage and using conservative photometric data from a signage manufacturer with similar performance characteristics, the estimated maximum intensity is 25 cd at 3 degrees which is below the Zone C limits as outlined by CASA Manual of Standards. Therefore an average luminance of 250 cd/m2 for the signage will comply with a maximum intensity of 150 cd above 3 degrees.

6. AS4282 ASSESSMENT

The existing signage (Sign 1 & Sign 2) 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 it is intended that the digital signage be illuminated all night, the assessment will review the proposed signage under 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

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

Address	Zone
156 Bay St	A3
158 Bay St	A3
160 Bay St	A3
162 Bay St	A3

Address	Zone
164 Bay St	A3
166 Bay St	A3
168 Bay St	A3
170 Bay St	A3

NOTE: Refer to Appendix D for details of calculation grid locations

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

The proposed signage (Sign 1 & Sign 2) and surrounding environment was modeled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the signage. Photometric data was based on a digital sign of similar performance characteristics with luminances 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 vertical illuminance to dwellings in Zone A3 is 0.1 lux at 162 Bay St, 164 Bay St, 166 Bay St, 168 Bay St and 170 Bay St. The illuminance level above complies with the maximum AS4282 limits outlined in Table 3.

Threshold Increment Assessment

The Threshold Increment was also calculated for the traffic approaches on Wentworth Ave (northbound) and Wentworth Ave (southbound). The calculation grids were located at 1.5m above ground level, with an approach viewing distance of between 5m to 200m from the sign. The calculation results show that the Threshold Increment does not exceed 13.02% for any traffic approach (the allowable maximum under the standard is 20%).

Luminous Intensity

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

Additional 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.

Summary

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

7. SEPP ASSESSMENT

Table 4 below outlines the illumination assessment criteria from the State Environmental Planning Policy (Industry and Employment) 2021 Schedule 5 - Clause 7 Illumination. In addition to the criteria, responses have been included demonstrating that the signage is in compliance.

TABLE 4
7. ILLUMINATION ASSESSMENT CRITERIA

Assessment Criteria	Response	Compliant?
Would illumination result in unacceptable glare?	The signage complies with the Threshold Increment limits of AS4282:2019, demonstrating that the illumination will not cause unacceptable glare.	✓
Would illumination affect safety for pedestrians, vehicles or aircraft?	The signage complies with the Threshold Increment limits of AS4282:2019, demonstrating that the illumination will not cause unacceptable glare to vehicles or pedestrians. The signage also complies with the relevant CASA MOS 139 Requirements for aircraft. As a result the signage will not affect the safety of pedestrians, vehicles or aircraft.	✓
Would illumination detract from the amenity of any residence or other form of accommodation?	The signage, when installed according to this report, complies with the illuminance (spill lighting) limits of AS4282:2019, 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 signage is dimmable and when designed according to this report, includes a light sensor to the signage that automatically adjusts the brightness of the advertising display to prevailing light conditions. The signage can also be controlled by a timer.	✓
Is the illumination subject to a curfew?	The signage, when operated 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 double sided signage (Sign 1 & Sign 2) installed at the Pedestrian Bridge over Wentworth Ave, Pagewood, 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	No Limit	✓
Day Time Luminance (typical sunny day)	6000	✓
Morning and Evening Twilight and Overcast Weather	700	✓
Night Time	250	✓

- 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 existing double sided signage (Sign 1 & Sign 2) has been found to comply with all relevant requirements of AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting
- The existing double sided signage (Sign 1 & Sign 2) digital signage complies with CASA Manual of Standards Part 139 - Aerodromes - Section 9.21
- In complying with the above requirements, the existing double sided signage (Sign 1 & Sign 2) shall not result in unacceptable glare nor should it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the signage shall not cause any unacceptable amenity impacts to nearby residences or accommodation

9. DESIGN CERTIFICATION

The existing double sided signage (Sign 1 & Sign 2) installed at the pedestrian bridge over Wentworth Ave, Pagewood, 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.
- CASA Manual of Standards Part 139 (Aerodromes) - Section 9.143 and 9.144 (Refer Appendix F).

Ryan Shamier MIES

M.Des.Sc(Illumination) B.Eng (Elec)

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Registered Professional Engineer - New South Wales (PRE0000868)

