A589
Two Oaks, Scholarstown
RESIDENTIAL LIGHTING ANALYSIS

Planning Stage
Rev 06

2nd October 2019

A589-OCSC-XX-XX-SP-E-0001

CONTENTS

1.0 EXECUTIVE SUMMARY

Ardstone Homes Limited intend to apply to An Bord Pleanála for permission for a strategic housing development at a 5.35 hectare site located north of Scholarstown Road incorporating dwellings known as 'Beechpark' and 'Maryfield', Scholarstown Road, Dublin 16, D16 X3X8 and D16 N6V6. Works are also proposed to Scholarstown Road and Woodfield junction including new traffic signals, the elimination of the left-turn slip-lane into Woodfield off Scholarstown Road, upgraded public lighting and upgraded cycle and pedestrian facilities on an area measuring 0.7 hectares, providing a total application site area of 6.05 hectares.

The development will principally consist of: the demolition of all existing structures on site which include a single story dwelling known as 'Beechpark' (172 sq m), a 2 No. storey dwelling known as 'Maryfield' (182 sq m), with associated garage/shed (33.5 sq m) and associated outbuildings (47.1 sq m); and the construction of 590 No. residential units (480 No. Build-to-Rent apartment units and 110 No. Build-to Sell duplex units and apartments), ancillary residential support facilities and commercial floorspace. The total gross floor space of the development is 51,252 sq m over a partial basement of 5,888 sq m (which principally provides car and bicycle parking, plant and bin stores).

The 480 No. 'Build-to-Rent' units will be provided in 8 No. blocks as follows: 7 No. blocks ranging in height from part 5 to part 6 No. storeys (Blocks B1 – B5, C1 and C3) and 1 No. block ranging in height from part 4 to part 6 No. storeys (Block C2) and will comprise 246 No. one bed units and 234 No. two bed units. The 110 No. 'Build-to-Sell' units will be provided in 9 No. duplex blocks which will be 3 No. storeys in height (Blocks A1 – A9) and will comprise 55 No. two bed units and 55 No. three bed units.

The development will also consist of the provision of a part 1 to part 2 No. storey ancillary amenity block (Block D1) (414 sq m) within the central open space which comprises a gymnasium, lobby, kitchenette and lounge at ground floor level and lounge at first floor level in addition to a roof terrace (facing north, south and west) to serve the Build-to-Rent residents; a 2 No. storey retail/café/restaurant building (Block D2) (657 sq m) comprising 2 No. retail units at ground floor level (328.5 sq m) and a café/restaurant unit at first floor level (328.5 sq m); a creche (438 sq m) within Block C2 at ground floor level; and a management suite (261 sq m) and café/restaurant (288 sq m) within Block C3 at ground floor level.

The development provides a vehicular access off Scholarstown Road between Blocks C1 and C3 towards the south-east corner of the site; a separate pedestrian access and emergency vehicular access off Scholarstown Road between Blocks A9 and C2 towards the south-west corner of the site; the facilitation of a pedestrian connection from the north-east corner of the subject site to the public open space in Dargle Park; 459 No. car parking spaces (178 No. at basement level and 281 No. at surface level); bicycle parking; bin storage; boundary treatments; private balconies and terraces; hard and soft landscaping; plant; services; sedum roofs; PV panels; substations; lighting; and all other associated site works above and below ground.

This report outlines the design intent and considerations to be taken with regards to residentially obtrusive light and bat flying patterns for lighting the proposed development of Two Oaks, Scholarstown, Knocklyon Dublin 16.

The report considers the lighting design as developed by O'Connor Sutton Cronin (OCSC). The report has been developed with the following principal considerations:

- Provide adequate illumination to contribute towards the safe use of all public roads, footpaths and cycle paths by both vehicles and pedestrians
- Provide adequate illumination to contribute towards the safe use of all walkways and footpaths by pedestrians within the residential development
- Contain the lighting within the site.
- Minimise light pollution and visual glare to residential neighbours, pedestrians and neighbouring areas.
- Minimise the impact of lighting on bats natural habitat
- Provide a visually interesting environment
- Enhance Security

The complete external lighting installation was designed in accordance with the regulations for electrical services as ETCI National Rules for Electrical Installations ET101:2008, BS5489-1:2003 Code of practice for the design of road lighting, IS EN 13201:2003-2, South Dublin County Council Public Lighting specification, CIE regarding Illumination levels as well Bat Conservation Ireland (BCI) guidelines. These design criteria are outlined in Section 2.0.

