

PROPERTY

PJ Livesey Homes (6) Limited
Chorlton Precinct Redevelopment
Lighting Impact Assessment

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Lighting Impact Assessment

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1. INTRODUCTION

Instruction

- 1.1 BWB Consulting Ltd (BWB) has been appointed by PJ Livesey Homes (6) Limited to prepare a Lighting Impact Assessment to inform a full planning application for a residential-led mixed-use redevelopment (the 'Proposed Development') at Chorlton Precinct, Manchester (the 'Site'). The Site is currently vacant and hoarded off.
- 1.2 A separate Prior Notice for Demolition application (LPA ref. 141706/DEM/2024) was approved by Manchester City Council, as the Local Planning Authority, in January 2025, confirming that the proposed demolition of the existing shopping precinct and Graeme House office building can be undertaken under permitted development rights. The submission is informed by a Demolition Management Plan, prepared by the proposed demolition contractor, which sets out the proposed mitigation measures to minimise impacts on surrounding receptors. The approved demolition works (starting with internal soft-strip) are intended to commence in Q2 2025 for a period of circa 20 weeks.

Proposed Development

- 1.3 The Description of Development is as follows:

"Application for Full Planning Permission for the erection of 6no. residential buildings to provide 262 residential dwellings (Use Class C3) with ground floor commercial uses (Use Class E(a-e)); infrastructure works including electric substation and associated utilities works, service yard, vehicular pedestrian accesses; together with public realm works and hard/soft landscaping."
- 1.4 The Proposed Landscape Masterplan is included within **Appendix 1**.

Objectives

- 1.5 This report has been produced to identify the proposed external lighting strategy and subsequent impact of the external lighting installation on the existing Site environment, sensitive ecology and the wider locality.
- 1.6 A lighting installation is required to enable users to operate safely and reduce the fear of crime. Lighting is needed for both pedestrians and vehicle drivers. For pedestrians, lighting for good viewing conditions and avoidance of dark areas is necessary. For vehicle drivers the emphasis is on good lighting for vehicle movement and use of roads.
- 1.7 This report reviews the potential effects of new lighting and reviews methods of lighting the proposed external areas of the Site/Scheme while limiting potentially obtrusive effects to sensitive receptors that may have a negative response to a change in their lighting condition. Nearby residential properties and wildlife / habitat which are found on, near or utilising the Site are typical receptors considered for analysis.

Scope of Works

1.8 The Scope of work includes:

- Identification and assessment of receptors and their sensitivity;
- Identification of required / anticipated lighting provisions for the Proposed Development; and
- Assessment of the potential effects created by a new lighting strategy with respect to the baseline condition.

2. RELEVANT POLICY AND GUIDANCE

Manchester Core Strategy (2012-2027)

- 2.1 The Core Strategy was adopted by Manchester City Council on 11th July 2012. It is the key document in Manchester's Local Development Framework and covers a period of 15 years from 2012 to 2027.

Policy DM 1 Development Management

"All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:

- *Appropriate siting, layout, scale, form, massing, materials and detail.*
- *Impact on the surrounding areas in terms of the design, scale and appearance of the proposed development. Development should have regard to the character of the surrounding area.*
- *Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise.*
- *Accessibility: buildings and neighbourhoods fully accessible to disabled people, access to new development by sustainable transport modes.*
- *Community safety and crime prevention.*
- *Design for health.*
- *Adequacy of internal accommodation and external amenity space.*
- *Refuse storage and collection."*

Guide to Development in Manchester Supplementary Planning Document and Planning Guidance Adopted April 2007

- 2.2 The Guide to Development in Manchester is effectively a hybrid document acting as both a Supplementary Planning Document and planning guidance.

Street design should contribute to attractive public realm

"UDP Part 1 Policy T3.9, referred to earlier, gives priority to pedestrians and disabled people. Streets are an integral part of the public realm and street layouts which are designed with people in mind will result in a better quality urban environment. The identity, character and level of usage of streets and spaces can be enhanced by high quality, attractive street furniture, good quality lighting and public art. Developers will be encouraged to consider the provision of such elements where this will enhance the character of the public realm and contribute to a sense of place.

Badly designed and positioned street furniture can create clutter and confusion; we will, therefore, look to minimise the provision of unnecessary street furniture and encourage coordination of function [...]"

Parking Guidelines

"[...] Parking courtyards are often proposed as the design solution to ensuring that parking does not dominate the street scene. These should be well designed with

attractive surface and boundary treatments, adequate lighting and good tree planting to ensure that they are attractive in appearance and safe. Whilst adequate turning and servicing areas are required, their design should reflect and respect the residential nature of the area. Their design must also ensure adequate parking provision for disabled people with clear, safe, accessible footways of no more than 40m length, leading to the front door.

Where parking to the front of the building is unavoidable, its design must include high quality materials, tree planting, lighting and appropriate boundary treatments to reinforce the legibility of the area. Decked or sub-basement parking may assist in providing sufficient spaces on even the smallest site, and will be encouraged. [...]"

Biodiversity

"UDP Part 1 Policies E2.3 and E2.4 require the protection of wildlife, wildlife habitats, and where possible, the creation of new nature reserves and features which will sustain wildlife. Part 1 Policy E2.6 states that the City Council wishes to prevent the loss of existing trees. Developers will need to contribute to Manchester's Biodiversity Strategy by demonstrating in their Environment Standards Statement how they have taken full account of the effect of their proposed development on biodiversity. This should highlight how existing species and habitats would be protected and how the proposed development would enhance the ecological value of the site. Mature trees and hedges should be retained on site wherever possible. Where this is not possible, developers will be expected to agree an appropriate scheme for replanting with the Development Control case officer [...]"

Community Safety and Crime Prevention

"Crime prevention measures should be included in designs:

Building owners, users and visitors have quite different needs in terms of security and safety, but these specific needs should find expression in shared, high quality design principles. Entry and exit from all buildings should be clearly monitored either by person or by the use of CCTV. Approved window and door locks should be provided and the design of balconies, porches and outbuildings should not facilitate unauthorised access. Good practice relating to the protection of persons visiting the building should be promoted by the use of good lighting, appropriate landscaping and clearly identified routes."

Places for Everyone Joint Development Plan (2024)

- 2.3 The Places for Everyone spatial strategy seeks to deliver sustainable, inclusive growth by focusing significant growth in jobs and housing at the core; boosting northern competitiveness through provision of significant new employment and housing opportunities and infrastructure and supporting key economic drivers in the south.

Policy JP-P1 Sustainable Places

- 2.4 "We aim to become one of the most liveable city regions in the world, consisting of a series of beautiful, healthy and varied places, each having the following key attributes that all development, wherever appropriate, should be consistent with:
- Distinctive, with a clear identity.

- *Visually stimulating, creating interesting and imaginative environments which raise the human spirit through the use of green space, public art and quality design.*
- *Socially inclusive.*
- *Resilient, capable of dealing with major environmental event.*
- *Adaptable, able to respond easily to varied and changing needs and technologies.*
- *Durable, being built to last and using robust materials that reflect local character, weather well and are easily maintained.*
- *Resource-efficient.*
- *Safe, including by designing out crime and terrorism, reducing opportunities for anti-social behaviour and by ensuring that developments make appropriate provision for response and evacuation in the case of an emergency or disaster.*
- *Supported by critical infrastructure, such as energy, water and drainage and green spaces.*
- *Functional and convenient, enabling people and uses to act efficiently with minimal effort, and responding to needs relating to servicing, recycling facilities, refuse collection and storage.*
- *Incorporating inclusive design within all spaces with support for tackling inequality and poverty to form part of creating sustainable places.*
- *Legible, being easy to understand and navigate, with the protection and enhancement of key views and new development well-integrated into the place*
- *Easy to move around for those of all mobility levels, particularly by walking and cycling, with enjoyable routes free from obstacles and disorienting stimuli, and with places to rest.*
- *Well-connected to other places, particularly by public transport and digital infrastructure enabling everyone to take advantage of the employment, cultural and leisure opportunities across Greater Manchester and beyond.*
- *Comfortable and inviting, with indoor and outdoor environments:*
 - *Offering a high level of amenity that minimises exposure to pollution; and*
 - *Addressing microclimate issues such as sunlight, indoor air quality, overheating, shade, wind and shelter.*
- *Incorporating high quality and well managed green infrastructure and quality public realm, with:*
 - *Opportunities for recreation and outdoor play for children, and interaction between the generations;*
 - *Public and private spaces clearly distinguished;*
 - *Development clearly defining, and promoting activity within, public spaces;*
 - *High quality landscaping with schemes.*
- *Well-served by local shops, services and amenities, including education and health facilities."*

