

Lighting Impact Assessment Report for Lidl Newcastle

For LIDL Ireland GmbH

Lidl Newcastle

Main Street Upper

Newcastle,

Co. Dublin

Document Control:

Rev:	Date:	Prepared By//Project Engineer		Quality Check by:	
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1.0 Project Description

Permission for development at Main Street Upper, Newcastle, Co. Dublin, principally consisting of the construction of a Discount Foodstore Supermarket with ancillary off-licence sales. The proposed development comprises:

- 1) The construction of a single storey Discount Foodstore Supermarket with ancillary off-licence use (with mono-pitch roof and overall building height of c. 6.74 metres) measuring c. 2,207 sqm gross floor space with a net retail sales area of c. 1,410 sqm;
- 2) Construction of a vehicular access point to Main Street Upper and associated works to carriageway and including partial removal of boundary wall / façade, modification of existing footpaths / public realm and associated and ancillary works including proposed entrance plaza area;
- 3) Demolition of part of an existing rear / southern single storey residential extension (and related alterations to remaining structure) of 'Kelly Estates' building. The original 'Kelly Estates' building (a protected structure - Eircode: D22 Y9H7) will not be modified;
- 4) Demolition of detached single storey accommodation / residential structure and ancillary wall / fence demolitions to rear of existing 'Kelly Estates' building;
- 5) Demolition of existing single storey (stable) building along Main Street and construction of single storey retail / café unit on an extended footprint measuring c. 118 sqm and associated alterations to existing Main Street boundary façade;
- 6) Renovation and change of use of existing (vacant) two storey vernacular townhouse structure to Main Street, and single storey extension to rear, for retail / commercial use (single level throughout) totalling c. 62 sqm;
- 7) Repair and renewal of existing Western and Eastern 'burgage plot' tree and hedgerow site boundaries; and,
- 8) Provision of associated car parking, cycle parking (and staff cycle parking shelter), pedestrian access routes and (ramp and stair) structures (to / through the southern and western site boundaries to facilitate connections to potential future development), free standing and building mounted signage, free standing trolley bay cover / enclosure, refrigeration and air conditioning plant and equipment, roof mounted solar panels, public lighting, hard and soft landscaping, boundary treatments and divisions, retaining wall structures, drainage infrastructure and connections to services / utilities, electricity Substation and all other associated and ancillary development and works above and below ground level including within the curtilage of a protected structure.

2.0 Introduction

Lawler Consulting Engineers have been commissioned by LIDL Ireland GmbH to design an external lighting scheme, prepare an external lighting layout drawing and a lighting impact assessment report. The following report addresses the lighting services issues raised by the planning authority.

This document summarises the information taken from a fully designed, comprehensively and accurately scaled, 3D parametric model with computer calculated illuminations levels of the proposed site but also the site perimeter.

This process reviews the baseline conditions in a worst case scenario and the impact that the lighting will have on the surrounding area and residential properties whilst ensuring the proposed lighting scheme is suitable for the intended use and that all applicable regulatory requirements are achieved.

3.0 Executive Summary

The assessment below provides design evidence that the designed lighting scheme shall be fit for purpose, achieve all applicable regulatory requirements and concludes that the light spill and glare from the car park, pathways and roadways within the development boundaries will have minimal impact on the surrounding area.

The recommendations made in this report for the area lighting are as follows;

- Zero Upwards Light Output Ratio (ULOR) lanterns and wall fittings are used.
- The height of all area lighting columns and wall fitting mounting points are restricted to an 8 metre maximum.
- The lighting installation shall be controlled via a combination of timeclock and photocell operation which will restrict the lighting operation to only when essential.

4.0 Design Guidelines

The preliminary lighting design and associated mitigations and assumptions for the proposed development of a Lidl store at Newcastle Mainstreet Upper, Co. Dublin and have been based upon the following British Standards and best practice guidelines;

- BS EN 12464-2:2014 'Lighting of Work Places – Part 2 – Outdoor Workplaces'
- BS5489-1 (2020) – Code of practice for the Design of Road Lighting – Lighting of roads and public amenity areas
- Guidance note for the Reduction of Obtrusive Light – GN01:2021, produced by the Institute of Lighting Professionals (ILP)
- Society of Light and Lighting (SLL) – Lighting Handbook 2012
- CIBSE Environmental considerations for External Lighting – Factfile no.7 (2003)

5.0 Methodology

5.1. General

This report assesses the impact of the external lighting for the proposed development of a Lidl store at Mainstreet Upper Newcastle Co. Dublin and associated grounds, on the surrounding residential properties, ecology, environment and public roadways and pathways. Colour temperature of the associated lighting will be 2700 Kelvin due to the sensitivity of bats in the area.

