

Date: 21.10.2022 Job Number: 2202040

Project: 41 Monbulk Road, Mount Evelyn VIC 3796

Subject: Obtrusive Lighting Report

Dear Andrew,

1.0 INTRODUCTION

engaged to provide a lighting assessment report to address the following:

An Obtrusive Light – Compliance Report prepared by a qualified and experienced Electrical Engineer in accordance with Australian Standard 4282 – 2019 'Control of the obtrusive effects of outdoor lighting' shall be provided to Council for Approval.

External lighting requirements for the proposed development; involving light spill across to adjacent properties will be required to be compliance with current Australian Standards.



Figure 1: Aerial view of proposed development

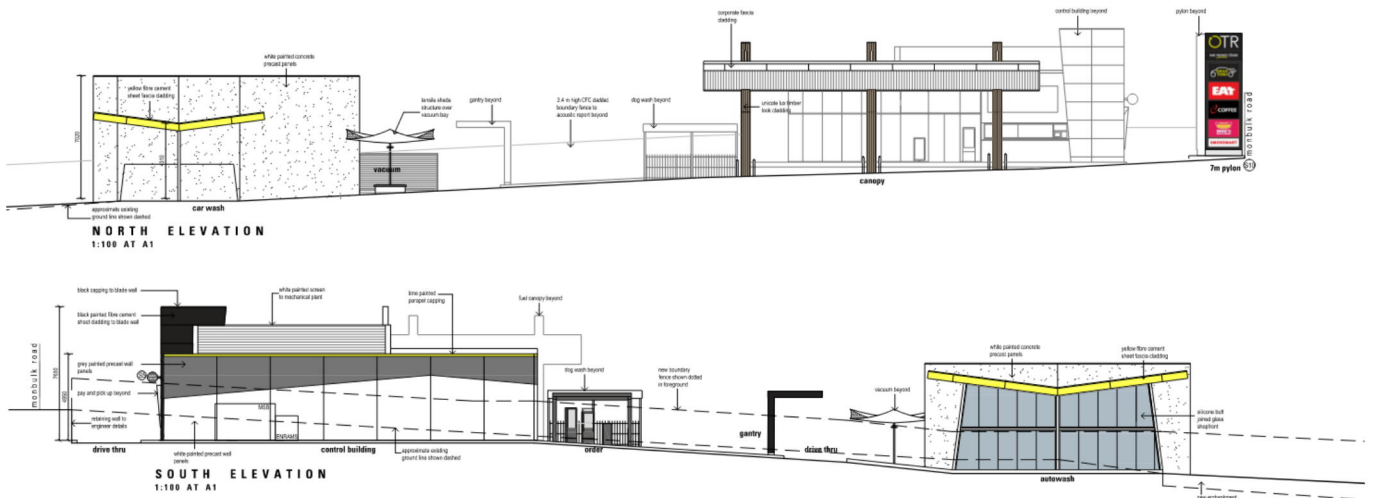


Figure 2: North Elevation abutting adjacent commercial property and South Elevation abutting residential property

The objective of this report is to:

- a) Provide certification/commentary on the light spill across the boundary lines to adjoining residential properties boundaries during both curfew & non-curfew hours when the site is in operation, for compliance to AS4282-2019 Table 3.1 and table 3.2 criteria (extract copied below) for Environmental Zone A2 – Low District Brightness.
- b) Provide certification/commentary on the light spill across the boundary lines to adjoining commercial properties boundaries during both curfew & non-curfew hours when the site is in operation, for compliance to AS4282-2019 Table 3.1 and table 3.2 criteria (extract copied below) for Environmental Zone A4 – High District Brightness.



Figure 3 – Site Plan Boundary Lines

TABLE 3.2
MAXIMUM VALUES OF LIGHT TECHNICAL PARAMETERS

Zones	Vertical illuminance levels (E_v) lx		Threshold increment (TI)		Sky glow
	Non-curfew	Curfew	%	Default adaptation level (L_{ad})	Upward light ratio
A0	See Note 1	0	N/A	N/A	0
A1	2	0.1	N/A	N/A	0
A2	5	1	20%	0.2	0.01
A3	10	2	20%	1	0.02
A4	25	5	20%	5	0.03
TV	See Table 3.4	N/A	20%	10	0.08
V	N/A	4	Note 2	Note 2	Note 2
R1	N/A	1	20%	0.1	Note 3
R2	N/A	2	20%	0.1	Note 3
R3	N/A	4	20%	0.1	Note 3
RX	N/A	4	20%	5	Note 4

Figure 4 Table 3.2 AS 4282

TABLE 3.1
ENVIRONMENTAL ZONES

Zones	Description	Examples
A0	Intrinsically dark	UNESCO Starlight Reserve. IDA Dark Sky Parks. Major optical observatories No road lighting - unless specifically required by the road controlling authority
A1	Dark	Relatively uninhabited rural areas No road lighting - unless specifically required by the road controlling authority
A2	Low district brightness	Sparsely inhabited rural and semi-rural areas
A3	Medium district brightness	Suburban areas in towns and cities
A4	High district brightness	Town and city centres and other commercial areas Residential areas abutting commercial areas
TV	High district brightness	Vicinity of major sports stadium during TV broadcasts
V	Residences near traffic routes	Refer AS/NZS1158.1.1
R1	Residences near local roads with significant setback	Refer AS/NZS 1158.3.1
R2	Residences near local roads	Refer AS/NZS 1158.3.1
R3	Residences near a roundabout or local area traffic management device	Refer AS/NZS 1158.3.1
RX	Residences near a pedestrian crossing	Refer AS/NZS 1158.4