International guidance

Commission Internationale De L'Eclairage (CIE 150)

- 2.5 The purpose of this guide is to help formulate guidelines for assessing the environmental effects of outdoor lighting and to give recommended limits for relevant lighting parameters to contain the obtrusive effects of outdoor lighting within tolerable levels. As the obtrusive effects of outdoor lighting are best controlled initially by appropriate

design, the guidance given is primarily applicable to new installations; however, some advice is also provided on remedial measures which may be taken for existing installations. This guide refers to the potentially adverse effects of outdoor lighting on both natural and man-made environments for people in most aspects of daily life, from residents, sightseers, transport users to environmentalists and astronomers.

National guidance

National Planning Policy Framework (2024)

- 2.6 The Revised National Planning Policy Framework (NPPF) provides guidance relating to planning and pollution control for new development in England. The purpose of the planning system is to contribute to achievement of sustainable development. In relation to lighting, Paragraph 198 states: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should: c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation"*

DEFRA's Lighting in the Countryside: Towards Good Practice (2001)

- 2.7 The Office of the Deputy Prime Minister (ODPM – now Department for Communities and Local Government) in conjunction with the Countryside Commission published 'Lighting in the Countryside: Towards Good Practice' in July 1997, and a revised issue in 2001. The guidance was developed to *'provide practical advice on the prevention and control of lighting effects through appropriate action by all those involved with lighting in the countryside'*. Its objective is *'to identify good practice in the planning and design of lighting in rural areas; and advise on how it can be achieved, using case study examples'*. The guide aims to provide an overview and common understanding of all aspects of good lighting practice stating that close co-operation and participation is required for all those involved in planning, designing and installing lighting schemes. The guidance provides valuable information on lighting best practice and the standard methodology outlined in this guidance document has been followed as part of this assessment. Whilst the guidance relates to 'lighting in the countryside', it is considered best practice to adopt many of the principles contained within the guidance to sites of a more urban nature.

Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light (2021)

- 2.8 The ILP has proposed lighting guidance and criteria for local authorities with a recommendation that they are incorporated at the local plan level. The guidance defines various forms of light pollution and describes a series of environmental zones (similar to the CIE 150 environmental zones). The ILP guidance provides suitable criteria against which the effects of artificial lighting can be assessed and is used in this assessment.
- 2.9 The ILP Guidance Notes recommends that the immediate environment is classified systematically as shown in **Table 1**. ILP Guidance Notes then make recommendations for limiting obtrusive light according to the environmental zone in which the lighting

would be situated. The stringency depends on the capacity to absorb lighting effects, with Zone E0 requiring the strictest level of control and E4 the lowest.

Table 1 Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night- time activity

- 2.10 For each Environmental Zone, recommended obtrusive light limits for exterior lighting installations have also been determined. Limits apply for light spill (**Table 2**), sky glow (direct upward light) (**Table 3**) and glare (viewed source intensity) (**Table 4**).

Table 2. Light spill limits

Light technical parameter	Application conditions	Environmental zones				
		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 3. Sky glow limits

Light technical parameter	Application conditions	Environmental zones				
		E0	E1	E2	E3	E4
Upward light ratio (ULR) %	Pre/post-curfew	0	0	2.5	5	15

Table 4. Glare (source intensity) limits

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)	E0						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 d	0.3 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

Institute of Lighting Professionals (ILP) Guidance Note 08 for Bats and artificial lighting in the UK (2023)

- 2.11 This document is aimed at lighting professionals, lighting designers, planning officers, developers, bat workers/ecologists and anyone specifying lighting. It is intended to raise awareness of the impacts of artificial lighting on bats, and mitigation is suggested for various scenarios. The Guidance Note provides recommendations for appropriate external lighting specification.

SLL Lighting Guide 9: Lighting for communal residential buildings (2022)

- 2.12 This Lighting Guide provides practical guidance and demonstrates good practice with recommendations on how to meet statutory requirements whilst achieving a pleasant ambience for residents in their living areas.

British Standards

BS EN 12464-2: Lighting of Workplaces, Outdoor Workplaces (2024)

- 2.13 This standard specifies requirements for lighting of tasks in most outdoor work places and their associated area in terms of quantity and quality of illumination. In addition, recommendations are given for good lighting practice. This standard includes important recommendations on how obtrusive light can be limited to keep night skies free of light pollution.

BS 5489: Code of Practice for the Design of Road Lighting – Part 1: Lighting of Roads and Public Amenity Areas (2021)

- 2.14 BS 5489-1 provides recommendations on the general principles, aesthetic and technical aspects of road lighting and advises on statutory provisions, operation and maintenance of lighting. The standard provides recommendations for the design of lighting for all types of highways and public thoroughfares, including those specifically for pedestrians and cyclists, and for pedestrian subways and bridges.

BS EN 13201 Part 2: Road Lighting Performance Requirements (2015)

- 2.15 This standard defines lighting classes for road lighting according to photometric requirements and aiming at the visual needs of road users. It also considers environmental aspects of road lighting.

3. LIGHT POLLUTION

- 3.1 Light pollution is a generic term for all the adverse impacts that artificial lighting can have after dark. The main types of light pollution are shown diagrammatically in **Figure 1**.

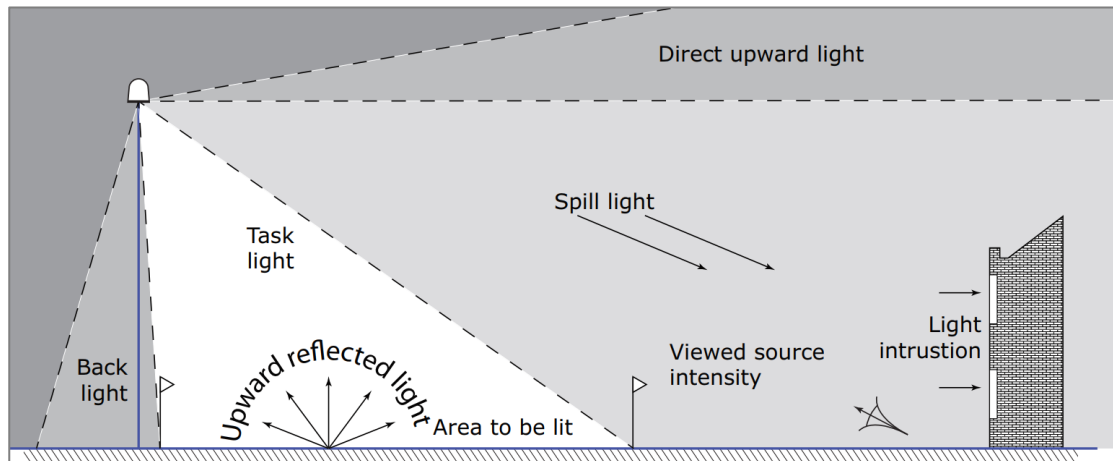


Figure 1. Types of Light Pollution

- 3.2 Contributing to these direct effects are three design aspects that should be considered alongside the purpose for a new lighting installation and the type of sensitive receptors found in the local area. These are described later in this report.

Types of Light Pollution

Light Spill (Light intrusion, back light)

- 3.3 Light spill is 'the spilling of light beyond the boundary of the site on which a light source is located', such that it causes a noticeably adverse effect. More simply, light spill is often termed as the intrusion of light into homes. It can also have a negative effect on wildlife and ecological systems local to an installation.