This report is based upon a preliminary calculation and site layout. The lighting used within the preliminary design is indicative of the standards of lighting currently being installed on similar sites.

Briefly, these light sources consist of;

- 8-meter columns with area lighting, Veelite Durostar series lanterns illuminating the LIDL Car park.
- 6-meter columns with area lighting, Veelite CHI series lanterns illuminating the Plaza Area

5.2. Environmental Zones

The ILE guidance note for the reduction of obtrusive light, recommends that local planning authorities specify the environmental zones for external lighting control.

The Categories are as follows;

Table : Environmental Zones

Source: ILP GN01:2021

Table 2: Environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity

For the purpose of this report, and based upon the evidence gained through the site survey, topographical information and surrounding areas, the environmental zone for this site has been specified as E3, this being considered the 'worst case' scenario for the area.

Selection of the environmental category sets out specific guidelines for the allowable light spillage to both nearby properties and 'skyglow' or upwards light output ratio. These values are shown with the table below.

Table: Obtrusive Light Limitations

Source: ILP GN01:2021

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on premises

Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (E_v)	Pre-curfew	n/a	2 lx	5 lx	10 lx	25 lx
	Post-curfew	n/a	<0.1 lx*	1 lx	2 lx	5 lx

Table 4 (CIE 150 table 3): Limits for the luminous intensity of bright luminaires⁴

Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0 < A_p \leq 0.002$	$0.002 < A_p \leq 0.01$	$0.01 < A_p \leq 0.03$	$0.03 < A_p \leq 0.13$	$0.13 < A_p \leq 0.50$	$A_p > 0.5$
Maximum luminous intensity emitted by luminaire (I in cd) ⁵	E0						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500
	Post-curfew	0	0	0	0	0	0
	E2						
	Pre-curfew	0.57 d	1.3 d	2.5 d	5.0 d	10 d	7,500
	Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	500
	E3						
Pre-curfew	0.86 d	1.9 d	3.8 d	7.5 d	15 d	10,000	
Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	1,000	
E4							
Pre-curfew	1.4 d	3.1 d	6.3 d	13 d	26 d	25,000	
Post-curfew	0.29 d	0.63 d	1.3 d	2.5 d	5.1 d	2,500	

Table 6 (CIE 150 table 5): Maximum values of upward light ratio (ULR) of luminaires

Light technical parameter	Environmental zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR) / %	0	0	2.5	5	15

For the selected environmental zone, E3, the above table recommends that the upwards light output ratio (ULOR) is restricted to a maximum of 5% of the ground illuminance levels. It also recommends that the light output into residential windows is restricted to 10000 Candelas or 10 lux pre and 1000 candelas or 2 lux post curfew times. The curfew times are usually dictated by the planning authority, however for the purpose of this report the standard maximum night time curfew of 23:00 hours through 07:00 hours, as recommended by the ILP, shall be used.

5.3. Car Park Lighting

The car park areas within the boundaries of the site have been designed to the illuminance levels set out within British Standards BS12464-2 and BS5489.

Table 2-3 Car Park Lighting Requirements

Source: BSEN 12464-2 (2014)

Table 5.9 — Parking areas

Ref. no.	Type of area, task or activity	\bar{E}_m lx	U_o -	R_{GL} -	R_a -	Specific requirements
5.9.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	0.25	55	20	
5.9.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	0.25	50	20	
5.9.3	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	0.25	50	20	

5.4. Calculation Procedure

The proposed lighting scheme has been designed using the lighting design software Dialux to ensure all regulations are achieved and to review its effects on the local residents, ecology and environment.

The lighting design within the site boundary shall generally be carried out utilising 8 metre high lighting poles, flat glass lanterns with LED light sources with supplementary wall mounted and ceiling mounted bulkheads to illuminate perimeter. The lighting shall be automatically controlled via photocell and timeclock combination.

All light fittings used shall comply with the requirements set out within table 2.2 of section 4.2 Environmental Zones of this report and comply with the 'Dark Skies' Initiative, as detailed within the ILP Guidance notes for the reduction of obtrusive light (2021).

6.0. Proposed Lighting Scheme Results


6.1. Proposed Lighting Scheme Results within Boundary

To ensure the proposed lighting scheme design achieves all the required regulation we have input data for the light fittings, their respective locations, pole heights etc. into the Dialux software. This is a re-iterative process, running the calculations and making small adjustments until we achieved the regulation whilst not affecting adjoining properties, roadway traffic etc.

