

THAMES VALLEY SCIENCE PARK

LIGHTING STRATEGY

DFL-UK

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Designs for Lighting (DFL) is a business built on successfully collaborating with our clients. We have over 20 years proven experience in our industry, listening to the challenges our clients face, developing the best solutions and being innovators in our specialism. Our role is to find the most effective and sustainable outcome to enhance and support your projects. We proudly work with recognised industry bodies to promote and shape the future of the industry and ensure our staff are trained to exceed the required competency levels of our industries. Above all, we ensure each project delivers against our values.



Quality



Knowledgeable



Dependable



Clear Advice

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1. INTRODUCTION

1.1. General

- 1.1.1. This Lighting Strategy has been written by DFL (Designs for Lighting Ltd), a lighting design consultancy specialising in Lighting Impact Assessments, obtrusive light mitigation, and detailed lighting design.
- 1.1.2. DFL are providing Abley Letchford, the lead engineering consultant, with lighting technical support.
- 1.1.3. The Lighting Strategy proposes good practice and outlines the approach for the proposed lighting for the Proposed Development. An application description has been provided from Abley Letchford:
- “Full planning permission for the construction of a Spine Road between the Thames Valley Science Park (Application Ref: 232995) and Loddon Garden Village (Application Ref: 252498) to support delivery of Local Plan Update Policy SS13, landscaping, surface water attenuation and other associated works”.*
- 1.1.4. The Lighting Strategy is intended to set out a minimally obtrusive approach to the lighting, whilst ensuring it is necessary and considers the sensitivity of nearby ecological receptors.
- 1.1.5. This report outlines the following:
- > Relevant National and Local Policies
 - > Relevant obtrusive light policies in direct relation to the Proposed Development
 - > Relevant standards and guidance to be followed when designing the lighting for the Proposed Development
 - > Local Authority lighting specifications
 - > An assessment of the environmental zone applicable to the Proposed Development
 - > Details as to how lighting will be implemented for the Proposed Development
 - > Details of the mitigation that is embedded into the Lighting Strategy for the Proposed Development

2. LEGISLATIVE FRAMEWORKS AND NATIONAL POLICIES

2.1. Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

- 2.1.1. Since 2005, artificial light has been incorporated as a potential statutory nuisance. An amendment to section 79 of the Environmental Protection Act 1990, contained within the Clean Neighbourhoods and Environment Act 2005 states:

“The following matters constitute “statutory nuisances” for the purposes of this Part, that is to say— [...]

[...] artificial light emitted from premises so as to be prejudicial to health or a nuisance;

[...]and it shall be the duty of every local authority to cause its area to be inspected from time to time to detect any statutory nuisances which ought to be dealt with under section 80 and, where a complaint of a statutory nuisance is made to it by a person living within its area, to take such steps as are reasonably practicable to investigate the complaint”.

2.2. National Planning Policy Framework 2024 (Published 2025)

The National Planning Policy Framework (NPPF) sets out the government’s planning policies for England and how they are expected to be applied and provides a framework for local plans. With regard to light pollution, the NPPF was updated in February 2025 and states that the following elements are to be considered:

“198. 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:

- > mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- > identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- > limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

2.3. Planning Practice Guidance

- 2.3.1. Guidance for assessing the effects of proposed artificial lighting is outlined in the planning practice guidance (PPG). The guidance states the following in 002 Reference ID: 31-002-20191101:

“Does an existing lighting installation make the proposed location for a development unsuitable, or suitable only with appropriate mitigation? For example, this might be because:

- > the artificial light has a significant effect on the locality; and/or*
- > users of the Proposed Development (e.g., a hospital) may be particularly sensitive to light intrusion from the existing light source.*

Where necessary, development proposed in the vicinity of existing activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme, reflecting the agent of change principle. Additional guidance on applying this principle is set out in the planning practice guidance on noise.

- > Will a new development, or a proposed change to an existing site, be likely to materially alter light levels in the environment around the site and/or have the potential to adversely affect the use or enjoyment of nearby buildings or open spaces?*
- > Will the impact of new lighting conflict with the needs of specialist facilities requiring low levels of surrounding light (such as observatories, airports and general aviation facilities)? Impacts on other activities that rely on low levels of light such as astronomy may also be a consideration but will need to be considered in terms of both their severity and alongside the wider benefits of the development.*
- > Is the development in or near a protected area of dark sky or an intrinsically dark landscape where new lighting would be conspicuously out of keeping with local nocturnal light levels, making it desirable to minimise or avoid new lighting?*
- > Would new lighting have any safety impacts, for example in creating a hazard for road users?*
- > Is a proposal likely to have a significant impact on a protected site or species? This could be a particular concern where forms of artificial light with a potentially high impact on wildlife and ecosystems (e.g. white or ultraviolet light) are being proposed close to protected sites, sensitive wildlife receptors or areas, including where the light is likely to shine on water where bats feed.*
- > Does the Proposed Development include smooth, reflective building materials, including large horizontal expanses of glass, particularly near water bodies? (As it may change natural light, creating polarised light pollution that can affect wildlife behaviour.)”*

3. LOCAL POLICIES

3.1. Wokingham Borough Council- Local Development Framework – Adopted Core Strategy Development Plan Document January 2010

- 3.1.1. The designing of the lighting for the Proposed Development will be informed by guidance and policies as detailed within the Wokingham Borough Council- Local Development Framework – Adopted Core Strategy Development Plan Document January 2010.

“CP1 – Sustainable Development

Planning permission will be granted for development proposals that:

- 1) *Maintain or enhance the high quality of the environment;*
- 2) *Minimise the emission of pollutants into the wider environment;*
- 3) *Limit any adverse effects on water quality (including ground water);*
- 4) *Ensure the provision of adequate drainage;*
- 5) *Minimise the consumption and use of resources and provide for recycling;*
- 6) *Incorporate facilities for recycling of water and waste to help reduce per capita water consumption;*
- 7) *Avoid areas of best and most versatile agricultural land;*
- 8) *Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;*
- 9) *Avoid increasing (and where possible reduce) risks of or from all forms of flooding (including from groundwater);*
- 10) *Provide attractive, functional, accessible, safe, secure and adaptable schemes;*
- 11) *Demonstrate how they support opportunities for reducing the need to travel, particularly by private car in line with CP6; and*
- 12) *Contribute towards the goal of reaching zero-carbon developments⁴¹ as soon as possible by:*
 - a) *Including appropriate on-site renewable energy features; and*
 - b) *Minimising energy and water consumption by measures including the use of appropriate layout and orientation, building form, design and construction, and design to take account of microclimate so as to minimise carbon dioxide emissions through giving careful consideration to how all aspects of development form.”*

“CP3 - General Principles for development

Planning permission will be granted for proposals that:

- a) *Are of an appropriate scale of activity, mass, layout, built form, height, materials and character to the area together with a high quality of design without detriment to the amenities of adjoining land users including open spaces or occupiers and their quality of life;*
- b) *Provide a functional, accessible, safe, secure and adaptable scheme;*
- c) *Have no detrimental impact upon important ecological, heritage, landscape (including river valleys) or geological features or water courses.*
- d) *Maintain or enhance the ability of the site to support fauna and flora including protected species;*
- e) *Use the full potential of the site and contribute to the support for suitable complementary facilities and uses;*
- f) *Contribute to a sense of place in the buildings and spaces themselves and in the way they integrate with their surroundings (especially existing dwellings) including the use of appropriate landscaping;*
- g) *Provide for a framework of open space in secure community use achieving at least 4.65 ha/1,000 population provision together with recreational/sporting facilities in addition to private amenity space;*
- h) *Contribute towards the provision of an appropriate sustainable network of community facilities;*
- i) *Do not lead to a net loss of dwellings and other residential accommodation or land; and*
- j) *Do not lead to a loss of community or recreational facilities/land or infrastructure unless suitable alternative provision is available.*

Development proposals will be required to demonstrate how they have responded to the above criteria through the submission of Design and Access Statements, clear and informative plans, elevations and streetscenes and where required Masterplans, Development Briefs, Concept Statements and Design Codes.”

“CP7 - Biodiversity

Sites designated as of importance for nature conservation at an international or national level will be conserved and enhanced and inappropriate development will be resisted. The degree of protection given will be appropriate to the status of the site in terms of its international or national importance.