- 3.4 As set out in the ILP Guidance Notes, the limits for light spill vary according to the environmental zone of the existing location and have been set to encourage appropriate lighting design. Through careful design, it can readily be ensured that this impact is prevented and that the illumination falling within any residential property can be reduced to zero. This is incorporated into the Lighting Strategy contained within this report.

Sky Glow (Direct upward light)

- 3.5 Sky glow is the 'the brightening of the night sky' above illuminated areas. The brightness created is constantly varying as a function of many parameters such as direct upward-lighting, ground surface reflectance, overhead cloud cover, and the degree of water droplets in the atmosphere - rain, fog / mist, and snow, for example, exacerbate the effect.

- 3.6 Mitigation is achieved by complying with the recommended limits in the ILP Guidance Notes for upward light emission. The limits vary according to the environmental zone of

the existing location and have been set to encourage appropriate lighting design. The Lighting Strategy will ensure that these limits can be met for the Proposed Development.

- 3.7 To mitigate sky glow as much as possible, lighting must be accurately targeted and kept to a minimum, and this design principle is incorporated into the Lighting Strategy.
- 3.8 The magnitude of the impact is a matter of judgement, taking into account the existing night-time view. The magnitude is lessened for those views where an observer is subject to direct illumination from, say, a nearby streetlight, or where light spill from a nearby light source illuminates the foreground, because the observer's vision is not fully dark adapted.

Glare (Viewed source intensity)

- 3.9 Glare occurs when an individual experiences visual discomfort or disability stemming from direct views of lamp sources, or high contrast of a lighting installation against a dark background. The placement of luminaires, their photometric characteristics, and the viewing context contribute to glare, which has been noted to result from uncontrolled private lighting installations, security lighting, street lighting mounted at high level near residences or habitat.

Design Aspects

Building Luminance

- 3.10 This considers the appropriateness and scale of brightness for the lighting / highlighting of built structures. Design criteria is included within ILP guidance notes as more of a main effect. While this is addressed independently, building luminance can also be considered as an indirect contributor to light spill, sky glow and glare.

Light Levels

- 3.11 Light levels, both as designed and installed, have the potential to create areas which have a noticeable difference in brightness. A new lighting installation in an area that has not been lit or is significantly brighter than the surrounding area may affect both adjacent receptors in the form of light spill or glare, and those over a larger area by contributing to sky glow through over-lighting.

Light Colour

- 3.12 Light colour has the potential to alter an individual's perception of their environment with respect to colour and clarity, as the human eye responds best to whiter light with higher quantities of ultraviolet wavelengths. Various wildlife species may respond differently to spectral composition depending on how reliant they are on darkness; many nocturnal animals continue their social habits and feeding behaviours with increased activity in the area while others may decrease their activity and possibly desert their habitat. This type of impact could affect pedestrians, vehicle operators and wildlife, and is likely to occur where new lighting is placed.

Example Lux Levels

- 3.13 To give context to the lux levels mentioned to within this report, **Table 5** provides examples of typical lux levels in various scenarios and applications.

Table 5. Example lux levels

Lighting Condition	Lux level
British summer sunshine	50,000
Overcast sky	5,000
Well-lit office	500
Minimum for easy reading	300
Passageway / outside working area	25
Main road lighting	5-20
Sunset	10
Typical side road lighting	5
Minimum security lighting	2
Twilight	1
Clear full moon	0.25 to <1
Typical moonlight / cloudy sky	0.1
Typical starlight	0.001
Poor starlight	0.0001

Source: IPCCTV specialists use-IP Ltd

4. BASELINE

Introduction

- 4.1 The study area includes the Site, the surrounding areas and any sensitive receptors which may have a direct view towards external lighting proposals and/or which may be affected during the construction and operation of the Proposed Development. Assessment of designation, use, habitat and external lighting condition dictates the classification of Environmental Zone across the proposed site location and surrounding areas.
- 4.2 The Site is bound to the north by Chorlton Health Centre and Nicolas Road which appears to be provided with a street lighting installation comprising assumed 8m high column mounted LED type luminaires.
- 4.3 The Site is bound to the east by Barlow Moor Road which appears to be provided with a street lighting installation comprising assumed 10m high column mounted LED type luminaires. Situated on the east side Barlow Moor Road are properties comprising retail frontage at ground level with residential flats above.
- 4.4 The Site is bound to the south by residential properties off Wilbraham Road which appears to be provided with a street lighting installation comprising assumed 10m high column mounted LED type luminaires.
- 4.5 The Site is bound to the west by residential properties off Oswald Road which appears to be provided with a street lighting installation comprising assumed 8m high column mounted LED type luminaires.
- 4.6 The Site currently comprises the vacant Chorlton Precinct shopping centre building together with Graeme House and associated areas of car parking, landscaping and hardstanding. The main existing source of on-site artificial light comprises the surface car park lighting installation which appears to comprise twin halogen type globe luminaires, installed on assumed 6m columns which emit light in all directions, including upward. This installation can be seen in **Figure 2**.



Figure 2. Existing site lighting

4.7 The following categories have been determined as potential sensitive receptors which could be impacted by any external lighting proposals at the Site:

- Ecology;
- Surrounding residential properties;
- Natural – direct sky glow; and
- Transport – highway.

Local Radiance

4.8 The Visible Infrared Imaging Radiometer Suite (VIIRS) is a satellite instrument which orbits Earth to collect and record radiance data (light emissions). The latest data was recorded in 2023 and is available in visual format. An extract at the Site location is included in **Figure 3**.

4.9 It is important to state that recognised organisations, such as the ILP or CIE, have not calibrated VIIRS radiance data with the Environmental Zones established in **Table 1**. It is also important to note the data should not accurately be relied upon and should be viewed conservatively. The data should be used as one tool to help understand the context of existing light emissions local to the Site.