The lighting scheme which best achieves all of the above items is shown on the site lighting drawing accompanying this report. Referring to table 2.3 "Car Park Lighting Requirements" within section 5.9.2 above we need to achieve an average lighting level of 15-20 lux.

The types of light fittings used within the calculation are LED fittings, very energy efficient, long lifetime running (reduced need for maintenance) and will provide a good lighting scheme with low running costs when compared to conventional outdated luminaires.

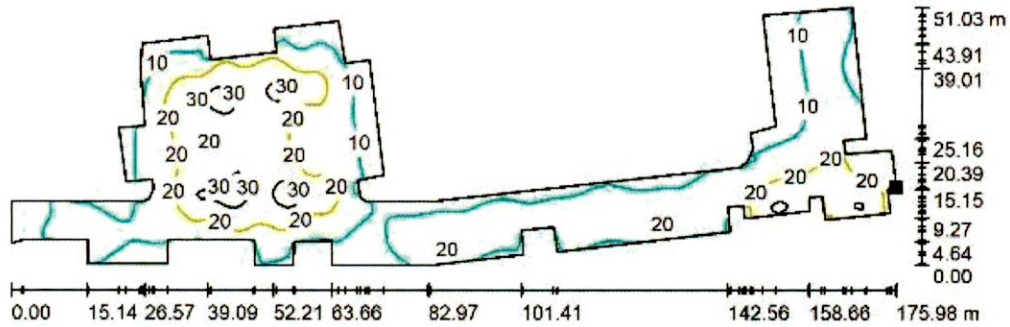
6.2. Luminaire Parts List: Lidl Newcastle Carpark

<p>18 Pieces</p>	<p>VEELITE 5CHI13LGA CHI 36W 16LED, Symmetric CIR04, 2700K, 700mA</p> <p>Article No.: 5CHI13LGA</p> <p>Luminous flux (Luminaire): 3127 lm</p> <p>Luminous flux (Lamps): 3127 lm</p> <p>Luminaire Wattage: 36.0 W</p> <p>Luminaire classification according to CIE: 97</p> <p>CIE flux code: 18 48 87 97 100</p> <p>Fitting: 1 x 16L(2x8)2700K700mA - 36.00 W (Correction Factor 1.000).</p>	
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<p>1 Pieces</p>	<p>VEELITE 5CHI13LGA CHI 36W 16LED, Symmetric CIR04, 2700K, 700mA</p> <p>Article No.: 5CHI13LGA</p> <p>Luminous flux (Luminaire): 3127 lm</p> <p>Luminous flux (Lamps): 3127 lm</p> <p>Luminaire Wattage: 36.0 W</p> <p>Luminaire classification according to CIE: 97</p> <p>CIE flux code: 18 48 87 97 100</p> <p>Fitting: 1 x 16L(2x8)2700K700mA - 36.00 W (Correction Factor 1.000).</p>	
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6.3. Calculation Results: Lidl Newcastle Carpark

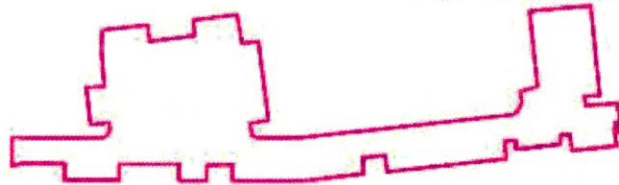
Exterior Scene 1 / Ground Element 1 / Surface 1 / Isolines (E)



Values in Lux, Scale 1 : 1259

Position of surface in external scene:

Marked point: (361.869 m, 302.162 m, 0.000 m)



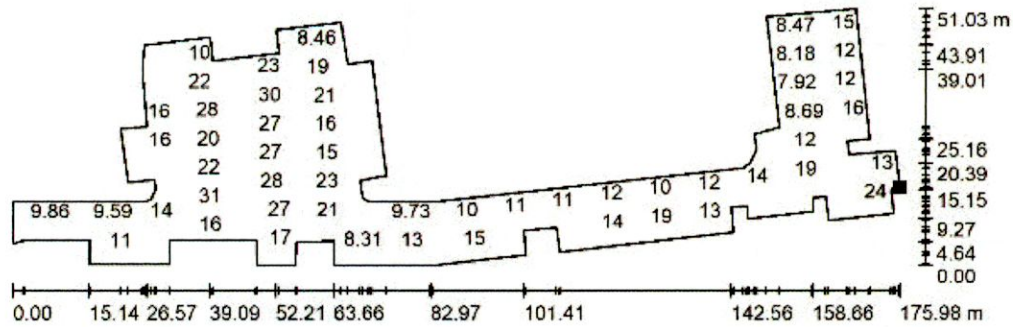
Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
16	4.29	34	0.269	0.126

