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The King David School 517 Orrong Road, Armadale Sport & Wellness Facility External Lighting Report for Planning Permit

Final Issue

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Date: 19 December 2021

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Ref: 46287

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Revision

Revision	Date	Comment	Prepared By	Approved By
01	10/12/2021	Preliminary Issue	J-PK / DK	J-PK
02	19/12/2021	Final Issue	J-PK	J-PK

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Contents

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1.	INTRODUCTION	1
1.1	Purpose	1
1.2	Authority	1
1.3	Project Intent	1
1.4	Sources of Information	1
2.	PROJECT AREA	2
2.1	Proposed Design	3
3.	STANDARDS & GUIDELINES	4
3.1	Introduction	4
3.2	Lighting Strategy	4
3.3	Australian Standards AS/NZS 1158.3.1:2020	4
3.4	Australian Standards AS/NZS 4282:2019	6
4.	TECHNICAL PARAMETERS	7
4.1	Luminaire Proposed Light Colour	7
4.2	Luminaire Optics	8
4.3	Luminaire Mounting Heights	8

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1. INTRODUCTION

1.1 Purpose

This report represents external lighting assessment for design standard compliance to Australian Standards and Stonnington City Council standards, for the proposed Sport & Wellness Facility at 517 Orrong Road.

This report is presented by Stantec to The King David School, Fontic Pty Ltd and other relevant stakeholders.

1.2 Authority

Stantec has been engaged on 3 November 2021 by The King David School to undertake an external lighting assessment for the proposed Sport & Wellness Facility at 517 Orrong Road.

1.3 Project Intent

The project scope is to outline the external lighting design intent for the new Sport & Wellness Facility at The King David School, 517 Orrong Road, Armadale. The purpose is to ensure new proposed external lighting works will comply to Australian Standards recommendations for outdoor lighting.

Factors considered included the following.

1.3.1 Australian Standards

- Study of the external area usages and application of appropriate lighting levels as per Australian Standards AS/NZS 1158 'Lighting for Roads and Public Spaces' for night-time safe movement.
- Study of the external area usages and application of appropriate lighting levels as per Australian Standards AS/NZS 1158.3.1:2020 'Pedestrian area (Category P) lighting – Performance and design requirements'.
- Study of the external area usages and application of appropriate spill lighting control to neighbouring properties as per Australian Standards AS/NZS 4282:2019 'Control of the obtrusive effects of outdoor lighting'.

1.3.2 Best Design Practices for Outdoor Lighting

- The use of energy efficient luminaires to reduce carbon emission.
- Use of lighting control technology being Photoelectric Cell (PE-Cell), timeclock and dimmable control of the luminaires
- External luminaires to be fitted with spill control accessories to manage spill light beyond the property title

1.4 Sources of Information

Sources of Information are as follows:

- Stantec access to Nearmap aerial photography
- Jackson Clements Burrows Architects Schematic Design Document
- CIVICA Tree Protection Management Plan
- Traffix Group Transport Assessment

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2. PROJECT AREA

The project area is within the property title for The King David School, located 517 Orrong Road, Armadale. The new Sports & Wellness Facility is to be constructed to replace the existing outdoor multi-use court. The existing car parking is to be retained and expanded.