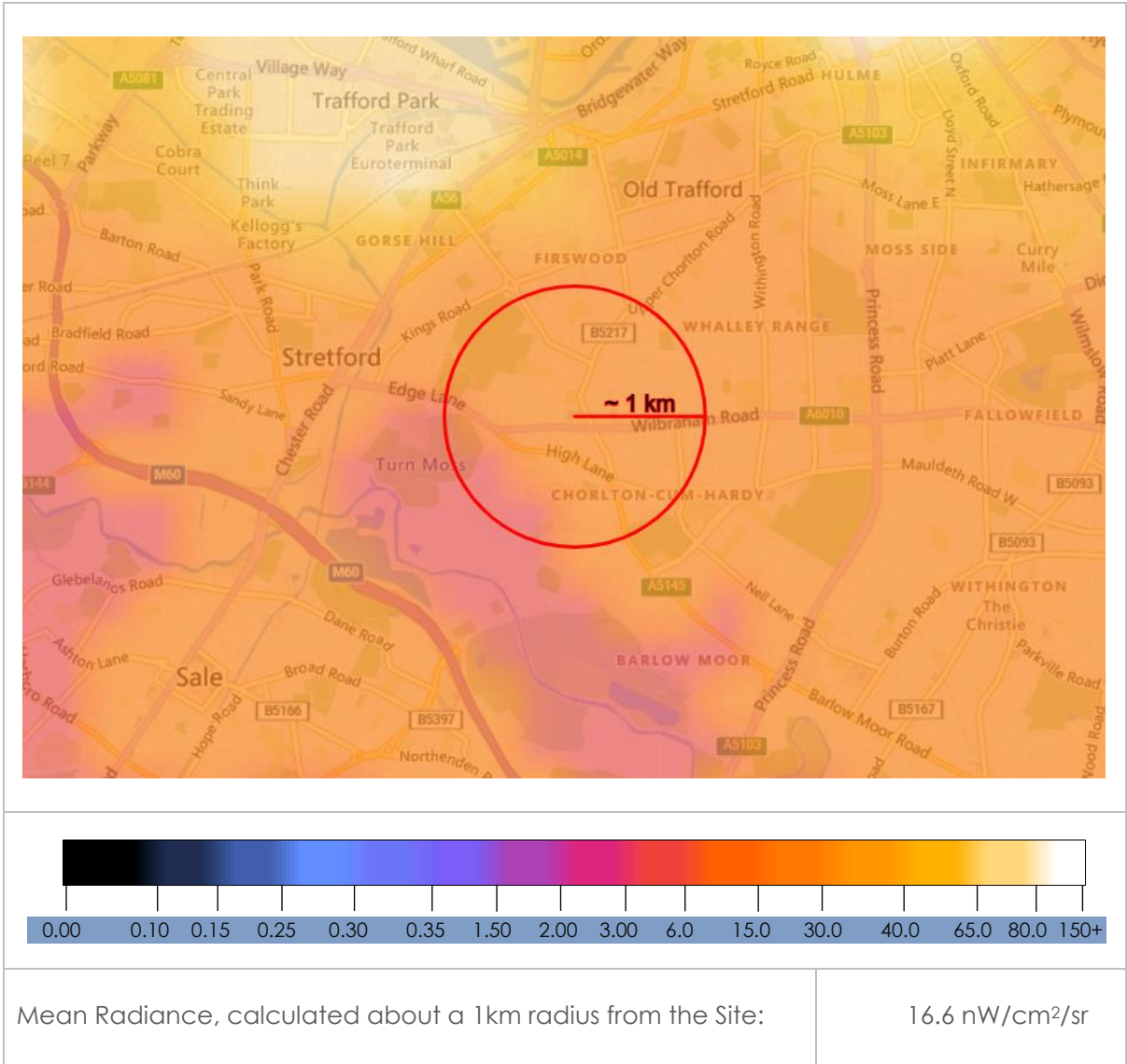


Figure 3. Radiance, in nanowatts per square centimetre per steradian (nW/cm²/sr)

Environmental Zone

4.10 With reference to **Table 1** and with consideration of the Site context and nature of identified potentially sensitive receptors it is deemed that the Site falls within Environmental Zone E3, defined as a small town centres or suburban location.

Ecology Receptors

- 4.11 The applicant's appointed Ecologist (Tyler Grange) has been consulted as part of the Lighting Strategy in order to establish all potentially light-sensitive ecology receptors in proximity to the Site.
- 4.12 The appointed Ecologist has confirmed that given the urban context of the Site, adverse impacts as a result of lighting installations are not anticipated.
- 4.13 Potentially sensitive ecology receptors surrounding the Site have been identified as illustrated in **Figure 4**. Mitigation measures are discussed later in this report.

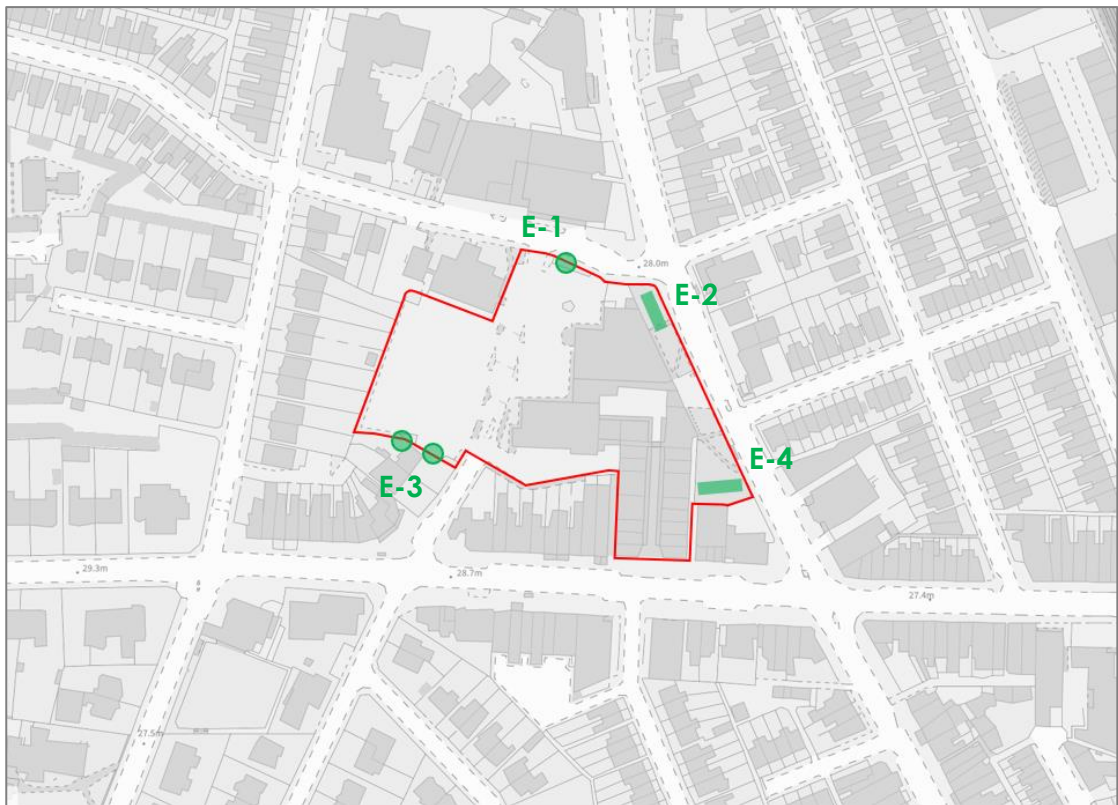


Figure 4. Ecology receptors

- **E-1** Boundary tree with roost potential;
- **E-2** Boundary tree;
- **E-3** Boundary tree with roost potential; and
- **E-4** Boundary tree.

Residential Receptors

- 4.14 The residential receptors surrounding the Site have been identified based on a desktop study using MAGIC mapping data in conjunction with Google Earth satellite and street view imagery.
- 4.15 Residential properties within 200m of the Site with a direct view of the Site are considered potentially sensitive.
- 4.16 Potentially sensitive residential receptors surrounding the Site have been identified as illustrated in **Figure 5**. Mitigation measures are discussed later in this report.

