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NBC Sports Fields Obtrusive Lighting Assessment

John Fisher Park, Curl Curl

Prepared by:

Lighting, Art and Science

for

Northern Beaches Council



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1. INTRODUCTION

Northern Beaches Council has engaged Lighting, Art & Science to review the obtrusive lighting for the proposed Sports Field lighting scheme for John Fisher Park, Curl Curl

The proposed lighting scheme was originally designed in September 2018 to Australian Standards: AS 2560.2.3-2007: *Sports Lighting Part 2.3: Specific Applications-Lighting for football (all codes)* and AS 4282-1997: *Control of the Obtrusive effects of outdoor lighting*.

The revised lighting scheme was dated October 12th, 2019.

This report reviews the revised calculations, which were based on the latest standards AS 2560.2.3-2007: *Sports Lighting Part 2.3: Specific Applications-Lighting for football (all codes)* and AS/NZS 4282:2019: *Control of the Obtrusive effects of outdoor lighting*.

Lighting, Art & Science assessed the site to confirm conformance with the most recent version of the obtrusive lighting standard: AS/NZS 4282:2019.

We have not evaluated the design with respect to conformance with AS2560.2.3.

2. PROPOSED LIGHTING SCHEME & SITE CONDITIONS

The proposed lighting scheme was developed by APEX Lighting.

2.1 Proposed Luminaire Details

The proposed luminaire for all three sites is the Philips Optivision LED (generation 3), 1500W, 5700K, fitted with integral shields to help mitigate obtrusive light.



Generation 3 (image of luminaire without gear box)

2.2 John Fisher Park, Curl Curl

The proposed lighting scheme for John Fisher Park comprises of 6 poles of 30m height. The proposal includes 50 luminaires to light 4 fields and 3 ovals (Frank Gray & Mike Pawley Ovals) to an approximate average of 100 lux. The design was based on generation 3 of the Philips Optivision LED luminaire.

The site is surrounded by Greendale Creek on the north, Weldon Oval to the east, residential properties and Freshwater Senior Campus on the south side, and commercial properties on local road Harbord Road to the west.

3. LIGHTING CATEGORIES

Australian Standard AS/NZS 4282:2019 recommends limits to control the obtrusive effects of outdoor lighting to environmentally sensitive areas, in particular residential areas. The standard recommends limits to light obtrusions as a benchmark of what a person living in an urban environment can be reasonably expected to tolerate as a result of an adjacent lighting installation.

There are a number of environmental zones used in the standard as per Table 1, which is an extract from table 3.1 of AS/NZS 4282:2019. The environmental zones are used to accommodate the different ambient light conditions.

We have made an assumption as to the relevant zone for each park and based our calculation on this.

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 commercial areas. Residential areas abutting commercial areas.

Table 1 Environmental Zones

4. UNITS OF MEASUREMENT

AS4282 uses several light technical parameters in the assessment.

AS4282 specifies different limits for the light technical parameters for the different ambient conditions (environmental zones). In addition, the standard nominates a curfew period where lower limits are applied. The default curfew period is between 11:00pm and 6:00am. The consent authority has the option to change the hours if required.

4.1 Luminous Flux

The **Luminous Flux** is a measure of the total amount of light that leaves a light source.

The luminous flux is the radiant flux that is emitted within the visible spectrum, between 380 (violet) and 740 (red) nanometres. The human eye does not have uniform sensitivity across the visible spectrum, and it is more sensitive to green and orange light than to blue and red light. The luminous flux is the product of the radiant flux and the sensitivity of the eye.

The luminous flux is measured in **lumens** (lm)

4.2 Illuminance

The **Illuminance** is a measure of the amount of light that falls on a surface. For obtrusive light the illuminance is calculated in the vertical plane and is an indicator of the light that is entering a building through the windows and illuminating the vertical surfaces within a room.

Illuminance is measured in **lux** (lumens/m²)

The illuminance assessment considers only the light resulting from direct illuminance from the installation; that is the light that comes directly from the light fittings.

In all installations there is also indirect light that is reflected off the ground, walls of buildings, objects in the lit area and in some cases reflections from clouds.

The standard only addresses direct illumination effects. This is due to the standard being designed to determine conformance or non-conformance and the difficulty of including consistent indirect lighting contributions.

Direct illumination can be readily and reliably calculated.

The indirect contribution is affected by colours (e.g. the colour of adjacent buildings), whether trees have leaves, the weather etc. Although the contributions from these indirect components are real, they cannot be reliably calculated. This makes it very difficult to make a quantitative assessment of the total impact of any installation.

The limits recommended in the standard are set with the understanding that they do not include the indirect component.

4.3 Luminous Intensity

Luminous Intensity is the light leaving a source in a given direction and is measured in **candelas**. (lumens/steradian)

Luminous Intensity emitted by luminaires – This is an indicator of the brightness of the light source or the resulting glare. This is governed by the brightness of the light source, the glare control of the light fitting and the viewing angle.

