Land at Downlands Farm

LIGHTING IMPACT ASSESSMENT

DATE: 24.05.22

PROJECT No. 4178

PREPARED FOR: GLEESON LAND LIMITED

Land at Downlands Farm

LIGHTING IMPACT ASSESSMENT

PROJECT: 4178

CURRENT REVISION: 0.1

DATE OF ISSUE: 24.05.22

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Rev	Date	Details
0.1	24.05.22	First Issue

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CONTENTS

1 Introduction 1
1.1 General 1
1.2 Scope of the Report 1
1.3 Structure of the Report 1
1.4 Site Location and Sensitive Ecological Receptors 2
2 Legislation, Planning and Policy Guidance 3
2.1 Legislative Background 3
2.2 Planning Policy Context 3
2.3 International Guidance 3
2.4 National Guidance 4
3 Environmental Zone Classification and Parameters 5
3.1 Environmental Zoning 5
3.2 Obtrusive Light Limitation for Exterior Lighting Installations 6
4 Assessment Methodology and Significance Criteria 11
4.1 Scope of Assessment 11
4.2 Methodology for Baseline Lighting Survey 11
4.3 Method for Assessing Proposed Lighting 13
4.4 Impact Assessment and Significance Criteria 13
5 Environmental Baseline 19
5.1 Assessment of Existing Environmental Zone 19
5.2 Baseline Conditions within the Site and Surrounding Area 19
6 Proposed Lighting 22
6.1 Construction Phase 22
6.2 Operational Phase- Proposed Lighting 22
7 Assessment of Impacts 27
7.1 Construction Phase 27
7.2 Operational Phase 27
8 Mitigation Measures 29
8.1 Construction Phase 29
8.2 Operational Phase 29
9 Residual effects 30
9.1 Construction Phase 30
9.2 Operational Phase 30
10 Conclusion/ Summary 31

CONTENTS

APPENDICES:

APPENDIX A: Lighting Terminology

APPENDIX B: Baseline Lighting Survey Location Plan

APPENDIX C: External Lighting Strategy for the boardwalk

APPENDIX D: Vertical Calculation Plane Results for the Boardwalk

APPENDIX E: Luminaire Data Sheets and Manufacturers Data

1 Introduction

1.1 General

This Lighting Assessment is provided by The Lighting Bee Ltd, a specialist lighting design consultancy with experience and knowledge in lighting impact assessments, mitigation and lighting design in relation to light sensitive ecological receptors.

The author of this report is a fully qualified Lighting Designer and Chartered Electrical Engineer, with full membership of the Institute of Lighting Professionals, Society of Light and Lighting, and Chartered Institute of Building Services Engineers.

The Lighting Bee Ltd have been commissioned by Gleeson Land Limited to undertake a Lighting Impact Assessment for the proposed development, on land at Downlands Farm, Uckfield.

1.2 Scope of the Report

The aim of the Lighting Impact Assessment is to provide an assessment of the impacts of the external lighting from the proposed development in terms of obtrusive light.

The Lighting Impact Assessment will also outline the proposed parameters and mitigation measures to limit light spill from all types of artificial lighting onto the Proposed Dark Zones for ecology.

The Hybrid Planning Application comprises:

1. Outline Application (with all matters reserved except for access) for the erection of up to 424 residential dwellings including affordable housing, the provision of vehicular, pedestrian and cycle access and separate emergency access from the Uckfield Bypass (A22), pedestrian and cycle access from Snatts Road, open spaces including children's play space, sustainable urban drainage systems, associated landscaping, infrastructure and earthworks.
2. Full Application comprising creation of a Strategic SANG, associated landscaping and car parking, and demolition of existing residential property and other buildings and provision of pedestrian and cycle access from Rocks Road, associated landscaping, infrastructure and earthworks.'

This lighting assessment report has been prepared to address the outline application, with an external lighting strategy prepared for the boardwalk which forms part of the pedestrian and cycle access from Rocks Road.

1.3 Structure of the Report

This report has been broken down into the following sections:

Section 2 – Outlines the relevant legislation, planning policy and guidance
Section 3 – Summarises the guidance for environmental zone classification and limiting parameters
Section 4 – Describes the assessment methodology and significance criteria

Section 5 – Contains the baseline lighting appraisal of the considered viewpoints and survey locations
Section 6 – Outlines the proposed external lighting for the development
Section 7 - Provides an assessment of the potential night time effects of the site lighting on the sensitive receptors
Section 8 - Considers further mitigation proposals for the site
Section 9 - Considers the residual effects
Section 10 - Concludes the lighting impact assessment

1.4 Site Location and Sensitive Ecological Receptors

The site is located to the northwest of the town of Uckfield, within the administrative area of Wealden District Council. The land immediately surrounding the north, west and south of the site largely comprises a mixture of agricultural land interspersed with areas of Ancient and Semi-Natural Woodland. The wider area to the north of the site includes the villages of Maresfield, Cooper's Green and Five Ash Down.

The A22 Uckfield Bypass cuts through the site north to south, splitting the site into two separate areas, to the east and west. The A22 turns into the A26 to the north west of the site. London Road, located to the northeast of the site and Rocks Road, located to the south of the site, provide the main vehicular access routes into Uckfield. A Public Right of Way (PRoW) passes to the immediate east of the site before crossing through the northern extent of the site. The PRoW provides access between the A26 to the northwest and Uckfield to the southeast.

There are no statutory ecological or landscape designations located on the site. West Park Uckfield Local Nature Reserve (LNR) is located approximately 100m to the south of the site and Buxted Park Site of Special Scientific Interest (SSSI) is located approximately 900m to the east of the site. Buxted Park is also a Grade II* Listed Registered Park and Garden, the boundary of which is located approximately 500m to the east of the site. High Weald Area of Outstanding Natural Beauty (AONB), is located approximately 2km to the north of the site. Rock Wood SSSI is located approximately 2.4km to the north of the site and Ashdown Forest SSSI, Special Protection Area (SPA) and Special Area of Conservation (SAC) is located approximately 2.75km to the north of the site.

The site is ecologically sensitive with light sensitive bat species commuting within the site, and Dormice present. Designated primary and secondary dark zones have been proposed throughout the site with targeted levels of illuminance for each zone. Refer to the Dark Areas Plan.

For further information refer to the ES Landscape and Ecology Chapters.

2 Legislation, Planning and Policy Guidance

2.1 Legislative Background

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

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

Although light was described as having the potential to cause statutory nuisance, no prescriptive limits or rules were set for impact assessment purposes. Guidance Notes for the Reduction of Obtrusive Light produced by the Institute of Lighting Professionals (ILP) has, therefore, been referred to for the purposes of this assessment.

Guidance produced by Defra, Statutory Nuisance from Insects & Artificial Light (2006) on s101to s103 of the Clean Neighbourhoods and Environment Act (2005) has also been referred to which places a duty on local authorities to ensure that their areas are checked periodically for existing and potential sources of statutory nuisances - including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice (in accordance with s80(2) of the EPA 1990), requiring that the nuisance cease or be abated within a set timescale.

2.2 Planning Policy Context

The National Planning Policy Framework (NPPF) 2021 states that the purpose of the planning system is to contribute to the achievement of sustainable development and constitute the Government's view on what sustainable development in England means in practice for the planning system. Paragraph 185 states that with regard to artificial lighting, planning policies and decisions should:

"limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."