The predicted performance of the external lighting installations has been assessed in detail using lighting simulation software. The lighting simulation software used was Lighting Reality: Roadway Lighting.

Lighting in all areas has been designed in compliance with the Bat Guidelines.

Our design intent comprising of column lighting for roadways are described in Section 3.0. An indicative example of the type of proposed luminaire (light fitting) and associated lamp specification have been included, with accompanying images, photometric and dimensional data.

Section 4.0 provides analysis of the predicted illumination results.

2.0 DESIGN CRITERIA

The design criteria applied to the proposed street lighting & Bat lighting installation shall be in accordance with BS 5489-1:2003 Code of practice for the design of road lighting, CIE Guide to the Lighting of Urban Areas, NSAI EN I.S. 13201-2 Road Lighting Performance Requirements, General Specification for Public Lighting Design and Installation in Residential, Industrial and Commercial Developments in the South Dublin City Council Area.

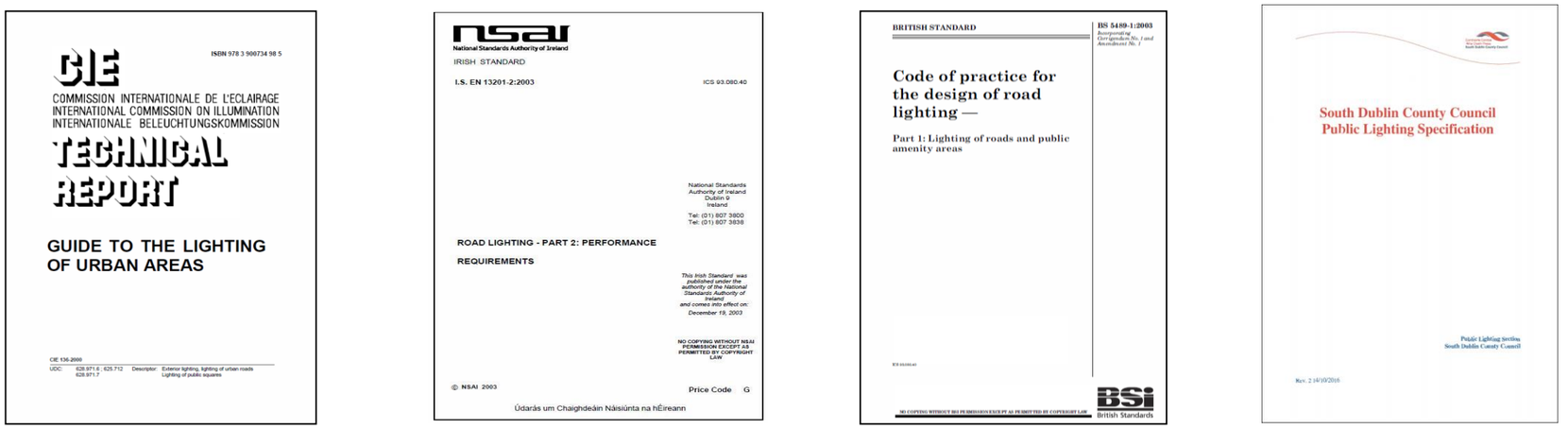


Figure 2.1 – Lighting Design Guides

The brief for this report was to define the design criteria and summarise the results of lighting calculations. Specific results are included for light spill from the public lighting to preserve neighbouring residential amenity and to reduce the impact of artificial lighting on local bat habitats & conform to BS, IS and EN guidelines in relation to minimum light pollution requirements.

OCSC conducted calculations in regard to light levels on the public roadways and adjoining proposed residential properties. To limit any excessive light trespass, which may impinge upon the residential amenity of housing units within the development, several preventative measures have been taken;

The key items in focusing the design are as described below:

1. Compliance with lighting regulations
2. Light posts have been consciously positioned, so as to limit negative spill, whilst also maintaining the required lux levels uniformly across the proposed development.
3. In addition, narrow beam optics are employed to physically contain unnecessary light spillage. This provision allows for a maximum level of delivered light to the road way, as opposed to territories outside the boundary area.
4. Requirement to safeguard bat use of the site against light emission

[1] *British Standards Institution 5489-1:2003 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas*
[2] *Commission Internationale de l'Eclairage or International Commission on Illumination*
[3] *I.S. EN 13201 Road Lightning - Part 2 Performance Requirements*
[4] *South Dublin County Council Public Lighting Specification*

To address these points the following measures were put in place:

1. Firstly, end columns have been
   - Consciously positioned, so as to limit negative spill whilst also maintaining the required lux levels.

