

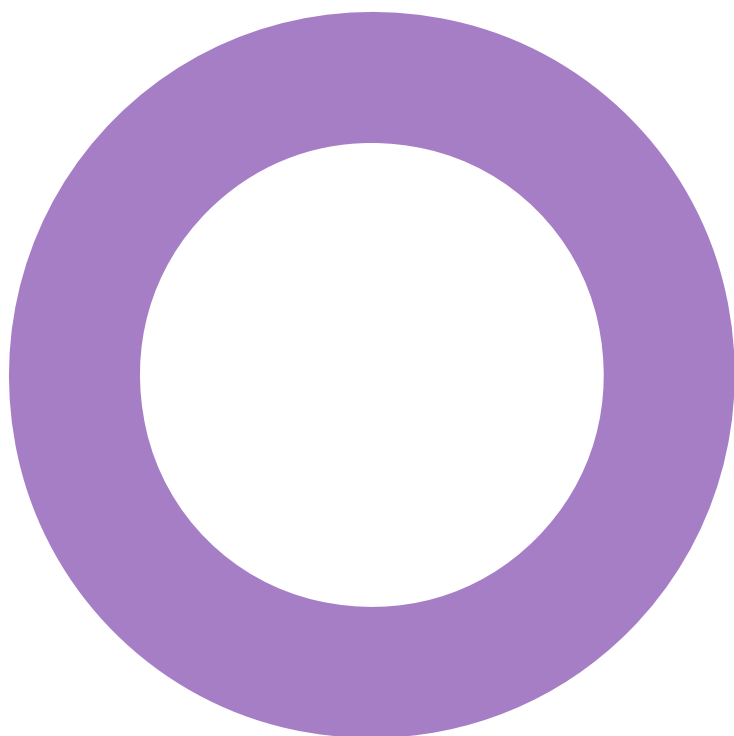


**FORMER JOHN LEWIS DEPOT, LETCOMBE STREET, READING
(ALSO KNOWN AS JLP MILL LANE)**

**EXTERNAL LIGHTING ASSESSMENT
AUGUST 2024**

**Former John Lewis Depot, Letcombe Street, Reading.
(Also known as JLP Mill Lane)**
John Lewis Partnership BTR Ltd.

ENVIRONMENTAL LIGHTING.
ILLUMINATION IMPACT PROFILE.
08278-HRL-XX-XX-RP-LD-708003-P07.
7TH JUNE 2024.



Audit sheet.

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Glossary of terms.

- Adaptive lighting: Lighting systems that can adjust their intensity, timing, or colour temperature based on specific needs or conditions. Adaptive lighting can optimize energy efficiency, enhance safety, and minimize light pollution by tailoring the lighting to actual requirements.
- Adverse impact: The negative or detrimental effect that a particular action, development, or policy may have on the environment, community, or stakeholders.
- Ambient lighting: General, overall lighting that provides uniform illumination to a space.
- AONB: Areas of Outstanding Natural Beauty.
- Astronomical twilight: The period before sunrise and after sunset when the sky is dark enough for astronomical observations. Light pollution can significantly impact the visibility of celestial objects during this time.
- Baffle: A mechanical device for the control of luminance (brightness) and light spill. Sometimes referred to as a louvre.
- Beam angle: The angular spread of light emitted by a luminaire. It determines the width of the light beam and is typically measured in degrees.
- Beneficial impact: The positive or advantageous effect that a specific action, development, or policy can have on the environment, community, or stakeholders. (See also magnitude).
- Candela: (cd) is the base unit of luminous intensity in the International System of unit (SI); that is, luminous power per unit solid angle emitted by a point light source in a particular direction.
- CIE, Commission Internationale de l'Eclairage (International Commission on Illumination).
- Colour Rendering Index (CRI): A measure of how accurately a light source reveals the true colours of objects compared to a reference light source. CRI is typically rated on a scale from 0 to 100, with higher values indicating better colour rendering.
- Colour temperature: A measure of the colour appearance of light, expressed in Kelvin (K). Lower colour temperatures represent warmer or more yellowish light, while higher colour temperatures represent cooler or bluish light.
- Curfew times: often referred to as pre or post curfew, typically post curfew is regarded as 11pm, however different times may be applied by the LPA.
- Dark sky reserve: is a public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for its scientific, natural, educational, cultural, heritage and/or public enjoyment- see IDA.
- Dimming: The process of reducing the light output of a luminaire. It is often used for adjusting illuminance (lux) levels and saving energy
- Direct sky glow: the direct upward spill of light into the sky, which can cause a 'glowing' effect and is often seen above cities when viewed from a dark area.
- Driver: is the name used to refer to the power supply component for LED lighting systems
- EIA, Environmental Impact Assessment.
- Energy waste: The unnecessary consumption of energy due to poorly designed or inefficient lighting systems.
- Environmental Zones: The characteristics of a locality are defined in ILP GN01. ***"It is recommended that Local Planning Authorities specify the ... environmental zones for exterior lighting control within their Development Plans."***
- ES, Environmental Statement.
- Fluorescent: A type of light source that emits light when an electrical current passes through a gas-filled tube, causing the phosphor coating inside the tube to fluoresce.
- Full cut-off luminaire: A type of luminaire that directs all of the light output downward, with no light emitted above the horizontal plane, (ideally below 85 degrees). It is designed to minimize light pollution by eliminating upward light and reducing glare.
- Glare: A visual discomfort caused by excessive brightness or uncontrolled light sources, which can impair visibility and cause discomfort to the eyes.
- Glare control: Measures and design techniques implemented to minimize excessive brightness and glare from lighting sources. These include shielding, diffusing or redirecting light, by selecting the appropriate luminaire.
- High-Intensity Discharge (HID): A type of light source that produces light by passing an electric current through a gas or vapour, such as metal halide or high-pressure sodium lamps. HID lamps are commonly used in streetlights and large commercial spaces.
- IDA, International Dark-Sky Association: is the recognized authority on light pollution and is the leading organization combating light pollution worldwide.
- Illuminance: is calculated as the density of lumen's per unit area and is expressed using lux (lumen's/square meter). Illuminance can be measured using a light meter.
- ILP, Institution of Lighting Professionals.
- Incandescent: A type of light source that produces light by heating a filament inside a bulb until it glows. Incandescent bulbs are less efficient compared to newer lighting technologies.
- Kelvin (K): A unit of measurement for the colour temperature of light. Lower Kelvin values represent warmer or more yellowish light, while higher Kelvin values represent cooler or bluish light.
- LED (Light-Emitting Diode): A semiconductor device that emits light when an electric current passes through it. LEDs are energy-efficient and have a longer lifespan compared to traditional light sources.
- LIA: Light Impact Assessment.
- Lighting master plan: A comprehensive plan that outlines the long-term vision and strategy for lighting within a city, town, or region. It includes guidelines for different types of lighting, such as street lighting, architectural lighting, and landscape lighting, to create a cohesive and sustainable lighting environment.
-

Glossary of terms.

- Lighting plan: A document or design that outlines the placement, type, and characteristics of luminaires in a specific area of a project. It can include details on the intended lighting levels, distribution, and control strategies.
- Lighting retrofit: The process of upgrading or replacing existing lighting systems with more energy-efficient and environmentally friendly alternatives.
- Louvre: A mechanical device for the control of luminance (brightness) and light spill. Sometimes referred to as a baffle.
- LPA: Local Planning Authority.
- Lighting simulation/modelling: The use of computer software or tools to create virtual models and simulations of lighting designs. It helps assess and visualize the expected lighting performance, distribution, and impact of a proposed lighting plan before implementation.
- Light pollution: The excessive or misdirected artificial light produced by human activities that adversely affects the natural darkness of the night sky and interferes with the environment, human health, and astronomical observations.
- Light Spill (vertical and horizontal): the spilling of light beyond the boundary of a property, which may cause nuisance to others.
- Lumen (lm): The unit of measurement for the total amount of visible light emitted by a light source. For example, a 60-watt incandescent bulb provides about 840 lumen's.
- Luminance (cd/m²) is a photometric measure of the luminous intensity per unit area of light travelling in a given direction. It describes the amount of light that passes through, is emitted or reflected from a particular area. This can be measured using a luminance meter but is more often calculated.
- Luminaire: A complete lighting unit that includes a light source, optical control, housing, and any necessary control components such as a driver.
- Lux: is the SI derived unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.
- LVIA: Landscape Visual Impact Assessment.
- Magnitude: refers to the size, extent, or scale of something. It is a measure of the quantity, intensity, or importance of a particular attribute or phenomenon. Usually used in assessing the significance of effects.
- Maintenance factor: usually a percentage is allowed for in lighting calculations to allow for the effects of time on fittings and their surroundings. Light sources, drop in output, fittings and surroundings become dirtier, several factors combine to reduce the amount of light available. A typical maintenance factor would be 70% this would ensure an installation was still meeting required light levels in for example 3 years. For this report a factor of 100% (unity) has been used, that is a day one, worst case scenario.
- Motion sensor: A device that detects motion and triggers the lighting system to turn on or off automatically. It is commonly used for security and energy-saving purposes. (Sometimes referred to as a PIR).
- NTS: Non-Technical Summary (NTS).
- Photometry: is the light intensity and distribution of a luminaire. Luminaire manufactures should provide electronic photometric data files, which are composed of light quantities and measurements, to illustrate the performance of a specific luminaire product.
- PIR: Passive Infrared (detector). – See motion sensor.
- Planning condition: A condition imposed on a grant of planning permission (in accordance with the Town and Country Planning Act 1990) or a condition included in a Local Development Order or Neighbourhood Development Order.
- Ramsar Sites: Wetlands of international importance, designated under the 1971 Ramsar Convention.
- Receptors: Light sensitive receptors are often sub categorized as - ecological, human, heritage and transport. Different receptors have various degrees of tolerance to increased light levels.
- Scattering: The process by which light is dispersed or deflected in different directions as it interacts with particles or molecules in the atmosphere. Scattering plays a significant role in the formation of skyglow.
- Shielding: The use of fixtures and design techniques to control the direction of light and minimize its upward or sideways emission. Proper shielding helps reduce light pollution by directing light towards the intended area.
- Skyglow: The brightening of the night sky caused by scattered and upward-directed artificial light. It reduces visibility of stars, constellations, and other celestial objects.
- SLL: Society of Light & Lighting.
- Site, Proposed development area, usually denoted by a “red-line” boundary.
- A Site of Special Scientific Interest (SSSI): is a formal conservation designation. Usually, it describes an area that's of particular interest to science due to the rare species of fauna or flora it contains - or even important geological or physiological features that may lie in its boundaries.
- SQM: Sky quality meter, measures the darkness of the night sky in magnitudes per square arcsecond.
- Upward Light Flux (ULF): The total amount of light emitted upward from a luminaires or source. High ULF contributes significantly to light pollution.
- ULR, Upward Light Ratio. Expressed as a percentage of upward light compared to downward light.
- UNESCO, United Nations Educational, Scientific and Cultural Organization.
- Watt (W): A unit of electrical power that measures the rate at which energy is consumed by a light source.
- Wildlife corridor: Areas of habitat connecting wildlife populations.
- Zone of influence (ZOI) refers to the area or region that is affected or influenced by a particular factor, phenomenon, or entity.

1.0 Introduction.

Hoare Lea have been commissioned by John Lewis Partnership BTR Ltd to provide an external Lighting Impact Assessment (LIA) for a proposed development, described as the Former John Lewis Depot, Letcombe Street, Reading.

The assessment is made up of 3 separate reports, which when combined form the LIA;

- Part 1: Baseline Survey (BLS) - **08278-HRL-XX-XX-RP-LD-708001 (Appendix 1).**

The baseline report provides a baseline condition of the artificial lighting currently installed on the Application Site area and adjacent surrounding areas. It has been prepared using the guidance provided in the ILP guidance note PLG04 “Guidance on Undertaking Environmental Lighting Impact Assessments”

- Part 2: External Lighting Design - **08278-HRL-XX-XX-RP-LD-708002 (Appendix 2).**

The lighting design provides the proposed technical and aesthetic lighting design strategy in accordance with appropriate guidance.

- Part 3: Illumination Impact Profile (IIP) (this document).

This IIP provides:

An assessment to convey how the proposed development will affect the illumination profile of the area should the lighting to the proposed development be implemented.

We will assess how the indicative proposed lighting scheme complies (or not) with reference to relevant legislation and national guidance for light pollution such as the Institution of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light GN01/21, (2021).

Light pollution is defined as a statutory nuisance within the ‘Clean Neighbourhood and Environment Act’ 2005. Further details of which are shown within **Section ‘3.0 Legislation, standards & guidelines’** of this document.

To assess and define light pollution the ILP Guidance Notes for the Reduction of Obtrusive Light GN01/21, (2021) uses the following definitions in describing obtrusive lighting effects:

- Light spill: the spilling of light beyond the boundary of the area being lit.
- Light intrusion: nuisance light, levels of light above defined values into residential properties.
- Glare: (viewed source intensity) the uncomfortable brightness of the light source against a dark background which results in dazzling the observer, which may cause nuisance to residents and a hazard to road users.
- Direct sky glow: the direct upward spill of light into the sky, which can cause a glowing effect and is often seen above cities when viewed from a dark area.

For this assessment the elements listed above along with other relevant criteria from the guidance will be quantified and assessed utilising the metrics defined in the ILP Guidance Notes for the Reduction of Obtrusive Light GN01/21, (2021). Full details of the assessment scope and methodology are detailed in the methodology section of this report.

Competent person

As noted in the Institution of Lighting Professionals (ILP) guidance note PLG04 “**Guidance on Undertaking Environmental Lighting Impact Assessments**” these assessments.... “*should only be undertaken by competent lighting professionals. The educational qualifications, training and experience will need to be summarised.*”

This report has been prepared by Sean Kielthy a full member of the Society of Light and Lighting (SLL) and an Associate member of the Institution of Lighting Professionals (ILP). He has 29 years experience in lighting with the last 6 years specifically in environmental lighting impact assessments.



Figure 1.1 Proposed Site landscape plan, supplied by Camlins - **SY743-000-0001 General Arrangement - Public Realm and Landscape.**

1.0 Introduction.

Existing Site overview.

The Site is located on the edge of the town centre in Central Reading within close proximity of key local services and facilities including The Oracle shopping centre opposite, the Premier Inn hotel adjacent to the west and Reading railway station located approximately 1km to the north.

The Site itself is bound by Mill Lane and the A329 to the north, Letcombe Street to the south-west and Crossland Road to the south-east, from which the Site is accessed. The Site currently comprises the existing JLP warehouse building with associated car parking and servicing areas to the north-east and south-west of the building.

The existing use of the Site consists of warehouse with customer collection facilities, ancillary car park and servicing area. The use of the existing building became surplus to requirements as a customer collection centre in 2021, with its functions having been transferred to the John Lewis department store at Broad Street, Reading.

Current lighting context.

The car parking and loading bay areas of the Site are illuminated by LED floodlights mounted to the building façades. Recessed downlights are present in the soffit of the entrance canopy. No external lighting is present on the northern facade of the building.

The A329 & Mill Lane are illuminated by luminaires mounted on approximately 30 metre high columns along the A329. Crossland Lane & Letcombe Street are illuminated by LED luminaires mounted on approximately 6 metre high columns. Building surface mounted floodlights & bulkheads are present on the developments along Crossland Lane & Letcombe Street, of which some of the lighting on these units were not operational during the period of the survey.

Heritage context.

No heritage assets exist within the Site nor is it within a conservation area. Numerous listed buildings are located in proximity to the Site, such as the Reading Friends Meeting House & St Giles Church. The Site is bound to the east by the Market Place/London Street Conservation Area.

Ecological context.

A building in proximity to the Site was identified as having bat roost potential. The nearest Site of Special Scientific Interest (SSSI) located on the DEFRA Magic website is Pincents Kiln which is approximately 4 miles to the south-west.



Figure 1.2 Aerial view of Site with approximate redline boundary. Background from Microsoft Mapping.

2.0 Legislation, planning & policy guidance.

Legislation background.

The issue of light pollution was introduced within the Clean Neighbourhoods and Environment Act 2005 (CNEA) as a form of statutory nuisance under the Environmental Protection Act (the 'EPA', 1990), which was amended in 2006 to include the following nuisance definition:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance."

The CNEA does not recommend how to control light pollution. Further guidance is given on the gov.uk website (<https://www.gov.uk/guidance/light-pollution#how-much-light-shines>), and which specifically points to DEFRA for further guidance. Considerations on what constitutes lighting nuisance can be found on <https://www.gov.uk/guidance/artificial-light-nuisances-how-councils-deal-with-complaints#what-can-cause-artificial-light-nuisances>.

Although light was described as having the potential to cause statutory nuisance (see also the Statutory Nuisance Statement (Document Ref. 5.9)), no prescriptive limits or rules were set for impact assessment purposes. Guidance Notes for the Reduction of Obtrusive Light produced by the Institute of Lighting Professionals (ILP) have, therefore, been referred to for the purposes of this document.

Guidance produced on Section 101 to Section 103 of the Clean Neighbourhoods and Environment Act 2005 has also been referred to, which places a duty on local authorities to ensure that their areas are checked periodically for existing and potential sources of statutory nuisances – including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or reoccur, local authorities must issue an abatement notice (in accordance with Section 80(2) of the EPA 1990 (as amended)), requiring that the nuisance cease or be abated within a set time-scale.

It is a requirement of the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations') that plans and projects are subject to an Appropriate Assessment if it is likely that they will lead to significant adverse effects on a Natura 2000 Site (the collective name for European designated Sites). Impacts from lighting are also relevant to the Habitats Regulations Assessment (HRA). This report does not assess any potential impact on ecology, however the information contained may be of relevance to a suitably qualified ecologist.

National planning policy framework.

The National Planning Policy Framework (NPPF) December 2023 issued by The Department for Levelling Up, Housing and Communities in Chapter 2, Paragraph 7, states ***"The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. At a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection."***

Within the guidance the following (taken from Chapter 15, Paragraph 191) is relevant to artificial lighting. ***"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."

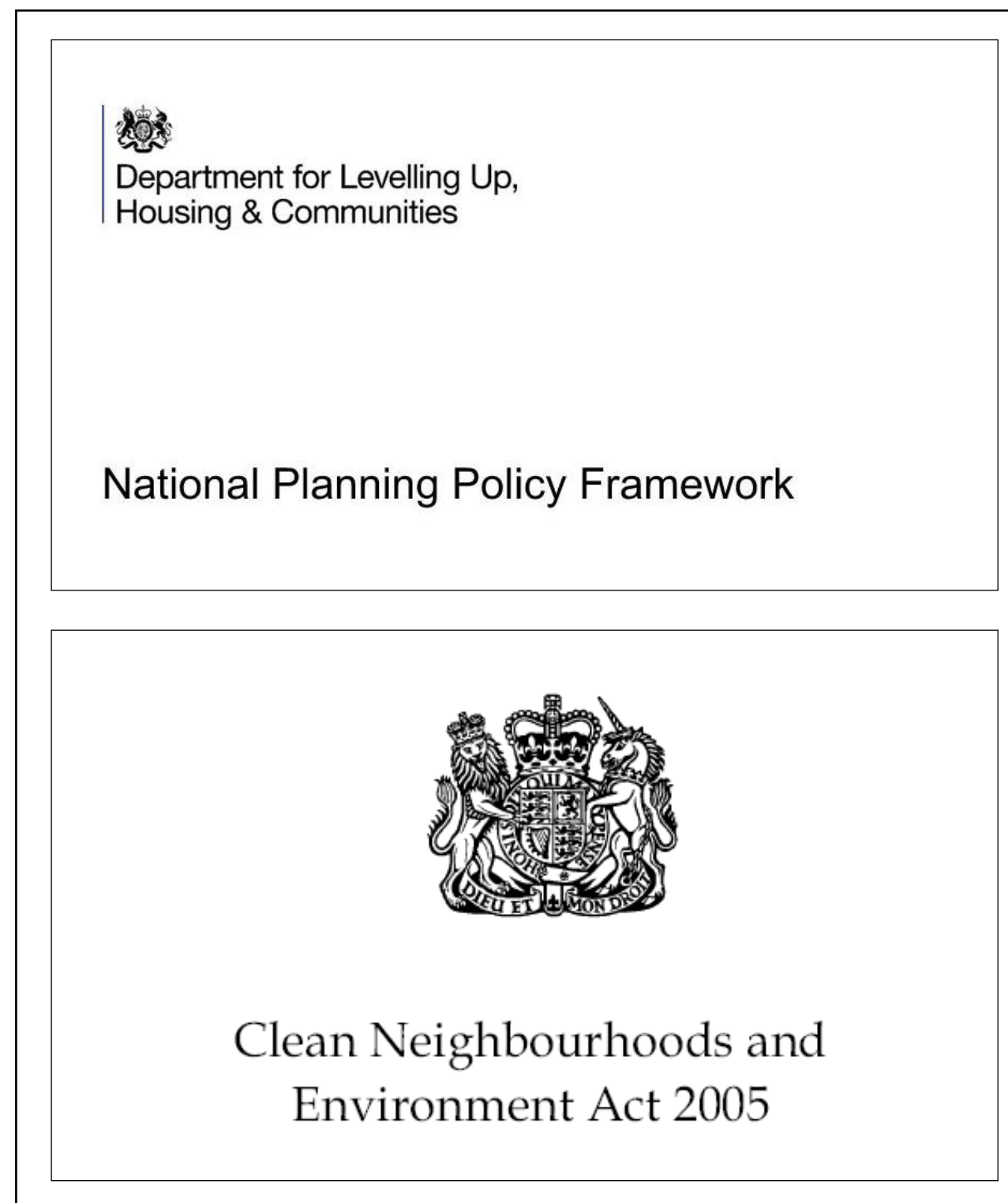


Figure 2.1 Extracts from gov.uk website.

2.0 Legislation, planning & policy guidance.

Local planning policy

A search online of local planning policy found the following documents; **The Reading Local Plan** (adopted November 2019). This document guides development in Reading up to 2036 and references light pollution within EN16: Pollution and Water Resources:

EN16: POLLUTION AND WATER RESOURCES

Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution.

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Reading Borough Council provides additional guidance on light pollution within the document **Sustainable Design & Construction Supplementary Planning Document** (adopted December 2019).

Pollution

Aim: To minimise damage to the environment through air, ground/surface water, land, noise or light pollution.

19. What measures have been incorporated to ensure that noise and light pollution will be minimised through the development?

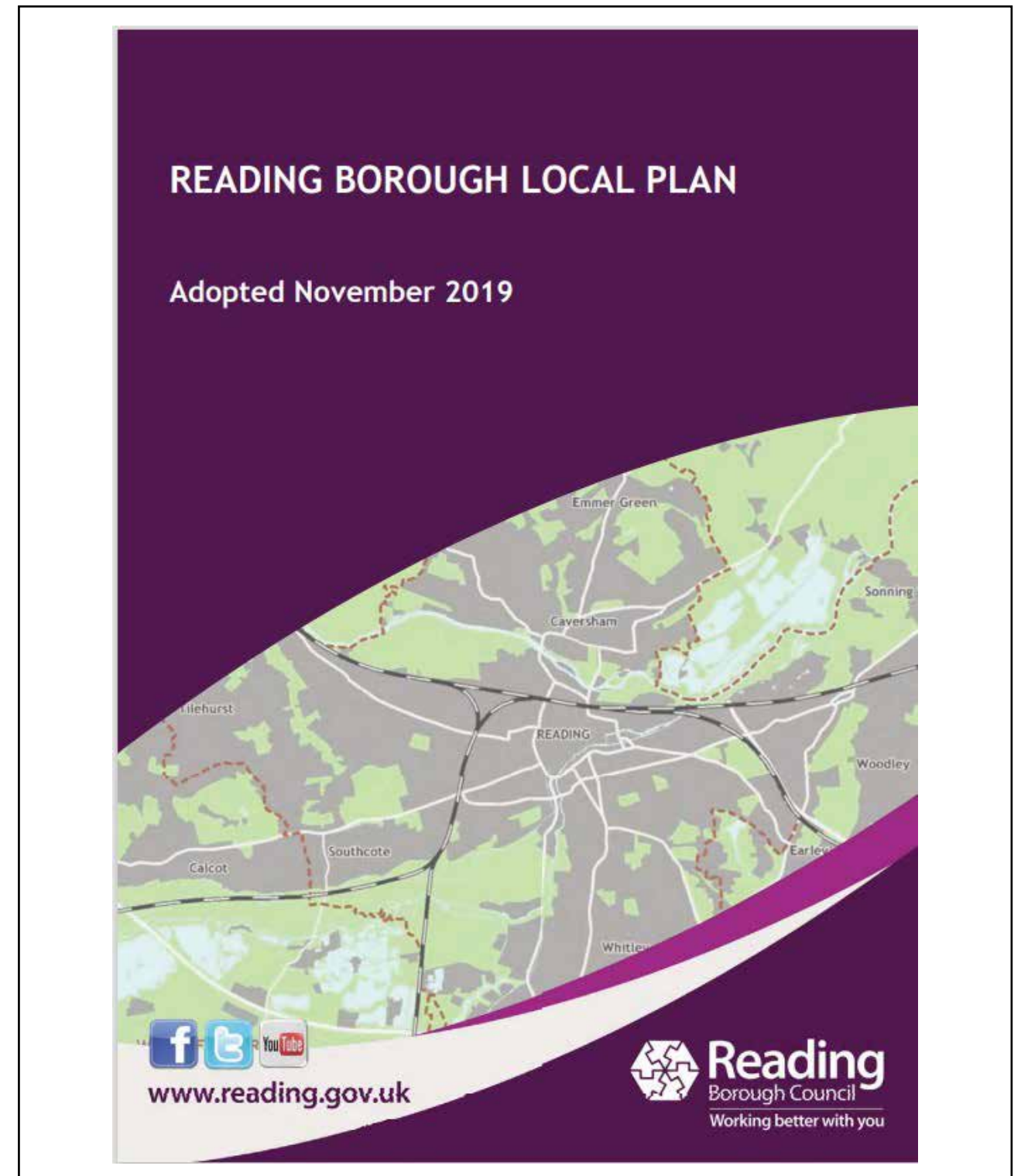


Figure 2.2 Extract from Reading Borough Local Plan.

3.0 Lighting standards.

Policy and guidance.

A number of documents lay down the best practice and guidance on providing sufficient and appropriate lighting for pedestrian passage, vehicle thoroughfare and visual interest.

These include:

- BS EN 5489-1:2020
- BS EN 13201-2:2015
- CIE 136: 2000
- BS EN 12464-2:2014
- SLL Code for Lighting
- Home Quality Mark (Version 6.0)
- Reading Borough Local Plan (2019)
 - CC8: Safeguarding Amenity & EN9: Provision of Open Space.

And if appropriate:

- CIBSE Lighting Guide 6: The Outdoor Environment 2016
- CIBSE : Lighting the Environment: A guide to good urban lighting
- Secure by Design - Lighting Against Crime

Light pollution.

A number of documents lay down the best practise and guidance on reducing the visual and environmental impact of external lighting in relation to light pollution.

These are:

- CIE Technical Report - CIE 150: 2017
- ILP Guidance Note 1 for the Reduction of Obtrusive Light 2021 (GN01/21)

The implementation of these standards is vital because of “The Clean Neighbourhoods and Environmental Act, 2005” which makes light a statutory nuisance.



Figure 3.1 Lighting standards & guidance.

4.0 Assessment methodology.

Assessment methodology.

As noted in the Institution of Lighting Professionals (ILP) guidance note PLG04 “Guidance on Undertaking Environmental Lighting Impact Assessments” the methodology should outline the details and procedures for the Site visit, design and evaluation process.

The assessment is made up of 3 parts, which when combined form the LIA;

- Part 1: Baseline Survey (BLS).
- Part 2: External Lighting Design.
- Part 3: Illumination Impact Profile (IIP) (this document).

Part 1: Baseline Survey

The Site visit captured spot light meter readings showing illumination levels (Lux) in and around the proposed development Site. These measurements assist in categorizing the environmental zone of the proposed development location and surrounding area. Secondly they also provide a “benchmark” of existing lighting levels which are used when measuring any light spill from the proposed development. Full details are shown in:

Baseline Lighting Survey - 08278-HRL-XX-XX-RP-LD-708001 (Appendix 1).

Part 2: External Lighting Design

The external lighting design shows the proposed technical and aesthetic lighting design concept in accordance with appropriate guidance. Typical lighting levels, indicative positions and typical luminaire types are shown. Full details are shown in: **External Lighting Design - 08278-HRL-XX-XX-RP-LD-708002 (Appendix 2).**

Part 3: Illumination Impact Profile (this document)

The evaluation of the Site is covered in this report. Using data gathered in the first two parts of the lighting impact assessment it demonstrates in a quantitative manner how the Site and surrounding area may change should the Site be developed.

The lighting on the Site was modelled utilising the lighting calculation software AGI32. A selection of survey locations visited during the baseline lighting survey and identified as being sensitive to change in illumination are evaluated. These locations are assessed and any change in level of illumination is measured against a standard procedure to quantify a significance of effect. The locations chosen will be around the perimeter of the site, within an approximate 30m zone adjacent to the Site. The value of 30m represents the maximum threshold of any significant contribution in illumination levels from the types of luminaires being utilised. The value of 30m is derived from the optical properties of the types of luminaires being utilised.

This report will assess how the proposed lighting scheme complies (or not) with reference to relevant legislation and national guidance for light pollution such as the Institution of Lighting Professional (ILP) Guidance Notes for the Reduction of Obtrusive Light GN01/21, (2021).



Figure 4.1 Aerial map showing redline boundary of the Site. Aerial map image taken from Microsoft Mapping.

4.0 Assessment methodology.

Assessing significance of effect.

Tables 4.1 to Table 4.3 (inclusive) define the parameters for evaluating change to the Site and surrounding areas. They define how to assess the sensitivity of receptor, the magnitude of effect and how the combination of these two elements form the significance of effect. These definitions are used in Tables 7.1 to 7.4 when assessing any change in lighting condition between the current baseline and the calculated values should the lighting proposal be implemented.

These tables are based upon the DMRB (Design Manual for Roads and Bridges). Document reference LA 104 - Environmental assessment and monitoring. Human receptors are assessed as low sensitivity and the magnitude of effect is defined by the change in value (%) from the base line survey. The significance of effect is the product of these two afore mentioned criteria.

ILP guidelines provide limiting criteria for luminous source intensity (glare) and light intrusion to residential locations. However several of the positions measured in the baseline survey do not have a residence at that location and have therefore been scoped out of the assessment process. The purpose of this assessment is to define the potential percentage change in lighting levels in and around the development to residential receptors.

Table 4.1. Defining sensitivity of receptor.	
Sensitivity	Definition
High	The receptor has little ability to absorb change in artificial light conditions without fundamentally altering its present character, or is of international or national importance.
Moderate	The receptor has moderate capacity to absorb change in artificial light conditions without significantly altering its present character, or is of high importance.
Low	The receptor is tolerant of change in artificial light conditions without detriment to its character, or is of low or local importance.

Table 4.2. Defining magnitude of effect.			
Magnitude of Effect	Horizontal and Vertical Light (Lux)	Direct Sky Glow ULR%	Glare Luminaire Source intensity
	Percentage Change Between Baseline Value and Baseline Value + Development	Percentage increase over guidance limits for the Environmental Zone (Baseline value not available).	Percentage increase over guidance limits for the Environmental Zone. (Baseline value not available).
High	75 to 100%	75 to 100%	75 to 100%
Medium	45 to 75%	45 to 75%	45 to 75%
Low	10 to 45%	10 to 45%	10 to 45%
Negligible	0 to 10%	0 to 10 %	0 to 10 %

4.0 Assessment methodology.

Assessing significance of effect.

Overall significance of effect will be calculated based on the interaction between magnitude and sensitivity, whereby the effects can be beneficial (positive), adverse (negative) or negligible (neutral). The tables (7.1 to 7.4.) only assess residential (human) receptors.

Table 4.3. Assessing significance of effects			
Magnitude of Effect	Sensitivity		
	High	Moderate	Low
High	Major Adverse / Beneficial	Moderate Adverse / Beneficial	Moderate Adverse / Beneficial
Medium	Moderate Adverse / Beneficial	Moderate Adverse / Beneficial	Minor Adverse / Beneficial
Low	Moderate Adverse / Beneficial	Minor Adverse / Beneficial	Negligible
Negligible	Negligible	Negligible	Negligible

4.0 Assessment methodology.

Calculation methodology.

To enable accurate assessment of the Site the following criteria are used to set out the parameters for the calculation model.