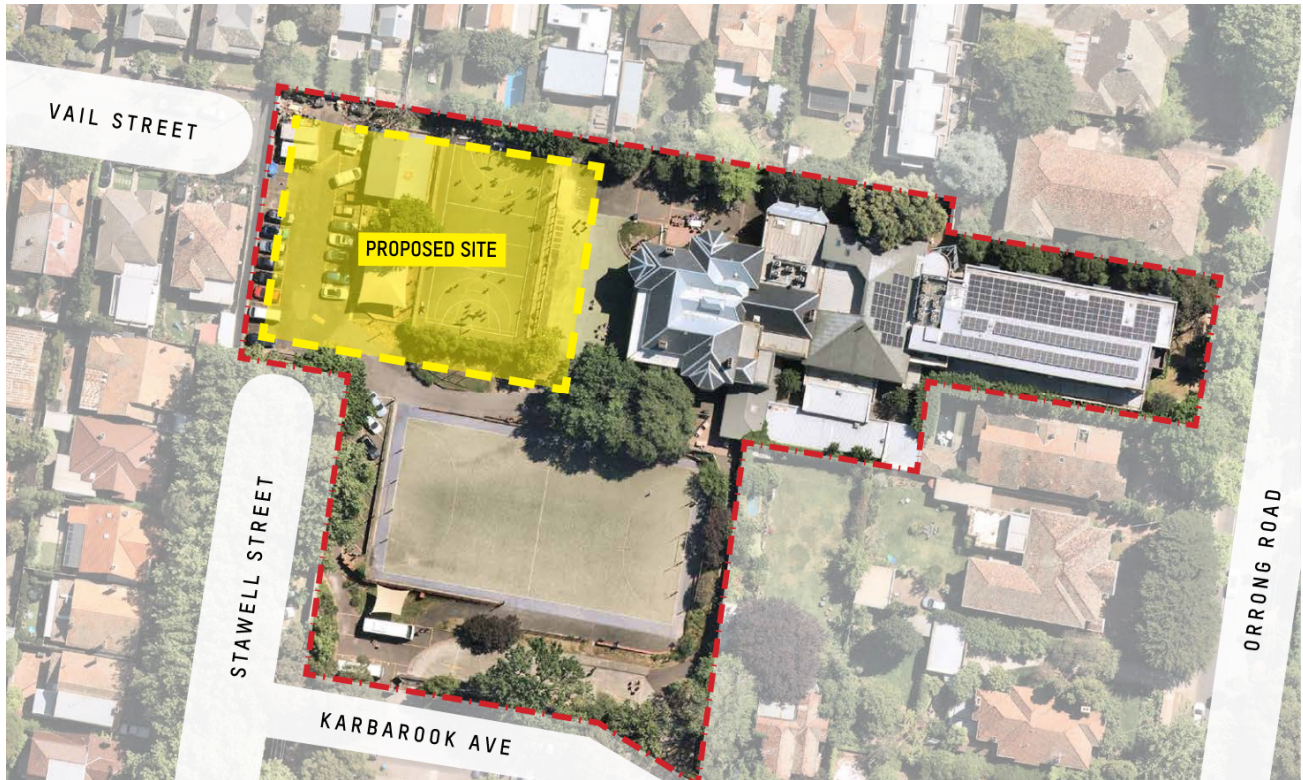


Illustration of project scope area

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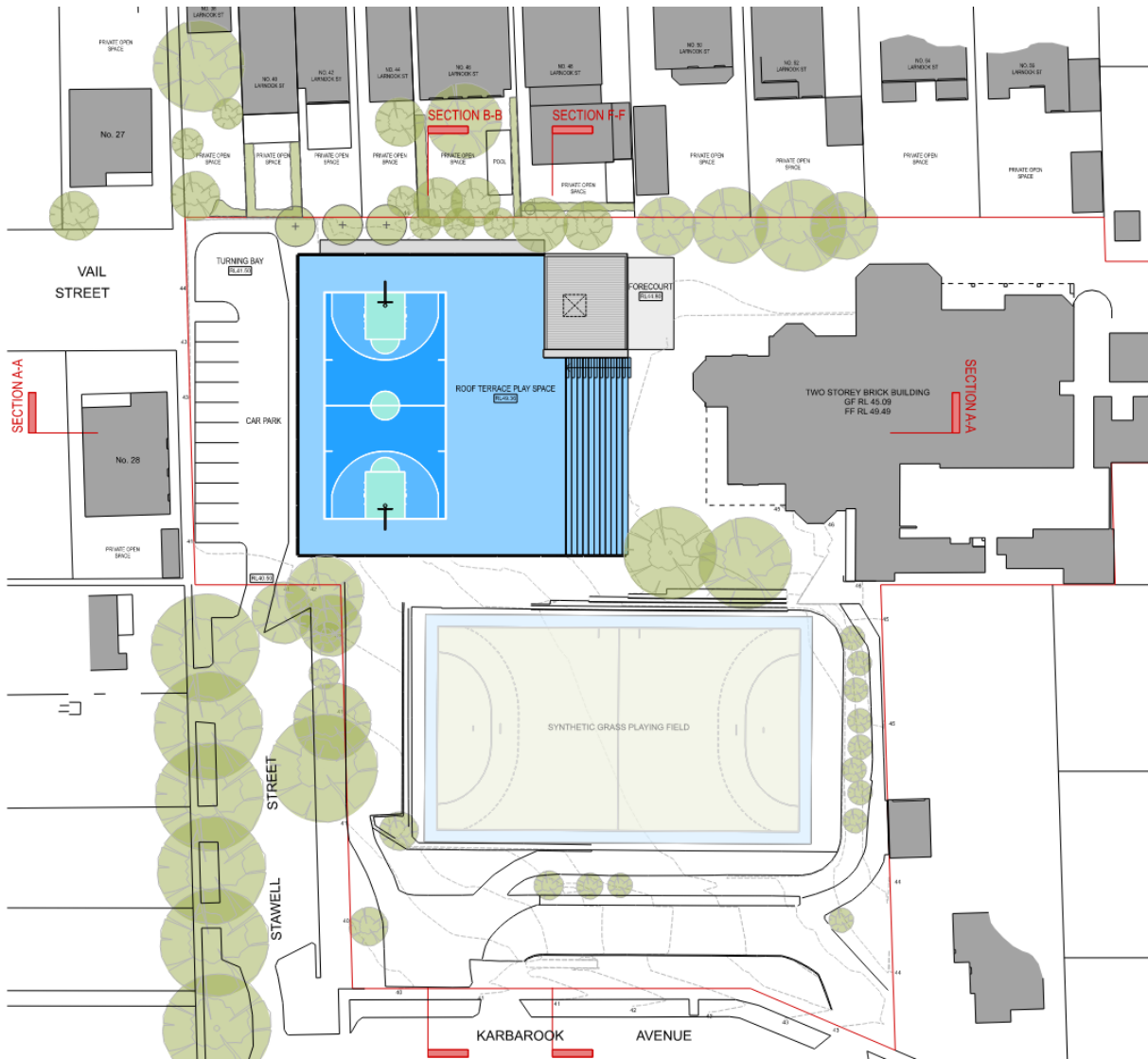


