INTEGRAL

Heffron Centre

External Lighting Assessment Report

610081–RE–ENG 001

Report No 610081–RE–ENG 001
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REPORT AUTHORISATION

PROJECT: **HEFFRON CENTRE**
EXTERNAL LIGHTING ASSESSMENT REPORT

REPORT NO: **610081–RE–ENG 001**

Date	Rev	Revision Name	Prepared by	Checked by	Authorised by
14/08/2020	A	Preliminary	SA	RH	RH
21/08/2020	B	Development Application	SA	RH	RH
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EXECUTIVE SUMMARY

This report addresses the key external lighting design considerations and parameters associated with the Heffron Centre at Heffron Park.

This report supports two Development Applications for the development of the Heffron Centre at Heffron Park, 417-439 Bunnerong Road, Maroubra. The Heffron Centre is a new indoor multi-purpose facility, gymnastics facility and Community and High-Performance Centre (CHPC) which forms a major part of the ongoing upgrade works in Heffron Park and enables the community to have access to high-quality sporting facilities into the future.

Randwick City Council is the proponent for both of the DAs.

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CONTENTS

1 INTRODUCTION

1.1 GENERAL

This report supports two Development Applications for the development of the Heffron Centre at Heffron Park, 417-439 Bunnerong Road, Maroubra. The Heffron Centre is a new indoor multi-purpose facility, gymnastics facility and Community and High-Performance Centre (CHPC) which forms a major part of the ongoing upgrade works in Heffron Park and enables the community to have access to high-quality sporting facilities into the future.

Randwick City Council is the proponent for both of the DAs.

The purpose of this report is to capture Integral Group's procedural-based assessment of a suitable external lighting strategy for the Heffron Centre development (Main building & surrounds, car parking, pedestrian and vehicular traffic areas), compliant with relevant Australian Standards, National Construction Code and applicable guidelines.

A summary of scope, design criteria, design options considered (where applicable) is provided in our assessment along with recommendations on key design strategies or options to be adopted during design development.

For the Showcase Field area, please refer to the Northrop Lighting Performance Report (Ref:SY171190-ER01 Revision 7) dated 21.06.2018.

1.2 BACKGROUND

Randwick City Council has been investigating the provision of new and improved community and elite sporting facilities at Heffron Park for some time. In 2019, Council entered into an Agreement for Lease and License with the South Sydney District Rugby League Football Club (the Rabbitohs) under a Public Private Partnership to accommodate administration, training and community facilities within a Community and High-Performance Facility (CHPC) to be delivered as one component of the Heffron Centre.

1.3 SITE DESCRIPTION

The subject site is located within the south-western corner of Heffron Park, at 417-439 Bunnerong Road, Maroubra as illustrated in Figures 1 and 2. The site is legally known as Lot 7026 DP 1026884. The site is located on the western edge of Randwick LGA, and has a primary frontage to Bunnerong Road to the west. To the west of Bunnerong Road is Bayside LGA.

The site is Crown Land owned by the NSW Department of Primary Industries, with Randwick City Council acting as the Reserve Manager.

Heffron Park is the largest recreational park in Randwick and includes playing fields, tennis and netball courts, a cycling criterium track, and an aquatic and leisure centre. The park is bounded by Bunnerong Road to the west, Fitzgerald Ave to the north, Robey Street to the east and Jersey Road to the south.

The surrounding context of the site is predominately low and medium density residential, with Southpoint Shopping Centre and a number of smaller business premises and shop-top housing located immediately to the west of the site across Bunnerong Road, with Matraville Public School located 300m to the south-west and Champagnat Catholic College located 400m to the north.

Figure 1 Aerial photograph of the site

Source: NS Group

Figure 2 Locational context of the site

Source: Co-op Studio, annotation by Ethos Urban

1.4 OVERVIEW OF PROPOSED DEVELOPMENT

The Heffron Centre is subject to two separate Development Applications as follows:

- **Concept Development Application** which addresses the matters set out in Clause 6.12 of the Randwick Local Environmental Plan 2012, including seeking consent for land uses, indicative building envelopes and site access arrangements; and

- **Detailed Development Application** which seeks consent for the construction and use of the Heffron Centre, including:

  - Demolition of existing buildings and structures within the site.
  - Site preparation works, including termination or relocation of site services and infrastructure, tree removal and the erection of site protection fencing.
  - Construction of the new Heffron Centre, including:
    - A Community and High-Performance Facility (CHPC).
    - An indoor multi-purpose sporting facility.
    - A local indoor gymnastics centre.
    - Installation of floodlighting to the Showcase Field.
  - Car parking, including a combination of staff and visitor spaces, accessed via the existing signalised intersection of Bunnerong Road and Flint Street.
  - Building identification signage.
  - Public domain works within the site, including new landscaping and tree planting.