- The lighting on the Site was modelled utilising the lighting calculation software AGI32. The accuracy of the software has been proven in independent testing as per the requirements of 'CIE 171:2006 Test Cases to Assess the Accuracy of Lighting Computer Programs'.
- The Site was modelled as a flat level plain, within and around the Site there are no significant changes in topography within the areas that would be individually lit by the types of lighting products utilised. Therefore any changes in level across extended areas can be scoped out of the modelling process.
- The calculation model was based on a lighting design outlined in the Hoare Lea document LIA Part 2: **08278-HRL-XX-XX-RP-LD-708002 (Appendix 2)**.
- It has been assumed that all the external lighting will be operational.
- A maintenance factor of 1 was applied to all luminaires within the calculation to represent the maximum adverse condition from initial installation. This equates to “day one” lumen output of the luminaires, with no allowance for luminaire cleaning and light source depreciation.
- The developed lighting design should be based on a Maintenance Factor which reflects likely cleaning intervals and lumen depreciation. This will deliver the design-lighting levels in use and result in higher than design-lighting levels when new.
- The calculation combines the effects of direct illumination (light emitted from a luminaire directly to a position) and indirect illumination (light reflected from the ground or building surfaces.) This method generates more accurate results particularly with regard to vertical receptor locations than the direct illumination only method.
- Ground surface reflectance was taken as 22% based on data from CIBSE LG11: Surface Reflectance and Colour. This is an Area Weighted Reflectance based on typical surfaces & natural landscaping.
- Lighting outside the Site boundary (existing or proposed) is not included within this calculation model. The effects of the existing lighting are captured within the baseline survey. The high mast lighting at the north east & north west perimeters of the redline boundary may be altered as part of the development program. However as the potential impacts of any such changes will be assessed by others it can be scoped out of our assessment process.
- The calculation does not account for atmospheric attenuation. The atmosphere (air) will absorb light particularly at extended distances.
- As per standard industry practice, existing planting and trees have not been included within the assessment calculations. As such they are excluded from the calculation and assessment process.
- Small feature lighting, such as bench or feature uplights have been excluded from the assessment. Their low output and orientation limit their impact.
- Selected locations around the proposed development are assessed in the calculation model for significance of effect. The locations chosen will be residential receptors within an approximate 30m zone to the south of the Site. The value of 30m represents the maximum threshold of any significant contribution in illumination levels from the types of luminaires being utilised.
- Five locations south of the proposed development were measured during the baseline survey, with and without the existing lighting to the development in operation. The difference between these values and their significance is discussed in the assessment section.

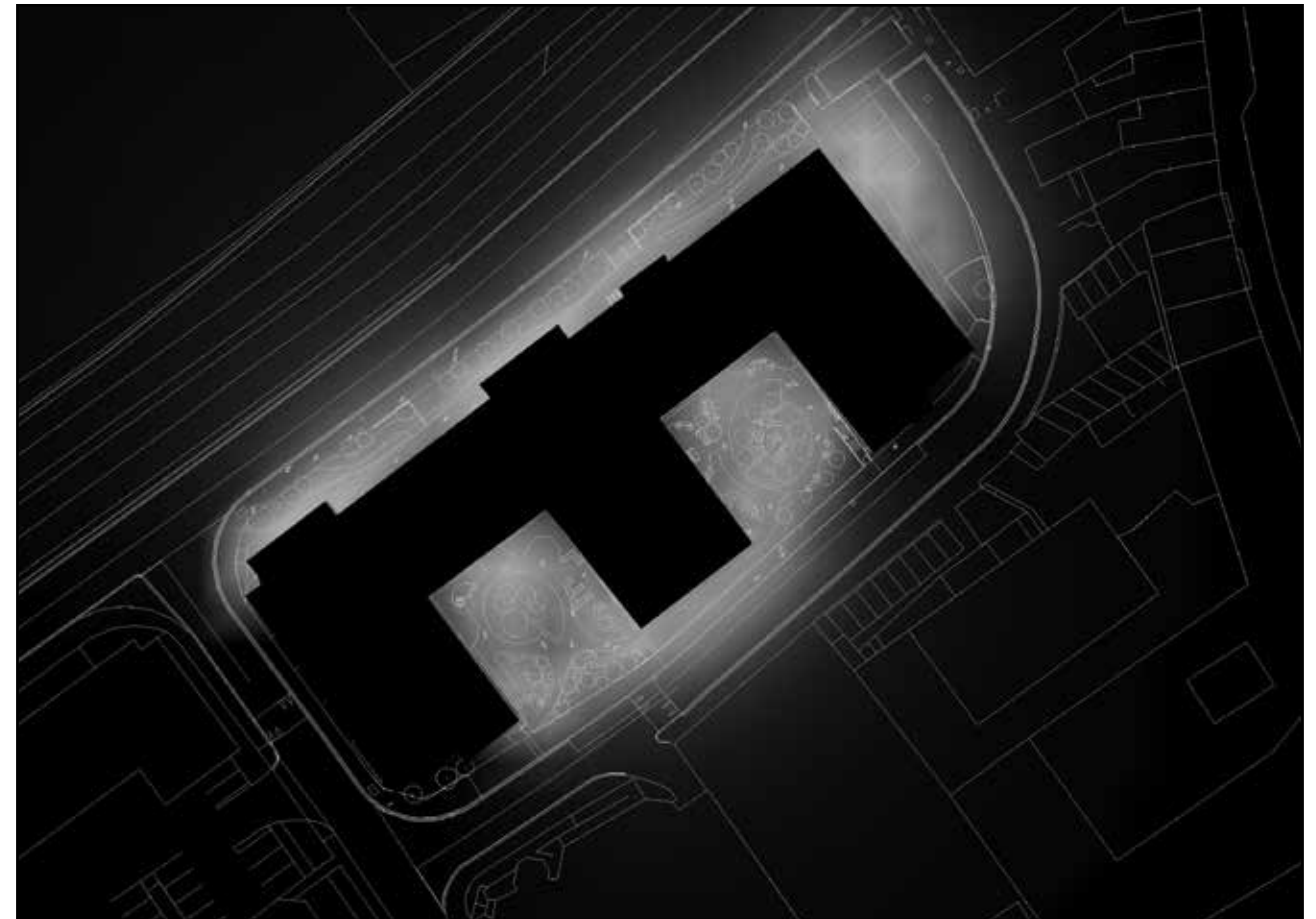


Figure 4.2 Showing top view of Site, extracted from AGI32 calculation software.

5.0 Baseline environmental zones.

To assess the current Site and surrounding condition we refer to the ILP Guidance Note GN01 for the Reduction of Obtrusive Light (2021) and ILP guidance note PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments. Within PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments, page 12 states that: *'In cases where the Planning Authority has not set Environmental Zones for its area, the lighting professional may have to make decisions on the nature of the area and explain the reasoning in the LIA'*. An online search did not find any documentation from Reading Borough Council establishing environmental zones for the Site & surroundings. Consequently they have been classified within this report.

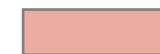
Utilising the information gathered in the baseline survey, a composite image (Figure 5.1, adjacent) is produced to assist in representing the current environmental zones of the locality. It must be noted that this graphic is an average representation of the area assessed, based on the information recorded.

In Figure 5.1 (adjacent map) areas would be classified as:



- **E3 Suburban, Medium district brightness. Well inhabited rural and urban settlements, small town centres of suburban locations.**

The residential areas bordering the Site are lit to typical parameters of a suburban development, i.e. by LED luminaires mounted on approximately 8 metres high columns on main trunk roads & 6 metre columns found on minor roads. External artificial lighting is generally limited to the street lighting, however some isolated building mounted floodlights may be found on developments.



- **E4 Urban, High district brightness. Town/city centres with high levels of night-time activity.**

The Site is illuminated by building surface mounted floodlights & downlights mounted within canopy soffit. The loading & car parking bays within the Site's boundary are illuminated to levels typically expected in these workspaces.

The Site is surrounded by dense mixed use development which contains a range of light sources. Mill Lane/ A329 is lit by luminaires mounted on approximately 25 metre high columns. The Oracle Shopping Centre contains a range of light sources but is predominantly lit by LED luminaires on approximately 6m high columns. This area also receives considerable amount of illumination from other light sources such as illuminated advertising/branding installations and handrail lighting.



Figure 5.1 Map showing current average environmental lighting zones with approximate redline boundary.

6.0 Lighting strategy.

Environmental Zone Classification.

To select the most appropriate lighting classifications for the site it is important to have an understanding of the surrounding areas. This is to ensure illuminance levels do not drop suddenly between one zone and another, creating distinct contrast and the appearance of being dark.

The area has been classified as E4 Urban, High district brightness. Town/city centres with high levels of night-time activity.

Lighting Requirements.

It is important that the lighting applications provide both an aesthetic quality and also the appropriate levels of illumination required for the space they inhabit.

The adjacent tables have been extracted from BS 12464-1:2014 and BS5489-1:2020 to give a guide to the target levels of illumination.

It is important to remember however that these are a guide and appropriate interpretation of the space and how these requirements align with its intended use should be taken into account.

The lighting requirements within the scope area fall into the following categories:

- Pedestrian Movement

- 5 lux average, 0.25 uniformity
- Canopied Area (C1/C0 Class - BS5489-1:2020)

- 30 - 50 lux average (Light level to balance internal and adjacent external spaces)
- Steps

- 20 lux average, 10 lux minimum
- Disabled Parking

- 10 lux average, 0.25 uniformity
- Areas of Interest

- No class, illumination for ease of navigation only.

Areas which are used for social and congregation spaces, are not critical to illuminate to a uniform standard, only for navigational assistance.

NOTE: Any lighting shown within the site boundary is private.

Table 6.1 - General requirements for areas and for cleaning at outdoor workspaces

Ref.no.	Type of area, task or activity	E_m lx	U_o -	R_{GL} -	R_a -
5.1.1	Walkways exclusively for pedestrians	5	0.25	50	20
5.1.2	Traffic areas for slowly moving vehicles (max. 10km/h), e.g. bicycles, trucks and excavators	10	0.40	50	20
5.1.3	Regular vehicle traffic (max. 40km/h)	20	0.40	45	20
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0.40	50	20
5.1.5	Cleaning and servicing	50	0.25	50	20

Table extracted from 'BS 12464-1:2014'

Table 6.2 - Maintained lighting levels for subways, footbridges, stairways and ramps

Type		Day		Night ^{a)}	
		E_{av} (lx)	E_{min} (lx)	E_{av} (lx)	E_{min} (lx)
Subways	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10
Footbridges	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10
Stairways/Ramps	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10

Table extracted from 'BS5489-1:2020'

Table 6.3 - Maintained lighting levels for outdoor car parks

Type of area and usage	E_{av} (lx)	U_o (-)
Light traffic e.g. parking areas of shops, terraced and apartment houses: cycle parks	5	0.25
Medium traffic e.g. parking areas of department stores, office buildings, plants, sports and multi-purpose building complexes	10	0.25
Heavy traffic e.g. parking areas of major shopping centres, major sports and multi-purpose building complexes	20	0.25

Table extracted from 'BS 5489-1:2020'

6.0 Lighting strategy.

Lighting Levels.

The adjacent plan sets out the lighting class and lighting level requirements to all the areas within scope.

A combination of lighting treatments will be provided to allow for safe navigation of the site.

Areas that are for the use as social and congregation spaces, should be treated as such and are not as critical to illuminate to a uniform standard. Feature lighting should be utilised to supplement ambient lighting to create a welcoming environment. As such these areas may not be lit to the BS5489 stated illuminance levels.

NOTE: Final exit and emergency lighting is not included in this proposal and will need to be considered and confirmed to ensure final exits and escape routes have been illuminated sufficiently. Hoare Lea recommend utilising proposed ambient lighting with integral emergency where appropriate.

- Pedestrian Movement
- 5 lux average, 0.25 uniformity*
- Canopied Area
- 30 - 50 lux average
- Steps
- 20 lux average, 10 lux minimum
- Disabled Parking
- 10 lux average, 0.25 uniformity*
- Areas of Interest
- No class, illumination for ease of navigation only.

NOTE: *If Secure by Design is targeted, the proposed lighting values noted above may be affected. Increased uniformity will be necessary, and consideration will be required for the types of lighting products proposed.



Lighting Levels
Landscape plan by Camlins

6.0 Lighting strategy.

The Figure below displays an indicative glow plan impression of the external lighting design of the proposed development. A breakdown of lighting strategy can be found within the Hoare Lea document LIA Part 2: **08278-HRL-XX-XX-RP-LD-708002 (Appendix 2)**.



Figure 6.2 Indicative luminaire glow plan, taken from the Hoare Lea document LIA Part 2: **08278-HRL-XX-XX-RP-LD-708002 (Appendix 2)**. Landscape plan supplied by Camlins.

7.0 Assessment of lighting impact.

Aerial view of Site and surrounding area with locations assessed for potential impact.

The figure below shows: the redline boundary of the proposed development site and baseline survey positions where the impact from the lighting to the proposed development are assessed. As noted in the assessment methodology, the locations were selected due to their proximity to the proposed development whilst being outside the Site's boundary. These results are shown in Tables 7.1 & 7.2 The locations scoped out are excluded from this image.

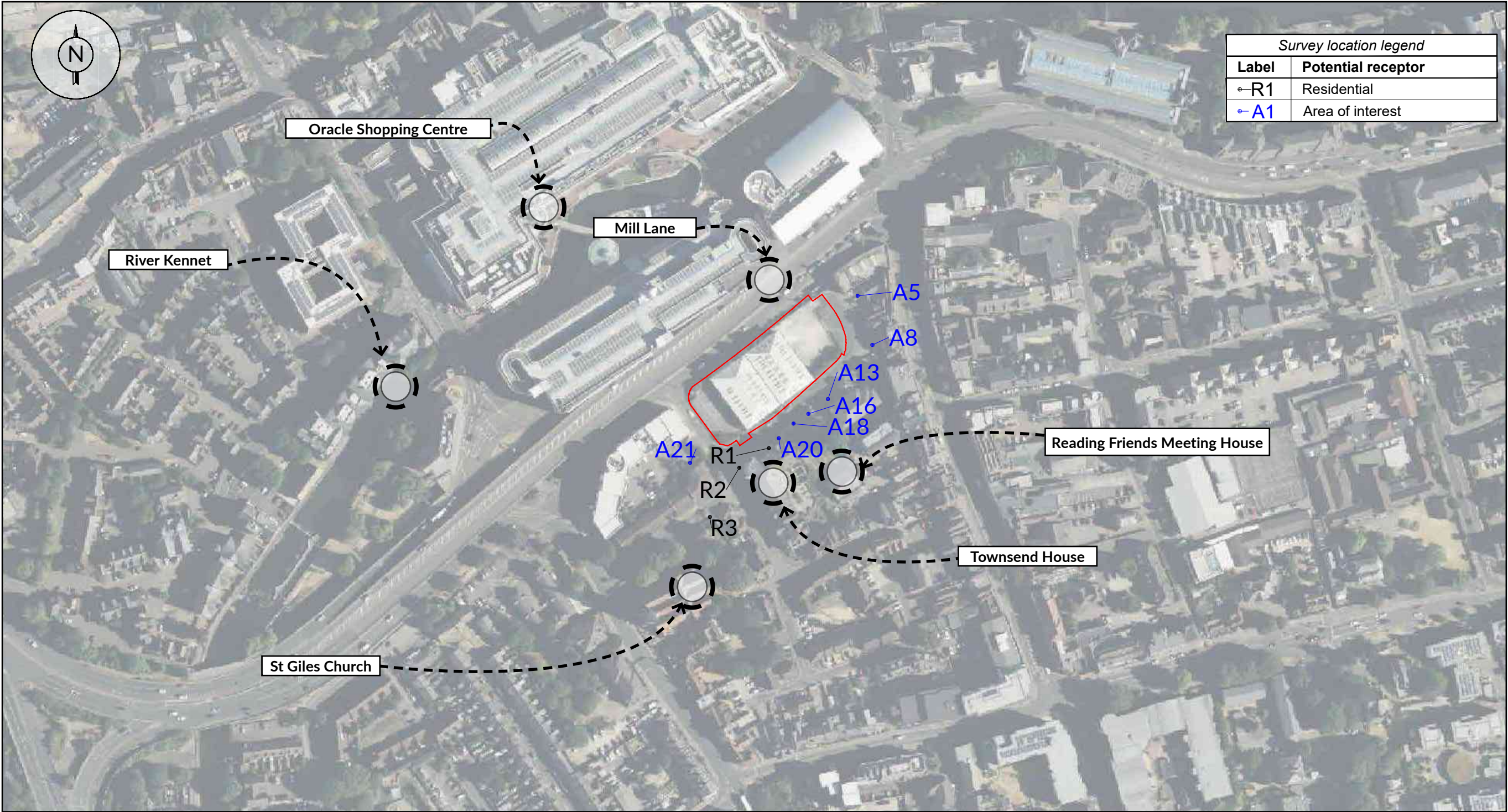


Figure 7.1 Aerial map showing assessment locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

7.0 Assessment of lighting impact.

Locations assessed for potential impact.

The table below shows measured baseline illumination levels (with all Site and local lighting in operation) at the selected assessment locations. As noted in the calculation and assessment methodology, only selected locations around the proposed development are assessed in the calculation model for significance of effect. The locations chosen as discussed in the methodology are within an approximate 30m zone to the south of the Site. The table shows the measured baseline value, the calculated light levels from the modelled design, subsequent resultant light level and the significance of effect. The significance of effect considers the proportional change (at each location) in illuminance between baseline illumination levels (pre-development) and the potential (post development) condition.

Table 7.1. Sensitive receptor (human) - horizontal.							
Survey Location	Location name	Sensitivity	Measured light level, taken from baseline survey	Calculated light level taken from modelled design	Predicted resultant light level (post development)	Note	Significance of effect
A5	Crossland Road, at back of buildings.	Low	4.26	0.00	4.26		Negligible
A8	Crossland Road, at back of buildings.	Low	1.76	0.00	1.76		Negligible
A13	Car park, Crossland Road	Low	8.65	0.24	8.89		Negligible
A16	Crossland Road, at boundary of Quakers Meeting House	Low	1.44	0.94	2.38		Minor Adverse
A18	Crossland Road, at boundary of Quakers Meeting House	Low	4.57	0.38	4.95		Negligible
A20	Crossland Road, at boundary of Quakers Meeting House	Low	3.41	0.51	3.92		Negligible
A21	Car park of Premier Inn	Low	2.12	0.00	2.12		Negligible
R1	Crossland Road	Low	1.96	0.16	2.12		Negligible
R2	Crossland Road & Letcombe Street junction	Low	4.83	0.00	4.83		Negligible
R3	Deansgate Rd, next to boundary of St Giles Church	Low	1.15	0.00	1.15		Negligible

7.0 Assessment of lighting impact.

Locations assessed for potential impact.

The table below shows measured baseline illumination levels (with all Site and local lighting in operation) at the selected assessment locations. As noted in the calculation and assessment methodology, only selected locations around the proposed development are assessed in the calculation model for significance of effect. The locations chosen as discussed in the methodology are within an approximate 30m zone to the south of the Site. The table shows the measured baseline value, the calculated light levels from the modelled design, subsequent resultant light level and the significance of effect. The significance of effect considers the proportional change (at each location) in illuminance between baseline illumination levels (pre-development) and the potential (post development) condition.

Table 7.2. Sensitive receptor (human) - vertical.								
Survey Location	Location name	Sensitivity	Measured light level, taken from baseline survey	Calculated light level taken from modelled design	Vertical direction of Peak illuminance calculated (Lux) at 1.5m	Predicted resultant light level (post development)	Note	Significance of effect
A5	Crossland Road, at back of buildings.	Low	5.12	0.24	West	5.36		Negligible
A8	Crossland Road, at back of buildings.	Low	2.78	0.20	West	2.98		Negligible
A13	Car park, Crossland Road	Low	13.34	0.71	West	14.05		Negligible
A16	Crossland Road, at boundary of Quakers Meeting House	Low	2.79	1.75	West	4.54		Minor Adverse
A18	Crossland Road, at boundary of Quakers Meeting House	Low	7.08	1.45	North	8.53		Negligible
A20	Crossland Road, at boundary of Quakers Meeting House	Low	5.85	1.45	North	7.30		Negligible
A21	Car park of Premier Inn	Low	6.01	0.00	North	6.01		Negligible
R1	Crossland Road	Low	3.34	0.61	North	3.95		Negligible
R2	Crossland Road & Letcombe Street junction	Low	5.99	0.10	North	6.09		Negligible
R3	Deansgate Rd, next to boundary of St Giles Church	Low	2.28	0.00	North	2.28		Negligible

7.0 Assessment of lighting impact.

Locations assessed for potential impact (with Site lighting excluded).

The table below shows measured baseline illumination levels, excluding the contribution from the existing Site. Site lighting was excluded by taking two sets of readings, one with all Site and local lighting in operation and one with Site lighting off. Five of the closest measured positions have been assessed. The table shows the measured baseline value “generated” by the local lighting (street lights etc.), the calculated light levels from the modelled design, subsequent resultant light level and the significance of effect. The significance of effect considers the proportional change (at each location) in illuminance between baseline illumination levels (pre-development) and the potential (post development) condition.

Table 7.3. Sensitive receptor (human) - horizontal.							
Survey Location	Location name	Sensitivity	Measured light level, taken from baseline survey	Calculated light level taken from modelled design	Predicted resultant light level (post development)	Note	Significance of effect
A8	Crossland Road, at back of buildings.	Low	1.63	0.00	1.63		Negligible
A16	Crossland Road, at boundary of Quakers Meeting House	Low	0.83	0.94	1.77		Moderate adverse
A18	Crossland Road, at boundary of Quakers Meeting House	Low	1.69	0.38	2.07		Negligible
A20	Crossland Road, at boundary of Quakers Meeting House	Low	1.03	0.51	1.54		Moderate adverse
R2	Crossland Road & Letcombe Street junction	Low	4.17	0.00	4.17		Negligible

7.0 Assessment of lighting impact.

Locations assessed for potential impact (with Site lighting excluded).

The table below shows measured baseline illumination levels, excluding the contribution from the existing Site. Site lighting was excluded by taking two sets of readings, one with all Site and local lighting in operation and one with Site lighting off. Five of the closest measured positions have been assessed. The table shows the measured baseline value “generated” by the local lighting (street lights etc.), the calculated light levels from the modelled design, subsequent resultant light level and the significance of effect. The significance of effect considers the proportional change (at each location) in illuminance between baseline illumination levels (pre-development) and the potential (post development) condition.

Table 7.4. Sensitive receptor (human) - vertical.								
Survey Location	Location name	Sensitivity	Measured light level, taken from baseline survey	Calculated light level taken from modelled design	Vertical direction of Peak illuminance calculated (Lux) at 1.5m	Predicted resultant light level (post development)	Note	Significance of effect
A8	Crossland Road, at back of buildings.	Low	0.67	0.20	West	0.87		Negligible
A16	Crossland Road, at boundary of Quakers Meeting House	Low	1.95	1.75	West	3.70		Moderate adverse
A18	Crossland Road, at boundary of Quakers Meeting House	Low	0.81	1.45	North	2.26		Moderate adverse
A20	Crossland Road, at boundary of Quakers Meeting House	Low	3.29	1.45	North	4.74		Negligible
R2	Crossland Road & Letcombe Street junction	Low	4.29	0.10	North	4.39		Negligible

7.0 Assessment of lighting impact.

Horizontal light spill.

Figure 7.2 below displays the horizontal illumination isoline at ground level. A lux legend is displayed to the right of the figure for isoline colour reference. The red line boundary of the proposed development is shown in the location key at the bottom of this page.

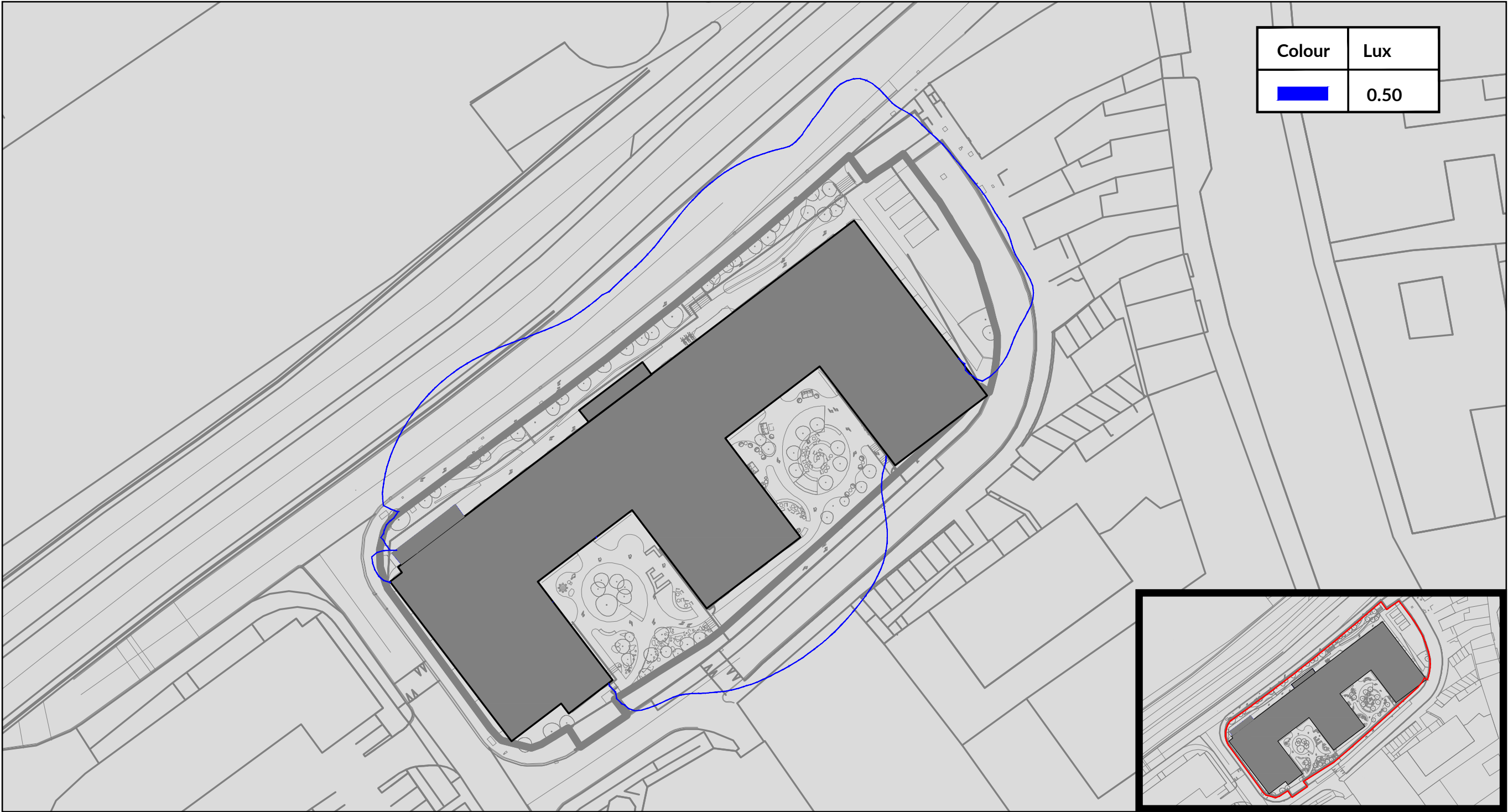


Figure 7.2 Aerial view showing 0.50 lux (blue) isoline at ground level.

7.0 Assessment of lighting impact.

Horizontal light spill.

Figure 7.3 below displays horizontal illumination isolines as per the BCT/ILP Guidance Note 08/23 “Bats and artificial lighting at night” 0.2 lux to 10 lux at ground level. A lux legend is displayed to the right of the figure for isoline colour reference. The red line boundary of the proposed development is shown in the location key at the bottom of this page.



Figure 7.3 Aerial view showing illumination isolines as per the BCT/ILP guidance note 08/23 “Bats and artificial lighting at night” 0.2 lux to 10 lux at ground level.

7.0 Assessment of lighting impact.

Light intrusion & glare at existing & potential residential locations.

Some areas on and around the Site were not practically possible to survey during the baseline study. In this case, the areas are the existing and potential future residential properties proposed around the Site which may have windows facing towards the proposed development. To assess the light impact on these receptors, virtual calculation measuring surfaces are placed at these locations as shown in VR1-VR3 in **Figure 7.5** below.

10m high vertical calculation measuring surfaces were placed at ground level, along the length of known or potential residential properties, facing towards the Site, as shown in **Figure 7.4**. This methodology ensures any potential windows along the property can be assessed (as per ILP guidelines) for potential impact from obtrusive light and glare (luminous source intensity).



Figure 7.4 Locations of 10m high vertical calculation measuring surfaces placed at ground level, facing towards the Site, to calculate potential impact from obtrusive light and glare (luminous source intensity) for existing and potential residential receptors.

Table 7.5 Residential surfaces and orientation.	
Residential surfaces and orientation. (VR1 to VR3 are the identifying labels shown in Figure 7.5 and referred to in Table 7.6.)	
VR1	Potential residential - facing east
VR2	Potential residential - facing north
VR3	Potential residential - facing west

7.0 Assessment of lighting impact.

Light intrusion & glare at existing & potential residential locations.

Table 7.6 below provides the calculated illumination and luminance (glare) results for the vertical residential receptor VR1 to VR3 and its compliance with ILP guidelines for illuminance and glare.

Table 7.6. Sensitive receptor (human) - vertical assessment.								
Sensitive receptor (human) - vertical (ILP Guidance notes 2021)				Light spill				Glare (Luminous source intensity)
Survey Location	Location name	Sensitivity	Environmental zone	Vertical illuminance Max. into windows (ILP guidance notes 2021) (Lux). Pre curfew	Vertical illuminance Max. into windows (ILP guidance notes 2021) (Lux). Post curfew	Calculated vertical illuminance (Lux) (maximum value to elevation) *1	Compliant with ILP guidelines for noted zone. (Residential) *1	Compliant with ILP guidelines for noted zone. (Residential)*1 *2
VR1	Potential residential - facing east	Low	E4	25.00 Lux	5.00 Lux	0.17	Pass	Pass
VR2	Potential residential - facing north	Low	E4	25.00 Lux	5.00 Lux	1.30	Pass	Pass
VR3	Potential residential - facing west	Low	E4	25.00 Lux	5.00 Lux	0.66	Pass	Pass
*1) These calculated values and pass/fail notations are based on a virtual surface 10m high, length as shown in Figure 5.6.								
*2) Glare, Maximum allowable value calculated is from CIE 150:2017 referenced in ILP Guidance Note 01/21 - Table 5. The allowable value varies by Projected Area (sq.m.) and Distance Factor.								

7.0 Assessment of lighting impact.

Vertical spill light towards potential ecological receptors

Some areas on and around the site were not practically possible to survey during the baseline study. Therefore 10m high Vertical calculation measuring planes are placed along locations of potential ecological sensitivity, facing towards the Proposed Development to assess potential impact. VE1-VE2 as shown in the figure below. The values shown are for reference only and may be used by a suitably qualified ecologist in the assessment of ecological impact.



Figure 7.5 Locations of 10m high vertical calculation measuring surfaces placed at ground level, facing towards the Site, to calculate potential impact from obtrusive light for potential ecological receptors.

Table 7.7. Vertical spill light towards potential ecological receptors .			
Location & orientation of calculation surface		Calculated Average. vertical illuminance (Lux)	Calculated maximum. vertical illuminance (Lux)
VE1	Potential ecological receptor, facing south west	0.51	0.61
VE2	Potential ecological receptor, facing south	0.12	0.18

7.0 Assessment of lighting impact.

Sky Glow.

Sky glow will be typically seen above areas with high levels of illumination, it is often the yellow/whiteish glow to the sky which can make viewing stars etc.... more difficult. It will be easiest to spot when viewing a location from a nearby darker area. It can have an ecological impact as it can disturb the natural cycles of wildlife. Sky glow is produced by direct light into the sky and (indirect) reflected light from ground surfaces. Direct light will typically come from poorly aimed or poorly designed luminaires being directed up into the sky rather than towards the ground where it can have a useful function. The (indirect) reflected light will be light reaching a surface and “bouncing” back into the sky.

When developed, this area would likely be classified as E4 therefore as per ILP guidelines a figure of 15% of the total light used is allowable as direct upward light. The two following sections show the assessment process for both criteria.

Natural receptor – direct Sky Glow (SG1).

The following shows the formula for calculating direct sky glow and demonstrating compliance.

Direct sky glow is assessed as a Site wide impact and is based on a scenario where the most onerous of lighting impact is applied relative to the potential uses within each area.

In accordance with CIE 150 (2017) & ILP guidelines the Upward Direct Light Ratio is calculated as follows:

$ULR = Eup / (Edown + Eup)$

- Eup – Resultant average illuminance taken from a grid 1.0m above the highest luminaire
- Edown – Resultant average illuminance taken from a grid 1.0m below the lowest luminaire

The resultant calculated value for this development passes within the specified limit of 15% of direct upward light.

For the purposes of direct sky glow assessment the majority of the Site once developed would be considered to be representative of the environmental zone classification E4.

In maintaining a no change / improved environment the ILP Guidance Notes for the Reduction of Obtrusive Light (2021) provides a limiting sky glow percentage of 15%.

Natural receptor – direct & indirect Sky Glow (SG2).

As the development does not have a ‘defined performance requirement or specialised fauna growth lighting systems’ and is not in proximity to either an optical observatory or within an E1 environmental zone that abuts a protected E0 Dark Sky zone, the calculation of Direct & Indirect Sky Glow is therefore not required.

7.0 Assessment of lighting impact.

Projected environmental lighting zones.

