Mulpha Norwest

LIGHTING IMPACT ASSESSMENT -

OUTDOOR SIGNAGE AT OLD WINDSOR RD, BELLA VISTA (CNR NORBRIK DRIVE)

11th August 2022
Ref: 3211

Lighting Impact Assessment
Outdoor Signage at Old Windsor Rd, Bella Vista (cnr Norbrik Drive)

DATE	REV	COMMENT	PREPARED BY	CHECKED BY
11/08/22	REV A	For Information	LC	RS

Electrolight Australia Pty Ltd
ABN: 44 600 067 392

info@electrolight.com
www.electrolight.com

4/414 Bourke St
Surry Hills NSW 2010
T + 612 9267 4777

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1. INTRODUCTION

Electrolight have been appointed by Mulpha Norwest to undertake a Lighting Impact Assessment on the existing illuminated signs (Sign A & Sign B) installed at Old Windsor Rd, Bella Vista (cnr Norbrik Drive). The objective of the assessment is to report on compliance with the State Environmental Planning Policy (Industry and Employment) 2021, NSW Transport Corridor Outdoor Advertising and Signage Guidelines and AS4282-2019 Control of the Obtrusive Effects of Outdoor Lighting.

2. DEFINITIONS

2.1 Illuminance

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

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

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

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

2.2 Luminance

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

2.3 Luminous Intensity

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

2.4 Obtrusive Light

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

2.5 Threshold Increment

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

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

2.6 AGI32 Light Simulation Software

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

2.7 Upward Light Ratio (ULR)

The ratio between the 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 existing internally illuminated signs are located on Old Windsor Rd, Bella Vista (cnr Norbrik Drive), NSW. The two signs, Sign A and B, are mounted on the pedestrian bridge over Old Windsor Rd. Sign A is oriented towards the Northbound traffic direction on Old Windsor Rd. Sign B is oriented towards the Southbound traffic direction on Old Windsor Rd. For the purposes of this assessment it has been assumed that the signs are to be operated all night. Refer to Appendix A for existing signs location plan and elevations.

The total active display (illuminated) area of Sign A and B is approximately 44.94 m2 for each face. Refer Appendix A for existing sings location plan and elevations.

The specification of the existing light sources is not known, however, for the purpose of this report, the luminance of the signs is not to exceed the values shown in this report.

4. DESIGN GUIDELINES AND STANDARDS

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

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

* The signage was assessed against the maximum values of Technical Light Parameters in Table 3.2 and the Maximum average luminance values in Table 3.5, refer AS4282-2019.

5. LUMINANCE ASSESSMENT

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

TABLE 1 - MAXIMUM AVERAGE 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 signs are 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 signs are located within Environmental Zone A4 under AS4282, therefore the maximum night time luminance is 350 cd/m2.

The Transport Corridor Outdoor Advertising & Signage Guidelines outlines luminance limits for different Environmental Zones. The existing signs are 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. Under the Guidelines, the maximum night time luminance for Sign A and B, which both have an area over 10m2, is 200 cd/m2 (taken to be 25% of the maximum daytime limit of 800cd/m2 as per the previous revision of the Guidelines).

Table 2 & 3 outlines the maximum luminance levels for the signs to comply with AS4282 and The Transport Corridor Outdoor Advertising & Signage Guidelines, for the various lighting conditions listed below:

TABLE 2 - LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED SIGNAGE SIGN A (NORTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Daytime	N/A (OFF)	✓
Night Time	200	✓

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

TABLE 3 - LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED SIGNAGE SIGN B (SOUTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Daytime	N/A (OFF)	✓
Night Time	200	✓

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

It is our opinion that the signs (Sign A & B) that are illuminated to the maximum luminances outlined above would be visually consistent with the existing ambient lighting and suitable for the local area. A more details night time lighting assessment is provided in section 6.0.

6. AS4282 ASSESSMENT

The existing signs (Sign A & B) have been assessed against AS 4282-2019 Control of the Obtrusive Effects of Outdoor Lighting as outlined in Section 4.