Full details of the proposed development are included in the Architectural Drawings prepared by Co-op Studio which accompany the Development Applications.

The construction of the Showcase Field is subject of an existing approval under Part 5 of the *Environmental Planning and Assessment Act 1979*, and accordingly is not within the scope of this Development Application.

2 DESIGN CRITERIA

External lighting will be provided around the main Heffron Centre building, car parking, pedestrian and vehicular circulation areas of the facility to provide a safe and welcoming environment for users of the facility and the general public, with consideration given to:

- Safe movement of pedestrians, cyclists and vehicles,
- Integration with the architectural design intent and to compliment the overall aesthetics of the building and surrounds,
- Minimisation of obtrusive light spill and glare to surrounding properties and the public domain,
- Minimise the impact of external lighting on wild life,
- Security lighting,
- Application of the Crime Prevention through Environmental Design (CPTED) strategy.

2.1 STANDARDS AND GUIDELINES

External lighting will be designed according to the following standards and guidelines:

Standards	
AS/NZS 1158.3.1:2020	Lighting for Roads and Public Spaces – Part 3.1: Pedestrian Area (Category P) Lighting – Performance and Design Requirements
AS/NZS 4282:2019	Control of the Obtrusive Effects of Outdoor Lighting
BCA	Building Code of Australia

3 CONTROL OF OBTRUSIVE EFFECTS OF OUTDOOR LIGHTING

3.1 ENVIRONMENTAL ZONE

While the site is located in the Sydney Metropolitan Area, to assist in achieving the design aesthetic and for the purposes of light spill management, the site has been assigned the following environmental zone (AS/NZS 4282 Table 3.1):

Zone	Description	Examples
A3	Medium District Brightness	Suburban Areas in Towns and Cities

The following maximum values of light technical parameters are applicable (AS/NZS 4282 Table 3.2):

Zone	Vertical Illuminance		Threshold Increment		Sky Glow
	Non-curfew	Curfew	%	Default Adoption Level	Upward Light Ratio
A3	10	2	20%	1	0.02

The following maximum luminous intensities per luminaire are applicable (AS/NZS 4282 Table 3.3):

Zone	Luminous Intensity		
	Non-curfew L1	Non-curfew L2	Curfew
A3	12500	25000	2500

3.2 POTENTIAL OBTRUSIVE EFFECTS

With regards to obtrusive lighting, the following aspects have been identified for consideration during design development: -

3.2.1 Adjacent Properties

Residential properties are located on the western side of the Bunnerong Rd, opposite the proposed development. The light spill impact from the facility entrance and car park area is anticipated to be negligible and will be assessed at the property boundary in accordance with AS/NZS-4282 requirements. The approximate distance to the properties on the western side of Bunnerong Rd is 40 metres.

3.2.2 Effects on Transport System Users

The design intent is to minimise the impact of the light spill on traffic travelling north and south bound along Bunnerong Rd. This shall be achieved by selection of appropriate light distribution optics and positioning of poles in such a manner to mitigate potential light spill onto adjacent traffic and road users.

3.2.3 Effects on Transport Signalling System

The design intent is to minimise the impact of the light spill on traffic management signalling equipment located at intersection of Bunnerong Rd and Flint St. This shall be achieved by selection of appropriate light distribution optics and positioning of poles in such a manner to avoid mitigate spill light onto adjacent traffic signally equipment.

3.2.4 Effects on Wild Life

The design intention is to minimise the effect of external lighting on the wild life by considering and implementing below: -

- Minimise the intensity of lighting to the minimum required to comply with standards as far as practical.
- Minimise the intensity of lighting by switching to a reduced lighting design category when the facility is unoccupied or in use by maintenance staff only.
- Minimise the duration of light by turning off site lighting when not required for access or security purposes.

3.2.5 Effects on Astronomical Observations

The design intention is to minimise the impact of the light spill on observatory facilities.