To assess the change in condition that the proposed development may have on the Site and surrounding condition we refer to the ILP guidance note GN01 for the reduction of obtrusive light (2021) and ILP guidance note PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments. Within this document, page 12 states that: *'In cases where the Planning Authority has not set Environmental Zones for its area, the lighting professional may have to make decisions on the nature of the area and explain the reasoning in the LIA'*. An online search did not find any documentation from Reading Borough Council establishing environmental zones for the Site & surroundings. Therefore they have been professionally judged within this report.

Assessment locations were selected using the methodology discussed earlier in this document. From the data gathered at these locations, combined with satellite information and professional judgement a composite image is produced to assist in representing the projected environmental zones of the locality. It must be noted that this graphic is an average representation of the area assessed, based on the information recorded and analysed.

No change in the Site and surroundings areas environmental zone has been identified from the proposed lighting scheme of the proposed development.

In Figure 7.6 (adjacent map) areas would be classified as:



- **E3 Suburban, Medium district brightness. Well inhabited rural and urban settlements, small town centres of suburban locations.**

The residential areas bordering the Site are lit to typical parameters of a suburban development, i.e. by LED luminaires mounted on approximately 8 metres high columns on main trunk roads & 6 metre columns found on minor roads. External artificial lighting is generally limited to the street lighting, however some isolated building mounted floodlights may be found on developments.



- **E4 Urban, High district brightness. Town/city centres with high levels of night-time activity.**

The Site would be lit to a lower level than its current commercial usage, however the level of light from the nearby existing street lighting etc. will remain the same. Overall there will be a lower level of spill light from the proposed exterior lighting than the existing.

The Site is surrounded by dense mixed use development which contains a range of light sources. Mill Lane/ A329 is lit by luminaires mounted on approximately 25 metre high columns. The Oracle Shopping Centre contains a range of light sources but is predominantly lit by LED luminaires on approximately 6m high columns. This area also receives considerable amount of illumination from other light sources such as illuminated advertising/branding installations and handrail lighting.



Figure 7.6. Showing projected average environmental lighting zones with approximate redline boundary.

8.0 Summary and conclusion

This report has been prepared by Hoare Lea to present quantitative information regarding pre and post development illuminance (lux) and luminance (glare) effects for residential locations.

This report should be read in conjunction with:

- LIA Part 1: Baseline Survey (BLS) - **08278-HRL-XX-XX-RP-LD-708001 (Appendix 1)**. This provides a baseline condition of the artificial lighting currently installed on the Application Site and adjacent surrounding areas. It has been prepared using the guidance provided in the ILP guidance note PLG04 “Guidance on Undertaking Environmental Lighting Impact Assessments”
- LIA Part 2: Exterior Lighting Design - **08278-HRL-XX-XX-RP-LD-708002 (Appendix 2)**. This report demonstrates the proposed technical and aesthetic lighting design strategy in accordance with appropriate guidance.

Our calculation model and subsequent assessment for the Site is based upon a worst-case scenario, that is all assessed exterior lighting within the new development will be in operation and all light fittings at day 1 maximum output. As per standard industry practise, existing and proposed planting / trees have not been included within the assessment calculations.

Current lighting context.

The car parking and loading bay areas of the Site are illuminated by LED floodlights mounted to the building façades. Recessed downlights are present in the soffit of the entrance canopy. No external lighting is present on the northern facade of the building.

The A329 & Mill Lane are illuminated by luminaires mounted on approximately 25 metre high columns along the A329. Crossland Lane & Letcombe Street are illuminated by LED luminaires mounted on approximately 6 metre high columns. Building surface mounted floodlights & bulkheads are present on the developments along Crossland Lane & Letcombe Street, of which some of the lighting on these units were not operational during the period of the survey.

Assessment - potential residential locations.

Of the 30 Survey Locations visited during the baseline lighting survey, using our methodology, 10 were assessed for potential light spill from the proposed developments lighting scheme. All residential locations were assessed and found to have a negligible change from baseline conditions.

Assessment - Light intrusion & glare at existing & potential residential locations.

An assessment of adjacent residential properties is detailed in Figure 7.4 & Table 7.6. All residential vertical measuring surfaces pass both pre-and post-curfew illuminance and glare guidance for their current environmental zone classification as set out in the Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light GN01:2021.

Potential ecological locations.

The results of light spill at potentially ecologically sensitive areas are detailed in Figure 7.6 & Table 7.7. Light spill into potential ecological receptors have not been assessed for any significance of change in this report, however the information in this report has been reviewed by the Ecology team at Aecom and the following comments were received... *“We have reviewed the light spill on the sensitive ecological receptor (suitability of Central Club for roosting bats) and confirm that the light spill is reduced to 0.2 lux threshold (as recommended in good practice guidance) at the boundary of the building. There will be no light spill on the sensitive receptor beyond this threshold. Therefore, the lighting design will not have any potential impact on roosting bats.*

The light spill at the Quaker Cemetery is reduced to between 0.5 to 0.2 lux at the entrance to the cemetery. Light spill has been minimised to low thresholds (as recommended in good practice guidance) to reduce the potential impact of foraging and bat flight lines. Therefore, the lighting design has minimised any potential impact on the sensitive receptor.”

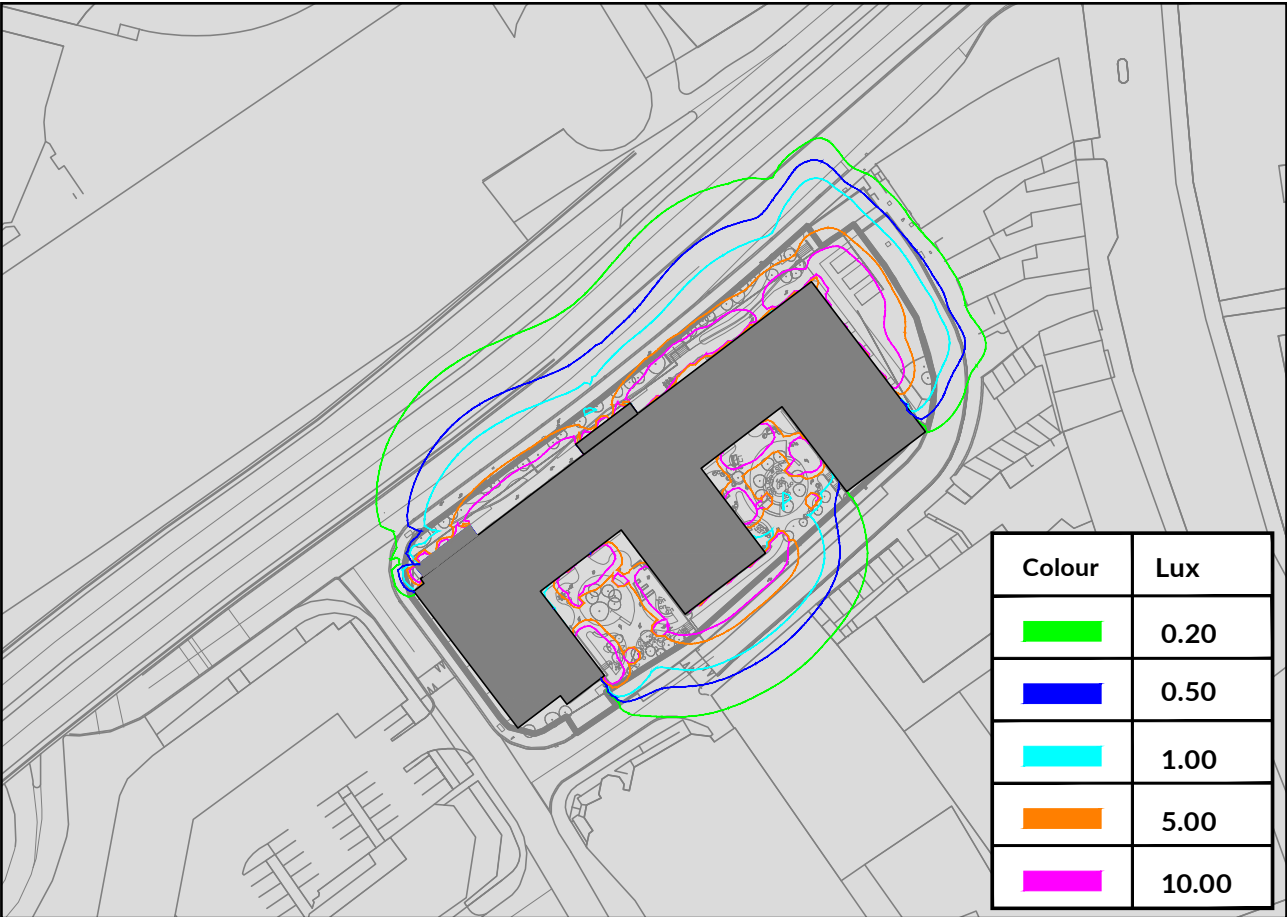


Figure 8.1 Aerial view showing illumination isolines as per the BCT/ILP guidance note 08/23 “Bats and artificial lighting at night” 0.2 lux to 10 lux at ground level.

Assessment - skyglow.

The lighting schemes direct sky glow was calculated in accordance with CIE 150 (2003/2017). The lighting design scheme passes within guidelines for E4 Urban High district brightness. Town / City centres with high levels of night-time activity.

Conclusion

The modelled lighting strategy for the proposed development will provide appropriate levels of illuminance for safe access, egress and usage of the Site. The modelling of the proposed lighting scheme set out in **LIA Part 2: 08278-HRL-XX-XX-RP-LD-708002** demonstrates that compliance with ILP GN01:2021 guidelines for light intrusion and luminous source intensity to residential receptors, can be achieved. Future design development should follow the ILP guidance to minimise light spill from the development.



EWAN RAMSDEN

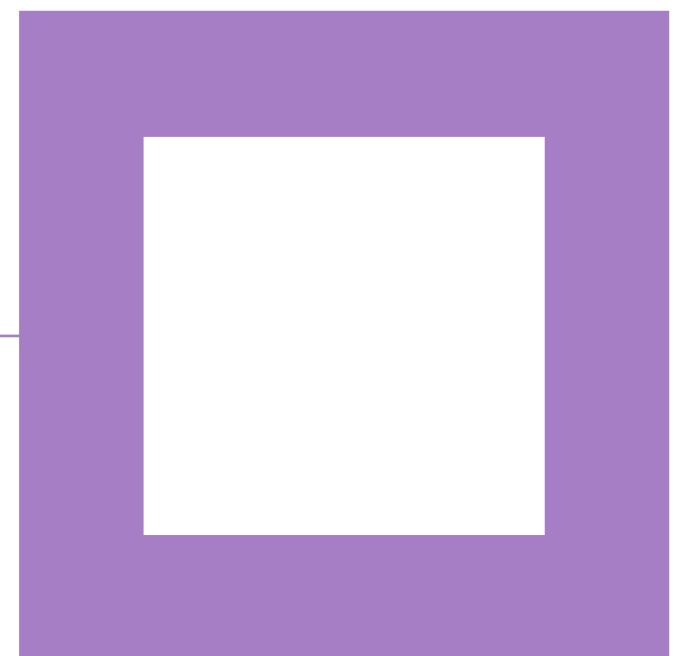
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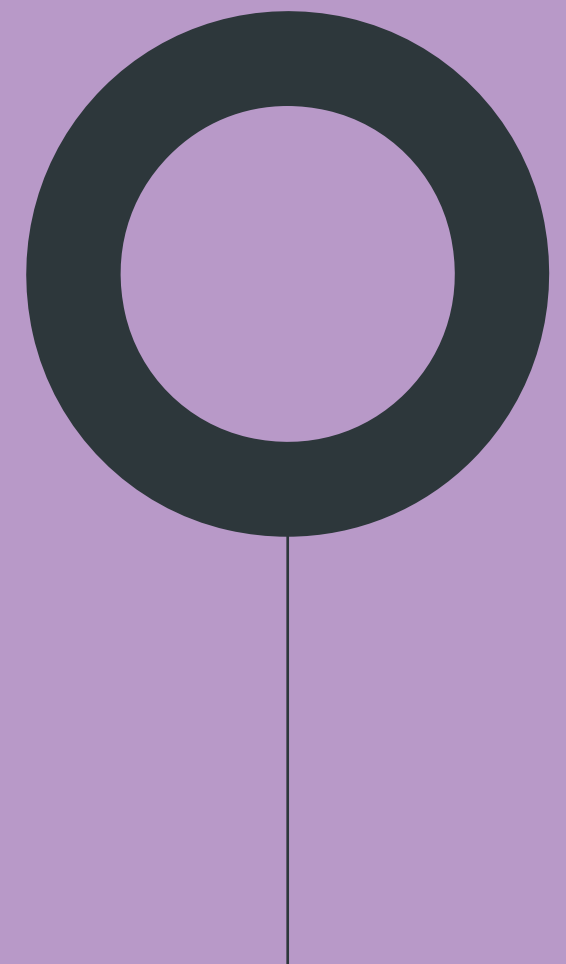
EWANRAMSDEN@HOARELEA.COM

HOARELEA.COM

155 Aztec West
Almondsbury
Bristol
BS32 4UB

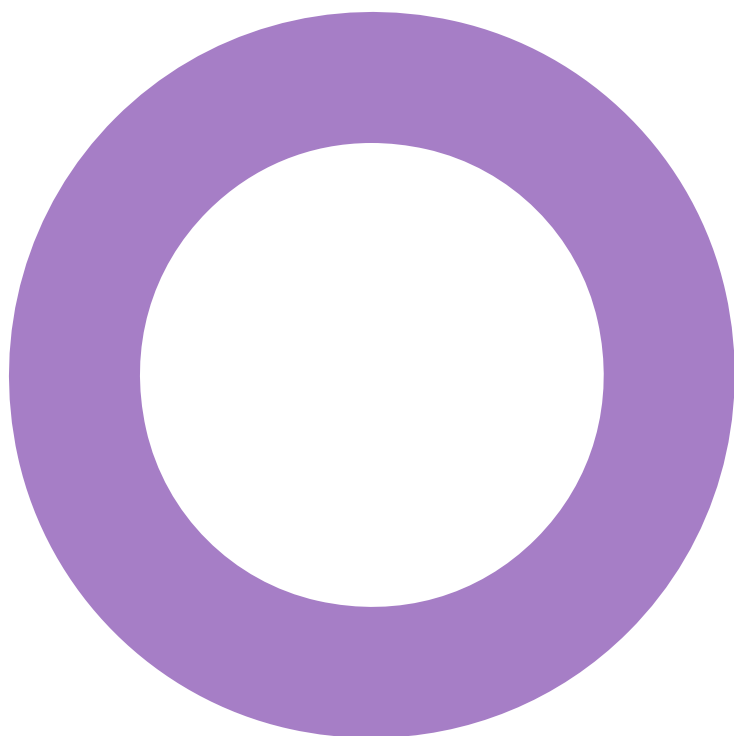


Appendix 1.



**Former John Lewis Depot, Letcombe Street, Reading.
(Also known as JLP Mill Lane)**
John Lewis Partnership BTR Ltd.

ENVIRONMENTAL LIGHTING.
BASELINE LIGHTING SURVEY.
08278-HRL-XX-XX-RP-LD-708001-P06.
15TH MAY 2024.



Audit sheet.

Rev	Date	Description	Prepared	Verified	Authorised
00	31/01/2024	First issue.	EFR	SMK	RJM
01	15/02/2024	Minor text changes.	EFR	SMK	RJM
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05	07/05/2024	Updated document incorporating comments .	EFR	SMK	RJM
06	15/05/2024	Updated document - revised graphics.	EFR	SMK	RJM

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Glossary of terms.

- Adaptive lighting: Lighting systems that can adjust their intensity, timing, or colour temperature based on specific needs or conditions. Adaptive lighting can optimize energy efficiency, enhance safety, and minimize light pollution by tailoring the lighting to actual requirements.
- Adverse impact: The negative or detrimental effect that a particular action, development, or policy may have on the environment, community, or stakeholders.
- Ambient lighting: General, overall lighting that provides uniform illumination to a space.
- AONB: Areas of Outstanding Natural Beauty.
- Astronomical twilight: The period before sunrise and after sunset when the sky is dark enough for astronomical observations. Light pollution can significantly impact the visibility of celestial objects during this time.
- Baffle: A mechanical device for the control of luminance (brightness) and light spill. Sometimes referred to as a louvre.
- Beam angle: The angular spread of light emitted by a luminaire. It determines the width of the light beam and is typically measured in degrees.
- Beneficial impact: The positive or advantageous effect that a specific action, development, or policy can have on the environment, community, or stakeholders. (See also magnitude).
- Candela: (cd) is the base unit of luminous intensity in the International System of unit (SI); that is, luminous power per unit solid angle emitted by a point light source in a particular direction.
- CIE, Commission Internationale de l'Eclairage (International Commission on Illumination).
- Colour Rendering Index (CRI): A measure of how accurately a light source reveals the true colours of objects compared to a reference light source. CRI is typically rated on a scale from 0 to 100, with higher values indicating better colour rendering.
- Colour temperature: A measure of the colour appearance of light, expressed in Kelvin (K). Lower colour temperatures represent warmer or more yellowish light, while higher colour temperatures represent cooler or bluish light.
- Dark sky reserve: is a public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for its scientific, natural, educational, cultural, heritage and/or public enjoyment- see IDA.
- Dimming: The process of reducing the light output of a luminaire. It is often used for adjusting illuminance (lux) levels and saving energy
- Direct sky glow: the direct upward spill of light into the sky, which can cause a 'glowing' effect and is often seen above cities when viewed from a dark area.
- Driver: is the name used to refer to the power supply component for LED lighting systems
- EIA, Environmental Impact Assessment.
- Energy waste: The unnecessary consumption of energy due to poorly designed or inefficient lighting systems.
- Environmental Zones: The characteristics of a locality are defined in ILP GN01. ***“It is recommended that Local Planning Authorities specify the ... environmental zones for exterior lighting control within their Development Plans.”***
- ES, Environmental Statement.
- Fluorescent: A type of light source that emits light when an electrical current passes through a gas-filled tube, causing the phosphor coating inside the tube to fluoresce.
- Full cut-off luminaire: A type of luminaire that directs all of the light output downward, with no light emitted above the horizontal plane, (ideally below 85 degrees). It is designed to minimize light pollution by eliminating upward light and reducing glare.
- Glare: A visual discomfort caused by excessive brightness or uncontrolled light sources, which can impair visibility and cause discomfort to the eyes.
- Glare control: Measures and design techniques implemented to minimize excessive brightness and glare from lighting sources. These include shielding, diffusing or redirecting light, by selecting the appropriate luminaire.
- High-Intensity Discharge (HID): A type of light source that produces light by passing an electric current through a gas or vapour, such as metal halide or high-pressure sodium lamps. HID lamps are commonly used in streetlights and large commercial spaces.
- IDA, International Dark-Sky Association: is the recognized authority on light pollution and is the leading organization combating light pollution worldwide.
- Illuminance: is calculated as the density of lumen's per unit area and is expressed using lux (lumen's/square meter). Illuminance can be measured using a light meter.
- ILP, Institution of Lighting Professionals.
- Incandescent: A type of light source that produces light by heating a filament inside a bulb until it glows. Incandescent bulbs are less efficient compared to newer lighting technologies.
- Kelvin (K): A unit of measurement for the colour temperature of light. Lower Kelvin values represent warmer or more yellowish light, while higher Kelvin values represent cooler or bluish light.
- LED (Light-Emitting Diode): A semiconductor device that emits light when an electric current passes through it. LEDs are energy-efficient and have a longer lifespan compared to traditional light sources.
- LIA: Light Impact Assessment.
- Lighting master plan: A comprehensive plan that outlines the long-term vision and strategy for lighting within a city, town, or region. It includes guidelines for different types of lighting, such as street lighting, architectural lighting, and landscape lighting, to create a cohesive and sustainable lighting environment.
- Lighting plan: A document or design that outlines the placement, type, and characteristics of luminaires in a specific area of a project. It can include details on the intended lighting levels, distribution, and control strategies.

Glossary of terms.

- Lighting retrofit: The process of upgrading or replacing existing lighting systems with more energy-efficient and environmentally friendly alternatives.
- Louvre: A mechanical device for the control of luminance (brightness) and light spill. Sometimes referred to as a baffle.
- LPA: Local Planning Authority.
- Lighting simulation/modelling: The use of computer software or tools to create virtual models and simulations of lighting designs. It helps assess and visualize the expected lighting performance, distribution, and impact of a proposed lighting plan before implementation.
- Light pollution: The excessive or misdirected artificial light produced by human activities that adversely affects the natural darkness of the night sky and interferes with the environment, human health, and astronomical observations.
- Light Spill (vertical and horizontal): the spilling of light beyond the boundary of a property, which may cause nuisance to others.
- Lumen (lm): The unit of measurement for the total amount of visible light emitted by a light source. For example, a 60-watt incandescent bulb provides about 840 lumen's.
- Luminance (cd/m²) is a photometric measure of the luminous intensity per unit area of light travelling in a given direction. It describes the amount of light that passes through, is emitted or reflected from a particular area. This can be measured using a luminance meter but is more often calculated.
- Luminaire: A complete lighting unit that includes a light source, optical control, housing, and any necessary control components such as a driver.
- Lux: is the SI derived unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.
- LVIA: Landscape Visual Impact Assessment.
- Magnitude: refers to the size, extent, or scale of something. It is a measure of the quantity, intensity, or importance of a particular attribute or phenomenon. Usually used in assessing the significance of effects.
- Maintenance factor: usually a percentage is allowed for in lighting calculations to allow for the effects of time on fittings and their surroundings. Light sources, drop in output, fittings and surroundings become dirtier, several factors combine to reduce the amount of light available. A typical maintenance factor would be 70% this would ensure an installation was still meeting required light levels in for example 3 years. For this report a factor of 100% (unity) has been used, that is a day one, worst case scenario.
- Motion sensor: A device that detects motion and triggers the lighting system to turn on or off automatically. It is commonly used for security and energy-saving purposes. (Sometimes referred to as a PIR).
- NTS: Non-Technical Summary (NTS).
- Photometry: is the light intensity and distribution of a luminaire. Luminaire manufacturers should provide electronic photometric data files, which are composed of light quantities and measurements, to illustrate the performance of a specific luminaire product.
- PIR: Passive Infrared (detector). – See motion sensor.
- Planning condition: A condition imposed on a grant of planning permission (in accordance with the Town and Country Planning Act 1990) or a condition included in a Local Development Order or Neighbourhood Development Order.
- Ramsar Sites: Wetlands of international importance, designated under the 1971 Ramsar Convention.
- Receptors: Light sensitive receptors are often sub categorized as - ecological, human, heritage and transport. Different receptors have various degrees of tolerance to increased light levels.
- Scattering: The process by which light is dispersed or deflected in different directions as it interacts with particles or molecules in the atmosphere. Scattering plays a significant role in the formation of skyglow.
- Shielding: The use of fixtures and design techniques to control the direction of light and minimize its upward or sideways emission. Proper shielding helps reduce light pollution by directing light towards the intended area.
- Skyglow: The brightening of the night sky caused by scattered and upward-directed artificial light. It reduces visibility of stars, constellations, and other celestial objects.
- SLL: Society of Light & Lighting.
- Site, Proposed development area, usually denoted by a “red-line” boundary.
- A Site of Special Scientific Interest (SSSI): is a formal conservation designation. Usually, it describes an area that's of particular interest to science due to the rare species of fauna or flora it contains - or even important geological or physiological features that may lie in its boundaries.
- SQM: Sky quality meter, measures the darkness of the night sky in magnitudes per square arcsecond.
- Upward Light Flux (ULF): The total amount of light emitted upward from a luminaire or source. High ULF contributes significantly to light pollution.
- ULR, Upward Light Ratio. Expressed as a percentage of upward light compared to downward light.
- UNESCO, United Nations Educational, Scientific and Cultural Organization.
- Watt (W): A unit of electrical power that measures the rate at which energy is consumed by a light source.
- Wildlife corridor: Areas of habitat connecting wildlife populations.
- Zone of influence (ZOI) refers to the area or region that is affected or influenced by a particular factor, phenomenon, or entity.

1.0 Introduction.

Hoare Lea have been commissioned by John Lewis Partnership BTR Ltd to provide an external Lighting Impact Assessment (LIA) for a proposed development, described as the Former John Lewis Depot, Letcombe Street, Reading.

The proposed development consists of Demolition of the existing building and redevelopment of the site comprising erection of a new building for up to 215 build to rent residential dwellings (Use Class C3) together with flexible commercial / community space (Use Class E/F1/F2), residents' facilities, landscaping, public realm, amenity space, cycle parking and disabled car parking.

The assessment is made up of 3 separate reports, which when combined form the LIA;

- Part 1: Baseline Survey (BLS) (this report).
- Part 2: External Lighting Design.
- Part 3: Illumination Impact Profile (IIP).

This report provides a baseline condition of the external artificial lighting currently present on the Application Site area and adjacent surrounding areas. The information from the survey conducted and other external data sources are utilised to professionally judge the environmental classification.

The locations noted in this report (where relevant to the proposed development) will be used in Part 3- the IIP, to assess any impact the external lighting from the proposed development may have upon the surrounding locality and wider environment.

This LIA is based upon the guidance in the Institution of Lighting Professionals guidance note PLG04 **“Guidance on Undertaking Environmental Lighting Impact Assessments”** & the Institution of Lighting Professionals (ILP) **“Guidance Notes for the Reduction of Obtrusive Light (GN01/2021).”**

This report has been prepared by Sean Kielthy a full member of the Society of Light and Lighting (SLL) and an Associate member of the Institution of Lighting Professionals. He has 29 years experience in lighting with the last 6 years specifically in environmental lighting impact assessments. As noted in PLG04 these assessments *“...should only be undertaken by competent lighting professionals. The educational qualifications, training and experience will need to be summarised.”*

Purpose of this report

This report will:

- Provide a Site overview.
- Provide baseline survey methodology.
- A summary of typical existing external lighting products, sample illumination levels relative to the proposed development Site and adjacent zones and possible existing light pollution scenarios.
- A summary of baseline illuminance conditions at identified sensitive receptor locations.
- Identify current environmental zone classification of the Site and surrounding areas based upon data captured and professional judgment.



Figure 1.1 Proposed Site landscape plan, supplied by Camlins - SY743-000-0001 General Arrangement - Public Realm and Landscape.

1.0 Introduction.

Site Overview

The site is located on the edge of the town centre in Central Reading within close proximity of key local services and facilities including The Oracle shopping centre opposite, the Premier Inn hotel adjacent to the west and Reading railway station located approximately 1km to the north.

The site itself is bound by Mill Lane and the A329 to the north, Letcombe Street to the south-west and Crossland Road to the south-east, from which the Site is accessed. The site currently comprises the existing JLP warehouse building with associated car parking and servicing areas to the north-east and south-west of the building.

The existing use of the Site consists of warehouse with customer collection facilities, ancillary car park and servicing area. The use of the existing building became surplus to requirements as a customer collection centre in 2021, with its functions having been transferred to the John Lewis department store at Broad Street, Reading.

Current lighting Context

The car parking and loading bay areas of the Site are illuminated by LED floodlights mounted to the building facades. Recessed downlights are present in the soffit of the entrance canopy. No external lighting is present on the northern facade of the building.

The A329 & Mill Lane are illuminated by luminaires mounted on 30 metre high columns along the A329. Crossland Lane & Letcombe Street are illuminated by LED luminaires mounted on approximately 6 metre high columns. Building surface mounted floodlights & bulkheads are present on the developments along Crossland Lane & Letcombe Street, of which some of the lighting on these units were not operational during the period of the survey.

Heritage Context

No heritage assets exist within the Site nor is it within a conservation area. Numerous listed buildings are located in proximity to the Site, such as the Reading Friends Meeting House & St Giles Church. The Site is bound to the east by the Market Place/London Street Conservation Area.

Ecological context.

A building in proximity to the Site was identified as having bat roost potential. The nearest Site of Special Scientific Interest (SSSI) located on the DEFRA Magic website is Pincents Kiln which is approximately 4 miles to the south-west.



Figure 1.2 Aerial view of Site with approximate redline boundary. Background from Microsoft Mapping.

2.0 Legislation & planning policy.

Legislation background

The issue of light pollution was introduced within the Clean Neighbourhoods and Environment Act 2005 (CNEA) as a form of statutory nuisance under the Environmental Protection Act (the 'EPA', 1990), which was amended in 2006 to include the following nuisance definition:

"(fb) artificial light emitted from premises so as to be prejudicial to health or nuisance."

The CNEA does not recommend how to control light pollution. Further guidance is given on the gov.uk website (<https://www.gov.uk/guidance/light-pollution#how-much-light-shines>), and which specifically points to DEFRA for further guidance. Considerations on what constitutes lighting nuisance can be found on <https://www.gov.uk/guidance/artificial-light-nuisances-how-councils-deal-with-complaints#what-can-cause-artificial-light-nuisances>.

Although light was described as having the potential to cause statutory nuisance (see also the Statutory Nuisance Statement (Document Ref. 5.9)), no prescriptive limits or rules were set for impact assessment purposes. Guidance Notes for the Reduction of Obtrusive Light produced by the Institute of Lighting Professionals (ILP) have, therefore, been referred to for the purposes of this document.

Guidance produced on Section 101 to Section 103 of the Clean Neighbourhoods and Environment Act 2005 has also been referred to, which places a duty on local authorities to ensure that their areas are checked periodically for existing and potential sources of statutory nuisances – including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or reoccur, local authorities must issue an abatement notice (in accordance with Section 80(2) of the EPA 1990 (as amended)), requiring that the nuisance cease or be abated within a set time-scale.

It is a requirement of the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations') that plans and projects are subject to an Appropriate Assessment if it is likely that they will lead to significant adverse effects on a Natura 2000 Site (the collective name for European designated Sites). Impacts from lighting are also relevant to the Habitats Regulations Assessment (HRA). This report does not assess any potential impact on ecology, however the information contained may be of relevance to a suitably qualified ecologist.

National planning policy framework

The National Planning Policy Framework (NPPF) December 2023 issued by The Department for Levelling Up, Housing and Communities in Chapter 2, Paragraph 7, states ***"The purpose of the planning system is to contribute to the achievement of sustainable development. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. At a similarly high level, members of the United Nations – including the United Kingdom – have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection."***

Within the guidance the following (taken from Chapter 15, Paragraph 191) is relevant to artificial lighting. ***"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."

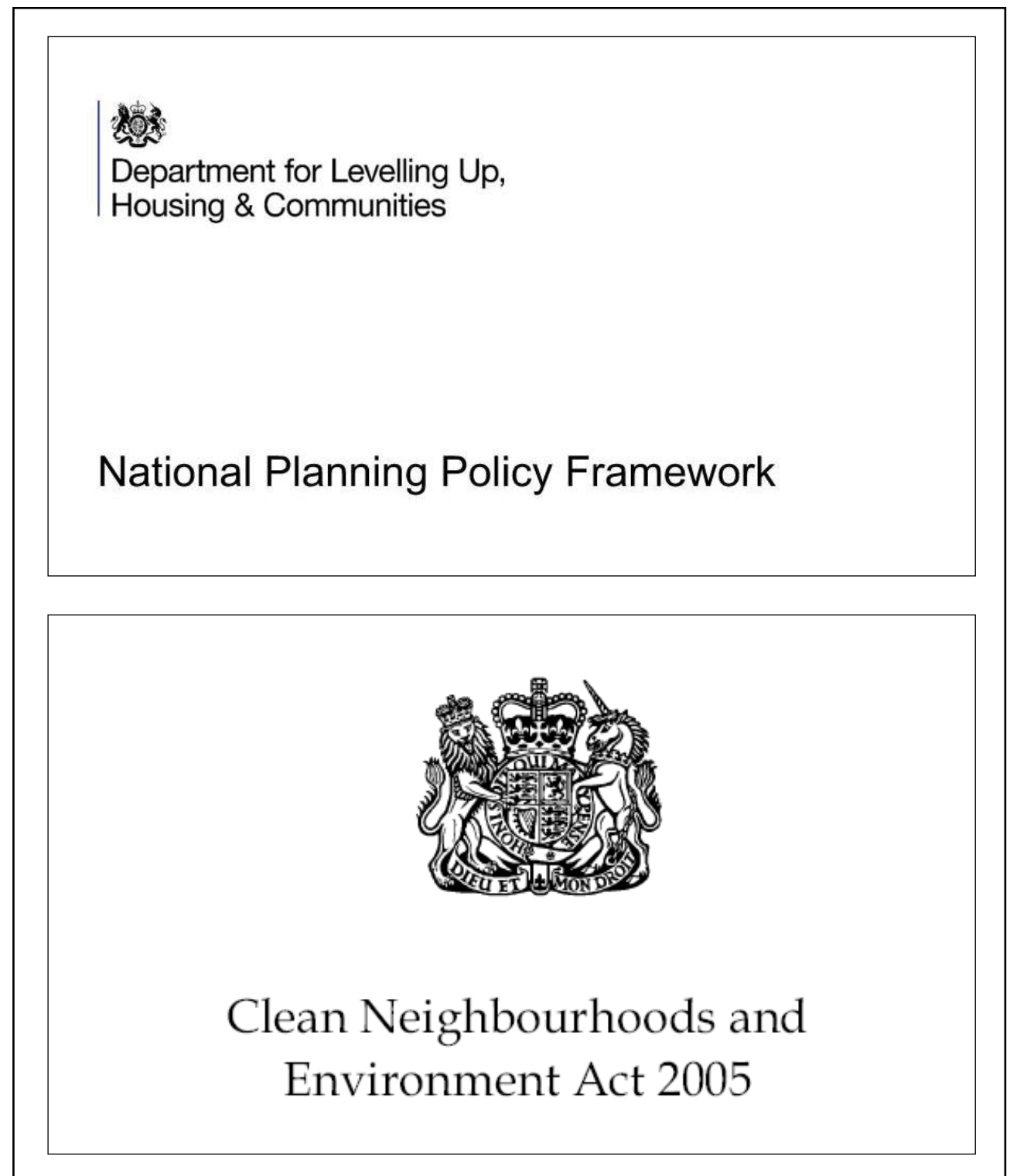


Figure 2.1 Extracts from gov.uk website.

