

Obtrusive Light Assessment

Bareena Park Tennis Club

This obtrusive light assessment is based on the lighting design provided on page 6 and the requirements of Australian/New Zealand Standard 4282-2019 *Control of Obtrusive Effects of Outdoor Lighting*.

Four aspects of potential obtrusive light are considered in AS/NZS 4282-2019:

1. The light falling on surrounding properties. Vertical illuminance (Ev): the illuminance on surfaces, particularly vertical surfaces, is an indicator of this effect.
2. The brightness of luminaires in the field of view of nearby residents. Intensity (I): the luminous intensity of a luminaire, in a nominated direction, is an indicator of this effect.
3. The effects on transport system users. Threshold increment (TI): the measurement of disability glare expressed as the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present.
4. The effects on astronomical observations and the impact on protected dark environments. Upward light ratio (ULR): the ratio of upward flux and total flux from a luminaire/installation.

In addition, the above limiting values are differentiated according to the following criteria:

1. The level of lighting existing in the area. Different limits have been applied based on the ambient light conditions. These ambient conditions are described for each of the environmental zones shown in table below.

Zone	Description	Example
AO	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

2. The time when the proposed lighting is to operate. Two sets of limits are specified. One, with higher values, is for application outside the curfew period set by local government and the other, with lower values, is for application during the curfew period. The majority of outdoor sports lighting systems are expected to operate only outside the curfew period (non-curfew).

In this project, assessment is made for Ev, I, TI, and ULR. All calculations are based on initial photometric values of the luminaires (new) and non-curfew period with an environment zone of A3 – Medium district brightness.

Calculation summary

Ev

- Vertical illuminance has been calculated on a grid of points in the relevant vertical planes, spaced at 2 metres horizontally and 2 metre vertically. The height of the calculation grid is from 0 metres to 10 metres above ground level. The location of the calculation plane is determined at the building line of the potentially affected dwellings.
- The maximum Ev calculated is 10 lux on any of the planes.
- AS/NZS 4282-2019 requires a maximum of 10 lux on the building line or at 10 metres inside the relevant property boundary as shown (whichever is closer).
- Please see Illuminance Report on page 6 for calculations for the following residential buildings:
 - 22 Vista Avenue
 - 26 Vista Avenue
 - 27 Vista Avenue
 - 29 Vista Avenue
 - 31 Vista Avenue
 - 34 Dobroyd Road

- Intensity calculation grids are the same as per the grids used for Ev.
- The maximum intensity calculated is 7557cd on any of the planes.

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- AS/NZS 4282-2019 requires a maximum of 12500 cd.

TI

- Threshold Increment is calculated less than 10 lux in both directions.
- The maximum TI calculated is 1 % using an adaption luminance (Lad) of 0.2 cd/m². Adaption luminance represents the brightness of the transport corridor, lower is darker (0.2 is a conservative assumption).
- AS/NZS 4282-2019 requires a maximum of 20 % using an adaption luminance (Lad) of 1 cd/m².

ULR

- The ULR applies to the whole installation. Therefore, individual luminaires are permitted to exceed the value provided the installation as a whole is less than the limit, as are individual luminaires.
- The ULR calculated is: 0.000
- AS/NZS 4282-2019 requires 0.02 maximum.

Notes

- The location of the property boundaries/building lines have been assumed by using a google earth aerial image.
- Although these limiting values are intended to control the obtrusive effects, they will not necessarily ensure that a conforming installation will receive no adverse reaction from those affected by the spillight, as both physiological and psychological effects are involved to determine the obtrusiveness.
- AS/NZS 4282-2019 does not apply to environment impacts associated with the daytime appearance of outdoor lighting systems, including associated support structures.
- Shine On Caravel Mk2 LED Sports Lights with rear shields have been used for this lighting scheme and analysis. The visors will ensure a superior level of light control with the figure below illustrating the light distribution of the design.
- We will minimise the energy consumption of the site by including a dimming function which will be set at 20% at initial installation.