Figure 5 Table 3.1 AS 4282

- c) Provide recommendation on the illumination level on the car park areas and driveways for compliance to AS1158.3.1 - 2020 for below usage areas indicated below and shown in Figure 7;

- Lighting calculations are according to AS1158.3.1, sub-category:
- PC1 for carpark areas

Obtrusive lighting calculations are within the limit permitted within AS4282:2019

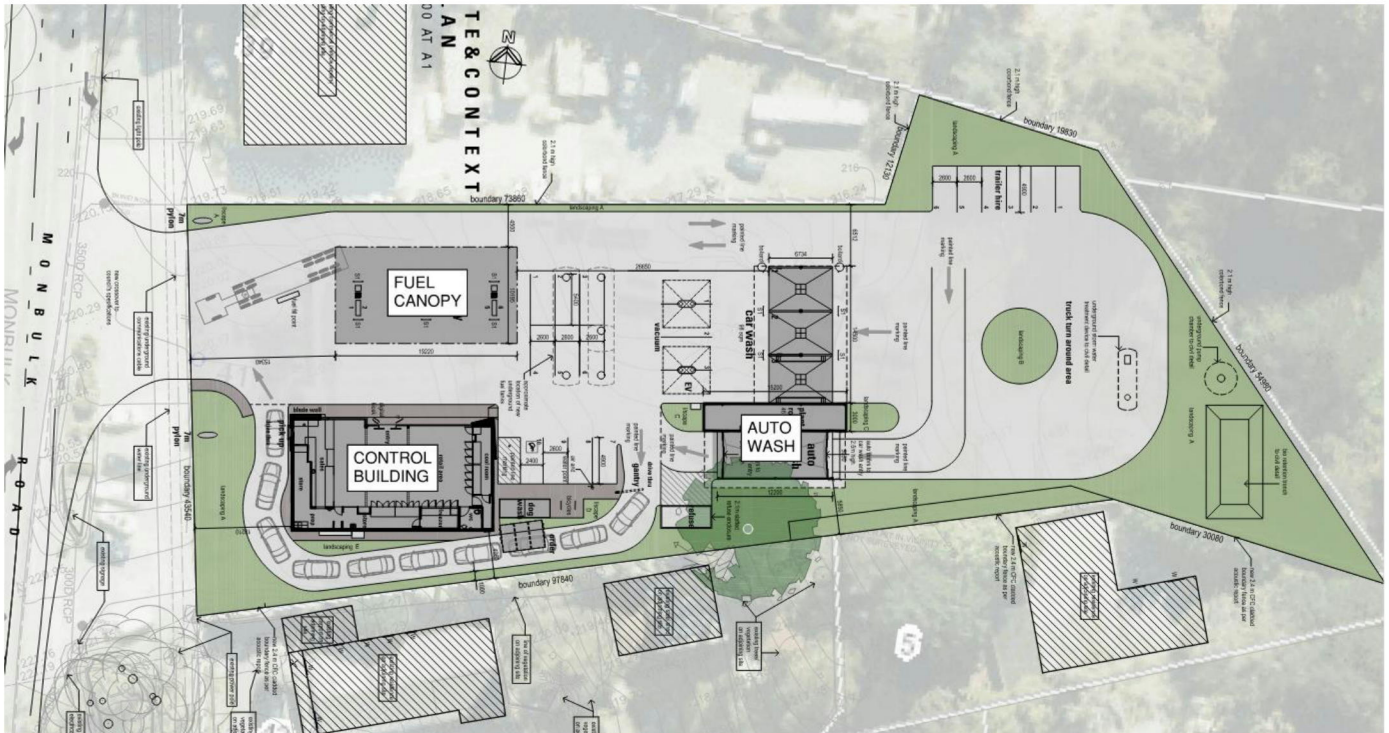


Figure 6 Site Plan Definitions

The various steps undertaken in the investigation were:

- Computer modeling using readily available software & luminaire photometric (.IES) files received from lighting supplier.
- Cross referencing & examination of all relevant standards to ensure the requirement is achieved.

The following was excluded from the assessment:

- Site survey visual walk through to examine the condition around the site.

2.0 PROPOSED LIGHTING LAYOUT

The lighting layout proposed is based on the use of:

- 18x 60W, LED luminaires, Mounted underneath of canopy (Gamma – 1065 VWFL)
- 12x 50W, LED luminaires, Surface mounted floodlight (Haneco - Stax)
- 3x 50W, LED luminaires, mounted on 5m pole (Haneco - Stax)
- 8x 22W, LED downlights, mounted underneath verandah (Gamma – 1004 VWFL)
- 24x 22W, LED downlights, mounted underneath canopy (Gamma – 1004 VWFL)
- 5x 20W, LED wall light, mounted on wall along drive thru (Haneco Dawn)
- 3x 12W, LED bollard lighting, mounted at drive thru entry (Haneco Matita)

Figure 7 provides an indication of the proposed lighting layout, along with Figure 8 shows an example 3D perspective of the proposed building and Figure 9 shows the lighting schedule & symbols:

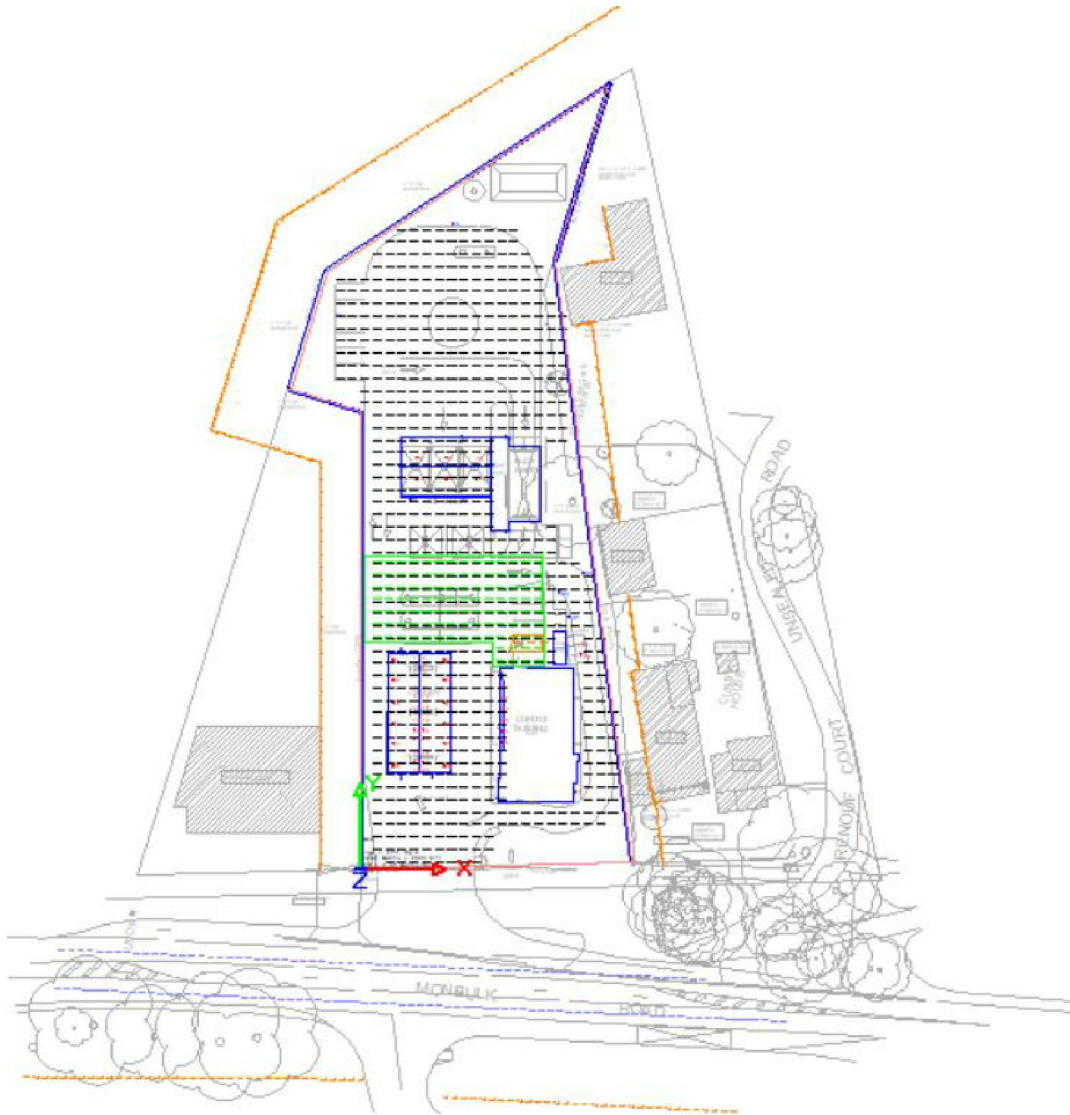


Figure 7 – Proposed Lighting Layout

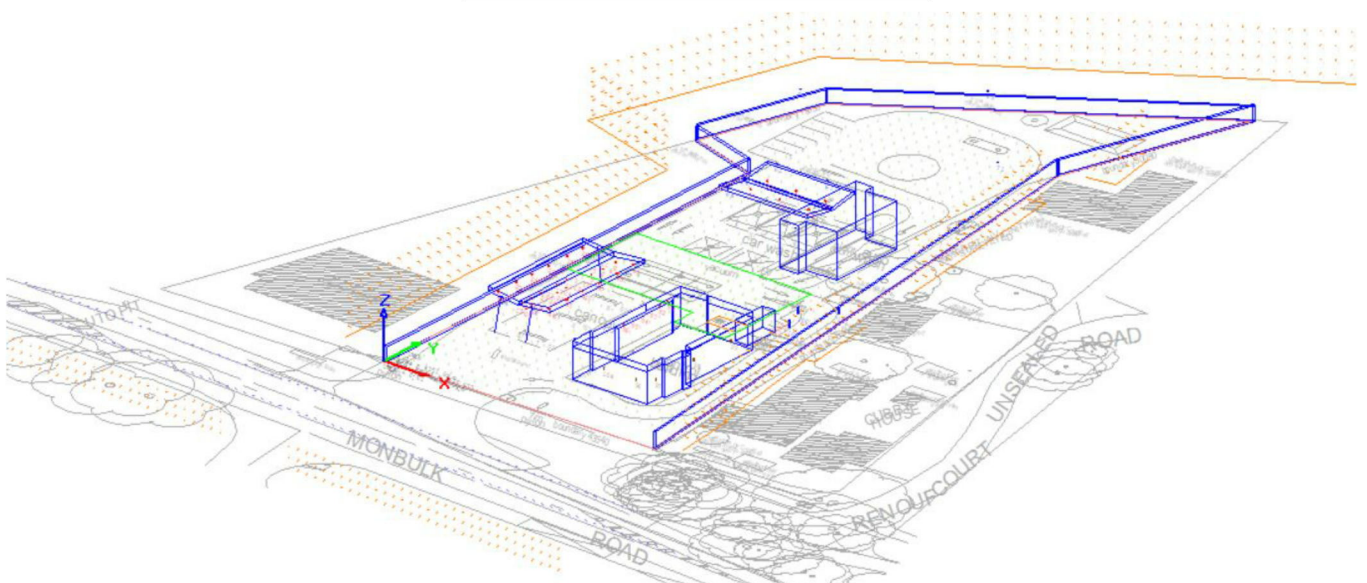


Figure 8 – Proposed 3D Perspective Model

Luminaire Schedule								
Symbol	Qty	Label	Arrangement	Description	LLF	Luminaire Lumens	Luminaire Watts	Total Watts
+	3	MATITA	Single	MATITA BOLLARD	1.000	553	16.49	49.47
+	5	DN20WRND-TRI-3000K IESNA2002	Single	DN20WRND-TRI	1.000	1895	19.5856	97.928
+	32	1004-VWFL-4K-22W - MYLO - G4	Single	1004-VWFL-4K-22W	1.000	1998	20.62	659.84
+	18	1065-VWFL-4K-60W - VORTEX - G	Single	1065-VWFL-4K-60W	1.000	6123	59.08	1063.44
+	15	STAX50W4K-S - IES	Single	STAX50W4K	1.000	5647	50	750

Luminaire Location Summary							
LumNo	Label	Insertion Point			Orient	Tilt	
		X	Y	Z			
1	1004-VWFL-4K-22W - MYLO - G4	8.785	34.298	4.6	180	13	
2	1004-VWFL-4K-22W - MYLO - G4	10.291	34.298	4.6	0	13	
3	1004-VWFL-4K-22W - MYLO - G4	8.785	33.244	4.6	180	13	
4	1004-VWFL-4K-22W - MYLO - G4	10.291	33.244	4.6	0	13	
5	1004-VWFL-4K-22W - MYLO - G4	8.785	31.774	4.6	180	13	
6	1004-VWFL-4K-22W - MYLO - G4	10.291	31.774	4.6	0	13	
7	1004-VWFL-4K-22W - MYLO - G4	8.785	29.467	4.6	180	13	
8	1004-VWFL-4K-22W - MYLO - G4	10.291	29.467	4.6	0	13	
9	1004-VWFL-4K-22W - MYLO - G4	8.785	27.941	4.6	180	13	
10	1004-VWFL-4K-22W - MYLO - G4	10.291	27.941	4.6	0	13	
11	1004-VWFL-4K-22W - MYLO - G4	8.785	26.226	4.6	180	13	
12	1004-VWFL-4K-22W - MYLO - G4	10.291	26.226	4.6	0	13	
13	1004-VWFL-4K-22W - MYLO - G4	8.785	24.271	4.6	180	13	
14	1004-VWFL-4K-22W - MYLO - G4	10.291	24.271	4.6	0	13	
15	1004-VWFL-4K-22W - MYLO - G4	8.785	18.93	4.6	180	13	