2. In addition to column positioning,
   - Narrow beam optics are employed to physically contain unnecessary light spillage.

3. Light fittings were chosen using a warm white bulb (3000K colour temperature) to negate any intrusion into Bat feeding patterns. Light levels around the perimeter were kept to a minimum to comply with Bat Conservation Ireland (BCI) guidelines.

The brief of this report was to complete public and roadway lighting design to pre mentioned design criteria nor alleviate the light spill to neighbouring residential amenity & conform in accordance with CIBSE guidelines in relation to minimum light pollution requirements. Bat friendly lighting was utilised in street lighting.

2.1 GUIDELINES TO STREET LIGHTING DESIGN

The points below were used as guidelines in the design of the external lighting. The different lighting classifications used for the proposed development and the Scholarstown Road can be seen below.

2.1.1 Proposed Development

1. No white light or other lighting with a UV component will be permitted due to Bat habitats;
    - Lighting with no UV will be utilised
    - Lighting with a narrow spectrum will be permitted to reduce impact on insects
    - LED lighting with a broad spectrum will not be used
2. Minimum lux levels around the boundary to be used as required by Bat guidelines especially along the perimeters
3. Light spillage from doorways and windows should be kept to a minimum
4. An Amber LED (3000K) has been shown to have a reduced impact on Bats due to its narrow spectrum properties
5. South Dublin County Council public lighting guidance document states that, all roadways are to be designed to conform to required lux levels of P4 lighting classes: 5 lux.
    - Lighting Classification P4 is intended for users of motorised vehicles on traffic routes where traffic speeds are from low to medium, pedestrian footpath / cycle ways.
    - To comply with P4 lighting classification the following parameters must be adhered to;
        a) Average Horizontal Illuminance ($\bar{E}$) must be an average of 5 lux.
        b) Minimum Horizontal Illuminance (Emin) must be a minimum of 1 lux.
        c) It is recommended that the actual overall uniformity of illuminance (Uo) be as high as reasonably practicable
6. The lighting will be directional on to the buildings only with no spillage of light to adjoining habitats. To reduce light spillage from luminaries, lights that are designed not to emit light at angles greater than 70° from the vertical plane will be used.
    - It is important to maintain Dark Zones for foraging bats in areas where lighting is not necessary. However, where lighting is required, this lighting will be placed at a minimum height using the lowest lux value permitted for health and safety.

	$\bar{E}$	E_{min}
P1 or S1	15.0	3.0
P2 or S2	10.0	2.0
P3 or S3	7.5	1.5
P4 or S4	5.0	1.0
P5 or S5	3.0	0.6
P6 or S6	2.0	0.4

Figure 2.2 - P4 - S4 Lighting Class per EN13201:2015

2.1.2 Scholarstown Road Lighting

7. South Dublin County Council public lighting document states that M Lighting Class should be used for Main Roads. In this case, Scholarstown has been deemed as an M4 Class and has been designed as such following consultation with SDCC Public Lighting Department.

    - Lighting Classification M4 is intended for users of motorised vehicles on traffic routes where traffic speeds are from medium to high.
    - The following table shows what is needed in order to comply with an M4 class.

Table 1 — M lighting classes

Class	Luminance of the road surface of the carriageway for the dry and wet road surface condition				Disability glare	Lighting of surroundings
	Dry conditions			Wet	Dry conditions	Dry conditions
	$\overline{L}$ [minimum maintained] cd·m²	U_o [minimum]	U_l [a] [minimum]	U_{ow} [b] [minimum]	f_{TI} [c] [maximum] %	R_{EI} [d] [minimum]
M1	2,00	0,40	0,70	0,15	10	0,35
M2	1,50	0,40	0,70	0,15	10	0,35
M3	1,00	0,40	0,60	0,15	15	0,30
M4	0,75	0,40	0,60	0,15	15	0,30
M5	0,50	0,35	0,40	0,15	15	0,30
M6	0,30	0,35	0,40	0,15	20	0,30

Figure 2.3 – M4 Lighting Class per EN13201:2015

3.0 PROPOSED INSTALLATIONS

3.1 Two Oaks Residential Development

The proposed development road and pedestrian access routes will require illumination and shall for the purpose of this report comprise of lighting installations to Two Oaks residential complex and Scholarstown Road as identified on the drawings which illustrates the design intent.

