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LODDON GARDEN VILLAGE

LIGHTING STRATEGY

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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.

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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:

"Application for the phased development of a new community at Loddon Garden Village, comprising, in outline:

- *up to 2,800 residential units to include up to 100 custom and self-build plots;*
- *2 primary schools (up to 3 forms of entry) to include early years provision and 1 secondary school (up to 12 forms of entry);*
- *one District Centre, to incorporate up to 11,000m2 of Class E (Commercial, Business and Service, to include a food store of around 2,500m2), and Class F (Local Community and Learning);*
- *one Local Centre; to incorporate up to 2,400m2 of Class E;*
- *a Sports Hub to include sports pitches and pavilion space;*
- *up to 4,250m2 of further Class E, Class F, and sui generis development to include commercial, health care and public house;*
- *comprehensive green infrastructure including a Country Park, landscaping and public open space, and ecological enhancement measures;*
- *20 gypsy and traveller pitches;*
- *comprehensive drainage and flood alleviation measures to include Sustainable Urban Drainage Systems (SUDS) and engineering measures within Loddon Valley for the River Loddon;*
- *internal road network including spine road with pedestrian and cycle connections and associated supporting infrastructure*
- *new and modified public rights of way;*
- *associated utilities, infrastructure, and engineering works, including the undergrounding of overhead lines;*
- *Ground reprofiling to accommodate infrastructure, flood alleviation and development parcels;*
- *Up to 0.5ha of land adjoining St Bartholomew's church for use as cemetery*
- *Electricity substation (up to 1.5ha)*

All matters reserved other than access, incorporating:

- *a new pedestrian, cycle and vehicular access to Lower Earley Way via a new 4th arm to the Meldreth Way roundabout;*
- *a new pedestrian, cycle and vehicular bridge over the M4;*
- *a new pedestrian, cycle and vehicular bridge over the River Loddon;*
- *a new vehicular access to the A327 Reading Road, via a new arm to the Observer Way roundabout;*
- *a new pedestrian, cycle and vehicular access to Thames Valley Science Park;*
- *an initial phase of internal roads with associated drainage, landscape and engineering works and ground reprofiling, between the A327 and the south eastern boundary of the site.*

Application includes full permission for the change of use of 40.4 hectares of agricultural land to Suitable Alternative Natural Greenspace (SANG), 18.35 hectares of SANG link, and provision of Biodiversity Net Gain measures, the demolition and clearance of 20,809 m2 of buildings and structures at the Centre for Dairy Research (CEDAR) and at Hall Farm, the demolition of 3 existing dwellings on Carter's Hill Lane, and the retention of specified buildings at Hall Farm."

1.1.4. The proposed Masterplan with red line boundary is shown in **Figure 1**.

1.1.5. 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 human, environmental and ecological receptors.

1.1.6. 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

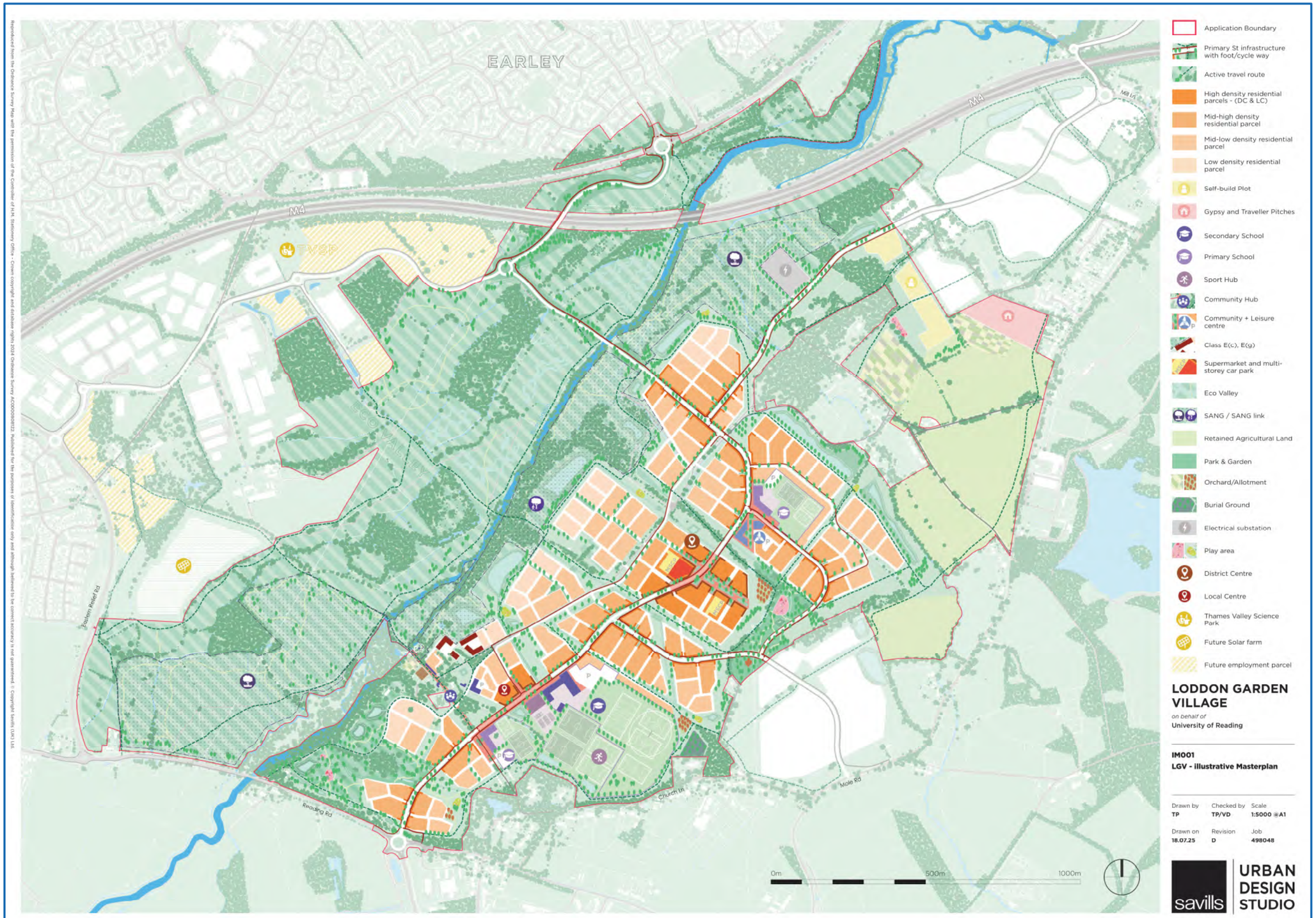


Figure 1: Proposed Development Layout

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 Brookthat 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**:

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**:

1. IMPORTANT – To avoid clashes with the CMS system, Constant Light Output (CLO) or "Constalux" should be disabled (can be achieved through the CMS system).
2. 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	Remotely controlled by WBC
	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

3.5. Consultation within Wokingham Borough Council Highway and Transport

3.5.1. Wokingham Borough Council Highways and Transport have been consulted on the lighting strategy from the Proposed Development. Their consultation responses are summarised within **Table 4**.

Subject Matter	Wokingham Borough Council Response	Incorporation in the Lighting Strategy
Environmental Zone Assessment	Wokingham Borough Council Highways and Transport have agreed with the use of E3 environmental zone for the Proposed Development	The environmental zone assessment has been incorporated within **Section 7** of the Lighting Strategy to outline the lighting requirements for each task area.
Correlated Colour Temperature (CCT) for lighting	Wokingham Borough Council Highways and Transport have requested that 3000K be used throughout the Proposed Development, but that 2700K may be used on the bridges if necessary	This has been incorporated into **Section 7** for each designated task area.
Approach to lighting the bridges	Wokingham Borough Highways and Transport have requested a standard columns approach be used on all bridges. This is to ensure future maintenance is cost effective and that a standard and safe level of illumination is provided.	This has been incorporated into **Section 7.4** of the Lighting Strategy.

Table 4: Summary of Engagement with WBC Highways and Transport

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 5: Environmental Zone Descriptions

Environmental Zones	Sky Glow ULR[1] (Max %)	Light Trespass (Into Windows) E_v (lux)		Building Luminance Average, Pre-curfew
		Pre- Curfew	Post-Curfew[2]	Average L (cd/m^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 6: Obtrusive Light Criteria

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 2**).*

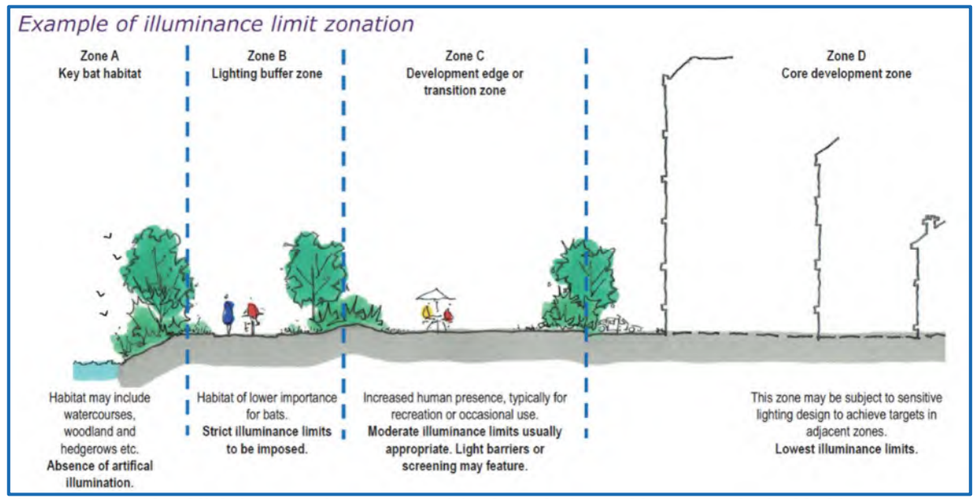


Figure 2: Example of lighting zonation near sensitive boundaries and known ecological habitat

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

[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

4.3. PLG23:2020 Lighting for Cycle Infrastructure – Institution of Lighting Professionals

4.3.1. Lighting for cycle infrastructure will be informed by guidance detailed in ILP PLG23:2020.

4.3.2. The lighting class for the cycle route will be selected based on its type. This being Unsegregated or Segregated and one of the following: Strategic, Major, Local, Rural (**Figure 3**). This is then used to confirm the lighting class as detailed within BS 5489-1:2020.