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

Illuminance Assessment

The AS4282 assessment includes a review of nearby residential dwellings and calculation of the amount of illuminance (measured in Lux) that the properties are likely to receive from the signs 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 4 below:

TABLE 4 - 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

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 areas, the nearest dwellings with potential views to the signs are at the following locations:

Address	Zone	Address	Zone	Address	Zone
1 Sharleen Ct	A3	41 Crestview Dr	A3	28 Norbrik Dr	A4
3 Sharleen Ct	A3	41A Crestview Dr	A3		
5 Sharleen Ct	A3	41B Crestview Dr	A3		
7 Sharleen Ct	A3	47 Crestview Dr	A3		
9 Sharleen Ct	A3	49 Crestview D	A3		
11 Sharleen Ct	A3	51 Crestview Dr	A3		
13 Sharleen Ct	A3	53 Crestview Dr	A3		

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

The existing signs (Sign A & B) and surrounding environment were modelled in lighting calculation program AGI32 to determine the effect (if any) of the light spill from the existing signs. Photometric data for the signs 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 C shows the lighting model and the results of the calculations.

It can be seen from the lighting model that the maximum illuminance to dwellings in zone A3 is 0.79 lux at 47 Crestview Dr and the maximum illuminance to dwellings in Zone A4 is 0.18 lux at 28 Norbrik Dr. The illuminance levels above comply with the maximum AS4282 limits of 2 lux for Zone A3 areas and 5 lux for Zone A4 areas outlined in Table 4.

Threshold Increment Assessment

The Threshold Increment was also calculated for traffic approaches of Old Windsor Rd Street (for both north and south bound directions), NW Transitway (for both north and south bound directions) and Norbrik Dr left turn. The calculation grid was located at 1.5m above ground level, with an approach viewing distance of between 10 m to 200 m from the signage. The calculation results show that the Threshold Increment does not exceed 11.7% along any of the approaches (the allowable maximum under the standard is 20%).

Luminous Intensity

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

Summary

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

7. SUMMARY

- The existing illuminated signs installed at Old Windsor Rd, Bella Vista (cnr Norbrik Drive), NSW shall be commissioned on site to yield the following maximum luminances:

LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED SIGNAGE SIGN A (NORTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Daytime	N/A (OFF)	✓
Night Time	200	✓

LUMINANCE LEVELS FOR INTERNALLY ILLUMINATED SIGNAGE SIGN B (SOUTHBOUND)		
Lighting Condition	Max Permissible Luminance (cd/m2) #	Compliant
Daytime	N/A (OFF)	✓
Night Time	200	✓

- The existing signs have 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 existing signs should not result in unacceptable glare nor should it adversely impact the safety of pedestrians, residents or vehicular traffic. Additionally, the existing signs should not cause any reduction in visual amenity to nearby residences or accommodation.