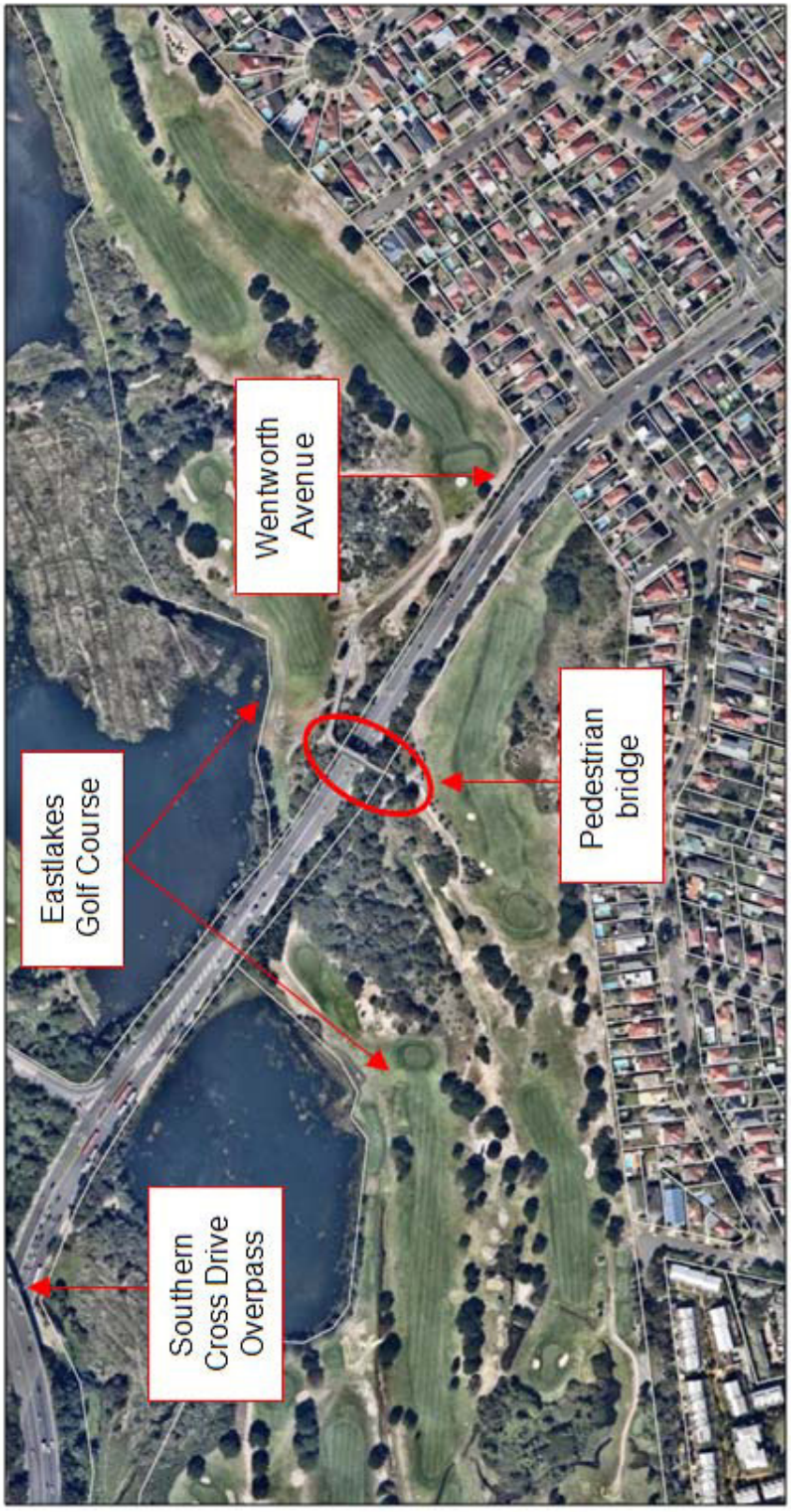
Senior Lighting Designer

Electrolight Sydney

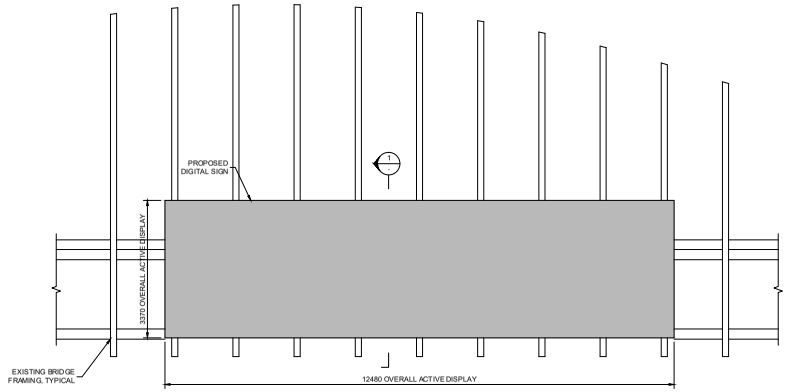
26/10/23

APPENDIX A

SIGNAGE LOCATION PLAN

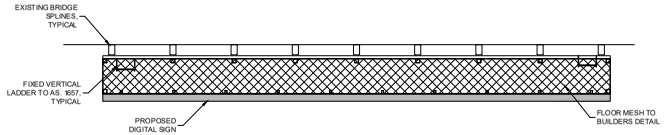


APPENDIX A
SIGNAGE LOCATION PLAN

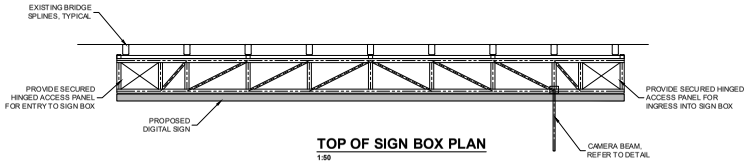


FRONT ELEVATION
1:50

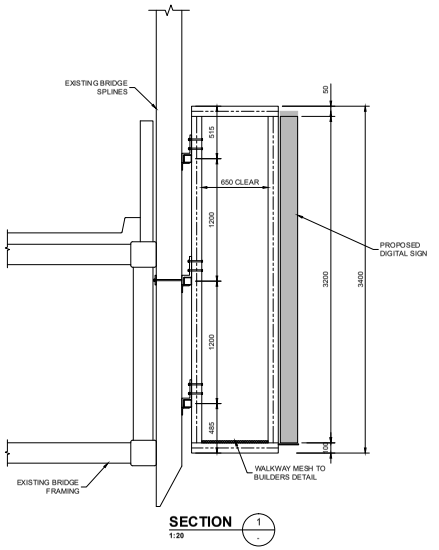
NOTE:
MAXIMUM WEIGHT OF SCREENS TO BE NO GREATER THAN 60kg/m^2. COMBINED WEIGHT OF DIGITAL SCREEN & SIGN BOX TO BE NO GREATER THAN 4.0 TONNES.



SIGN BOX FLOOR PLAN
1:50



TOP OF SIGN BOX PLAN
1:50



SECTION
1:20

GENERAL

G1 These drawings shall be read in conjunction with all architectural and other consultants drawings and specifications and with such other written instructions and sketches as may be issued during the course of the Contract. Any discrepancies shall be referred to the Superintendent before proceeding with any related works. Construction from these drawings, and their associated consultants drawings is not to commence until approved by the Local Authorities.

G2 All materials and workmanship shall be in accordance with the relevant and current Standards Australia codes and with the By-Laws and Ordinances of the relevant building authorities except where varied by the project specification.

G3 All set out dimensions shall be obtained from Architect's and Engineer's details. All discrepancies shall be referred to the Architect and Engineer for decision before proceeding with related work.

G4 During construction the structure shall be maintained in a stable condition and no part shall be overstressed. Temporary bracing shall be provided by the builder/subcontractor to keep the works and excavations stable at all times.

G5 Unless noted these level levels are in metres and dimensions are in millimetres.

G6 During Construction a minimum of one (1) floor shall remain fully backpropped at all times. At no time shall concrete be poured unless the floor below is fully backpropped.

G7 Any substitution of materials shall be approved by the Engineer and included in any tender.