2.3 International Guidance

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

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

CIE 126: Guidelines for Minimising Sky Glow (1997)

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

2.4 National Guidance

ILP Guidance Note for the Reduction of Obtrusive Light (GN 01/21)

The ILP has proposed lighting guidance and criteria for local authorities with a recommendation that these are incorporated at the local plan level. The ILP Guidance Notes define various forms of light pollution and describe a series of environmental zones. The ILP Guidance Notes provide suitable criteria against which the effects of artificial lighting can be assessed. This assessment has been based upon these criteria.

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

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

Guidance Note 08/ 18 Bats and artificial lighting in the UK – Bats and the Built Environment series

This guidance document was jointly published in 2018 by the ILP and BCT. It is intended to raise awareness of the impacts of artificial lighting on bats, and mitigation is suggested for various scenarios.

3 Environmental Zone Classification and Parameters

All standards consulted in section 2 are nationally recognised documents, (some internationally, also) which deal with all design issues associated with external lighting.

3.1 Environmental Zoning

The CIE Standards, the CIBSE and the Society of Light & Lighting guidance documents all apply a common Environmental Zoning system, which is summarised in Table 3.1 below.

TABLE 3.1: ENVIRONMENTAL ZONES

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO Starlight Reserves, IDA Dark Sky Parks/ Places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhibited rural areas. National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low District brightness (SQM 15 to 20)	Sparsely inhabited rural areas. Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural or urban settlements. Small town centres or suburban locations
E4	Urban	High district brightness	Town/City centres and other commercial areas with high levels of night-time activity

3.2 Obtrusive Light Limitation for Exterior Lighting Installations

The ILP Guidance Note for the Reduction of Obtrusive Light (GN 01/21) provide guidelines and threshold values applicable to each Environmental Zone, which are reproduced in tables 3.2 – 3.7 with associated notes.

Table 3.2 aims to address light intrusion by providing maximum values of vertical illuminance on properties. Limits apply to nearby dwellings, or potential dwellings, more specifically to their relevant surfaces or parts of surfaces, especially where windows are located. This parameter can also be considered for the management of spill light.

Table 3.3 aims to limit the luminous intensity of bright luminaires. It shows the maximum values for the luminous intensity of luminaires in designated directions where views of bright surfaces of luminaires are likely to be a nuisance to occupants of premises or from positions where such views are likely to be maintained, that is, not momentary or short-term.

Table 3.4 aims to limit the effects on transport systems, applying limits where users of road networks are subject to a reduction in the ability to see essential information.

Tables 3.5 and 3.6 aim to limit the effects of sky glow. The limits in table 3.5 represent the primary approach. The limits in table 3.6 should only be considered in certain scenarios as described.

Table 3.7 aims to limit the effect of over-lit building facades and signs. For illuminated advertising signs the aim should be to achieve the limits advised in PLG05.

TABLE 3.2: Maximum values of vertical illuminance on properties

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

Note: * If the installation is for public (road) lighting then this may be up to 1 lx.

TABLE 3.3: Limits of the luminous intensity of luminaires in designated directions							
Light technical parameter	Application conditions	Luminaire group (projected area A_p in m^2)					
		$0<A_P \leq 0.002$	$0.002<A_P \leq 0.01$	$0.01<A_P \leq 0.03$	$0.03<A_P \leq 0.13$	$0.13<A_P \leq 0.50$	$A_P>0.5$
Maximum luminous intensity emitted by luminaire (I in cd)	**E0**						
	Pre-curfew	0	0	0	0	0	0
	Post-curfew	0	0	0	0	0	0
	E1						
	Pre-curfew	0.29 *d*	0.63 *d*	1.3 *d*	2.5 *d*	5.1 *d*	2,500
	Post-curfew	0	0	0	0	0	0
	E2						
	Pre-curfew	0.57 *d*	1.3 *d*	2.5 *d*	5.0 *d*	10 *d*	7,500
	Post-curfew	0.29 *d*	0.63 *d*	1.3 *d*	2.5 *d*	5.1 *d*	500
	E3						
	Pre-curfew	0.86 *d*	1.9 *d*	3.8 *d*	7.5 *d*	15 *d*	10,000
	Post-curfew	0.29 *d*	0.63 *d*	1.3 *d*	2.5 *d*	5.1 *d*	1,000
	E4						
	Pre-curfew	1.4 *d*	3.1 *d*	6.3 *d*	13 *d*	26 *d*	25,000
	Post-curfew	0.29 *d*	0.63 *d*	1.3 *d*	2.5 *d*	5.1 *d*	2,500
Aid to gauging A_P		2 to 5cm	5 to 10cm	10 to 20cm	20 to 40cm	40 to 80cm	>80cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding A_P representative area (m^2)		0.0008	0.004	0.016	0.063	0.251	>0.5

Notes:

1. *d is the distance between the observer and the glare source in metres;*
2. *A luminous intensity of 0 cd can only be realised by a luminaire with a complete cutoff in the designated directions;*
3. *A_P is the apparent surface of the light source seen from the observer position*
4. *For further information refer to Annex C of CIE 150*
5. *Upper limits for each zone shall be taken as those with column Ap>0.5*

TABLE 3.4: Maximum values of threshold increment and viewing direction in the path of travel				
Light technical parameter	Road classification*			
	No road lighting	M6/M5	M4/M3	M2/M1
Veiling luminance† (L_v)	0.037 cd/m^2	0.23 cd/m^2	0.40 cd/m^2	0.84 cd/m^2
Threshold increment	15% based on adaption luminance of 0.1 cd/m^2	15% based on adaption luminance of 1.0 cd/m^2	15% based on adaption luminance of 2.0 cd/m^2	15% based on adaption luminance of 5 cd/m^2

Notes:
** Road classifications as given in CIE 115:2010*
† The veiling luminance values specified in this table are based upon on a permissible TI value of 15%

Definitions:
TI The measure of disability glare (the reduction in visibility caused by intense light sources in the field of view) expressed as the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present. Note: Higher values of TI correspond to greater disability glare.
L_v The luminance that would need to be superimposed on a scene in object space to reduce the scene's contrast by an amount equal to the added retinal illuminance from scattered light on the scene's retinal image. It is most commonly used to describe the contrast-reducing effect of a glare source in the field of view.

TABLE 3.5: Maximum values of upward light ratio (ULR) of luminaires					
Light technical parameter	Environmental Zones				
	E0	E1	E2	E3	E4
Upward light ratio (ULR)/%	0	0	2.5	5	15

Note:
1. *This is the primary approach to limit skyglow and is suitable to compare different single luminaires and mitigate the contribution of each luminaire within an installation.*
2. *This does not take into account the effect of light reflected upwards from ground that also contributes to sky glow.*
3. *Some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlights and festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments*

TABLE 3.6: Maximum values of upward flux ratio of installation (of four or more luminaires).						
Light technical parameter	Type of installation	Environmental Zones				
		E0	E1	E2	E3	E4
Upward flux ratio (UFR)/%	Road	n/a	2	5	8	12
	Amenity	n/a	n/a	6	12	35
	Sports	n/a	n/a	2	6	15

Notes:

- *The table allows the effect of both direct and reflected upward components of a whole installation to be considered. The factor being the upward flux ratio (UFR).*
- *n/a within the table denotes that lighting of this type is not usually expected within these zones*
- *This should only be considered where an installation consists of four or more luminaires that form an installation with a defined performance requirement or specialised fauna growth lighting systems (such as those use to promote grass growth in sports stadia) and is in proximity to:*
    - *Optical observatories*
    - *Lies within dark (E1) zones which abuts a protected (E0) dark sky zone*
- *The effect of distance must be considered which is a factor of the artificial lighting installation size. A small lighting installation will have an effect on an optical observatory 30km away whereas a large lighting installation of many luminaires will have an effect from a greater distance up to 100km. Specific guidance is given in CIE126 and CIE150.*
- *All external surfaces will have varying reflectances depending upon their condition and climatic conditions (wet, dry, frost etc,) as well as their varying angles, therefore the level of uncertainty in any assessment may be considerable.*
- *Clauses 6.4.2 and 6.4.3 of CIE 150:2017 describe the calculation methods for both ULP and UFR.*
- *Light emitted just above the horizontal in a zone between 90° and 110° is extra critical for sky glow in large open areas around observatories. An additional measure in these areas limits the luminous intensities ($I_{90} – I_{110}$) as follows:*
    - *between 90° and 100° < 0.5 cd/1000lm;*
    - *between 100° and 110° 0 cd.*
- *All proposed luminaires must have been photometrically measured so that results can be verified for Gamma angles 0 to 180°.*

TABLE 3.7: Maximum permitted values of average surface luminance (cd/m^2)						
Light technical parameter	Application conditions	Environmental Zones				
		E0	E1	E2	E3	E4
Building façade luminance (L_b)	Taken as the product of the design average illuminance and reflectance divided by π	< 0.1	< 0.1	5	10	25
Sign luminance (L_s)	Taken as the product of the design average illuminance and reflectance divided by π, or for self-luminous signs, its average luminance	< 0.1	50	400	800	1000

Note:
The values apply to both pre- and post-curfew, except that in zones 0 and 1 the values shall be zero post curfew. The values for signs do not apply to signs for traffic control purposes. For illuminated advertising signs the aim should be to achieve the limits advised in PLG05.

4 Assessment Methodology and Significance Criteria

4.1 Scope of Assessment

The existing baseline conditions on site and in the surrounding area have been surveyed and assessed.

The extent of the study area for this assessment includes the Site and its immediate surroundings and the key sensitive receptors which may be subject to a change in the existing lighting conditions. Sensitive receptors may include local residents, ecological receptors, the night-time amenity, and road users.

Night-time visual impacts are being assessed as part of the LVIA, refer to the ES Landscape Chapter.

4.2 Methodology for Baseline Lighting Survey

Day and night-time site visits were undertaken on 13th November 2020 to ascertain the current baseline lighting conditions. A record was made of the types of lighting installations present, within the Site, the immediate surrounding area and at the selected viewpoint and survey locations.

The weather conditions during the day and evening were dry with clear skies. Night-time measurements were taken between 9pm - midnight.

An evening as close to the New Moon phase as possible was selected as ‘natural’ ambient light levels from the moon will be as low as possible, allowing any ‘artificial’ ambient lighting levels from surrounding lighting, light aura or sky glow etc. to be measured as accurately as possible. This provides a baseline upon which any new lighting effects will be additive. (The survey was conducted two nights before the New Moon.)

Natural ambient light from moon light will have an additive effect to the lighting levels measured during the survey depending on the phase of the moon and sky conditions. The typical level of illuminance at ground level from a full moon on a clear night in the UK is 0.35 lux.

The survey locations were selected to establish the current lighting conditions within the site and surrounding area.

Measurements of point illuminance were recorded at each of the survey locations. These were recorded horizontally on the ground at each location, and at 1.5m in the vertical plane in the four compass directions, North, South, East and West. Measurements were taken using a calibrated Konica Minolta T-10A Illuminance Meter (Serial no: 30018095/20016053).

9 No. survey locations were chosen that correspond to the Landscape and Visual Impact Assessment (LVIA) Chapter of the Environmental Statement as these have been identified to represent sensitive night-time receptors. These are denoted by the prefix VP, and are listed in Table 4.1. (VP numbers correspond to the ES Landscape Chapter.)

TABLE 4.1: VIEWPOINT SURVEY LOCATIONS		
Survey Location Reference	OS Grid Reference	Survey Location Description
VP03	TQ 47197 22224	Snatt's Road at junction with PRoW footpath
VP04	TQ 47141 22152	Snatt's Road west of Lot Lane
VP05	TQ 46948 21886	Snatt's Road at junction with residential to properties including Oast Cottage
VP06	TQ 46334 22175	A22 layby west of Black Down Roundabout (A22/A26 junction)
VP11	TQ 47602 24341	PRoW footpath (ref. Maresfield 61a) near Reeding's Wood
VP12	TQ 46634 23921	Maresfield Recreation Ground
VP13	TQ 45326 23427	Batts Bridge Road west of Batt's Farm
VP14	TQ 44637 24271	PRoW footpath - East of Downstreet Farmhouse
VP15	TQ 45568 28737	Car Park south of Friends Clump within the High Weald AONB

33 No. survey locations were chosen in conjunction with the project ecologist in relation to sensitive ecological receptor locations within the site. Refer to the ES Ecology Chapter for further detail. These locations are denoted by the prefix E, and are listed in Table 4.2.

TABLE 4.2: ECOLOGICAL RECEPTOR SURVEY LOCATIONS	
Survey Location Reference	OS Grid Reference
E01	TQ 47133 22155
E02	TQ 47105 22155
E03	TQ 47062 22156
E04	TQ 47050 22126
E05	TQ 46918 22168
E06	TQ 46965 21942
E07	TQ 46889 22002
E08	TQ 46801 22033
E09	TQ 46828 21943
E10	TQ 46785 21940
E11	TQ 46744 21875
E12	TQ 46683 21835
E13	TQ 46648 21754

E14	TQ 46528 21816
E15	TQ 46344 21910
E16	TQ 46357 21963
E17	TQ 46336 21980
E18	TQ 46306 21995
E19	TQ 46397 22082
E20	TQ 46488 22213
E21	TQ 46514 22158
E22	TQ 46559 22061
E23	TQ 46535 22001
E24	TQ 46511 21923
E25	TQ 46581 21918
E26	TQ 46681 22036
E27	TQ 46708 22091
E28	TQ 46640 22132
E29	TQ 46517 22286
E30	TQ 46574 22425
E31	TQ 46714 22327
E32	TQ 46749 22283
E33	TQ 46830 22142

Refer to Appendix B for the Lighting Baseline Survey Location Plan showing the survey locations for ecology, and the ES Landscape Chapter for a plan showing the LVIA Viewpoint locations.

4.3 Method for Assessing Proposed Lighting

An external lighting strategy is outlined in Section 6, which forms the basis of the assessment.

4.4 Impact Assessment and Significance Criteria

The effect attributed to each impact has been based on the magnitude of change as a result of the Proposed Development. The criteria used to assess the effects of artificial lighting has been derived from the Institute of Lighting Professionals (ILP) (2020) Guidance Notes for the Reduction of Obtrusive Light and PL04 Guidance on Undertaking Environmental Lighting Impact Assessments and is shown in Tables 4.3 - 4.6.

This methodology assesses potential impacts on receptors sensitive to light associated with the Proposed Development in comparison with the existing baseline conditions. The approach to this impact assessment is outlined below:

- The nature of a receptor (receptor/ resource sensitivity) was classified as either high, medium, or low based on the criteria shown in Table 4.4;
- The potential magnitude of impact is described as high, medium, low or negligible based on the criteria shown in Table 4.5;
- The classification of effects associated with the Proposed Development are then assessed as major, moderate, minor, or negligible, in accordance with the matrix shown in Table 4.6 ; and
- These effects are then described as significant or not significant according to the definitions set out in Table 4.7.