8. DESIGN CERTIFICATION

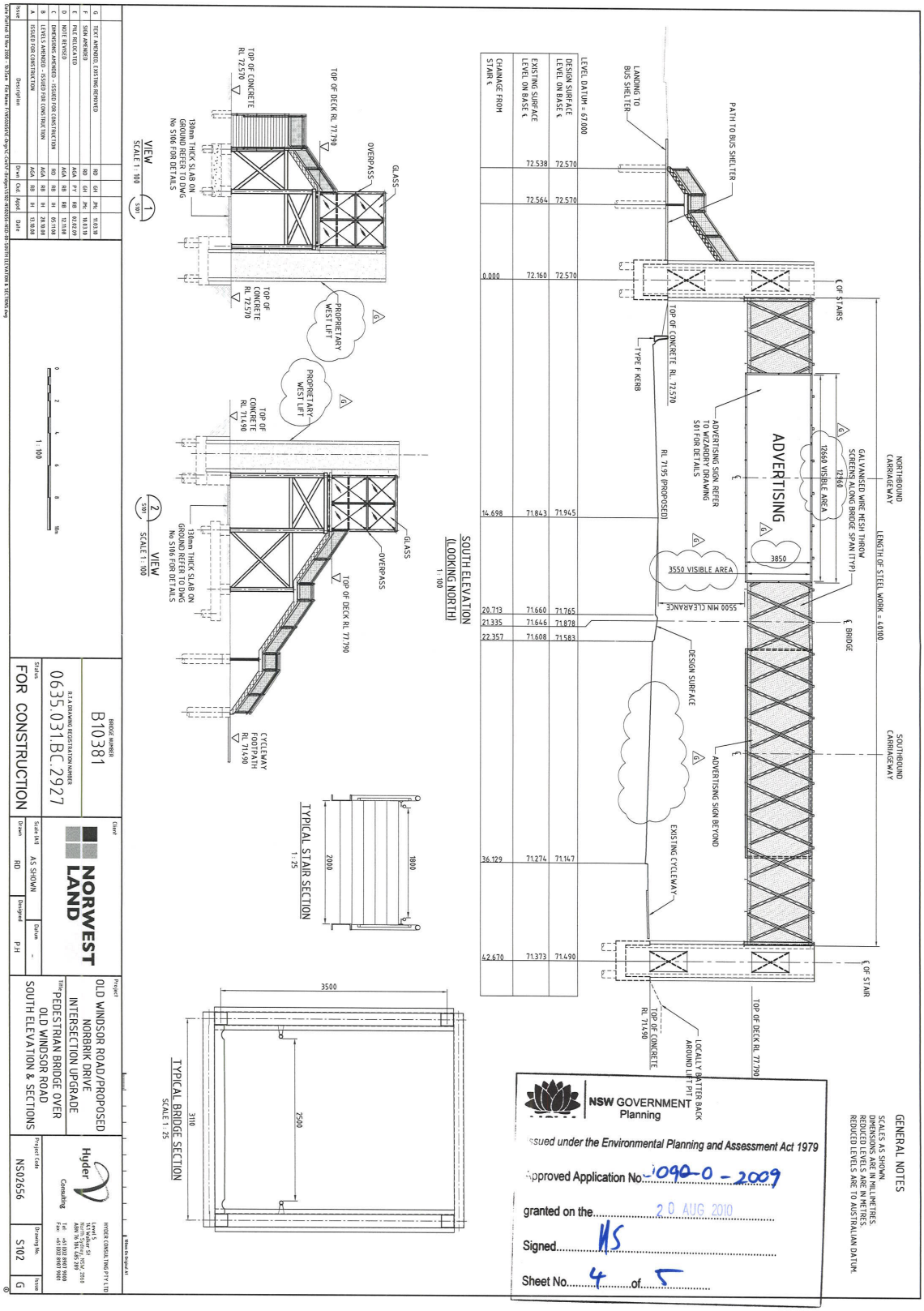
The existing signs installed at Old Windsor Rd, Bella Vista (cnr Norbrik Drive), NSW, if commissioned according to this report, comply with the following criteria, guidelines and standards:

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

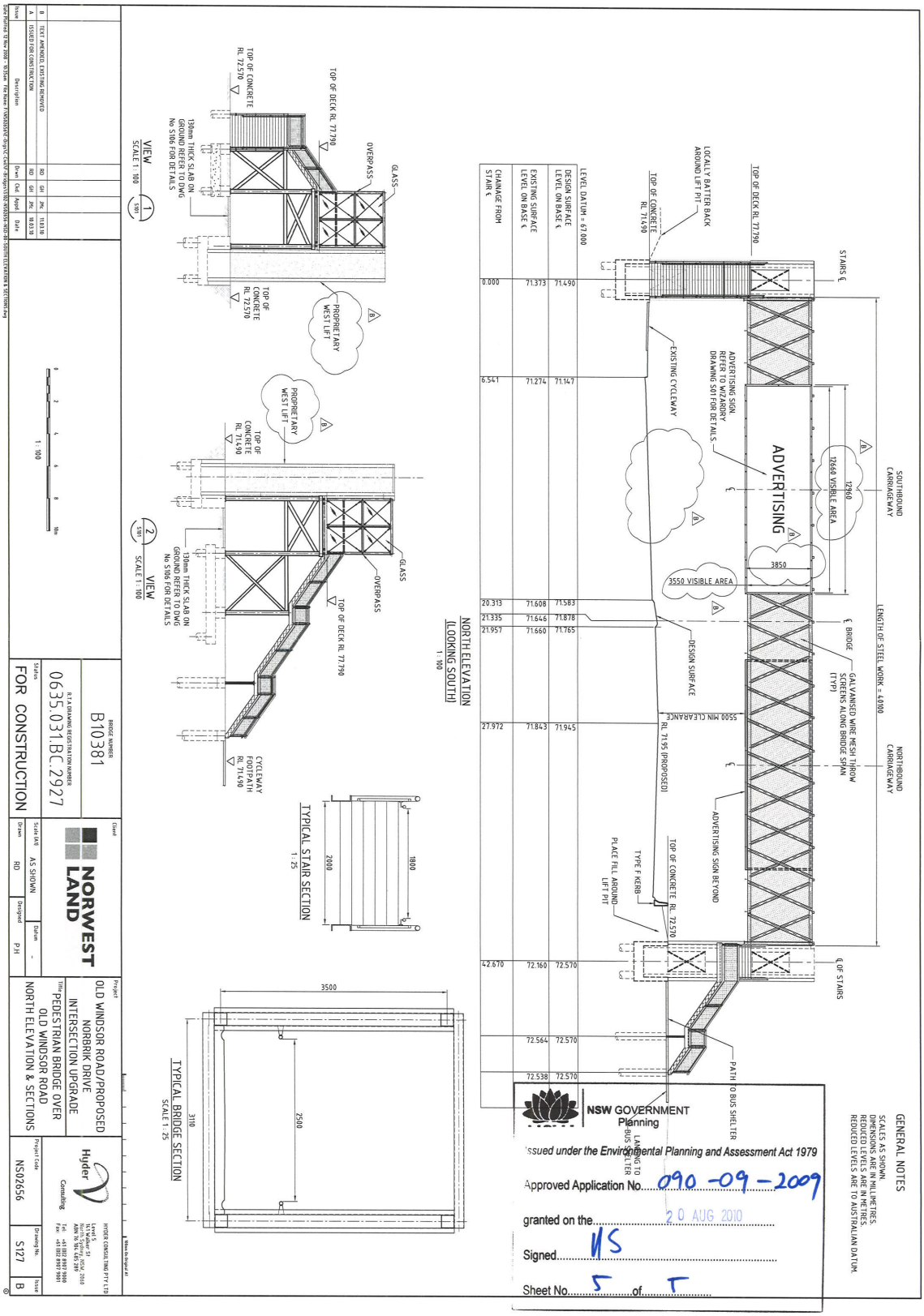
Ryan Shamier
Master Design Science (Illumination)
B. Elec Eng (Hons)
Member of the Illuminating Engineering Society of Australia and New Zealand (MIES)
Professional Engineer NSW PRE0000868

Senior Lighting Designer
Electrolight Sydney
11/08/22

APPENDIX A
SIGN A - LOCATION PLAN AND ELEVATIONS



APPENDIX A
SIGN B - LOCATION PLAN AND ELEVATIONS



APPENDIX B

State Environmental Planning Policy (Industry and Employment) 2021

Schedule 5 Assessment criteria

(Clauses 8, 13 and 17)