16	1004-VWFL-4K-22W - MYLO - G4	10.291	18.93	4.6	0	13	
17	1004-VWFL-4K-22W - MYLO - G4	8.785	17.268	4.6	180	13	
18	1004-VWFL-4K-22W - MYLO - G4	10.291	17.268	4.6	0	13	
19	1004-VWFL-4K-22W - MYLO - G4	8.785	16.17	4.6	180	13	
20	1004-VWFL-4K-22W - MYLO - G4	10.291	16.17	4.6	0	13	
21	1004-VWFL-4K-22W - MYLO - G4	8.785	22.547	4.6	180	13	
22	1004-VWFL-4K-22W - MYLO - G4	10.291	22.547	4.6	0	13	
23	1004-VWFL-4K-22W - MYLO - G4	8.785	21.127	4.6	180	13	
24	1004-VWFL-4K-22W - MYLO - G4	10.291	21.127	4.6	0	13	
25	1065-VWFL-4K-60W - VORTEX - G	5.336	33.788	5.4	180	13	
26	1065-VWFL-4K-60W - VORTEX - G	5.336	16.716	5.4	180	13	
27	1065-VWFL-4K-60W - VORTEX - G	5.336	20.333	5.4	180	13	
28	1065-VWFL-4K-60W - VORTEX - G	5.336	23.468	5.4	180	13	
29	1065-VWFL-4K-60W - VORTEX - G	5.336	26.844	5.4	180	13	
30	1065-VWFL-4K-60W - VORTEX - G	5.336	30.622	5.4	180	13	
43	1065-VWFL-4K-60W - VORTEX - G	13.615	33.788	5.4	0	13	
44	1065-VWFL-4K-60W - VORTEX - G	13.615	16.716	5.4	0	13	
45	1065-VWFL-4K-60W - VORTEX - G	13.615	20.333	5.4	0	13	
46	1065-VWFL-4K-60W - VORTEX - G	13.615	23.468	5.4	0	13	
47	1065-VWFL-4K-60W - VORTEX - G	13.615	26.844	5.4	0	13	
48	1065-VWFL-4K-60W - VORTEX - G	13.615	30.622	5.4	0	13	
50	STAX50W4K-S - IES	11.652	15.704	5.4	270	15	
59	STAX50W4K-S - IES	22.192	11.479	5.4	180	0	
60	STAX50W4K-S - IES	26.275	32.691	5.4	90	10	
61	STAX50W4K-S - IES	8.093	69.695	5.1	90	10	
62	STAX50W4K-S - IES	6.512	64.88	4.7	180	0	
63	STAX50W4K-S - IES	16.389	69.79	5.1	90	10	
64	STAX50W4K-S - IES	8.093	59.901	5.1	270	10	