G8 The structural components detailed on these drawings have been designed in accordance with the relevant Standards Australia codes and Local Government Ordinances for the following loadings. Refer to the Architectural drawings for proposed floor usage. Refer to drawings for live loads and superimposed dead loads.

DESIGN CRITERIA

Site wind classification : REGION A2
TERRAIN CATEGORY 2.5

Earthquake design category: BEDC2

SURFACE TREATMENT NOTES

ST1 All steelwork as indicated by this drawing is to be primed in Dulux Luxaprime Zinc Phosphate and finished with Dulux Luxol 4 Q.D Gloss Enamel

Preparation
All steel surfaces shall be abrasive blast cleaned in accordance with AS1627 Part 4 to a standard not less than equal to Class 2.5. All dust shall be removed before application of coating and particular attention paid to corners, angles, crevices around bolts and similar difficult areas.

Prime Coat
The coating material shall be a one pack self curing, inorganic zinc phosphate material which when applied to a surface shall be a minimum of 75 microns thick.
Colour light grey - Dulux - Luxaprime Zinc Phosphate

The coating shall be applied to the surface as not more than 4 hours after surface preparation.

Application finishing and curing shall be by the appropriate methods specified by the manufacturer.

Top Coat
Top coat to be Dulux Luxol 4 Q.D Gloss Enamel - Finished colour - White - 40 Microns

Application finishing and curing shall be by the appropriate methods specified by the manufacturer.

STRUCTURAL STEEL

SS1 All workmanship and materials shall be in accordance with AS 4100 except where varied by the contract documents.

SS2 Unless noted otherwise, all steel shall be in accordance with AS 3678 Grade 250 or AS 3679 Grade 300, or AS 1163 Grade 350 as appropriate.

SS3 Three (3) copies or 1 transparency of workshop drawings shall be submitted to the Engineer for review at least 7 days prior to commencement of fabrication. Fabrication shall not commence without Engineers approval of workshop drawings. All dimensions and setouts to be obtained from the Architects drawings where not indicated on the Structural drawings.