Development:

A) Which may harm county designated sites (Local Wildlife Sites in Berkshire), whether directly or indirectly, or

B) Which may harm habitats or, species of principle importance in England for nature conservation, veteran trees or features of the landscape that are of major importance for wild flora and fauna (including wildlife and river corridors), whether directly or indirectly, or

C) That compromises the implementation of the national, regional, county and local biodiversity action plans will be only permitted if it has been clearly demonstrated that the need for the proposal outweighs the need to safeguard the nature conservation importance, that no alternative site that would result in less or no harm is available which will meet the need, and:

i) Mitigation measures can be put in place to prevent damaging impacts;

or

ii) Appropriate compensation measures to offset the scale and kind of losses are provided.”

3.2. Wokingham Borough Council- Local Development Framework – Adopted Managing Development Delivery Local Plan February 2014

3.2.1. The designing of the lighting for the Proposed Development will be informed by guidance and policies as detailed within the Wokingham Borough Council- Local Development Framework – Adopted Managing Development Delivery Local Plan February 2014

“Policy TB23: Biodiversity and Development

1. Sites of national or international importance are shown and sites of local importance are defined on the Policies Map.

2. Planning permission for development proposals will only be granted where they comply with policy CP7 – Biodiversity of the Core Strategy and also demonstrate how they:

a) Provide opportunities, including through design, layout and landscaping to incorporate new biodiversity features or enhance existing

b) Provide appropriate buffer zones between development proposals and designated sites as well as habitats and species of principle importance for nature conservation

c) Ensure that all existing and new developments are ecologically permeable through the protection of existing and the provision of new continuous wildlife corridors, which shall be integrated and linked to the wider green infrastructure network.”

3.3. Wokingham Borough Council – Right Homes, Right Places – Wokingham Borough Local Plan Update 2023-2040 Proposed Submission Plan

- 3.3.1. The designing of the lighting for the Proposed Development will be informed by guidance and policies as detailed within the Wokingham Borough Council- Right Homes, Right Places – Local Plan update 2023-2040 Proposed Submission Plan.

Policy SS13: Loddon Valley Garden Village

“The area identified as Loddon Valley Garden Village Strategic Development Location, as shown on the policies map, is allocated for a beautifully and imaginatively designed community including housing, employment, social and physical infrastructure.

Place shaping principles

The siting, layout, and form of development, including landscaping should:

- a) Draw on and enhance the site’s context, changes in topography and its considerable natural assets such as the River Loddon and Barkham Brook, irreplaceable habitats, and hedgerows, trees, woodland and other features*
- ;b) Protect and retain the permanent physical and visual sense of separation of Arborfield and the defined settlements of Arborfield Cross and Shinfield*
- c) Be designed around a series of walkable neighbourhoods, each providing a range of accessible services and facilities. Where important local facilities are necessarily located beyond the neighbourhood, these should be linked by accessible and attractive routes which support and encourage active travel. The promotion of community facilities for shared use, such as outdoor and indoor sports and leisure provision will be strongly encouraged*
- d) Establish a comprehensive and integrated network of high-quality and attractive active travel routes, greenways and bus services within the garden village and to destinations in the wider area*
- e) Incorporate measures to protect the separate identity of Carter’s Hill*
- f) Incorporate measures to conservation and enhancement of heritage assets, including listed buildings, through appropriate design and the provision of sufficient space;*
-) Locate district and local centres where they are accessible to the planned housing, and are of an appropriate scale to meet the day-to-day needs with a range of retail (including food store of around 2,500m²), leisure, cultural, community, health and service facilities*
- h) Locate higher development densities around the district and local centres, transport nodes, and along public transport routes subject to site specific sensitivities such as landscape, character and heritage*

i) Locate new buildings, except those for water compatible uses, outside areas of flood risk, with development planned for sequentially, by placing the most vulnerable development in the lowest areas of flood risk; and

j) Draw on the recreational and ecological opportunities of the River Loddon and Barkham Brook to create a multi-functional country park which provides coherent ecological networks, recreational opportunities and active travel connectivity.

Masterplanning

To ensure that development comes forward in a strategic, coordinated and comprehensive manner, delivery should be led by a single agreed vision and masterplan for the whole garden village that demonstrates how the principles established in this policy and supporting guidance in Appendix C have been considered to ensure high quality development. The masterplan must be produced in partnership between the council, developers, landowners and key stakeholders, and involve consultation with the local community. Development proposals on individual land parcels must accord with the principles and requirements set out in the agreed vision and masterplan. The masterplan must provide:

- a) A coordinated and comprehensive landscape led approach to development of the whole Loddon Valley Garden Village to avoid piecemeal and ad-hoc development proposals*
- b) A strategy for the quantum and distribution of land uses, access points, design and layout principles (including a strategic design code) which draws on a detailed understanding of the area’s characteristics, opportunities and constraints*
- c) A strategy for the timely delivery of facilities and infrastructure necessary to support each phase of delivery and the garden village as a whole*
- d) A strategy for creating a distinctive and sustainable community, embracing the best of town and country and that delivers climate resilience; and*
- e) A strategy for integrating and implementing arts and cultural activities including public art*

Landscape and green and blue infrastructure

Development proposals should devise and implement a comprehensive strategic landscape and green and blue infrastructure strategy that:

- a) Provides a new country park incorporating the River Loddon and Barkham Brook that contributes to, and enhances, coherent ecological networks and habitats, which are integrated into the wider green and blue infrastructure beyond the garden village;*
- b) Protects and enhances the identified attributes of the River Loddon Valued Landscape and Barkham and Bearwood Valued Landscape;*

c) Provide a network of connected, accessible and high-quality open spaces that includes tree lined streets, opportunities for local food growing and natural play, that integrate with the wider green and blue infrastructure network;

d) Retains, and incorporates appropriate buffers for, ancient woodland, ancient or veteran trees, watercourses, hedgerows, and other trees into the connected green and blue infrastructure of the site;

e) Provides a network of safe, attractive, landscaped and accessible public rights of way across the site, and where appropriate demonstrates how they connect into the existing rights of way network;

f) Contributes to establishing the Loddon long distance footpath for active travel; and

g) Establishes clear and robust arrangements for future maintenance

..."

3.4. Wokingham Borough Council Street Lighting Design, Adoption Process and Specification Guide – Appendix A (June 2023)

3.4.1. Where street lighting is to be adopted by the Local Highway Authority (LHA), it will follow the guidance and specification as set out within Wokingham Borough Council Street Lighting Design, Adoption Process and Specification Guide – Appendix A (June 2023) and summarised in **Tables 1-3**.

Approx. full Carriageway Width (does not include adjacent footpath or verge)	Residential Roads	Estate Distributor Roads	Main Traffic Routes
5 to 6m	5m + Type A lantern	5m + Type A lantern	6m
6 to 7m	6m + Type B lantern	6m + Type B lantern	8m + Type C lantern
7 to 9m	6m + Type B lantern	8m + Type C lantern	10m + Type D lantern
Dual Carriageways	Not normally applicable	10m + Type D lantern	12m + Type E lantern

Table 1: Wokingham Borough Council Street Lighting Columns – Suggested Column Heights & Lantern Combinations

Notes to **Table 1**:

- The above heights are for guidance only and exact requirements will be subject to design requirements for illumination levels, uniformity, and glare, etc. It may also be necessary to increase heights at “Conflict Zones” such as roundabouts or at special road features such as pedestrian crossings or reduce heights where a column may be in proximity to overhead power lines, etc.

Type (see Table 1)	Model	Gear/Driver	Control/Dimmer Unit
Type A	Philips Signify “Micro-Luma” BGP615 DM10 2,000lm NW LED (12 no. LED’s)	Philips Xitanium LED Driver (DALI standard)	Telensa 5-pin NEMA Telecell with integral Dimming Module & GPS positioning
Type B	Philips Signify “Micro-Luma” BGP615 DM10 3,000lm NW LED (20 no. LED’s)*	Philips Xitanium LED Driver (DALI standard)	Telensa 5-pin NEMA Telecell with integral Dimming Module & GPS positioning
Type C	Philips Signify “Mini-Luma” DM11 8,800lm NW LED (40 no. LED’s)*	Philips Xitanium LED Driver (DALI standard)	Telensa 5-pin NEMA Telecell with integral Dimming Module & GPS positioning

Type D	Philips Signify “Mini-Luma” DM11 12,000lm NW LED (40 no. LED’s)*	Philips Xitanium LED Driver (DALI standard)	Telensa 5-pin NEMA Telecell with integral Dimming Module & GPS positioning
Type E	Philips Signify “Luma 1” DW10 24,000lm NW LED (80 no. LED’s)*	Philips Xitanium LED Driver (DALI standard)	Telensa 5-pin NEMA Telecell with integral Dimming Module & GPS positioning

Table 2: Wokingham Borough Council Lantern Types

Notes to **Table 2**:

- IMPORTANT – To avoid clashes with the CMS system, Constant Light Output (CLO) or “Constalux” should be disabled (can be achieved through the CMS system).
- Colour temperature to be “Neutral White” (4000k) as standard or “Warm White” (3000k) in areas identified as having bat activity or other wildlife concerns.