2.0 Legislation & planning policy.

Local planning policy

A search online of local planning policy found the following documents; **The Reading Local Plan** (adopted November 2019). This document guides development in Reading up to 2036 and references light pollution within EN16: Pollution and Water Resources:

EN16: POLLUTION AND WATER RESOURCES

Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution.

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Reading Borough Council provides additional guidance on light pollution within the document **Sustainable Design & Construction Supplementary Planning Document** (adopted December 2019).

Pollution

Aim: To minimise damage to the environment through air, ground/surface water, land, noise or light pollution.

19. What measures have been incorporated to ensure that noise and light pollution will be minimised through the development?

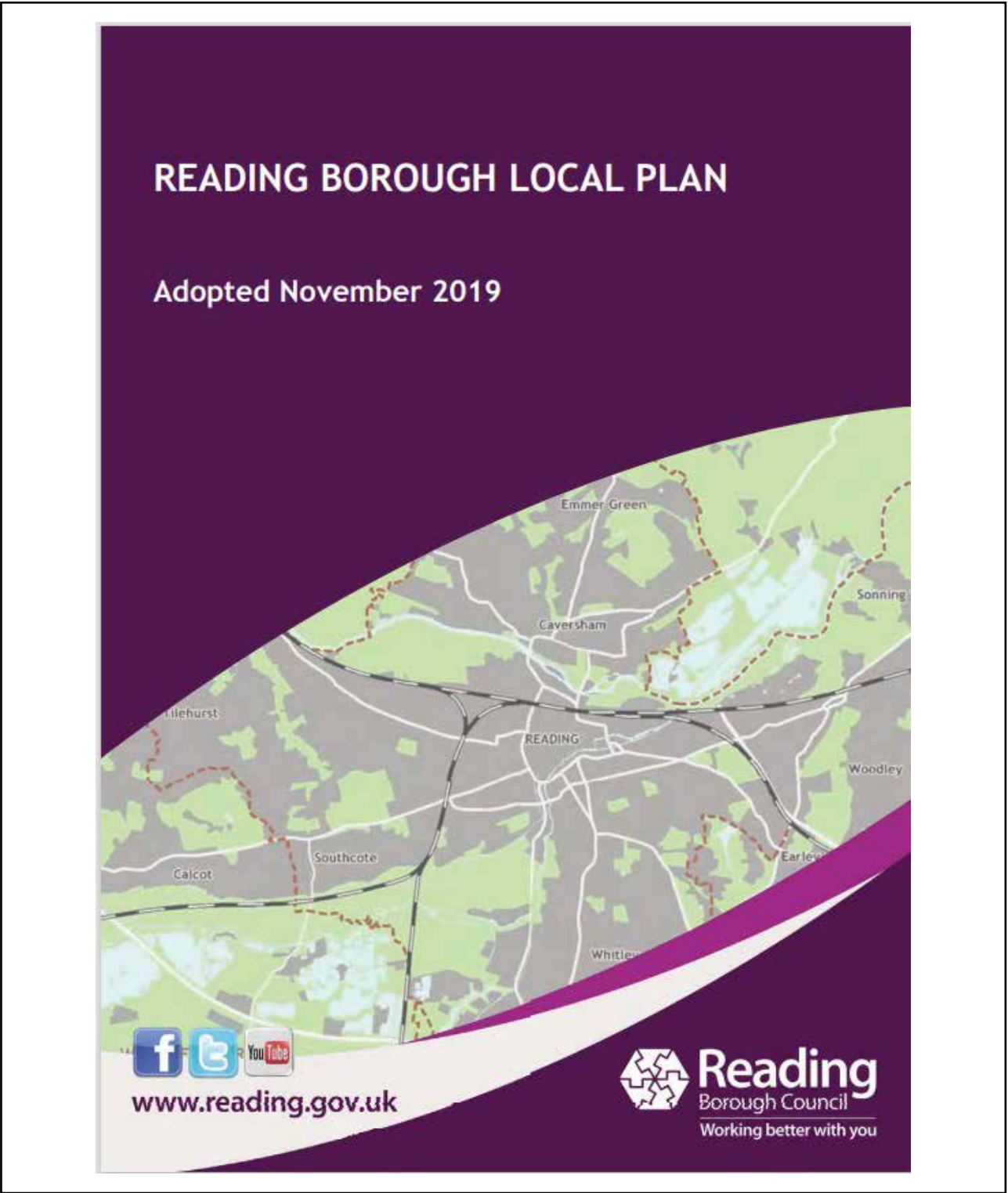


Figure 2.2 Extract from Reading Borough Local Plan.

3.0 Relevant obtrusive light standards & guidance

International guidance

Commission Internationale De L'Eclairage (CIE) 150: Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations (the 'CIE 150', 2017 2nd edition)

The purpose of CIE 150 is to aid in formulating guidelines for assessing the environmental effects of exterior lighting and to provide limits for relevant lighting parameters to contain the obtrusive effects obtrusive effects of exterior lighting to tolerable levels. CIE 150 refers to the potentially adverse effects of exterior lighting on both natural and man-made environments.

CIE 126: Guidelines for Minimising Sky Glow (1997)

This document gives general guidance for lighting designers and policy makers on the reduction of sky glow. The report gives recommendations about maximum permissible values for exterior lighting installations. These values are regarded as limiting values. Lighting designers should strive to meet the lowest criteria for the design. Practical implementation of the general guidance is left to national regulations.

National guidance

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

GN01/21 reflect the changes in international guidance regarding obtrusive light as detailed in CIE 150:2017:- Guide on the limitation of the effects of obtrusive light from outdoor lighting installations. It also considers industry comment regarding the assessment and definition of obtrusive lighting. The ILP has proposed lighting guidance and criteria for local authorities with a recommendation that these are incorporated at the local plan levels.

Institute of Lighting Professionals (ILP) (2013) PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessments

The aim of this guidance is to outline good practice in lighting design and provide practical guidance on the production and assessment of lighting impacts within new developments.

This LIA is based upon the guidance in the Institution of Lighting Professionals (ILP) guidance note PLG04 "Guidance on Undertaking Environmental Lighting Impact Assessments" & the Institution of Lighting Professionals (ILP) "Guidance Notes for the Reduction of Obtrusive Light (GN01/2021)."



Figure 3.1 Guidance on minimising light pollution.

3.0 Relevant obtrusive light standards & guidance

What is light pollution

Light Pollution (sometimes referred to as obtrusive light) is the excessive or misdirected use of artificial light produced by human activities that can disrupt the natural darkness of the night sky and interfere with the environment, human health, and astronomical observations.

As stated by the Institution of Lighting Professionals: "Obtrusive light, whether it keeps you awake through a bedroom window, impedes your view of the night sky or adversely affects the performance of an adjacent lighting installation, is a form of pollution. It may also be a nuisance in law and can be substantially mitigated without detriment to the requirements of the task."

The ILP provide Guidance notes: PLG 04: Guidance on undertaking environmental lighting impact assessments and GN01/21 Guidance notes for the reduction of obtrusive light, so that light pollution can be quantifiably assessed and lighting limitations can be applied to the following:

- **Light spill** is the spilling of light beyond the boundary of the area being lit and **Light intrusion ('Nuisance')** are all forms of obtrusive light which may cause nuisance to others, or adversely affect fauna & flora as well as waste money and energy.
- **Sky glow** is the brightening of the night sky.
- **Glare** is the uncomfortable brightness of a light source when viewed against a darker background.

What is not light pollution

It is not the observation of a lit Site from a distance, if the three elements that make up light pollution: light spill, glare and sky glow, have been controlled in accordance with current guidance. It is important to understand that the subjective impression of a lit Site at night, potentially when there was no lit Site previously, does not, itself constitute light pollution.

Figure 3.2 illustrates the types of obtrusive light.

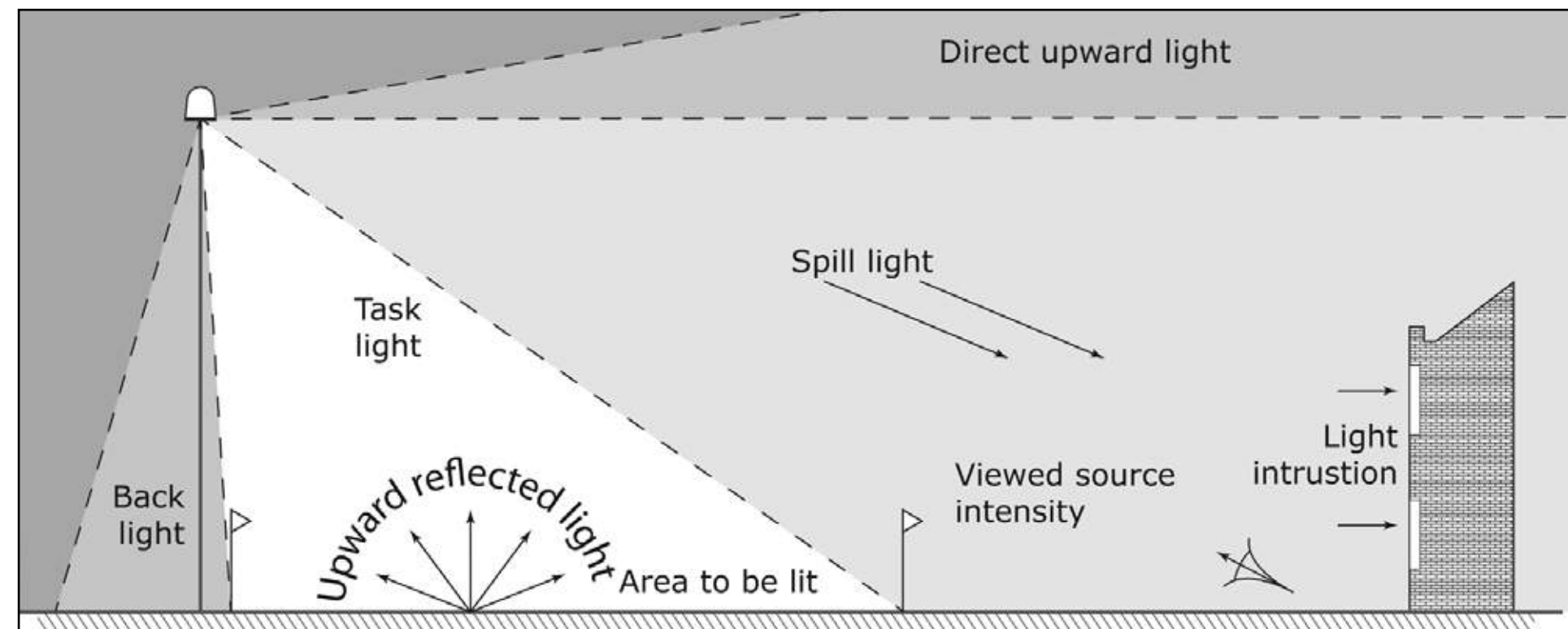


Figure 3.2 Types of obtrusive light- Extract ILP Guidance notes (GN01/21)

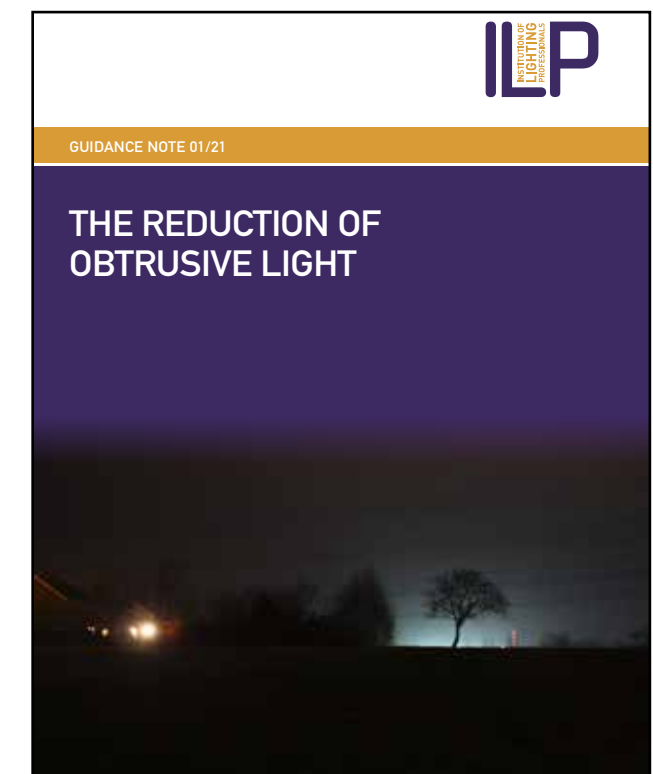


Figure 3.3 ILP Guidance notes (GN01/21)

3.0 Relevant obtrusive light standards & guidance

Whilst current legislation (CNEA) covers light pollution issues, it doesn't define the criteria or methodology for categorising an area. To enable the classification of an area and thereby the limits on levels of light pollution, we refer to several nationally recognised documents which deal with the issues associated with external lighting. These standards include documents by; the Commission Internationale de l'Eclairage (which translates as, International Commission on Illumination), (CIE), Society of Light & Lighting (SLL) and the Institute of Lighting Professionals (ILP). All of these organisations apply a common environmental zoning system which is summarised in Table 3.1 below.

With regard to the tables 3.1 to 3.7, which are derived from ILP GN01/21, their following caveat should be noted "...These notes are intended as guidance only. The application of the values given in the various tables should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting undertaken and assessed by a competent lighting professional, where the various and maybe conflicting visual requirements need to be balanced."

Table 3.1: Environmental Zones (Taken from ILP GN/01, 2021 (Table 2)).			
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.

Table 3.1 Notes:

1. Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.
2. Rural zones under protected designations should use a higher standard of policy.
3. Zone E0 must always be surrounded by an E1 Zone.
4. Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas.
5. SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid 2019 but not retrospective.
6. Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.
7. Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

3.0 Relevant obtrusive light standards & guidance

Table 3.2 below details the maximum values of vertical illuminance on premises, these limits apply to nearby dwellings/ premises or potential dwellings/ premises and specifically windows; the values are the summation of all lighting installations.

With regard to Table 3.2 below, ILP GN01/21 , states: "...can also be considered for the management of spill light; however, designers must consider the task performance requirements of any adjacent lit areas and ensure that any spill light does not adversely affect these performance parameters as this could affect their safe use. This may result in a need to minimise spill and intrusive lighting values to less than might be expected for the environmental zone within which the installation lies."

BS EN 12464-2: 2014 Light and Lighting at work places (BSI, 2014) states the following with regard to obtrusive light , pre and post curfew regulations, "In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits".

Table 3.2: Maximum values of vertical illuminance on premises. (Taken from ILP GN/01, 2021 (Table 3)).						
Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (Ev)	Pre-curfew	n/a	2 lux	5 lux	10 lux	25 lux
	Post-curfew	n/a	<0.1 lux*	1 lux	2 lux	5 lux
Note: * If the installation is for public (road) lighting then this may be up to 1 lux.						

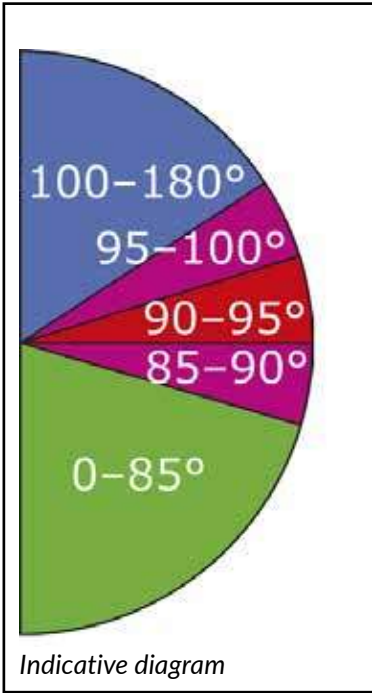
3.0 Relevant obtrusive light standards & guidance

The limits for the luminous intensity of bright luminaires are dependent on the viewing distance *d* (between the observer and the bright luminaire(s)) and the projected area *Ap*, of the bright part of the luminaire in the direction of the observer. Table 3.3 ILP GN01/21 gives values for luminous intensity of bright luminaires.

Table 3.3: Limits for the luminous intensity of bright luminaires ⁴ . (Taken from ILP GN/01, 2021 (Table 4)).							
Light technical parameter	Application conditions	Luminaire group (projected area <i>Ap</i> in m ²)					
		0< <i>Ap</i> ≤0.002	0.002< <i>Ap</i> ≤0.01	0.01< <i>Ap</i> ≤0.03	0.03< <i>Ap</i> ≤0.13	0.13< <i>Ap</i> ≤0.50	<i>Ap</i> >0.5
Maximum luminous intensity emitted by luminaire (<i>I</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 <i>d</i>	0.63 <i>d</i>	1.30 <i>d</i>	2.50 <i>d</i>	5.10 <i>d</i>	2,500
	Post-curfew	0	0	0	0	0	0
	E2						
	Pre-curfew	0.57 <i>d</i>	1.30 <i>d</i>	2.50 <i>d</i>	5.00 <i>d</i>	10.00 <i>d</i>	7,500
	Post-curfew	0.29 <i>d</i>	0.63 <i>d</i>	1.30 <i>d</i>	2.50 <i>d</i>	5.10 <i>d</i>	500
	E3						
	Pre-curfew	0.86 <i>d</i>	1.90 <i>d</i>	3.80 <i>d</i>	7.50 <i>d</i>	15.00 <i>d</i>	10,000
	Post-curfew	0.29 <i>d</i>	0.63 <i>d</i>	1.30 <i>d</i>	2.50 <i>d</i>	5.10 <i>d</i>	1,000
	E4						
	Pre-curfew	1.40 <i>d</i>	3.10 <i>d</i>	6.30 <i>d</i>	13.00 <i>d</i>	26.00 <i>d</i>	25,000
	Post-curfew	0.29 <i>d</i>	0.63 <i>d</i>	1.30 <i>d</i>	2.50 <i>d</i>	5.10 <i>d</i>	2,500
Aid to gauging <i>Ap</i>		2 to 5 cm	5 to 10cm	10 to 20 cm	20 to 40 cm	40 to 80 cm	>80 cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding <i>Ap</i> representative area (m2)		0.0008	0.004	0.016	0.063	0.251	>0.5
Notes:							
1. <i>d</i> is the distance between the observer and the glare source in metres;							
2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions;							
3. <i>Ap</i> is the apparent surface of the light source seen from the observer position.							
4. For further information refer to Annex C of CIE 150.							
5. Upper limits for each zone shall be taken as those with column <i>Ap</i> >0.5.							

3.0 Relevant obtrusive light standards & guidance

The table below describe the impact of luminaire aiming angles upon sky glow and glare. The angle of light emitted and significance of skyglow and glare affect have a bell curve-like distribution, with aiming angles of closer to the horizontal (90 degrees) have the greatest effect.

 Indicative diagram	Table 3.4: The effect on the ability to view the night sky at various angles. (Taken from ILP GN/01, 2021 (Table 1)).		
	Angle of light emitted (degrees)	Sky glow effect	Glare effect
	100 - 180	Local	Little
	95 - 100	Significant	Some
	90 - 95	High	High
	85 - 90	Significant	High
	0 - 85	Minimal	Some

Note: Good design practice to minimise sky glow, should limit the amount of light emitted within the 85 - 100 degree band. Extract taken from page 5 ILP GN 01/21.

3.0 Relevant obtrusive light standards & guidance

The analysis of upward light is important for understanding a lighting schemes sky glow contribution. ILP guidance sets out acceptable levels of upward light in relation to an areas environmental zone, shown in the tables below.

Table 3.5: Maximum values of upward light ratio (ULR) of luminaires. (Taken from ILP GN/01, 2021 (Table 6)).					
Light technical parameter	Environmental zone				
	E0	E1	E2	E3	E4
Upward light ratio (ULR)/%	0	0	2.5	5	15
Note: This does not take into account the effect of light reflected upwards from ground that also contributes to sky glow. This is the traditional method to limit sky glow and is suitable to compare different single luminaires.					

Table 3.6: Maximum values of upward flux ratio of installation (of four or more luminaires). (Taken from ILP GN/01, 2021 (Table 7)).						
Light technical parameter	Type of installation	Environmental zone				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR)/%	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	16	15
Notes: Table 3.6 allows the effect of both direct and reflected upward components of a whole installation to be taken into account. The factor being the upward flux ratio (UFR) and CIE 150 suggests that table 6 is used for all installations consisting of four or more luminaires. Clauses 6.4.2 and 6.4.3 of CIE 150:2017 describe the calculation methods for both ULR and UFR.						

3.0 Relevant obtrusive light standards & guidance

The limiting criteria for the luminance (brightness) of a building facade and signs is shown below. These values set the limits with regard to the surrounding environmental zones.

Table 3.7: Maximum permitted values of average surface luminance (cd/m2). (Taken from ILP GN/01, 2021 (Table 8)).						
Light technical parameter	Application conditions	Environmental zone				
		E0	E1	E2	E3	E4
Building façade luminance (Lb)	Taken as the product of the design average illuminance and reflectance divided by π	<0.1	<0.1	5	10	25
Sign luminance (Ls)	Taken as the product of the design average illuminance and reflectance divided by π , or for self-luminous signs, its average luminance.	<0.1	50	400	800	1,000
Note: The values apply to both pre- and post-curfew, except that in zones 0 and 1 the values shall be zero post curfew. The values for signs do not apply to signs for traffic control purposes. Where a 'curfew' threshold is given, as referred to in the tables below, this will typically indicate the period between 23:00 and 05:00. A different curfew period may be advised by the local authority.						

4.0 Methodology.

Baseline methodology.

To assess the existing external lighting condition, a Site survey was undertaken to confirm the existing lighting conditions. Prior to the on Site survey, utilising Google Maps and Ordnance Survey, survey locations were identified to aid in:

- Classifying the environmental zones within the Site boundary and surrounding areas.
- Recording illumination levels (lux) at potential receptors.
- If requested by the ecological or architectural team, locations to aid in their assessment will be included.

Data capture

The data collated within this baseline report forms the basis of our Light Impact Assessment (LIA) .

The survey was undertaken on Tuesday 16th of January 2024. The weather was clear with little to no cloud coverage and a Waxing Crescent Moon that was 31% illuminated on the horizon. During the survey, the moon was visible at times.

Throughout the survey digital photographs were taken to gain an understanding of the Site context and illustrate the existing night time lighting conditions.

Point light meter readings were taken post sunset within each selected location. To ensure replicable measurements, readings are only taken during the periods of astronomical twilight or night, i.e. when the sun is at least 15 degrees below the horizon.

Sunset was approximately 4.30pm and the measurements were taken between 6pm and 8.30pm.

Point horizontal illuminance (lux) measurements, were taken using the light meter at ground level facing directly upwards towards the sky (Figure 4.1).

Point vertical illuminance (lux) measurements, were taken with the light meter at 1.5m above ground level, facing directly away from the operator. The readings were taken in a variety of orientations depending upon the location and relevance to the study. (Figure 4.2).

All measurements taken are recorded in section 6: Site Survey - illuminance readings.

The survey locations are labelled and ordered into the following categories:

- Residential, selected utilising Google Maps and Ordnance Survey.
- Areas of interest: Locations which may have significance in aiding classifying the environmental zone of the surrounding area or be a point of interest such as a heritage, Area of Outstanding Natural Beauty (AONB) or transport receptor. Details will be included in the survey comments.

Five locations were selected to include & exclude the contribution from the existing Site. Site lighting was excluded by taking two sets of readings, one with all Site and local lighting in operation and one with site lighting off. The data from these locations are shown in Tables 6.5 & 6.6.

Equipment

Survey equipment used comprised of:

- Apple iPhone 8 to take photographic images and record illuminance level results.
- Calibrated hand-held Minolta T-10A light meter & Sensor. Serial Numbers 30015159 & 20013532. Calibration certificate: 141276/ABU (copy available on request).

Risk assessment

Prior to the Site survey, a risk assessment was carried out to analyse and mitigate any potential hazards and a method statement was completed to define the procedures for completing the task. During the survey dynamic risk assessment procedures were followed to ensure the safety of all personnel involved.

Assumptions & limitations

- Every effort was made to obtain accurate information, however where areas were inaccessible, lighting was inoperative or information was not readily available, professional judgement has been used in regards to illumination levels, receptors and environmental zone classifications.
- The illuminance recordings are affected by natural lighting sources such as the moon & stars. The contribution of illuminance from natural light sources is variable according to their position & visibility at the time of survey.

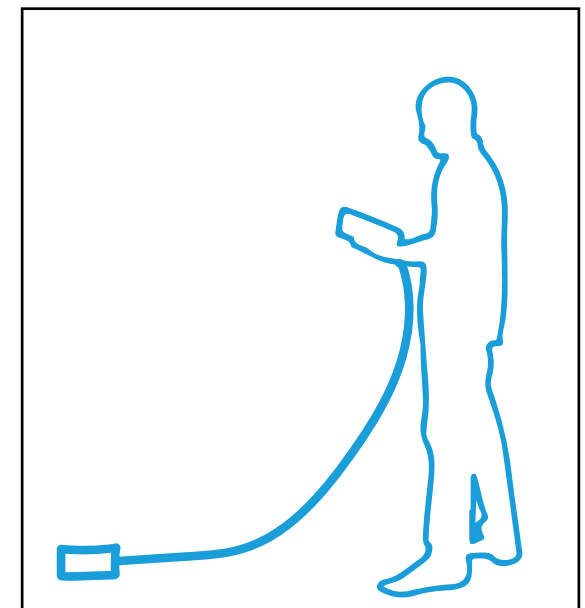


Figure 4.1

Point horizontal measurements, are taken with the light meter at ground level facing directly upwards towards the sky.

Figure 4.1

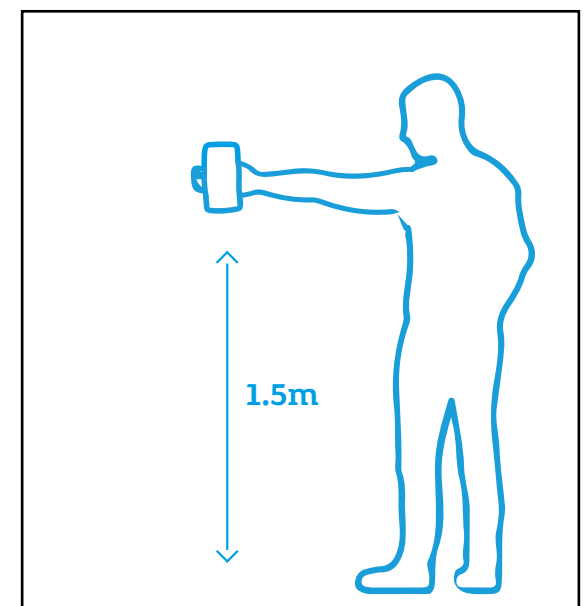


Figure 4.2

Point vertical measurements, are taken with the light meter at 1.5m above ground level, facing directly away from the operator. The readings were taken in a variety of orientations depending upon the location and relevance to the study.

Figure 4.2

5.0 Site & surrounding area survey.

The Microsoft mapping aerial image below shows: the RED line boundary of the proposed development Site and survey positions where data was collected. Horizontal and vertical illuminance (lux) point readings are recorded in the following tables 6.1 to 6.5 complete with commentary of observations.

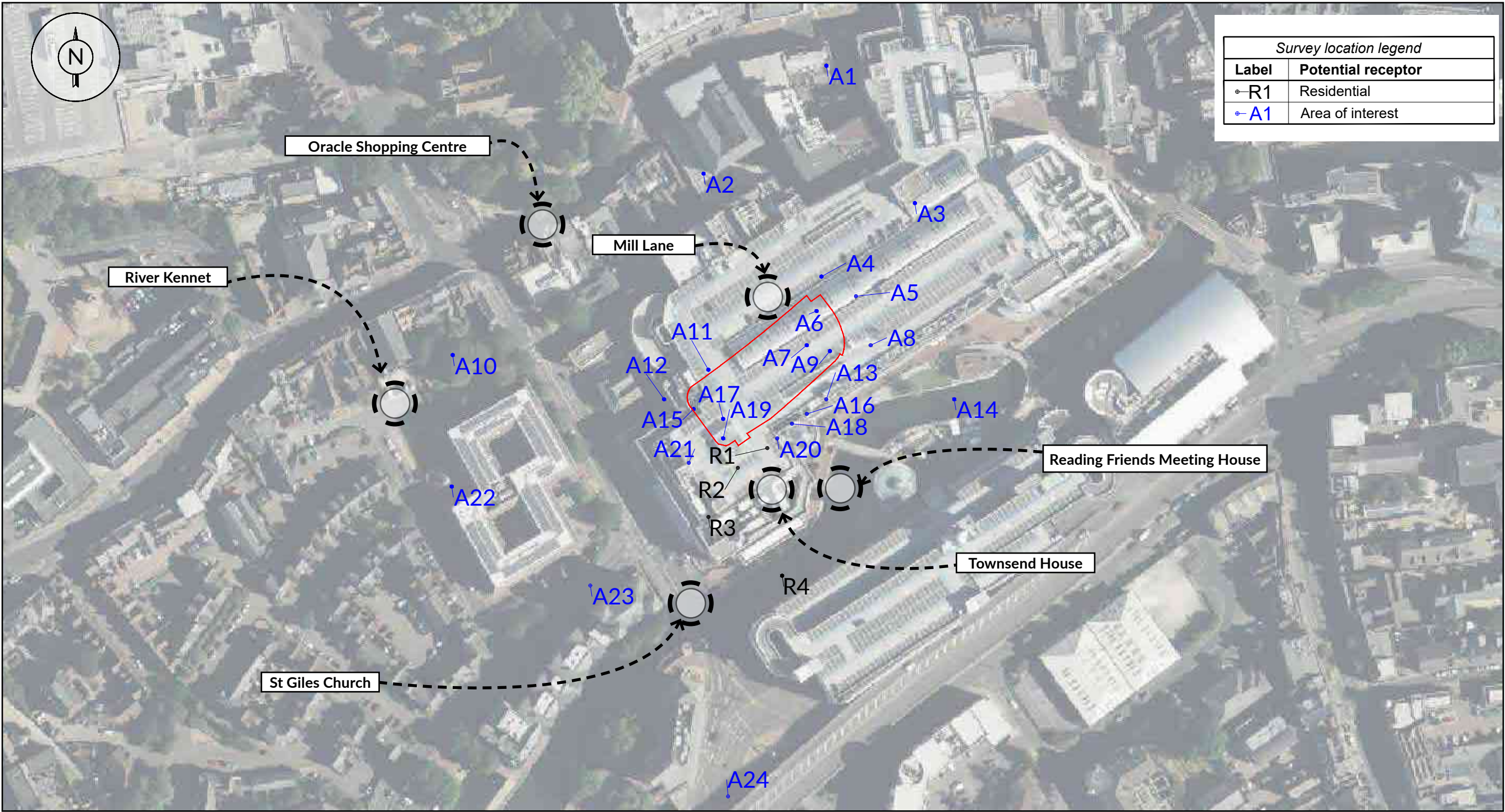


Figure 5.1 Aerial map showing Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey.

The Microsoft mapping road image below shows: the RED line boundary of the proposed development Site and survey positions where data was collected. Horizontal and vertical illuminance (lux) point readings are recorded in the following tables 6.1 to 6.5 complete with commentary of observations.