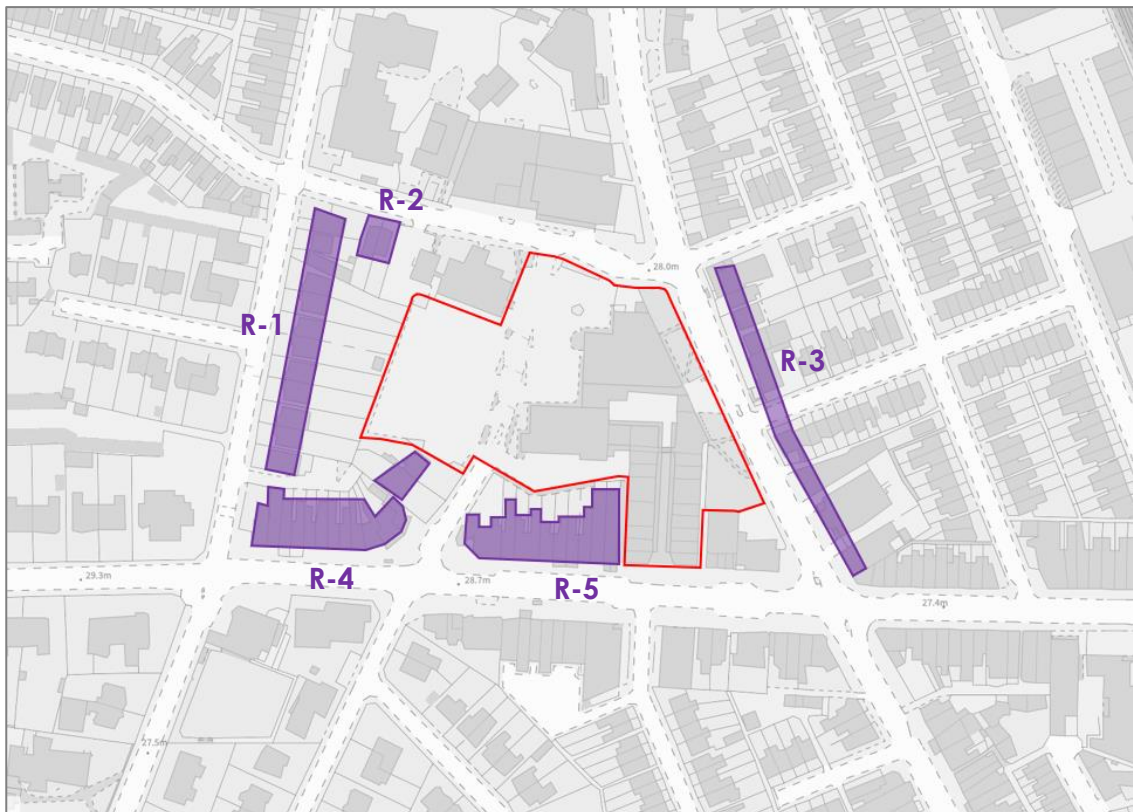


Figure 5. Residential receptors

- **R-1** Residential property off Oswald Road;
 - **R-2** Residential properties off Nicolas Road;
 - **R-3** Residential properties off Barlow Moor Road;
 - **R-4** Residential properties off Wilbraham Road (i) and Manchester Road; and
 - **R-5** Residential properties off Wilbraham Road (ii).
- 4.17 The limits for light intrusion (Illuminance in the vertical plane, in this case intrusion through windows) for Environmental Zone E3 are provided in **Table 6**.

Table 6. Maximum values of vertical illuminance on residential properties

Light Technical Parameter	Application Conditions	Environmental Zones				
		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

- 4.18 The limits for source intensity (as viewed from nearby residential properties) for Environmental Zone E3 are provided in **Table 7**.

Table 7. Glare (source intensity) limits as viewed from residential properties

Light technical parameter	Application conditions	Luminaire group (projected area A _p in m ²)					
		0<A _p ≤0.002	0.002<A _p ≤0.01	0.01<A _p ≤0.03	0.03< A _p ≤0.13	0.13<A _p ≤0.50	A _p >0.5
Maximum luminous intensity emitted by luminaire (I in cd)	E0						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 d	0.3 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

- 4.19 Curfew is defined as the time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the Local Authority. Unless otherwise stated, 23:00 – 07:00 is suggested.

Natural – Sky Glow Receptors

- 4.20 The ILP GN01/21 guidance provides limitations for maximum allowable sky glow percentage for each Environmental Zone as shown in **Table 8**.
- 4.21 Sky glow is measured as ULR (Upward Light Ratio), the percentage of luminaire flux of a luminaire or a lighting installation that is emitted above the horizontal. Sky glow limitations depend on the Environmental Zone of the lighting installation as set out in the ILP guidance notes. The Environmental Zone categories are previously defined in this report in **Table 1**.

Table 8. 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

Transport Receptors

- 4.22 The transport receptors surrounding the Site have been determined based on a desktop study using MAGIC mapping data in conjunction with Google Earth satellite and street view imagery.
- 4.23 Highways or railway lines within 200m of the Site with a direct view of the Site are considered potentially sensitive.
- 4.24 Potentially sensitive transport receptors surrounding the Site have been identified as illustrated in **Figure 6**. Mitigation measures are discussed later in this report.

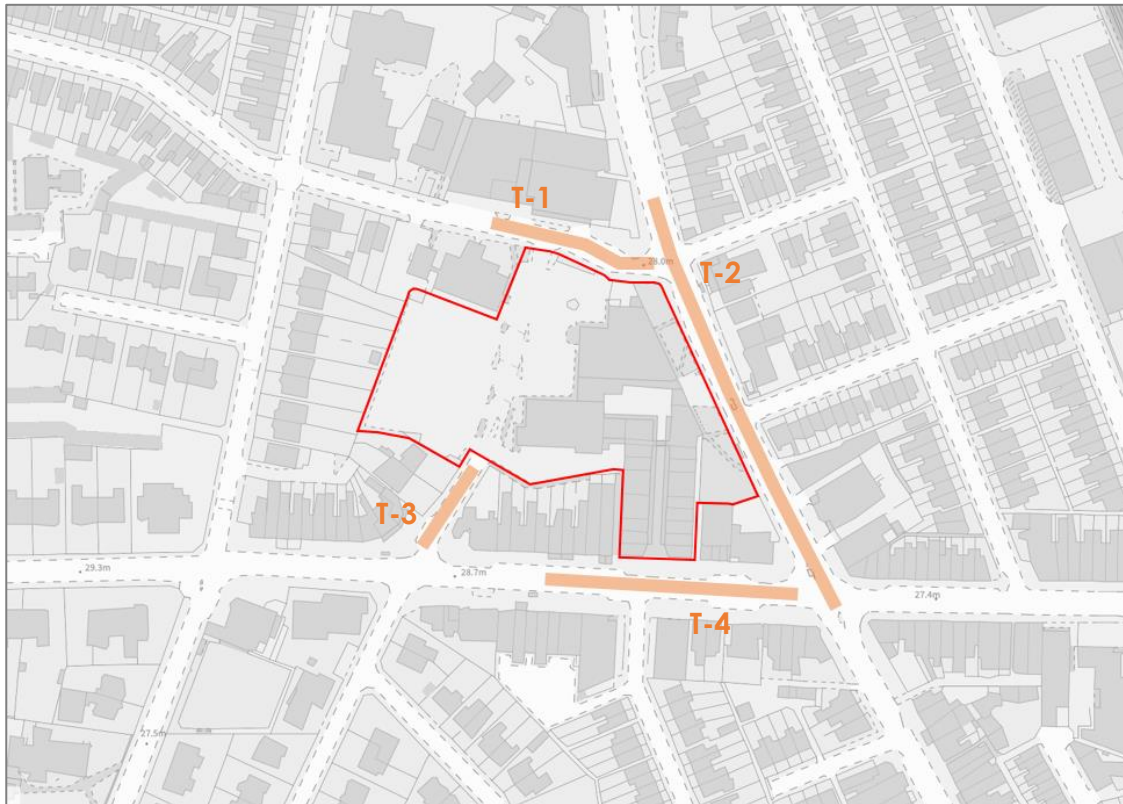


Figure 6. Transport receptors

- **T-1** Nicolas Road;
- **T-2** Barlow Moor Road;
- **T-3** Manchester Road; and
- **T-4** Wilbraham Road.

5. PROPOSED SITE LIGHTING

Design Parameters

- 5.1 All external lighting shall be provided in accordance with the Relevant Policies and Guidance. It shall minimise obtrusive light and optimise energy use. Lighting will comply with recommendations for Environmental Zone E3 given in the ILP Guidance Notes for the Reduction of Obtrusive Light (Guidance Note 01/21).
- 5.2 All external lighting shall be provided in accordance with Core Strategy (2012-2027) and Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (Adopted April 2007).
- 5.3 Luminaires shall be LED light source to provide optimum energy efficiency and accurate targeting of light output to minimise obtrusive light.
- 5.4 Luminaires shall be warm white colour temperature with low blue light content in line with the recommendations of ILP Guidance Note 08 for Bats and artificial lighting in the UK (2023) and the recommendations of the appointed Ecologist.
- 5.5 Warm white light also causes less light scatter as compared to blue light, reducing overall contribution to sky glow.
- 5.6 Column heights have been carefully considered to minimise obtrusive light. Columns should generally be as low as practicable, at maximum spacing, designed to achieve the performance requirements of the task area while not introducing any tilt angle to the heads. Columns mounted luminaires positioned at or close to the perimeter shall be directed into the Site.
- 5.7 If it becomes apparent that modifications are needed to existing adoptable lighting to accommodate the proposed Site entrances, these changes will be made in line with the requirements of Manchester City Council. Any modifications shall be dealt with as part of a Section 278 Highways Act agreement.