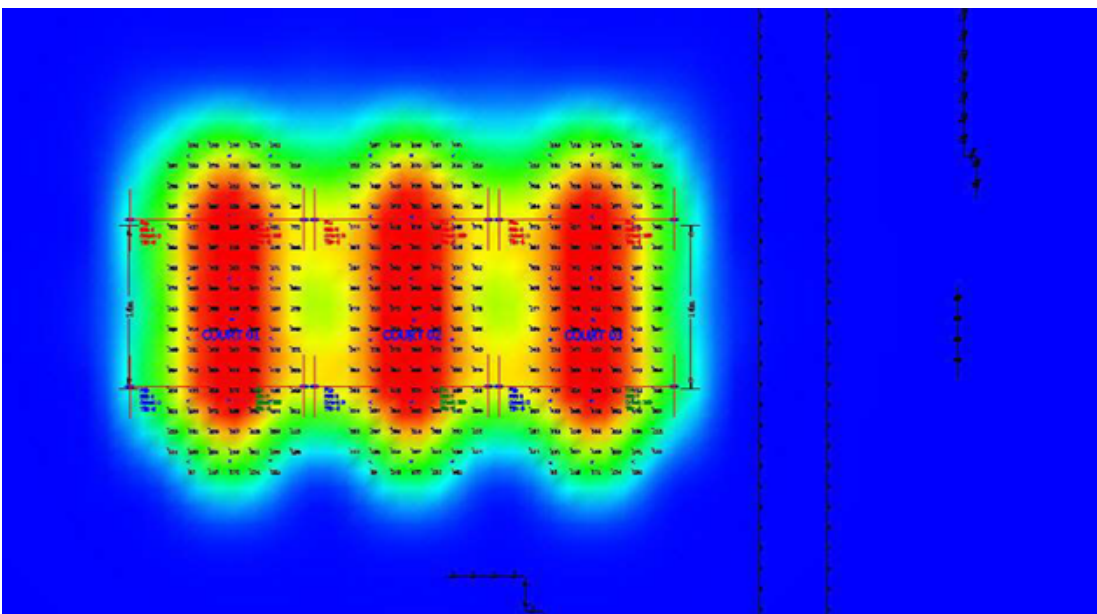


Figure 1. Rendering image in pseudo colour

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Figure 2. Caravel Mk5 500W LED Sports Light



Figure 3. Caravel with rear shield



Figure 4. Example project installation with Shine On Caravel Mk2 LED

Caravel Mk2 Series

High Mast LED Sports Light

With wide area illumination, the Caravel Series LED Sports Light is perfect for large area lighting applications that require extremely high quality, even light distribution, with very low glare. Using the latest Nichia LED chip technology, the Caravel delivers excellent luminaire efficiency and thermal management with a premium extruded aluminium heat sink. This high efficiency combined with an indirect asymmetric light distribution for reduced glare, make it an ideal solution for sports applications such as tennis courts.



FEATURES AND BENEFITS

- **High ingress protection.** IP66 rated for high durability outdoors.
- **Indirect asymmetric beam angle.** Provides low glare, optimised beam angle spread with enhanced, more efficient lighting distribution and less light spillage.
- **Excellent luminaire efficiency.** Up to 140 lumens per watt.
- **High colour rendering options.** 70 CRI.
- **Great option for retrofitting.** Due to lightweight design and accessory options.
- **Premium Inventronic driver solution.**
- **Exceptional heat dissipation.** Critical to any high wattage LED solution is thermal management, delivered in this product by premium extruded aluminium heat sinks.
- **Tempered glass lens.** Impact and heat resistant with no chance of discolouration over time.
- **Lifetime rating of 100,000 hours.**

SPECIFICATIONS

Model	AHM-M2-400W-40 AHM-M2-400W-50 AHM-M2-400W-57	AHM-M2-500W-40 AHM-M2-500W-50 AHM-M2-500W-57	AHM-M2-700W-40 AHM-M2-700W-50 AHM-M2-700W-57
Power consumption	400W	500W	700W
Output	56,000 lm	70,000 lm	98,000 lm
Efficiency	140 lm/W	140 lm/W	140 lm/W
Dimensions	(L)659 x (W)372 x (H)99mm	(L)749 x (W)372 x (H)99mm	(L)500 x (W)750 x (H)99mm
Weight	11.5kg (remote driver) 12.8kg (whole fixture)	13kg (remote driver) 13.9kg (whole fixture)	16.6kg (remote driver) 18kg (whole fixture)
Windage	0.107m ²	0.123m ²	0.174m ²
Colour temperature	4000K, 5000K, 5700K		
CRI	>70		
Beam angle	Asymmetric		
IP rating	IP66		
IK rating	IK10		
Lifetime rating	100,000 hours*		
Warranty	Five years (can be extended to 10 years)		

* Lifetime rating is based on LM80-15 Calculated L70.

INDUSTRIES



Sport, hospitality, education and industrial.

OLD LIGHT TECHNOLOGIES



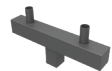
Metal halide and mercury vapour (HID) and metal halide type 2.