	Strategic	Major	Local	Rural
Route type	Core routes linking main settlements and areas of high employment or education	Core leisure routes and routes linking the strategic network to secondary destinations	Feeder routes within urban areas	Rural feeder routes
Common characteristics	Largely segregated network of cycle routes with separation from pedestrians where width allows	Predominantly off-road routes, although some linking sections might be on road	Mix of on road routes often with cycle lanes / symbols and off-road shared use links	Predominantly quiet on road routes without cycle lanes, with some off-road paths
Surface	Sealed surface	Sealed surface	Generally surfaced routes	Generally surfaced, but some routes may be unsurfaced
Lighting	Lit within urban areas	Lit within urban areas	On road routes usually lit	Not generally lit

Figure 3: Typical Cycle Route Hierarchy from PLG23:2020 Page 13

4.3.3. The placement of lighting columns within cycle infrastructure is important for achieving a safe and useful cycle route. **Figure 4** contains an extract from PLG23:2020 discussing this.

Obstacle Avoidance

For simplicity, the dynamic width (actual width plus deviation) of a cyclist on the road may be taken as 1m.

Lighting columns, should not be installed within 1m of a cycle track.

Where signs are erected above footways and cycle tracks, adequate clearance is required for pedestrians and cyclists. A minimum height of 2300mm for pedestrians and 2400mm for cyclists is recommended.

Sign posts should be placed at least 0.5m from the carriageway and cycle track edge, but no more than 1m from the route to ensure that they are visible to users.

Where any equipment is installed less than 1m from any cycle infrastructure, it is recommended that a retro-reflective band of contrasting colour is installed around each of them, at a suitable height to increase conspicuity.

Figure 4: Obstacle Avoidance Guidance from PLG23:2020 Page 15

4.4. PLG02:2013 The Application of Conflict Areas on the Highway – Institution of Lighting Professionals

4.4.1. There are several roundabouts and junctions within the Proposed Development. This document provides guidance on the best practice for lighting these locations as shown in **Figures 5 & 6**.

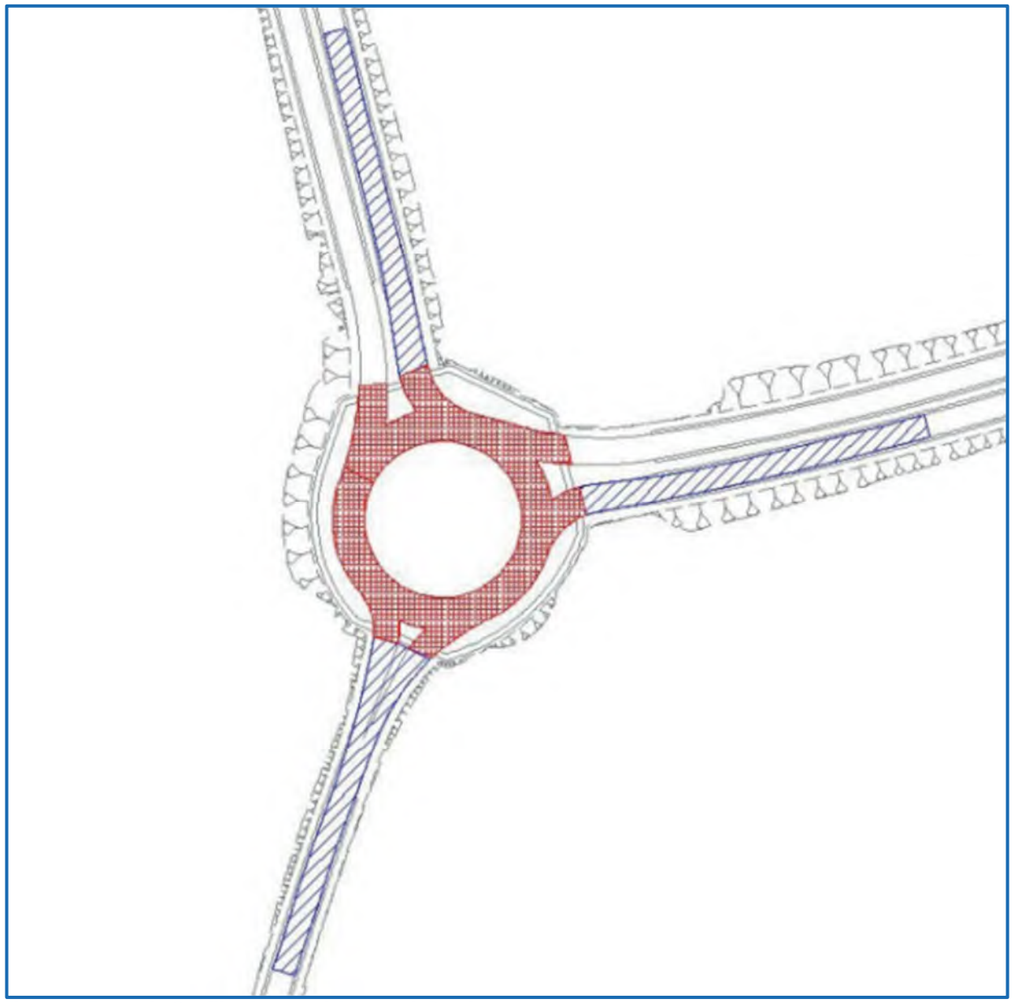


Figure 5: Example Conflict Area and Approach Roads

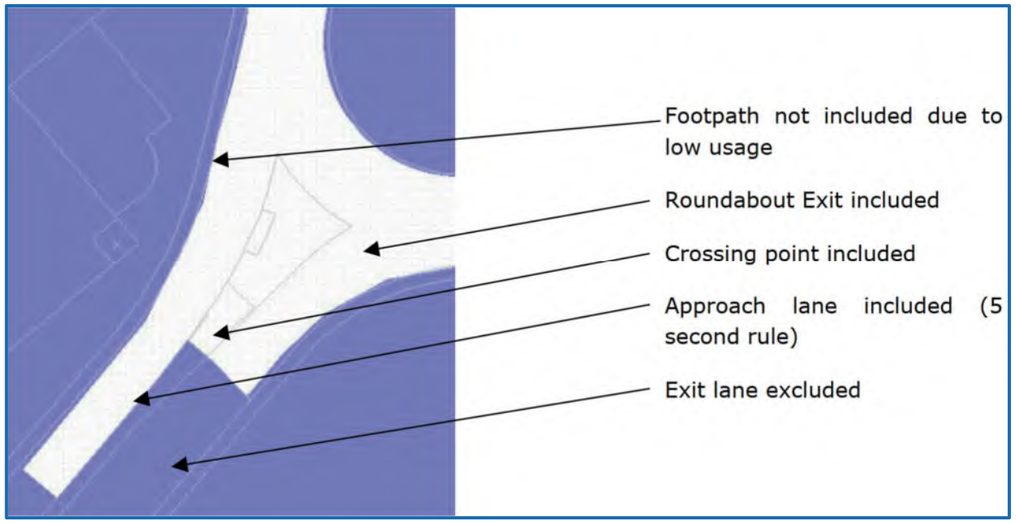


Figure 6: Roundabout Approach and Exit Example

4.5. TR12:2007 Lighting of Pedestrian Crossings – Institution of Lighting Professionals

4.5.1. Where pedestrian crossing areas are included on main access roads and they take the form of Zebra, Toucan, Pelican, etc, and are not signal controlled, they may require lighting as outlined within TR12:2007 (**Figure 7** and **Figure 8**).

4.5.2. Where these crossings are adjacent to conflict areas (roundabout), and a risk assessment has been conducted, they may be included within the conflict area lighting to avoiding the need for specific lighting.

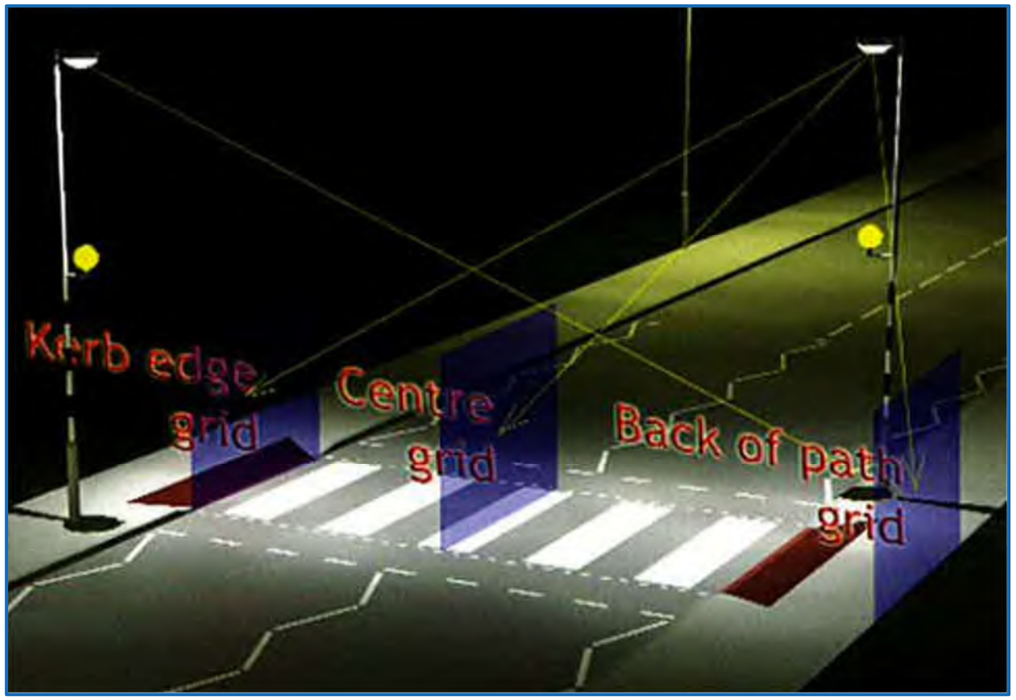


Figure 7: TR12:2007 Crossing Example

Design values

Minimum average horizontal illuminance ($\bar{E}$) on the carpet:

Carpet $\bar{E}$ = 3.5 x average horizontal road illuminance with $U_o > 0.6$

Minimum vertical illuminance at a point E_v:

Grid 1 (centre of crossing)	= 2 x nominal average horizontal road illuminance
Grid 2 (kerb edge)	= 2 x nominal average horizontal road illuminance
Grid 3 (rear of waiting area)	= 1.5 x nominal average horizontal road illuminance.