4.4.1 Sensitivity of a Receptor

There is currently no specific guidance on determining the sensitivity of a receptor in terms of lighting impact. Therefore, for the purpose of this assessment it has been based on the descriptions shown in Table 4.3. When considering natural resources/ receptors such as the effect on an area in terms of sky glow, it is deemed appropriate to assign sensitivity based on the current baseline conditions and Environmental Zone, with the highest sensitivity being applied to an E0 intrinsically dark zone, and the least to an E4 urban zone. The Environmental Zones are defined in Table 3.1 and the classification of sensitivity of natural resources / receptor will correspond to each Environmental zone as shown in Table 4.3 below. For other receptors such as residential receptors the description will be used to determine sensitivity.

TABLE 4.3: SENSITIVITY OF RECEPTOR

Sensitivity of Resource/ Receptor	Assigned Environmental Zone when considering natural resources/ receptors	Description – for consideration of other receptors such as residential dwellings
Very High	E0	The receptor has very limited capability to accommodate change in artificial light conditions without fundamentally altering its present character, or is of international or national importance.
High	E1	The receptor has limited capability to accommodate change in artificial light conditions without fundamentally altering its present character, or is of international or national importance.
Medium	E2	The receptor has moderate ability to accommodate change in artificial light conditions without significantly altering its present character, or is of high importance.
Low	E3	The receptor is tolerant of and can accommodate change in artificial light conditions without detriment to its character, or is of low or local importance.

Very Low	E4	The receptor is very tolerant of and can accommodate change in artificial light conditions without detriment to its character, or is of low or local importance.

4.4.2 Magnitude of Impact

The impact magnitude is considered to be a function of extent, duration, frequency and reversibility, and these aspects have been considered in the criteria. The criteria described in Table 4.4 have been used.

TABLE 4.4: MAGNITUDE OF IMPACT

Magnitude of Impact	Description
High	Significant deterioration/ improvement in local conditions or circumstances
Medium	Readily apparent change in conditions or circumstances
Low	Perceptible change in conditions or circumstances
Negligible	No discernible change in conditions or circumstances

4.4.3 Classification of Effects

The classification of effects associated with the Proposed Development are then assessed as major, moderate, minor, or negligible, using the matrix shown in Table 4.5 as a guide:

TABLE 4.5: CLASSIFICATION OF EFFECTS

Sensitivity of Resource/ Receptor	Magnitude of Impact			
	High	Medium	Low	Negligible
Very High	Major	Major	Moderate	Minor
High	Major	Major	Minor	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Very Low	Moderate	Minor	Negligible	Negligible

4.4.4 Significance Criteria

The threshold values stated in the obtrusive light standards and guidance (refer to section 3.3) aim to control obtrusive light by limiting:

- the illumination on surrounding properties, referred to as light intrusion, and limited by the vertical illuminance measured typically at the window of a neighbouring property;
- bright luminaires in the field of view, referred to as glare, and limited by the luminous intensity in designated directions;
- sky glow, limited by upward light ratio (ULR) and upward flux ratio (UFR); and
- the effects of over lit building facades and signs, limited by the average luminance on the surface.

These parameters form the primary basis for considering potential effects from artificial lighting and defining the effect criteria (refer to Table 4.6). However, this assessment also gives consideration to light spill, 'over' lighting, energy consumption and the effect on flora and fauna, as these are also identified as being of environmental concern with regard to lighting installations. The distant view of light across the landscape, particularly in rural or dark landscapes (Light Presence), is another consideration; however this aspect is covered in the Landscape and Visual Impact Assessment for the project.

These factors are described in more detail below.

Light Intrusion (into windows)

Light intrusion is light that impacts on to a surface outside of the area designed to be lit by the installation concerned. It is somewhat subjective because it is difficult to define when, where and how much light is unwanted. An example of light intrusion is when spill light from a streetlight enters a window and illuminates an indoor area. The ILP guidance specifies limits for light intrusion entering windows in terms of environmental zones. The values in the table are the suggested maximum and need to also take into account the existing light intrusion at the point of measurement. Light intrusion is measured in illuminance on the vertical plane. Other forms of light intrusion are not specifically limited in the guidance, however it is becoming increasingly common to assess light spill at the boundary of a development, especially in ecologically sensitive areas.

Light spill

Light spill, sometimes referred to as stray light, is light emitted by a lighting installation, which falls outside the boundary of the property on which the installation is sited. This is usually measured in illuminance on a horizontal plane.

Glare

Glare is the uncomfortable brightness of a light source against a darker background. It can cause discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or to extreme contrasts.

The ILP guidance sets limits for the luminous intensity in designated directions for each luminaire in a potentially obtrusive direction, outside of the site being lit, in an attempt to control glare. It should only be applied to viewing directions that are likely to cause discomfort or disability glare. The guidance suggests that glare should be minimised by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70 degrees.

Sky Glow

Sky glow is the brightening of the night sky caused by outdoor lighting and natural atmospheric and celestial factors. Outdoor lighting contributes to sky glow by producing light that is either emitted directly upward by luminaires or reflected from the ground. This light is then scattered by dust and gas molecules in the atmosphere, producing a luminous background. The part of the sky glow which is attributed to man-made sources of luminous radiation is called Artificial Sky Glow. (Note: this assessment considers the impact of artificial sky glow only)

A major effect of sky glow at night is to reduce contrast in the sky. It has the effect of reducing one's ability to view the stars. This is the most pervasive form of light pollution and can affect areas many miles from the original light source.

Sky glow is highly variable depending on immediate weather conditions, quality of dust and gas in the atmosphere, amount of light directed skyward, and the direction from which it is viewed.

Measuring and predicting sky glow from artificial lighting is a very challenging task due to the number of factors involved. Sky glow caused by artificial light can be minimised by limiting the upward light output of luminaires used in a lighting installation, and limiting the amount of reflected light from the installation by considering the levels of illuminance provided to the areas being lit, and reflectance of surfaces being lit and in the immediate surrounding areas.

Building and Signage Luminance

Building and signage luminance should be limited to avoid 'over' lighting and to relate to general district brightness. Building luminance is applicable to buildings directly illuminated as a night time feature as opposed to the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area.

Over' Lighting

'Over' lighting is when an area is lit to a higher level of illuminance than the task/use requires. It is identified by the ILP guidance as being a major cause of obtrusive light and for wasting energy. Good design practice and adherence to the published lighting standards prevents 'over' lighting areas, which in turn helps to minimise upward reflected light.

Energy Consumption

Consideration should be given to the energy efficiency of the existing lighting installed on site and to minimising the energy consumption of any proposed lighting. Energy efficient luminaires, light sources and lighting controls should be selected.

The Effect on Flora and Fauna

When considering lighting impacts on to flora and fauna, light sensitive species using the site are determined so that mitigation measures appropriate to that species can be applied, and existing or proposed dark zones can be maintained as required.

TABLE 4.6: SIGNIFICANCE CRITERIA			
Nature	Level of significance	Descriptions	Remedial Needs
Positive	Major / substantial beneficial effects (Significant)	Significant improvement in night environment and/or a major decrease in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), resulting in a noticeable or major improvement in baseline conditions and is well within the recommended CIE guidance levels.	None
	Moderate beneficial effects (Significant)	Noticeable improvement in the night environment and/or a moderate decrease in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), resulting in a moderate improvement in the current baseline conditions and recommended CIE guidance levels.	
	Minor beneficial effects (Not Significant)	Slight improvement in night environment and/or a minor decrease in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), resulting in a perceptible improvement in baseline conditions and is within the recommended CIE guidance levels.	
Neutral	None / negligible (Not Significant)	No significant effect or overall effects balancing out with a barely perceptible change in the level of sky glow, light spill and glare onto surrounding areas and illuminance levels at the windows of residential properties (light intrusion) and would cause a negligible or barely discernible change to current baseline conditions.	None
Negative	Minor adverse effects (Not Significant)	Slight increase in visibility of site, minor increase in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), would cause a minor perceptible change in baseline conditions, which are slightly above recommended CIE guidance levels but where current uses could still be maintained.	Develop appropriate levels and type of mitigation
	Moderate adverse effects (Significant)	Noticeable increase in visibility of site, moderate increase in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), and would result in a noticeable effect on baseline conditions moderately in excess of the recommended CIE guidance levels.	
	Major adverse effects (Significant)	Significant problems with increase in visibility of site, major increase in the level of sky glow, light spill and glare on to surrounding areas and illuminance levels at the windows of residential properties (light intrusion), and would result in a major effect on baseline conditions significantly in excess of the recommended CIE guidance levels.	