Theoretically this effect does not reduce with distance; however, with a very small light source the perception will reduce as the image of the light on the eye becomes smaller than the size of the light receptors in the eye. In addition, if the distance is long enough there will be a reduction in the brightness due to the permeability of the air.



Although it is not a formal Glare Index, it was included as a simple indication of the glare caused by the lighting installation and an indication of the level of distraction or discomfort the lighting might cause. The luminous intensity relates to a specific direction and will depend on the light distribution of the light fitting and the direction of view.

Luminous intensity is not relevant in locations that do not have direct view of light.

The standard has two levels of conformance for luminous intensity. L1 relates to all new installations whereas L2 is allowed for legacy installations that are reusing existing poles.

AGi32, the industry standard lighting calculation program assess the luminous intensity at an angle 10 degrees below the horizontal. This means that if you are more than 200 metres from a 35 metre high pole your viewing angle is above that 10 degree level. Many modern sports lights have a very sharp cut-off which means that the fitting may formally fail the AGI assessment, but in practice will not be a problem.

4.4 Luminance

The **luminance** is the light that leaves the area of a surface in all directions. It is measured in **candela/m² (cd/m²)**. The eye sees by distinguishing the difference in luminance between the different objects and surfaces.

AS/NZS4282 recommends limits on the luminance of lit vertical surfaces including signs.

Luminance is only required for lit vertical surfaces such as illuminated signs and is therefore not relevant in this situation.

4.5 Threshold Increment

Threshold increment – This is a measure of the disability glare that results from the light sources with particular application to the reading of signs, signals by the drivers of vehicles etc.

4.6 Upward Light Ratio (ULR)

Upward light ratio limits the light emitted into the sky to limit the impact on sky glow.

5. LIGHTING CONFORMANCE PARAMETERS AS/NZS 4282:2019

The standard specifies limits for a number of light technical parameters required to achieve conformance, per those outlined in the standards.

The pre-lodgement advice (PLM2018-0253) states that “for all parks the operating hours are restricted to 9.30pm, and lights are shut off at that point”. Therefore, the site was assessed to non-curfew L1 conditions.

5.1 Lighting technical parameters

We consider that John Fisher Park is located within or adjacent to A3 environmental zones, ‘medium district brightness’

Therefore, the proposed lighting for John Fisher Park was assessed for an A3 environmental zone for AS/NZS 4282:2019.

Table 2 lists the applicable light parameters.

Zones	Description	Vertical illuminance levels (Ev) – Non-curfew L1	Maximum luminous intensity per luminaire – Non-curfew L1	Threshold increment (TI)	Upward light ratio (ULR)
A3	Medium district brightness	10 lux	12,500 cd	20% at default adaptation level of 1	0.02

Table 2: Environmental Zones Parameters

Refer to Appendix A for a map showing what parameters were assessed.

6. AS/NZS 4282:2019 ASSESSMENT FINDINGS AND RECOMMENDATIONS

AGI32 software was used to demonstrate conformance with the parameters of AS/NZS 4282:2019.

Table 3 shows the results for conformance with AS/NZS 4282:2019.

Location	John Fisher Park, Curl Curl
Vertical Illuminance Levels (Ev) Non-curfew L1 conformance	Yes
Applicable Limit	10 lux
AGI32 Results (highest calculated value)	0.9 lux @ Manuela/ Holloway (& 0.7 lux @ 5 Holloway Place)
Maximum Luminous Intensity per luminaire Non-curfew L1 conformance	Yes
Applicable Limit	12,500 cd
AGI 32 Results (highest calculated value)	3,949 cd @ Manuela/ Holloway (& 3,352 cd @ 4 Holloway Pl)
Threshold Increment (TI) conformance	Yes
Applicable Limit	20% at default adaptation level of 1
AGI32 Result (highest calculated value)	1% @ Bennett St E, Harbord Bowl S, Holloway Pl and Manuela Pl
Upward Light Ratio (ULR) conformance	Yes
Applicable Limit	0.02
AGI32 Result (highest calculated value)	0.000

Table 3: AS/NZS 4282:2019 assessment findings



7. LIGHTING EFFECTS ON SURROUNDS/WILDLIFE

We are not environmental consultants and as a result although we can assess the magnitude of the lighting impact on a specific area, we cannot determine the impact on a specific biota.

AS4282 does not specifically address the impacts of lighting on biota. The standard acknowledges that there may be an impact but that it is not possible to be specific as light has different impacts on different species and although the impact on some species has been extensively researched, very little is known about the majority of species.

As the environmental zones A0 to A2 relate to virtually uninhabited areas, the limits applied in AS4282 are principally for the protection of the environment and the sky.

For the purposes of assessing the impact on wildlife in surrounding bushland, the Vertical Illuminance was calculated at the boundary of the site itself, as well as 10m beyond the boundary. In addition to this a horizontal lighting calculation illustrated with isolines, demonstrates the horizontal light levels within a radius of 250m from the approximate centre of the fields. Note that in some instances the boundary of the site is not clear from the site drawings, and assumptions were made.

