



Light Spill Report
Parramatta Eels
Centre of Excellence,
Kellyville Park

Revision	Date	Description	Author/s	Reviewer
P1	17/09/2021	Preliminary	MO/MJ	MO
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erbas™ were not involved in the design or certification of the field lighting. However, have put together the report based on information provided from the designer.

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1 Executive Summary

1.1 Environmental Amenity - Lighting

The aim of the Lighting Spill Report is to focus on and identify the physical effects that lighting may have on the surrounding neighbourhood. The proposed lighting system shall be evaluated to ensure any spill light and glare impact to the surrounding area is reduced while fulfilling the functional needs of the project.

The light spill report will demonstrate how a high level of environmental amenity is achieved by assessing the impacts of view loss, privacy, lighting, reflectivity, and wind impacts & over shadowing within the site and to the surrounding buildings. To support the EIS (Environmental Impact Statement) as part of the SSDA (State Significant Development Application).

The Project SEARs details are below.

Application Number	SSD-24452965
Project Name	Eels Centre of Excellence and Community Sports Hub, Kellyville
Location	Kellyville Memorial Park, 8 Memorial Avenue, Kellyville Lot 60/DP 10702, Lot 1/DP 167535, Lot 10/DP 258947, Lot 123/DP 1113073 and Lot 1002/DP 1132811 within The Hills Shire Council Local Government Area
Applicant	Paramatta National Rugby League Club Limited
Date of Issue	18/08/2021

The report shows compliance with item 7 (Lighting element of the Environmental amenity). Other elements are to be captured within other reports.

The lighting guidelines being applied for the proposed design development require that in no event shall any light element associated with the project adversely impact the local residential community or ecological sensitive receptors.

A desktop study utilising professionally recognised computer-generated lighting calculation, AGI (Advanced Graphics Interface) software (or similar) has assessed the existing sports lighting systems conformity with recognised guideline requirements, and will do so for the new carparking and façade lighting upon development.

The design of the project based upon the current conditions and our calculated results of the proposed new lighting, has achieved the design goal to limit spill illumination to the surrounding neighbourhood.

The information within this report has assumed optimal use of available site information whilst also considering the Building Code of Australia, relevant Australian Standards and Codes, client driven design guidance, best practice industry guidelines.

erbas™ were not involved in the design or certification of the field lighting. However, have put together the report based on information provided from the designer.

This statement has been prepared in response to the Secretary Environmental Assessments Requirements (SEAR) Item 6 – Environmental Amenity

The development of the Parramatta Eels Centre of Excellence and Community facility at Kellyville Park will involve the expansion of existing lighting systems including Sports lighting, plus new façade lighting, external (general security) lighting at the building perimeter, new carpark lighting and functional lighting throughout the interior spaces.

The two primary environmental considerations in the execution of the lighting design are to minimise atmospheric light pollution causing sky-glow, and to limit unwanted spill lighting and glare to neighbouring residential and commercial properties as well as surrounding habitats.

To satisfy these considerations in accordance with best practice guidelines, all of the external lighting systems will be designed and installed in accordance with AS4282: 2019 - Control of the obtrusive effects of outdoor lighting.

Site Context

The site bounds comprises sports fields to the west of the site, the building centrally and existing/new car parking to the east. The site is immediately surrounded by park land to the north and west, residential to the east and sports fields to the south.

Additionally, there are a number of habitats for local flora and fauna in the surrounding parkland which will be taken into consideration with the design of external lighting systems and their functionality.

Light spill and the impacts of glare caused by lighting systems from the operation of the facility will be managed in accordance with AS4282 guidelines and limitations to ensure minimal impact to the amenity of these areas caused by new and existing lighting systems.

Sports & Carpark Lighting

The lighting conditions for training and competition grades require vertical and horizontal minimum illuminance levels for both safe and practical use of the field. Using contemporary LED luminaires allows for a high degree of optic control limiting the upward light pollution. Sports lighting systems will be aimed directly toward the pitch with a downward direction from the pole top. The fitting lens over the LED modules optimises lighting throw and minimises vertical and horizontal light spill from the intended area of illumination.

Carpark lighting will be designed for the safe movement of pedestrians in line with the required P-category within Australian Standards.

Façade Lighting

Feature lighting to the external building helps to identify key public entries and spectator areas in the stands, plus provides a low level of illuminance for general security.