5 Environmental Baseline

5.1 Assessment of Existing Environmental Zone

An assessment has been made of the existing Environmental Zone(s) by considering the baseline lighting conditions within the site, and at each survey location.

5.2 Baseline Conditions within the Site and Surrounding Area

The site is currently unlit.

The A22 Uckfield Bypass to the west and north west of the site is predominantly unlit along its length adjacent to the site, with the exception of the roundabouts. London Road to the north east of the site is also un-lit from the roundabout with the A22 to the 40 mph zone. Snatts Road to the south east and east of the site is lit with street lighting, with various light sources utilised.

All survey locations within the site were dark (>0.1 lux), with the exception of survey location E01 located at the application site boundary with Snatts Road.

Based on the ILP guidance (refer to table 3.1) and following the baseline survey the site has been assessed to be Environmental Zone E2 in accordance with a low district brightness rural area. The surroundings to the site are rural in nature, with Uckfield assumed to be an E3 zone in accordance with a medium district brightness area.

Sections 5.2.6 -5.28 list the measurements of illuminance recorded at each location.

5.2.1 Measurements of Illuminance at Viewpoint Survey Locations

Table 5.1 summarises the levels of illuminance recorded at each viewpoint survey location.

TABLE 5.1: VIEWPOINT SURVEY LOCATIONS - LEVELS OF ILLUMINANCE RECORDED					
Survey Location Reference	Horizontal Illuminance at Ground level	Vertical Illuminance at 1.5m			
		N	E	S	W
VP03	0.80	0.04	0.17	1.77	1.46
VP04	3.68	4.24	9.00	0.14	0.17
VP05	0.00	0.00	0.00	0.00	0.00
VP06	0.00	0.00	0.00	0.00	0.00
VP11	0.01	0.00	0.00	0.00	0.00
VP12	0.01	0.01	0.00	0.00	0.01
VP13	0.00	0.00	0.00	0.00	0.00
VP14	0.00	0.00	0.00	0.00	0.00
VP15	0.01	0.01	0.00	0.00	0.00

5.2.2 Measurements of Illuminance at Ecological Receptor Survey Locations

Table 5.2 summarises the levels of illuminance recorded at each survey location.

TABLE 5.2: ECOLOGICAL RECEPTOR LOCATIONS - LEVELS OF ILLUMINANCE RECORDED					
Survey Location Reference	Horizontal Illuminance at Ground level	Vertical Illuminance at 1.5m			
		N	E	S	W
E01	0.03	0.07	4.61	1.07	0.06
E02	0.00	0.00	0.03	0.00	0.00
E03	0.00	0.00	0.00	0.00	0.00
E04	0.00	0.00	0.00	0.00	0.00
E05	0.00	0.00	0.00	0.00	0.00
E06	0.00	0.00	0.00	0.00	0.00
E07	0.00	0.00	0.00	0.00	0.00
E08	0.01	0.00	0.00	0.00	0.00
E09	0.00	0.01	0.01	0.00	0.00

E10	0.01	0.01	0.00	0.00	0.01
E11	0.01	0.01	0.00	0.00	0.00
E12	0.00	0.01	0.00	0.00	0.00
E13	0.00	0.01	0.00	0.00	0.00
E14	0.00	0.00	0.00	0.00	0.00
E15	0.00	0.00	0.00	0.00	0.00
E16	0.00	0.00	0.00	0.00	0.00
E17	0.00	0.00	0.00	0.00	0.00
E18	0.00	0.00	0.00	0.00	0.00
E19	0.00	0.00	0.00	0.00	0.00
E20	0.00	0.00	0.00	0.00	0.00
E21	0.00	0.00	0.00	0.00	0.00
E22	0.00	0.00	0.00	0.00	0.00
E23	0.00	0.00	0.00	0.00	0.00
E24	0.00	0.00	0.00	0.00	0.00
E25	0.00	0.00	0.00	0.00	0.00
E26	0.00	0.00	0.00	0.00	0.00
E27	0.00	0.00	0.00	0.00	0.00
E28	0.00	0.00	0.00	0.00	0.00
E29	0.00	0.00	0.00	0.00	0.00
E30	0.00	0.00	0.00	0.00	0.00
E31	0.00	0.00	0.00	0.00	0.00
E32	0.00	0.00	0.00	0.00	0.00

6 Proposed Lighting

6.1 Construction Phase

The primary reasons for lighting provision within the construction site will be for health and safety and security requirements.

The sources of artificial light that have been assumed to be present during the construction phase are:

- Temporary floodlighting particularly during winter months;
- Floodlighting and security lighting associated with site access, on-going work areas, temporary car parking areas and on the exterior of construction compounds;
- Lighting at height associated with construction of structures;
- Interior lighting within any temporary office units within any construction compounds.
- Crane warning lights.

The working hours for construction are anticipated to be typical industry hours (i.e. 08:00 to 18:00 Monday to Friday and 09:00 to 13:00 on Saturday). It is assumed there will be no working on Sundays or Bank Holidays. Therefore, it is likely that temporary sources of artificial lighting will be required to enable the safe continuation of works in the early morning and late afternoons during the winter months when working hours fall within the hours of darkness. Lighting associated with the construction works is assumed to be temporary and intermittent in nature. It is assumed that some level of security lighting will be required at all times during the hours or darkness.

6.2 Operational Phase- Proposed Lighting

The Proposed Development will require lighting for safety, amenity and security during the hours of darkness. This section outlines the requirements for the lighting design, ensuring that it is fit for purpose and sensitive to ecological and environmental receptors.

The external lighting and street lighting proposed for the development will be designed in accordance with industry standards, guidance and recommendations as far as possible in order to provide an adequate level of illuminance for security, safety and amenity throughout the site, whilst limiting obtrusive light and impacts onto ecological receptors.

Lighting in this section generally refers to public realm lighting, excluding lighting to domestic/ residential properties. However, specific mitigation measures related to residential properties required to protect the ecological dark zones proposed are included.

The significant sources of lighting for the operational phase of the proposed development will be as follows:

- Street lighting to the S38 roads within the site;
- Street lighting to the site access roundabout and A22 junction approaches;
- Lighting to private roads within the site;

- Lighting associated with pedestrian and cycle routes within the site and from Snatts Road and Rocks Road;
- Lighting to car parking areas;
- Private lighting to the residential properties.

No lighting is proposed to the car parks for the SANG/ open space, to the informal footpaths within the Strategic SANG, or to the separate emergency access from the Uckfield Bypass (A22).

6.2.1 Recommended Lighting Levels

The design standards recognise road lighting in three classes; traffic routes where the needs of the driver are dominant, subsidiary roads where the lighting is primarily intended for the pedestrian and the cyclist, and urban centres, where the lighting is designed to enhance public safety and security, while also providing an attractive night time environment (SLL Lighting Handbook). The photometric recommendations for all types of road lighting in the UK are given in BS EN 13201: Part 2. Advice on implementation of these recommendations is given in BS5489-1. The site access and roads within the site will be designed in accordance with these recommendations and East Sussex County Council's specification and requirements as far as possible, whilst also considering the ecological constraints within the site. Refer to section 6.2.5.