SS4 The bolting procedure is designated as follows: 4.6/S Commercial bolts of grade 4.6 to AS 1111 - snug tightened 8.8/S High strength bolts of grade 8.8 to AS 1252 - snug tightened 8.8/TB High strength bolts of grade 8.8 to AS 1252 fully tensioned to AS 4100 as a friction type joint 8.8/TF High strength bolts of grade 8.8 to AS 1252 fully tensioned to AS 4100 as a friction type joint with faying surfaces left uncoated.

SS5 Unless noted otherwise all fillet welds shall be 6 mm continuous category SP using E48XX electrodes. All butt welds shall be complete penetration butt welds SP1 to AS 1554.1. All gusset plates shall be 12 mm thick, all bolts shall be M20 8.8/S in 22mm diameter holes, minimum 2 bolts to each connection. All washers and bolts shall be galvanised.

SS6 Fabrication shall comply with AS 4100 - Section 14. Erection shall comply with AS 4100 - Section 15. /TB and /TF bolts to be installed in accordance with AS 4100 - Section 15, using either the part-turn method or the direct-tension indicator method.

SS7 Where connection forces (in Kilonewtons) are shown on the drawings, connections shall be provided to transmit these forces. Connections shall provide for a minimum force of 25 kN.

SS8 Steelwork intending to be concrete encased shall be unpainted. Encasing concrete to be grade N25 providing cover adequate to suit the rating or exposure conditions. Concrete encasement shall be centrally reinforced with 5mm wire to AS 1303 or 6mm structural grade bars to AS 1302 at 150 mm pitch.

SS9 All steelwork below ground shall be encased by 75mm of concrete, steel wrapped with PGW81 placed 2 5mm clear of steel. Provide 50mm minimum encasing.

SS10 Steelwork not to be concrete encased shall be given one shop coat of an approved primer unless noted otherwise. Faces of friction grip connections shall not be painted. Refer to architectural specifications for coatings schedule.

SS11 The builder shall provide all cleats and drill all holes necessary for fixing steel to steel and timber and other elements to steel whether or not detailed on the drawings.

SS12 Unless noted otherwise camber shall be provided to all roof beams, trusses, portals etc. At 5mm per 2000mm of span. No member shall be erected with negative camber.

SS13 Provide seat plates to the plates to the ends of all hollow sections, with "breather" holes if members to be hot dip galvanised.

SS14 All steelwork shall be securely temporarily braced by the erector as necessary to stabilise the structure during erection. Design of all temporary bracing is the responsibility of the erector. Specific design details are to be forwarded onto the project engineer upon request.

SS15 All bolts shall be of such length that at least one full thread is exposed beyond the nut after the nut has been tightened.

SS16 Minimum one washer shall be used under the nut in all situations. If tightening is carried out at the head, and additional washer is to be used under the head. For slotted holes use hardened washer under the nut and bolt head.

SS17 Unless noted otherwise all material to be: Grade 250 Hot Rolled Plates, Flats, Angles (100 x 100 or 125 x 75 and smaller) Grade 300 All WB's and WCs Grade 300 PluAll UB's, UC's, PFCs and larger angles. Grade 350 All RHS's, and CHS's

SS18 All galvanising of structural steelwork to AS 1650. The continuous average zinc coating mass to be 600 g/m2 (550 g/m2 minimum)

SS19 The fabrication and erection of the structural steel work shall be supervised by a qualified engineer, experienced in such supervision, to ensure that all requirements of the design are met.

SS20 Surface finishes for all structural steelwork to be in accordance with the Architectural specification.

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE

REV	DATE	DESCRIPTION	BY
b	05.09.16	RE-ISSUED FOR APPROVAL	F.I.
A	12.08.16	ISSUED FOR APPROVAL	F.I.