2 Introduction

2.1 Project Description

The proposed development will provide state of the art facilities which enable physical recreation opportunities in conjunction with improved facilities for staff, players and existing users of the site. The proposed development will be integrated with the existing recreational landscape of the site and complement the upgrades to the existing playing fields being undertaken by Council. The proposed development is defined as a Recreation facility (major), and includes the following components:

- Construction of high-performance Centre of Excellence in the north east of the site adjacent to Training Field 2:
 - Elite level gymnasium.
 - Medical and rehabilitation facilities.
 - Aquatic recovery and rehabilitation pools.
 - Lecture theatre and meeting rooms.
 - Player education and study areas.
 - Administration offices for the Parramatta Eels.
 - New female facilities including a dedicated female change room, cubicle toilets and showers.
 - Balcony and terrace area.
 - End of Trip Facilities and bicycle parking.
 - Refuse Area.
- Construction of a Community Facility, including a grandstand with approximately 1,500 seats in the centre of the site adjacent to the Main Playing Field 3:
 - Unisex changerooms and amenities.
 - Referee changeroom and amenities.
 - First Aid/Medical room.
 - Community gymnasium.
 - Café/kiosk.
 - Concourse terrace.
 - Multipurpose community function room with kitchen and amenities.
 - Refuse Area.
 - Bicycle parking.
- Solar arrays will be included on the roof of both the Centre of Excellence and Community Facility.
- Additional 40 car parking spaces for the proposed facility to operate in conjunction with existing at grade carparking already constructed by Council.
- Additional landscaping throughout the development footprint.
- Removal of a small number of trees internal to the site, however noting perimeter trees will be retained where not affected by the proposed building footprints.
- Hours of operation for the Centre of Excellence and Community Facility are 5:00am to 12:00am, however the following key times are likely:
 - Centre of Excellence: 7.00am - 7.00pm
 - Community Facility: 7.00am - 10.00pm

2.2 Overview

This Light Spill Report has been prepared by erbas™ on behalf of HB Arch for Parramatta Eels and Hills Shire Council (the Applicant). This report supports a State Significant Development Application (SSDA) submitted to the Minister for Planning and Public Spaces, pursuant to Part 4.7 of the Environmental Planning and Assessment Act 1979 (EP&A Act). This SSDA seeks consent for the design, construction and operation of a new Parramatta Eels Centre of Excellence, within Kellyville Park, Kellyville.

The Parramatta Eels Centre of Excellence will comprise a state-of-the-art, NRL and touch football training facility, which will service major community sporting events, community festivals, markets and school sports programs. The centre will allow Kellyville to become a regional hub for the NRL, touch football and women's league, and will also allow greater opportunity for local boys and girls to become involved with the NRL.