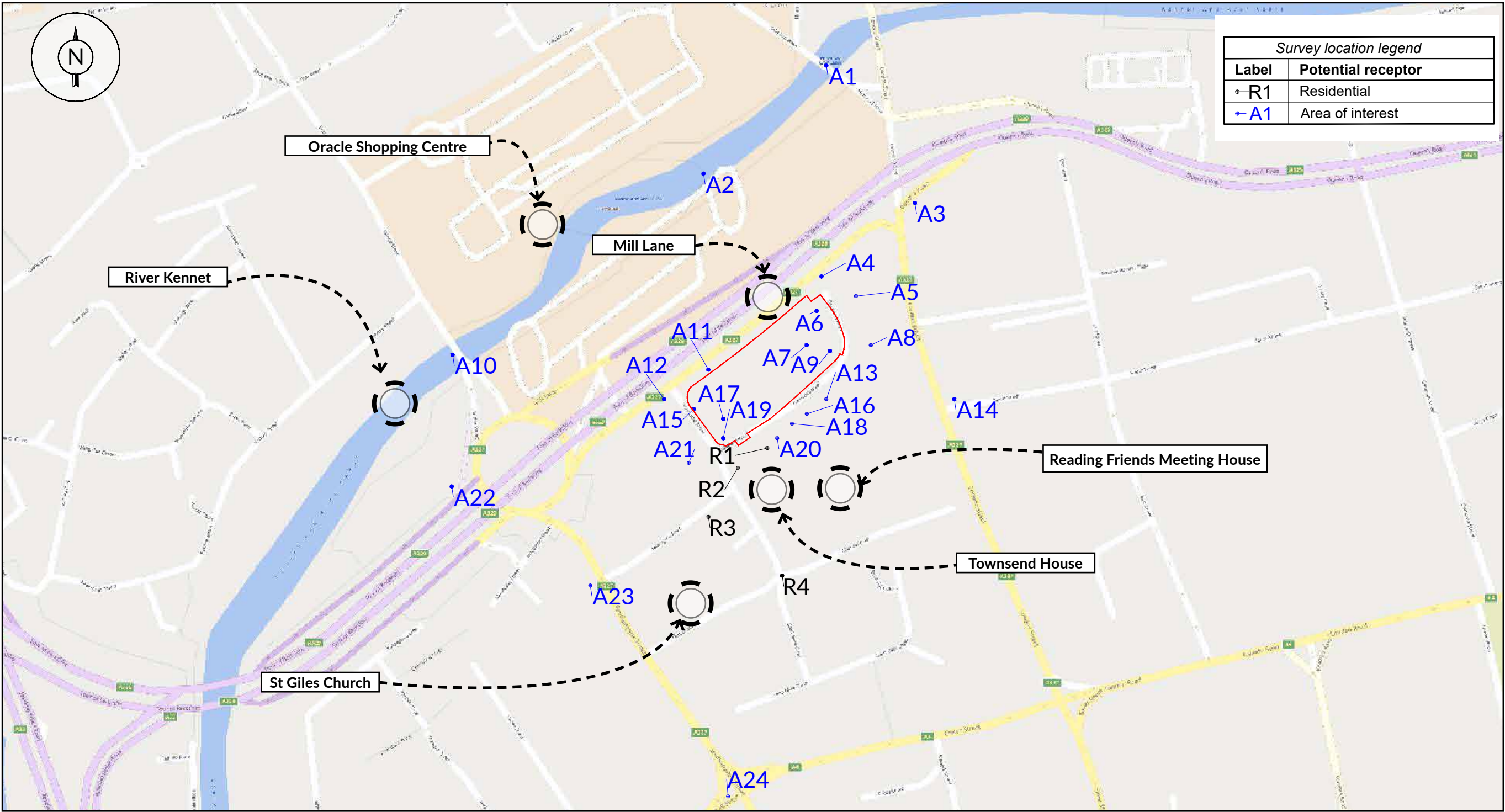


Figure 5.2 Road map showing Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

The Microsoft mapping aerial image below shows: the RED line boundary of the proposed development Site and survey positions where data was collected. Horizontal and vertical illuminance (lux) point readings are recorded in the table 6.1 complete with commentary of observations.



Figure 5.3 Aerial map showing residential Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.4 Showing LED luminaires mounted on approximately 6 metre high columns & building surface mounted floodlights, facing north-east. Captured at approximate position of Survey Location R1.



Figure 5.6 Showing bulkheads on Townsend House, looking south. Captured at approximate position of Survey Location R1.



Figure 5.5 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.7 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.8 Showing LED luminaires mounted on approximately 6 metre high columns along Deansgate Road, facing west. St Giles Church on left of image. Captured at approximate position of Survey Location R3.



Figure 5.10 Showing residences & LED luminaires mounted on approximately 6 metre high columns along Deansgate Road, looking north. Site in middle ground. Captured at approximate position of Survey Location R3.



Figure 5.9 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.11 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.12 Showing LED luminaires mounted on approximately 6 metre high columns along St Giles Close, facing west. Captured at approximate position of Survey Location R4.



Figure 5.14 Showing residences along Church Street, looking north. Captured at approximate position of Survey Location R4.



Figure 5.13 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.15 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.16 Showing LED luminaires mounted on approximately 6 metre high columns along Church Street, facing south-west. Townsend House on left of image. Captured at approximate position of Survey Location R1.



Figure 5.18 LED luminaires mounted on approximately 6 metre high columns along Crossland Road looking north-east. Reading Quakers Meeting House boundary on right. Captured at approximate position of Survey Location R1.



Figure 5.17 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.19 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - residential locations.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.20 Showing LED luminaires mounted on approximately 6 metre high columns along Church Street, facing south-west. Townsend House on left of image. Captured at approximate position of Survey Location R4.



Figure 5.22 Showing residences along Church Street, looking north-east. Captured at approximate position of Survey Location R4.



Figure 5.21 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.23 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

The Microsoft mapping aerial image below shows: the RED line boundary of the proposed development Site and survey positions where data was collected. Horizontal and vertical illuminance (lux) point readings are recorded in the tables 6.3 to 6.5 complete with commentary of observations. These locations aid in the establishment of the Sites & surrounding areas environmental zone.

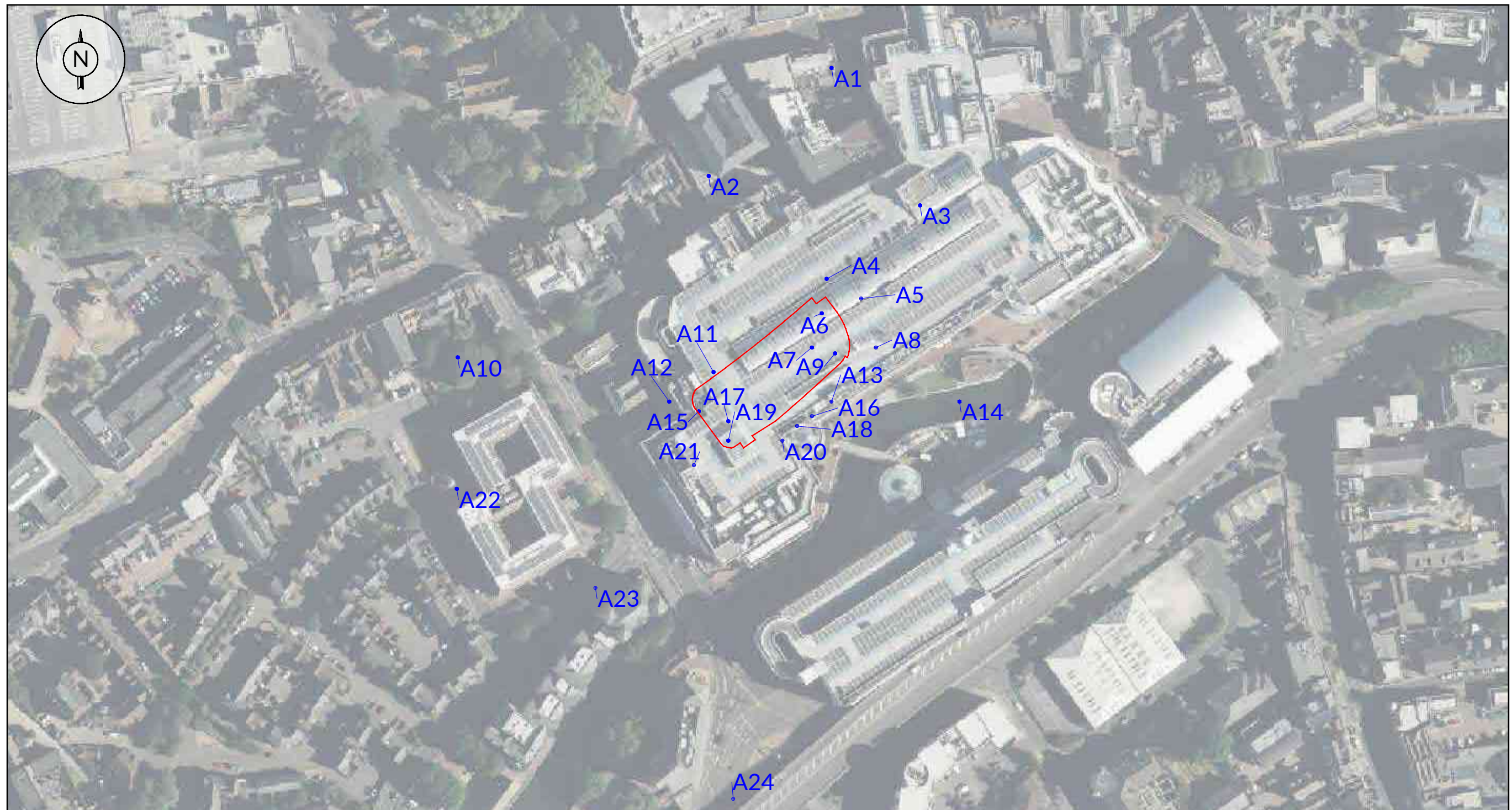


Figure 5.24 Aerial map showing area of interest Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.25 showing LED floodlights on building facade, facing west. Captured at approximate position of Survey Location A9.



Figure 5.27 Showing luminaire mounted on 30 metre high column, looking north. Captured at approximate position of Survey Location A9.



Figure 5.26 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.28 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.29 Showing LED luminaire mounted on approximately 8 metre high column along Bridge Street, looking east. Captured at approximate position of Survey Location A10.



Figure 5.31 Showing River Kennet, passing through Bridge Street, looking west. Captured at approximate position of Survey Location A10.



Figure 5.30 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.32 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.33 Showing luminaire mounted on 30 metre high column along Mill Lane, looking north-east. Captured at approximate position of Survey Location A11.



Figure 5.35 Showing luminaires mounted on approximately 6 metre high columns on top level of MSCP adjacent to A329, looking north-west. Captured at approximate position of Survey Location A11.



Figure 5.34 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.36 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.37 Showing luminaires mounted on approximately 6 metre high columns along London Street, looking north. Captured at approximate position of Survey Location A14.



Figure 5.39 Showing luminaires mounted on approximately 6 metre high columns along London Street, looking south. Captured at approximate position of Survey Location A14.



Figure 5.38 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.40 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.41 Showing LED luminaire mounted on approximately 6m high column along Crossland Road, looking south. Captured at approximate position of Survey Location A16.



Figure 5.43 Showing LED luminaire mounted on approximately 6m high column along Crossland Road, looking east. Captured at approximate position of Survey Location A16.

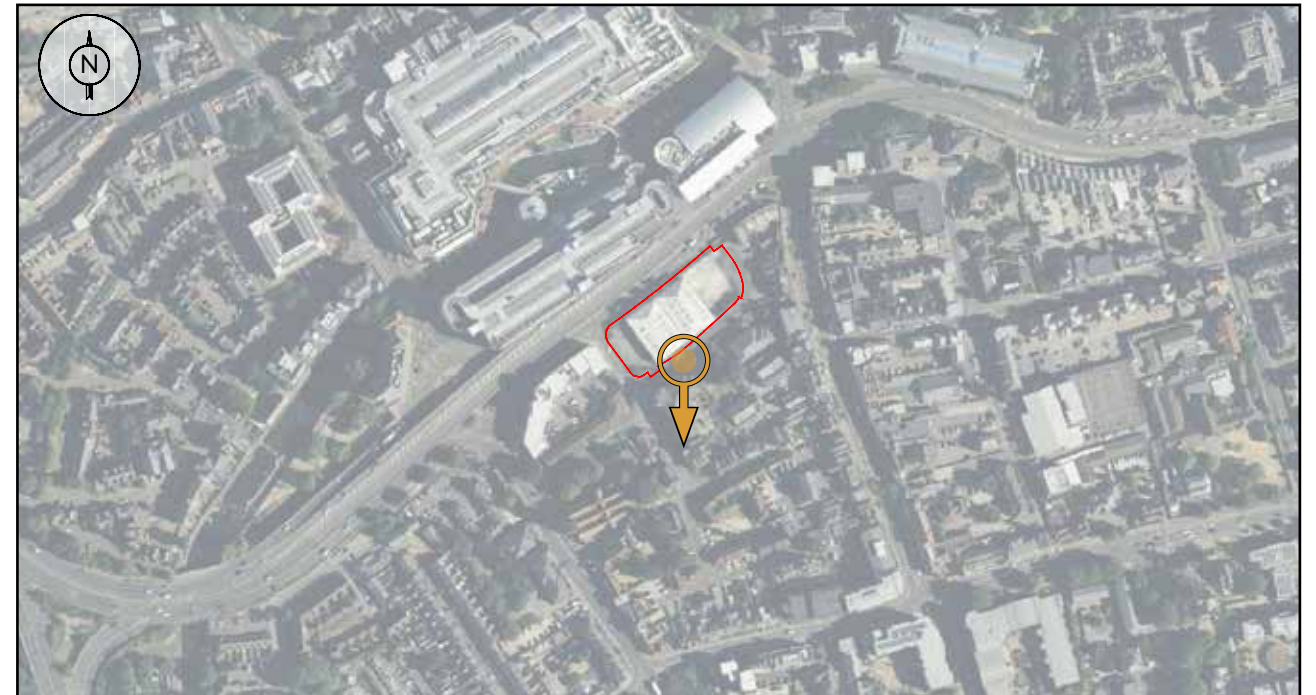


Figure 5.42 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.44 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - day time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded.



Figure 5.45 Showing LED luminaire mounted on approximately 6m high column along Deansgate Road looking north-east. Captured at approximate position of Survey Location A23.



Figure 5.47 Showing LED luminaires mounted on approximately 8m high columns along Southampton Street looking south-east. Captured at approximate position of Survey Location A23



Figure 5.46 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.48 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.49 Showing LED luminaires mounted on approximately 6m high columns along Yield Hall Place, looking north-west. Captured at approximate position of Survey Location A1.



Figure 5.51 Showing LED luminaires mounted on approximately 6m high columns along Oracle Shopping Centre waterfront, looking south-west. Captured at approximate position of Survey Location A1.



Figure 5.50 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.52 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.53 Showing illuminated branding/advertising installations of building frontages of Oracle shopping centre & River Kennet, looking south-west. Captured at approximate position of Survey Location A2.



Figure 5.55 Showing illuminated branding/advertising installations of building frontages of Oracle shopping centre & River Kennet, looking north-west. Captured at approximate position of Survey Location A2.



Figure 5.54 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.56 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.57 Showing luminaire mounted on 30 metre high column along A329/Mill Lane, looking north-west. Captured at approximate position of Survey Location A3.



Figure 5.59 Showing luminaire mounted on 30 metre high column along A329/Mill Lane, looking south-west. Captured at approximate position of Survey Location A3.



Figure 5.58 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.60 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.61 Showing loading bays with Site lighting switched off, looking south-west. Captured at approximate position of Survey Location A6.



Figure 5.63 Showing loading bays with Site lighting off, looking south-west. Luminaires mounted on approx. 6m & 30m along Mill Lane/MSCP visible. Captured at approximate position of Survey Location A6.



Figure 5.62 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.64 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.65 Showing luminaires mounted on approximately 6 metre high columns along London Street, looking north. Captured at approximate position of Survey Location A14.



Figure 5.67 Showing luminaires mounted on approximately 6 metre high columns along London Street, looking south. Captured at approximate position of Survey Location A14.



Figure 5.66 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.68 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.



Figure 5.69 Showing luminaire mounted on 30 metre high column along A329/Mill Lane, looking north-west. MSCP in background. Captured at approximate position of Survey Location A19.



Figure 5.71 Showing building surface mounted floodlights on Site facade, looking north. MSCP in background. Captured at approximate position of Survey Location A19.



Figure 5.70 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

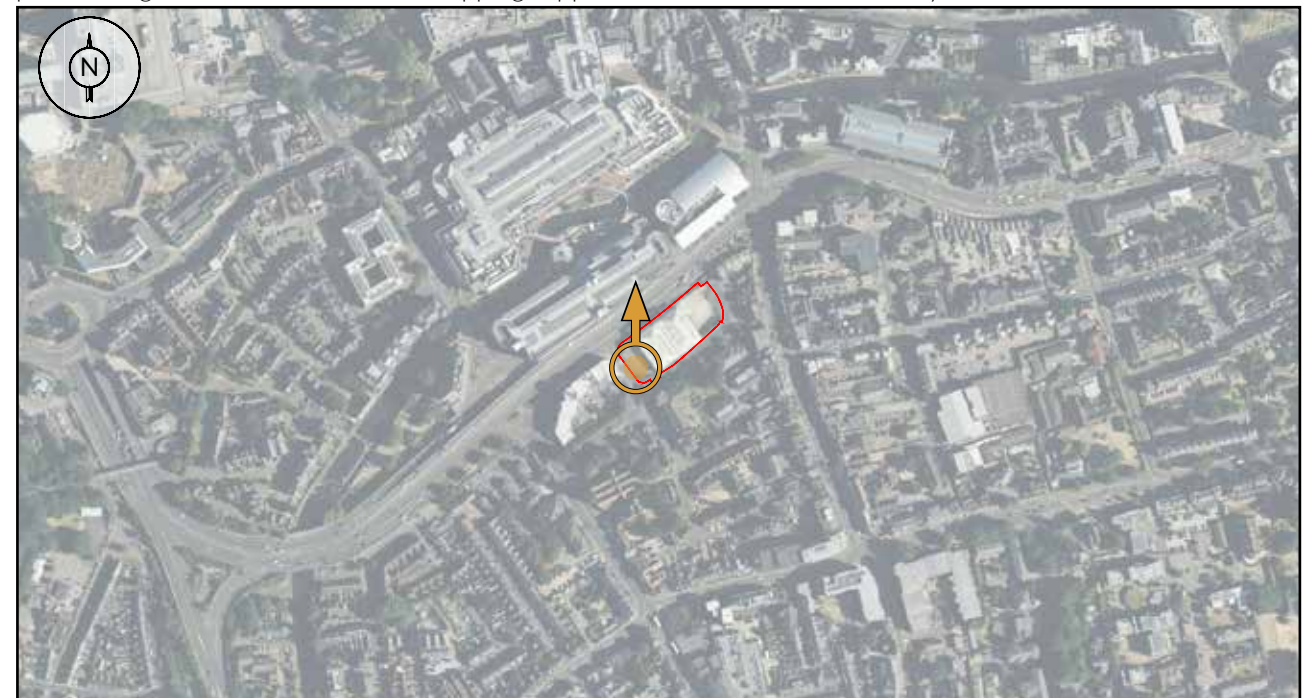


Figure 5.72 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

5.0 Site & surrounding area survey - photos - areas of interest.

Photographs - twilight & night time hours.

Showing Site and surrounding area conditions and where applicable the variety of luminaires. Images captured using an Apple iPhone 8 with HDR imaging, EXIF location and time data recorded. Please note night time photography is for reference purposes only as no industry accepted methodology is currently in place for the capture of these images.

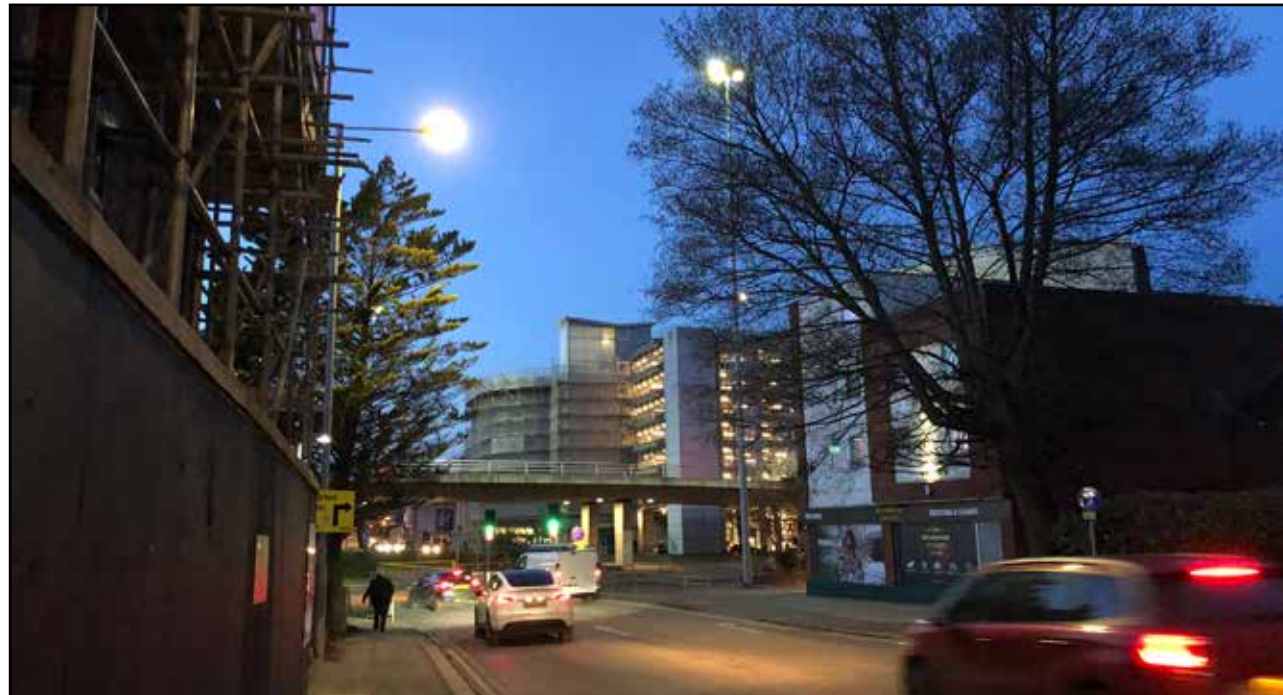


Figure 5.73 Showing luminaires mounted on approximately 6 & 30m high columns along Mill Lane/A329, looking north-west. Captured at approximate position of Survey Location A23.



Figure 5.75 Showing luminaire mounted on approximately 6 metre high column along Deansgate Road, looking north-east. Site is middle/background. Captured at approximate position of Survey Location A23.



Figure 5.74 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.



Figure 5.76 Aerial map showing marker with marker representing approximate location & direction of view of photo. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - illuminance readings.

The Microsoft mapping aerial image below shows: the RED line boundary of the proposed development Site and survey positions where data was collected. Horizontal and vertical illuminance (lux) point readings are recorded in the tables 6.1 to 6.5 complete with commentary of observations.

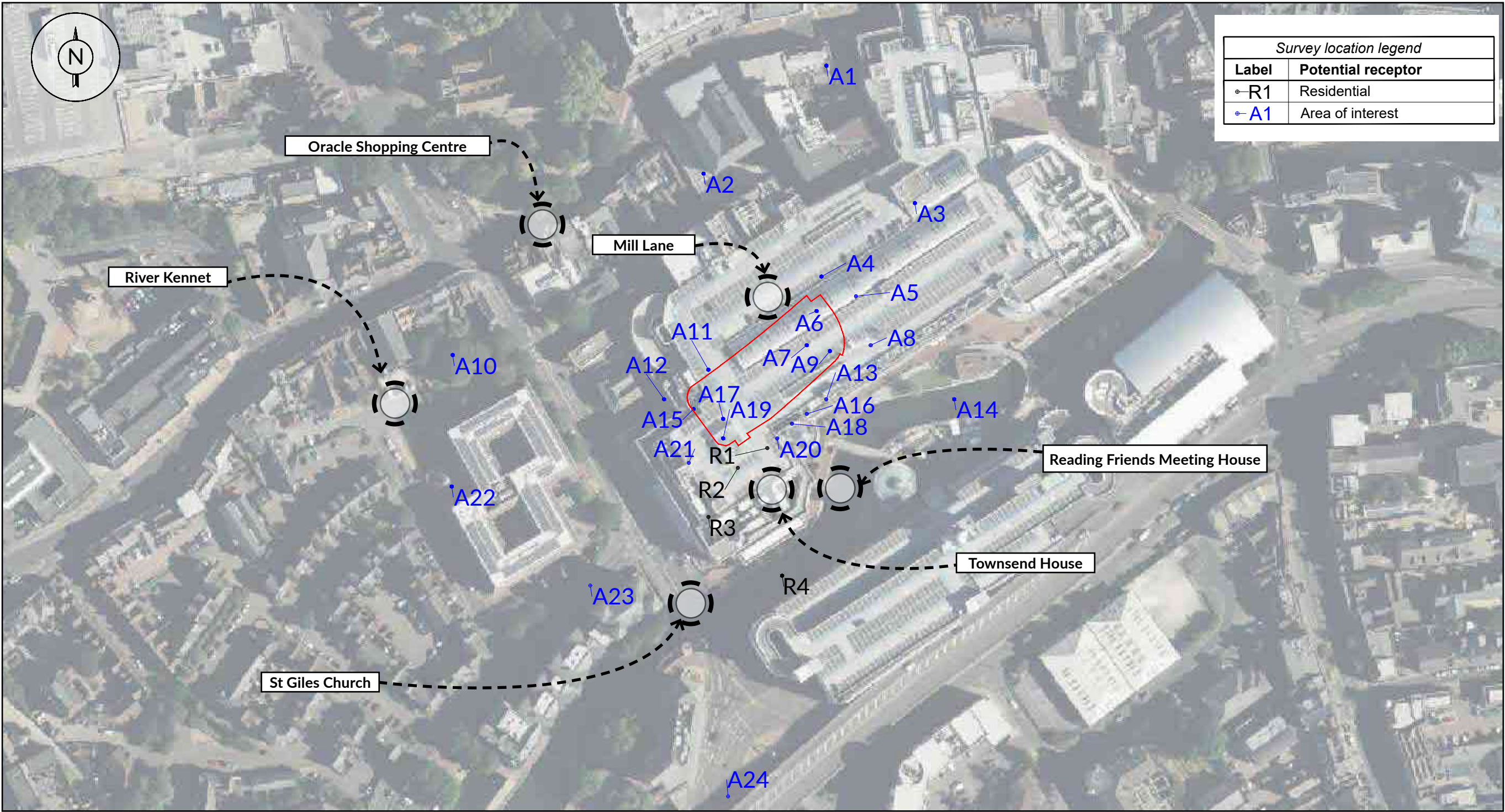


Figure 6.1 Aerial map showing Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - illuminance readings (residential areas).

Table 6.1 Residential locations					
Survey location.	Location name.	Horizontal meter reading.	Vertical meter reading.	Peak vertical direction.	Comments.
R1	Crossland Road	1.96	3.34	West	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.
R2	Crossland Road & Letcombe Street junction	4.83	5.99	North	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.
R3	Deansgate Rd, next to boundary of St Giles Church	1.15	2.28	North	Flatbed LED luminaires mounted on approximately 6 metre high columns.
R4	Saint Giles Close/Church Street	1.37	3.68	West	Flatbed LED luminaires mounted on approximately 6 metre high columns.

Table 6.1 notes

- All horizontal light meter readings taken at ground level unless stated otherwise, with light meter sensor facing directly upwards.
- Vertical readings taken at north, east, south and west at 1.5 metres above ground level, with light meter sensor facing directly forwards.
- Peak vertical direction result of 'N/A' represents a uniform level of lighting from all four compass directions where no peak direction of illumination was recorded.



Figure 6.2 Aerial map showing residential Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - illuminance readings (areas of interest).

Table 6.2 Areas of interest.					
Survey location.	Location name.	Horizontal meter reading.	Vertical meter reading.	Peak vertical direction.	Comments.
A1	Yield Hall Place Bridge over River Kennet	2.14	4.60	West	Discharge luminaires mounted on approximately 6 metre high columns.
A2	Pedestrian bridge over River Kennet	21.87	63.10	West	Illuminated feature & hand rail lighting.
A3	Queens Road	6.85	15.24	East	Luminaires mounted on 30m high columns. Bulkheads on nearby building.
A4	Mill Lane	7.47	5.30	West	Luminaires mounted on 30m high columns. Floodlights on adjacent building not operational.
A5	Crossland Road, at back of buildings.	4.26	5.12	West	Flatbed LED luminaires mounted on approximately 6 metre high columns.
A6	Corner of Site boundary, near to loading bays.	6.15	5.36	West	Building mounted LED floodlights.
A7	Within Site boundary, in loading bays	39.70	41.20	South	Building mounted LED floodlights, spill from luminaires mounted on 30m high columns.
A8	Crossland Road, at back of buildings.	1.76	2.78	West	Flatbed LED luminaires mounted on approximately 6 metre high columns.
A9	Corner of Site boundary, near to loading bays.	4.38	9.28	West	Building mounted LED floodlights. Spill from luminaires mounted on approximately 6 & 30m high columns.
A10	KVP10 Bridge Street, over River Kennet	11.39	9.45	South	Flatbed LED luminaires mounted on approximately 8 metre high columns.

Table 6.2 notes

- All horizontal light meter readings taken at ground level unless stated otherwise, with light meter sensor facing directly upwards.
- Vertical readings taken at north, east, south and west at 1.5 metres above ground level, with light meter sensor facing directly forwards.
- Peak vertical direction result of 'N/A' represents a uniform level of lighting from all four compass directions where no peak direction of illumination was recorded.

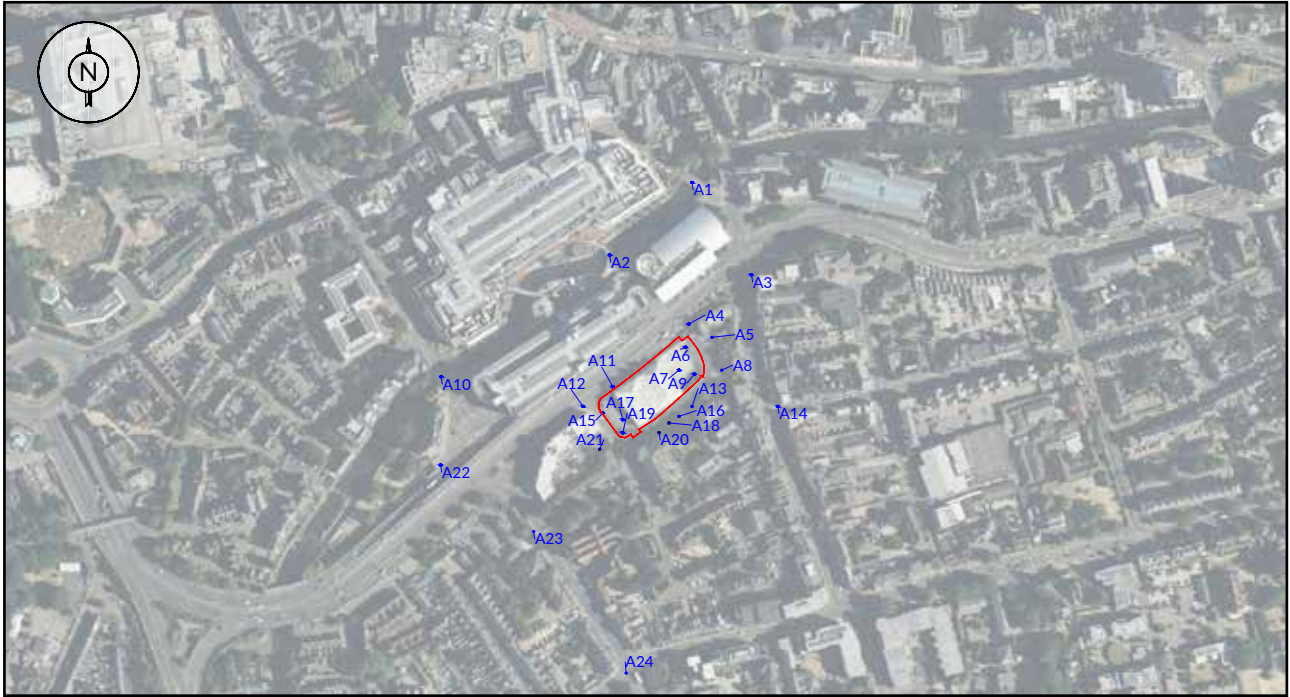


Figure 6.3 Aerial map showing areas of interest Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - illuminance readings (areas of interest).

Table 6.3 Areas of interest.					
Survey location.	Location name.	Horizontal meter reading.	Vertical meter reading.	Peak vertical direction.	Comments.
A11	Mill Lane, adjacent to Site	12.22	6.09	South	Luminaires mounted on 30m high columns.
A12	Mill Lane & Letcombe Street junction	11.73	10.86	East	Luminaires mounted on approximately 6m & 30m high columns.
A13	Car park, Crossland Road	8.65	13.34	East	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.
A14	KVP2, South Street	3.67	5.61	South	Flatbed LED luminaires mounted on approximately 6 metre high columns.
A15	Within Site boundary, in car parking bays	21.57	16.06	North	Luminaires mounted on approximately 6m & 30m high columns. Building mounted LED floodlights.
A16	Crossland Road, at boundary of Quakers Meeting House	1.44	2.79	North	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.
A17	Within Site boundary, in car parking bays	76.00	80.70	East	Luminaires mounted on approximately 6m & 30m high columns. Building mounted LED floodlights.
A18	Crossland Road, at boundary of Quakers Meeting House	4.57	7.08	West	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.
A19	Within Site boundary, in car parking bays	13.36	15.70	North	Luminaires mounted on approximately 6m & 30m high columns. Building mounted LED floodlights.
A20	Crossland Road, at boundary of Quakers Meeting House	3.41	5.85	East	Flatbed LED luminaires mounted on approximately 6 metre high columns. Building mounted LED floodlights.