Application	Control Type	Lux Setting
Street Light	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning	Remotely controlled by WBC
Illuminated Sign	Telensa Telecell	Remotely controlled by WBC
Illuminated Bollard	Telensa Telecell or where specified by Wokingham Borough Council a miniature solid state electronic photo electric cell sensitive to infra-red light (pre-fitted by bollard manufacturer)	On: 55 lux Off: 28 lux

Table 3: Wokingham Borough Council Controls

4. GUIDANCE

4.1. Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals GN01:2021)

4.1.1. The Lighting Strategy is informed by industry guidance notes which aim to reduce the potential for obtrusive light to occur, which is typically caused by poorly designed and installed exterior artificial lighting. The Lighting Strategy is informed by the most relevant sections of GN01:2021 that has recently been published to reduce the potential for obtrusive light from a wide range of exterior lighting applications.

4.1.2. **Table 5** and **Table 6** are taken from GN01 and describe the Environmental Zones and provide obtrusive light criteria for each Environmental Zone

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA Dark Sky Parks.
E1	Natural	Intrinsically dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, 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 or suburban locations.
E4	Urban	High district brightness	Town / City centres with high levels of night-time activity.

Table 4: Environmental Zone Descriptions

Environmental Zones	Sky Glow ULR ¹ (Max %)	Light Trespass (Into Windows) E _v (lux)		Building Luminance Average, Pre-curfew Average L (cd/m ²)
		Pre-Curfew	Post-Curfew ²	
E0	0	0	0	0
E1	0	2	0 (1*)	0
E2	2.5	5	1	5
E3	5	10	2	10
E4	15	25	5	25

Table 5: Obtrusive Light Criteria

¹ ULR (Upward Light Ratio) is the maximum permitted percentage of luminaire flux that goes directly into the sky.

4.2. GN08:2023 Bats and Artificial Lighting in the UK – Bat Conservation Trust and Institution of Lighting Professionals.

4.2.1. This guidance states the following:

"It is acknowledged that, especially for vertical calculation planes, very low levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light adverse behaviour (Stone, 2012)."

"A warm white light source (2700Kelvin or lower) should be adopted to reduce blue light component."

*"A buffer zone subdivided to into smaller zones of increasing illuminance limit further away from the Supporting Habitat would ensure light levels (illuminance - measured in lux) do not exceed certain defined limits. This has the effect of a gradual decrease in lighting from the developed zone, rather than a distinct cut-off, which may provide useable area for the project which also limits lighting impacts on less sensitive species, or less well-used habitat." (see **Figure 1**).*

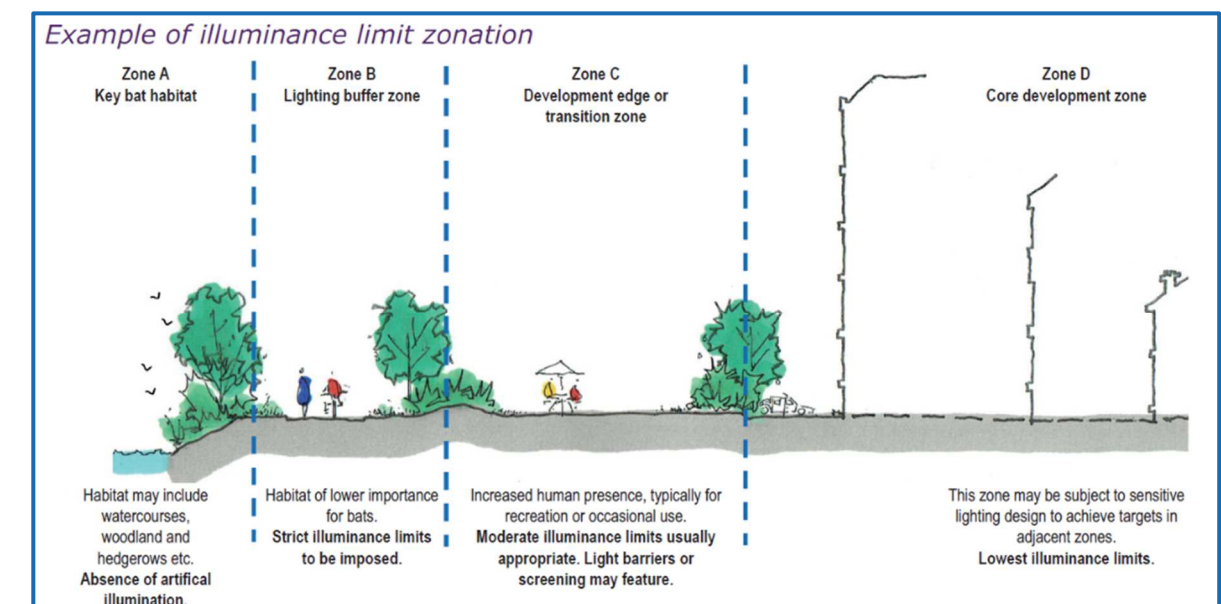


Figure 1: Example of lighting zonation near sensitive boundaries and known ecological habitat

² Curfew refers to a time when the local planning authority has agreed that the lighting installation should be switched off; this typically refers to 23h00 – 07h00

5. DESKTOP STUDY

5.1. Site Description and Context

- 5.1.1. The Application Site sits under the jurisdiction of Wokingham Borough Council and is located Southeast of Reading within the agricultural land south of the M4 motorway. The area primarily contains vegetated green spaces, rivers (River Loddon) to the southeast and surrounding farmland. However, there are farming and commercial facilities (Shinfield Studios) on the western side.
- 5.1.2. The Proposed Development is for a spine road of the northwestern section of the Loddon Garden Village masterplan, which can be seen in **Figure 2** highlighted in **orange**. A description of the Proposed Development can be found in **Section 1.1.3**.