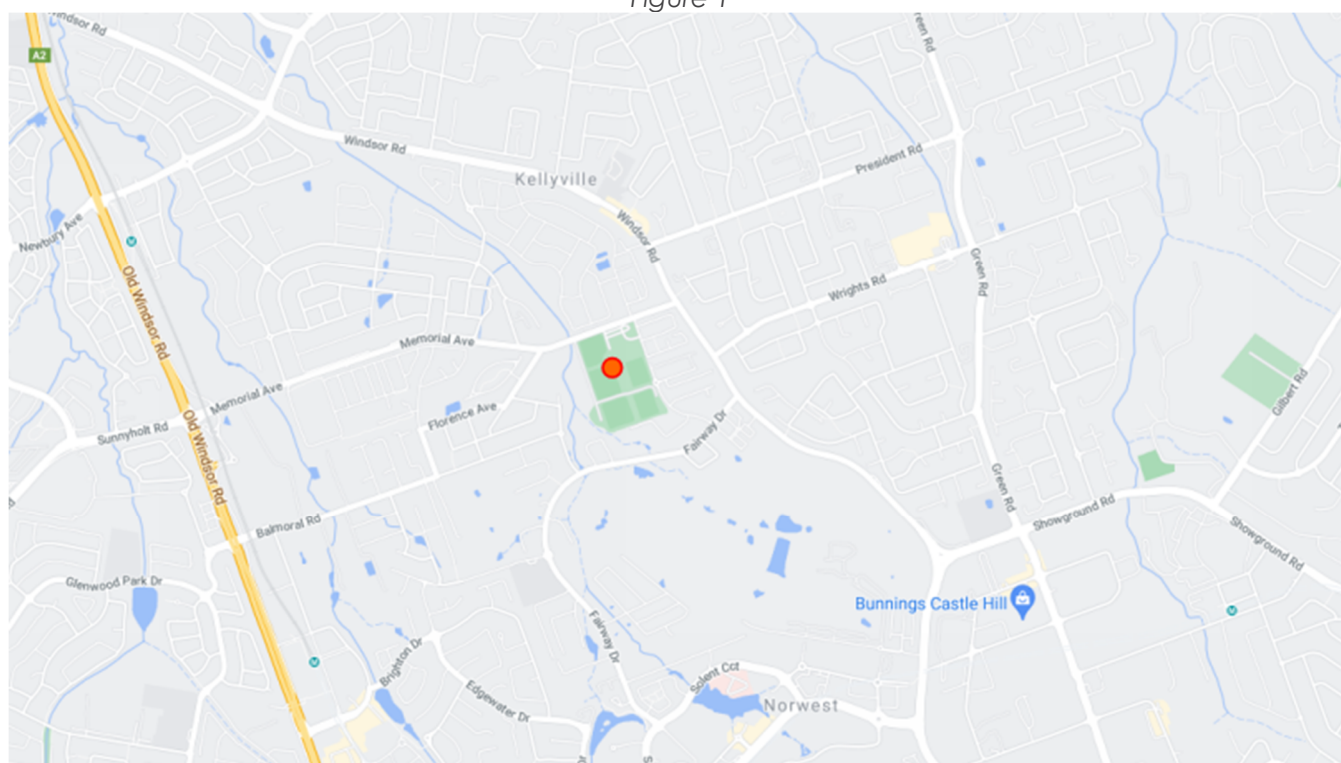
2.3 Site Description

The site is located at Kellyville Park, in the suburb of Kellyville, within The Hills Shire Local Government Area (LGA) situated towards its southwestern corner.

The site is located in proximity to the Balmoral Road Sports Hub, less than 1km south west of the site. Further to this, the site is located approximately 3.5km north east of the Westlink M7 tollway.

The site's locational context is shown in **Figure 1** below.

Figure 1



Locational context of the site

The site comprises a dual allotment of land with a total area of 127,070m², and development of the Center of Excellence will occur within the northern allotment, having an area of 76,262m². The site is currently owned by Hills Shire Council and it is legally described as Lot 1 DP167535 & Lot 60 DP10702. The site is bounded between Memorial Avenue to the North, Stone Mason Drive to the East, McKellar Court to the South and council parkland to the West. An aerial image of the site is shown in **Figure 2**.



Figure 2: Site aerial

2.4 Proposed Development

The proposal relates to a development application to facilitate the development of a Parramatta Eels Centre of Excellence at the Kellyville Park site. Specifically, the works that are proposed for the DA include:

- A two-storey Parramatta Eels centre of excellence consolidated administration and high-performance training centre, comprising a gymnasium, sports science and sports medicine facilities, business offices, player lounges, social spaces, a double height seating area, café and kitchen facilities, and retail stores.
- A two-storey community facility and grandstand area comprising of changing facilities, a community gym, a multi-purpose room, first aid centre, café and kitchen facilities and a retail tenancy;
- Two international Rugby League compliant fields 116m long x 68m wide;
- Two additional international compliant Rugby League main playing fields, 116m long x 68m wide, including grandstand seating.
- Associated car parking, landscaping and public domain works; and
- Extension and augmentation of services and infrastructure as required.

2.5 Purpose

This Light Spill Report has been provided as part of the State Significant Development (SSD) submission to address [in part] amenity impacts on the surrounding locality incorporating external lighting methodologies for the external areas by way of a high-level review of environmental amenity for any surrounding residential land uses within the site.

The reporting must be read in conjunction with other relevant reporting provided as part of the submission to address other SEARs listed components like solar access, visual privacy, visual amenity, overshadowing, wind impacts and acoustic impacts as these are noted in Condition 7 but not addressed as part of this report.

2.6 Introductory information

The project is to be assessed under the NCC 2019 and is subject to ongoing assessments for compliance as design development is progressed. This report has considered both historical and present reporting in its generation and references summary information herein. Detailed technical analysis must be done from within the context of the primary technical documents, and Architectural schemes provided within the submission.

This report provides commentary to the extent of the existing intent of the design considerate to the statutory regulations. The infrastructure and design strategies herein may change or be developed with further scope as the design progresses.

Note: erbas™ have no design involvement or commission for the sports field lighting. erbas™ have compiled provided results from Apex Lighting, the supplier based on their submitted information only. erbas™ does not warrant the accuracy of the calculations or data herein.

2.7 Limitations

This report does not currently incorporate all constraints, which may yet to be determined by the project.