Note: the value of the average road horizontal illuminance to be used is that designed within the standard installation in the vicinity of the crossing – and this average should be the actual design value in the particular installation and not the nominal value for the lighting class selected.

Figure 8: TR12:2007 Lighting Levels

4.6. The FA Guide to Floodlighting – Design Guidance

4.6.1. The football association have published a guidance document relating to the construction and maintenance of sporting facilities. The following Sports England Documents specifically relate to artificial lighting:

- The FA Guide to Floodlighting

4.6.2. This document provides guidance for developers of Multi-Use Games Areas (MUGA's) and artificial sports pitches for the use of sports lighting, with the aim of encouraging the use of artificial sports lighting partly to increase the available sporting hours for uses.

4.7. The FA Guide to Floodlighting

4.7.1. This document provides guidance on the application of sports lighting to projects and includes guidance for external lighting installations.

4.7.2. Several key principles are outlined within this document:

"Careful detailed design can alleviate most problems and should be based on the following principles:

- *The number of columns is dictated by your needs and the site conditions. The required and future lighting levels, the visual impact of columns, minimising light spillage*
- *When designing a floodlighting system, it is important that an assessment of the available power supply is made to determine if adequate capacity is on hand*
- *Lighting should provide uniform illumination over the pitch appropriate for the proposed grade of play. Lighting requirements are dictated by good, safe and stable visual conditions for players and viewing requirements of spectators.*
- *Particular attention should be paid to providing low glare and uniform lighting within goalmouth areas to ensure good viewing conditions for goalkeepers. Equally consideration needs to be taken to limit the visual obstruction of the match for spectators wherever possible*
- *Access for installation, maintenance, budget (capital and ongoing maintenance and energy costs) and potential planning challenges are among, but not limited to, the additional considerations when designing floodlighting installations that meet a clubs needs*

…"

4.8. LTA Tennis for Britain Floodlighting Guide

4.8.1. The LTA Tennis for Britain has published a guidance document relating to the construction and maintenance of hardcourt sport facilities.

4.8.2. Several key principles are outlined within this document:

- *"All UK floodlighting schemes require formal planning consent from the Local Authority.*
- *Local Authorities have specific local requirements in addition to national ones.*
- *Designs must be produced by specialist lighting designers, contractors, or manufacturers using software (e.g., AGI 32) to demonstrate performance standards, minimal environmental impact, and compliance with regulations.*
- *Crucial to submit all relevant information, plan and elevation drawings, and accurate lighting designs correctly to avoid jeopardizing the application.*
- *Choosing the right luminaire with appropriate optical distribution and mounting height is critical to minimize light spill and obtrusive light, while ensuring performance.*
- *Luminaires should have low tilt angles (less than 35 degrees).*
- *Louvres and shields may be needed near neighbouring properties to minimize obtrusive light.*
- *Systems usually involve various luminaire types, optical distributions, and wattages on multiple columns.*
- *Column heights generally range from 6m – 10m.*
- *Luminaires should provide high-quality colour rendition with minimal glare, sky glow, and spillage.*

…"

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) and farmland, however, there are residential, agricultural and research (Centre for Dairy Research (CEDAR) and Coco Quarantine Centre) locations within the site. These are connected with existing roads.

5.1.2. The Proposed Development is a large urban masterplan scheme. A description of the Proposed Development can be found in **Section 1.1.3.**

5.2. Designations

5.2.1. According to Natural England, the Application Site:

- Is not located within a designated SAC[3],
- Is not located within a designed SSSI
- Is not located/near a National Landscape[4],
- Is not located near/within a National Park[5].

5.2.2. However, a scheduled monument "Arborfield Old Church Ruins" is located within the Application Site boundaries. A local nature reserve "Pearman's Copse" is also circa 800 metres from the boundary of the Application Site. 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.

5.3. Baseline lighting

5.3.1. Within the Application Site itself where the Proposed Development is to be built, there are no lighting columns or road lighting on the existing roads. However, the road connections to the south (A327), the north (B3270) and northeast (Hatch Farm Way) all have existing lighting.

5.3.2. **Figures 9 – 11** show the roadway connections points to the existing infrastructure.

Figure 9 – Observer Way, A327 Roundabout (Google Maps, 2023)

[3] Natural England: Special Areas of Conservation (England)
[4] Natural England: Areas of Outstanding Natural Beauty (England)
[5] Natural England: National Parks (England)

Figure 10 – Meldreth Way, B3270 Roundabout (Google Maps, 2023)

Figure 11 - Hatch Farm Way (Google Maps, 2023)

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 will be split into two environmental zones, an E2 and E3. This is to ensure that suitable lighting classes are determined both within the central developed part of the site and wider extents of the Proposed Development.

5.5. Wider extents of the Application Site

5.5.1. The Application Site itself, as described in **Section 5.1,** 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. This can be seen as **Figure 12** highlighted in Yellow.

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

5.6. Main Area of Development

5.6.1. The core area of the Proposed Development will be classified as an E3 environment zone. This is due to the more suburban nature of the area.

5.6.2. **Figure 13** with the red as the existing E3 zoning and the orange as the proposed E3 zoning for the Proposed Development.

Zone	Surrounding	Examples	Limitations		Sky Glow ULR (Max)
			Pre-curfew	Post-curfew	
E3	Urban	Well inhabited rural and urban settlements, small town centres or suburban locations.	10	2	5%

Table 8: Limitations of External Lighting for the centralised area of the Application Site

5.7. Environmental Zoning

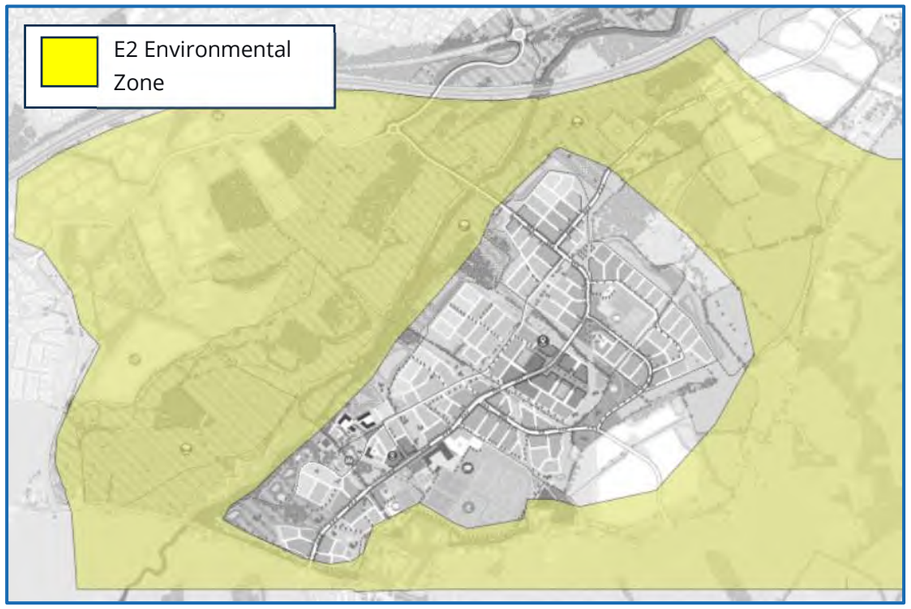


Figure 12 - E2 Environmental Zone

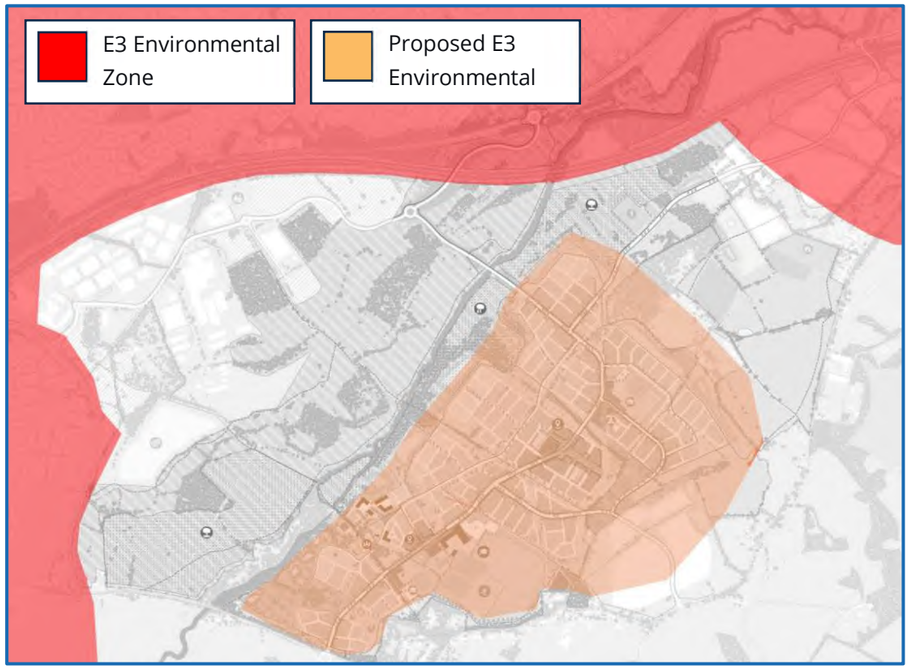


Figure 13 - E3 Environmental Zone

6. LIGHTING REQUIREMENTS

6.1. Overview

6.1.1. Loddon Garden Village will require suitable illumination throughout the development for the safety and security of residents, road users and pedestrians.