Lighting Design

- 5.8 A lighting design has been prepared utilising high quality low intensity LED type luminaires of the following types:
 - 4m and 5m high columns mounted luminaires;
 - 1m high bollard luminaires;
 - In-ground recessed luminaires;
 - Spigot mounted luminaires;
 - Static strip luminaires; and
 - Static string lighting.
- 5.9 At this stage the lighting design does not include the details of lighting integrated into the building structure. Building integrated lighting shall meet the following criteria:
 - The lumen output is static;
 - The luminaires are of low intensity;

- The luminaires match the colour temperature and overall aesthetic of the Site wide lighting installation; and
- The installation is verified, by calculation, that limits for obtrusive light as set out in this report are not exceeded.

5.10 A lighting design layout is included in **Appendix 2**. A lighting lux plot layout is included in **Appendix 3**. All luminaires proposed are 3000K colour temperature.



Figure 7. Selected colour temperature

5.11 The final detailed design may deviate from the external lighting design presented but must meet all parameters and criteria as set out in this report and demonstrate equal to or less than the quantity of obtrusive light achieved. An adequate and safe level of lighting must be provided for Site tasks, amenity, and security, whilst maintaining acceptable impact on the Site surroundings, ecology, and neighbouring properties.

Obtrusive Light Assessment

- 5.12 The lux plot layout, included in **Appendix 3**, has been produced in advanced industry standard lighting calculation software. The lux plot assumes a level, clear site. In practice, the effect of changes in elevation and obstructions such as trees and hedges will contain the light spill further than is shown in the plot, i.e. this Lux plot represents the absolute worst-case scenario.
- 5.13 A compliance test has been generated from the design model which tests light spill, source intensity and upward light during post-curfew conditions against the limits set out in ILP GN01/21. The compliance test report is included in **Figure 8**.

Obtrusive Light - Compliance Report

CIE 150:2017, E3-Medium District Brightness, Post-Curfew
Filename: 233048_AGI5
19/03/2025 11:00:39

Illuminance

Maximum Allowable Value: 2 Lux

Calculations Tested (7):

Calculation Label	Test Results	Max. Illum.
xObtrusiveLight_1_Ill_Seg1	PASS	0.0
xObtrusiveLight_3_Ill_Seg1	PASS	0.0
xObtrusiveLight_3_Ill_Seg2	PASS	0.0
xObtrusiveLight_3_Ill_Seg3	PASS	0.0
xObtrusiveLight_2_Ill_Seg1	PASS	0.0
xObtrusiveLight_4_Ill_Seg1	PASS	0.2
xObtrusiveLight_5_Ill_Seg1	PASS	0.2

Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value calculated from CIE 150:2017 (varies by Projected Area sq.m. and Distance Factor)
For E3-Medium District Brightness, Projected Area and Distance Factors:
(0.002, 0.29) (0.01, 0.63) (0.03, 1.3) (0.13, 2.5) (0.5, 5.1)

Calculations Tested (7):

Calculation Label	Test Results
xObtrusiveLight_1_Cd_Seg1	PASS
xObtrusiveLight_3_Cd_Seg1	PASS
xObtrusiveLight_3_Cd_Seg2	PASS
xObtrusiveLight_3_Cd_Seg3	PASS
xObtrusiveLight_2_Cd_Seg1	PASS
xObtrusiveLight_4_Cd_Seg1	PASS
xObtrusiveLight_5_Cd_Seg1	PASS

Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 5.0 %

Calculated UWLR: 2.0 %
Test Results: **PASS**

Figure 8. Compliance Test

Light spill (light intrusion)

- 5.14 Vertical calculation surfaces have been included on elevations of residential properties facing the Site. The calculations show 0.2 lux maximum vertical illumination. As illustrated in **Table 6**, the ILP obtrusive light limitation for an area classified as Environmental Zone E3 is 10 Lux pre-curfew and 2 Lux post-curfew. As such the proposed lighting scheme meets the ILP vertical illumination limitations and is therefore not considered to result in unacceptable light spill impacts on to surrounding residential properties.

Glare (source intensity)

- 5.15 Source intensity calculations have been included on elevations of residential properties facing the Site. The calculations show 36 Candelas maximum luminous intensity. As illustrated in **Table 7**, the ILP obtrusive light limitations vary based on luminaire size and

relative distance between receptor and light source, and in all cases is greater than the maximum calculated. As such the proposed lighting scheme meets the ILP source intensity limitations and is therefore not considered to result in unacceptable glare impacts on residential properties.

- 5.16 The proposed lighting, in the context of existing local light sources, is anticipated to result in negligible negative impacts on road users.

Upward light ratio (ULR)

- 5.17 According to ILP GN01/21 it is accepted that some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlights and festive lighting, to which upward light limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments. The design model does therefore not measure the effects of proposed decorative lighting.
- 5.18 The lighting design has been used to calculate the predicted ULR of the proposed external lighting scheme. The model outputs predict a ULR of 0.20%. As illustrated in **Table 8**, the ILP sky glow limitation for an area classified as Environmental Zone E3 is 5% ULR. As such the proposed lighting scheme meets the ILP sky glow limitations and is therefore not considered to result in unacceptable impacts on the dark sky landscape.

Ecology measures

- 5.19 This assessment and the accompanying external lighting design has been produced in collaboration with the appointed Ecologist. The appointed Ecologist has reviewed and subsequently approved the external lighting design presented.
- 5.20 Mitigation measures comprise:
- Using warm white (3000K) LED, narrow spectrum lights with little or no UV;
 - Lowest practical luminaire Wattage;
 - Directional lighting with near full horizontal cut off;
 - Minimum height columns at maximum spacing; and
 - Utilise luminaires with sharp cut-off.
- 5.21 Any proposed bat boxes should be installed at locations which will not be directly illuminated by the proposed lighting installation.

Apartment Lighting

Balcony Lighting

- 5.22 Balcony lighting has the potential to adversely impact the environment if designed incorrectly and without mitigation. Balcony lighting shall be wall mounted or recessed and shall be downward directional type, controlled via manual switching, to prevent overall contribution to lighting impacts.
- 5.23 Balcony lighting should be narrow beam, designed to light the immediate vicinity without unnecessary light spill. Balconies shall be illuminated up to 5 lux.

Internal

- 5.24 The internal lighting specification for the proposed dwellings shall include four main features in line with the recommendations of SLL Lighting Guide 9:
- Good colour rendering, i.e. CRI ≥ 80 ;
 - Warm white colour temperature (2700–3000 K);
 - Efficient light sources, i.e. LED luminaires; and
 - Suitable lighting controls.
- 5.25 Internal lighting has the potential to adversely impact the environment if designed incorrectly and without mitigation. **Figure 9** illustrates recommended mitigation options for internal lighting. Internal luminaires shall be recessed (as opposed to using a pendant fitting) where installed in proximity to windows to reduce glare and light spill.

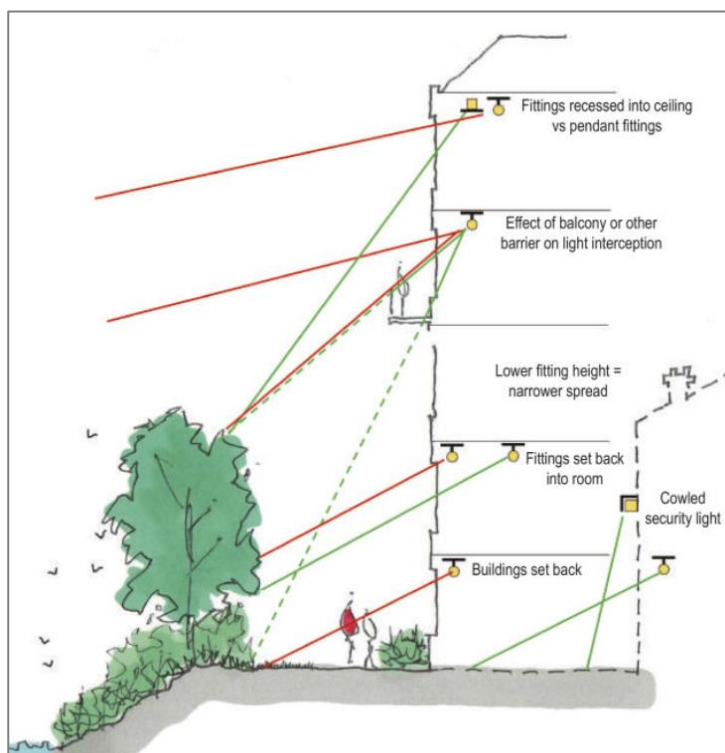


Figure 9. Internal Lighting Mitigation Options

Source: ILP GN08/23

5.26 With residential lighting there is less concern for illuminance uniformity and more with ambience. Internal lighting shall generally be provided in line with the recommendations of SLL Lighting Guide 9 to meet the following horizontal illuminance levels without over lighting:

- 100 lux – Lounge areas;
- 150 lux – Bathroom / En-suite areas; and
- 200 lux – Kitchen areas.