This report does not try to anticipate any requirements of the project that may be imposed as part of any required development conditions resultant to its submission as part of application for development.

3 Design response to SEARs

The following table provides a summary response to the SEARs requirements for Parramatta Eels Centre of Excellence, Kellyville Park.

SEARS No.	General Requirements	Responses
7.	The EIS must demonstrate how a high level of environmental amenity would be achieved by: - Assessing impacts associated with view loss, privacy, lighting, reflectivity and wind impacts - Providing a detailed assessment of overshadowing impacts within the site, on surrounding buildings and public spaces (during summer and winter solstice and spring and autumn equinox) at hourly intervals between 9am and 3pm, when compared to the existing situation.	With respect to the first dot point, the installation design of the project based upon the current conditions and the calculated results of the existing lighting has achieved the design goal to limit spill illumination to the surrounding neighbourhood.

4 Methodology

The methodology for the light spill assessment has been undertaken with an understanding of the proposed site processes and site usage to realise the limitations within which the lighting can be provided.

That is to provide for safe environments, avoid potential interference with equipment used on site and at the same time minimise light spill from the site.

As such the pole positions, luminaire mounting heights, luminaire selection and luminaire aiming angles have been derived to provide an optimum result within the restrictions of the site.

The lighting design is provided in accordance with code and modelled using industry standard lighting design software.

The results are provided in this report. It should be noted that transitory lighting such as vehicle headlights do not form part of the site lighting assessment.

5 Applicable design standard – sports field lighting

The proposal is designed in accordance with AS4282, Control of the obtrusive effects of outdoor lighting; and AS2560.2.3 Sports lighting: Specific applications – Lighting for Football.

AS4282 – Table 3.1

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/NZS 1158.1.1
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

AS4282 – Table 3.2

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

AS2560 – Table 1

TABLE 1
LIGHTING CRITERIA

Level of play	Maintained average horizontal illuminance ^{a),b)} (E_{mh}) lux	Minimum horizontal uniformities ^{c)}		Maximum glare rating (GR_{max})	Minimum colour rendering index (R_a min)	Maximum uniformity gradient
		(U_1)	(U_2)			
Recreational level						
Touch and tag	50	0.3	N/A	N/A	65	N/A
Amateur level						
Ball and physical training ^{e)}	50	0.3	N/A	N/A	65	N/A
Club competition and match practice	100	0.5	0.3	50	65	N/A
Semi-professional level						
Ball and physical training ^{e)}	50	0.3	N/A	N/A	65	N/A
Match practice	100	0.5	0.3	50	65	N/A
Semi-professional competition	200	0.6	0.4	50	65 ^{d)}	N/A
Professional level						
Ball and physical training ^{e)}	100	0.5	0.3	50	65	N/A
Match practice	200	0.6	0.4	50	65	N/A
Professional competition	500	0.7	0.5	50	65 ^{d)}	20% per 5 m