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2.1 Proposed Design

The proposal is to construct a double story sports facility with an indoor multi-use court, gym, and amenities. The facility will have a roof terrace play space (outdoor multi-use court) and forecourt.

In relation to external lighting, it is proposed that the outdoor areas will not be used for sporting activities at night. The indoor facilities will be used in the evenings. General security and safe movement lighting will be required to facilitate school staff, student, and parent pedestrian movement in the evening from the new Sports & Wellness Facility to the car park and school site exit locations. During the evening operational hours 8am to 6pm, all external lighting will be on, non-curfew hours. When the facility is closed the external lighting is to be adjusted to suit security level lighting. This is during curfew hours.



Proposed site plan for the new facility

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3. STANDARDS & GUIDELINES

3.1 Introduction

The appropriate Australian Standards for pedestrian lighting levels is defined in the Australian Standards AS/NZS 1158 series.

The appropriate standards for pedestrian and cyclist pathways are defined in Australian Standard AS/NZS 1158.3.1 version 2020.

The appropriate standards for public activity areas are defined in Australian Standard AS/NZS 1158.3.1 version 2020.

The appropriate standards for car parks are defined in Australian Standard AS/NZS 1158.3.1 version 2020.

The appropriate standards for Spill lighting are defined in Australian Standards AS 4282 version 2019

3.2 Lighting Strategy

The external lighting strategy provides a direction for staff, student, and parent movement throughout the campus. The strategy aims to provide Australian Standard compliant lighting levels for the external areas of the new facility, while ensuring responsible security lighting levels are provided after hours. The strategy outlines that the external lighting for the facility should express the two hierarchies –

- Australian Standard compliant lighting levels for users to enter and exit the facility.
- Security lighting for after hours.

New informal lighting to the roof terrace play space, forecourt and external pathways is to utilise the new building canopies, landscape elements, bollard lighting or low height light columns. Luminaires to be good quality fittings equipped with various light optic options to enable light to be directed to the areas that is to be illuminated.

3.3 Australian Standards AS/NZS 1158.3.1:2020

AS/NZS 1158.3.1 specifies the performance and design requirements for exterior public lighting. The standard defines a sub-category to suit the usage of the space considering the following features –

- Pedestrian and or cycle activity.
- Fear of crime.
- Need to enhance amenity.

The recommended light technical parameters for the Sports & Wellness Facility are on the next page.