1. Character of the area

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

2. Special areas

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

3. Views and vistas

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

4. Streetscape, setting or landscape

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

5. Site and building

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

6. Associated devices and logos with advertisements and advertising structures

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

7. Illumination

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

8. Safety

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

APPENDIX C
OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Calculation Summary			
Label	**CalcType**	**Units**	**Max**
9 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.28
7 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.28
53 Crestview Dr_2_III_Seg1	Obtrusive - III	Lux	0.46
51 Crestview Dr_1_III_Seg1	Obtrusive - III	Lux	0.61
5 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.18
49 Crestview Dr_III_Seg1	Obtrusive - III	Lux	0.74
47 Crestview Dr_III_Seg1	Obtrusive - III	Lux	0.79
41B Crestview Dr_1_III_Seg1	Obtrusive - III	Lux	0.62
41A Crestview Dr_III_Seg1	Obtrusive - III	Lux	0.40
41 Crestview Dr_III_Seg1	Obtrusive - III	Lux	0.53
3 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.17
28 Norbrik Dr_III_Seg2	Obtrusive - III	Lux	0.13
28 Norbrik Dr_III_Seg1	Obtrusive - III	Lux	0.18
13 Sharleen Ct_III_Seg2	Obtrusive - III	Lux	0.11
13 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.46
11 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.45
1 Sharleen Ct_III_Seg1	Obtrusive - III	Lux	0.12

Environmental Zone Legend:

- A0
- A1
- A2
- A3
- A4

APPENDIX C
OBTRUSIVE LIGHTING AND THRESHOLD INCREMENT CALCULATIONS

Calculation Summary			
Label	**CalcType**	**Units**	**Max**
OldWindsorRd LeftT Southbound	Obtrusive - TI	%	8.0
Old Windsor Rd Northbound	Obtrusive - TI	%	11.7
Old Windsor Rd - Southbound	Obtrusive - TI	%	11.6
NW Transitway - Southbound	Obtrusive - TI	%	0.09
NW Transitway - Northbound	Obtrusive - TI	%	4.76
Norbrik Dr Left Turn	Obtrusive - TI	%	11

APPENDIX C

OBTRUSIVE LIGHTING CALCULATIONS

POST-CURFEW OPERATION

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Curfew
Filename: 3211
10-Aug-22 3:45:12 PM

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (15):

Calculation Label	Test Results	Max. Illum.
11 Sharleen Ct_Ill_Seg1	**PASS**	0.45
13 Sharleen Ct_Ill_Seg1	**PASS**	0.46
13 Sharleen Ct_Ill_Seg2	**PASS**	0.11
9 Sharleen Ct_Ill_Seg1	**PASS**	0.28
7 Sharleen Ct_Ill_Seg1	**PASS**	0.28
5 Sharleen Ct_Ill_Seg1	**PASS**	0.18
3 Sharleen Ct_Ill_Seg1	**PASS**	0.17
1 Sharleen Ct_Ill_Seg1	**PASS**	0.12
49 Crestview Dr_Ill_Seg1	**PASS**	0.74
47 Crestview Dr_Ill_Seg1	**PASS**	0.79
41B Crestview Dr_1_Ill_Seg1	**PASS**	0.62
41A Crestview Dr_Ill_Seg1	**PASS**	0.40
41 Crestview Dr_Ill_Seg1	**PASS**	0.53
53 Crestview Dr_2_Ill_Seg1	**PASS**	0.46
51 Crestview Dr_1_Ill_Seg1	**PASS**	0.61

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A4 - High District Brightness, Curfew
Filename: 3211
10-Aug-22 3:46:17 PM

Illuminance

Maximum Allowable Value: 5 Lux

Calculations Tested (2):

Calculation Label	Test Results	Max. Illum.
28 Norbrik Dr_Ill_Seg1	**PASS**	0.18
28 Norbrik Dr_Ill_Seg2	**PASS**	0.13

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A4 - High District Brightness, Curfew
Filename: 3211
11-Aug-22 9:15:33 AM

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (6):

Calculation Label	Adaptation Luminance	Test Results
Old Windsor Rd - Southbound	5	**PASS**
Norbrik Dr Left Turn	5	**PASS**
OldWindsorRd LeftT Southbound	5	**PASS**
Old Windsor Rd Northbound	5	**PASS**
NW Transitway - Southbound	5	**PASS**
NW Transitway - Northbound	5	**PASS**