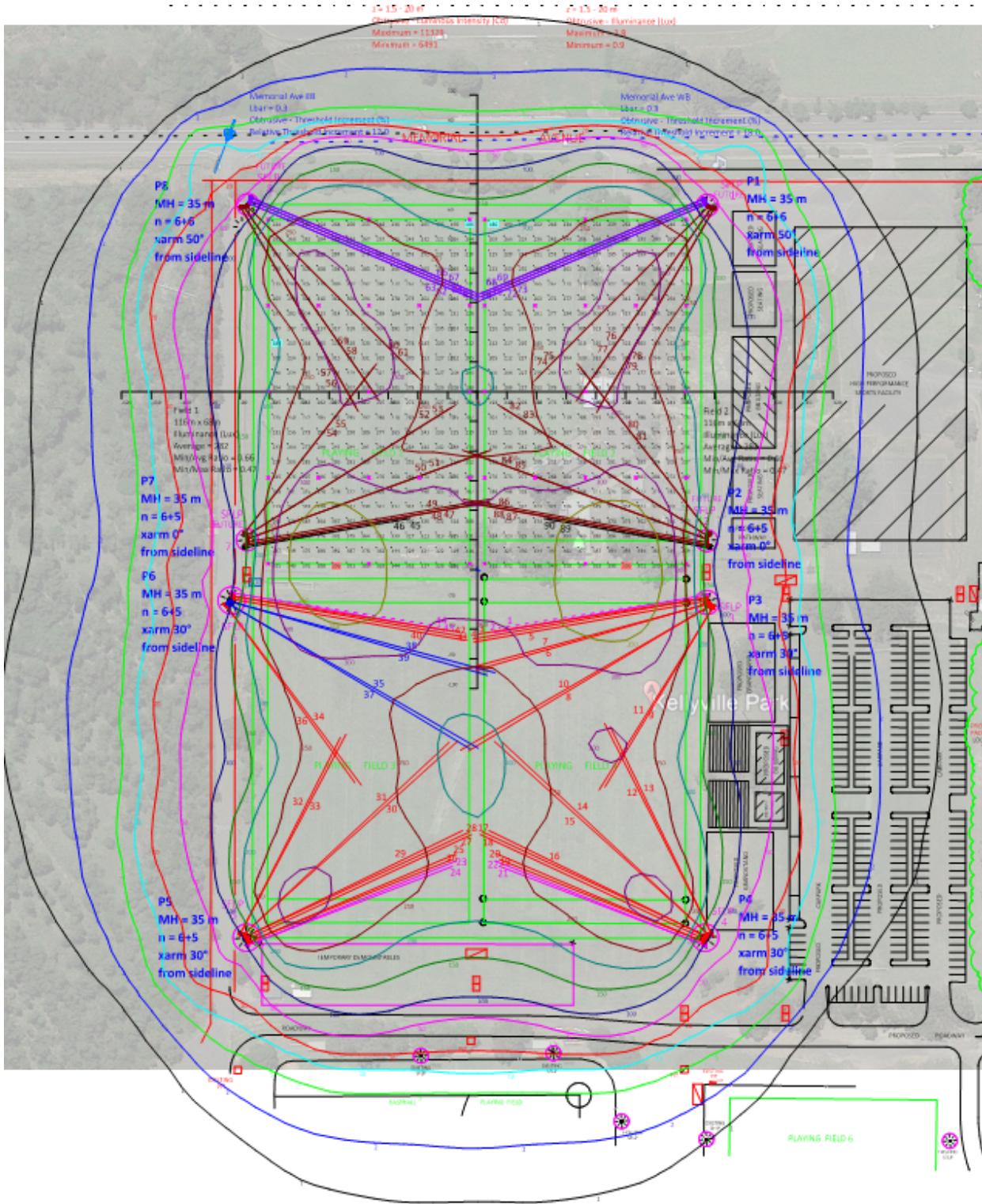
6 Luminaire selection

Minimisation of any direct light spill requires selection of a luminaire that essentially have a horizontal front glass when aimed and fixed in position.

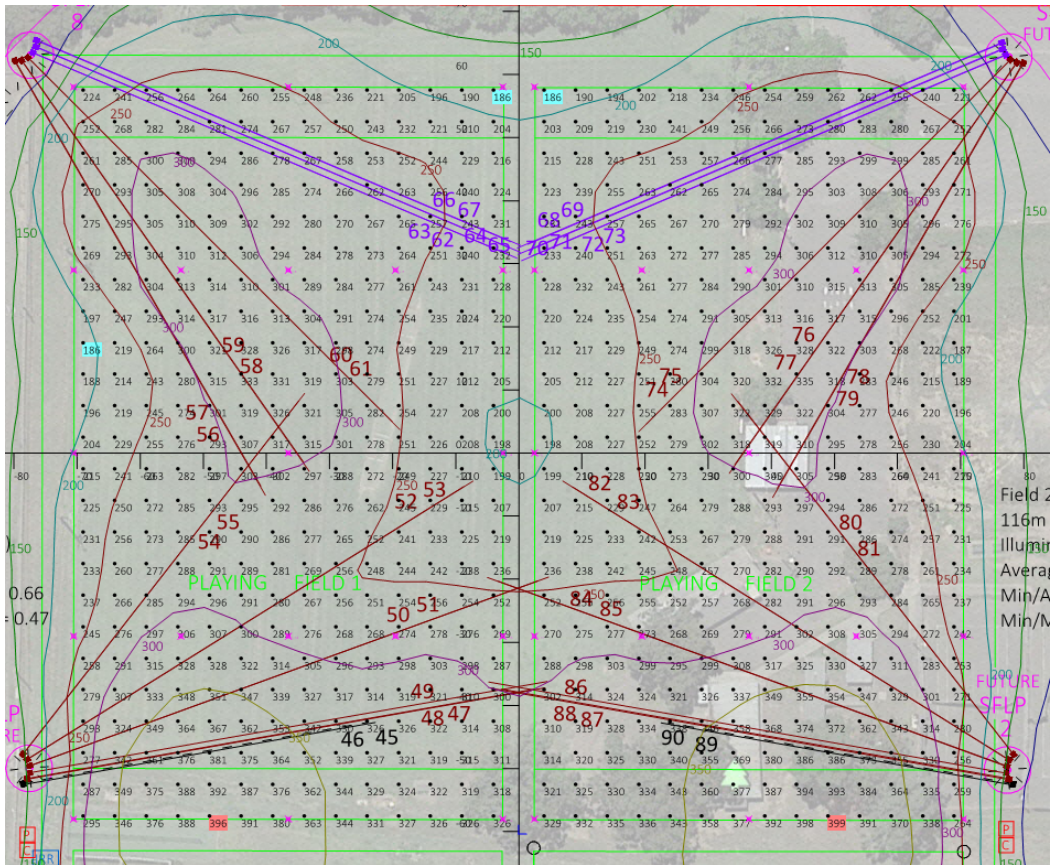
Luminaire mounting height and position is considered within the selection with pole mounted lighting on 35m poles being the standard applied for the below calculations utilising, 'Philips OptiVision LED Gen3 BVP527 50K 757 T30 A35 IP66 3 module'.