In accordance with the above standards, and assuming a moderate traffic flow, an M3 lighting class will apply to the A22, which will require the access round-about to be lit to a C2 conflict class. Guidance Note PLG 02 The Application of Conflict Areas on the Highway recommends that 133m of lighting be provided on the approach extent to a conflict zone based on a 60mph speed limit. To minimise the ecological impacts to the ancient woodland it will be beneficial to reduce the extent of the approach lighting, subject to agreement from East Sussex County Council.

Based on an E2 Environmental Zone and normal traffic flow a P5 lighting class may be applied to the residential roads within the site and to the pedestrian/ cycle routes. However, where the site access junction comes into the site it may be necessary to step down the lighting in increments from a P3 class to a P5 class, to allow for adaption from the higher class of lighting to the junction to the lower class of lighting within the site. Lighting Classes to be agreed with East Sussex County Council at the detailed design/ technical stage. Table 6.1 summarises the levels of design illuminance and uniformity for P Classes. The values have been taken from BS 5489-1 and BS EN 12464-2.

An indicative lighting design has been prepared for the boardwalk section, which forms part of the pedestrian and cycle access from Rocks Road, to demonstrate how light spill will be minimised to the surrounding dark zone. Luminaires will be mounted at approx. 1.4m to the side of the boardwalk. The luminaires are proposed to be mounted on one side of the boardwalk at approximately 5m spacings, with the opposite side proposed to have overlapping infill panelling, so it is effectively solid and will limit spill outside of the area being lit. The luminaries proposed will be bespoke, with the strategy based on the luminaire used in the Garda Pro Handrail manufactured by DW Windsor. It will be provided as a standalone fixture in their Anti-Climb enclosure or similar. The luminaire output will be limited so that a

P5 lighting class is achieved on the boardwalk. The luminaire will be LED and will be provided in 2700K to minimise the impact on ecological receptors and the environment.

TABLE 6.1: RECOMMENED LEVELS OF ILLUMINANCE FOR RESIDENTIAL ROADS- P CLASSES- STREET LIGHTING		
Road Type / Classification	Average level of Illuminance required (lux)	Minimum level of Illuminance required (lux)
P1	15	3.0
P2	10	2.0
P3	7.5	1.5
P4	5.0	1.0
P5	3.0	0.6
P6	2.0	0.4

6.2.2 Strategy for Luminaire Type and Light Source

The luminaires selected for the street lighting to adoptable areas throughout the development will be LED and provided in accordance with East Sussex County Councils specification. Luminaires will be mounted on 5m or 6m columns to the residential roads within the site, and 8m or 10m columns to the access junction and A22 approaches. Final mounting heights will be selected at the detailed/ technical design stage, with the minimum height selected in order to minimise light spill, and the ecological impacts.

Standalone footpaths/ cycleways will be lit using 5m column mounted luminaires, with the exception of the boardwalk section which is part of the link from Rocks Road.

The boardwalk section will be lit using low level downward directional lighting, as shown in Appendix C, in order to minimise light spill as far as possible. Luminaires will be low output LED with warm white colour temperature 2700K to minimise the ecological impacts.

The street lighting luminaires will have good light control and cut off angles to reduce light spillage, control glare and limit sky glow. The Upward Light Output Ratio of the luminaires will be 0%, and they will be mounted horizontally with no upward tilt to minimise sky glow. The street lighting luminaires selected for adoptable roads will have either neutral white colour temperature (approx. 4000K) or warm white colour temperature (3000K) in accordance with East Sussex County Councils requirements.

For all other lighting throughout the site LED luminaires with a warm white colour temperature (3000K or less) will be specified to minimise the impacts on ecological receptors and the environment.

Luminaires that comply with the requirements for an E2 Environmental Zone will be chosen at the detailed/technical design stage to limit upward light output.

Manufacturers details for the luminaire proposed for the boardwalk are shown in Appendix E.

6.2.3 External Luminaire Control Strategy

Street lighting to the residential roads within the site will operate on a Part Night lighting strategy in accordance with East Sussex County Councils Policy, whereby they will either be dimmed or switched off between midnight and 0600 hours. Lighting to the boardwalk is proposed to operate dusk till dawn.

Street lighting controls for the access junction and A22 approaches will be confirmed by East Sussex County Council, however it is envisaged that if traffic rates are low enough the lights may be able to dim to 50% between midnight and 0600 hours, which would help to mitigate the ecological impacts.

6.2.4 Strategy for Minimising Obtrusive Light

The proposed lighting shall be designed in accordance with the limiting criteria for an E2 Environmental Zone, in order to limit obtrusive light and light pollution. It is likely due to the nature of the development that the site will become classified as an E3 zone as a result of the development, taking it from a rural area in nature, to a sub urban area.

The upward light ratio (ULR) of luminaires and the installation shall be limited to 2.5% in accordance with the parameters for an E2 zone to limit sky glow. The street lighting luminaires will have 0% upward light output, and therefore all direct upward light from the luminaires will be minimised.

6.2.5 Strategy for Minimising Impacts in terms of Ecology

Various areas within the site have been identified as being ecologically sensitive, with light sensitive bat species and Dormice present on site. Designated primary and secondary dark zones have been proposed throughout the site with targeted levels of illuminance for each zone. Within the Primary Zone 0.2 lux horizontally at ground level and 0.4 lux vertically will be targeted, and within the Secondary Zone 1 lux horizontally at ground level will be targeted. Refer to the Dark Areas Plan.

A dark crossing point is proposed to provide a dormouse hopover across the site access road. Levels of lighting at this point are to be minimised as far as possible, and will be subject to agreement with the Local Planning Authority and East Sussex Councils Street Lighting team.

Two crossing points are also proposed along the access road for bats, where lighting levels are to be minimised. Street lighting columns should be spaced so that the gap between the lights coincides with the crossing points, so that levels of illuminance are as low as possible at those points.

An indicative lighting design has been prepared for the boardwalk section to demonstrate how light spill will be minimised to the surrounding dark zone, as described in section 6.2.1.

The following parameters/ mitigation measures are proposed to limit light spill onto the proposed dark areas.

- No artificial lighting to be proposed within the Primary Dark zones.

- No artificial lighting to be proposed within the Secondary Dark zones, with the exception of lighting to the boardwalk which forms part of the pedestrian and cycle access from Rocks Road.
- Lighting to the boardwalk to be low level to minimise light spill to the surrounding ancient woodland.
- Lighting to the boardwalk to be downward directional LED warm white 2700K.
- Careful consideration to be given to the locations of the residential roads within the site and their hierarchy. Where possible private roads/drives to be located to the edge of the development, as these areas can be left un-lit, or be provided with lower levels of illuminance, and luminaires with lower mounting heights than Section 38 adoptable standards will require.
- For S38 roads street lighting luminaires with either back shields, or a narrow optic designed for the road width, may be used to limit light spill into the proposed dark zones.

To assess the impacts on ecological receptors, it will be necessary to limit light spill from private external lighting and internal light spill from the proposed dwellings. The following parameters/ mitigation measures are proposed to limit light spill from private lighting and internal lighting onto the proposed dark areas.