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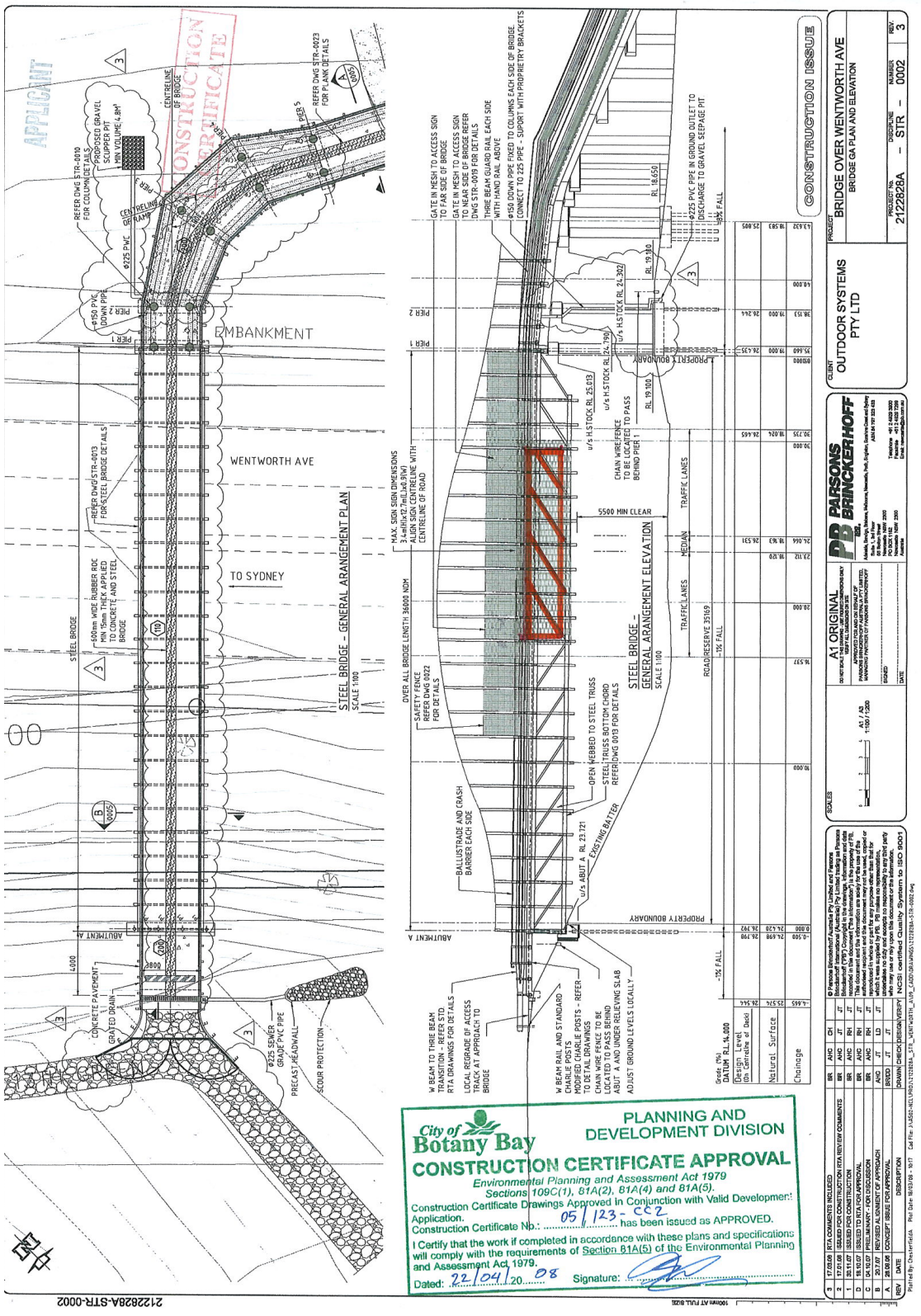
BAULKHAM HILLS NSW 2153

PROPOSED SIGNAGE
AT EASTLAKE GOLF CLUB -
BRIDGE OVER WENTWORTH AVENUE
FOR OUTDOOR SYSTEMS

GENERAL ARRANGEMENT PLAN

JOB NUMBER:	DWG NUMBER:	ORIGINAL SIZE:
16518	S01.01	A1
DESIGNED BY: T.I.	DATE: AUGUST 2016	
DRAWN BY: F.I.	SCALE: 1:50, 1:20 U.N.O.	

APPENDIX A
SIGNAGE LOCATION PLAN



APPENDIX B

DIGITAL SIGNAGE SPECIFICATION

- Led features P10 SMD CREE lamps (BBM range) :

Pitch (mm)	10mm
LED supplier /Type/Code	**Cree3435**
LED technology	SMD
LED configuration	3 in 1 SMD
Pixel density / sqm	10 000
Colours	280 trillion
Total number of pixels	396 800
Contrast	6000:1
Ave Consumption over 24 hours ave content/sqm	194
Max Power consumption full white @ 6000cd (W/sqm)	645
Max Power consumption ave content @ 6000cd (W/sqm)	296
Lifespan, 50% brightness at end	100 000 hours
Viewing angle horizontal	140°
Viewing angle vertical	140°
Luminosity	Double Light sensor included
Connectivity	LAN or 3G Cellular Router
Outdoor	IP 67 front, IP 67 back
Control system	BBM

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 CALCULATIONS

Calculation Summary			
Project: Obtrusive			
Label	CalcType	Units	Max
156 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.0
156 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
158 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.0
158 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
160 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.0
160 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
162 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.1
162 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
164 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.1
164 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
166 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.1
166 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
168 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.1
168 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0
170 Bay St_Ill_Seg1	Obtrusive - Ill	Lux	0.1
170 Bay St_Ill_Seg2	Obtrusive - Ill	Lux	0.0