Nearby observatories were identified from the Astronomical Society of Australia list of designated observatories (review 6/9/2019).

- Macquarie University – 28km
- Sydney Observatory – 14km
- Penrith Observatory – 40km

As the site is distant from above mentioned sites and the environmental category A3 for upward light ratio is minimal (0.02), it is not anticipated the development will have an impact on the observatories.

4 OUTDOOR LIGHTING ASSESSMENT – AS/NZS 1158.3.1

4.1 AREA OF WORK CATEGORY

The proposed development shall comprise the following categories described in AS/NZS 1158.3.1:2020;

- Table 2.2 – pedestrian / cycle activity
- Table 2.5 – outdoor car parks

Please refer to Appendix A, which provides a summary of categories and subcategories for roads and public space type areas, with the applicable areas for the development highlighted.

4.2 SUB-CATEGORY SELECTION

The level of activity and fear of crime is considered in the sub category selection.

Level of activity has been assessed as high in the sub category selection.

Appendix B provides information NSW Bureau of Crime Statistics and Research associated with crime rates in Matraville NSW 2036. For most categories of crime such as assault, robbery, theft and malicious damage to property, recorded data from April 2017 to March 2020 is relatively below average for NSW.

Assessment of crime cases indicates between 15% to 35% of recorded crimes are within road, street, footpaths and carparks. Therefore, for Fear of Crime, the selection criteria is considered medium level for the lighting subcategory determination.

Table 2.2 and 2.5 subcategory definitions as per AS/NZS 1158.3.1 is provided below.

TABLE 2.2

LIGHTING SUBCATEGORIES FOR PEDESTRIAN AND CYCLIST PATHS

1	2	3	4	5
Type of pathway		Selection criteria[a,b,c]		Applicable lighting subcategory
General description	Basic operating characteristics	Pedestrian/ cycle activity	Fear of crime	
Pedestrian or cycle orientated pathway, e.g. footpaths, including those along local roads[d] and arterial roads[e], walkways, lanes, park paths, cyclist paths	Pedestrian and or cycle traffic only	N/A	High	PP1[c]
		High	Medium	PP2[c]
		Medium	Medium	PP3
		Medium	Low	PP4
		Low	Low	PP5

TABLE 2.5

LIGHTING SUBCATEGORIES FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)

1	2	3	4
Type of area	Selection criteria[a,c]		
	Night time vehicle and/or pedestrian movements	Fear of crime	Applicable lighting subcategory[b]
Parking spaces, aisles and circulation roadways	High	High	PC1
	Medium	Medium	PC2
	Low	Low	PC3
Designated parking spaces specifically intended for people with disabilities	N/A	N/A	PCD
For any designated areas for pedestrians to cross	N/A	N/A	PCX

Summary of subcategory assessment is provided below: -

Category	Classification
Type of Road or Pathway	Pedestrian or cycle oriented pathway
Basic Operation Characteristics	Pedestrian/cycle traffic only
Pedestrian/ Cycle Activity	High
Fearof Crime	Medium
Applicable Lighting Subcategory	PP2

Table 1: Table 2.2 Assessment Summary

Category	Classification
Type of Area in Carpark	Parking spaces, aisles and circulation roadways
Night Time Vehicle and/or Pedestrian Movements	Medium
Fear of Crime	Medium
Applicable Lighting Subcategory	PC2

Table 2: Table 2.5 Assessment Summary – General Circulation

Category	Classification
Type of Area in Carpark	Designated parking spaces specifically intended for people with disabilities
Night Time Vehicle and/or Pedestrian Movements	N/A
Fear of Crime	N/A
Applicable Lighting Subcategory	PCD

Table 3: Table 2.5 Assessment Summary – Disabled Carpark

Category	Classification
Type of Area in Carpark	For any designated areas for pedestrians to cross
Night Time Vehicle and/or Pedestrian Movements	N/A
Fear of Crime	N/A
Applicable Lighting Subcategory	PCX

Table 4: Table 2.5 Assessment Summary – Cross Section

4.3 LIGHT TECHNICAL PARAMETERS (LTP)

Computer aided lighting design to comply with Light Technical parameters set out in AS1158.3.1:2020 Table 3.4 and 3.7 for footpath and carpark sections respectively will be completed during development to ensure compliance is achieved.