The proposed lighting scheme for the car park area comply with the minimum requirements set out in BS EN 12464-2:2014 which requires an average of 15[lx] or greater and a uniformity of 0.25[u0]. The above lighting scheme achieves as follows:

Average → 16 [lx] Uniformity → 0.27 [u0]

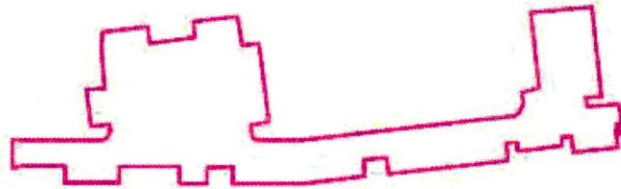
Exterior Scene 1 / Ground Element 1 / Surface 1 / Value Chart (E)



Values in Lux, Scale 1 : 1259

Not all calculated values could be displayed.

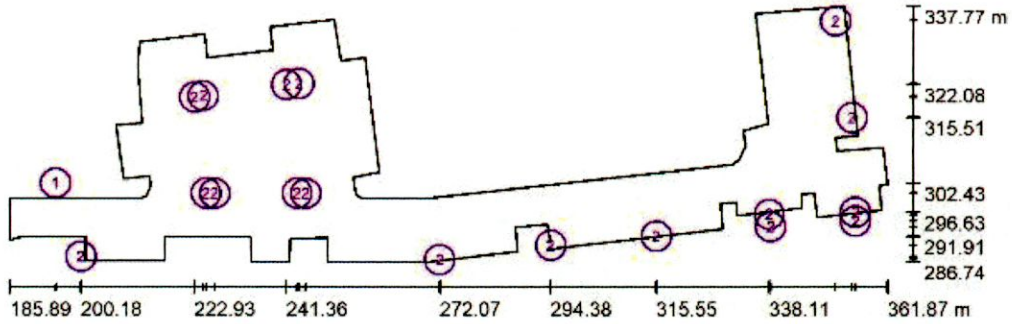
Position of surface in external scene:
Marked point: (361.869 m, 302.162 m, 0.000 m)



Grid: 128 x 128 Points

E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	$u0$	E_{min} / E_{max}
16	4.29	34	0.269	0.126

Exterior Scene 1 / Luminaires (layout plan)



Scale 1 : 1259

Luminaire Parts List

No.	Pieces	Designation
1	1	VEELITE 5CHI13LGA CHI 36W 16LED, Symmetric CIR04, 4000K, 700mA
2	18	Veelite 5DRS09LGA-FT2 Durostar 50w LED 4K Forward Throw 2 Optic

6.4. Proposed Lighting Scheme Results outside Boundary

To analyse the potential light intrusion/spill and skyglow issues surrounding the proposed redevelopment another set of calculations were undertaken.

The design takes into account the general area lighting requirements for car parks, pathways, roadways and shared surfaces, as defined with sections 4.2. Environmental Zones.

To ensure compliance with the ILP guidance all light fittings used within the preliminary design emit <2% upwards light.

The light intrusion calculations take minimal account of screening via vegetation or fencing, either existing or proposed.

6.5. Light Intrusion/ Light Spill – Area Lighting only

The light spill from the proposed external lighting installation has been determined where there is open land directly adjacent to the site boundary as shown on the image above.

All light fittings proposed comply with the requirements set out within section 2.2 of this report and comply with the 'Dark Skies' Initiative, as detailed within the ILP Guidance notes for the reduction of obtrusive light (2021).

6.6. Upwards Light Output Ratio (ULOR)

The lighting design utilised lanterns with less than 4% upwards light output on 8 metre columns. Therefore the ULOR is less than 5% across the entire site. This is in compliance with ILP guidance.

7.0. Impact on surrounding area due to proposed lighting scheme

7.1. Light pollution reduction

Careful consideration was taken when preparing our lighting schemes to ensure there is no risk of light pollution. Lighting systems frequently emit light that, in addition to performing their primary function of illumination of exterior functions, illuminate beyond what is necessary. Light Pollution is often considered a nuisance, a safety hazard when it causes 'blind' spots to pedestrians and drivers and also poses environmental concerns as it disrupts human health, affects bird migration patterns and other natural cycles. Another negative condition that arises from light pollution is the inability to view the night sky by the general public.