- Private external lighting adjacent to the proposed dark zones to be carefully positioned, limited in number, and to operate by PIR (movement) detectors. Luminaires should be selected to be downward directional with good light control and cut off angles to limit light spill into the proposed dark zones.
- Private external lighting to utilise LED lights sources, therefore emitting no UV light, and with warm white colour temperatures of <3000K, to limit the impacts on bats.
- Careful consideration to be given to the locations and orientations of proposed dwellings located directly adjacent to the proposed dark zones. Where possible these should be positioned with their gable end elevation facing the dark zone. Where the front or rear elevations of any proposed dwellings face the dark zones, sufficient offsets will be required between the two.
- If required, recessed lighting may be provided in properties adjacent the proposed dark zones. Typically, downlight luminaires used, and sold for use, in residential properties will have beam angles of 30-40 degrees. The recessed nature of downlights, and smaller beam angles reduces light spill, compared with pendant luminaires.
- Consideration may also be given to window locations, head heights and size, to reduce impacts from internal light spill into the proposed dark zones.

Separate detailed analysis and assessment may be required for the development at the reserved matters/ detailed submission stage to assess light spill from street lighting, external lighting and internal light spill from buildings onto the proposed dark zones.

7 Assessment of Impacts

7.1 Construction Phase

Construction impacts are temporary in their nature, however prior to mitigation there is potential for the development to result in adverse effects. Mitigation and residual effects are further discussed in Sections 8 and 9.

7.2 Operational Phase

The site is currently classified as Environmental Zone E2, with the proposed lighting for the site being assessed in accordance with the limiting criteria for that zone, refer to table 3.1, in order to limit obtrusive light and light pollution to an acceptable level. However, it is likely that within the site boundary the classification will change to an E3 zone following the development, due to the change in the baseline conditions and night time environment of the area.

7.2.1 Assessment of impact In terms of Obtrusive Light

The upward light ratio (ULR) of luminaires and the installation will be limited to 2.5% in accordance with the parameters for an E2 zone.

Following a review of the locations of existing residential receptors adjacent to the application site, there is no potential for light intrusion from the proposed development to impact on any of those receptors when considering the proposed lighting strategy due to the proposed locations of luminaires in relation to residential receptors and the luminaire types proposed. All luminaires will be full cut off/ downward directional with no upward tilt.

Light spill will be contained within the application boundary, with the exception of the site access point, and where the pedestrian/cycle paths link to Snatts Road.

The obtrusive light guidance aims to limit the luminous intensity of bright luminaires in order to limit glare. The limits for luminaire intensity apply to luminaires situated in a potentially obtrusive direction outside of the area being lit. All of the luminaires proposed for the development will be downward directional, with clear and defined cut-off angles, without the potential for glare.

The lighting scheme for the proposed development, as outlined in section 6, has been assessed against the significance criteria shown in section 4 to establish the effects.

The sensitivity of existing residential receptors is considered to be low, with the magnitude of impact predicted to be negligible, resulting in a negligible effect.

The sensitivity of the site when considering sky glow is considered to be medium in accordance with an E2 zone, with the magnitude of impact predicted to be low, resulting in a minor adverse effect as levels of ULR are expected to be within the limits of an E2 zone, however it is predicted that there will be a perceptible change in conditions.

It can be concluded that the lighting scheme will have Minor Adverse Effects/ Not Significant. Although the impacts in terms of obtrusive light will be designed to be within the recommended

CIE/ Obtrusive Light guidance levels for an E2 Environmental Zone, the site is currently predominantly unlit so there will be a perceptible change to current baseline conditions.

7.2.2 Consideration of Impacts In terms of effect on Flora and Fauna

Designated primary and secondary dark zones have been proposed throughout the site with targeted levels of illuminance for each zone. Within the Primary Zone 0.2 lux horizontally at ground level and 0.4 lux vertically will be targeted, and within the Secondary Zone 1 lux horizontally at ground level will be targeted. Refer to the Dark Areas Plan.

The lighting strategy outlined within this report aims to minimise light spill to the proposed dark zones to achieve the targeted levels of illuminance shown on the Dark Areas Plan as far as possible. This will be achievable in the majority of the areas of the site by applying the mitigation measures outlined, however achieving these levels at the dormouse hopover will be subject to agreement of an unlit/ dark point with East Sussex County Councils Street Lighting team. Also, when considering the boardwalk through Fir Tree Grove, light spill can be well contained, with levels of light spill horizontally at ground level not exceeding 0.2 lux outside of the boardwalk, and levels vertically being contained within 1.2m either side of the boardwalk. Refer to the vertical calculation planes and cross section calculation plane results in Appendix D. (The calculation planes are 6m in height and 20m in length, placed vertically at ground level.)

Separate detailed calculations, analysis and assessment, including lux contour plans will be required for the development at the reserved matters/ detailed submission stage to fully assess light spill from street lighting, external lighting and internal light spill from buildings onto the proposed dark zones.

For further detail and assessment of effect on Flora and Fauna refer to the Ecology Chapter of the ES Statement.

8 Mitigation Measures

8.1 Construction Phase

Mitigation of the effects of the lighting installation during the construction phase will include:

- Specifying working hours, uses of lighting, location of temporary floodlights and construction compound and agreeing these with the local council
- Lighting to be switched off when not required specifically for construction activities or required for health and safety or security
- Glare will be minimised by ensuring that the main beam angle of all luminaires are directed away from any potential observer into the centre of site wherever possible, and angled at less than 70 degrees from the horizontal
- Light spill will be minimised by avoiding poorly sited luminaires located at the boundary of the development
- Sky glow will be minimised by using modern flood lights with good photometric control, angled at less than 70 degrees from the horizontal and by using additional shields as appropriate
- The selection of luminaires, including those required for night-time security, that are designed to minimise any obtrusive light
- No construction lighting or compounds to be located within the proposed dark zones for ecology. All construction lighting to be directed away from the proposed dark zones and hedgerows/woodland. Construction lighting for security purposes to be operate by PIRs (movement detection) on short timers and be mounted at the lowest practical mounting height to minimise light spill.

These measures will form part of a Construction Environmental Management Plan.

8.2 Operational Phase

Mitigation of the effects of the lighting installation in terms of obtrusive light during the operational phase will be achieved by designing the lighting for the development in accordance with the lighting strategy outlined in this report, including primary mitigation measures outlined in Section 6.

Further mitigation measures beyond this are not deemed to be required.

9 Residual effects

9.1 Construction Phase

It is predicted that following implementation of the mitigation measures outlined in section 8, overall there will be a minor adverse residual effect of lighting at the construction phase.

9.2 Operational Phase

There are no significant residual effects predicted for the operational phase of the Proposed Development.

10 Conclusion/ Summary

The site has been assessed to be located within Environmental Lighting Zone E2, representative of a rural location with low district brightness.

The external lighting and street lighting proposed for the development will be designed in accordance with industry standards, guidance and recommendations in order to provide an adequate level of illuminance for security, safety and amenity throughout the site, whilst limiting obtrusive light, over-lighting, energy consumption and impacts on ecological receptors.

The proposed lighting shall be designed in accordance with the limiting criteria for an E2 Environmental Zone, in order to limit obtrusive light and light pollution.

In summary, it is our considered opinion that by the use of a well-designed lighting strategy, adopting the criteria outlined in this report, together with careful site planning that the impact from the new development on sensitive receptors in terms of obtrusive light and light pollution will not be significant.

THE LIGHTING BEE

APPENDIX A

Lighting Terminology

Lighting Terminology and Abbreviations

Glossary of terms

For the purpose of this report, the definitions given below apply. For further definitions the International Lighting Vocabulary (ILV), published by the CIE, can be found at http://eilv.cie.co.at/

Colour Rendering Index (CRI): A scale of the colour appearance of an object under a particular light source compared to its colour appearance under a reference light source. Expressed on a scale of 1 to 100 Ra, where 100 Ra represents the colour rendering of natural daylight i.e. perfect colour.