APPENDIX D
THRESHOLD INCREMENT CALCULATIONS

Calculation Summary			
Project: Ti			
Label	CalcType	Units	Max
Wentworth Ave (northbound)	Obtrusive - TI	%	12.28
Wentworth Ave (southbound)	Obtrusive - TI	%	13.02

APPENDIX D

OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Curfew
Filename: 3048.1 Wentworth Ave rev B
26/10/2023 10:16:09 AM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (16):

Calculation Label	Test Results	Max. Illum.
156 Bay St_Ill_Seg1	**PASS**	0.0
156 Bay St_Ill_Seg2	**PASS**	0.0
158 Bay St_Ill_Seg1	**PASS**	0.0
158 Bay St_Ill_Seg2	**PASS**	0.0
160 Bay St_Ill_Seg1	**PASS**	0.0
160 Bay St_Ill_Seg2	**PASS**	0.0
162 Bay St_Ill_Seg1	**PASS**	0.1
162 Bay St_Ill_Seg2	**PASS**	0.0
164 Bay St_Ill_Seg1	**PASS**	0.1
164 Bay St_Ill_Seg2	**PASS**	0.0
166 Bay St_Ill_Seg1	**PASS**	0.1
166 Bay St_Ill_Seg2	**PASS**	0.0
168 Bay St_Ill_Seg1	**PASS**	0.1
168 Bay St_Ill_Seg2	**PASS**	0.0
170 Bay St_Ill_Seg1	**PASS**	0.1
170 Bay St_Ill_Seg2	**PASS**	0.0

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (2):

Calculation Label	Adaptation Luminance	Test Results
Wentworth Ave (northbound)	5	**PASS**
Wentworth Ave (southbound)	5	**PASS**

9.142 Movement area guidance signs

For a movement area guidance sign (MAGS):

(a) the sign must be legible at all times; and

(b) any lamp unserviceability in a sign must be fixed as soon as possible.

Note 1 No specific standard is specified for a critical number of unserviceable lamps in an illuminated MAGS. The key requirement is the legibility of the sign inscription at all times.

Note 2 The failure of MAGS illumination is not subject to notification by NOTAM.

9.143 Other lighting on the aerodrome

(1) This section applies only to lights that are not otherwise provided as visual aids to aircraft under the other provisions of this MOS.

(2) The following requirements must be complied with:

(a) an aerodrome operator must notify CASA in writing as soon as possible after becoming aware that a person is installing or proposing to install, or is using or is proposing to use, any installation, equipment or laser, outside the aerodrome boundary, that has or may have lighting or lighting intensity greater than that specified in Figure 9.144 (2);

(b) CASA must:

(i) consider whether the notification identifies a risk to the safety of aviation; and

(ii) if necessary, issue directions for action to mitigate the risk.

Note For directions, see regulation 94 of CAR, and regulation 11.245 of CASR.

(3) An aerodrome operator must immediately notify CASA in writing if the operator proposes to install or use any installation, equipment or laser, inside the aerodrome boundary, that has or may have lighting or lighting intensity greater than that specified in Figure 9.144 (2).

(4) An aerodrome operator must not proceed with the installation or use of any installation, equipment or laser mentioned in subsection (3) until CASA has assessed, and approved in writing, the proposed lighting intensity of the installation, equipment or laser.

(5) An aerodrome operator must immediately notify CASA in writing of any proposals to install or use any installation, equipment or laser within the aerodrome boundary which will have any of the following kinds of lighting:

(a) multiple light colours emitting from a single source;

(b) rapid changes in light colour;

(c) flashing lights.

Note Coloured lights, flashing lights or lasers may cause a hazard to aircraft operations irrespective of their intensity.

(6) An aerodrome operator must not proceed with any proposal mentioned in subsection (5) until CASA has assessed, and approved in writing, the lighting intensity proposed for the installation, equipment or laser.

(7) Subsections (3), (5) and (6) do not apply to the following:

(a) visual aids required for aircraft operations;

(b) signalling equipment;

(c) visual aids required for road safety.

(8) An aerodrome operator must immediately notify CASA in writing of any proposals for equipment or lighting installation within the aerodrome boundary which would reflect sunlight, including solar panels, mirrors or reflective building cladding.

(9) An aerodrome operator must not proceed with any proposal mentioned in subsection (8) unless CASA has determined, in writing, that it will not cause a hazard to aircraft operations.

(10) CASA may direct the aerodrome operator, in writing, that an installation, equipment, laser or reflective source within the aerodrome boundary must be modified, shielded, or extinguished to ensure aviation safety.

Note Certain lights might cause confusion, distraction or glare to pilots in the air. Ground lights may cause confusion or distraction by reason of their colour, position, pattern or intensity of light emission above the horizontal plane. Under regulation 94 of the CAR, CASA may issue notices about dangerous lights and it is an offence to fail to comply with any directions in a notice.