The requirements which we shall be following in our design of the relevant lighting schemes shall be as follows:

- BSEN 12464-2:2014 'Lighting of Work Places – Part 2 – Outdoor Workplaces'
- BS5489-1 (2020) – Code of practice for the Design of Road Lighting – Lighting of roads and public amenity areas
- Guidance note for the Reduction of Obtrusive Light – GN01:2020, produced by the Institute of Lighting Professionals (ILP)
- We shall specify light fittings which have lighting shields to prevent the risk of light pollution to adjacent properties.
- We shall specify Light Emitting Diode (LED) lamps and fixtures for all exterior lighting including parking lots and streets.

As highlighted within our calculations and within Section 5.1 of this report we achieve all regulations in relation to potential light intrusion/spill and skyglow.

7.2. Impact upon wider urban area and landscape

Careful consideration was taken when preparing our lighting schemes to ensure there is no risk of upsetting the existing lighting schemes throughout the local area. The proposed lighting scheme will only enhance the lighting within our boundary thus enhancing the general feel while driving through the area.

7.3. Impact upon Vehicular / Pedestrian Safety

The lighting scheme will not have any adverse effect on the lighting of the existing public road, there is no risk of additional brightness or glare effecting oncoming traffic.

The lighting scheme will only enhance pedestrian safety as all footpaths achieve the required lighting regulations.

7.4 Impact upon Bats

Introduction:

Many Species of Bat, insects and other wildlife are in danger from increasing urbanisation in general and lighting is part of the problem. Legislation protects the Roost (Resting places for Bats) from being intentionally or recklessly disturbed. If a lighting scheme is being developed in an area with Bats, a survey is carried out to plan and minimise the disruption to Bats.

For safety reasons lighting will be required to illuminate the car park on the site. However, several factors have been included in the lighting design to mitigate the disruption to Bats at the boundary areas.

The requirements which we shall be following in our design of the relevant lighting schemes are as follows:

ILP – Guidance Note 08/18 : Bats and artificial lighting in the UK/Bats and the Built Environment series and recommendations of the Environmental Consultants Report.

The Proposed Lighting Design Factors which will minimise the effect on Bats at the boundary areas:

1. The lighting installation has been designed to only illuminate the new car parking. The proposed luminaires minimise light spill to any other area forming part of the Bats commute. The luminaires provide no uplight, and have narrow downward beams of light, and optics that prevent back spill.
2. Lighting Cowls/Shields shall be installed on luminaires where there may be the potential for any light spill on the perimeter to further minimise the effects on bats.
3. Lighting Controls - The peak time for feeding for Bats is dusk. This is when they exit the Roost to go foraging. The light output from dusk to dawn can be restricted using LED controls to dim the luminaires located across the carpark and along the boundaries, this would benefit the Bats as the dimmer can be set to suitable times throughout the year.
4. Artificial Lighting – LED
This is the light source of choice for most local authorities. The light emitted is more directional and normally controlled by lenses or sometimes reflectors. The light is produced in a narrow beam. It is an instant light source. LED is available in several colour temperatures.

'Warm white' (more yellow/orange colour) at 2700°K can now be used with little reduction in lumen output. LED typically features no UV component and research indicates that while lower UV components attract fewer invertebrates, warmer colour temperatures with peak wavelengths greater than 550nm (~2700°K) cause less impacts on bats (Stone, 2012, 2015a, 2015b).

7.5. Justification of level and type of lighting

Careful consideration was taken when preparing our lighting schemes to ensure we designed a scheme which achieved all required regulations and didn't have any adverse effect on surrounding residents. It was important within our lighting scheme that we also provided our client with the most energy efficient, cost effective and easily maintainable solution going forward.

The above reasons are why we designed the lighting scheme with L.E.D luminaires. As discussed within the report the lighting will be controlled via a combination of timeclock and photocell operation which will restrict the lighting operation to only when essential. A maximum night time curfew of 23:00 hours through 07:00 hours, as recommended by the ILP, shall be used also.

8.0. Maintenance Programme

Careful consideration was taken when selecting our proposed light fittings with respect to maintenance. The fitting selected, **VEELITE DUROSTAR & CHI Series** have been accredited with maintenance of lumen output - L80F10 which in turn means the fittings have a life cycle of 50,000 hours. This illustrates that these fittings will not need a lot of maintenance. It is the client's responsibility to monitor the performance of the lighting installation and Lawler Consulting Engineers have advised that VEELITE Lighting have a facility to set up a maintenance agreement on their installations. Going forward a maintenance agreement will ensure the lighting scheme is operating to its full potential thus ensuring the client has a solution still achieving the regulations whilst operating at its most energy efficient.