6.1.2. As noted earlier, the aim of this Lighting Strategy is to outline the lighting requirements, and the types of lighting equipment to be used to achieve the relevant British Standards for lighting while ensuring that obtrusive light is avoided and where this is not possible, minimised or mitigated

6.1.3. Throughout the Proposed Development, there are a number of roads which will be offered for adoption by the Local Authority (Wokingham Borough Council) and therefore these will be required to meet the adoptable specification. This ensures continuity of equipment for ongoing maintenance purposes, and that the installed lighting equipment is consistent with existing lighting installed on traffic routes, and within residential areas nearby. There are however a number of areas where roads and spaces requiring lighting may not be adopted by the local authority, such as private drives along the development periphery, so it is also the aim of this Lighting Strategy to outline the standard approach to lighting throughout the Proposed Development.

6.1.4. The Control specifications for the adoptable roads are to follow Wokingham Borough Council control schemes. This is to include dimming regimes.

6.2. Breakdown of Areas Requiring Illumination

6.2.1. The following areas form part of the outline section of the planning application:

- Spine Roads
- Bridge Crossing
- Primary Roads
- Secondary Roads
- Tertiary Residential Roads
- Larger Parking Areas servicing Flats and Other Uses
- Edge of Settlement Roadways
- Sports Hub (Including 3x AGP pitches & MUGA hard courts)
- Local Centres – Highstreet
- Education Areas
- EcoValley

6.2.2. This Lighting strategy set out the approach that is being taken for the above areas of development. Notably, light spill diagrams have been created for the sections of Access Road that route to the west of the River Loddon, including the M4 and River bridge crossings, mindful that these are particularly sensitive areas of the proposed development.

6.3. British Standards, Guidance and Local Authority Requirements

6.3.1. Artificial exterior lighting that illuminates the Proposed Development's highway network will be designed and installed to the specification of the adopting Local Authority. Design guidance will be provided by the adopting Local Authority to the designer upon request. In general, the Local Authority's lighting specification and design requirements will comply with the relevant British Standards and obtrusive light guidance.

6.3.2. Decorative and feature lighting, along with equipment that is not compliant with the Local Authority's adoptable specification is not likely to be adopted by the Local Authority. Such lighting equipment will be the responsibility of the developer or development manager to maintain.

6.3.3. In areas where the artificial exterior lighting is not to be adopted, the following standards and guidance will be applied by the lighting designer and equipment specifier:

- Artificial exterior lighting will, where applicable comply with the requirements outlined within BS 5489-1:2020 [Code of practice for the design of road lighting] (Part 1: Lighting of roads and public amenity areas). This British Standard provides recommendations for the lighting design for specific roadway classifications and amenity spaces where lighting is required. Exterior lighting installed as part of the Proposed Development will therefore comply with the requirements, to ensure that the exterior artificial lighting is British Standard compliant.
- Artificial exterior lighting within close proximity to ecologically sensitive areas will comply with guidance for the protection of sensitive species as provided by the Bat Conservation Trust (BCT) and the Institution of Lighting Professionals (ILP) in GN08:2023.
- Dimming requirements in the form of dusk to dawn, PIR sensors and Internal Switching to be utilised where possible to adhere to mitigation measures.

6.4. Reducing Obtrusive Light Potential

6.4.1. The Application Site is assessed through the desktop survey to be located within an E3 and E2 Environmental Zone. This is separated into the wider extents of the Application Site being an E2 and the central more built suburban area being an E3.

6.4.2. The exterior lighting throughout the Proposed Development will therefore comply with the obtrusive light criterion as outlined in the Institution of Lighting Professional's Guidance Notes for the Reduction of Obtrusive Light: GN01: 2011, as set out in **Table 9**.

Environmental Zone	Sky Glow ULR [Max %]	Light Intrusion (into Windows) Ev [Lux]		Luminaire Intensity I [candelas]		Building Luminance Pre- curfew
		Pre-Curfew	Post-curfew	Pre-Curfew	Post-curfew	Average L [cd/m^2]
E0	0	0	0	0	0	0
E1	0	2	0	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

Table 9: Environmental Zone Classifications (GN01:2021)

Notes to **Table 9**:

- ULR = Upward Light Ratio of the Installation: this is the maximum permitted percentage of luminaire flux that goes directly into the sky.
- EV = Vertical Illuminance in Lux: measured flat on the glazing at the centre of the window.
- I = Light Intensity in Candelas (cd): when viewed by an observer.
- L = Luminance in Candelas per Square Metre (cd/m2).
- Curfew = the time in which stricter requirements (for the control of obtrusive light) apply: If not otherwise stated, 23:00 hours is suggested.

6.4.3. The purpose of adhering to the above criteria within the lighting design applied to the detailed and outline component, is to reduce the potential for obtrusive light negatively affecting potentially sensitive human and ecological receptors. A diagram example can be seen in **Figure 14**.

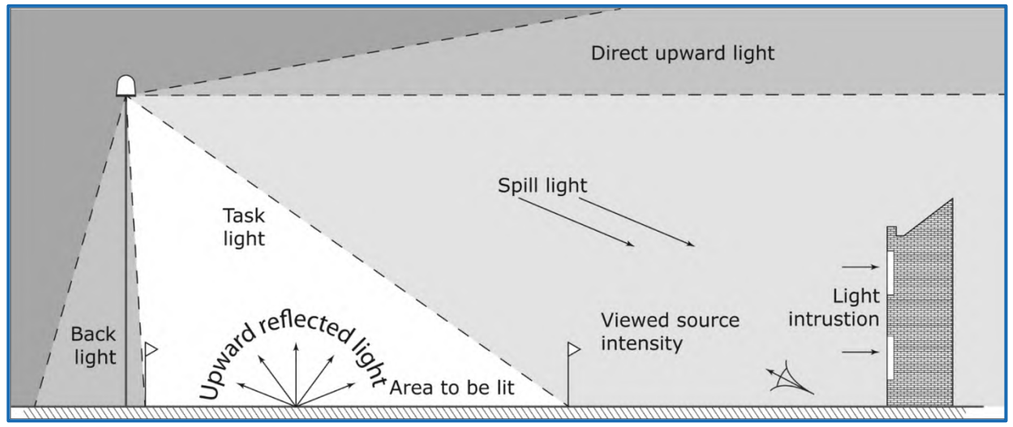


Figure 14: Types of Obtrusive Light

7. LIGHTING STRATEGY

7.1. Aims of the Proposed Lighting

7.1.1. The aim of the Lighting Strategy is to ensure that a safe and recognised level of illumination is provided to all areas of the Proposed Development that require lighting, which also ensure that the lighting is as sensitive as possible and contributes to a strong sense of place.

7.2. Outline Component

7.2.1. Outline lighting requirements will be provided for the following areas:

- Spine Roads
- Bridge Crossings
- Primary Road
- Secondary Roads
- Tertiary Residential Roads
- Larger Parking Areas servicing Flats and Other Uses
- Edge of Settlement Roadways
- Sports Hub (Including 3x AGP pitches & MUGA hard courts)
- Local Centres – Highstreet
- Education Areas
- EcoValley

7.2.2. Each area has been sectioned into subheadings below detailing the approach to lighting with reference to council specification, British Standards and guidance.

7.3. Access Roads from the Wider Area

7.3.1. **Table 10** provides the primary route lighting requirements to be adopted and accords with the local authority's street lighting specification **(Section 3.4)**.

7.3.2. Based on the Environmental Zone classification of the Application Site (**Section 5.4**) and considering that the roads in question serve as "Access Roads" to the Proposed Development, with expected traffic flows classified as "busy" and speed limits below 30 mph, the appropriate lighting class has been assessed as **P4**. This has been derived from and in accordance with **BS 5489-1:2020, Table A.5**.

7.3.3. Based on the road lighting class derived from BS5489-1:2020 being a P4 and conflict area lighting class requirements within PLG02:2013 Table 1, this is to be lit as a C4 conflict area lighting class.

7.3.4. Based on this, the "Approach Roads" lighting requirements are to be lit to a P3 (**PLG05:2013, Table 1**), with the approach extent dependant on the road speed limit (**PLG05:2013, Table 2**).

7.3.5. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are not positioned directly located adjacent to property windows.

Detail	Requirement
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature	3000K
Luminaire tilt	0°
Environmental Zone	E2
Lighting Control	Lighting Control Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning.
Column Height	≤8 metres
Illuminance – Access Roads	
Lighting Class (as per BS 5489-1:2020)	P4
Average**	5.0 Lux
Minimum	1.0 Lux
Illuminance – Approach Roads	
Lighting Class (as per BS 5489-1:2020)	P3
Average**	7.5 Lux
Minimum	1.5 Lux
Illuminance - Roundabout	
Lighting Class (as per ILP PLG02:2013)	C4
Average**	10.0 Lux
Uniformity	0.40
****To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 10: Outline Component Lighting Requirements

7.3.6. See **Figure 15** for the Access Roads Lighting Parameters Plan and **Appendix 1** for the overarching Parameters Plan.

7.3.7. For the Access Roads from the Wider Area, see **Appendix 1** for details of the Indicative Lighting Design for these areas, and **Figure 16** for an indicative Light Spil Diagram.