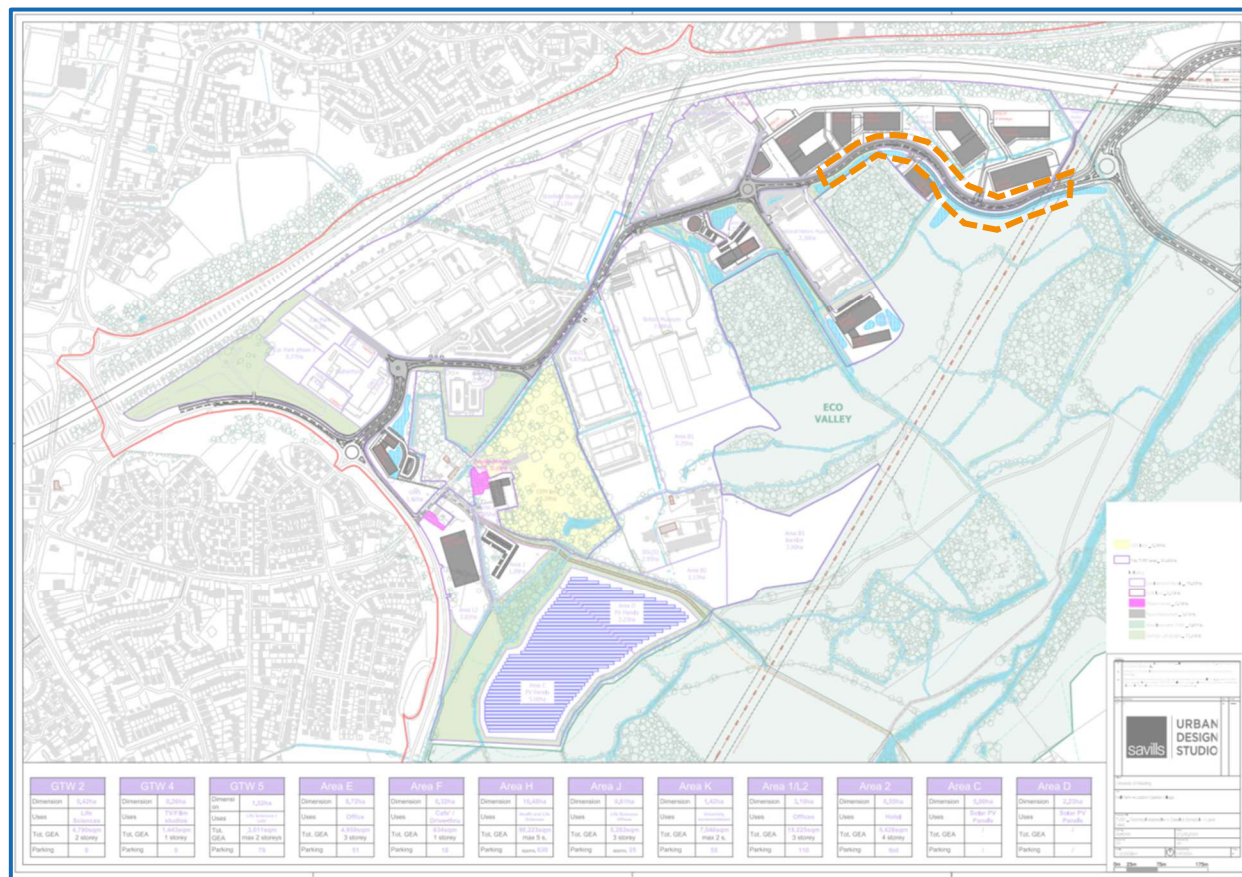


Figure 2 - Redline boundary and Proposed Roadway layout

5.2. Designations

5.2.1. According to Natural England, the Application Site:

- > Is not located within a designated SAC³,
- > Is not located within a designed SSSI
- > Is not located/near a National Landscape⁴,
- > Is not located near/within a National Park⁵.

5.2.2. However, an ancient woodland (St Johns Copse) is located <200 metres from the proposed spine road. Therefore, the Lighting Strategy need to ensure that guidance requirements from ILP GN01:2021 and GN08:2023 are to be followed and the embedded mitigation measures are adhered to.

³ Natural England: Special Areas of Conservation (England)

⁴ Natural England: Areas of Outstanding Natural Beauty (England)

⁵ Natural England: National Parks (England)

5.3. Baseline lighting

- 5.3.1. Within the Application Site itself where the Proposed Development is to be built, there are streetlighting columns located along Cutbush Lane East which is the adjacent roadway that connects to the Proposed Development. This can be seen in **Figure 3**.



Figure 3 - Baseline Lighting along Cutbush Lane East (Google Maps, November 2022)

- 5.3.2. Additional lighting can be seen within the boundary of Stage 14 and Stage 15 of Shinfield Studios. This consists of streetlighting and building mounted fittings (**Figures 4 and 5**). Building mounted fittings are highlighted in **orange**.
- 5.3.3. Figures 3, 4 and 5 are the nearest lighting fittings from the existing baseline lighting assessment, however, the Proposed Development roadway section adjoins to a proposed scheme as seen in **Figure 2**, which connects westwards. This is to be lit with streetlighting columns.

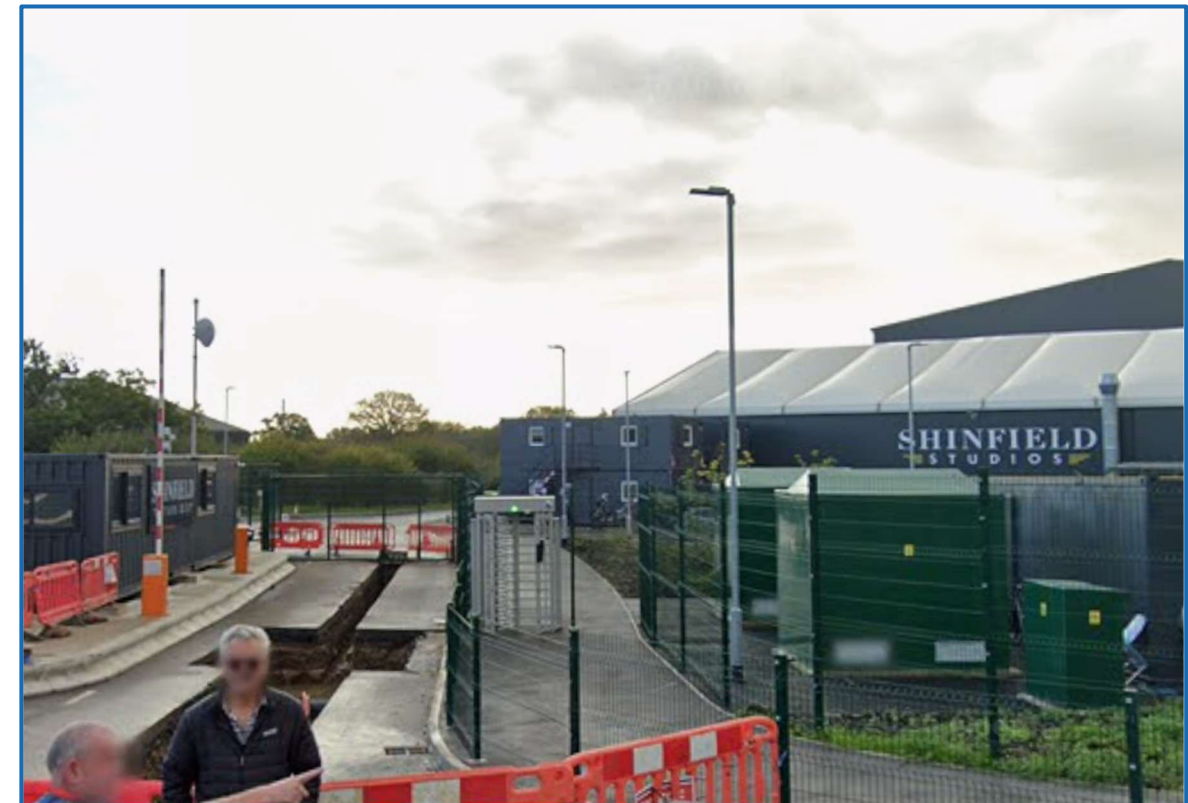


Figure 4 - Baseline Lighting of Stage 14 and Stage 15 (Google Maps, November 2022)



Figure 5 - Baseline Lighting of Stage 14 and Stage 15 Building Mounted Fittings (Google Maps, November 2022)

5.4. Environmental Zone Classification

5.4.1. Due to the Application Sites location and the Proposed Development within a proposed allocation via Wokingham Borough Local Plan Update Policy SS13, the environmental zone classification has been based on the Outline Lighting Strategy for Loddon Garden Village (3807-DFL-ELG-XX-RP-EO-13001). **Section 5.5** within this document highlights that the surrounding area is:

“Widely rural with large spaces of vegetation and green boundaries. Therefore, the environmental zone classification in reference to ILP GN01:2021 will be an E2”.