Commercial Unit Lighting

5.27 Lighting within the with ground floor commercial areas (Use Class E(a-e) will be provided in accordance with relevant guidance from the Society of Light and Lighting, depending on the requirements of the eventual use-case / operator. Lighting shall be provided without over lighting, and controlled to operate only when required.

Lighting Controls

Astronomical Timeclock

5.28 The astronomical timeclock or switch is an automatic time-switch control that controls lighting based on the time of day and astronomical events such as sunset and sunrise, accounting for geographic location and calendar date.

5.29 Timers with both astronomic and Daylight-Saving Time (DST) functionality automatically adjust to the seasonal day-to-night-time changes throughout the year. An electronic timer with astronomic functionality determines each day's sunrise and sunset times based on geographic location, while the automatic DST functionality resets the clock by one hour in the spring and fall.

5.30 It is recommended that external lighting is controlled via astronomical time clocks as a minimum standard.

Part Night Dimming

5.31 Subject to a risk assessment and consultation between all relevant stakeholders, (including the Local Authority, Client and Crime Assessor), part-night dimming should be considered as a means to reduce energy consumption and lighting impact.

5.32 This would involve reducing the luminaire output at set times to achieve reduced average illuminance across the intended area.

Climate Change

5.33 The external lighting installation must incorporate highly efficient LED light sources to minimise the required energy while providing the required lighting levels. Typically LED light sources use between 25%-80% less energy than traditional incandescent light sources, reducing the cumulative kilowatt-hours and carbon footprint of the installation. LED technology can last between 3-15 times longer than traditional light sources which also reduces the required manufacture, distribution and installation works needed to routinely replace and dispose of failed luminaires.

- 5.34 An external lighting controls system shall be employed as described above to ensure lighting is energised only when required.

Construction Phase Lighting

- 5.35 While construction phase lighting is expected to be short term and reversible it is important to define the parameters to minimise light pollution.
- 5.36 To reduce the effects of lighting during the construction phase on sensitive receptors, a Construction Environmental Management Plan (CEMP) has been produced which will contain best practice recommendations given by CIE, ILP, CIRIA and Health and Safety Executive (HSE). These should include, but not be limited to, the following:
- Lighting will operate in all external areas used by construction workers after dark in order to provide a safe and secure working environment without over lighting. High quality LED light sources with high colour rendering index (CRI) shall be utilised to maximise visibility with efficient light output;
 - Lighting shall be provided to meet the target lux level as set out in BS 12464-2 Lighting of Outdoor Workplaces without over lighting. Luminaires shall be mounted at the lowest practical mounting height, providing lighting only where lighting is required;
 - The Contractor shall specify working hours, uses of lighting, location of temporary floodlights and construction compound and agreeing these with the local council to reduce duration of impact;
 - Lighting controls should be employed to dim or switch off any lighting that is not needed;
 - Lighting that needs to be sited close to the permitter or ecologically sensitive areas should be fitted with shielding or be switched off or dimmed when not in use;
 - Lighting should be controlled in such a way to illuminate high activity, hazardous or high security areas while reducing lighting levels at less pertinent areas; and
 - The Contractor should act responsibly to adjust any temporary lighting reported as causing nuisance.

6. CONCLUSION

- 6.1 As part of this lighting impact assessment a review has been undertaken of the potential impact created by new lighting in relation to the Proposed Development.
- 6.2 Legislation, British standards, and good practice guidance recommends the development requires new exterior lighting for purposes of vehicular and pedestrian safety.
- 6.3 Potentially significant effects from the proposed lighting on sensitive receptors can be managed to create a negligible night-time impact.
- 6.4 The lighting design presented is anticipated to offer an overall improvement when compared to the existing on-site lighting, in terms of site security, visual interest and lighting impact.
- 6.5 At this stage the lighting design does not include the details of lighting integrated into the building structure. Building integrated lighting shall meet the following criteria:
 - The lumen output is static;
 - The luminaires are of low intensity;
 - The luminaires match the colour temperature and overall aesthetic of the Site wide lighting installation; and
 - The proposals are verified, by calculation, that limits for obtrusive light as set out in this report are not exceeded.
- 6.6 The lighting design presented indicates the proposed lighting installation can achieve the required minimum lighting levels and distribution to meet the requirements of the ILP Guidance notes while causing negligible light trespass to the adjoining land and negligible increase in local sky glow.
- 6.7 This assessment and the accompanying external lighting design has been produced in collaboration with the appointed Ecologist. The appointed Ecologist has reviewed and subsequently approved the external lighting design presented.
- 6.8 The final detailed design may deviate from the external lighting design presented but must meet all parameters and criteria as set out in this report and demonstrate equal to or less than the quantity of light spill achieved. An adequate and safe level of lighting must be provided for Site tasks, amenity, and security, whilst maintaining acceptable impact on the Site surroundings, ecology, and neighbouring properties.
- 6.9 The most noticeable effect due to the proposed lighting installation expected to remain is a negligible increase in sky glow.

APPENDICES

Appendix 1: Proposed Landscape Masterplan



Beehive Lofts, Beehive Mill, Jersey St, Ancoats, Manchester, M4 6JG
0161 228 7721 mail@randallthorp.co.uk www.randallthorp.co.uk

KEY

Ground Floor

- | | |
|---|--|
|  | Application red-line boundary |
|  | Indicative works outside the red-line application boundary - details TBC |
|  | Existing retained tree (RPA zones) |
|  | Proposed tree |
|  | Biodiverse, naturalistic planting areas |
|  | Rain garden |
|  | Hedge |
|  | Mounding |
|  | Amenity grass |
|  | Natural sandstone surfaces: to define key public spaces - laid in bands of varying sizes and finishes (light grey/buff colour) |
|  | Natural sandstone brick format units: to define the apartment entrance spaces - laid in herringbone pattern (light grey/buff colour mix) |
|  | Resin-bound gravel with natural sandstone cobble edges, thresholds and binding details (buff colour mix) |
|  | Resin bound gravel (no-dig specification): to define change in use to Pocket Park space (dark buff colour mix) |
|  | Block paving: to define transition spaces and key boundary edges (including adopted areas outside of the red-line up to the existing kerb-line) (natural aggregate concrete blocks, smaller block unit setts used for edges, thresholds and detailing - light grey colour) |
|  | Coloured permeable bitmac: to define private parking area access roads (buff colour) |
|  | Sealed bitmac: to define public parking areas and service access routes |
|  | Un-bound gravel chippings (grey granite) |
|  | Brick wall: brick to match FCBS specification for the proposed buildings |
|  | 1.8m railings and pedestrian gates (specification TBC) |
|  | Corten-steel raised planter edge (varies between 400-500mm high - naturally rusted brown colour) |
|  | Mild steel raised edge: 6mm thick with concealed joining system - naturally rusted brown colour (to be used around planting beds containing existing trees where ground levels are not to be raised significantly). |
|  | Natural sandstone kerb with dropped section inlets for rain garden drainage |