These two calculations provide an indication of the amount of light spilling beyond the illuminated area that may impact on wildlife in the surrounding bushland. Note that all calculations are based on the direct component of light only, excluding any reflected light. Nor do these calculations take into account any obstructions such as trees etc.

These additional calculation grids were assessed against the environmental zone applicable for each site. The selected environmental zones take into account the brightness of the district.

Note that these calculations are not required by AS/NZS 4282:2019. The results of these calculations do not determine conformance or non-conformance with the standard. However, they can be used as an indication of spill light impacting surrounds/wildlife.

8. SURROUNDS ASSESSMENT FINDINGS AND RECOMMENDATIONS

Table 4 shows the results for the Vertical Illuminance calculations.

Location	John Fisher Park, Curl Curl
Vertical Illuminance Levels (Ev) Non-curfew L1 conformance @ site boundary	No, note 1
Applicable Limit	10 lux
AGI32 Results (highest maximum calculated value)	39.6 lux
AGI32 Results (highest average calculated value)	5 lux
Vertical Illuminance Levels (Ev) Non-curfew L1 conformance @ 10 from site boundary	Yes, note 2
Applicable Limit	10 lux
AGI32 Results (highest maximum calculated value)	6.6 lux
AGI32 Results (highest average calculated value)	1 lux

Note 1: It should be noted that the site boundary has not been clearly defined On the site plan. Therefore, the site boundary was taken at approximately Greendale Creek. The maximum values occur in the area between pole 1 and pole 6. On the assumed boundary calculation grid the values are above the maximum of 10 lux. However, the values decrease significantly at approximately 10m from the assumed boundary, and fall well within the limits.

The maximum values only provide an illuminance reading at a particular location. The average value provides a more comprehensive indication of impact on the surrounds. The highest average value for this area is a 5 lux, which drops off significantly at the 10m calculation grid to 1 lux. Therefore, the impact on the surrounds is deemed to be minimal.

Note 2: The values fall well within the limits of the standard.

Table 4: Surrounds assessment findings



9. CONCLUSIONS

John Fisher Park was assessed against the limits of the latest standard of AS/NZS 4282:2019 to determine the impact of the proposed lighting scheme on the nearby residences and streets.

The revised calculations for John Fisher Park show conformance with environmental zone A3.

The impact of the proposed lighting scheme on its surrounds/wildlife was assessed by analysing Vertical Illuminance around the site. Lighting, Art & Science has not identified any areas of concern, and deem the impact of the proposed lighting installations on its surrounds to be minimal given the locations of the area and the site.