Figure 15: Access Roads from the Wider Area – Lighting Parameters

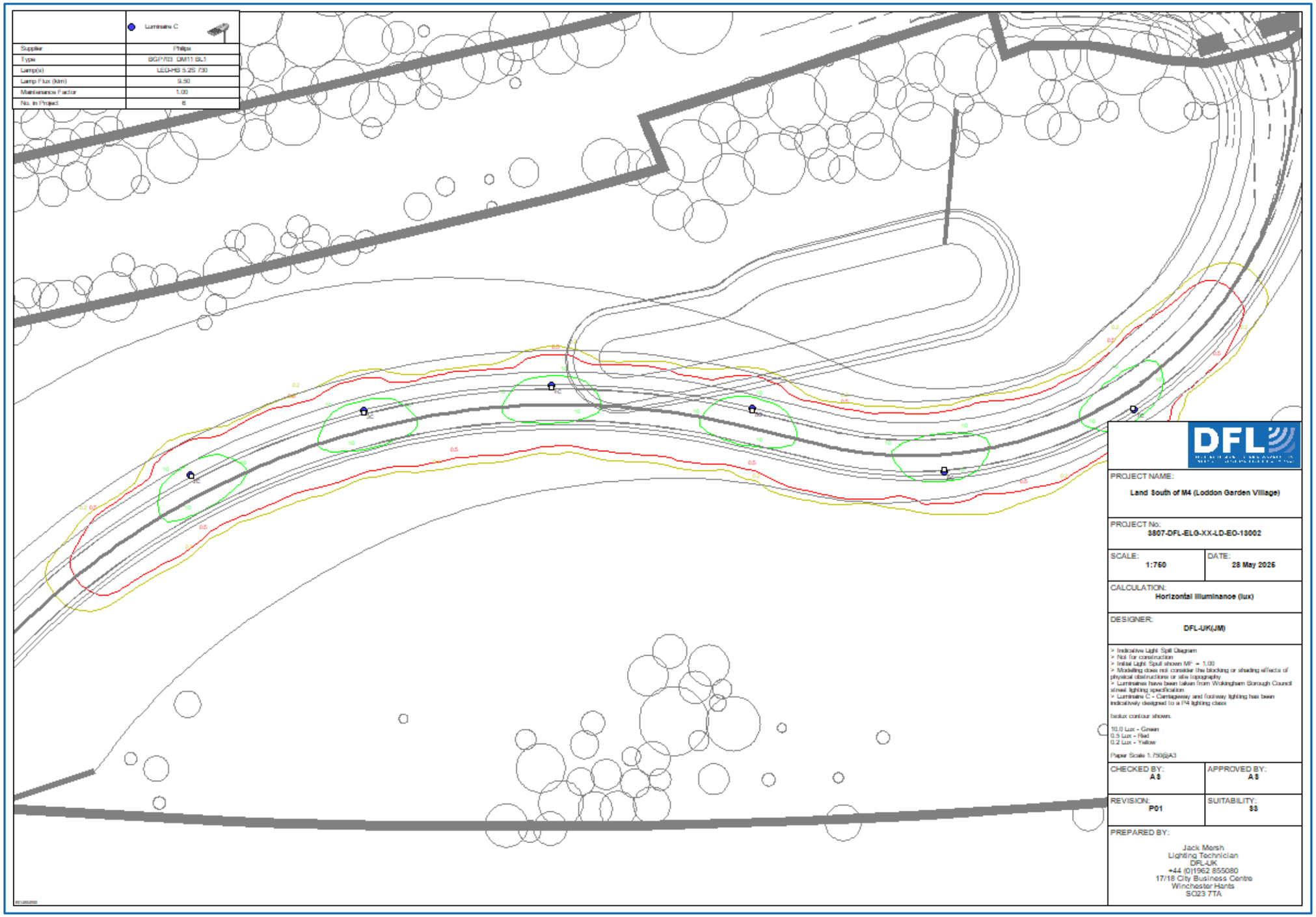


Figure 16: Access Roads from the Wider Area Indicative Light Spill Diagram

7.4. Bridge Crossings

7.4.1. A standard approach to lighting all bridge crossings will be using lighting columns, as shown in Figure **18.**

7.4.2. A specialist bridge option had also been reviewed and the details of this can be seen in **Section 8.4**.

7.4.3. The Bridge Crossing lighting class has been determined using BS5489-1:2020 Table A.5 lighting requirements. The task area sits within the pre-determined Environmental Zone of an E2, however, due to the traffic composition, the complexity of task requirements and the potential traffic flow, this has been risk assessed and adjusted to one class higher to a P3.

7.4.4. **Table 11** provides the standard approach lighting requirements to be adopted for the outline component and accords with the local authority's street lighting specification **(Section 3.4)**.

Detail	Requirement
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature*	2700K
Luminaire tilt	0°
Environmental Zone	E2
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
Column Height	≤8 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	P3
Average**	7.5 Lux
Minimum	1.5 Lux
****To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 11: Outline Component Lighting Requirements – Bridge Crossings

7.4.5. See **Figure 17** for the Lighting Parameters Plan for the Bridge Crossing and see **Appendix 1** for the overarching Parameters Plan.

7.4.6. For Bridge Crossings see Figure **18** for details of the Indicative Lighting Design for these areas.

Figure 17: Bridge Crossings – Lighting Parameters

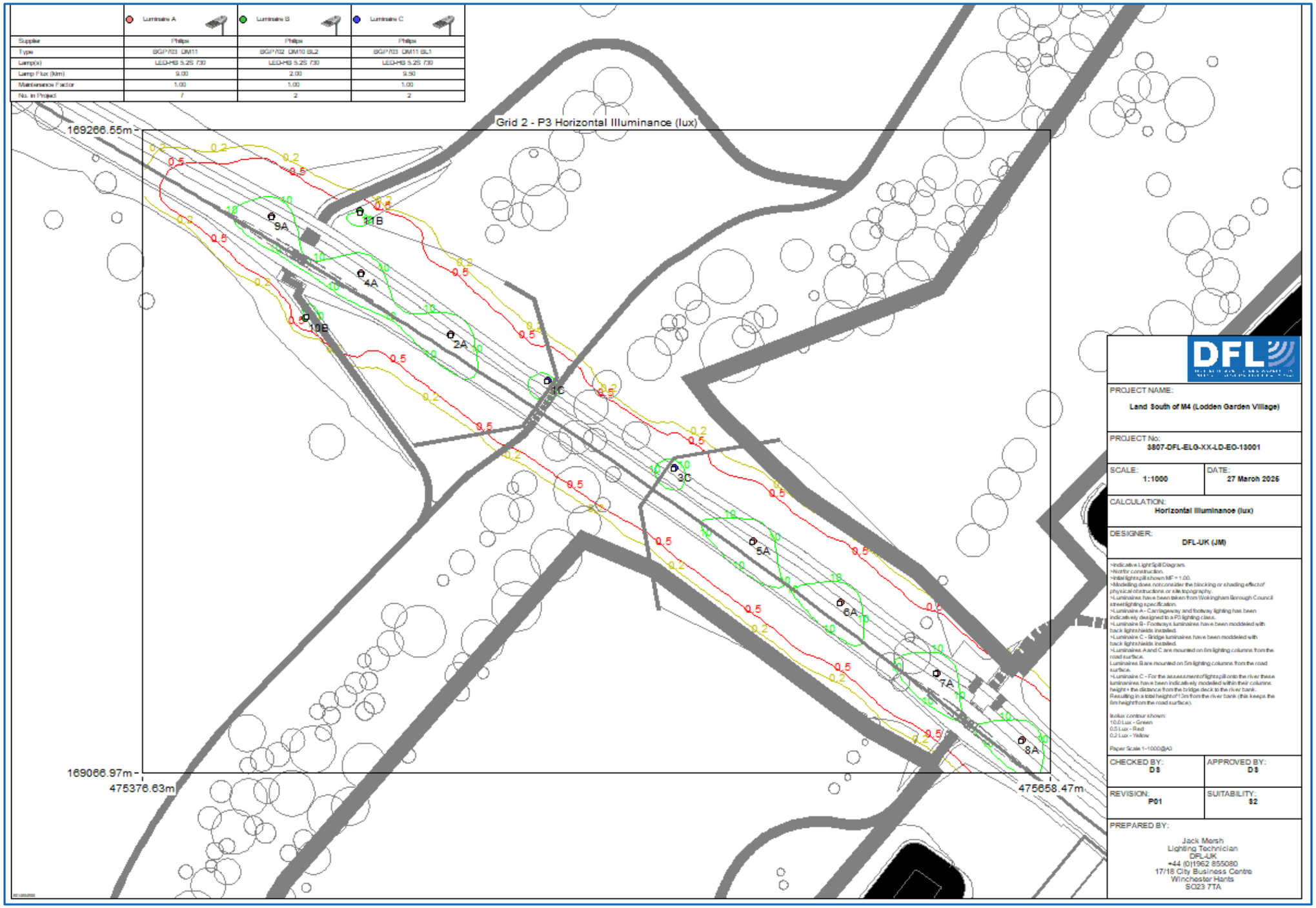


Figure 18 - Bridge Crossing Standard Approach Indicative Light Spill Diagram (WIP)

7.5. Spine Roads

7.5.1. **Table 12** provides the primary residential roads lighting requirements to be adopted these components and accords with the local authority's street lighting specification **(Section 3.4)**.

7.5.2. Due to the Environmental Zone for the Application Site being E3, the expected traffic flow on these roads is to be "busy" as this is the central Primary Road within the Proposed Development, and the expected speed limit being <30mph, the lighting class is assessed as a P3. This has been determined from BS5489-1:2020.

7.5.3. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Table 12**.

7.5.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

Detail	Requirement
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature	3000K
Luminaire tilt	0°
Environmental Zone	E3
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
Column Height	≤8 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	P3
Average*	7.50 Lux
Minimum	1.5 Lux
*** To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 12: Outline Component Lighting Requirements - Primary Residential Roads

7.5.5. See **Figure 19** for the Lighting Parameters Plan for Primary Roads and see **Appendix 1** for the overarching Parameters Plan.

Figure 19 - Spine Roads – Lighting Parameters

7.6. Secondary Roads

7.6.1. **Table 13** provides the secondary residential roads lighting requirements to be adopted for these components and accords with the local authority's street lighting specification **(Section 3.4)**.

7.6.2. Due to the Environmental Zone for the Application Site being E3, the expected traffic flow on these roads to be "normal" as these will be secondary roads to residential zones, the expected speed limit being <30mph, the lighting class is assessed as P4. This has been determined from BS5489-1:2020.

7.6.3. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Table 13**.