5.4.2. This can also be seen in **Figure 6**, where the Thames Valley Science Park is located northwest of this.

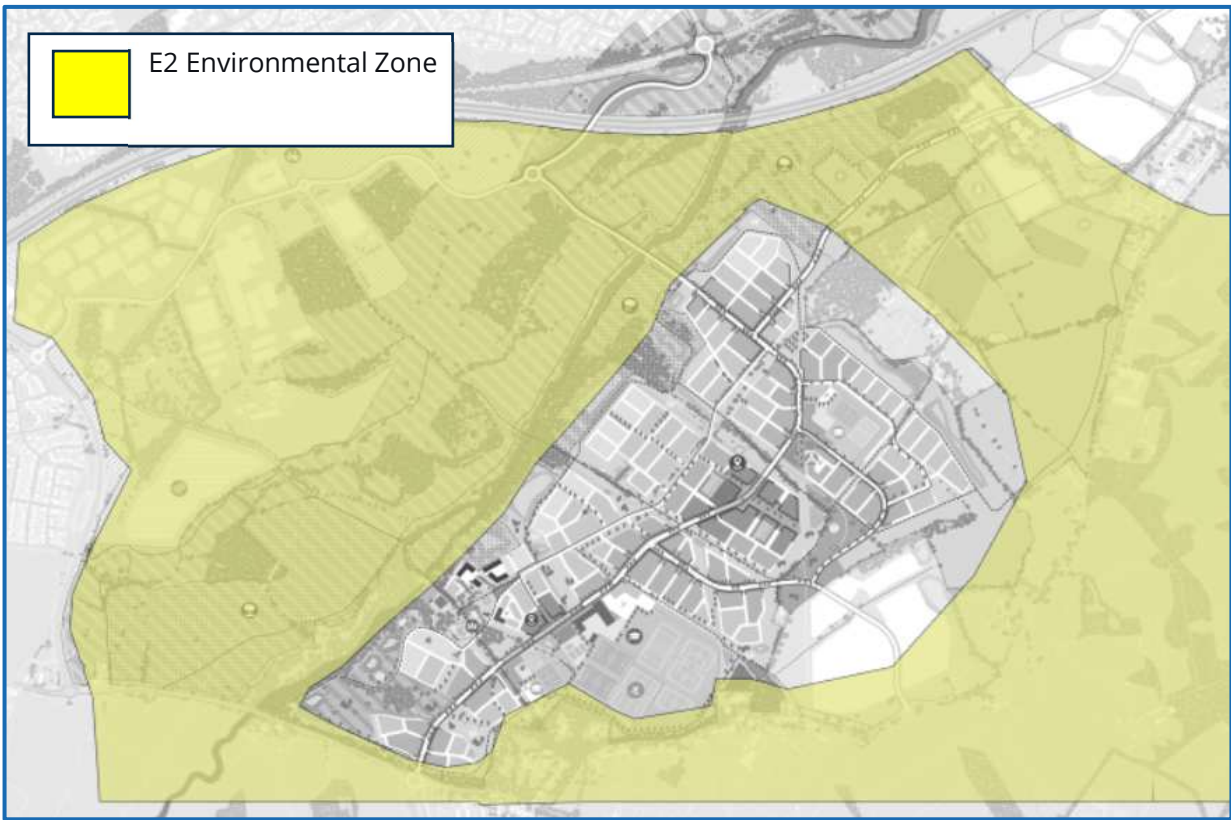


Figure 6 - Environmental Zone from Loddon Garden Village Lighting Strategy

5.4.3. Therefore, the environmental zone for the Application Site is to be an E2.

Zone	Surrounding	Examples	Limitations		Sky Glow ULR (Max)
			Pre-curfew	Post-curfew	
E2	Rural	Sparsely inhabited rural areas,Village or relatively dark outer suburban locations	5	1	2.5%

Table 6: Limitations of External Lighting for the Wider extents of the Application Site.

6. IDENTIFIED RECEPTORS

6.1. General

6.1.1. The locations of the Identified Sensitive Receptors in relation to the Application Site can be seen in **Appendix 3**.

6.2. Ecological

6.2.1. The project ecologist (EPR) has been liaised with regarding the identification of sensitive areas within and surrounding the Application Site. The ecology receptors with sensitivity to lighting are detailed within **Table 7**. **Figure 7** below highlights the light sensitive habitat map.

Receptor Type	Receptor No.	Description	Sensitivity
Ecology	PSER 001	Western vegetation corridor	High
Ecology	PSER 002	Southern vegetation corridor 01	High
Ecology	PSER 003	Northern vegetation corridor	High
Ecology	PSER 004	Southern vegetation corridor 02	High

Table 7 - Sensitive Ecological Receptors (PSER)

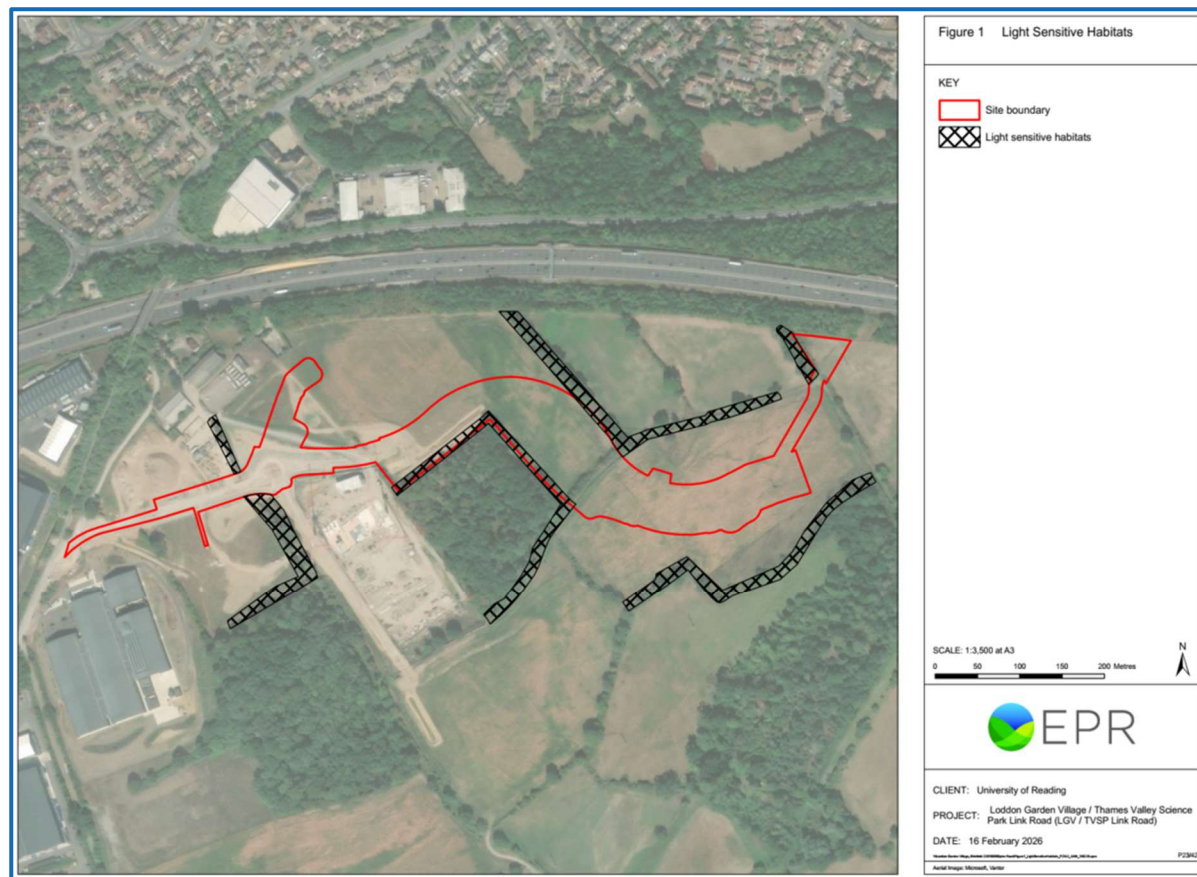


Figure 7 - Light Sensitive Habitat Map

7. LIGHTING STRATEGY

7.1. Summary

- 7.1.1. The Proposed Development will require lighting for safety purposes at limited times during the hours of darkness. Lighting will be fit for purpose and sensitive to nearby ecological receptors.
- 7.1.2. Lighting will follow Wokingham Borough Council streetlighting specification.
- 7.1.3. Luminaires will be used with integral LEDs and only where the luminaire photometry is available from the manufacturer. This is to ensure the photometric footprint of the luminaires can be modelled to ensure the potential effects of light spill are minimised or mitigated.
- 7.1.4. The following criteria seeks to ensure that the lighting is not outside of the obtrusive light limits for the Environmental Zone in which the Proposed Development Wimpey is located, is sensitive to the area, and provides a recognised standard level of lighting for all adoptable areas requiring illumination.
- 7.1.5. All lighting unless otherwise stated is to emit a warm white colour temperature light (2700K or less) to reduce the potential for adverse effects onto sensitive receptors.