10. REFERENCES:

- a) AS/NZS 4282:2019
- b) AS 4282:1997
- c) AS 2560.2.3

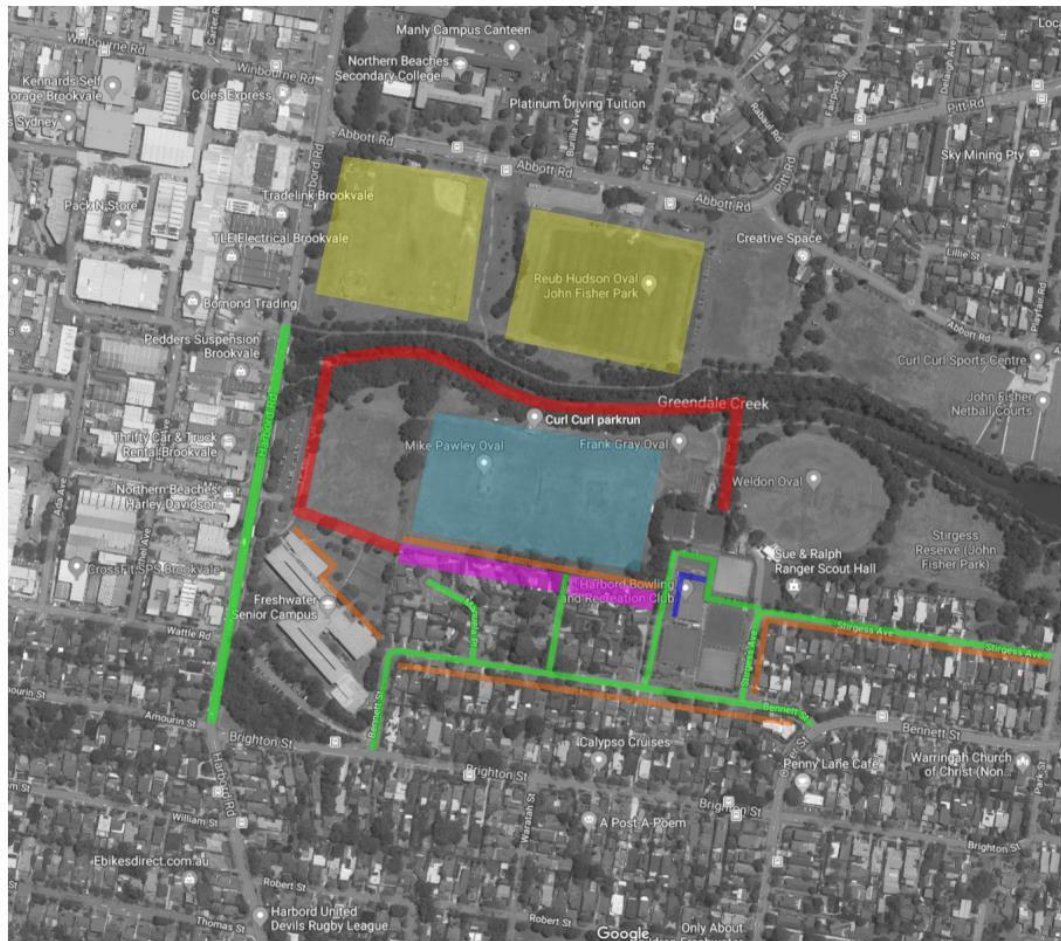
11. APPENDICES

Appendix A – Map Lighting Parameters John Fisher Park, Curl Curl

L160P-CL03-STD-P2 – John Fisher Park – AS/NZS 4282:2019 Calculations

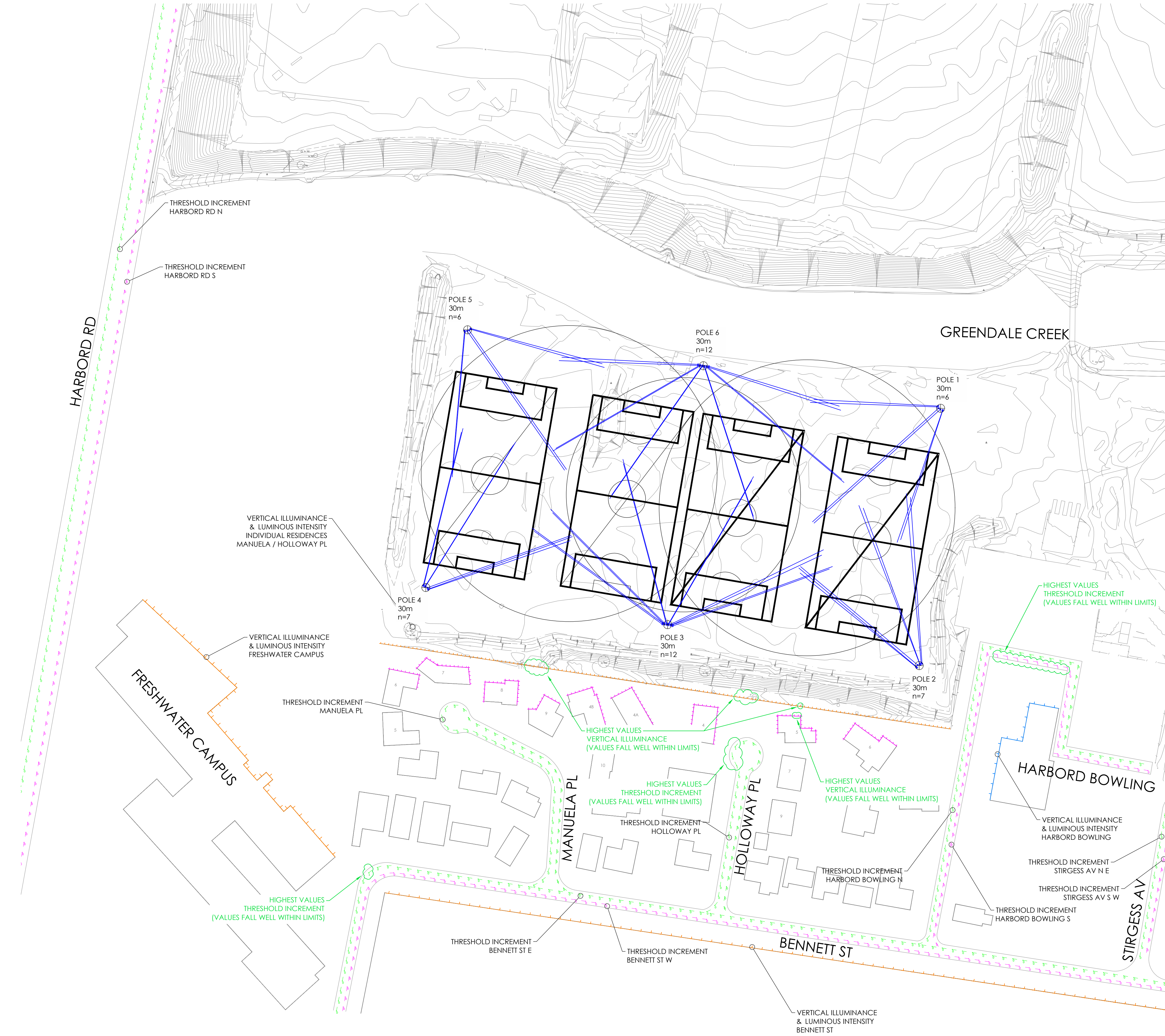
L160P-CL03-SUR-P2 – John Fisher Park – Surrounds Calculations