ACCESSORIES

15KV SPD
voltage protection



180° vertical bracket



180° horizontal brace



Round pole mounting
arm



Back shield



Swivel bracket



Adapter for square to
round pole



90° vertical bracket



Square pole mounting
arm



Proud partners of



To whom it may concern,

Bareena Park Tennis Club - Tennis Court Lighting

Lighting Design Certificate – Verification by calculation – Compliance of the Design

The lighting design calculation document "Bareena Park Tennis Club SO-01" conforms with AS 2560.2.1–2003(2017) "Sports Lighting Part 2.1: Specific Applications – Lighting for Outdoor Tennis", specifically the following criteria:

1. Level of Play – Club Competition & Commercial;
 - a. Maintained average horizontal illuminance $E_h \text{ maint} \geq \text{PPA } 350 \text{ Lux, TPA } 250 \text{ Lux,}$
 - b. Horizontal uniformity PPA $U1 \geq 0.60, \& U2 \geq 0.4$
 - c. Horizontal uniformity TPA $U1 \geq 0.30, \& U2 \geq 0.2$
 - d. Max. Glare rating < 50
 - e. Minimum colour rendering $R_a \text{ min} \geq 65$

Notes:

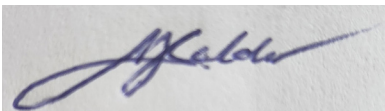
The lighting design calculations are based upon specified parameters supplied by the client, and other design inputs assumed by us, as detailed in the lighting design calculation document.

In practice, there may be variations due to differences in as-installed luminaire positioning, supply voltage, photometric tolerances, etc., and normally accepted uncertainties, refer to Australian Standards AS/NZS 3827.1:1998 and AS/NZS 3827.2:1998 Lighting system performance – accuracies and tolerances.

A maintenance regime must be implemented to ensure that the assumed maintenance factors used in the lighting design calculations are realised in practice.

Regards,

Marcosa Calderon MIES



Lighting Designer



PROPOSED LIGHTING PLAN - Tennis Area 1
Scale= 1: 400

Luminaire Schedule							
Tag	Symbol	Fitting Code	Description	Lumens	LLF	Watts	Qty
F1a		AHM-M2-500W WB + Rear Shield	Caravel Mk2 LED High Mast Floodlight	64324	0.800	510	6
F1b		AHM-M2-500W WB Left & Rear	Caravel Mk2 LED High Mast Floodlight	56905	0.800	501.2	3
F1c		AHM-M2-500W WB Right & Rear	Caravel Mk2 LED High Mast Floodlight	58443	0.800	507.3	3

Obtrusive Light - Compliance Report

AS/NZS 4282:2019, A3 - Medium District Brightness, Non-Curfew L2
Filename: 141223_Bareena Park Tennis Club Lighting Study
14/12/2023 5:50:14 PM

Illuminance

Maximum Allowable Value: 10 Lux

Calculations Tested (16):

Calculation Label	Test Results	Max. Illum.
ObtrusiveLight_South_III_Seg1	PASS	8
ObtrusiveLight_South_III_Seg2	PASS	2
ObtrusiveLight_South_III_Seg3	PASS	5
ObtrusiveLight_South_III_Seg4	PASS	1
ObtrusiveLight_South_III_Seg5	PASS	3
ObtrusiveLight_31 Vista Avenue_III_Seg1	PASS	3
ObtrusiveLight_29 Vista Avenue_III_Seg1	PASS	1
ObtrusiveLight_27 Vista Avenue_III_Seg1	PASS	1
ObtrusiveLight_34 Dobroyd Rd_III_Seg1	PASS	3
ObtrusiveLight_26 Vista Avenue_III_Seg1	PASS	2
ObtrusiveLight_26 Vista Avenue_III_Seg2	PASS	1
ObtrusiveLight_26 Vista Avenue_III_Seg3	PASS	2
ObtrusiveLight_22 Vista Avenue_III_Seg1	PASS	1
ObtrusiveLight_22 Vista Avenue_III_Seg2	PASS	1
ObtrusiveLight_22 Vista Avenue_III_Seg3	PASS	1
ObtrusiveLight_22 Vista Avenue_III_Seg4	PASS	1

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 25000 Cd

Calculations Tested (16):