7.2. Areas that require lighting

- 7.2.1. Lighting in adopted areas will be required in the following application areas:
 - > Spine Road
 - > Spine Road Footpath

7.3. Spine Road

- 7.3.1. The Spine Road is to be illuminated in accordance with BS5489-1:2020 and BS EN 13201-2:2015 for safety purposes. The lowest practicable levels are proposed within this Lighting Strategy.
- 7.3.2. Based on the Environmental Zone classification in **Section 5.4**, and considering that the road in questions serves as a spine road, with expected traffic flows classified as “busy” and speed limits below 30mph, the appropriate lighting class has been assessed as **P4**. This has been derived from and in accordance with **BS5489-1:2020, Table A.5**.
- 7.3.3. This was also determined in liaison with Wokingham Borough Council through the adjacent scheme (3399 - National History Access Road):

“To better align with the planning design, it was agreed with Wokingham Borough Council that the roundabout is to be lit to a C5 lighting class. Roads travelling east and west are to be lit to a P4 lighting class, and the southern road is to be lit to a P5 lighting class”. - 3399-DFL-HLG-XX-RP-EO-13001-A1-C01.

Table A.5 — Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit v ≤ 30 mph	Speed limit v ≤ 30 mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

Figure 8 - BS5489-1:2020 Table A.5

Area	Class	P4 Lighting Class Requirements		MF used (for design)
		Eav [lux]	Emin [lux]	
Spine Road	P4	5-7.50	1.0	0.82

Table 8 - Design Parameters for Spine Road

7.4. Spine Road Footpath

- 7.4.1. The Spine Road Footpath is to be illuminated in accordance with BS5489-1:2020 and BS EN 13201-2:2015 for safety purposes. The lowest practicable levels are proposed within this Lighting Strategy.
- 7.4.2. Based on the Environmental Zone classification in **Section 5.4**, and considering that the footpath in questions serves as the spine road footpath, with expected traffic flows classified as “busy” and pedestrian and cyclists only, the appropriate lighting class has been assessed as **P5**. This has been derived from and in accordance with **BS5489-1:2020, Table A.5**.

Table A.5 — Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4 ^{A)}	E1 to E2 ^{A)}	E3 to E4 ^{A)}
	Pedestrian and cyclists only	Speed limit v ≤ 30 mph	Speed limit v ≤ 30 mph
Busy ^{B)}	P5	P4	P3
Normal ^{C)}	P5	P5	P4
Quiet ^{D)}	P6	P5	P4

Figure 9 - BS5489-1:2020 Table A.5

Area	Class	P4 Lighting Class Requirements		MF used (for design)
		Eav [lux]	Emin [lux]	
Spine Road Footpath	P5	3-4.5	0.6	0.82

Table 9 - Design Parameters for Spine Road Footpath

7.5. Example Equipment

7.5.1. Where proposed lighting is to be adopted by Wokingham Borough Council, the luminaire used will follow the adoptable specification that is set out by Wokingham Borough Council. The Philips Luma Gen2 is typically used within the local specification for adoptable areas (**Section 3.4**).

Equipment Specification	
Application Area	Main Road and Footpath
Correlated Colour Temperature (Kelvin / K)	2700K as per ecological requirements
Luminaire Manufacturer	Philips (Or Similarly Approved)
Luminaire Model	Luma Gen 2 (Or Similarly Approved)
Light Source	LED
Height	8 metres
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Upward Light Output Ratio E3 < 5%	0%
Example Luminaire Image	
Controls	As per local authority specification

Table 10 - Adoptable Specification

8. SUMMARY OF RESULTS

8.1. Overview

- 8.1.1. The Lighting layout shown in **Appendix 1** and the Vertical Light Spill Calculations shown in **Appendix 2**, demonstrate that the Light Spill Levels associated with the proposed lighting will comply with the obtrusive light guidance set out in ILP GN01:2021 and ILP GN08:2023, at sensitive receptors.
- 8.1.2. To ensure the worst-case scenario has been modelled, the highest potential light levels have been modelled / presented in the light spill diagram, with the project maintenance factors set at MF = 1.0⁶. This demonstrates the light levels at their highest (initial light levels at the start of luminaire life).

8.2. Ecology Receptors

- 8.2.1. Where ecological receptors are potentially sensitive to vertical light spill, a vertical illumination grid has been modelled, as shown in **Appendix 2**. The light levels based on the modelling do not exceed 0.4 Lux, keeping the light levels within the guidance given within GN08:2023.
- 8.2.2. The vertical light spill calculations for ecological receptors can be seen in **Table 11**.

Receptor No	GN08:2023 requirements	Maximum vertical Illuminance (Lux)
PSER 001 #1	0.40 Lux	0.08 Lux
PSER 001 #2	0.40 Lux	0.13 Lux
PSER 001 #3	0.40 Lux	0.12 Lux
PSER 001 #4	0.40 Lux	0.03 Lux
PSER 002 #1	0.40 Lux	0.36 Lux
PSER 002 #2	0.40 Lux	0.24 Lux
PSER 002 #3	0.40 Lux	0.04 Lux
PSER 002 #4	0.40 Lux	0.02 Lux
PSER 002 #5	0.40 Lux	0.00 Lux
PSER 002 #6	0.40 Lux	0.00 Lux
PSER 003 #1	0.40 Lux	0.01 Lux
PSER 003 #2	0.40 Lux	0.01 Lux
PSER 003 #3	0.40 Lux	0.00 Lux
PSER 003 #4	0.40 Lux	0.01 Lux
PSER 004 #5	0.40 Lux	0.01 Lux

Table 11 - PSER results table, maximum illuminance.

⁶ <https://www.dfl-uk.com/knowledge-hub/faqs/>

8.3. Mitigation by Design

8.3.1. The mitigation by design for lighting is detailed in **Table 12**. This mitigation for best practice to ensure sensitive receptors are not affected by obtrusive light.

Mitigation Name	Description of Mitigation	Installation Location
Using the minimum practical mounting height for the area being lit	The mounting height of luminaires is dependent on the designed lighting levels and the task area being lit. Using the correct mounting heights will reduce the need for tilting of the luminaires This will ensure obtrusive light is minimised. Local authority specification is to be followed for column mounting heights.	Whole Proposed Development
Using luminaires with a 0% Upward Light Output Ratio	Luminaires that have a full cut off of upward light would be used for all lighting designs. Streetlighting to have an Upward Light Output Ratio of 0%.	Whole Proposed Development
Using luminaires to control back light spill (Back Light Shielding)	To minimise back light spill, manufacturers can provide “back light optics” where this is integrated into the lenses of the luminaires. When this is not available, physical shields can be installed to minimise the effect of back light spill onto receptors.	Whole Proposed Development Especially where luminaires are installed on the boundaries of sensitive receptors.
Using the lowest applicable lighting levels for task and areas	All areas and task will be lit using the lowest applicable lighting levels as defined within the British Standards. This will ensure a standard of illumination is achieved as per the standard but to also ensure the task area is not over lit. During the detailed lighting design, a risk assessment must be undertaken to identify the specific lighting class for each area.	Whole Proposed Development

Only using Luminaires where Photometry is available from the manufacturer	Luminaires will be used with integral LEDs and only where the photometry is readily available from a manufacturer. This is to ensure the accuracy of the photometric footprint of the luminaire can be modelled to ensure the any effects of light spill are minimise and/or mitigated.	Whole Proposed Development
Control Systems	Adoptable luminaires are to be controlled via the Wokingham Borough Council control system.	Whole Proposed Development

Table 12 - Mitigation by Design

9. CONCLUSION

9.1. General

- 9.1.1. Lighting associated with the Proposed Development shall be designed in accordance with the Lighting Strategy for the Application Site outlined in **Section 7**.
- 9.1.2. This Lighting Strategy has been written in accordance with the relevant British Standards, industry guidance and local policies to ensure it is unlikely to give rise to obtrusive light with the potential to affect ecological receptors.
- 9.1.3. Through the application of this Lighting Strategy, ecological receptors will not be adversely affected by obtrusive light, as shown in **Appendix 1** and **Appendix 2**. Which is in line with the Bat Conservation Trust and ILP GN08:2023 guidance.