Summary of Light Technical Parameters definition is provided below: -

LIGHT TECHNICAL PARAMETERS (LTP)

Parameter	Symbol
Average horizontal illuminance	$\bar{E}_h$
Point horizontal illuminance	E_{ph}
Illuminance uniformity Category P	U_{E2}
Point vertical illuminance	E_{pv}

Further assessment of Maintenance of Light Technical Parameters by considering two main aspects of Luminaire Dirt Depreciation Factor (LDD) of 0.9 provided by Table 3.2 and Luminaire Source Lumen Depreciation (LLD) of 0.8 which is standard across LED type light source is considered for the system overall Light Loss Factor (LLF).

LDD FACTORS

Environmental zone	LDD factor			
	Cleaning frequency			
	36 months	48 months	60 months	72 months
Rural	0.95	0.94	0.93	0.92
Urban	0.90	0.88	0.86	0.84

In accordance with section 3.5.5 of AS1158.3.1:2020, the overall LLF of 0.7 will be considered.

4.4 PEDESTRIANS AND CYCLIST PATH - LTP

The development will comply with Light Technical Parameters set in AS1158.3.1:2020 Table 3.4. Refer below for summary of design criteria to achieve in order to obtain compliance.

VALUES OF LIGHT TECHNICAL PARAMETERS FOR PATHWAYS AND CYCLIST PATHS

1	2	3	4	5
	Light technical parameters (LTP)			
Lighting subcategory	Average horizontal illuminance[a,b] ($\bar{E}_h$) lx	Point horizontal illuminance[a,b,d] (E_{Ph}) lx	Illuminance (horizontal) uniformity[c] Cat. P (U_{E2})	Point vertical illuminance[a,b] (E_{Pv}) 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[e]
PP5	0.85	0.14	5	0.02[e]

[a] These values are maintained. See Clause 3.2 pertaining to lumen derating values for non-white light sources.

[b] Conformance is achieved by being greater than or equal to the applicable table value.

[c] Conformance is achieved by being less than or equal to the applicable table value.

[d] Conformance of 50% of E_{ph} shall also be demonstrated over an area of 5 m either side of the pathway—where a verge exists—or up to any structure/fence/property boundary that forms the edge of the pathway, unless deemed otherwise by the relevant authorities (see Clause 3.1.3.5).

[e] For luminaires with mounting heights of 1.5 m or less, the E_{Pv} values need not be applied.

4.5 CARPARK - LTP

The development will comply with Light Technical Parameters set in Table 3.7. refer below for summary of design criteria to achieve in order to obtain compliance.

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] $(\bar{E}_h)$ lx	Point horizontal illuminance[a,b] (E_{Ph}) lx	Illuminance (horizontal) uniformity[c] Cat. P (U_{E2})	Point vertical illuminance[a,b] (E_{Pv}) lx
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	—
PCD[d]	—	≥14 and ≥$(\bar{E}_h)$ [d]	—	—
PCX[e]	21	5	8	—

[a] These values are maintained.

[b] Conformance is achieved by being greater than or equal to the applicable table value.

[c] Conformance is achieved by being less than or equal to the applicable table value.

[d] E_{Ph} shall be determined for each PCD area in the car park and, in each case, it shall be greater than the value stated and greater than the average for the overall car park.

[e] This level shall be used for any marked areas for pedestrians to cross.

5 LIGHTING STRATEGY

The facility will be used during normal business hours as well at night. The external lighting to the carpark and walkways will be adapted to suit with means of adjustable/programmable control to suit the site's operations. It is anticipated that the lighting system will operate from dusk till dawn.

The lighting system will utilise a combination of post-top, bollard, recessed location, façade mounted and pathway illumination type luminaires to achieve the design intent and comply with the relevant requirements.

Pole mounted luminaires shall be 5-8 metre high and shall have adjustable mounting brackets to properly aim the luminaires' light distribution (to be detailed during design development).