The lighting design proposed is to use high efficiency LED luminaires. A lighting design for the proposed development incorporates a 6 metre high tubular lamppost with over hang out reach to provide directional light output direct to the road surface, 5 metre high lamp posts provide directional light output to pedestrian walkways. Bollards are used in green open areas to illuminate the walkways. This is selected to ensure compliance with guidelines and standards noted in Section 2 above. Six metre high lamp posts have been selected due their characteristics enabling a lower quantity of luminaires to provide an even spread of luminance along the road.

The design intent for Scholarstown Road comprises of 10 meter high lamppost which provide a wide spread forward throw of light. This mitigates the need to provide for excessive amounts of lighting poles as well as only concentrating light on to the road with little light to no light spill. All the while, complying with the lighting class which was discussed for the Main Road in Section 2 above. Provided below is an illustration of the lighting design incorporated into a colour rendered drawing.

3.1.1 Proposed Development – Access Routes

It is proposed that 6 metre high roadway light fittings provide illumination to the residential vehicle and pedestrian pathways and cycle routes.

Figure 3.1.1 – Two Oaks Public Lighting

3.1.2 Scholarstown Road

It is proposed that 10 metre high roadway light fittings in accordance with SDCC specification will provide illumination to Scholarstown Road along the frontage of the proposed development.

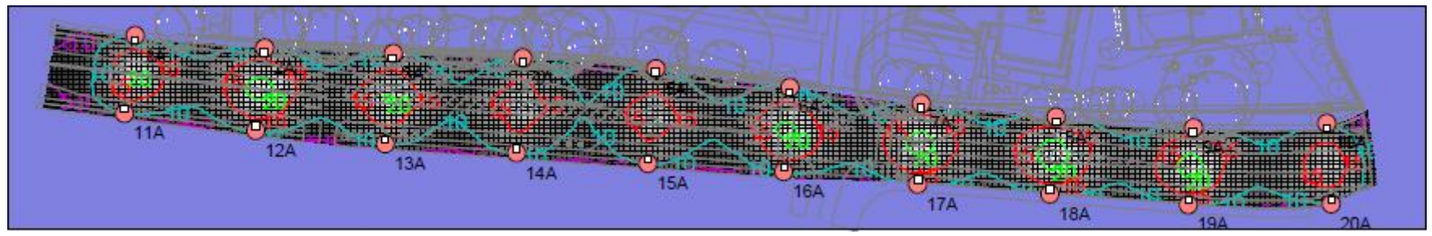


Figure 3.1.2 – Scholarstown Road Main Road Public Lighting

3.2 Public Road Lighting Selected Luminaire

It is proposed to provide 6m high column-type light fittings to the road area in order to achieve average Illumination levels.
The proposed column light fitting is modern decorative LED luminaire 28W LED lamp module with direct light spread. The luminaire is constructed out of die cast aluminium.
The luminaire will be installed with a DALI ballast for future use. Fully compliant with EN 60598: CE.

Figure 3.2.1
Luminaire fitting

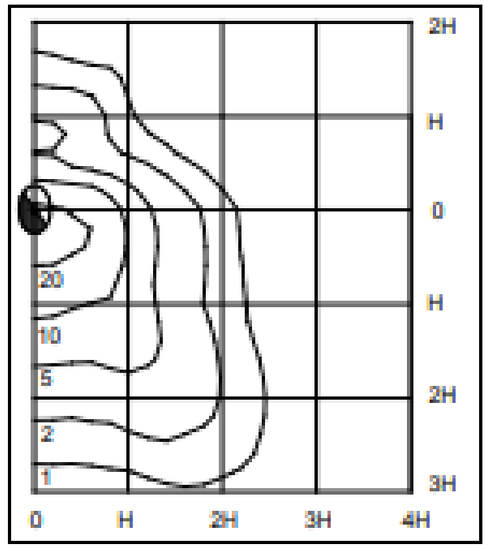


Figure 3.2.2
Luminaire - Photometric Curve

3.3 Pedestrian Lighting Selected Luminaire

It is proposed to provide 5m high column-type light fittings and bollards to the footpath/cycle routes in order to achieve average Illumination levels. The proposed column light fitting is modern decorative LED luminaire 28W LED lamp module with direct light spread. The proposed bollard light fitting is a modern decorative LED luminaire 12W bollard. The luminaire will be installed with a DALI ballast for future use. Fully compliant with EN 60598: CE.