APPENDIX 1

Lighting Layout

See accompanying documents:

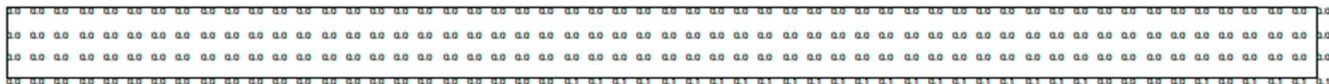
- > 4500-DFL-ELG-XX-DR-EO-13001
- > 4500-DFL-ELG-XX-DR-EO-13002

APPENDIX 2

Vertical Light Spill Calculations

Illuminance (lux)

PSER 001 #1

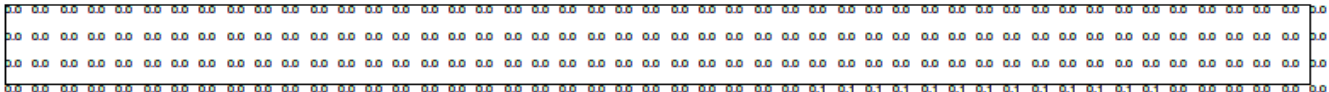


Results

Eav	0.03
Emin	0.00
Emax	0.08
Emin/Emax	0.04
Emin/Eav	0.13

Illuminance (lux)

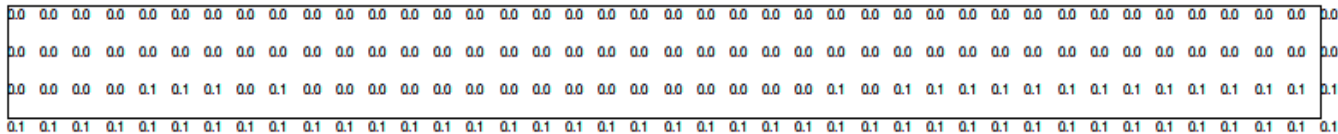
PSER 001 #3



Results

Eav	0.02
Emin	0.00
Emax	0.12
Emin/Emax	0.02
Emin/Eav	0.13

PSER 001 #2



Results

Eav	0.04
Emin	0.01
Emax	0.13
Emin/Emax	0.06
Emin/Eav	0.17

Illuminance (lux)

PSER 001 #4

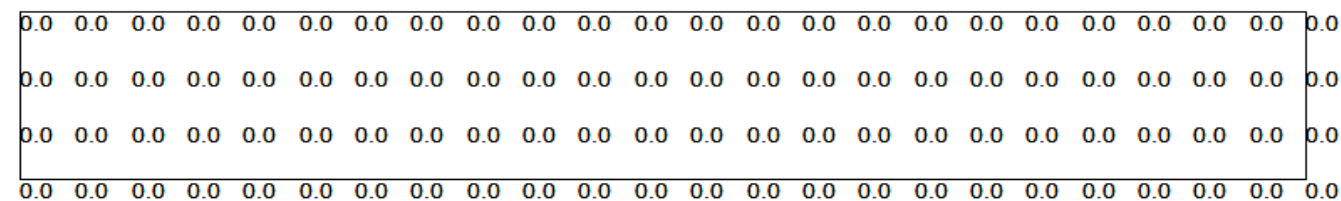


Results

Eav	0.01
Emin	0.00
Emax	0.03
Emin/Emax	0.05
Emin/Eav	0.22

Illuminance (lux)

PSER 002 #3



Results

Eav	0.01
Emin	0.00
E _{max}	0.04
Emin/E _{max}	0.02
Emin/Eav	0.10

Illuminance (lux)

PSER 002 #4



Results

Eav	0.01
Emin	0.00
E _{max}	0.02
Emin/E _{max}	0.05
Emin/Eav	0.18

Illuminance (lux)

PSER 002 #5

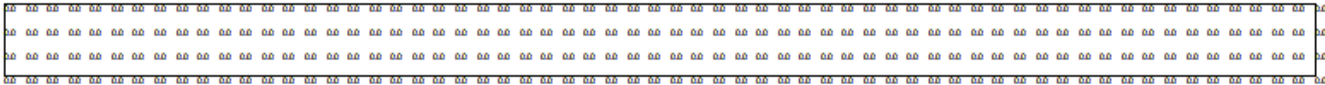


Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

Illuminance (lux)

PSER 003 #1

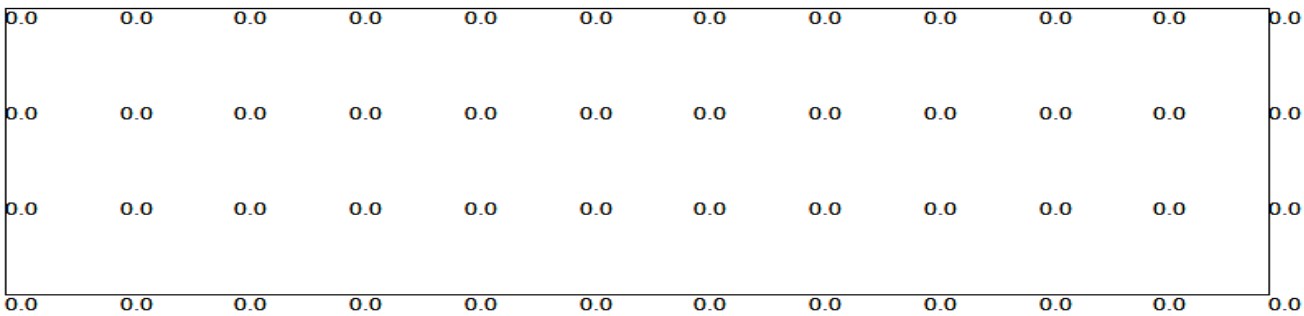


Results

Eav	0.00
Emin	0.00
Emax	0.01
Emin/Emax	0.00
Emin/Eav	0.00

Illuminance (lux)

PSER 002 #6

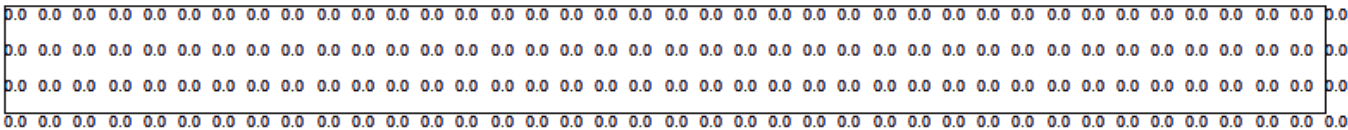


Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

Illuminance (lux)