7.6.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

Detail	Requirement
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature	3000K
Luminaire tilt	0°
Environmental Zone	E3
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
Column Height	≤6 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	P4
Average*	5.0 Lux
Minimum	1.0 Lux
*** To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 13: Outline Component Lighting Requirements – Secondary Roads

7.6.5. See **Figure 20** for the Lighting Parameters Plan for Secondary Roads and see **Appendix 1** for the overarching Parameters Plan.

Figure 20 - Secondary Roads – Lighting Parameters

7.7. Tertiary Residential Roads

7.7.1. **Table 14** provides the tertiary residential roads lighting requirements to be adopted for these components and accords with the local authority's street lighting specification **(Section 3.4)**.

7.7.2. Due to the Environmental Zone for the Application Site being E3, the expected traffic flow on these roads to be "quiet" as these will be tertiary roads adjacent to properties, and the expected speed limit being <30mph, the lighting class is assessed as P4. This has been determined from BS5489-1:2020.

7.7.3. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Table 14**.

7.7.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

Detail	Example Specification
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature	3000K
Luminaire tilt	0°
Environmental Zone	E3
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
Column Height	≤5 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	P4
Average*	5.0 Lux
Minimum	1.0 Lux
*** To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 14: Outline Component Lighting Requirements – Tertiary Residential Roads

7.7.5. See **Figure 21** for the Lighting Parameters Plan for Tertiary Roads and see **Appendix 1** for the overarching Parameters Plan.

Figure 21: Tertiary Residential Roads – Lighting Parameters

7.8. Parking Areas Servicing Flats and Other Uses

7.8.1. **Table 15** outlines the lighting requirements for large parking areas servicing flats and other uses and accords with the local authority's street lighting specification **(Section 3.4)**.

7.8.2. Due to the Environmental Zone for the Application Site being E3 and the contextual usage requirements, the lighting class for the Parking areas servicing flats and other uses is to be "Light Traffic". This is determined from BS EN 12464-2:2024 Table 4.

7.8.3. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Table 15**.

7.8.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

Detail	Example Specification
Luminaire Manufacturer	Philips
Luminaire Model	Luma
Light Source Colour Temperature	3000K
Luminaire tilt	0°
Environmental Zone	E3
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
	≤6 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	**Light Traffic
Average*	5.0 Lux
Minimum	0.25 Lux
To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times	
****Taken from BS EN 12464-2:2024 - "Parking areas of shops, terraced and apartment houses; cycle parks"***	

Table 15: Outline Component Lighting Requirements - Larger Parking Areas servicing Flats and Other Uses

7.9. Edge of Settlement Small Residential Roads

7.9.1. **Table 16** outlines the lighting requirements for edge of settlement roadways and accords with the local authority's street lighting specification (**Section 3.4)**.

7.9.2. Due to the Environmental Zone for the Application Site being E2, the expected traffic flow on these roads to be "quiet" as these will be roadways on the edge of the main development, and the expected speed limit being <30mph, the lighting class is assessed as P5. This has been determined from BS5489-1:2020.

7.9.3. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Table 16**.

7.9.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

Detail	Example Specification
Luminaire Manufacturer	Phillips
Luminaire Model	Luma
Light Source Colour Temperature	≤3000K
Luminaire tilt	0°
Environmental Zone	E2
Lighting Control	Telensa 5-pin NEMA Telecell with integral Telensa Dimming Module (DALI standard) and GPS positioning
	≤5 metres
Illuminance	
Lighting Class (as per BS 5489-1:2020)	P5
Average*	3.0 Lux
Minimum	0.6 Lux
*** To maintain Uniformity, the average illuminance must not exceed the minimum illuminance by more than 1.5 times**	

Table 16 - Outline Component Lighting Requirements – Edge of Settlement Roadways

7.10. Sports Hub

7.10.1. The AGP pitch lighting columns are to be a maximum height of 15 metres.

7.10.2. The MUGA pitch lighting columns are to be a maximum height of 10 metres.

7.10.3. Due to the Environmental Zone for the Application Site being E3 and the contextual usage requirements, the lighting class Sports Hub car parking areas is to be "Medium Traffic" as per BS EN 12464-2:2024.

7.10.4. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Section** Error! Reference source not found.

7.10.5. Where luminaires are to be positioned, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned to minimise light spill from the lit pitches into human and ecology receptors.

7.10.6. The AGP sports pitches are to be lit with The FA Guide to Floodlighting guidance for a 200-lux average and 0.6 uniformity lighting requirement.

7.10.7. The MUGA pitches are to be lit with using LTA guidance below:

APPENDIX A – PERFORMANCE STANDARDS

The LTA performance standards for artificial lighting within the prescribed areas of a tennis court are set out as follows:-

Standard	Maintained average illumination on P.P.A.	Maintained average illumination on T.P.A.	Uniformity within PPA Emin/Eav	Uniformity within TPA Emin/Eav
Recommended	500 Lux	400 Lux	0.7	0.6
Minimum	400 Lux	300 Lux	0.7	0.6

Figure 22 - Lighting Requirements: MUGA Pitches

7.10.8. See **Figure 25** for the Lighting Parameters Plan for the Sports Hub and see **Appendix 1** for the overarching Parameters Plan.

7.10.9. Car parking areas are to be lit with BS EN 12464-2:2024 Table 8 lighting requirements for a "Medium Traffic" parking area **(Figure 23)**.

Table 8 — Parking areas

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx required[a]	$\bar{E}_m$ lx modified[b]	U_o	R_{GL}	R_a	Specific requirements
8.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	–	0,25	55	70	
8.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	–	0,25	50	70	
8.3	Car charging station points in lit areas	20	–	0,25	50	70	At the relevant area approx. up to 3 m from charging point. If the display is not self illuminated, a vertical illuminance of $\bar{E}_m$ = 50 lx at the charging poles should be provided for the time of reading. Vertical illuminance on the car should be considered.
8.4	Car charging station points in unlit areas	10	–	0,25	50	70	If the display is not self illuminated, a vertical illuminance of $\bar{E}_m$ = 50 lx at the charging poles should be provided for the time of reading.
8.5	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	–	0,25	50	70	

[a] Required: minimum value.
[b] Modified: considers common context modifiers in 5.3.3.

Figure 23 - Lighting Requirements: Sports Hub Car Park

7.10.10. Pedestrian footpaths within the sports hub area are to be lit using BS EN 12464-2:2024 Table 7 lighting requirements **(Figure 24)**.

Table 7 — General requirements for traffic zones outside buildings and for cleaning at outdoor work places

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx required[a]	$\bar{E}_m$ lx modified[b]	U_o	R_{GL}	R_a	Specific requirements
7.1	Walkways exclusively for pedestrians	5	–	0,20	50	70	
7.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	–	0,40	50	70	
7.3	Regular vehicle traffic (max. 40 km/h)	20	–	0,20	45	70	At shipyards and in docks, R_{GL} may be 50.
7.4	Mixed traffic areas, vehicle turning, stationary loading and unloading points	50	–	0,40	50	70	When the area is non-occupied $\bar{E}_m$ required may be reduced to 5 lx. Pay attention to the illuminance levels of the surrounding and adjacent areas.
7.5	Cleaning and servicing	50	–	0,25	50	70	At all relevant surfaces
7.6	Recycling centers - areas with rubbish bins and sorting of waste	30	–	0,25	50	70	

[a] Required: minimum value.
[b] Modified: considers common context modifiers in 5.3.3.

Figure 24 - Lighting Requirements: Sports Hub Pedestrian footpaths

Figure 25 - Sports Hub – Lighting Parameters

7.11. Education Areas

7.11.1. **Figures 26-28** highlight the lighting requirements for education areas. This is separated into car parking, outdoor task areas and pedestrian walkways.

7.11.2. Note that the lighting designer is not limited to luminaire manufacturer and model where it is not intended for lighting equipment to be adopted. However, the selected luminaire and lighting design must comply with the lighting performance requirements and Environmental Zone compliance outlined in **Section 8.1**.

7.11.3. Educational fitting specification is to follow local school guidance at detailed design.

7.11.4. Where luminaires are to be positioned outside residential dwellings, the lighting designer will ensure that all necessary steps are taken during the design phase to ensure, where reasonably practicable, that luminaires are positioned on property boundaries, and not directly located adjacent to property windows.

7.11.5. Subsidiary roads within Education Areas are to be lit using road lighting specifications detailed within **Sections 7.5.**

7.11.6. Car parking areas are to be lit with BS EN 12464-2:2024 lighting requirements for a “Medium Traffic” parking area **(**Figure **26).**

Table 8 — Parking areas

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx		U_o	R_{GL}	R_a	Specific requirements
		required[a]	modified[b]				
8.1	Light traffic, e.g. parking areas of shops, terraced and apartment houses; cycle parks	5	–	0,25	55	70	
8.2	Medium traffic, e.g. parking areas of department stores, office buildings, plants, sports and multipurpose building complexes	10	–	0,25	50	70	
8.3	Car charging station points in lit areas	20	–	0,25	50	70	At the relevant area approx. up to 3 m from charging point. If the display is not self illuminated, a vertical illuminance of $\bar{E}_m$ = 50 lx at the charging poles should be provided for the time of reading. Vertical illuminance on the car should be considered.
8.4	Car charging station points in unlit areas	10	–	0,25	50	70	If the display is not self illuminated, a vertical illuminance of $\bar{E}_m$ = 50 lx at the charging poles should be provided for the time of reading.
8.5	Heavy traffic, e.g. parking areas of major shopping centres, major sports and multipurpose building complexes	20	–	0,25	50	70	

[a] Required: minimum value.
[b] Modified: considers common context modifiers in 5.3.3.

Figure 26 - Lighting Requirements: Education Area Car Park

7.11.7. Outdoor task areas within education areas to be lit using BS EN 12464-2:2024 Table 10 lighting requirements **(Figure 27)**.