Figure 3.3.1
Luminaire fitting

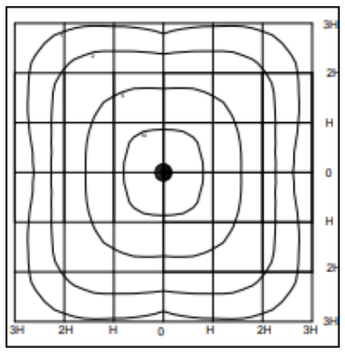


Figure 3.3.2
Luminaire - Photometric Curve

Figure 3.3.3
Luminaire Fitting

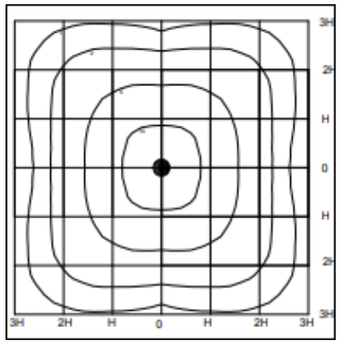
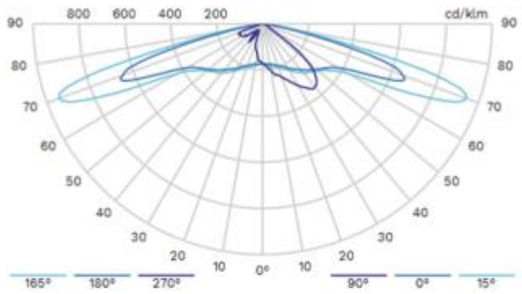


Figure 3.3.4
Luminaire Fitting

3.4 Scholarstown Road Lighting Selected Luminaire

It is proposed to provide 10m high column-type light fittings to the Scholarstown Road area in order to achieve M4 Class Illumination levels.
The proposed column light fitting is an Urbis Schreder Axia 2.2 with a 13.8kLm output. This lamp has been used in recent lighting upgrades to adjacent parts of Scholarstown Road. The luminaire is constructed out of die cast aluminium. The luminaire will be installed with a 7 prong NEMA Socket with a 5 core 1.5mm loom c/w a 35/18 lux electronic photocell per lantern. A preset dimming protocol to 75% between 12.00-6.00am will be provided. All lanterns come with CLO as standard and a fully programmable, duplex DALI protocol compatible driver for future proofing.
The proposed luminaire is fully compliant with EN 60598: CE.

Figure 3.4.1
Luminaire fitting



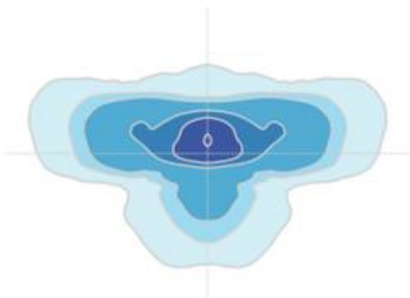


Figure 3.4.2
Luminaire – Photometric Curve

4.0 RESULTS

4.1 (Light Spill on Residential Units)

Figure 4.1.1 indicates the predicted illumination levels on ground for the proposed installations around the residential areas.

Results for the residential units indicate the following:

- The light spill on the apartments and duplexes reach a level of 3-7 Lux
- The light on the front façade of the apartment & duplexes does not exceed the guidelines set forth in table 2.2 CIBSE guidelines which is over 10lux

Figure 4.1.1 - Ground Illumination Levels (Lux) for Residential Site

4.2 Scholarstown Main Road Lighting

Figure 4.2.1 indicates the predicted illumination levels on ground for the proposed installations around the residential areas.
Figure 4.2.2 shows compliance with M4 class as per Lighting Reality Roadway.