11.1 Appendix A – Map Lighting Parameters John Fisher Park, Curl Curl



LEGEND





Luminaire Schedule				
Scene: Initial				
Symbol	Label	Qty	Description	Total Lamp Lumens
	BVP527 OUT T30 50K A35-NB +LO	50	Apex OptiVision LED Gen3 3 module 5700 K	212481

Luminaire Location Summary 1				
Project: Pole 1				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
1	BVP527 OUT T30 50K A35-NB +LO	29.7	64	1.00
2	BVP527 OUT T30 50K A35-NB +LO	30.25	64	1.00
3	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
4	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
5	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
6	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00

Luminaire Location Summary 2				
Project: Pole 2				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
7	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
8	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
9	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
10	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
11	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
12	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
13	BVP527 OUT T30 50K A35-NB +LO	29.7	68	1.00

Luminaire Location Summary 3				
Project: Pole 3				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
14	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
15	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
16	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
17	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
18	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
19	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
20	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
21	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
22	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
23	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
24	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
25	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00

Luminaire Location Summary 4				
Project: Pole 4				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
26	BVP527 OUT T30 50K A35-NB +LO	29.7	68	1.00
27	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
28	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
29	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
30	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
31	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
32	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00

Luminaire Location Summary 5				
Project: Pole 5				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
33	BVP527 OUT T30 50K A35-NB +LO	30.25	67	1.00
34	BVP527 OUT T30 50K A35-NB +LO	29.7	67	1.00
35	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
36	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
37	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00
38	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00

Luminaire Location Summary 6				
Project: Pole 6				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
39	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00
40	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
41	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
42	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
43	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
44	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
45	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
46	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
47	BVP527 OUT T30 50K A35-NB +LO	29.7	71	1.00
48	BVP527 OUT T30 50K A35-NB +LO	30.25	71	1.00
49	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
50	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Non-Curfew L1
Filename: 18076-07-A John Fisher Park_LA+S - Copy - revised 200225
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Illuminance

Maximum Allowable Value: 10 Lux
Calculations Tested (53):

Calculation Label	Test Results	Max. Illum.
ObtrusiveLight_6 Manuela Pl_III_Seg1	PASS	0.3
ObtrusiveLight_6 Manuela Pl_III_Seg2	PASS	0.1
ObtrusiveLight_7 Manuela Pl_III_Seg1	PASS	0.1
ObtrusiveLight_7 Manuela Pl_III_Seg2	PASS	0.4
ObtrusiveLight_7 Manuela Pl_III_Seg3	PASS	0.5
ObtrusiveLight_7 Manuela Pl_III_Seg4	PASS	0.3
ObtrusiveLight_8 Manuela Pl_III_Seg1	PASS	0.1
ObtrusiveLight_8 Manuela Pl_III_Seg2	PASS	0.1
ObtrusiveLight_8 Manuela Pl_III_Seg3	PASS	0.5
ObtrusiveLight_8 Manuela Pl_III_Seg4	PASS	0.3
ObtrusiveLight_8 Manuela Pl_III_Seg5	PASS	0.3
ObtrusiveLight_9 Manuela Pl_III_Seg1	PASS	0.2
ObtrusiveLight_9 Manuela Pl_III_Seg2	PASS	0.4
ObtrusiveLight_9 Manuela Pl_III_Seg3	PASS	0.5
ObtrusiveLight_4A Holloway Pl_III_Seg1	PASS	0.1
ObtrusiveLight_4A Holloway Pl_III_Seg2	PASS	0.2
ObtrusiveLight_4 Holloway Pl_III_Seg1	PASS	0.1
ObtrusiveLight_4 Holloway Pl_III_Seg2	PASS	0.5
ObtrusiveLight_4 Holloway Pl_III_Seg3	PASS	0.2
ObtrusiveLight_5 Holloway Pl_III_Seg1	PASS	0.2
ObtrusiveLight_5 Holloway Pl_III_Seg2	PASS	0.7
ObtrusiveLight_5 Holloway Pl_III_Seg3	PASS	0.3
ObtrusiveLight_5 Holloway Pl_III_Seg4	PASS	0.5
ObtrusiveLight_5 Holloway Pl_III_Seg5	PASS	0.2
ObtrusiveLight_5 Holloway Pl_III_Seg6	PASS	0.5
ObtrusiveLight_5 Holloway Pl_III_Seg7	PASS	0.2
ObtrusiveLight_6 Holloway Pl_III_Seg1	PASS	0.4
ObtrusiveLight_6 Holloway Pl_III_Seg2	PASS	0.4
ObtrusiveLight_6 Holloway Pl_III_Seg3	PASS	0.3
ObtrusiveLight_6 Holloway Pl_III_Seg4	PASS	0.2
ObtrusiveLight_Harbord Bowling_III_Seg1	PASS	0.1
ObtrusiveLight_Harbord Bowling_III_Seg2	PASS	0.1
ObtrusiveLight_Harbord Bowling_III_Seg3	PASS	0.2
ObtrusiveLight_Harbord Bowling_III_Seg4	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg1	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg2	PASS	0.0
ObtrusiveLight_Freshwater Campus_III_Seg3	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg4	PASS	0.0
ObtrusiveLight_Freshwater Campus_III_Seg5	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg6	PASS	0.0
ObtrusiveLight_Freshwater Campus_III_Seg7	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg8	PASS	0.0
ObtrusiveLight_Freshwater Campus_III_Seg9	PASS	0.1
ObtrusiveLight_Freshwater Campus_III_Seg10	PASS	0.0
ObtrusiveLight_Freshwater Campus_III_Seg11	PASS	0.0
ObtrusiveLight_Bennett St_III_Seg1	PASS	0.1
ObtrusiveLight_4B Manuela Pl_III_Seg1	PASS	0.4
ObtrusiveLight_4B Manuela Pl_III_Seg2	PASS	0.3
ObtrusiveLight_4B Manuela Pl_III_Seg3	PASS	0.4
ObtrusiveLight_4B Manuela Pl_III_Seg4	PASS	0.3
ObtrusiveLight_Stirgess Av_III_Seg1	PASS	0.0
ObtrusiveLight_Stirgess Av_III_Seg2	PASS	0.0
ObtrusiveLight_Manuela Holloway_III_Seg1	PASS	0.9