Calculation Label	Test Results
ObtrusiveLight_South_Cd_Seg1	PASS
ObtrusiveLight_South_Cd_Seg2	PASS
ObtrusiveLight_South_Cd_Seg3	PASS
ObtrusiveLight_South_Cd_Seg4	PASS
ObtrusiveLight_South_Cd_Seg5	PASS
ObtrusiveLight_31 Vista Avenue_Cd_Seg1	PASS
ObtrusiveLight_29 Vista Avenue_Cd_Seg1	PASS
ObtrusiveLight_27 Vista Avenue_Cd_Seg1	PASS
ObtrusiveLight_34 Dobroyd Rd_Cd_Seg1	PASS
ObtrusiveLight_26 Vista Avenue_Cd_Seg1	PASS
ObtrusiveLight_26 Vista Avenue_Cd_Seg2	PASS
ObtrusiveLight_26 Vista Avenue_Cd_Seg3	PASS
ObtrusiveLight_22 Vista Avenue_Cd_Seg1	PASS
ObtrusiveLight_22 Vista Avenue_Cd_Seg2	PASS
ObtrusiveLight_22 Vista Avenue_Cd_Seg3	PASS
ObtrusiveLight_22 Vista Avenue_Cd_Seg4	PASS

Threshold Increment (TI)

Maximum Allowable Value: 20 %

Calculations Tested (2):

Calculation Label	Adaptation Luminance	Test Results
ObtrusiveLight_To South	10	PASS
ObtrusiveLight_To North	10	PASS

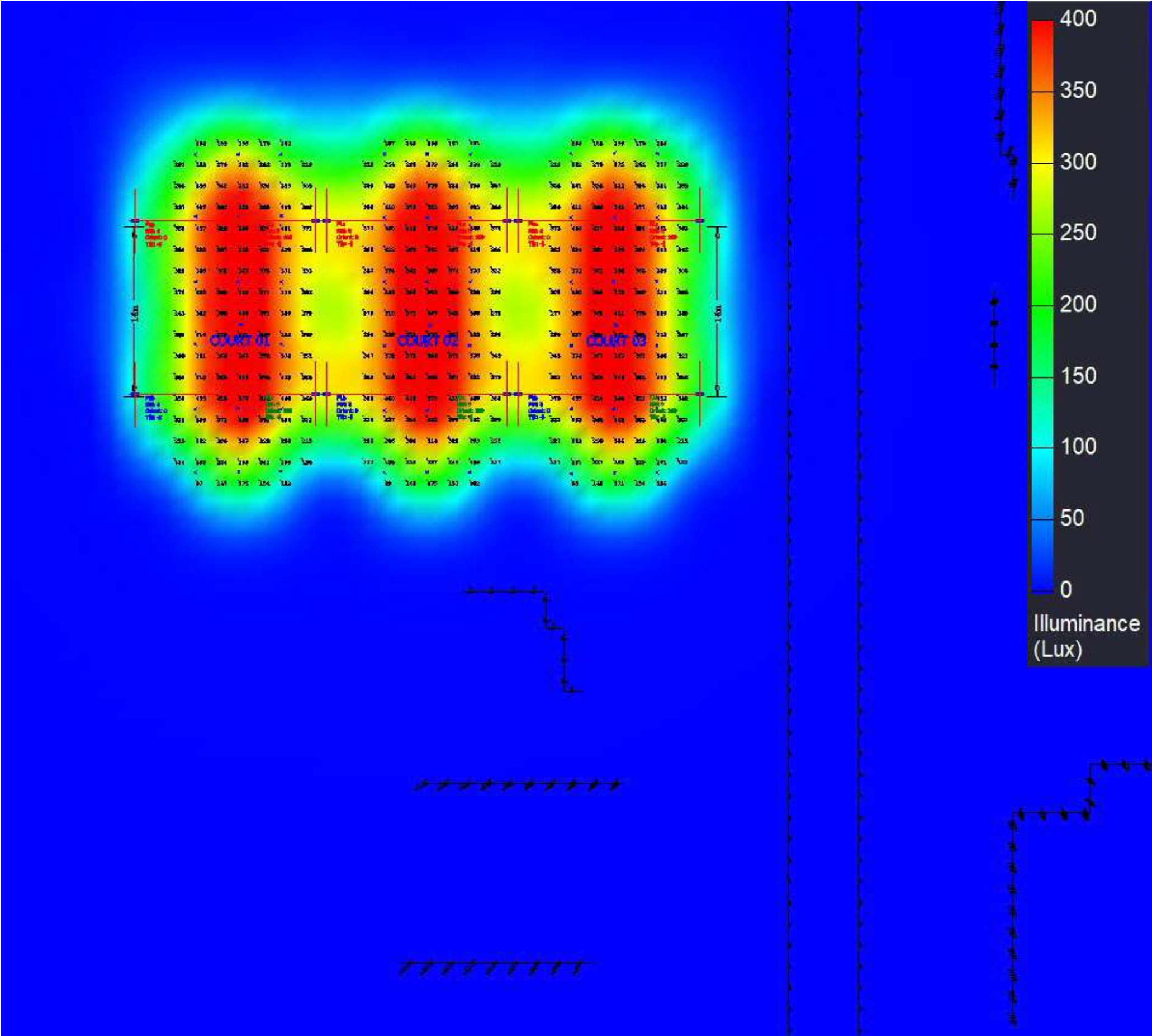
Calculation Summary							
Label	Units	Avg	Max	Min	Min/Avg	Min/Max	Height (m)
Court 01 PPA	Lux	374	457	282	0.75	0.62	1
Court 01 TPA	Lux	323	457	97	0.30	0.21	1
Court 02 PPA	Lux	374	460	286	0.77	0.62	1
Court 02 TPA	Lux	326	460	99	0.30	0.22	1
Court 03 PPA	Lux	369	460	283	0.77	0.62	1
Court 03 TPA	Lux	320	460	95	0.30	0.21	1