65	STAX50W4K-S - IES	16.389	59.996	5.1	270	10	
66	STAX50W4K-S - IES	23.417	69.847	6	90	0	
67	STAX50W4K-S - IES	23.507	54.55	6	270	0	
68	STAX50W4K-S - IES	14.896	104.18	5	270	5	
70	STAX50W4K-S - IES	-4.076	89.439	5	0	5	
71	STAX50W4K-S - IES	29.717	88.027	5	180	20	
74	1065-VWFL-4K-60W - VORTEX - G	9.157	66.48	4.2	90	7.58	
75	1065-VWFL-4K-60W - VORTEX - G	13.927	66.48	4.2	90	7.58	
76	1065-VWFL-4K-60W - VORTEX - G	18.724	66.48	4.2	90	7.58	
77	1065-VWFL-4K-60W - VORTEX - G	9.157	63.14	4.2	270	7.58	
78	1065-VWFL-4K-60W - VORTEX - G	13.927	63.14	4.2	270	7.58	
79	1065-VWFL-4K-60W - VORTEX - G	18.724	63.14	4.2	270	7.58	
80	1004-VWFL-4K-22W - MYLO - G4	22.881	29.467	4.5	270	0	
82	1004-VWFL-4K-22W - MYLO - G4	22.876	27.778	4.5	270	0	
83	1004-VWFL-4K-22W - MYLO - G4	22.876	26.077	4.5	270	0	
84	1004-VWFL-4K-22W - MYLO - G4	22.91	24.234	4.5	270	0	
85	1004-VWFL-4K-22W - MYLO - G4	22.908	22.287	4.5	270	0	
86	1004-VWFL-4K-22W - MYLO - G4	22.895	20.528	4.5	270	0	
93	STAX50W4K-S - IES	6.737	34.978	5.4	90	10	
94	STAX50W4K-S - IES	6.672	15.704	5.4	270	18	
96	DN20WRND-TRI-3000K IESNA2002	32.66	10.957	3	270	0	
97	DN20WRND-TRI-3000K IESNA2002	34.604	12.605	3	270	0	
98	DN20WRND-TRI-3000K IESNA2002	34.622	20.306	3	270	0	
99	DN20WRND-TRI-3000K IESNA2002	34.658	27.817	3	270	0	
100	MATITA	32.032	44.686	0	270	0	
101	MATITA	33.693	40.779	0	270	0	
102	1004-VWFL-4K-22W - MYLO - G4	35.387	36.379	3	270	0	
103	1004-VWFL-4K-22W - MYLO - G4	35.693	34.682	3	270	0	
104	DN20WRND-TRI-3000K IESNA2002	27.457	10.9	3	270	0	
105	MATITA	36.038	47.897	0	270	0	