9.144 Lights — requirements for zones

(1) This section does not apply to the lights mentioned in paragraphs 9.143 (7) (a), (b) and (c).

(2) Lights installed at an aerodrome must comply with the zone requirements as shown in Figure 9.144 (2).

APPENDIX E

CASA MANUAL OF STANDARDS PART 139 – AERODROMES

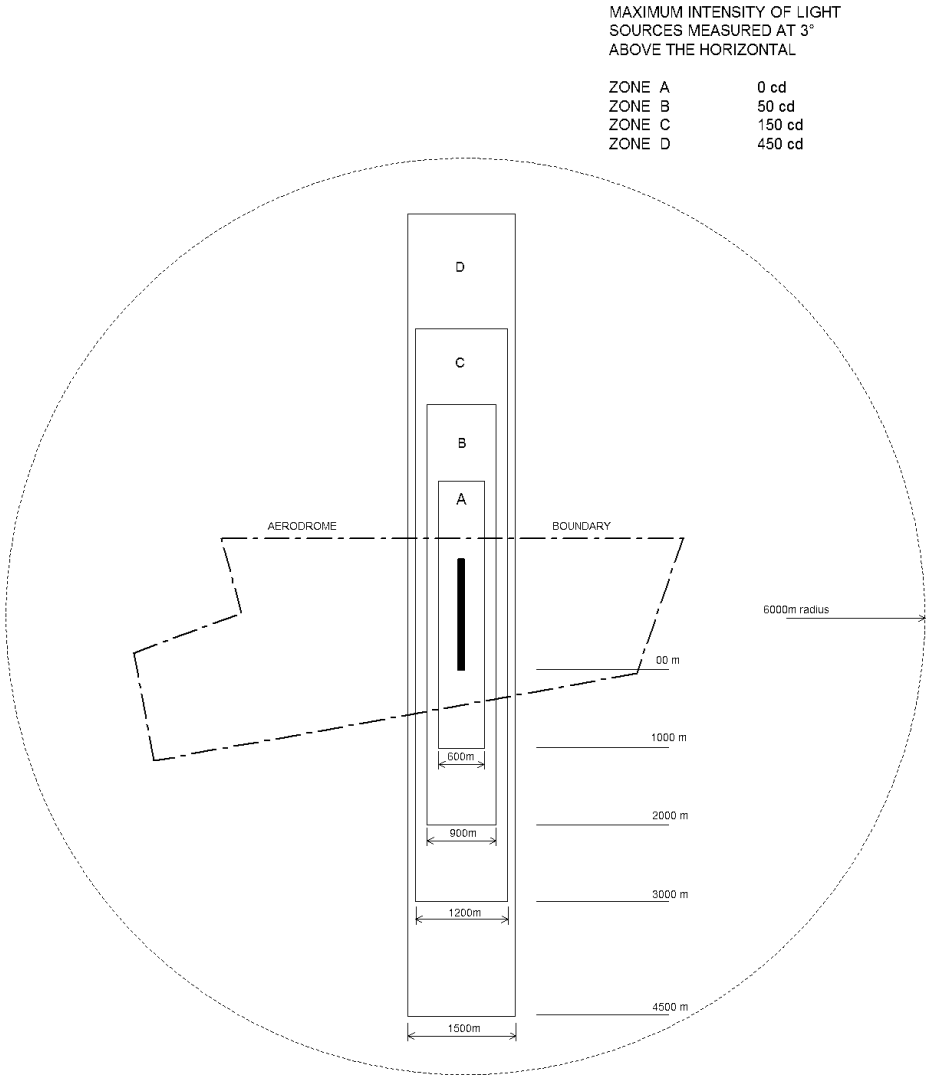


Figure 9.144 (2) Zone requirements for lighting (shows matters)

Note In many cases the polar diagrams published by manufacturers do not show sufficient detail in the sector near the horizontal and further information may need to be requested.

For installations where the light fitting does not meet the zone requirements, a screen may be used to limit light emission to zero above the horizontal.