PSER 003 #2



Results

Eav	0.00
Emin	0.00
Emax	0.01
Emin/Emax	0.00
Emin/Eav	0.00

PSER 003 #3

Results

Eav	0.00
Emin	0.00
Emax	0.00
Emin/Emax	0.00
Emin/Eav	0.00

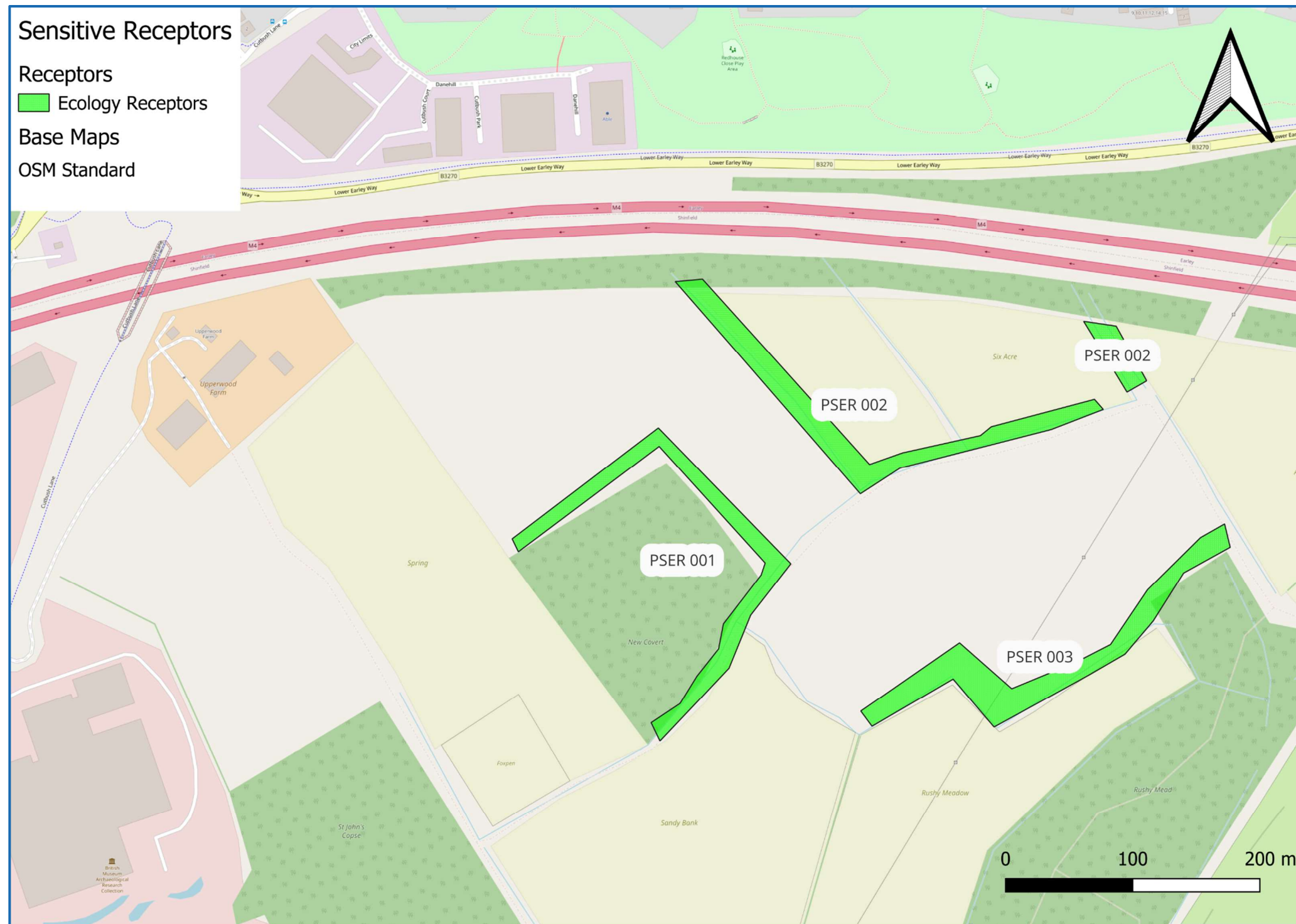
PSER 003 #4

Results

Eav	0.00
Emin	0.00
Emax	0.01
Emin/Emax	0.00
Emin/Eav	0.00

APPENDIX 3

Sensitive Receptor Map



TECHNICAL DESCRIPTIONS, DEFINITIONS & ABBREVIATIONS

PHAR: is an abbreviation for a potential human amenity receptor, a location where an observer could have the potential to be affected by the proposed lighting to be installed *Abbreviation used by DFL LI&P.*

PSER: is an abbreviation for an area identified as or treated as a location that may host a potentially sensitive ecological receptor. This is generally used where light sensitive bats have the potential to live, forage or use as a flight path, other ecologically sensitive receptors such as (but not limited to) the Great Crested Newt may also be identified by this term. *Abbreviation used by DFL LI&P.*

PSR: is an abbreviation for an area where an individual maybe susceptible to light brightness (Light intensity) which may have the potential to cause a hazardous situation. *Abbreviation used by DFL LI&P.*

Obtrusive Light: refers to excessive or bothersome artificial light that goes where it shouldn't, causing discomfort and disruption. *Spill light which because of quantitative, directional or spectral attributes in a given context gives rise to annoyance, discomfort, distraction or reduction in the ability to see essential information.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Sky glow: When lights are directed upwards or light is scattered by particles in the air, like dust or water droplets, it creates a glow that makes it hard to see stars. *The increase in diffuse illuminance of the night sky above that produced by natural sources such as the moon and visible star.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Vertical Illuminance: is how much light lands on upright surfaces like walls. It's measured in lux or footcandles and matters for places where the view from a vertical angle is important. *Lighting of vertical surfaces such as walls, windows, statues, sculptures and people's faces.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Correlated colour temperature (CCT): the appearance of light emitted by a light source measured in Kelvin (K), Lower CCT values such as 2700K represent warmer, more yellowish light, *similar to the light from older incandescent lamps. (Tcp)The temperature of the Planckian radiator whose perceived colour most closely resembles that of a given stimulus at the same brightness and under specified viewing conditions, measured in absolute temperature on the kelvin (K) scale.* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lux: measures the brightness of light as perceived by the human eye at a specific point on a surface. *The SI derived unit of illuminance, measuring luminous flux per unit area (1 lux = 1 lumen/m²).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Lumens: measure how bright a light appears to our eyes. *The SI derived unit of luminous flux; a measure of the total quantity of visible light emitted by a source or received by a surface (unit: lumen).* CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Glare: refers to an excess of bright light that makes you uncomfortable or hinders your vision. It happens when there's a big difference between a bright light and the rest of the surroundings. *Glare: condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or by extreme contrasts.* BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.1.8

Luminous intensity: is light brightness or how intense the light source is. light intensity is how intense a light source is emitted or received in a particular direction, this is measured candelas and is termed as luminous intensity I_v <of a source, in a given direction> quotient of the luminous flux, $d\Phi_v$, leaving the source and propagated in the element of solid angle $d\Omega$ containing the given direction, by the element of solid angle (unit: $cd = lm \cdot sr^{-1}$). BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.2.

Candela: is a measurement for the brightness of a light source, taking into account the direction in which the light is emitted. Base unit of luminous intensity in the International System of Units (SI); the luminous power per unit solid angle emitted by a point light source in a particular direction. CIBSE LG21 Lighting Guide 21: Protecting the night-time environment.

Uniformity (Uo): is an explanation for the even distribution of light across an area or surface. The overall uniformity shall be calculated as the ratio of the lowest luminance, occurring at any grid point in the field of calculation, to the average luminance. BS EN 13201-3-2015, Calculation of Performance Section 8.3.

Luminance: is how bright a surface appears to our eyes. It considers the light coming from or reflected by an object. L_v <in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: $cd \cdot m^{-2} = lm \cdot m^{-2} \cdot sr^{-1}$) BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.3.

Illuminance is how much light lands on a surface per square meter. It's measured in lux. More lux means a brighter area. E_v (unit: $lx = lm \cdot m^{-2}$) 1. <at a point of a surface> quotient of the luminous flux $d\Phi_v$ incident on an element of the surface containing the point, by the area dA of that element 2. <at a point of a surface> equivalent definition: integral, taken over the hemisphere visible from the given point, of the expression. BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.2.10.

Luminaire: a light fixture, this is also sometimes referred to as a lantern or a light fitting, is a product that produces artificial light. apparatus which distributes, filters or transforms the light transmitted from one or more lamps and which includes, except the lamps themselves, all the parts necessary for fixing and protecting the lamps and, where necessary, circuit auxiliaries together with the means for connecting them to the electric supply BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.3

ULOR: upward light output ratio or ULOR refers to the amount of light the light fixture will produce upwards as a percentage of its total light output. $RULO$ <of a luminaire> ratio of the upward luminous flux of the luminaire, measured under specified practical conditions with its own lamp(s) and equipment, to the sum of the individual luminous fluxes of the same lamp(s) when operated outside the luminaire with the same equipment, under specified conditions BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.3.12.

Maintenance factor (MF): is an allowance for how well the lights keep working overtime. It considers things like dirt on the light fittings and "wear and tear". DEPRECATED: light loss factor ratio of illuminance produced by the lighting installation after a certain period to the illuminance produced by the installation when new Note 1 to entry: The term depreciation factor has been formerly used to designate the reciprocal of the above ratio. Note 2 to entry: The maintenance factor takes into account light losses caused by dirt accumulation on luminaires and room surfaces (in interiors) or other relevant surfaces (in exteriors, where appropriate), and the decrease of the luminous flux of lamps. BS EN 12665-2018, Light and lighting - Basic terms and criteria for specifying lighting requirements, Section 3.5.18.

Tilt: is how much the luminaire is lifted based on the fitting facing flat to the ground.

Outreach: how far away the fitting is from the column/wall its mounted on to the light source.

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- **Residential** teams that cover all aspects of new development and redevelopment spanning private, section 38 and section 278 design packages.
- **Public Realm** teams that are experts in enhancing night-time public spaces to create inviting spaces and opportunity for local economies to thrive during the hours of darkness.
- **Electrical** teams – we don't just put a light in the ground, we can help you get power to it as well! Additionally, we also offer design services for EV charging. As this market rapidly expands, make sure you have the experts managing the load, otherwise your EV charging solutions might not live up to expectations.
- **Strategic Infrastructure** teams that offer Lighting and Electrical expertise for complex transport networks and interchanges.
- **Consultancy Services** teams that help when you know what you want but you need someone to help you turn the idea into a project.

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