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Roof Terrace Play Space & Forecourt

Recommended applicable lighting sub-category is PA3

VALUES OF LIGHT TECHNICAL PARAMETERS FOR PUBLIC ACTIVITY AREAS (EXCLUDING CAR PARKS)

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2})	Point vertical illuminance ^{a,b,d} (E_{pv})
	lx	lx		lx
PA1	21	7	8	7
PA2	14	4	8	4
PA3	7	2	8	2

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Pedestrian Pathways

Recommended applicable lighting sub-category is PP3

VALUES OF LIGHT TECHNICAL PARAMETERS FOR PATHWAYS AND CYCLIST PATHS

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b,d} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2})	Point vertical illuminance ^{a,b} (E_{pv})
	lx	lx		lx
PP1	10	2	5	1
PP2	7	1	5	0.3
PP3	3	0.5	5	0.1
PP4	1.5	0.25	5	0.05 ^c
PP5	0.85	0.14	5	0.02 ^c

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Car Parking

Recommended applicable lighting sub-category is PC3

VALUES OF LIGHT TECHNICAL PARAMETERS FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b} (\bar{E}_h)	Point horizontal illuminance ^{a,b} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{E2})	Point vertical illuminance ^{a,b} (E_{pv})
	lx	lx		lx
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	—
PCD ^d	—	≥ 14 and $\geq (\bar{E}_h)^d$	—	—
PCX ^e	21	5	8	—



External Steps / Stairs

Recommended applicable lighting sub-category is PE3

VALUES OF LIGHT TECHNICAL PARAMETERS FOR CONNECTING ELEMENTS

1	2	3	4	5
Lighting subcategory	Light technical parameters (LTP)			
	Average horizontal illuminance ^{a,b,d} (E_h)	Point horizontal illuminance ^{a,b} (E_{ph})	Illuminance (horizontal) uniformity ^c Cat. P (U_{Ez})	Point vertical illuminance ^{a,b} (E_{pv})
	lx	lx		lx
PE1	35	17.5	8	17.5
PE2	Same as for highest lighting subcategory applying to areas that abut the connecting element but, where forming part of a road or pathway, to be not less than subcategory PA3 in Table 3.5.			
PE3	Same as for highest lighting subcategory applying to areas that abut the connecting element but, where forming part of a road or pathway, to be not less than subcategory PP3 in Table 3.4.			

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3.4 Australian Standards AS/NZS 4282:2019

AS/NZS 4282 specifies the performance and design requirements for exterior public lighting. The standard defines a sub-category to suit the usage of the space considering the following features –

Outdoor lighting should exhibit a high degree of glare and waste light control – optics, louvers, shields, snoots etc. shall be used liberally as required to minimize visual problems for neighbouring properties, and the surrounding environment.

The external lighting solution shall comply with the relevant light spill standard – AS 4282-2019 Control of the obtrusive effects of outdoor lighting.

AS4282 requires assessment of light spill from the proposed installation. This is performed in terms of three components:

- Spill light received by specific receptors around the site – at residential property boundaries pre-curfew and at windows of habitable rooms post-curfew
- Luminous intensity emitted by luminaires

The spill light assessment does not consider the existing lighting around the site. It considers light received directly from the proposed installation and not its reflections off any surfaces. Any obstruction between the light poles and the receptors should be considered in this assessment.

Light Spill assessments shall be performed at beginning-of-life of the floodlights. No maintenance factors shall be applied.

The new Sports & Wellness Facility is located within suburban Melbourne and therefore the environmental zone can be considered as Zone A3 Medium district brightness, for suburban areas in towns and cities.