Figure 9 – Proposed Lighting Schedule

3.0 LIGHT SPILL ASSESSMENT

The criteria for vertical light spills outline in AS 4282-2019 - Control of the obtrusive effects of outdoor lighting, Table 3.2:

- Non-Curfew hour (between 6am– 11pm) – maximum of 25 lux across the ‘commercial boundary line A4 – High District Brightness under AS4282:2019 Tables 3.1 and 3.2
- Curfew hour (between 11pm– 6am) – maximum of 5 lux across the ‘commercial boundary line A4 – High District Brightness under AS4282:2019 Tables 3.1 and 3.2
- Non-Curfew hour (between 6am– 11pm) – maximum of 5 lux across the ‘residential boundary line A2 – Low District Brightness under AS4282:2019 Tables 3.1 and 3.2
- Curfew hour (between 11pm– 6am) – maximum of 1 lux across the ‘residential boundary line A2 – Low District Brightness under AS4282:2019 Tables 3.1 and 3.2

Obtrusive Light - Compliance Report				Obtrusive Light - Compliance Report			
AS/NZS 4282:2019, A2 - Low District Brightness, Non-Curfew L1 Filename: 20221020 21/10/2022 10:34:03 AM				AS/NZS 4282:2019, A4 - High District Brightness, Non-Curfew L1 Filename: 20221020 21/10/2022 10:34:29 AM			
Illuminance Maximum Allowable Value: 5 Lux				Illuminance Maximum Allowable Value: 25 Lux			
Calculations Tested (15):				Calculations Tested (15):			
<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>		<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>	
ObtrusiveLight_4_Ill_Seg1	PASS	0.4		ObtrusiveLight_4_Ill_Seg1	PASS	0.4	
ObtrusiveLight_4_Ill_Seg2	PASS	0.0		ObtrusiveLight_4_Ill_Seg2	PASS	0.0	
ObtrusiveLight_4_Ill_Seg3	PASS	0.7		ObtrusiveLight_4_Ill_Seg3	PASS	0.7	
ObtrusiveLight_4_Ill_Seg4	PASS	0.2		ObtrusiveLight_4_Ill_Seg4	PASS	0.2	
ObtrusiveLight_4_Ill_Seg5	PASS	0.9		ObtrusiveLight_4_Ill_Seg5	PASS	0.9	
ObtrusiveLight_6_Ill_Seg1	PASS	0.8		ObtrusiveLight_6_Ill_Seg1	PASS	0.8	
ObtrusiveLight_6_Ill_Seg2	PASS	0.4		ObtrusiveLight_6_Ill_Seg2	PASS	0.4	
ObtrusiveLight_5_Ill_Seg1	PASS	0.3		ObtrusiveLight_5_Ill_Seg1	PASS	0.3	
ObtrusiveLight_5_Ill_Seg2	PASS	0.0		ObtrusiveLight_5_Ill_Seg2	PASS	0.0	
ObtrusiveLight_1_Ill_Seg1	PASS	2.5		ObtrusiveLight_1_Ill_Seg1	PASS	2.5	
ObtrusiveLight_1_Ill_Seg2	PASS	0.4		ObtrusiveLight_1_Ill_Seg2	PASS	0.4	
ObtrusiveLight_1_Ill_Seg3	PASS	0.6		ObtrusiveLight_1_Ill_Seg3	PASS	0.6	
ObtrusiveLight_1_Ill_Seg4	PASS	0.6		ObtrusiveLight_1_Ill_Seg4	PASS	0.6	
ObtrusiveLight_3_Ill_Seg1	PASS	0.4		ObtrusiveLight_3_Ill_Seg1	PASS	0.4	
ObtrusiveLight_2_Ill_Seg1	PASS	0.5		ObtrusiveLight_2_Ill_Seg1	PASS	0.5	
Luminous Intensity (Cd) At Vertical Planes Maximum Allowable Value: 7500 Cd				Luminous Intensity (Cd) At Vertical Planes Maximum Allowable Value: 25000 Cd			
Calculations Tested (15):				Calculations Tested (15):			
<u>Calculation Label</u>	<u>Test Results</u>			<u>Calculation Label</u>	<u>Test Results</u>		
ObtrusiveLight_4_Cd_Seg1	PASS			ObtrusiveLight_4_Cd_Seg1	PASS		
ObtrusiveLight_4_Cd_Seg2	PASS			ObtrusiveLight_4_Cd_Seg2	PASS		
ObtrusiveLight_4_Cd_Seg3	PASS			ObtrusiveLight_4_Cd_Seg3	PASS		
ObtrusiveLight_4_Cd_Seg4	PASS			ObtrusiveLight_4_Cd_Seg4	PASS		
ObtrusiveLight_4_Cd_Seg5	PASS			ObtrusiveLight_4_Cd_Seg5	PASS		
ObtrusiveLight_6_Cd_Seg1	PASS			ObtrusiveLight_6_Cd_Seg1	PASS		
ObtrusiveLight_6_Cd_Seg2	PASS			ObtrusiveLight_6_Cd_Seg2	PASS		
ObtrusiveLight_5_Cd_Seg1	PASS			ObtrusiveLight_5_Cd_Seg1	PASS		
ObtrusiveLight_5_Cd_Seg2	PASS			ObtrusiveLight_5_Cd_Seg2	PASS		
ObtrusiveLight_1_Cd_Seg1	PASS			ObtrusiveLight_1_Cd_Seg1	PASS		
ObtrusiveLight_1_Cd_Seg2	PASS			ObtrusiveLight_1_Cd_Seg2	PASS		
ObtrusiveLight_1_Cd_Seg3	PASS			ObtrusiveLight_1_Cd_Seg3	PASS		
ObtrusiveLight_1_Cd_Seg4	PASS			ObtrusiveLight_1_Cd_Seg4	PASS		
ObtrusiveLight_3_Cd_Seg1	PASS			ObtrusiveLight_3_Cd_Seg1	PASS		
ObtrusiveLight_2_Cd_Seg1	PASS			ObtrusiveLight_2_Cd_Seg1	PASS		