Table 6.3 notes

- All horizontal light meter readings taken at ground level unless stated otherwise, with light meter sensor facing directly upwards.
- Vertical readings taken at north, east, south and west at 1.5 metres above ground level, with light meter sensor facing directly forwards.
- Peak vertical direction result of 'N/A' represents a uniform level of lighting from all four compass directions where no peak direction of illumination was recorded.

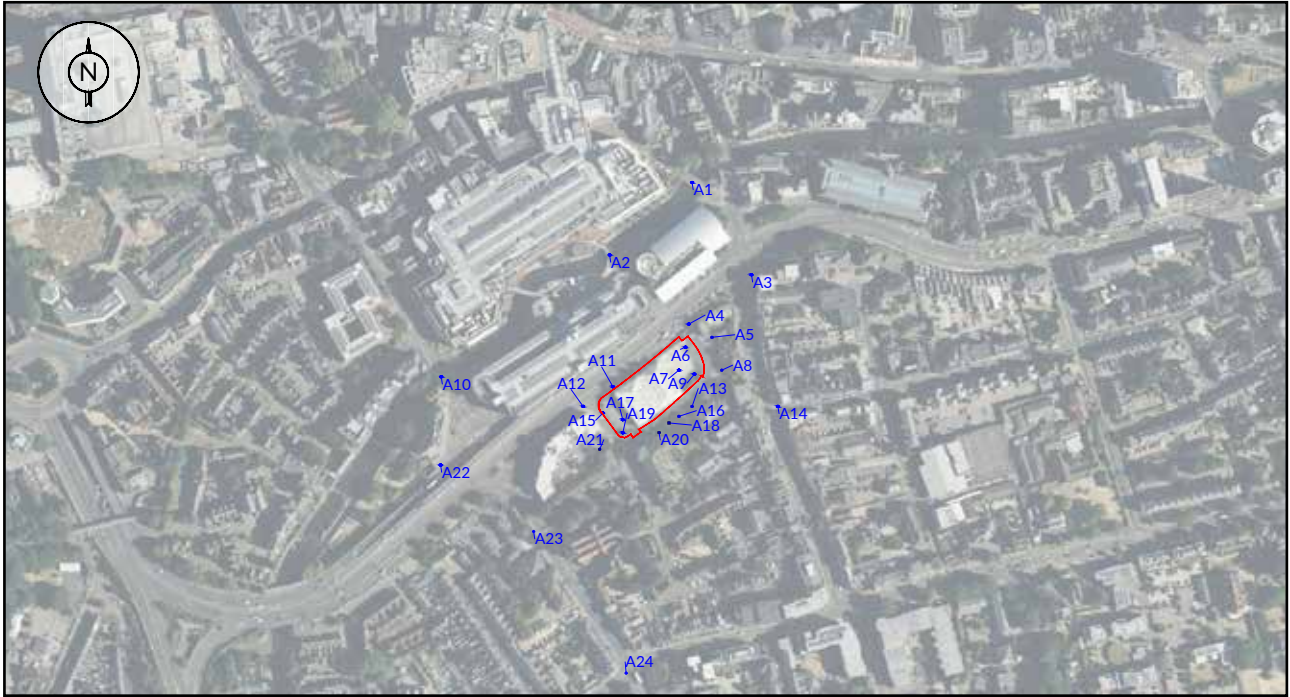


Figure 6.4 Aerial map showing areas of interest Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - illuminance readings (areas of interest).

Table 6.4 Areas of interest.					
Survey location.	Location name.	Horizontal meter reading.	Vertical meter reading.	Peak vertical direction.	Comments.
A21	Car park of Premier Inn	2.12	6.01	North	Flatbed LED luminaires mounted on approximately 6m high columns.
A22	KVP9 Mill Lane	4.85	6.69	North	Luminaires mounted on 30m high columns.. Cove mounted bulkheads.
A23	KVP7, Southampton Street	12.56	9.75	West	Flatbed LED luminaires mounted on approximately 8m high columns.
A24	Pell Street & Southampton Street	27.85	15.94	East	Flatbed LED luminaires mounted on approximately 8m high columns.

Table 6.4 notes

- All horizontal light meter readings taken at ground level unless stated otherwise, with light meter sensor facing directly upwards.
- Vertical readings taken at north, east, south and west at 1.5 metres above ground level, with light meter sensor facing directly forwards.
- Peak vertical direction result of 'N/A' represents a uniform level of lighting from all four compass directions where no peak direction of illumination was recorded.

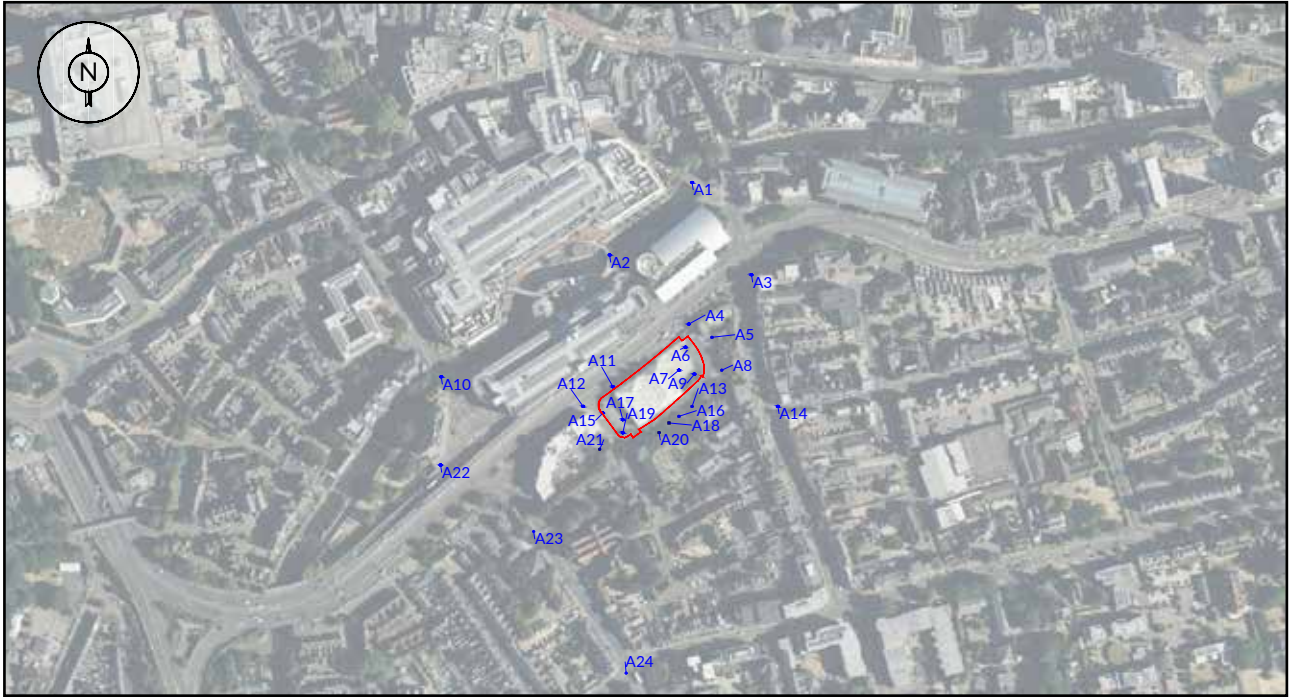


Figure 6.4 Aerial map showing areas of interest Survey Locations. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

6.0 Site & surrounding area survey - Site lighting on & off.

The tables below shows: measured baseline illumination levels, including & excluding the contribution from the existing Site. Site lighting was excluded by taking two sets of readings, one with all Site and local lighting in operation and one with site lighting off. Five of the closest measured positions have been assessed. The table shows the measured baseline value “generated” by the lighting from the current development.

Table 6.5 Horizontal measurements.					
Survey location.	Location name.		Site lighting ON meter reading.	Site lighting OFF meter reading.	Contribution of Site lighting.
A8	Crossland Road, at back of buildings.		1.76	1.63	0.13
A16	Crossland Road, at boundary of Quakers Meeting House		1.44	0.83	0.61
A18	Crossland Road, at boundary of Quakers Meeting House		4.57	1.69	2.88
A20	Crossland Road, at boundary of Quakers Meeting House		3.41	1.03	2.38
R2	Crossland Road		4.83	4.17	0.66

Table 6.6 Vertical measurements.					
Survey location.	Location name.	Vertical measurement direction	Site lighting ON meter reading.	Site lighting OFF meter reading.	Contribution of Site lighting.
A8	Crossland Road, at back of buildings.	West	2.78	0.67	2.11
A16	Crossland Road, at boundary of Quakers Meeting House	North	2.79	1.95	0.84
A18	Crossland Road, at boundary of Quakers Meeting House	North	2.41	0.81	1.60
A20	Crossland Road, at boundary of Quakers Meeting House	North	5.45	3.29	2.16
R2	Crossland Road	North	5.99	4.29	1.70

Table 6.5 & 6.6 notes

- All horizontal light meter readings taken at ground level unless stated otherwise, with light meter sensor facing directly upwards.
- Vertical readings taken at north, east, south and west at 1.5 metres above ground level, with light meter sensor facing directly forwards.
- Peak vertical direction result of ‘N/A’ represents a uniform level of lighting from all four compass directions where no peak direction of illumination was recorded.

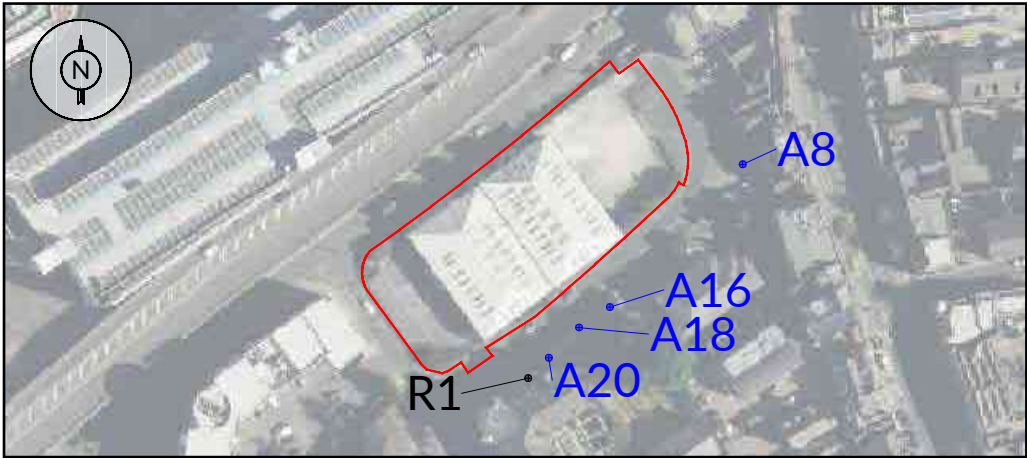


Figure 6.5 Aerial map showing measured locations used to assess lighting generated by existing development. Image taken from Microsoft mapping. Approximate Site redline boundary shown in red.

7.0 Sky glow - Site and wider area.

CPRE Extract

The Site is located in Reading.

Figure 7.1 below, is an extract from CPRE – Great Britain's light pollution and dark skies. The map below shows the approximate location of the proposed development and wider area. This figure should be referenced in conjunction with Figure 7.2 on the next page.

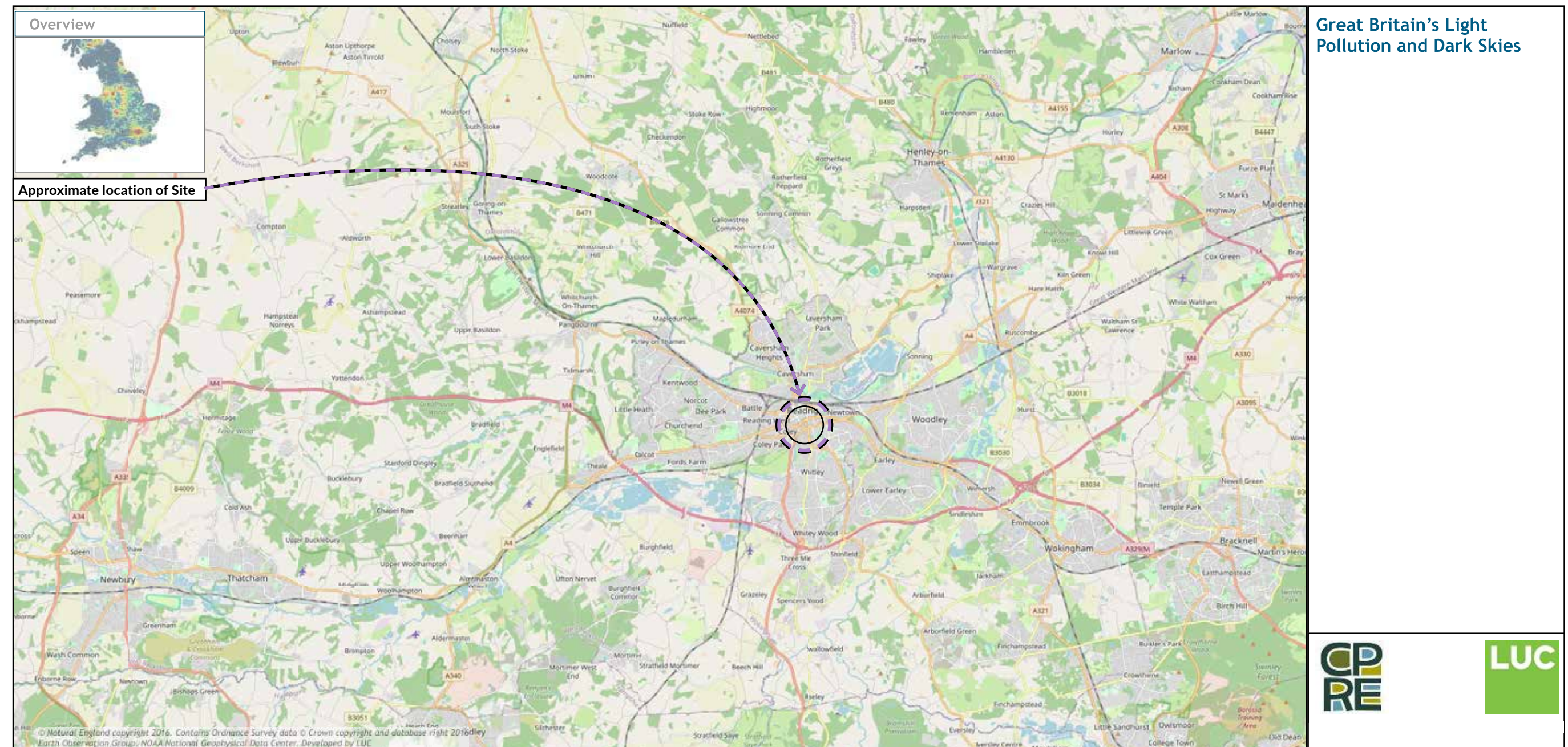


Figure 7.1 Extract from CPRE website.

7.0 Sky glow - Site and wider area.

CPRE Extract

Figure 7.2 below, is an extract from CPRE – Great Britain's light pollution and dark skies gives a broad brush indication of the upwards light (sky glow) experienced in the year 2015 for the Site and further surrounding locations.

Shades of blue are indicative of the lowest levels of sky glow .

Shades of red are indicative of the highest levels of sky glow.

Satellite measurements range from <0.25 (NanoWatts/cm²/sr) (being a dark sky) to <32 (NanoWatts/cm²/sr) (being a saturated bright sky at night – city centre). Full details on this mapping are available at https://nightblight.cpre.org.uk/images/resources/Night_Blight_cpre.pdf

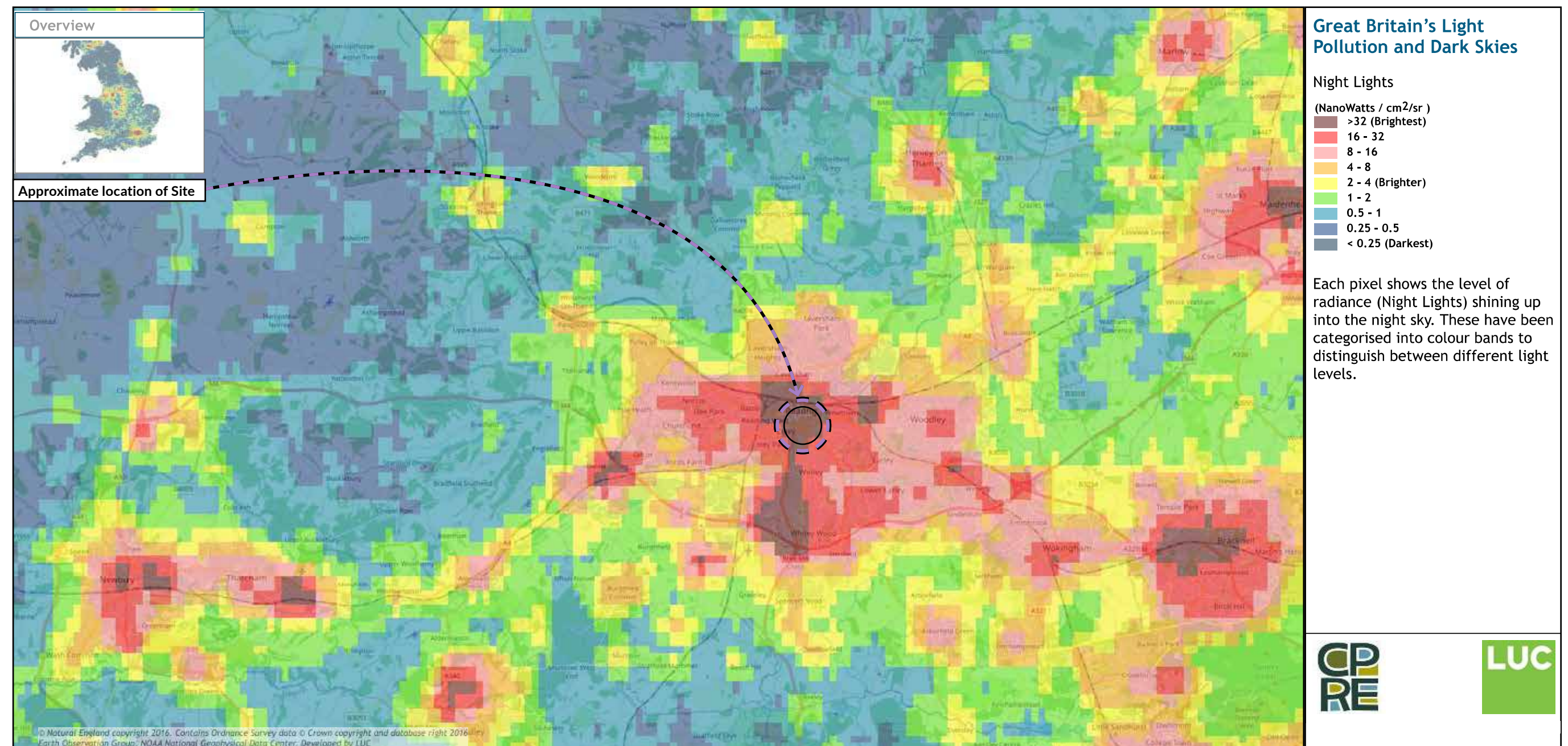


Figure 7.2 Extract from CPRE website.

8.0 Environmental zones.

To assess the current Site and surrounding condition we refer to the ILP Guidance Note GN01 for the Reduction of Obtrusive Light (2021) and ILP guidance note PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments. Within PLG04 Guidance on Undertaking Environmental Lighting Impact Assessments, page 12 states that: *'In cases where the Planning Authority has not set Environmental Zones for its area, the lighting professional may have to make decisions on the nature of the area and explain the reasoning in the LIA'*. An online search did not find any documentation from Reading Borough Council establishing environmental zones for the Site & surroundings. Consequently they have been classified within this report.

Survey locations were labelled based on potential receptor classification. Using the data gathered at these locations, combined with satellite information and professional judgement, a composite image (Figure 8.1, adjacent) is produced to assist in representing the current environmental zones of the locality. It must be noted that this graphic is an average representation of the area assessed, based on the information recorded.

In Figure 8.1 (adjacent map) areas would be classified as:



- **E3 Suburban, Medium district brightness. Well inhabited rural and urban settlements, small town centres of suburban locations.**

The residential areas bordering the Site are lit to typical parameters of a suburban development, i.e. by LED luminaires mounted on approximately 8 metres high columns on main trunk roads & 6 metre columns found on minor roads. External artificial lighting is generally limited to the streetlighting, however some isolated building mounted floodlights may be found on developments.



- **E4 Urban, High district brightness. Town/city centres with high levels of night-time activity.**

The Site is illuminated by building surface mounted floodlights & downlights mounted within canopy soffit. The loading & car parking bays within the Site's boundary are illuminated to levels typically expected in these workspaces.

The Site is surrounded by dense mixed use development which contains a range of light sources. Mill Lane/ A329 is lit by luminaires mounted on 30 metre high columns. The Oracle Shopping Centre contains a range of light sources but is predominantly lit by LED luminaires on approximately 6m high columns. This area also receives considerable amount of illumination from other light sources such as illuminated advertising/branding installations and handrail lighting.



Figure 8.1 Map showing current average environmental lighting zones with approximate redline boundary.

9.0 Summary.

Hoare Lea have been commissioned by John Lewis Partnership BTR Ltd to provide a Lighting Impact Assessment (LIA) for a proposed development, described as John Lewis, Letcombe Street.

The proposed development consists of Demolition of the existing building and redevelopment of the site comprising erection of a new building for up to 215 build to rent residential dwellings (Use Class C3) together with flexible commercial / community space (Use Class E/F1/F2), residents' facilities, landscaping, public realm, amenity space, cycle parking and disabled car parking.

The assessment is made up of 3 separate reports, which when combined form the LIA;

- Part 1: Baseline Survey (BLS).
- Part 2: External Lighting Design.
- Part 3: Illumination Impact Profile (IIP).

This report provides a baseline condition of the artificial lighting currently installed on the Application Site area and adjacent surrounding areas. It has been prepared using the guidance provided in the Institution of Lighting Professionals (ILP) guidance note PLG04 ***“Guidance on Undertaking Environmental Lighting Impact Assessments”***.

The information from the survey conducted and other external data sources are utilised to professionally judge the environmental classification with reference to the Institution of Lighting Professionals (ILP) ***“Guidance Notes for the Reduction of Obtrusive Light (GN01/2021).”***

The locations noted in this report (where relevant to the proposed development) will be used in Part 3- the IIP, to assess any impact the lighting from the proposed development may have upon the surrounding locality and wider environment.

This LIA is based upon the guidance in the Institution of Lighting Professionals (ILP) guidance note PLG04 ***“Guidance on Undertaking Environmental Lighting Impact Assessments”*** & the Institution of Lighting Professionals (ILP) ***“Guidance Notes for the Reduction of Obtrusive Light (GN01/2021).”*** As noted in PLG04 these assessments.... *“should only be undertaken by competent lighting professionals. The educational qualifications, training and experience will need to be summarised.”*

This report has been prepared by Sean Kielthy a full member of the Society of Light and Lighting (SLL) and an Associate member of the Institution of Lighting Professionals (ILP). He has 29 years experience in lighting with the last 6 years specifically in environmental lighting impact assessments.

Site Overview

The site is located on the edge of the town centre in Central Reading within close proximity of key local services and facilities including The Oracle shopping centre opposite, the Premier Inn hotel adjacent to the west and Reading railway station located approximately 1km to the north.

The site itself is bound by Mill Lane and the A329 to the north, Letcombe Street to the south-west and Crossland Road to the south-east, from which the Site is accessed. The site currently comprises the existing JLP warehouse building with associated car parking and servicing areas to the north-east and south-west of the building.

The existing use of the Site consists of warehouse with customer collection facilities, ancillary car park and servicing area. The use of the existing building became surplus to requirements as a customer collection centre in 2021, with its functions having been transferred to the John Lewis department store at Broad Street, Reading.

Current lighting Context

The car parking and loading bay areas of the Site are illuminated by LED floodlights mounted to the building facades. Recessed downlights are present in the soffit of the entrance canopy. No external lighting is present on the northern facade of the building.

The A329 & Mill Lane are illuminated by luminaires mounted on 30 metre high columns along the A329. Crossland Lane & Letcombe Street are illuminated by LED luminaires mounted on approximately 6 metre high columns. Building surface mounted floodlights & bulkheads are present on the developments along Crossland Lane & Letcombe Street, of which some of the lighting on these units were not operational during the period of the survey.

Heritage Context

No heritage assets exist within the Site nor is it within a conservation area. Numerous listed buildings are located in proximity to the Site, such as the Reading Friends Meeting House & St Giles Church. The Site is bound to the east by the Market Place/London Street Conservation Area.

Ecological context

A building in proximity to the Site was identified as having bat roost potential. The nearest Site of Special Scientific Interest (SSSI) located on the DEFRA Magic website is Pincents Kiln which is approximately 4 miles to the south-west.

Environmental zones

To assess the current Site and surrounding condition we refer to the Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light GN01/21.

From the data collected during the on Site survey, satellite information and professional judgement, we assess and classify the environmental zones of the Site & some surroundings to be E4 Urban, High district brightness and E3 Suburban, Medium district brightness. Well inhabited rural and urban settlements, small town centres of suburban locations. Following the guidance given by the ILP, where possible the environmental zones surrounding the proposed development should remain unchanged if permission for the proposed development is approved.



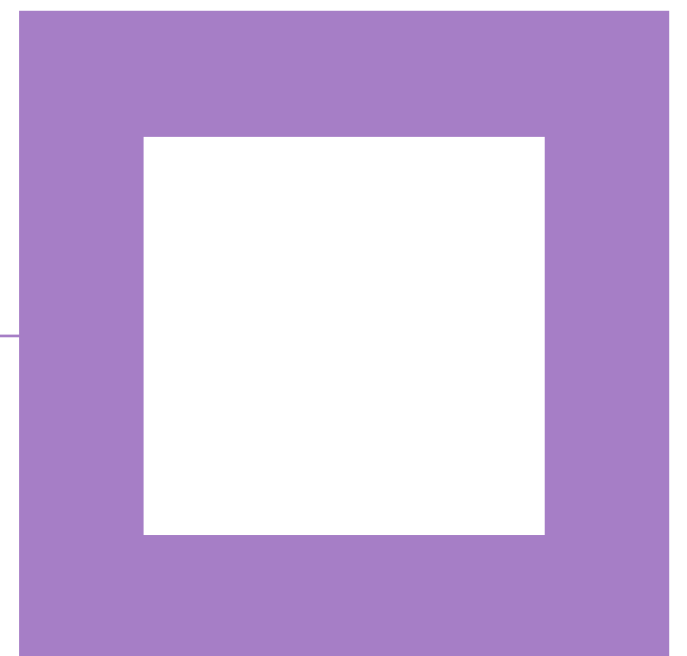
SEAN KIELTHY

PRINCIPAL ENVIRONMENTAL LIGHTING DESIGNER

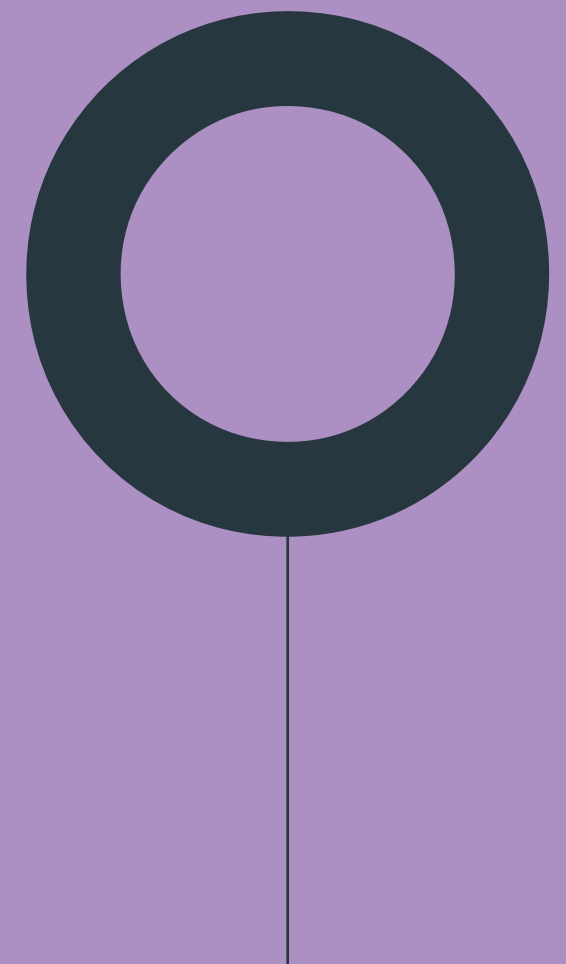
01454 806807
SEANKIELTHY@HOARELEA.COM

HOARELEA.COM

155 Aztec West
Almondsbury
Bristol
BS32 4UB



Appendix 2.

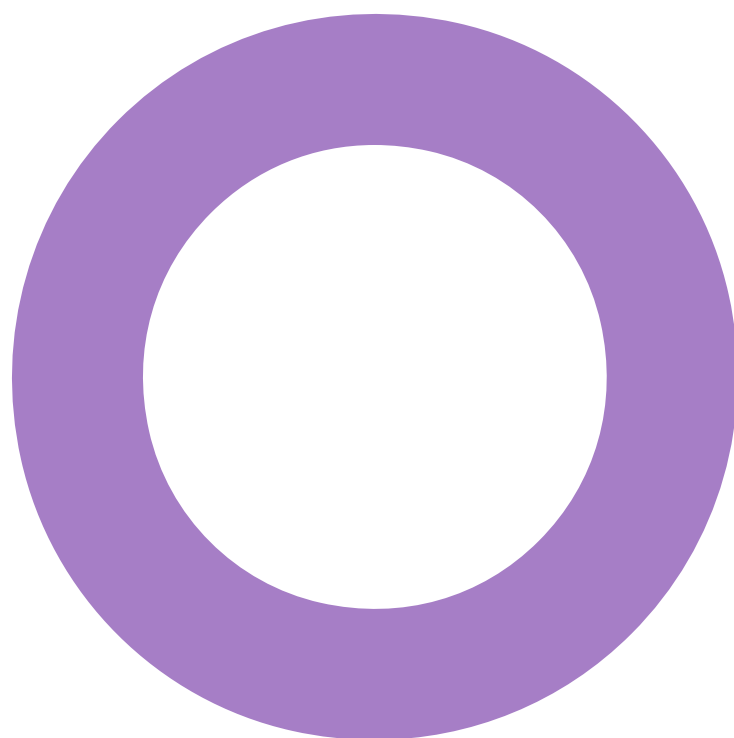


Former John Lewis Depot, Letcombe Street, Reading.
(Also known as JLP Mill Lane)
John Lewis Partnership BTR Ltd.

EXTERNAL LIGHTING DESIGN
08278-HRL-XX-XX-RP-LD-708002

P07

JUNE 2024



Audit sheet.

Rev	Date	Description	Prepared	Reviewed	Authorised
P01	14/02/2024	Stage 2+ Draft Issue	HD	JB	JR
P02	28/03/2024	Stage 2+ Draft Issue	HD	JB	JR
P03	08/04/2024	Stage 2+ Issue	HD	JB	JR
P04	30/04/2024	Stage 2+ Issue updated to comments	HD	JB	JR
P05	07/05/2024	Stage 2+ Issue updated to comments	HD	JB/SK	JR
P06	15/05/2024	Stage 2+ Issue updated to latest layout	HD	SK	JR
P07	06/06/2024	Stage 2+ Issue updated to comments	HD	SK	JR

This document has been prepared for the client from our Appointment only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Contents.

Audit Sheet.
Introduction.
Exterior Lighting Design Considerations.
Exterior Lighting Standards & Guidance.
Lighting Strategy.

Introduction.

This document has been produced as part of the RIBA Stage 2+ design process and as part of an external Lighting Impact Assessment (LIA) for a proposed development, described as the Former John Lewis Depot, Letcombe Street, Reading.

The assessment is made up of 3 separate reports, which when combined form the LIA;

- Part 1: Baseline Survey (BLS)
- Part 2: External Lighting Design (this document)
- Part 3: Illumination Impact Profile (IIP)

The external lighting design document demonstrates the proposed technical and aesthetic lighting design concept for the scheme.

The external lighting philosophy should ensure the scheme is not only visually interesting but also provides a safe and inviting environment for visitors and residents, whilst minimising the impact on the environment and the surrounding areas.