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

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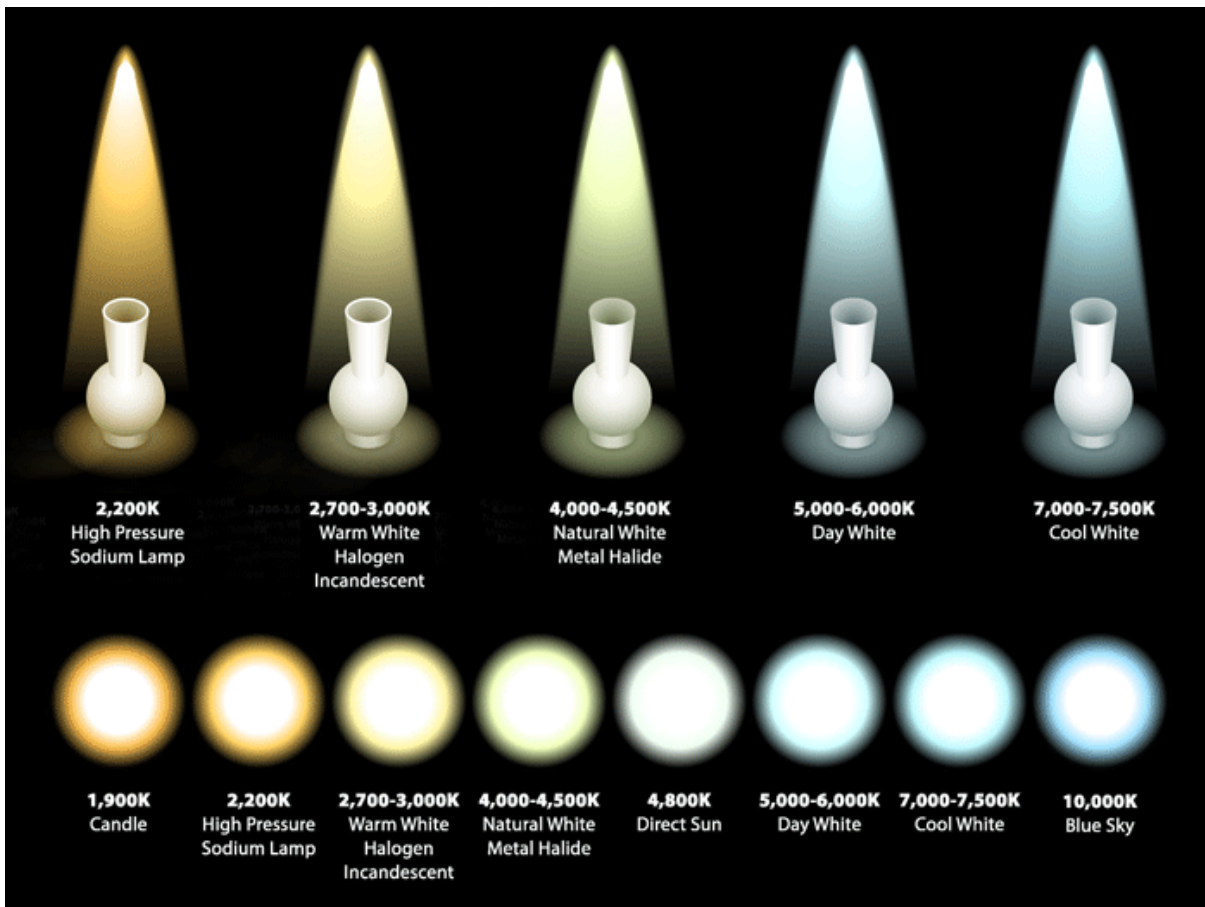
4. TECHNICAL PARAMETERS

Light Technical parameters to achieve the above design strategies are found within the Australian Standards Lighting guidelines. The guidelines provide technical guidance to lighting designers to ensure that lighting designs for the desired outcomes. The guidelines include lighting technical parameters to ensure consistency of the lighting design objectives.

4.1 Luminaire Proposed Light Colour

The image below shows the proposed light colour temperatures. For safe movement 3000K is recommended across the project scope area, however 4000K can be employed – but is not desirable.

Colour temperatures such as 2200K & 5000K – 7500K are not recommended due having either poor colour rendering and being visually uncomfortable.



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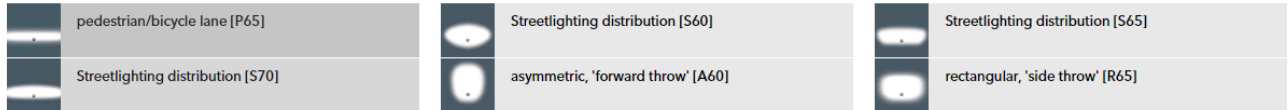
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4.2 Luminaire Optics

Luminaires to be fitted with various optics to control the light distribution is proposed. This allows Lighting designers to control spill lighting beyond the property.

Light Distribution



4.3 Luminaire Mounting Heights

A hierarchy of recommended mounting heights is proposed.

Differentiation in mounting heights will add greater variety to the lighting scheme; allow lower wattages to be used in smaller spaces; and allow easier maintenance in areas where elevated working platform access is limited.

The proposed hierarchy is as follows.

Roof Terrace Play Space & Forecourt

Utilise the building canopies and structure including Roof Terrace pergola.

Viewing Platform

Utilise handrails or step walls

Pathways

Bollard luminaires 1.2m high

Carparks

Bollard luminaires 1.2m high

Landscape elements

Surface or recessed low level lighting

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