APPENDIX F

Image: Luminous Intensity Limits for Runway 16R/34L

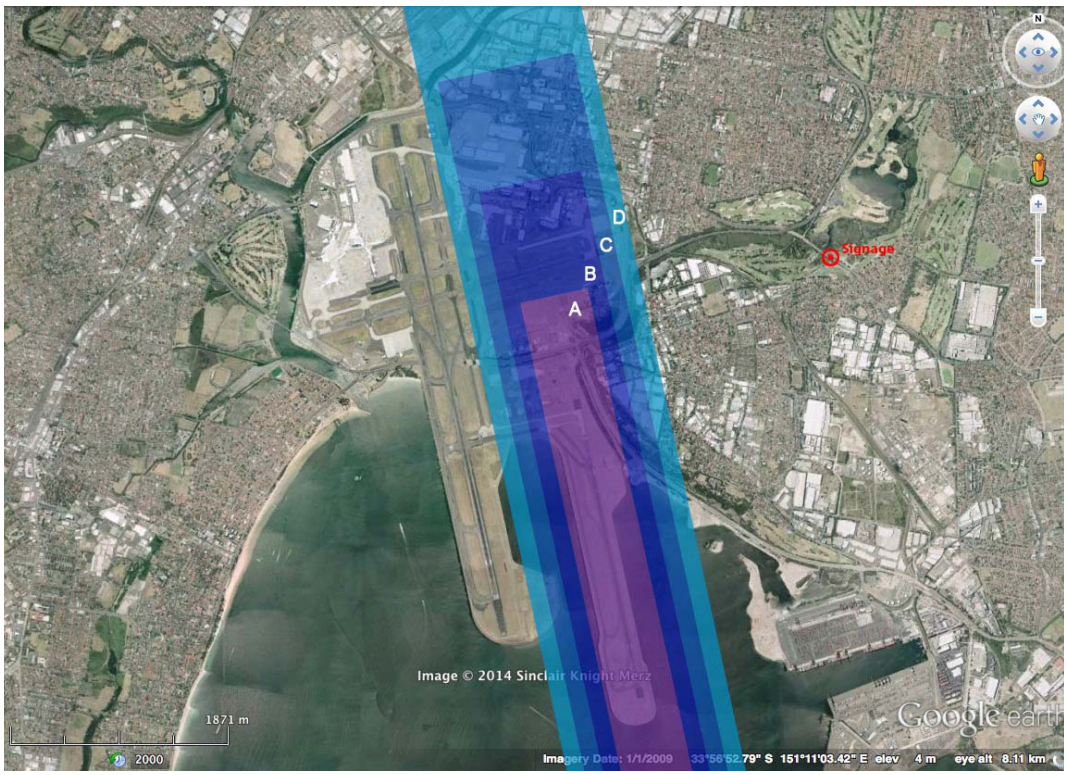


Image: Luminous Intensity Limits for Runway 16L/34R

APPENDIX F

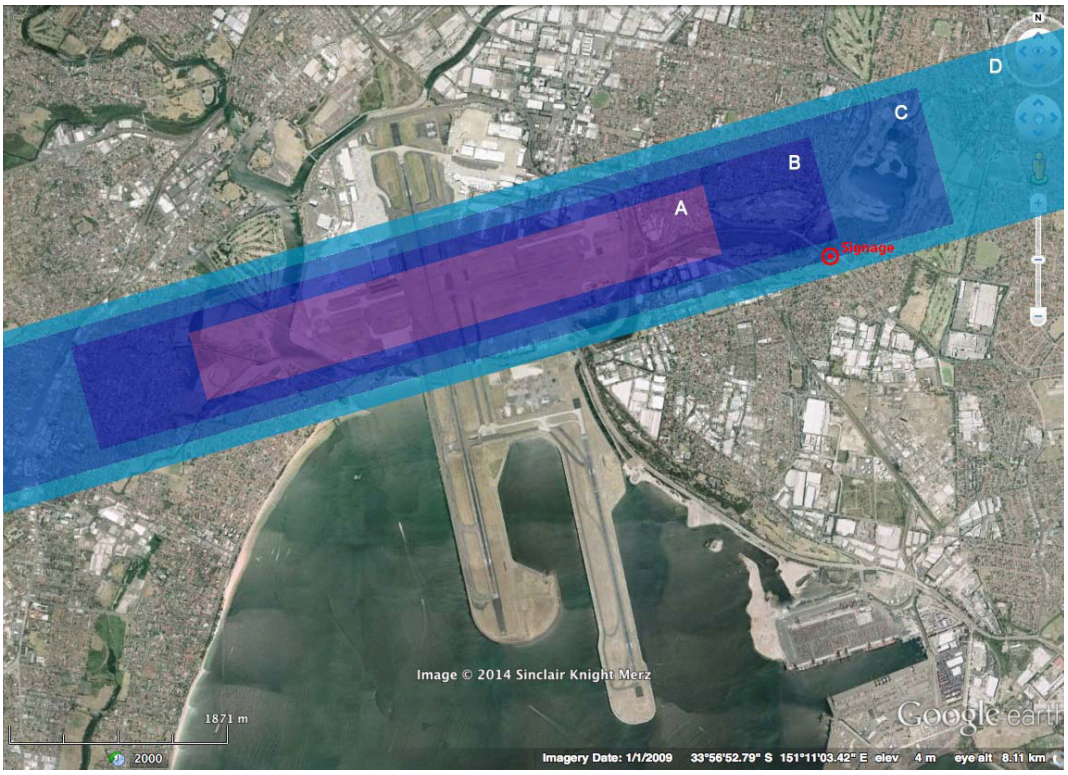


Image: Luminous Intensity Limits for Runway 07/25