CLIENT LOCATION PROJECT # DRAWING # Bareena NSW Bareena Park Tennis Club SO-01

SCALE REVISION # DRAWN BY CHECKED BY

AS SHOWN @ A3 B Marcosa Calderon MIES

Suite K109
63-85 Turner Street
Port Melbourne, VIC 3207
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Court 03 TPA	Lux	320	460	95	0.30	0.21	1

CLIENT
LOCATION
PROJECT #
DRAWING #

Bareena NSW
Bareena Park Tennis Club
SO-01

SCALE
REVISION #
DRAWN BY
CHECKED BY

AS SHOWN @ A3
B
Marcosa Calderon MIES

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Outline of lighting work

The following pages outline our recommended lighting solution by area. All additional costs to upgrade the fitting(s) have been included in the unit and total price columns. Please refer to the legend for any additional items. Other additional costs such as access equipment can be found towards the end of this section.

Legend - additional lighting costs

	After hours		Conduit
	Canopy freezer		Spotter
	Highbay relocation		Sensor
	Pole floodlights		

tennis courts										Annual hours: 2000
Current lighting	Quantity of fittings	Globes per fitting	Proposed lighting	Proposed quantity	Unit price	Price after subsidy	Total price	Annual energy saving	Energy reduction	Additional Cost/Items
0.000W	0	1	Caravel Mk2 500W Floodlight 4000K (Product Only)	12	\$788.00	\$788.00	\$9,456.00	(\$3,403.01)	0%	
0.000W	0	1	Caravel Mk2 Rear Shield	12	\$108.00	\$108.00	\$1,296.00	\$0.00	0%	
0.000W	0	1	Extended Warranty (total 10yrs) - Caravel Mk2 500W Floodlight (Product Only)	12	\$266.00	\$266.00	\$3,192.00	\$0.00	0%	
Total:							\$13,944.00	(\$3,403.01)		

Additional items

Item	Quantity	Unit price	Total price
New/Replacement Poles (SL) — Quote reference - GPA N10056 (8 poles)	1	\$16,875.00	\$16,875.00
Labour - Lighting Control Device — Halytech Lighting Control - Supply, Installation and commissioning	1	\$14,293.50	\$14,293.50
Footing & Installation (SL) — Installation of footing per pole	8	\$2,325.00	\$18,600.00
Structural Engineering (SL) — Per pole charge for Geotech as per previous quotes	8	\$1,800.00	\$14,400.00
Civil Works (SL) — Trenching, Conduits, Cabling Installation, electrical pits and spoil removal.	1	\$62,242.50	\$62,242.50
Electrical Works (SL) — Assemble, stand, orient, level, bolt down and grout eight 8m fixed floodlight poles, including unloading.	1	\$22,492.50	\$22,492.50
Structural Engineering (SL) — Service Location	1	\$2,700.00	\$2,700.00
Electrical Installation (SL) — Night-time Aiming and commissioning	12	\$750.00	\$9,000.00
Boom Lift Weekly Hire (per week) — 2 week hire allowance for boom lift	2	\$1,648.50	\$3,297.00
Track Mats (SL) — Site establishment, maintenance and clean up + 10 days track matting hire (12 x matts)	1	\$5,242.50	\$5,242.50
Lighting Design & Control (SL) — As built drawings	1	\$975.00	\$975.00
Labour - Additional Wiring — Disconnection/Reconnection of existing incoming supply to new switchboard - inc. 3 phase upgrade.Upgrade existing switchboard.	1	\$4,023.50	\$4,023.50
Sports Lighting Installation — Installation of LED flood lights	12	\$750.00	\$9,000.00

Please initial _____