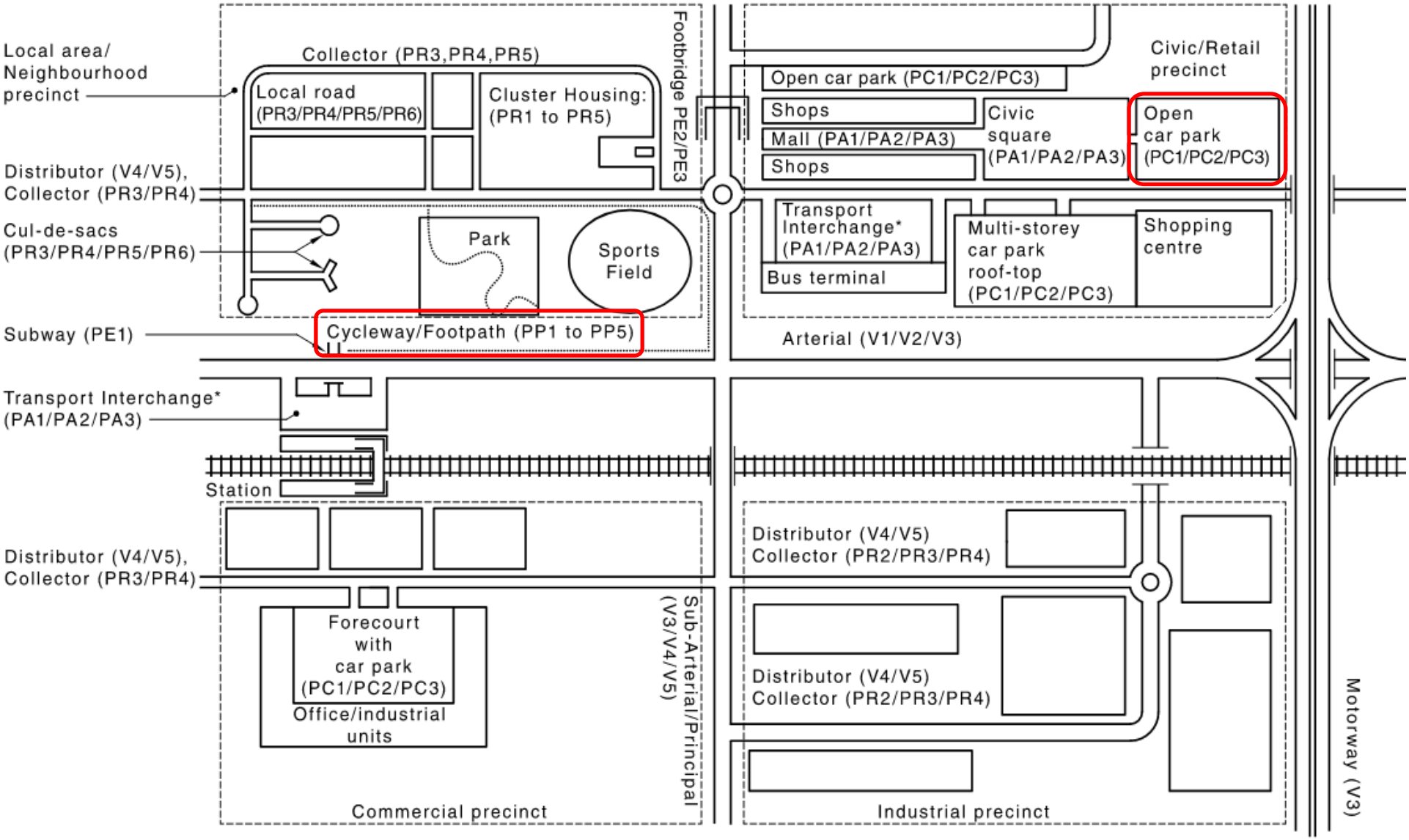
Luminaire selections shall generally incorporate the following: -

- High Impact Resistance - IK10
- High Ingress Protection Rating – IP66
- Light source to be LED
- Forward and side light distribution optics
- Colour Rendering Index of greater than 80
- Colour Temperature of 4000K
- Compatible with DALI Lighting Control System
- Low-cutoff, Aeroscreen style casing to minimise upward light spill