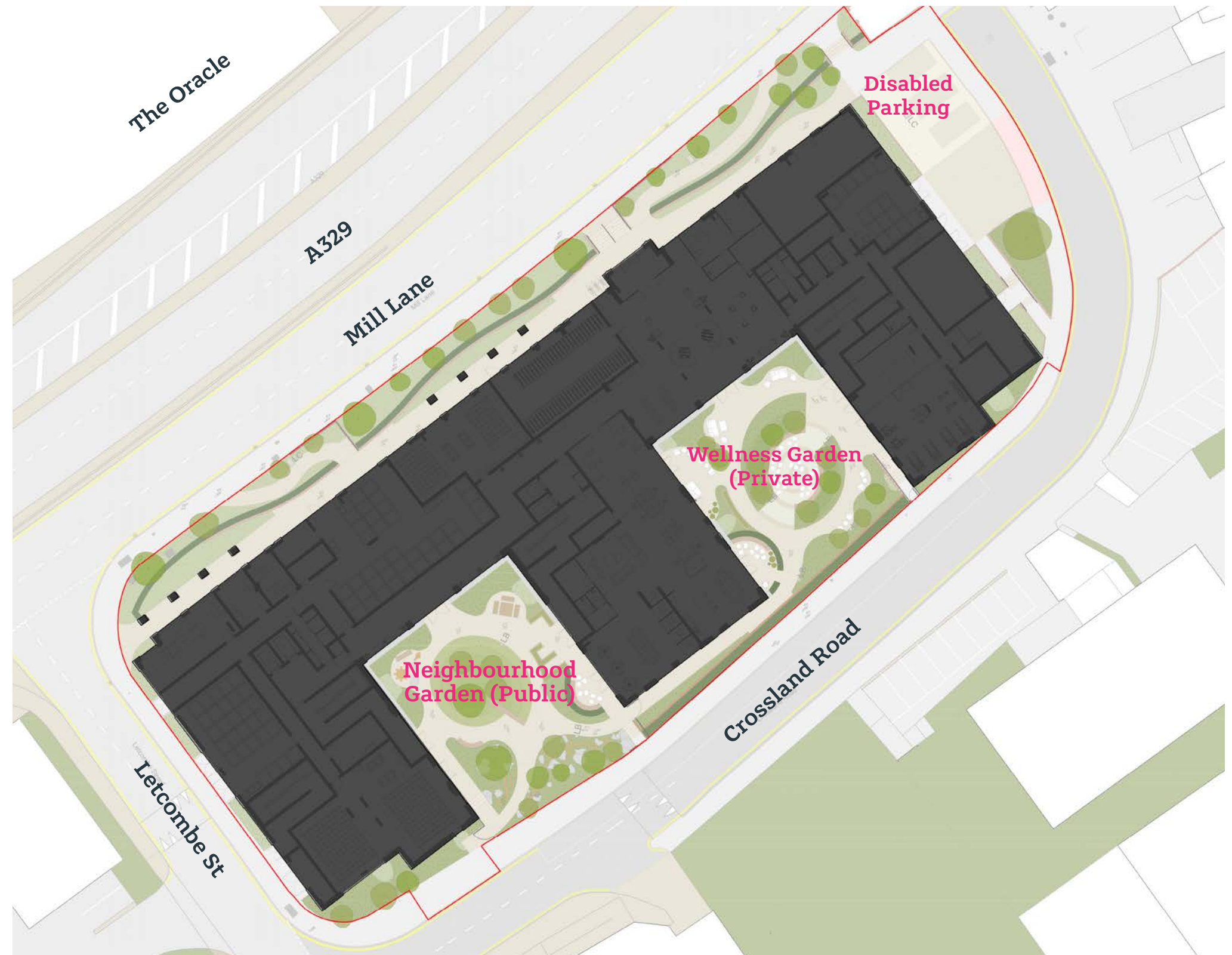
Site Description.

The site is located on the edge of the town centre in Central Reading within close proximity of key local services and facilities including The Oracle shopping centre opposite, the Premier Inn hotel adjacent to the west and Reading railway station located approximately 1km to the north.

The site itself is bound by Mill Lane and the A329 to the north, Letcombe Street to the south-west and Crossland Road to the south-east, from which the Site is accessed. The site currently comprises the vacant JLP warehouse building with associated car parking and servicing areas to the north-east and south-west of the building.

Description of Development.

Demolition of the existing building and redevelopment of the site comprising erection of a new building for up to 215 build to rent residential dwellings (Use Class C3) together with flexible commercial / community space (Use Class E/F1/F2), residents' facilities, landscaping, public realm, amenity space, cycle parking and disabled car parking.



Proposed Landscape Plan
by Camlins

Introduction.

This document has been produced as part of the RIBA Stage 2+ design process, to demonstrate the proposed technical and aesthetic lighting design concept for the proposed Build to Rent Development, on Letcombe Street, Reading.

The external lighting philosophy should ensure the scheme is not only visually interesting but also provides a safe and inviting environment for visitors and residents, whilst minimising the impact on the environment and the surrounding areas.

The scope includes the pathways, external landscaping and parking areas shown within the site boundary on the adjacent image.

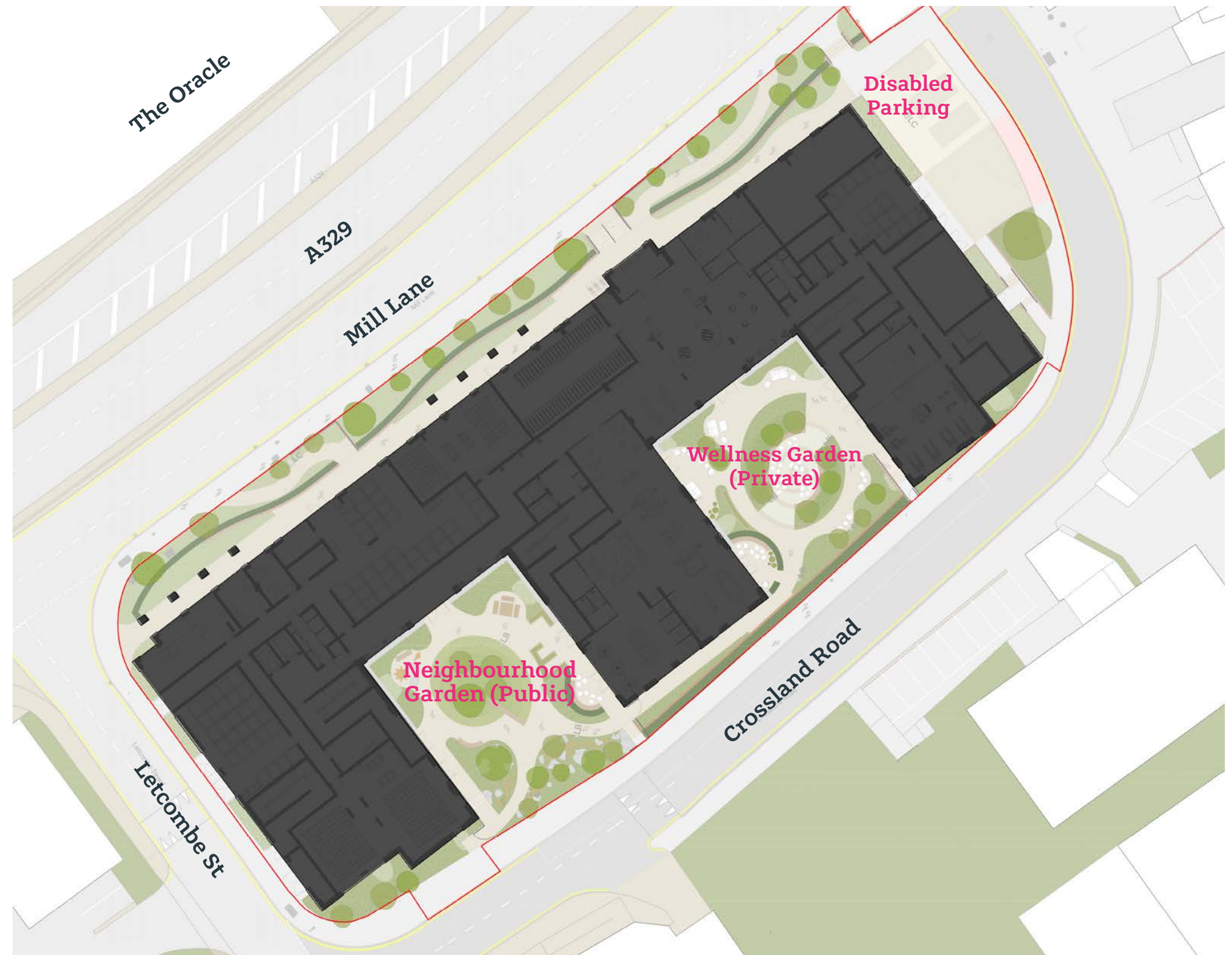
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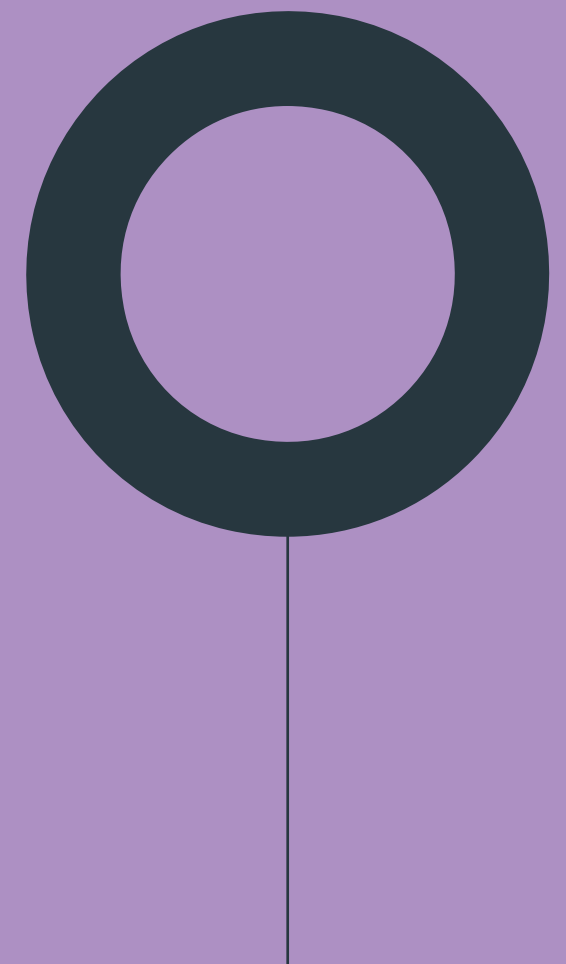
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Proposed Landscape Plan
by Camlins

Exterior Lighting Design Considerations.



Exterior Lighting Design Considerations.

External Lighting.

Good exterior lighting can play a positive role in the way people feel about their environment; it can reveal and enhance our buildings aesthetically, improve our sense of local identity, safety and civic pride and make people more willing to use the streets, squares and parks after dark.

Used correctly exterior lighting can thus boost an area's night-time use and commercial viability. For all these reasons it is generally accepted that effective, varied lighting of buildings and townscapes, both public and private, is a sound investment, that well justifies the relatively small capital and energy costs involved.

A badly-designed lighting scheme distributes light where it is not wanted, causing light pollution, while wasting energy unnecessarily and creating poor visual environments. Designed lighting solutions create better exterior schemes and give a new dimension to the urban environment at night rather than, the all too often, so called 'functional' lighting approach which adds little to the night scene.

Light Pollution.

The general heading for the negative effects of light at night is Light Pollution but this heading actually covers four key factors. These are:

- Glare occurs when the site user sees light directly from the fixture (or lamp) and contrast ratios are high.
- Light Trespass/Encroachment: Poor outdoor lighting shines onto neighbourhood properties and into bedroom windows, reducing privacy and hindering sleep. Consideration needs to be paid to areas of sensitive ecological areas, including waterways, as to not hinder wildlife.
- Sky Glow: A large fraction of poor lighting shines directly upwards, creating the adverse sky glow above towns and cities that washes out views of the dark night sky, taking away an important natural resource.
- Energy Waste: Much outdoor lighting wastes energy because it is not well-designed with light not directed where it is required.

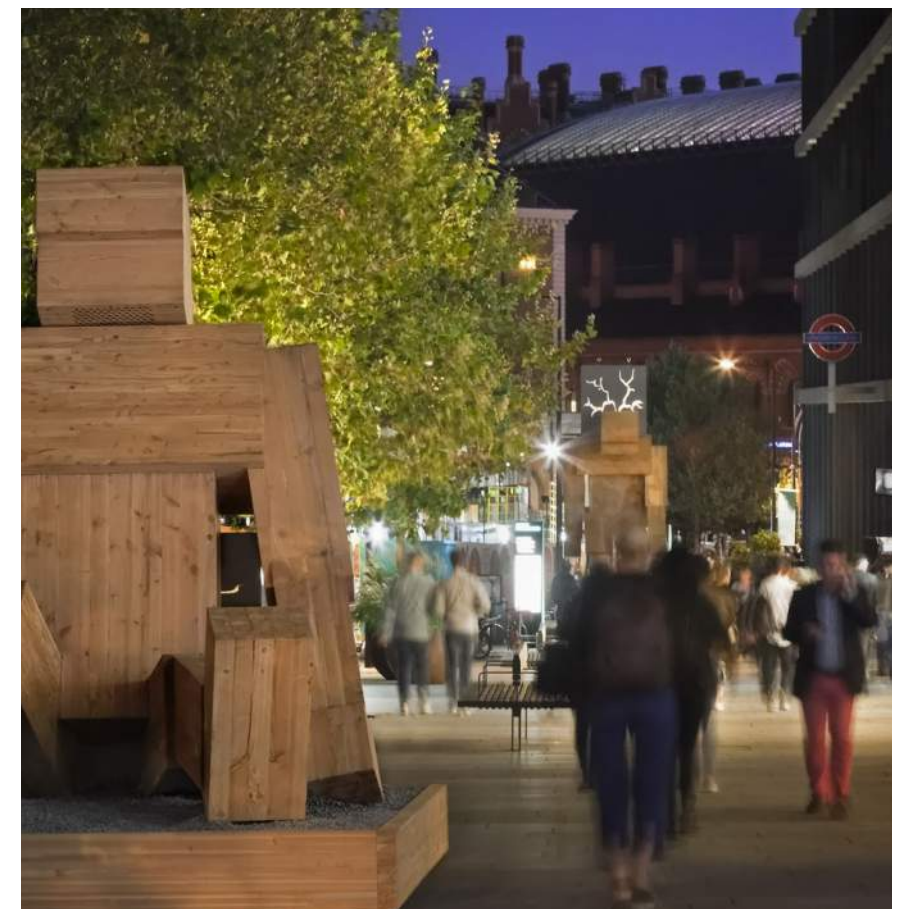
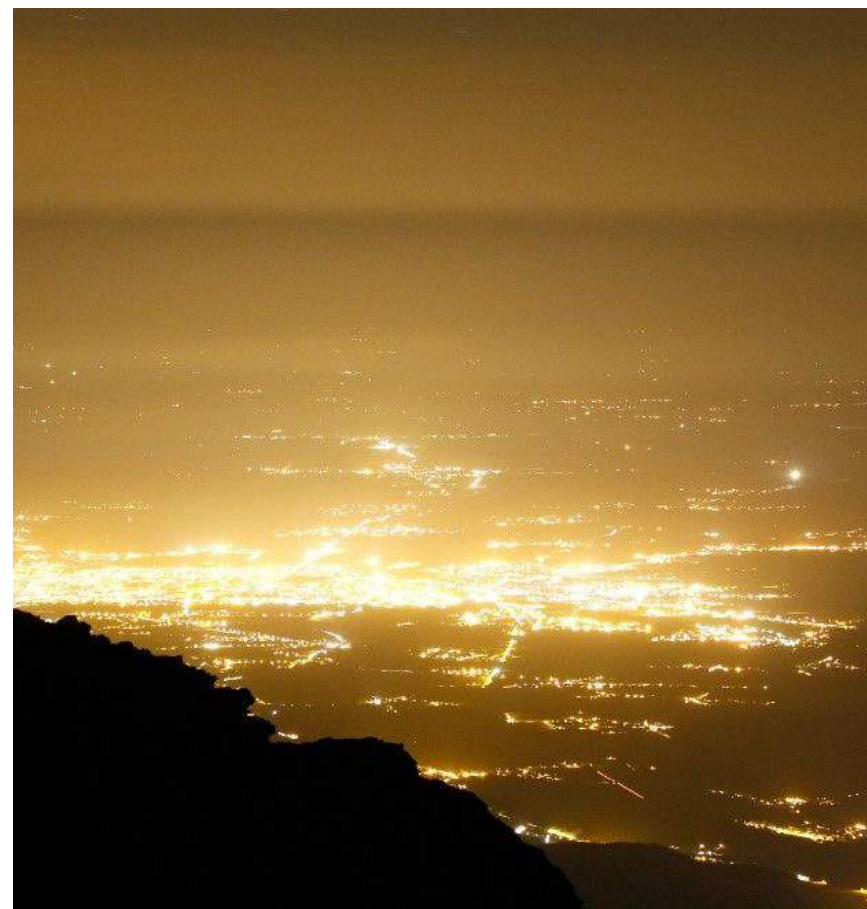
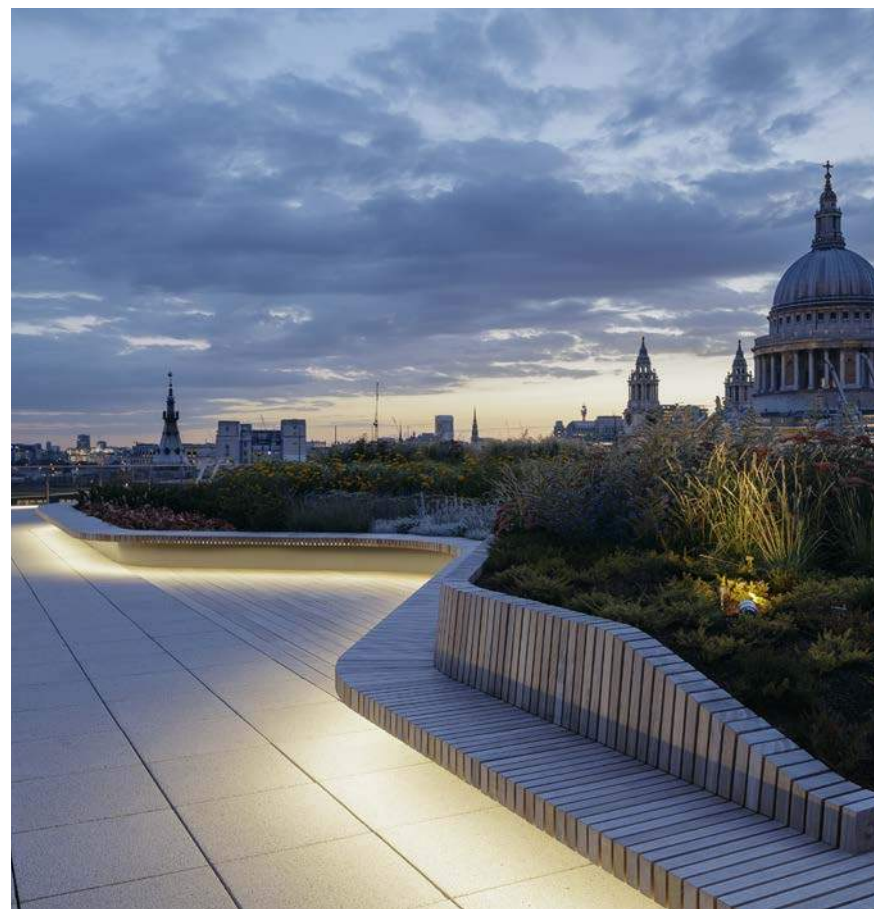
Safety & Orientation.

The amount of lighting required for obstacle avoidance and visual orientation is minimal. For example, emergency lighting standards suggest a value of between 0.5 and 1 lux for a person, in a high stress situation, to safely negotiate a safe passage. Often these low levels of illumination are provided by existing light spill and moonlight alone.

In reality the purpose of urban realm pedestrian lighting is not one of obstacle avoidance, but of human subjectivity. Research has shown that the ability to read a persons facial features in external realm environments is a key function in reducing "fear of crime".

Appropriately illuminated pedestrian areas can reduce fear of crime, which is known to encourage footfall – this in turn can increase natural and community surveillance and further deter criminal acts.

A pleasing and visually interesting exterior environment can be further enhanced by creating spaces and zones of interaction which encourage residence to utilise spaces in the evening.



Exterior Lighting Design Considerations.

Feature Elements.

Providing certain lighting treatments to landscape details and illuminating key vertical surfaces will make spaces feel more inviting and comfortable to use.

Please note that the above statement does not give us as lighting designers the freedom to do as we please or desire. There will need to be design rationale which will be focused towards providing a cohesive layered approach.

Hoare Lea Lighting feel that a layered approach to feature landscape elements should be low level with close attention paid to light distribution to these feature elements. Also, providing focused illumination to key vertical elements can provide perspective recognition which is required when persons travel through any space.

It is important that routes through the site and to building entrances are lit appropriately to give people a sense of safety and security. It is also important that there is a good balance between vertical and subject brightness.

Colour Temperature and Colour Rendering.

When one considers colour in light it is important to consider the colour of white lighting. Like daylight and sunlight, the range of colours available within the white spectrum.

Changes in white colour temperature are often an intuitive experience for people, as it relates to the natural rhythms of daylight.

Different colours of white light will provide different impressions and have differing properties when it comes to rendering surface finish.

Impressions of character and impact can be expressed through the appropriate use of colour.

The visual impact of coloured light changes in relation to illumination levels, be that through daylight or artificial light sources.

By understanding the eye's sensitivity to colour one can utilise coloured light to create a strong visual impression that would have required a greater amount of energy to achieve in white light.

Hoare Lea recommend using a warmer white light colour temperature of 2700K - 3000K, to remain in-keeping with the surrounding external lighting.

Lighting Controls.

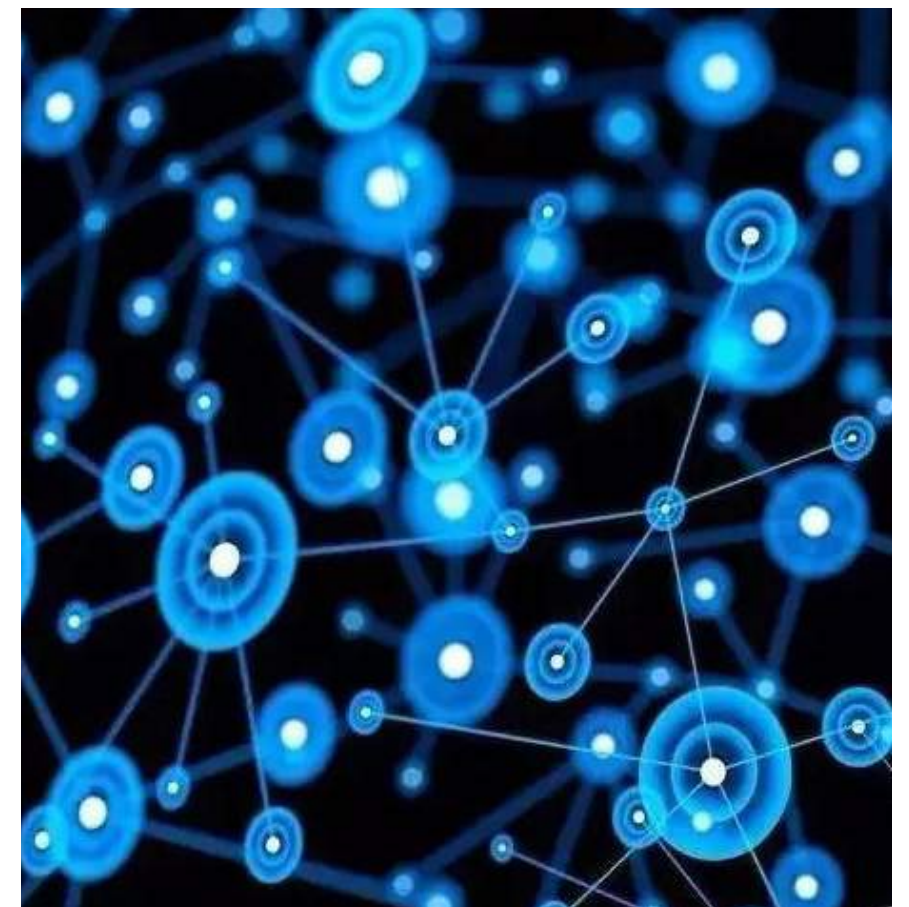
The use of lighting controls will be important in creating an external environment that is sympathetic both to the occupants of the building and surrounding neighbours. It can enable variation and can ensure the scheme is used efficiently dependant on usage, through the control of grouped fittings and their lighting output. Different lighting treatments can be kept on for alternative lengths of time/brightness dependant on the needs or requirements of the given area.

Hoare Lea recommend that all luminaires are to be dimmable, and that the exterior lighting as a whole should only be turned on in twilight hours, by using an astronomical time clock (with manual override) to determine sunset/sunrise over the course of the year. Safety and orientation lighting should remain on throughout the evening, and feature lighting should be dimmed down after curfew hours.

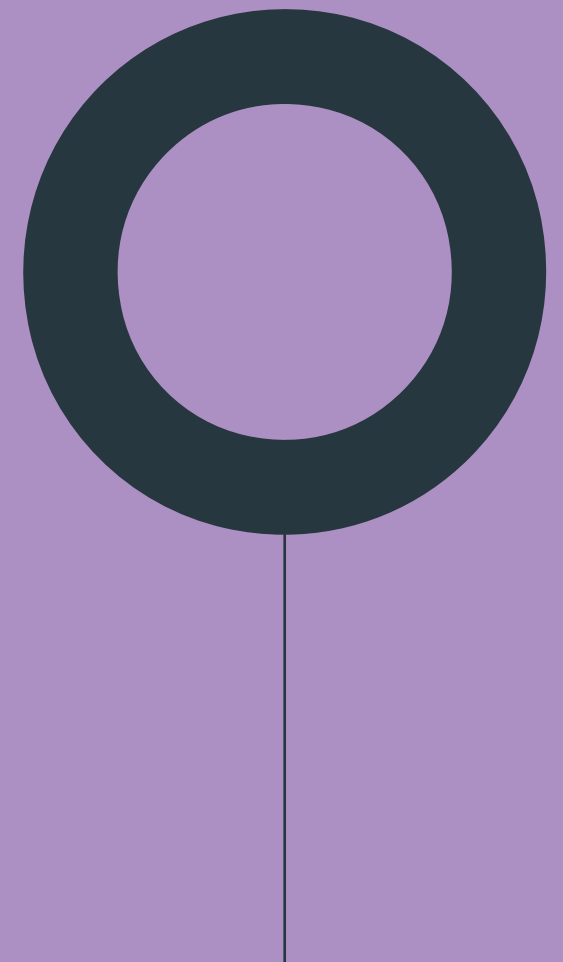
Things to consider:

- Astronomical time clocks
- Dimming
- Photocells
- Presence detection
- Curfew times*
- Manual switching

* Lighting will dim to security appropriate level during these times.



Exterior Lighting Standards & Guidance.



Exterior Lighting Standards & Guidance.

Policy and guidance.

A number of documents lay down the best practice and guidance on providing sufficient and appropriate lighting for pedestrian passage, vehicle thoroughfare and visual interest.

These include:

- BS EN 5489-1:2020
- BS EN 13201-2:2015
- CIE 136: 2000
- BS EN 12464-2:2014
- SLL Code for Lighting
- Home Quality Mark (Version 6.0)
- Reading Borough Local Plan (2019)
 - CC8: Safeguarding Amenity & EN9: Provision of Open Space.

And if appropriate:

- CIBSE Lighting Guide 6: The Outdoor Environment 2016
- CIBSE : Lighting the Environment: A guide to good urban lighting
- Secure by Design - Lighting Against Crime

Light pollution.

A number of documents lay down the best practise and guidance on reducing the visual and environmental impact of external lighting in relation to light pollution.

These are:

- CIE Technical Report - CIE 150: 2017
- ILP Guidance Note 1 for the Reduction of Obtrusive Light 2021 (GN01/21)

The implementation of these standards is vital because of "The Clean Neighbourhoods and Environmental Act, 2005" which makes light a statutory nuisance.



Exterior Lighting Standards & Guidance.

Environmental Zone Classification.

To select the most appropriate lighting classifications for within the site it is important to have an understanding of the surrounding areas. This is to ensure illuminance levels do not drop suddenly between one zone and another, creating distinct contrast and the appearance of being dark.

The area has been classified within the E4 Environmental lighting zone category.

Lighting Requirements.

It is important that the lighting applications provide both an aesthetic quality and also the appropriate levels of illumination required for the space they inhabit.

The adjacent tables have been extracted from BS 12464-1:2014 and BS5489-1:2020 to give a guide to the target levels of illumination.

It is important to remember however that these are a guide and appropriate interpretation of the space and how these requirements align with its intended use should be taken into account.

The lighting requirements within the scope area fall into the following categories:

- Pedestrian Movement

- 5 lux average, 0.25 uniformity
- Canopied Area (C1/C0 Class - BS5489-1:2020)

- 30 - 50 lux average (Light level to balance internal and adjacent external spaces)
- Steps

- 20 lux average, 10 lux minimum
- Disabled Parking

- 10 lux average, 0.25 uniformity
- Areas of Interest

- No class, illumination for ease of navigation only.

Areas which are used for social and congregation spaces, are not critical to illuminate to a uniform standard, only for navigational assistance.

NOTE: Any lighting shown within the site boundary is private.

Table 5.1 - General requirements for areas and for cleaning at outdoor workspaces

Ref.no.	Type of area, task or activity	E_m lx	U_o -	R_{GL} -	R_a -
5.1.1	Walkways exclusively for pedestrians	5	0.25	50	20
5.1.2	Traffic areas for slowly moving vehicles (max. 10km/h), e.g. bicycles, trucks and excavators	10	0.40	50	20
5.1.3	Regular vehicle traffic (max. 40km/h)	20	0.40	45	20
5.1.4	Pedestrian passages, vehicle turning, loading and unloading points	50	0.40	50	20
5.1.5	Cleaning and servicing	50	0.25	50	20

Table extracted from 'BS 12464-1:2014'

Table 3 - Maintained lighting levels for subways, footbridges, stairways and ramps

Type		Day		Night ^{a)}	
		E_{av} (lx)	E_{min} (lx)	E_{av} (lx)	E_{min} (lx)
Subways	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10
Footbridges	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10
Stairways/Ramps	Open ^{b)}	-	-	20	10
	Enclosed ^{c)}	350	150	20	10

Table extracted from 'BS5489-1:2020'

Table 4 - Maintained lighting levels for outdoor car parks

Type of area and usage	E_{av} (lx)	U_o (-)
Light traffic e.g. parking areas of shops, terraced and apartment houses: cycle parks	5	0.25
Medium traffic e.g. parking areas of department stores, office buildings, plants, sports and multi-purpose building complexes	10	0.25
Heavy traffic e.g. parking areas of major shopping centres, major sports and multi-purpose building complexes	20	0.25

Table extracted from 'BS 5489-1:2020'

Exterior Lighting Standards & Guidance.

Lighting Levels.

The adjacent plan sets out the lighting class and lighting level requirements to all the areas within scope.

A combination of lighting treatments will be provided to allow for safe navigation of the site.

Areas that are for the use as social and congregation spaces, should be treated as such and are not as critical to illuminate to a uniform standard. Feature lighting should be utilised to supplement ambient lighting to create a welcoming environment. As such these areas may not be lit to the BS5489 stated illuminance levels.

NOTE: Final exit and emergency lighting is not included in this proposal and will need to be considered and confirmed to ensure final exits and escape routes have been illuminated sufficiently. Hoare Lea recommend utilising proposed ambient lighting with integral emergency where appropriate.

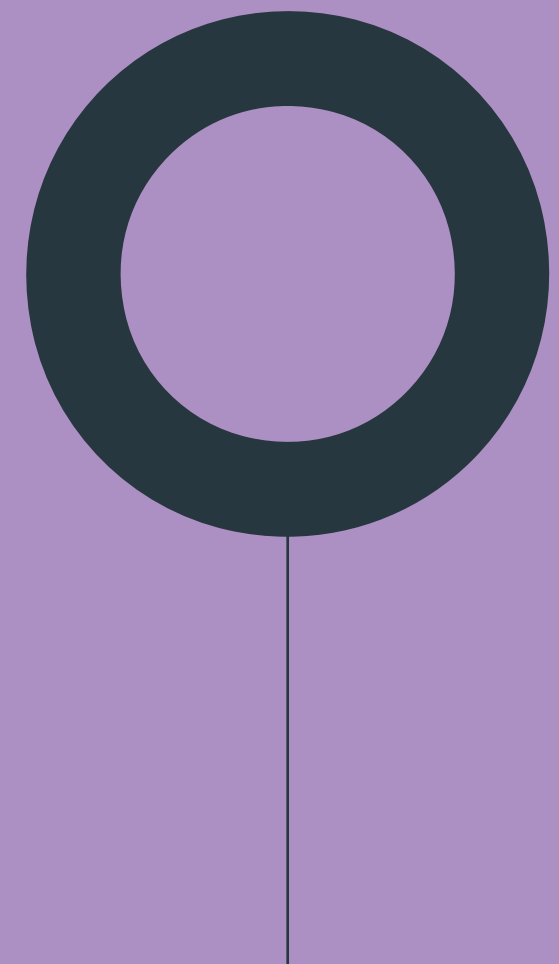
- Pedestrian Movement
- 5 lux average, 0.25 uniformity*
- Canopied Area
- 30 - 50 lux average
- Steps
- 20 lux average, 10 lux minimum
- Disabled Parking
- 10 lux average, 0.25 uniformity*
- Areas of Interest
- No class, illumination for ease of navigation only.