Figure 10 – Non-Curfew Obtrusive Light Compliance Report for A2 & A4 zones

Obtrusive Light - Compliance Report			Obtrusive Light - Compliance Report		
AS/NZS 4282:2019, A2 - Low District Brightness, Curfew Filename: 20221020 21/10/2022 10:33:28 AM			AS/NZS 4282:2019, A4 - High District Brightness, Curfew Filename: 20221020 21/10/2022 10:34:42 AM		
Illuminance Maximum Allowable Value: 1 Lux			Illuminance Maximum Allowable Value: 5 Lux		
Calculations Tested (15):			Calculations Tested (15):		
<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>	<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>
ObtrusiveLight_4_III_Seg1	PASS	0.4	ObtrusiveLight_4_III_Seg1	PASS	0.4
ObtrusiveLight_4_III_Seg2	PASS	0.0	ObtrusiveLight_4_III_Seg2	PASS	0.0
ObtrusiveLight_4_III_Seg3	PASS	0.7	ObtrusiveLight_4_III_Seg3	PASS	0.7
ObtrusiveLight_4_III_Seg4	PASS	0.2	ObtrusiveLight_4_III_Seg4	PASS	0.2
ObtrusiveLight_4_III_Seg5	PASS	0.9	ObtrusiveLight_4_III_Seg5	PASS	0.9
ObtrusiveLight_6_III_Seg1	PASS	0.8	ObtrusiveLight_6_III_Seg1	PASS	0.8
ObtrusiveLight_6_III_Seg2	PASS	0.4	ObtrusiveLight_6_III_Seg2	PASS	0.4
ObtrusiveLight_5_III_Seg1	PASS	0.3	ObtrusiveLight_5_III_Seg1	PASS	0.3
ObtrusiveLight_5_III_Seg2	PASS	0.0	ObtrusiveLight_5_III_Seg2	PASS	0.0
ObtrusiveLight_1_III_Seg1	FAIL	2.5	ObtrusiveLight_1_III_Seg1	PASS	2.5
ObtrusiveLight_1_III_Seg2	PASS	0.4	ObtrusiveLight_1_III_Seg2	PASS	0.4
ObtrusiveLight_1_III_Seg3	PASS	0.6	ObtrusiveLight_1_III_Seg3	PASS	0.6
ObtrusiveLight_1_III_Seg4	PASS	0.6	ObtrusiveLight_1_III_Seg4	PASS	0.6
ObtrusiveLight_3_III_Seg1	PASS	0.4	ObtrusiveLight_3_III_Seg1	PASS	0.4
ObtrusiveLight_2_III_Seg1	PASS	0.5	ObtrusiveLight_2_III_Seg1	PASS	0.5
Failed Meter Locations (27):			Luminous Intensity (Cd) At Vertical Planes Maximum Allowable Value: 2500 Cd		
<u>Calculation Label</u>	<u>Lux</u>	<u>Meter Coords</u>	Calculations Tested (15):		
ObtrusiveLight_1_III_Seg1	1.1	-6.425, 30.769, 2.75	<u>Calculation Label</u>	<u>Test Results</u>	
ObtrusiveLight_1_III_Seg1	1.1	-6.425, 4.769, 4.75	ObtrusiveLight_4_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.1	-6.425, 6.769, 4.75	ObtrusiveLight_4_Cd_Seg2	PASS	
ObtrusiveLight_1_III_Seg1	1.2	-6.425, 16.769, 2.75	ObtrusiveLight_4_Cd_Seg3	PASS	
ObtrusiveLight_1_III_Seg1	1.2	-6.425, 60.769, 2.75	ObtrusiveLight_4_Cd_Seg4	PASS	
ObtrusiveLight_1_III_Seg1	1.3	-6.425, 32.769, 2.75	ObtrusiveLight_4_Cd_Seg5	PASS	
ObtrusiveLight_1_III_Seg1	1.3	-6.425, 58.769, 2.75	ObtrusiveLight_6_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.4	-6.425, 56.769, 2.75	ObtrusiveLight_6_Cd_Seg2	PASS	
ObtrusiveLight_1_III_Seg1	1.5	-6.425, 34.769, 2.75	ObtrusiveLight_5_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.6	-6.425, 0.769, 2.75	ObtrusiveLight_5_Cd_Seg2	PASS	
ObtrusiveLight_1_III_Seg1	1.6	-6.425, 48.769, 2.75	ObtrusiveLight_1_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.6	-6.425, 50.769, 2.75	ObtrusiveLight_1_Cd_Seg2	PASS	
ObtrusiveLight_1_III_Seg1	1.6	-6.425, 52.769, 2.75	ObtrusiveLight_1_Cd_Seg3	PASS	
ObtrusiveLight_1_III_Seg1	1.6	-6.425, 54.769, 2.75	ObtrusiveLight_1_Cd_Seg4	PASS	
ObtrusiveLight_1_III_Seg1	1.7	-6.425, 44.769, 2.75	ObtrusiveLight_3_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.7	-6.425, 46.769, 2.75	ObtrusiveLight_2_Cd_Seg1	PASS	
ObtrusiveLight_1_III_Seg1	1.8	-6.425, 2.769, 2.75			
ObtrusiveLight_1_III_Seg1	1.8	-6.425, 36.769, 2.75			
ObtrusiveLight_1_III_Seg1	1.8	-6.425, 42.769, 2.75			
ObtrusiveLight_1_III_Seg1	1.9	-6.425, 14.769, 2.75			
ObtrusiveLight_1_III_Seg1	1.9	-6.425, 38.769, 2.75			
ObtrusiveLight_1_III_Seg1	1.9	-6.425, 40.769, 2.75			
ObtrusiveLight_1_III_Seg1	2.1	-6.425, 4.769, 2.75			
ObtrusiveLight_1_III_Seg1	2.3	-6.425, 6.769, 2.75			
ObtrusiveLight_1_III_Seg1	2.3	-6.425, 12.769, 2.75			
ObtrusiveLight_1_III_Seg1	2.5	-6.425, 8.769, 2.75			
ObtrusiveLight_1_III_Seg1	2.5	-6.425, 10.769, 2.75			

Figure 11 – Curfew Obtrusive Light Compliance Report for A2 & A4 zones

Assessment had been conducted based on 5.5-metre-high working planes on all boundaries, measuring from the highest point of impacted observation points on adjoining properties in the direct sight of line with height point of luminaries.

Boundary vertical spill had been measured at 1.5m off ground level, and at the face of the adjoining property or at 10m into the adjoining property, whichever is closer. The illumination level on the proposed car park, drive-through and associated driveway etc had been conducted based on the recommendation of AS1158.3.1.