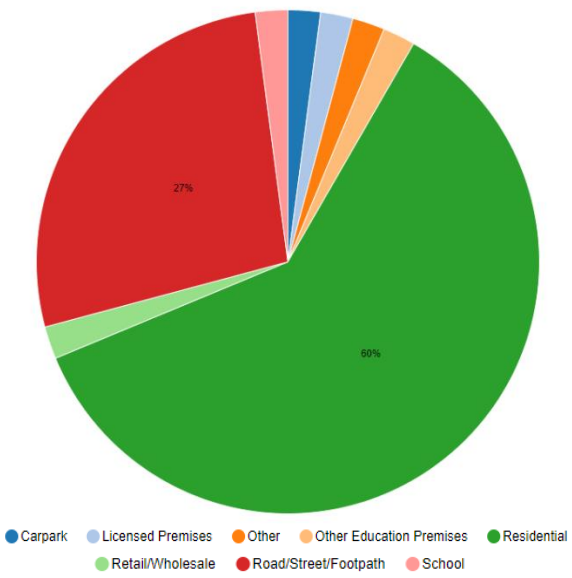
5.1 SWITCHING AND CONTROL

The site switching and control strategy will utilise a flexible DALI programmable control system that can be adjusted to meet changing requirements for community use. The main use of the site lighting will be from dusk and dawn to ensure safe community access and use and will be switched using a timeclock/photoelectric cell with manual override. Lighting provided for security purposes will operate between dusk and dawn.

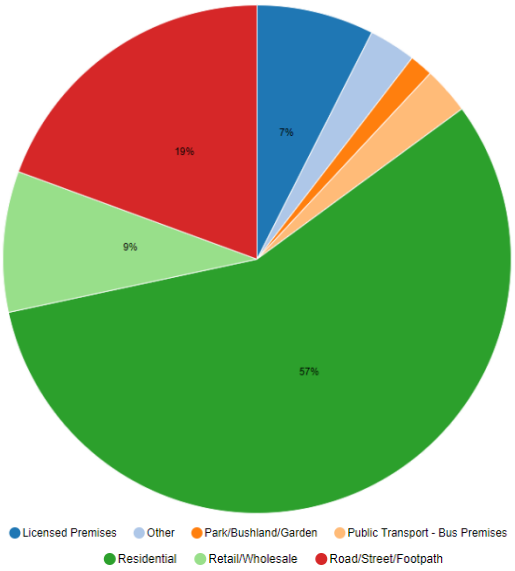
APPENDIX A: OUTDOOR LIGHTING CATEGORIES/ SUB-CATEGORIES



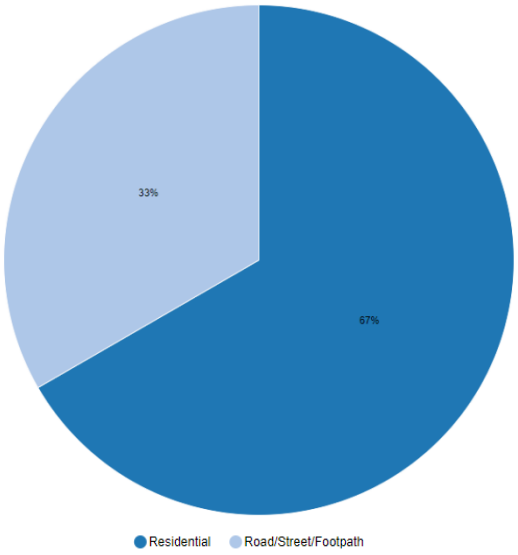
APPENDIX B: CRIME RATE PIE CHART



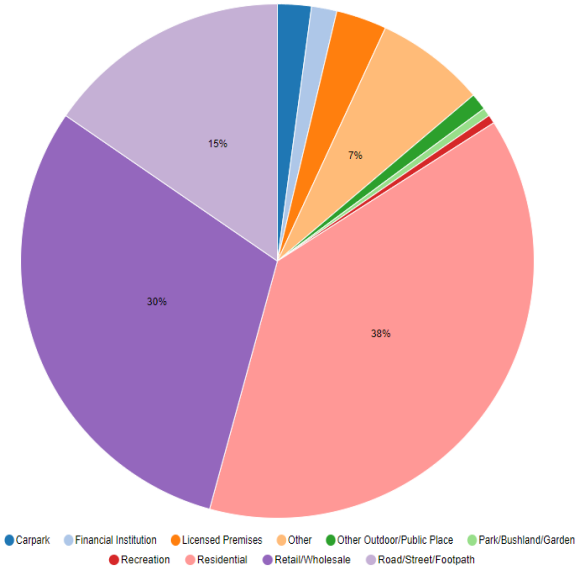
Malicious Damage to Property



Assault



Robbery



Theft

APPENDIX C: AREA OF WORK ASSESSED SUB-CATEGORIES