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 2.0 %

Calculated UWLR:	0.0 %
Test Results:	PASS

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 12500 Cd

Calculations Tested (53):

Calculation Label	Test Results
ObtrusiveLight_6 Manuela Pl_Cd_Seg1	PASS
ObtrusiveLight_6 Manuela Pl_Cd_Seg2	PASS
ObtrusiveLight_7 Manuela Pl_Cd_Seg1	PASS
ObtrusiveLight_7 Manuela Pl_Cd_Seg2	PASS
ObtrusiveLight_7 Manuela Pl_Cd_Seg3	PASS
ObtrusiveLight_7 Manuela Pl_Cd_Seg4	PASS
ObtrusiveLight_8 Manuela Pl_Cd_Seg1	PASS
ObtrusiveLight_8 Manuela Pl_Cd_Seg2	PASS
ObtrusiveLight_8 Manuela Pl_Cd_Seg3	PASS
ObtrusiveLight_8 Manuela Pl_Cd_Seg4	PASS
ObtrusiveLight_9 Manuela Pl_Cd_Seg1	PASS
ObtrusiveLight_9 Manuela Pl_Cd_Seg2	PASS
ObtrusiveLight_9 Manuela Pl_Cd_Seg3	PASS
ObtrusiveLight_4A Holloway Pl_Cd_Seg1	PASS
ObtrusiveLight_4A Holloway Pl_Cd_Seg2	PASS
ObtrusiveLight_4 Holloway Pl_Cd_Seg1	PASS
ObtrusiveLight_4 Holloway Pl_Cd_Seg2	PASS
ObtrusiveLight_4 Holloway Pl_Cd_Seg3	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg1	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg2	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg3	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg4	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg5	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg6	PASS
ObtrusiveLight_5 Holloway Pl_Cd_Seg7	PASS
ObtrusiveLight_6 Holloway Pl_Cd_Seg1	PASS
ObtrusiveLight_6 Holloway Pl_Cd_Seg2	PASS
ObtrusiveLight_6 Holloway Pl_Cd_Seg3	PASS
ObtrusiveLight_6 Holloway Pl_Cd_Seg4	PASS
ObtrusiveLight_Harbord Bowling_Cd_Seg1	PASS
ObtrusiveLight_Harbord Bowling_Cd_Seg2	PASS
ObtrusiveLight_Harbord Bowling_Cd_Seg3	PASS
ObtrusiveLight_Harbord Bowling_Cd_Seg4	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg1	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg2	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg3	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg4	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg5	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg6	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg7	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg8	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg9	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg10	PASS
ObtrusiveLight_Freshwater Campus_Cd_Seg11	PASS
ObtrusiveLight_Bennett St_Cd_Seg1	PASS
ObtrusiveLight_4B Manuela Pl_Cd_Seg1	PASS
ObtrusiveLight_4B Manuela Pl_Cd_Seg2	PASS
ObtrusiveLight_4B Manuela Pl_Cd_Seg3	PASS
ObtrusiveLight_Stirgess Av_Cd_Seg1	PASS
ObtrusiveLight_Stirgess Av_Cd_Seg2	PASS
ObtrusiveLight_Manuela Holloway_Cd_Seg1	PASS

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (10):