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Avg
CARPARK 1	Illuminance	Lux	17.52	95.2	4.1	4.27	N.A.
DDA	Illuminance	Lux	32.10	35.5	27.0	1.19	N.A.
site	Illuminance	Lux	71.16	440.9	3.0	23.72	6.20

Figure 12 Calculation Summary

4.0 SIGNAGE ILLUMINANCE LEVEL ASSESSMENT

We note that the signage contractor is unable to provide the photometric data for the advertising signs at this stage.

Figure 16 shows the elevations which include the existing and new pylon signs.

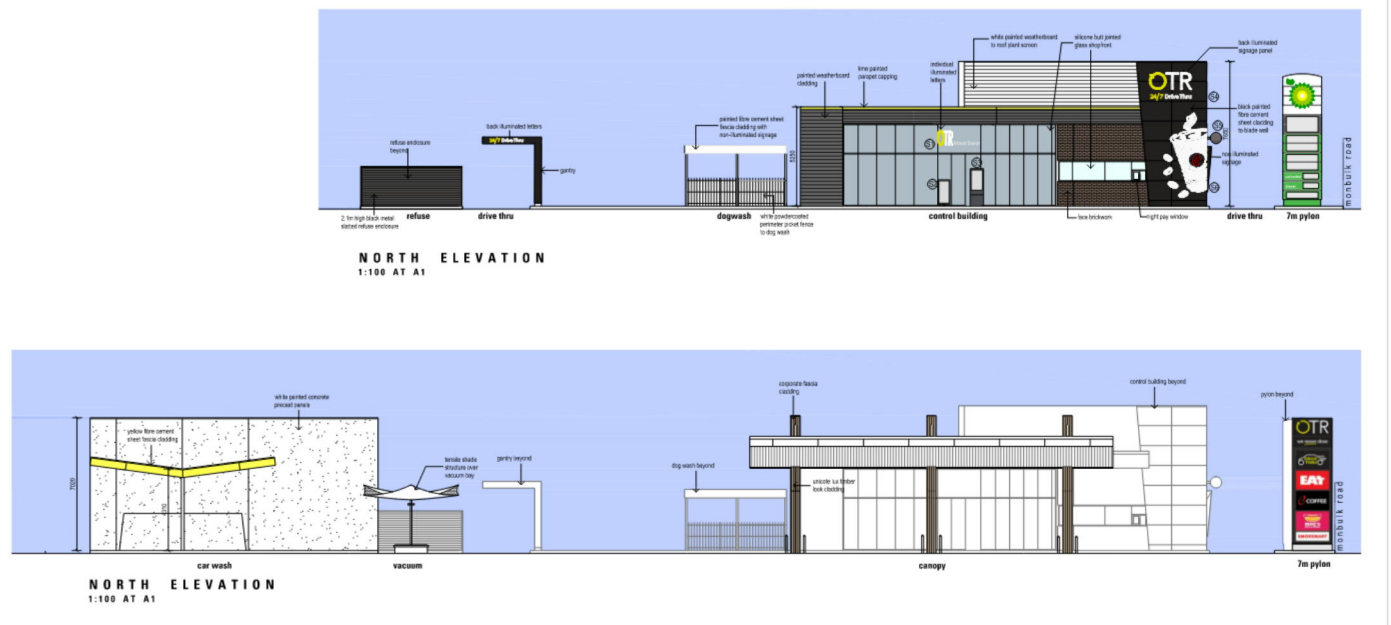


Figure 13 – Elevations showing Pylon Signs.

The brand light box will be completed with a dimmable driver Mean Well HLG -150H which will be dimmed down measured on site to ensure the *veiling luminance from the advertising signs not exceeding 0.25cd/m*.

The signs are suggested to bedimmed to meet the pre-curfew hours limited to a maximum of 25 lux across the boundary line, and the curfew hour limited to a maximum 5 lux (Light output to road way).

150W Single Output Switching Power Supply **HLG-150H-xx** ADM series

■ Features :

- * Universal AC Input / Full range (up to 305VAC)
- * Built-in active PFC function
- * High efficiency up to 94%
- * Protections: Short circuit / Over current / Over voltage / Over temperature
- * Cooling by free air convection
- * OCP point adjustable through output cable or internal potentiometer
- * IP67 / IP65 design for indoor or outdoor installations
- * Type HL LED Driver for use in Class I, Division 2 hazardous location luminaires
- * Three in one dimming function (1~10Vdc or PWM signal or resistance)
- * Suitable for LED lighting and street lighting applications
- * Compliance to worldwide safety regulations for lighting
- * Suitable for dry / damp / wet locations
- * 7 years warranty (Note.10)

We recommended that a dimmable controller ELEC0613-150Watt is installed for pylon signs. Pylon signs are suggested to be dimmed to meet the pre-curfew hours limited to a maximum of 5 lux across the boundary line, and the curfew hour limited to a maximum 2 lux (Light output to road way).

5.0 CONCLUSION

The modelled maximum spill on all boundaries for external lighting based on the above lighting layout and type complies with the criteria outlined in AS4282:2019. Although on the simulated result for A2-zone during Curfew hours (figure 11) shows a failure point along the Obtrusive light 1 segment boundary, this do not affect the compliance as the boundary in question is abutting a commercial zone, where A4 zoning requirement is applied.

The modelled illumination level on ground plane on the proposed carpark and circulating space based on the above lighting layout and type complies with the criteria outlined in AS1158.3.1.

We trust the above is satisfactory. However, should there be any further clarifications/assistance please do not hesitate to contact the undersigned or Adrian Ko.