Table 10 — Outdoor areas in educational facilities and kindergartens

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx		U_o	R_{GL}	R_a	Specific requirements
		required[a]	modified[b]				
10.1	Common play areas	7,5	10	0,20	50	70	Pay attention to the illuminance levels of the surrounding areas (5.3.4).
10.2	Play areas with play-equipment that requires lighting for safety reasons	10	15	0,20	50	80	Pay attention to the illuminance levels of the surrounding areas (5.3.4).
10.3	Schoolyards with a need of schoolyard guards during the hours with no daylight	30	–	0,25	50	80	Pay attention to the illuminance levels of the surrounding areas (5.3.4).
10.4	Play areas for ball playing and games to be used during the hours with no daylight	15	20	0,40	50	70	Pay attention to the illuminance levels of the surrounding areas (5.3.4).

[a] Required: minimum value.
[b] Modified: considers common context modifiers in 5.3.3.

Figure 27 - Lighting requirements: Outdoor Education Areas

7.11.8. Pedestrian footpaths within education areas are to be lit using BS EN 12464-2:2024 Table 7 lighting requirements **(Figure 28).**

Table 7 — General requirements for traffic zones outside buildings and for cleaning at outdoor work places

Ref. no.	Type of area, task or activity	$\bar{E}_m$ lx		U_o	R_{GL}	R_a	Specific requirements
		required[a]	modified[b]				
7.1	Walkways exclusively for pedestrians	5	–	0,20	50	70	
7.2	Traffic areas for slowly moving vehicles (max. 10 km/h), e.g. bicycles, trucks and excavators	10	–	0,40	50	70	
7.3	Regular vehicle traffic (max. 40 km/h)	20	–	0,20	45	70	At shipyards and in docks, R_{GL} may be 50.
7.4	Mixed traffic areas, vehicle turning, stationary loading and unloading points	50	–	0,40	50	70	When the area is non-occupied $\bar{E}_m$ required may be reduced to 5 lx. Pay attention to the illuminance levels of the surrounding and adjacent areas.
7.5	Cleaning and servicing	50	–	0,25	50	70	At all relevant surfaces
7.6	Recycling centers - areas with rubbish bins and sorting of waste	30	–	0,25	50	70	

[a] Required: minimum value.
[b] Modified: considers common context modifiers in 5.3.3.

Figure 28 - Lighting Requirements: Education Area Footpaths

7.12. EcoValley

7.12.1. The footways, cycleways and bridleways within the EcoValley area of the Proposed Development are to be retained in darkness and to be non-illuminated, with specifications detailed in **Section 8.7** for a non-illuminated bollard option for wayfinding purposes.

7.12.2. See **Figure 29** for the Lighting Parameters Plan for EcoValley and see **Appendix 1** for the overarching Parameters Plan.

Figure 29 – EcoValley – Footways, Cycleways and Bridleways – Lighting Parameters

8. EXAMPLE EQUIPMENT

8.1. Adoptable Roadway Specification

8.1.1. 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	Areas within the Proposed developed that are to be adopted
Correlated Colour Temperature (Kelvin / K)	3000K as standard but may be reduced to 2700K in specific areas due to ecological constraints, as per the ecological consultant (EPR) and **Appendix 2.**
Luminaire Manufacturer	Philips (Or Similarly Approved)
Luminaire Model	Luma Gen 2 (Or Similarly Approved)
Light Source	LED
Height	Mounting height specifications are detailed in local authority specification **(Section 3.4)**
Mounting Arrangement	Post-Top
Luminaire Tilt	0°
Upward Light Output Ratio E3 < 5%	0%
Example Luminaire Image	
Controls	As per local authority specification

Table 17 - Adoptable Specification

8.2. Non-Adoptable Lighting Specifications

8.2.1. Non-Adoptable lighting specifications are detailed to show an example of typical luminaires that can be used for sports lighting and private lighting. It is important to note that these are still required to follow **Table 18** to ensure light spill, glare and light intrusion are minimised onto any identified receptors.

8.3. Sports Lighting

8.3.1. Where the sports hub is to have sports lighting for the 3x AGP pitches & the MUGA hard courts, example lighting specifications have been laid out to ensure mitigative measured are included in the design and equipment specification stages.

8.3.2. Abacus lighting is an example of sports floodlighting. They support variable lumen outputs, wattages, colour temperatures and optic control. These can be configurable to include mitigation measures such as cowls for full cut off of light spill from the side and back profiles. This is to ensure light spill is minimised onto sensitive receptors.

8.3.3. An example of this fitting can be seen in **Figure 30.**

Figure 30 - Abacus Lighting Challenger 1 LED Floodlight

8.3.4. Musco Lighting is another example of sports floodlighting with similar specifications for lumen outputs, wattages, colour temperature and optic control for a multitude of mixed sports contextual usages. Physical cowls can also be included within the specification alongside a smart control system for stage dimming and shut off that can be remote programmable via a smartphone.

8.3.5. An example of this fitting can be seen in **Figure 31.**

Figure 31 - Musco Lighting LED Floodlight

8.4. Specialist Bridge Lighting Approach

8.4.1. A specialist bridge lighting approach was explored using the Thron Orus Pro as an example of other bridge lighting solutions. If this solution was to be chosen, it must be this product and cannot deviate from this. An example of this fitting can be seen in Figure **32.** The pros and cons of this fitting are listed below:

Pros:

- Lower mounting height than standard column,
- Full cut off back spill onto receptors if parapet wall is solid,
- 2700K colour temperature may be available to specify.

Cons:

- More expensive to maintain due to use of non-standard equipment,
- Bridge to require a minimum 1 metre solid parapet to act as a physical shield,
- Luminaire currently not on market but expected to be released summer 2025. Full details of colour temperatures currently not published.
- Luminaire can only be used on straight bridges and roads. Any bend in the bridge or road will result in glare for drivers.

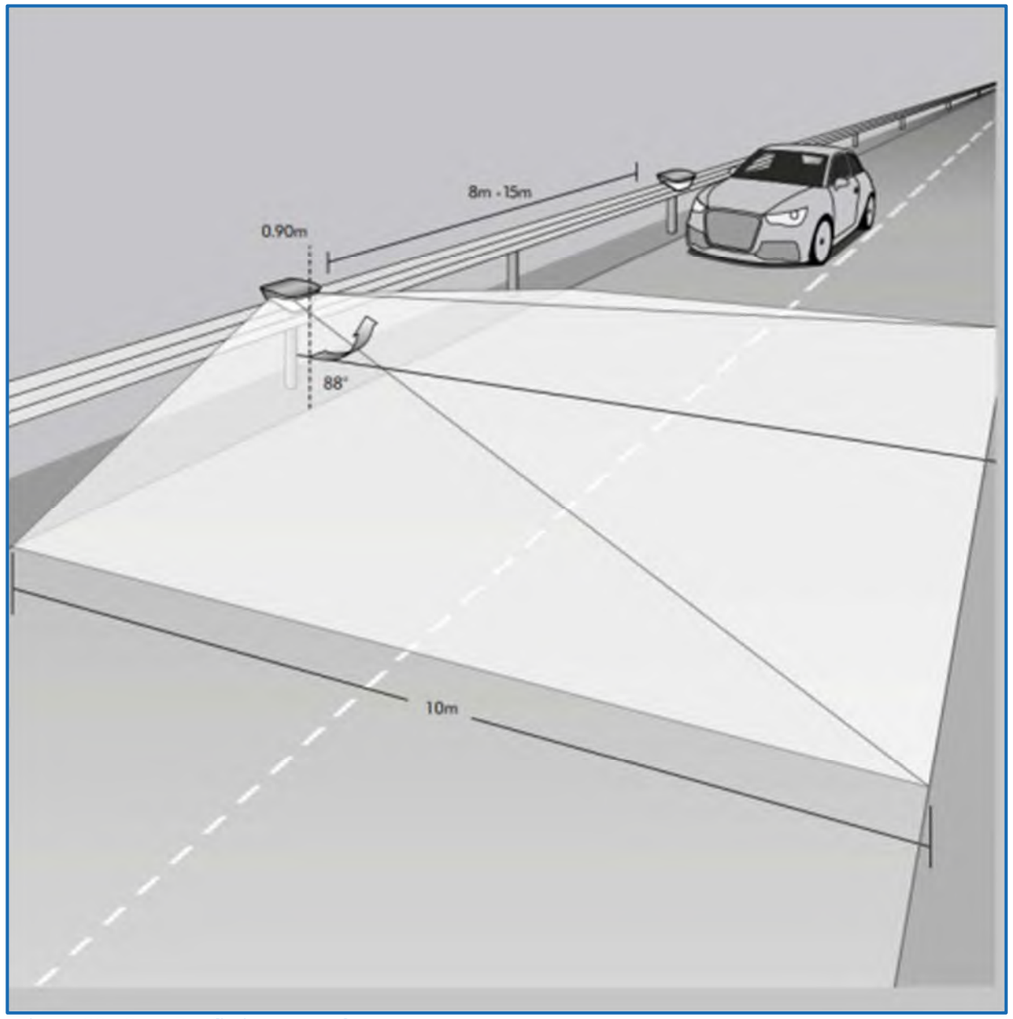


Figure 32 - Orus Pro fitting example

8.5. Property Frontages and Rears

8.5.1. The key entrances and exits for dwellings could be illuminated for wayfinding purposes only, to ensure amenity and safety. This can be put on a timed sensor and will switch off after 1 minute of no motion detected.

8.5.2. The colour temperature is to be specified as 2700K, in line with ILP GN08:2023 requirements.

8.5.3. These are to be wall mounted with a downward optic to prevent the potential for upward light spill, as well as any unnecessary light spill onto neighbouring properties and the determined receptors.

8.5.4. Lighting to the frontages and rears to be restricted to a height of no greater than 2.0 metres, this is to ensure downward illumination light spill is minimised.

Figure 33 - Example of Frontage and Rear luminaire

8.6. Bollards

8.6.1. Other non-standard equipment within privately maintained spaces can be bollards, non-adopted footpaths within amenity areas.

8.6.2. The type of bollard is dependent on designer lighting levels, with regards to lumen output, optic and model. However general design principles should ensure that bollards are of full cut off specification and 2700K colour temperature within determined receptor areas.