erbas™ were not involved in the luminaire selection process, design or validation of the design.

7 Luminaire calculation data – existing sports field



Overall area (black isoline denotes 1 lux).



Field 1 & 2 (lux plots)

Luminaire Schedule						
Scene: All 200 lux						
Symbol	Qty	Label	Description	Source	Power	LLF
	8	BVP527 OUTT30 50K A35-MB +BL	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000
	32	BVP527 OUTT30 50K A35-NB	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000
	4	BVP527 OUTT30 50K A35-NB +BL	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000
	12	BVP527 OUTT30 50K A35-NB +LO	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000
	30	BVP527 OUTT30 50K A35-NB +LT	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000
	4	BVP527 OUTT30 50K A35-MB +LT	Apex Optivision LED Gen3 3-module 5700K	LED2120/757	1500	1.000

Calculation Summary					
Project: Illuminance					
Scene: All 200 lux					
Label	CalcType	Units	Avg	Min/Avg	Min/Max
Field 1	Illuminance	Lux	282	0.66	0.47
Field 2	Illuminance	Lux	283	0.66	0.47
Minimum permitted in accordance with AS 2560.2.3:			200	0.6	0.4

Glare Rating			
Project: GR			
Scene: All 200 lux			
Label	CalcType	Description	Max
F1 GRmax	Glare Rating	r = 0.25	47
F2 GRmax	Glare Rating	r = 0.25	47
Maximum permitted in accordance with AS 2560.2.3:			50

Threshold Increment				
Project: TI				
Scene: All 200 lux				
Label	CalcType	Units	AdpLum	TI
Memorial Ave EB	Obtrusive - TI	%	0.3	12.0
Memorial Ave WB	Obtrusive - TI	%	0.3	18.0
Road 1_TI	Obtrusive - TI	%	0.5	17.0
Road 2_TI	Obtrusive - TI	%	0.5	19.0
Road 3_TI	Obtrusive - TI	%	0.5	13.0
Maximum permitted in accordance with AS 4282:				20

UWLR Area Summary (Upward waste light ratio)		
Scene: All 200 lux		
Label	UWLR	
UWLR	0.000	
Maximum permitted in accordance with AS 4282:		0.03

Ev I				
Project: Ev I				
Scene: All 200 lux				
Label	CalcType	Units	Description	Max
Ev 1_Cd_Seg1	Obtrusive - Cd	N/A	z = 1.5 - 20m	11329
Ev 1_Ill_Seg1	Obtrusive - II	Lux	z = 1.5 - 20m	3.8
Ev 2_Cd_Seg1	Obtrusive - Cd	N/A	z = 1.5 - 20m	12041
Ev 2_Ill_Seg1	Obtrusive - II	Lux	z = 1.5 - 20m	2.7

8 Results of Assessment

The light source type, the luminaire make and model, luminaire aiming, pole positions and heights assessed in this report note that minimal direct light spill from the static site lighting is demonstrated.

Minimal effect on adjacent properties and on the environment can be achieved by the appropriate selection of light source, luminaire, luminaire mounting height and luminaire aiming in accordance with the details noted above.

The permanent static site lighting included in the Proposal would provide minimal light spill and be below the limits stated in AS 4282 - 2019 Control of the obtrusive effects of outdoor lighting.

As the design develops the landscape lighting and general articulation lighting is to be subjected to the same methodology and approach.

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