NOTE: *If Secure by Design is targeted, the proposed lighting values noted above may be affected. Increased uniformity will be necessary, and consideration will be required for the types of lighting products proposed.



Lighting Levels
Landscape plan by Camlins

Lighting Strategy.



Lighting Strategy.

1. Wall mounted luminaires.

Located centrally to the architectural mullions on the building facade facing Mill Lane, wall mounted luminaires are proposed to provide general illumination to the pedestrianised route following along the perimeter of the building.

To the gardens and main entrance a wall mounted luminaire of a similar aesthetic is proposed but with a smaller housing and a reduced output.

The aesthetic of the luminaires are proposed to be neat, considered and unobtrusive to the facade of the building.

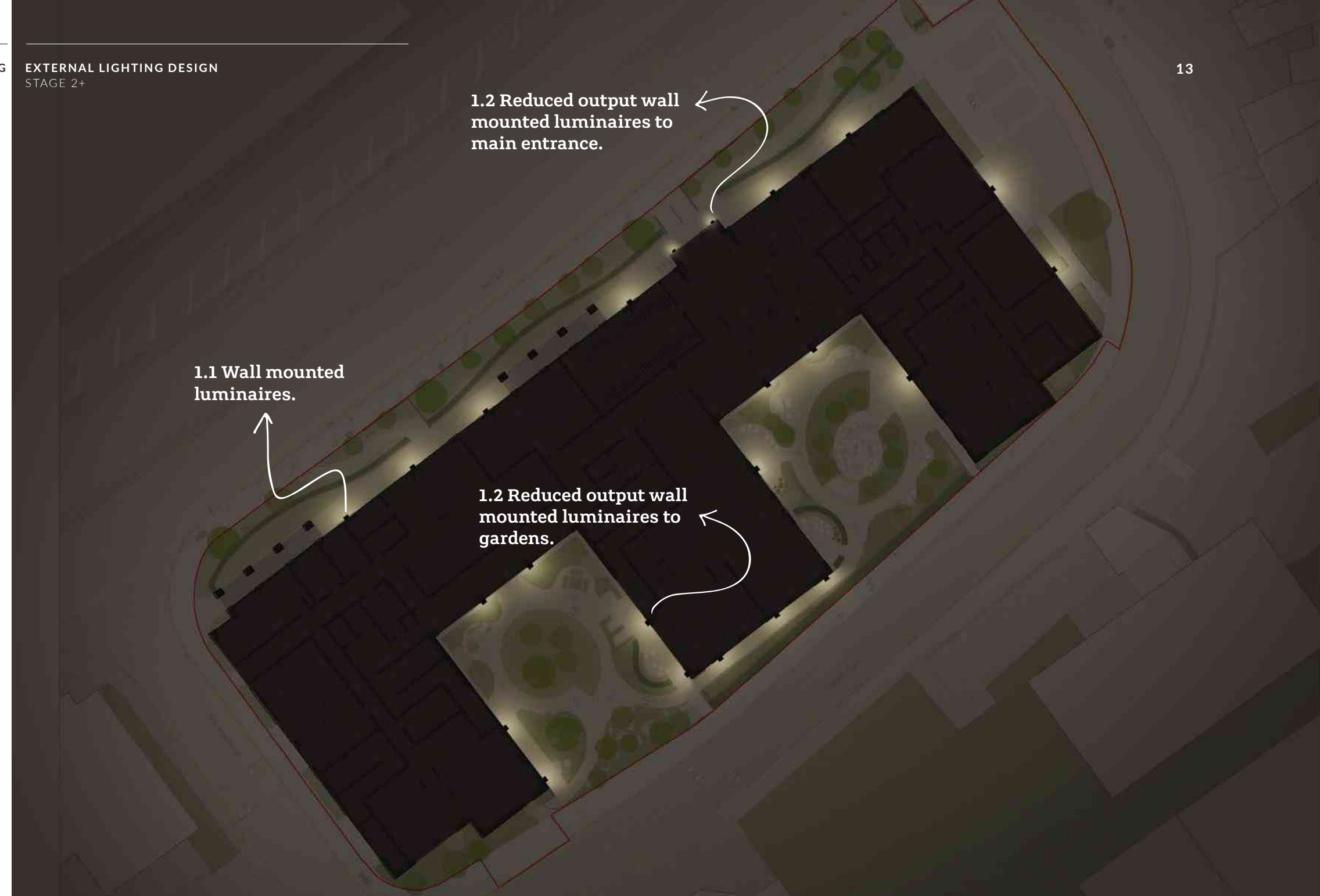
All building mounted lighting will require co-ordination and consideration to final mounting positions and cable routes required.

Typical Specifications (1.1):

- Wall mounted luminaire
- 3000K CCT
- Rectangular throw optic
- 20W

Typical Specifications (1.2):

- Wall mounted luminaire
- 3000K CCT
- Rectangular throw optic
- 11W



Typical luminaire:
Wall light to Mill Lane.



Typical luminaire:
Wall light to Gardens.



Lighting Strategy.

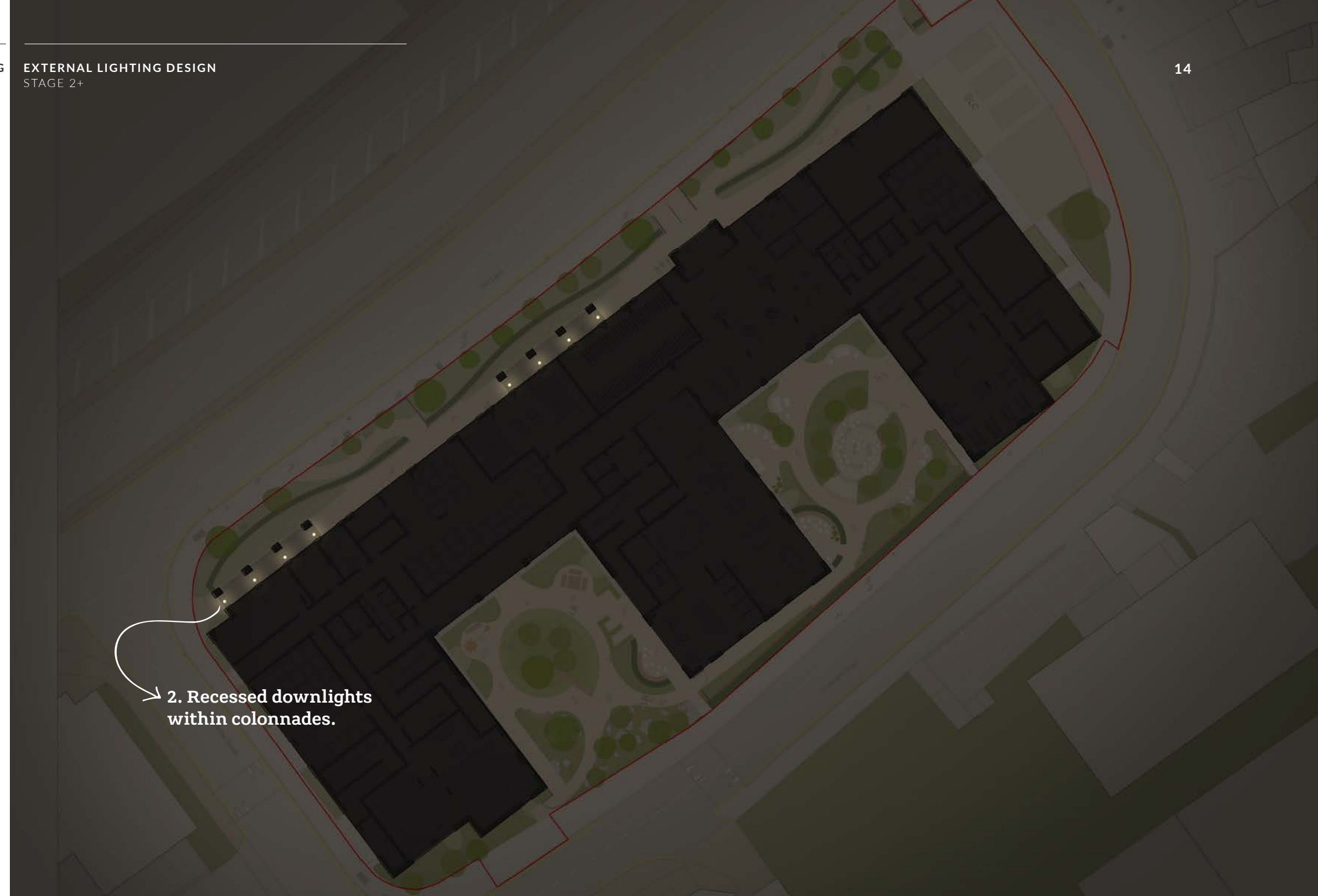
2. Recessed downlights within colonnades.

Lighting is proposed to be recessed within the colonnades, providing direct illumination onto the circulation route below.

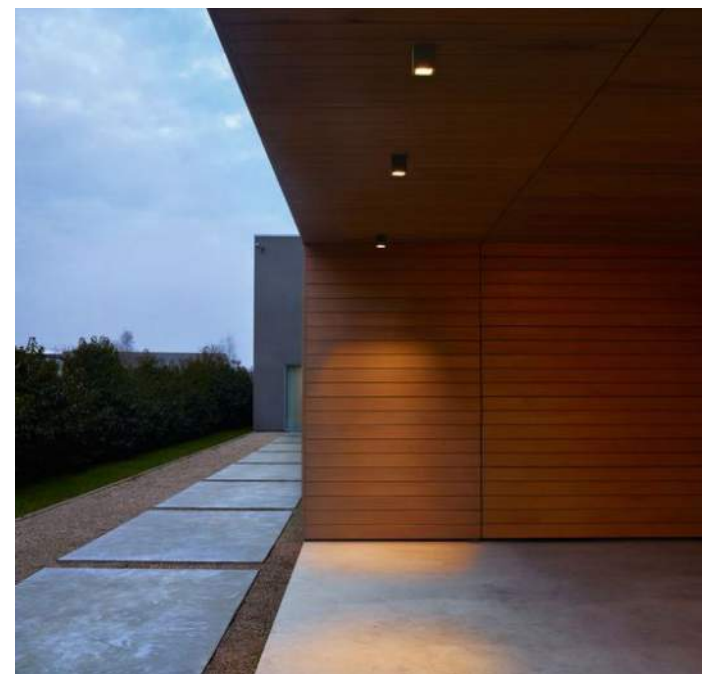
The recessed downlights have been aligned to the structural columns to provide vertical illumination through the colonnade to help balance the visual contrast within the space.

Typical Specifications:

- Recessed downlight
- 3000K CCT
- Wide beam distribution
- 7W



Typical luminaire:



Lighting Strategy.

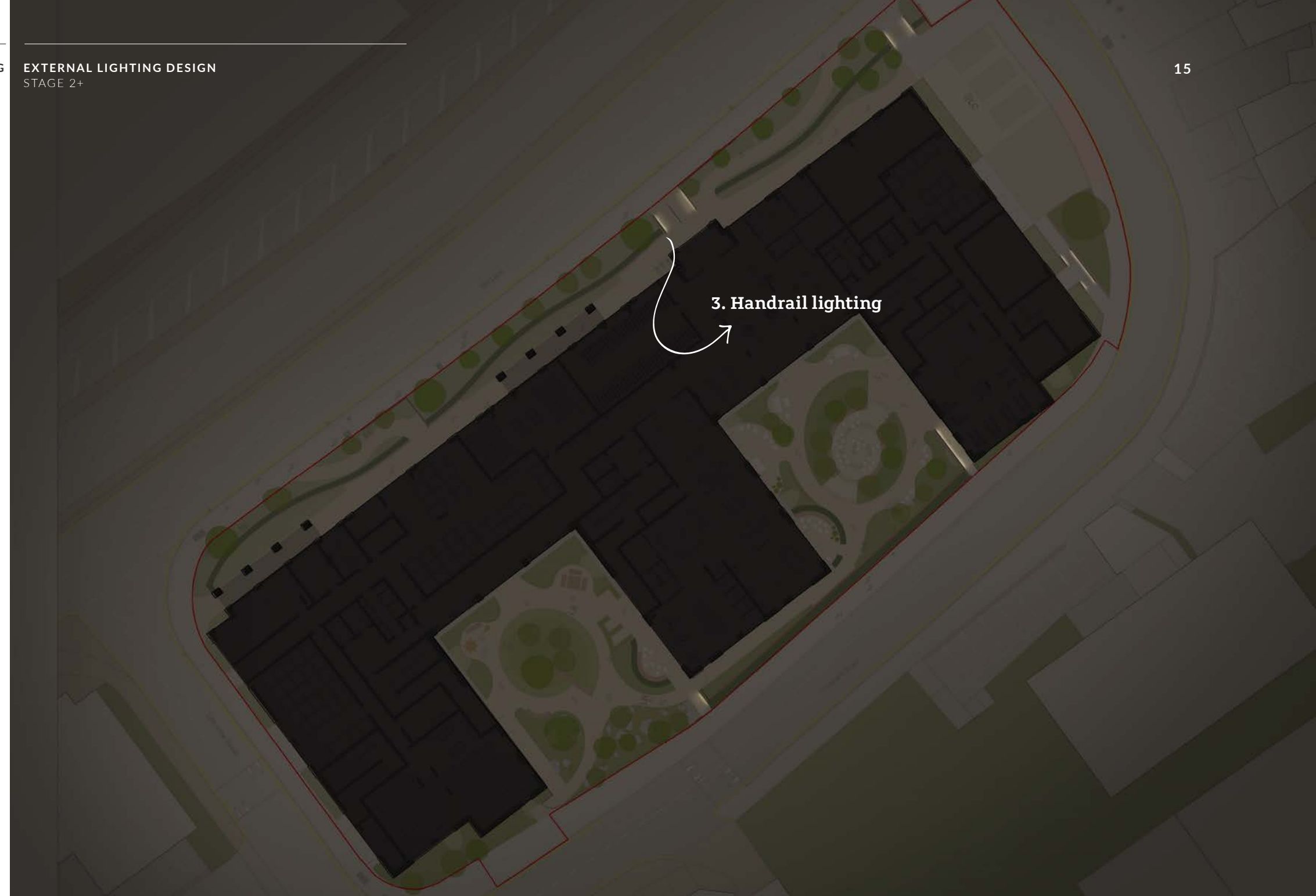
3. Handrail lighting.

Lighting integrated into the handrails over stepped areas, provides direct illumination to the steps connecting to the pedestrian circulation.

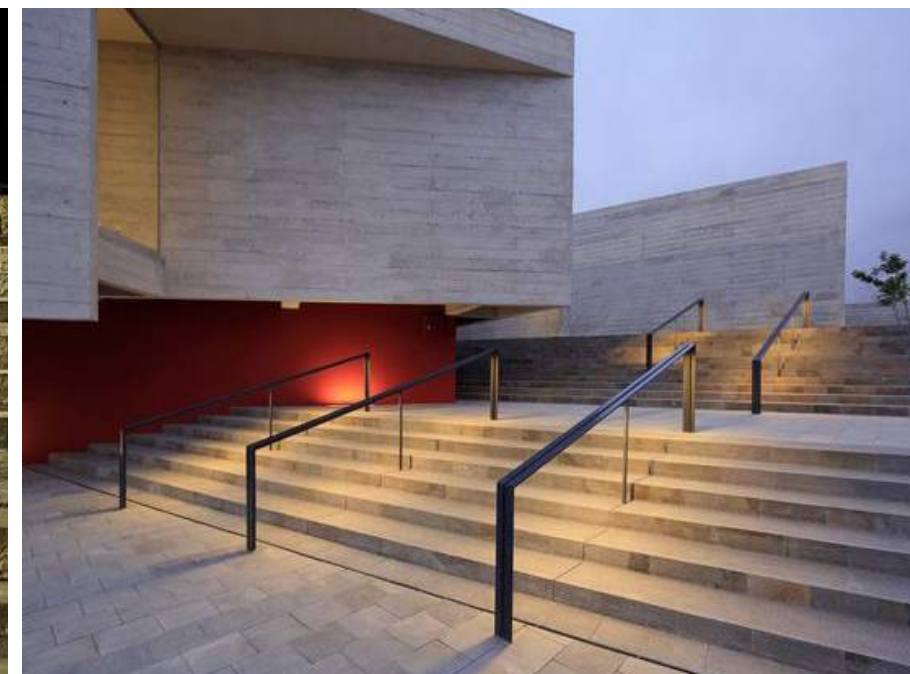
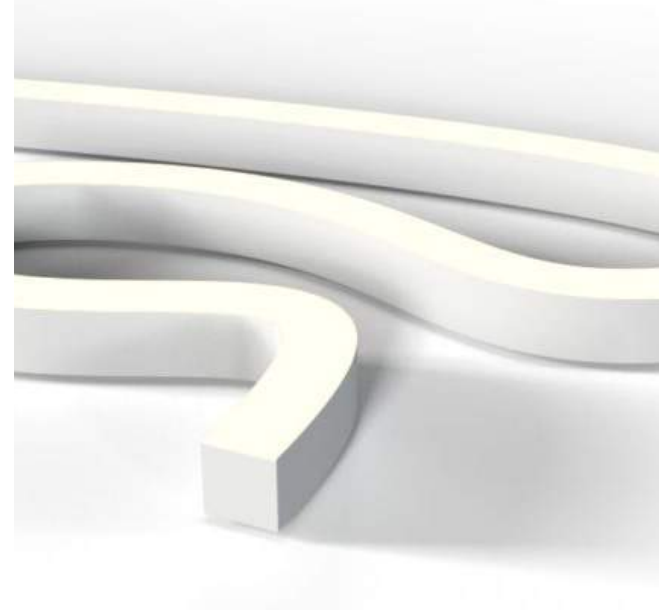
It is proposed the same luminaire type proposed for the colonnades would be used within the canopies for consistency in light output and quality, however there is flexibility on the luminaire finishes.

Typical Specifications:

- Homogeneous flexible encapsulated LED
- 2700K CCT
- 12W/m
- Attachments for luminaire integration required



Typical luminaire:



Lighting Strategy.

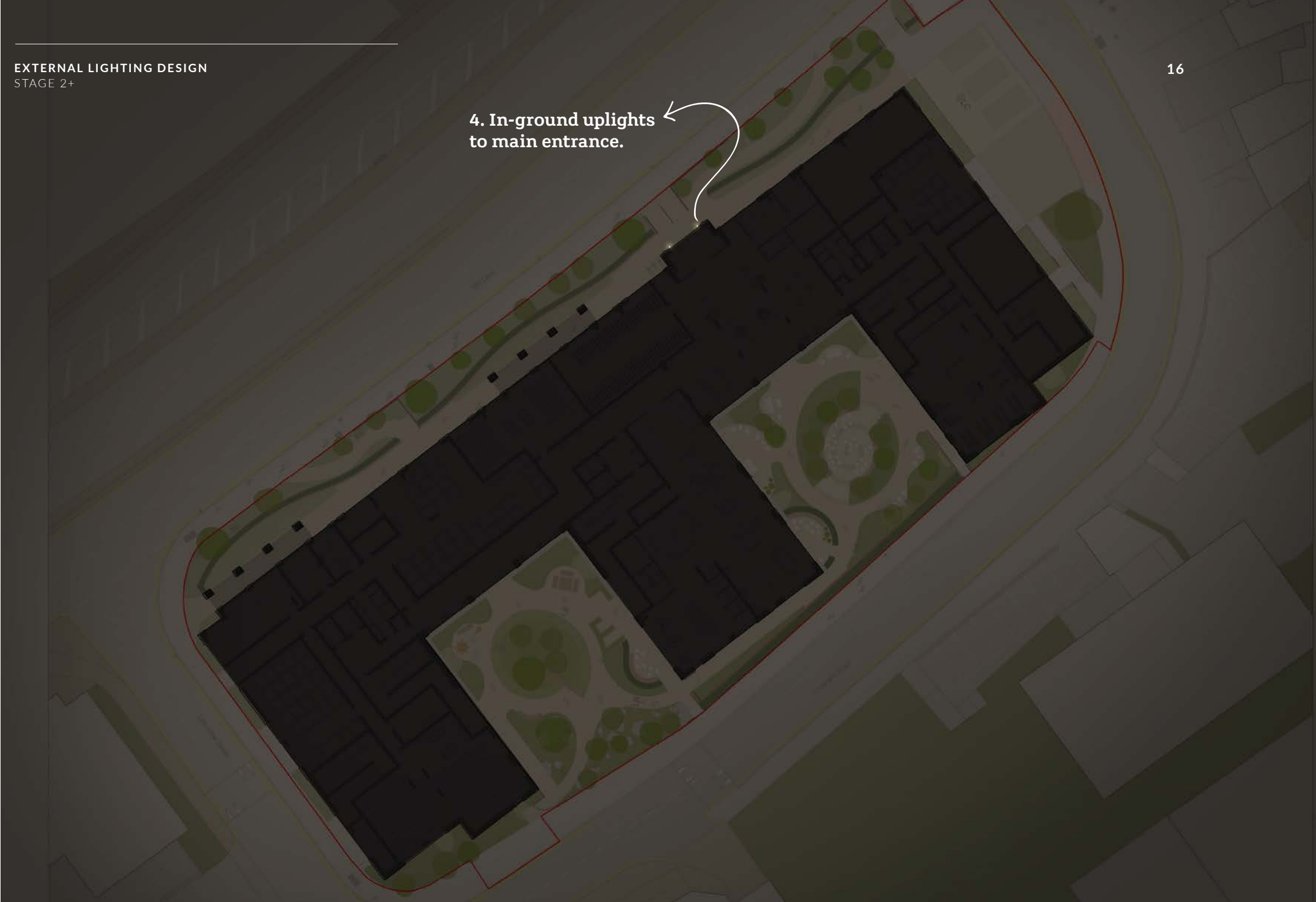
4. In-ground uplights to main entrance.

To denote and emphasise the main entrance to the building, two small in-ground uplights are proposed either side of the entrance portal to frame the main entrance.

Using a narrow beam distribution and an integral glare shield the light can be contained onto the vertical surface of the entrance.

Typical Specifications:

- In-ground uplight
- 3000K CCT
- Narrow beam distribution
- 7W



Typical luminaire:



Lighting Strategy.

5. Column lighting.

To provide illumination to the three parking spaces located at the end of Crossland Road, a 6m high column with a modern aesthetic pole-top luminaire is proposed.

To the front of the scheme two 4m columns are proposed to provide direct illumination to the ramps either side of the building, these would utilise a pathway/bicycle optic to keep the lighting contained to the pathway.

Typical Specifications (5.1):

- 6m high column mounted luminaire
- 3000K CCT
- Asymmetric forward throw distribution
- 26W

Typical Specifications (5.2):

- 4m high column mounted luminaire
- 3000K CCT
- Pathway/Bicycle optic distribution
- 16W

Note: The approximate locations of existing street lights shown are provided by the local authority and are not within our scope. We assume that these lights provide the appropriate lighting for highways.



Typical luminaire:



Lighting Strategy.

6. Bollard lighting.

To aid with way-finding at a human scale, low level bollards are proposed around the Wellness and Neighbourhood gardens.

These are to illuminate pathways in between the landscaped elements. Modern, simplistic and minimal bollards are proposed to provide direct illumination down onto the pathway only.

Typical Specifications:

- 900mm high bollard luminaires
- 3000K CCT
- Asymmetric forward throw distribution
- 7W

Note: Should Secure by Design be targeted, achieving increased uniformity may require omitting bollards from the Neighbourhood Garden (public) area, and instead opting to use columns or another alternative method of illumination.



Typical luminaire:



Lighting Strategy.

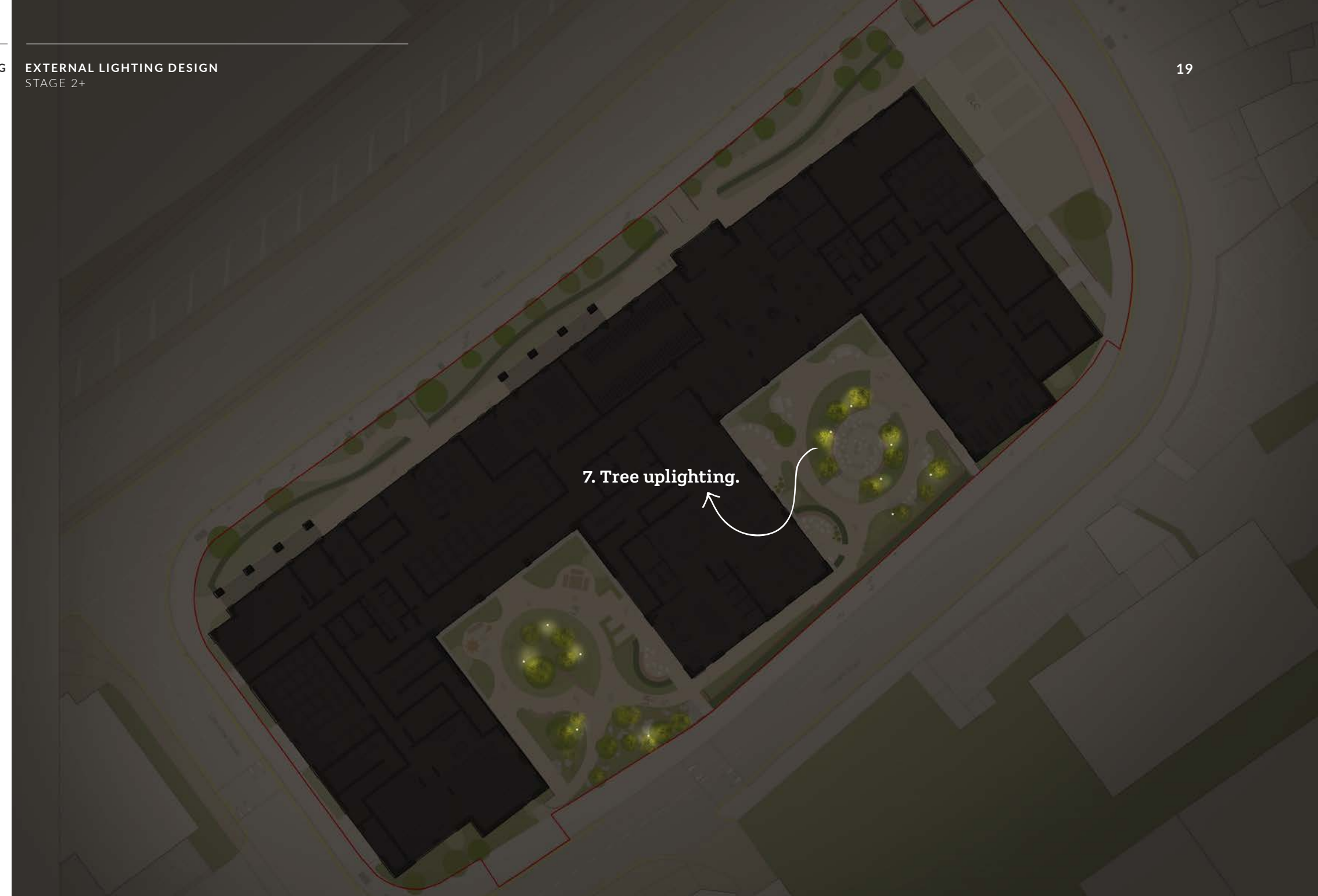
7. Tree lighting.

Low level spike mounted lighting, located within the soft landscaping is proposed to the Wellness and Neighbourhood gardens, to illuminate the lower levels of the foliage, adding illumination and visual intrigue. Consideration to anti-theft measures will be taken.

This lighting treatment is proposed to be on a time clock to minimise disturbance to residents and tree leaf cycles.

Typical Specifications:

- Spike mounted spotlight
- 2700K CCT
- Narrow beam distribution
- 7W



Typical luminaire:



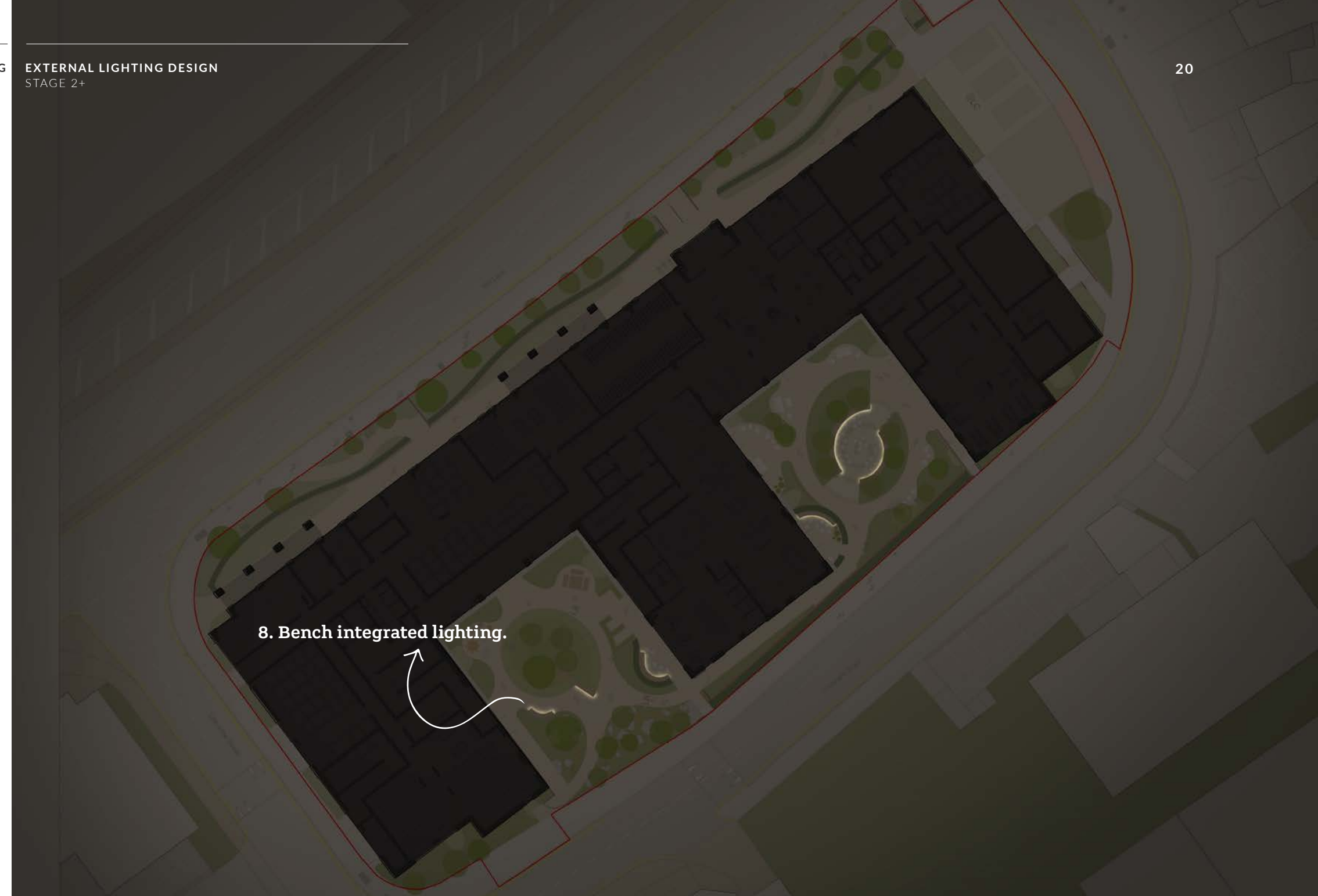
Lighting Strategy.

8. Bench integrated lighting.

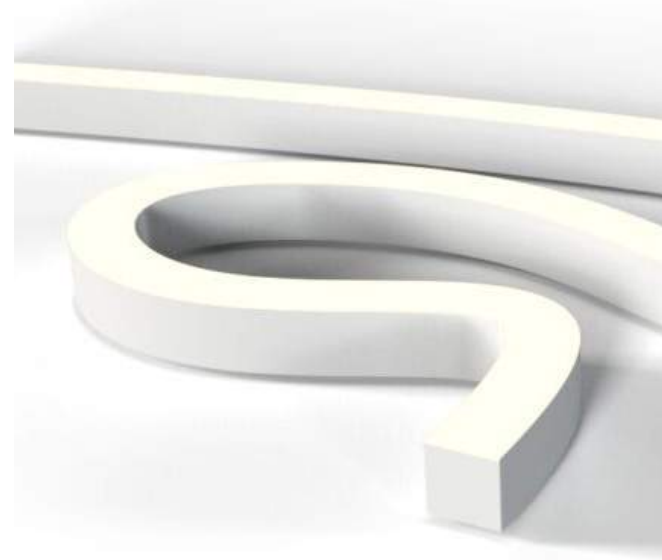
Concealed and unobtrusive lighting could be integrated into the benches to provide a wash of light into floor of the central space of the gardens. This add low level lighting creating a more personal space for the users.

Typical Specifications:

- Homogeneous flexible encapsulated LED
- 2700K CCT
- 12W/m



Typical luminaire:



Lighting Strategy.

Lighting Overview.





HOARELEA.COM

12 - 13 Western Transit Shed
Stable Street
London
N1C 4AB