8.6.3. An example visualisation of bollards in context can be seen in **Figure 34.**

Figure 34 - Example of Bollard

Figure 35 - Bollard Visualisation

8.7. Non illuminated bollards

8.7.1. Non illuminated reflective bollards are to be proposed within the country park rural footways and bridleways. This is to provide wayfinding as a non-illuminated alternative to restrict any light spill onto determined receptors. An example of this can be seen in **Figure 36.**

Figure 36 - Example of non-illuminated bollard

8.8. Mitigation by Design

8.8.1. The mitigation by design for lighting is detailed in **Table 18**. 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. Where areas are to be adopted by the council, their local specification to be followed.	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, more specifically sports lighting designs and non-adopted decorative lighting. 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. Sports Lighting design process must consider using physical cowls to minimise light spill.	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.	Whole Proposed Development
	During the detailed lighting design, a risk assessment must be undertaken to identify the specific lighting class for each area.	
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. Luminaires to be controlled via a PIR sensor for Frontage and Rears with a 1–2-minute timer before switching off, as detailed in **Section 8.5.**	Frontages and Rears

Table 18 - Mitigation by Design

9. CONCLUSION

9.1.1. This Lighting Strategy proposes a framework for the lighting design that accounts for best practice for the design of lighting. The guidance that has been followed for this has been:

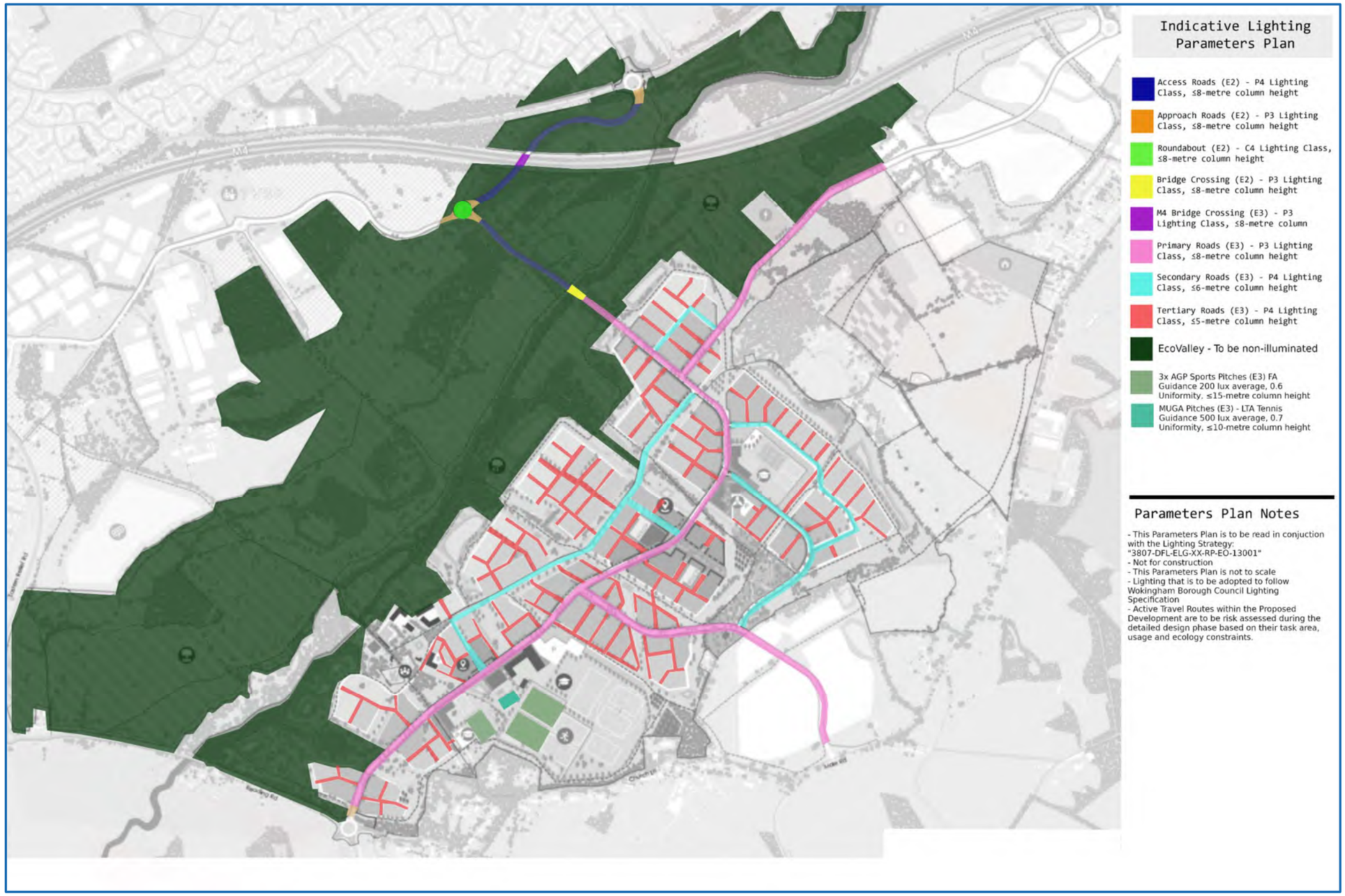
- Wokingham Borough Council Lighting Design Specification **"- 3 - Street Lighting - Design Process, Requirements and Specification Guide - Appendix A - V11"**
- ILP GN01:2021 Guidance note on the Reduction of Obtrusive Light
- ILP GN08:2023 Bats and Artificial Lighting

9.1.2. The Parameters Plan, detailed in **Appendix 1** outlines the lighting requirements for each task area (**Section 7)** that adheres to local authority design specification and industry guidance.

9.1.3. Non-illuminated parameters have been made for locations that are retained green space and where ecological constraints are present.

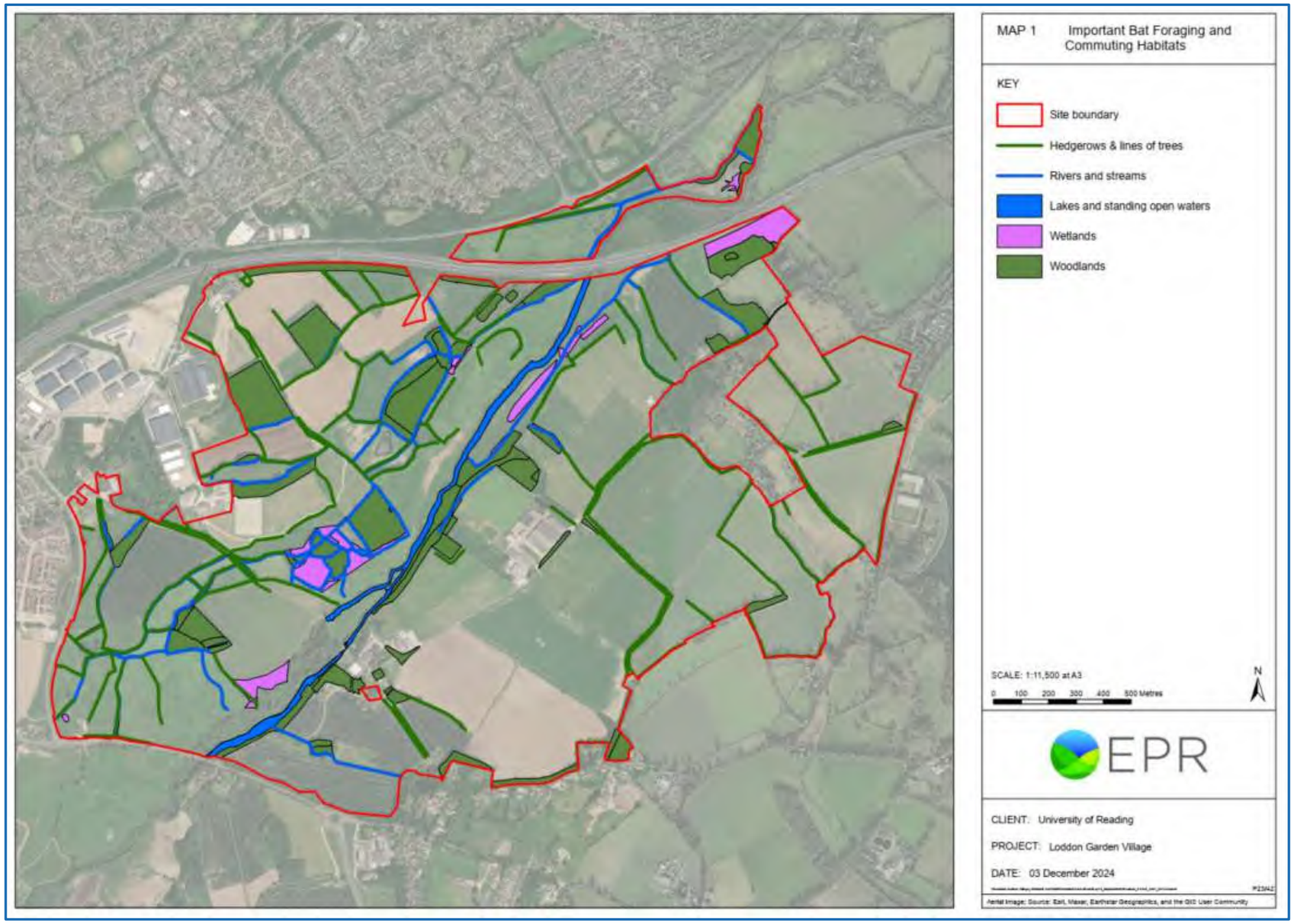
APPENDIX 1

Lighting Parameters Plan



APPENDIX 2

EPR Ecology Mapping



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 *Iv <of a source, in a given direction> quotient of the luminous flux, dΦv, leaving the source and propagated in the element of solid angle dΩ containing the given direction, by the element of solid angle (unit: cd =lm · 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. *Lv <in a given direction, at a given point of a real or imaginary surface> quantity defined by the formula (unit: cd · m-2 = lm · m-2 · 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. *Ev (unit: lx = lm · m-2) 1. <at a point of a surface> quotient of the luminous flux dΦv 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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- **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.
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