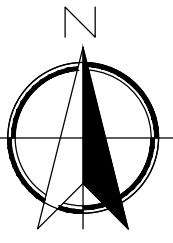
Calculation Label	Adaptation Luminance	Test Results
ObtrusiveLight_TI_Harbord Rd_S	1	PASS
ObtrusiveLight_TI_Harbord Rd_N	1	PASS
ObtrusiveLight_TI_Bennett St_W	1	PASS
ObtrusiveLight_TI_Manuela Pl	1	PASS
ObtrusiveLight_TI_Holloway Pl	1	PASS
ObtrusiveLight_TI_Bennett St_E	1	PASS
ObtrusiveLight_TI_Harbord Bowl_N	1	PASS
ObtrusiveLight_TI_Harbord Bowl_S	1	PASS
ObtrusiveLight_TI_Stirgess Av_NE	1	PASS
ObtrusiveLight_TI_Stirgess Av_SW	1	PASS

Issue Amendment

P1	PRELIMINARY ISSUE
P2	PRELIMINARY ISSUE
P3	PRELIMINARY ISSUE

Date

25-09-19
01-11-19
27-02-20



0 10 20 30 40 50 100m 1:1000@A1

Notes:

- Drawings are based on site plan, converted PDF from APEX lighting design for pole locations, and aerial imagery. Locations are indicative only.
- Vertical Illuminance & Luminous Intensity calculation grid heights: 1.5 - 30m.
- Vertical Illuminance & Luminous Intensity calculation grid heights for individual houses: 1.5 - 10m.
- Threshold Increment calculations height: 1.5m.
Windscreen cutoff angle: 20° above the horizontal.
- A light loss factor of 1.0 is used to show initial light values.

Lead Consultant
BBF TOWN PLANNERS

Client
NBC



Lighting, Art & Science

Lighting Consultants, Electrical Engineers
Level 1, 41 Hume St, Crows Nest NSW 2065
p: +61 2 9436 0998 e: mail@laands.com.au

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Project NBC SPORTSFIELDS
JOHN FISHER PARK, MANLY VALE

Drawing OBTRUSIVE LIGHTING ASSESSMENT
AS/NZS 4282:2019 CALCULATIONS

Drawn CVZ Date SEP 2019

Project No Drawing No

L160P CL-03 STD

Scale
1:1000@A1

Rev

P3

Luminaire Schedule				
Scene: Initial				
Symbol	Label	Qty	Description	Total Lamp Lumens
	BVP527 OUT T30 50K A35-NB +LO	50	Apex OptiVision LED Gen3 3 module 5700 K	212481

Luminaire Location Summary 1				
Project: Pole 1				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
1	BVP527 OUT T30 50K A35-NB +LO	29.7	64	1.00
2	BVP527 OUT T30 50K A35-NB +LO	30.25	64	1.00
3	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
4	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
5	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
6	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00

Luminaire Location Summary 2				
Project: Pole 2				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
7	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
8	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
9	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
10	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
11	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
12	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
13	BVP527 OUT T30 50K A35-NB +LO	29.7	68	1.00

Luminaire Location Summary 3				
Project: Pole 3				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
14	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
15	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
16	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
17	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
18	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
19	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
20	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
21	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
22	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
23	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
24	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
25	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00

Luminaire Location Summary 4				
Project: Pole 4				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
26	BVP527 OUT T30 50K A35-NB +LO	29.7	68	1.00
27	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
28	BVP527 OUT T30 50K A35-NB +LO	30.25	68	1.00
29	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
30	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
31	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
32	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00

Luminaire Location Summary 5				
Project: Pole 5				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
33	BVP527 OUT T30 50K A35-NB +LO	30.25	67	1.00
34	BVP527 OUT T30 50K A35-NB +LO	29.7	67	1.00
35	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
36	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
37	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00
38	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00

Luminaire Location Summary 6				
Project: Pole 6				
Scene: Initial				
LumNo	Label	Z	Tilt	LLF
39	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00
40	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
41	BVP527 OUT T30 50K A35-NB +LO	30.25	70	1.00
42	BVP527 OUT T30 50K A35-NB +LO	29.7	70	1.00
43	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
44	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
45	BVP527 OUT T30 50K A35-NB +LO	30.25	69	1.00
46	BVP527 OUT T30 50K A35-NB +LO	29.7	69	1.00
47	BVP527 OUT T30 50K A35-NB +LO	29.7	71	1.00
48	BVP527 OUT T30 50K A35-NB +LO	30.25	71	1.00
49	BVP527 OUT T30 50K A35-NB +LO	29.7	66	1.00
50	BVP527 OUT T30 50K A35-NB +LO	30.25	66	1.00

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Non-Curlew L1
Filename: 18076-07-A John Fisher Park_LA+S - Copy - revised 200225
25/02/2020 4:02:11 PM

Illuminance

Maximum Allowable Value: 10 Lux

Calculations Tested (20):