Podium courtyard garden

- | | |
|--|--|
| | Ornamental mixed planting areas in raised steel edge planter |
| | Green roof lawn turf |
| | Green roof native wildflower meadow turf |
| | Multi-stem large shrub / small tree |
| | Multi-stem large shrub / small tree in large feature pot |
| | Resin bound gravel (buff colour mix) |
| | Composite timber decking |
| | Brick unit paving laid in herringbone pattern |
| | Stepping stones |
| | Aluminum feature pergola on raised platform |
| | Climbing plant support structure and tensile wires (incorporating overhead lighting) |
| | 2m high steel powder coated railings: (to match architectural specification and colour) |
| | Decorative privacy screen boundary |
| | Fixed bench seating |
| | Moveable timber seating blocks |
| | Raised platform feature (positioned over evaluated podium floor level over generator room below) constructed with composite wood (billionboard or similar approved). Incorporating steps, ramp, seating elements and planters. |
| | Flexible seating: Indicative only (Hay Palisade table and chair collection - Iron Red colour or similar approved) |
| | Outdoor entertainment features (potentially including outdoor kitchen and bar with stools) |
| | Outdoor games features (potentially including table tennis and table football) |

P J L I V E S E Y

Chorlton Precinct, Manchester

Landscape Masterplan DRAFT

Drwg No: 1062-01U

Drawn by: LS

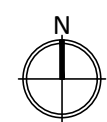
Rev by: LN/LS
QM Status: CHECKED

Scale: 1:200_@_A0

Date: 13-10-23

Checker: LC

Product Status



Scale - 1:200

A horizontal number line representing distance in meters. It starts at 0m on the left and ends at 20m on the right. Major tick marks are labeled at 0m, 2, 4, 6, 8, 10m, and 20m. There are 10 equal intervals between 0m and 20m, each containing a minor tick mark in the middle, representing 1m intervals.

Appendix 2: Proposed External Lighting Layout

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.

2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.

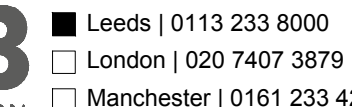
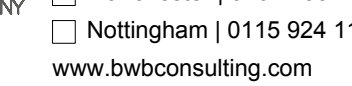
4. Any discrepancies noted on site are to be reported to the engineer immediately.

Key Plan

Legend

P6	19.03.25	Preliminary Issue		GCL	DA
P5	18.12.24	Preliminary Issue	Latest architects layout incorporated.	GCL	DA
P4	12.12.24	Preliminary Issue	Latest architects layout incorporated.	GEM	DA
P3	29.11.24	Preliminary Issue		GEM	DA
P2	28.11.24	Preliminary Issue		GEM	DA
P1	19.11.24	Preliminary Issue		GEM	DA
Rev	Date	Details of issue / revision		Dwn	Rev

Issues & Revisions

Client

P J Livesey

Project Title

Chorlton Precinct
Redevelopment, Manchester

Drawing Title

Electrical Services
Proposed External Lighting
Layout, Proposed Site Plan

Drawn: G. E. Maher Reviewed: D. Alastair

BWB Ref: 233048 Date: 18.11.24 Scale@A0: 1:200

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number Status Rev

CPM-BWB-XX-XX-DR-E-2300 S2 P6

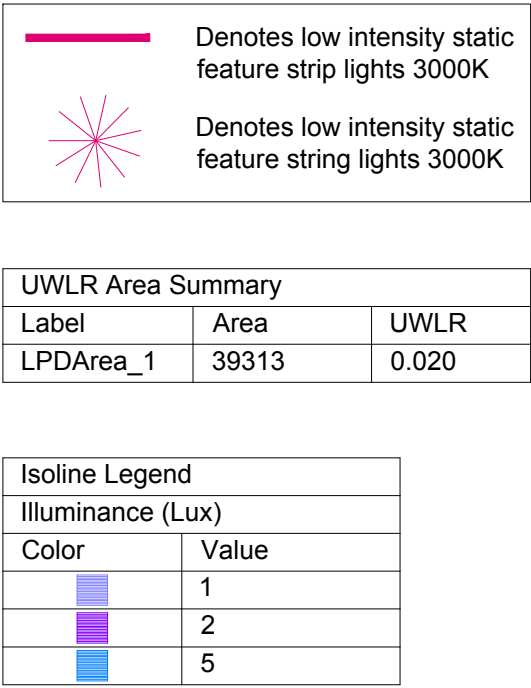
Calculation Summary	Units	Avg	Max	Min	MinAvg
Label	Lux	7.7	20	3	0.30
Basement parking access	Lux	13.1	69	4	0.31
Car free road	Lux	12.4	41	3	0.24
Car park	Lux	10.3	52	3	0.29
East plot east path	Lux	10.3	10.9	9.6	0.94
East plot entrance	Lux	9.1	17.0	2.3	0.25
Market routes	Lux	8.4	13	3	0.36
North plot paths	Lux	7.2	12	3	0.42
North plot paths (BOH)	Lux	12.1	24.0	2.7	0.22
Podium centre	Lux	9.3	58	1	0.11
Podium paths	Lux	15.7	17.1	14.3	0.91
West plot entrance	Lux	9.1	30	2	0.22
xObrusveLight_1_Cd_Seg1	N.A.	0.0	0.0	0.0	N.A.
xObrusveLight_1_III_Seg1	Lux	25.5	36	3	0.12
xObrusveLight_2_Cd_Seg1	N.A.	0.0	0.0	0.0	N.A.
xObrusveLight_2_III_Seg1	Lux	3.2	4	3	0.94
xObrusveLight_3_Cd_Seg1	N.A.	0.0	0	0	N.A.
xObrusveLight_3_Cd_Seg2	N.A.	3.0	3	3	1.00
xObrusveLight_3_III_Seg1	Lux	0.0	0.0	0.0	N.A.
xObrusveLight_3_III_Seg2	Lux	0.0	0.0	0.0	N.A.
xObrusveLight_3_III_Seg3	Lux	0.0	0.0	0.0	N.A.
xObrusveLight_4_Cd_Seg1	N.A.	31.4	34	26	0.83
xObrusveLight_4_III_Seg1	Lux	0.1	0.2	0.0	0.00
xObrusveLight_5_Cd_Seg1	N.A.	24.1	26	23	0.95
xObrusveLight_5_III_Seg1	Lux	0.2	0.2	0.1	0.59

Luminaire Schedule	Qty	Label	Tag	Description
	1	A1	102-0756-70	WE-EF Lighting AFL100 27.5W R81 Optic 3000K 6m Column mounted
	3	A1-Twin	102-0756-70	WE-EF Lighting AFL100 27.5W R81 Optic 3000K 6m Column mounted (Twin)
	2	A2	102-0716-70	WE-EF Lighting AFL100 27.5W S85 Optic 3000K 5m Column mounted
	5	A3	102-0428-70	WE-EF Lighting AFL100 9.5W S85 Optic 3000K 4m Column mounted
	2	A4	102-0640	WE-EF Lighting AFL100 18W G08 Optic 3000K 4m Column mounted
	29	B1	131-9569	WE-EF Lighting PLS420 14.5W R65 Optic 3000K 4m Wall mounted
	2	B2	131-9562	WE-EF Lighting PLS420 14.5W S70 Optic 3000K 4m Wall mounted (dimmed to 50%)
	33	C	114-9085	WE-EF Lighting KTY234 11W R65 Optic 3000K 1m Bollard
	21	D	134-2183	WE-EF Lighting DAS120 6W B Optic 3000K 4m Catenary mounted (dimmed to 50%)
	16	X	145-7241	WE-EF Lighting FLC301 4W Med beam 3000K Spot mounted
	10	Y	185-2908	WE-EF Lighting ETC329 5W 3000K In-ground

 Denotes low intensity static feature strip lights 3000K

 Denotes low intensity static feature string lights 3000K

Appendix 3: Proposed External Lux Plot Layout



- | | | | | | |
|--|-------------|-------|-----------|------------|-----------|
| Drawn: | G. E. Maher | | Reviewed: | D. Alasfar | |
| BWB Ref: | 233048 | Date: | 18.11.24 | Scale@A0: | 1:200 |
| Drawing Status | | | | | |
| PRELIMINARY | | | | | |
| Project - Originator - Zone - Level - Type - Role - Number | | | | Status | Rev |
| CPM-BWB-XX-XX-DR-E-2301 | | | | S2 | P6 |



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