Results for the Main Road indicate the following:

- Compliance with M4 class as per EN 13201:2015
- The light on the front façade of the apartment & duplexes does not exceed the guidelines set forth in table 2.2 CIBSE guidelines which is over 10lux

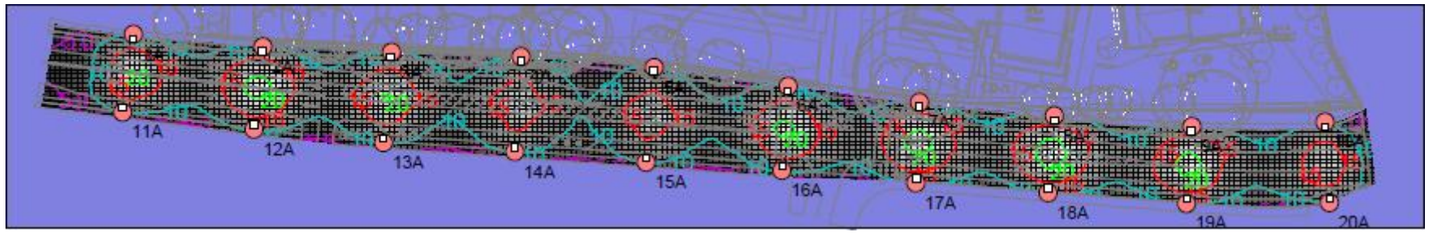
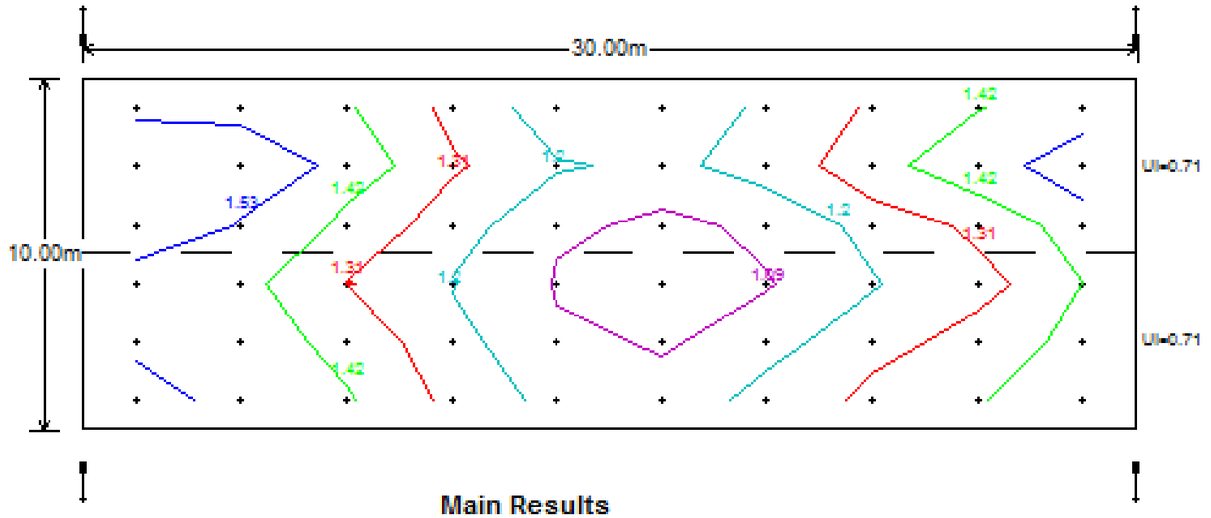


Figure 4.2.1 - Ground Illumination Levels (Lux) for Scholarstown Road



Main Results

Observers in all Lanes

Lavmin	1.33 (1)
Lmin	1.04 (1)
Lmax	1.69 (2)
U0min	0.78 (1)
Ulmin	0.71 (1)
TImax(%)	12.28 (1)
Rei	0.59

Number in brackets is the
Observer Lane for Result shown.

Figure 4.2.2 - Typical Ground Illumination Levels (Lux) for Scholarstown Road

4.3 (Bat lighting levels)

In compliance with Bat Conservation Ireland guidelines the following results were achieved:

- Lighting in areas that bats migrate/habitat achieve levels of 3 lux or under. This is in compliance with Bat guidelines which require 3 lux or under to facilitate feeding patterns.

5.0 CONCLUSION

As shown in Figure 4.1.1 the illumination throughout the development meets the lighting design requirements; with an average of 7 lux. As well as internal to the development site, Scholarstown Road is also in compliance with the required lux levels as seen from figures 4.2.1 and 4.2.2. The proposed lighting scheme complies with the recommendations of BCI.