Calculation Label	Test Results	Max. Illum.
ObtrusiveLight_Site_Surrounds_0m_III_Seg1	PASS	0.3
ObtrusiveLight_Site_Surrounds_0m_III_Seg2	PASS	0.1
ObtrusiveLight_Site_Surrounds_0m_III_Seg3	PASS	0.1
ObtrusiveLight_Site_Surrounds_0m_III_Seg4	PASS	0.3
ObtrusiveLight_Site_Surrounds_0m_III_Seg5	PASS	0.5
ObtrusiveLight_Site_Surrounds_0m_III_Seg6	FAIL	29.9
ObtrusiveLight_Site_Surrounds_0m_III_Seg7	FAIL	36.6
ObtrusiveLight_Site_Surrounds_0m_III_Seg8	FAIL	39.6
ObtrusiveLight_Site_Surrounds_0m_III_Seg9	PASS	0.2
ObtrusiveLight_Site_Surrounds_0m_III_Seg10	PASS	0.2
ObtrusiveLight_Site_Surrounds_10_III_Seg1	PASS	0.2
ObtrusiveLight_Site_Surrounds_10_III_Seg2	PASS	0.1
ObtrusiveLight_Site_Surrounds_10_III_Seg3	PASS	0.1
ObtrusiveLight_Site_Surrounds_10_III_Seg4	PASS	0.2
ObtrusiveLight_Site_Surrounds_10_III_Seg5	PASS	0.4
ObtrusiveLight_Site_Surrounds_10_III_Seg6	PASS	3.9
ObtrusiveLight_Site_Surrounds_10_III_Seg7	PASS	6.5
ObtrusiveLight_Site_Surrounds_10_III_Seg8	PASS	6.6
ObtrusiveLight_Site_Surrounds_10_III_Seg9	PASS	0.1
ObtrusiveLight_Site_Surrounds_10_III_Seg10	PASS	0.2

Calculation Summary				
Project: LA+S - Obtrusive Surrounds				
Scene: Initial				
Label	Units	Avg	Max	
ObtrusiveLight_Site_Surrounds_0m_III_Seg1	Lux	0	0.3	
ObtrusiveLight_Site_Surrounds_0m_III_Seg10	Lux	0	0.2	
ObtrusiveLight_Site_Surrounds_0m_III_Seg2	Lux	0	0.1	
ObtrusiveLight_Site_Surrounds_0m_III_Seg3	Lux	0	0.1	
ObtrusiveLight_Site_Surrounds_0m_III_Seg4	Lux	0	0.3	
ObtrusiveLight_Site_Surrounds_0m_III_Seg5	Lux	0	0.5	
ObtrusiveLight_Site_Surrounds_0m_III_Seg6	Lux	3	29.9	
ObtrusiveLight_Site_Surrounds_0m_III_Seg7	Lux	5	36.6	
ObtrusiveLight_Site_Surrounds_0m_III_Seg8	Lux	3	39.6	
ObtrusiveLight_Site_Surrounds_0m_III_Seg9	Lux	0	0.2	
ObtrusiveLight_Site_Surrounds_10_III_Seg1	Lux	0	0.2	
ObtrusiveLight_Site_Surrounds_10_III_Seg10	Lux	0	0.2	
ObtrusiveLight_Site_Surrounds_10_III_Seg2	Lux	0	0.1	
ObtrusiveLight_Site_Surrounds_10_III_Seg3	Lux	0	0.1	
ObtrusiveLight_Site_Surrounds_10_III_Seg4	Lux	0	0.2	
ObtrusiveLight_Site_Surrounds_10_III_Seg5	Lux	0	0.4	
ObtrusiveLight_Site_Surrounds_10_III_Seg6	Lux	0	3.9	
ObtrusiveLight_Site_Surrounds_10_III_Seg7	Lux	1	6.5	
ObtrusiveLight_Site_Surrounds_10_III_Seg8	Lux	0	6.6	
ObtrusiveLight_Site_Surrounds_10_III_Seg9	Lux	0	0.1	

Lead Consultant
BBF TOWN PLANNERS

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Project NBC SPORTSFIELDS
JOHN FISHER PARK, MANLY VALE

Drawing OBTRUSIVE LIGHTING ASSESSMENT
SURROUNDINGS CALCULATIONS

Drawn CVZ Approved RM Date SEP 2019

Project No L160P Drawing No CL-03 SUR

Scale 1:1000@A1
Rev P3

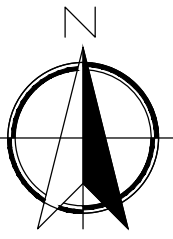
Issue

Amendment

Date

P1 PRELIMINARY ISSUE
P2 PRELIMINARY ISSUE
P3 PRELIMINARY ISSUE

25-09-19
01-11-19
27-02-20



0 10 20 30 40 50 100m 1:1000@A1

Notes:

- Drawings are based on site plan, converted PDF from APEX lighting design for pole locations, and aerial imagery. Locations are indicative only.
- Vertical illuminance calculation grid heights: 1.5 - 30m.
- A light loss factor of 1.0 is used to show initial light values.
- Floodlight reference tilt is noted as 'tilt'. Subtract 30° from tilt value to get the tilt of the visor.