Curfew: The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by a government controlling authority, usually the local government (CIE, 2003).

Disability Glare: Glare which impairs the vision of objects but may not cause discomfort.

Discomfort Glare: Glare causing discomfort which may not impair the ability to see objects.

Environmental Zones: Area where specific activities take place or are planned and where specific requirements for the restriction of obtrusive light are recommended. Zones are indicated by the zone rating (E1… E4) (CIE, 2003).

Illuminance: Illuminance is the quantity of light, or luminous flux, falling on a unit area of a surface. It is designated by the symbol E. The unit is the lux (lx). One lux equals one lumen per square metre (lm/m²).

> **Horizontal Illuminance**: Illuminance incident on a horizontal surface or calculation plane.
>
> **Vertical Illuminance**: Illuminance incident on a vertical surface or calculation plane.

Isolux Diagram: A diagram showing lines joining points of equal illuminance. Sometimes also referred to as Isolines.

Light Pollution: The spillage of light into areas where it is not required.

Light Intrusion: Light that impacts on a surface outside of the area designed to be lit by a lighting installation.

Obtrusive Light: Spill light which because of quantitative, directional or spectral attributes in a given context, gives rise to annoyance, discomfort, distraction or a reduction in the ability to see essential information (CIE, 2003).

Photocell: A unit which senses light to control luminaires.

Residential Property: Land upon which a dwelling exists (CIE, 2003).

Sky Glow: The brightening of the night sky caused by artificial lighting resulting from the reflection of radiation (visible and non-visible), scattered from the constituents of the atmosphere (gas molecules, aerosols and particulate matter), in the direction of observation. It comprises two separate components as follows:

(a) *Natural sky glow* - That part of the sky glow which is attributable to radiation from celestial sources and luminescent processes in the Earth's upper atmosphere.

(b) *Man-made sky glow* - That part of the sky glow which is attributable to man-made sources of radiation (e.g. outdoor electric lighting), including radiation that is emitted directly upwards and radiation that is reflected from the surface of the Earth (CIE, 2003).

Spill Light (Stray Light): Light emitted by a lighting installation which falls outside the boundaries of the property for which the lighting installation is designed (CIE, 2003).

Upward Light Ratio: The maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.

Abbreviations

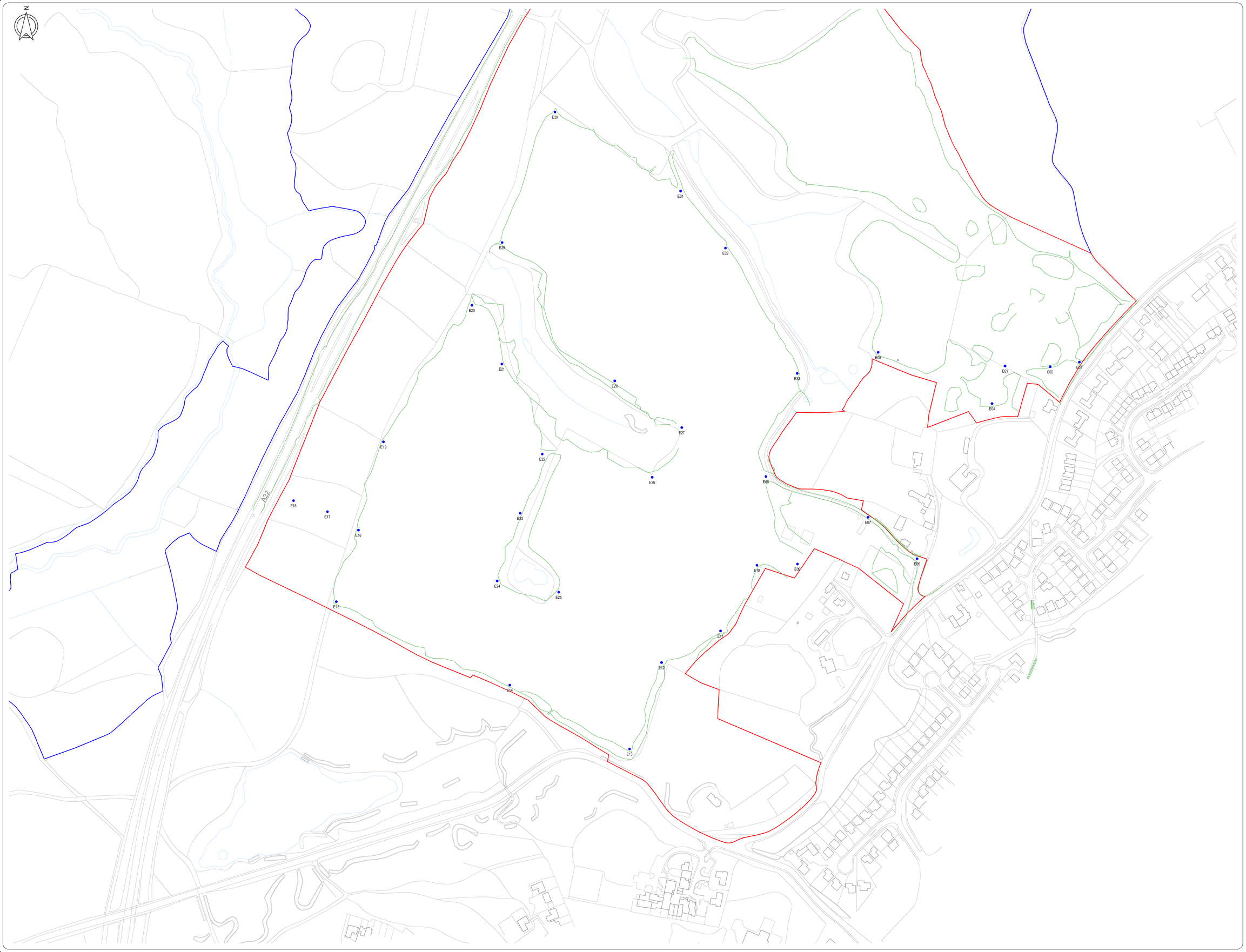
CIBSE	Chartered Institute of Building Services Engineers
CIE	International Commission on Illumination
CNEA	Clean Neighbourhoods and Environment Act
ILP	Institute of Lighting Professionals
SLL	Society of Light and Lighting

THE LIGHTING BEE

APPENDIX B

Baseline Lighting Survey
Location Plan

A0 - DO NOT SCALE



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Luminairs Legend

= Survey Location

= Application Boundary

= Vegetation

Notes

1. Do not scale from this drawing.
2. All measurements are in mil imeters unless stated otherwise.
3. Positions shown or plan are indicative.
4. Refer to baseline report and GPS locations.

Rev	Details:	By / Chkd / App	Date
P01	Preliminary Issue	TB / BB	24.05.22

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CLIENT

gleeson land
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PROJECT TITLE

Downlands Farm
Uckfield
East Sussex

DRAWING TITLE

Baseline Survey Location Plan

SCALE AT A0

1:1250

DISCIPLINE

Lighting

DRAWING NUMBER

4243-LB-EX-XX-SU-E-7080-01

Project - Originator - Zone - Level - "ype - Role - NBS class - Sequential Number

STATUS	ISSUE
Preliminary	P01

21 Time Saved by Use of BIM

THE LIGHTING BEE

External Lighting Strategy for the Boardwalk

APPENDIX C

A0 - DO NOT SCALE



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Luminairs Legend

X1 — IP66 2700K Downward directional luminaire mounted to the side of the boarcwalk at 1.4m. Bespoke luminaire based on Garda Pro module with Anti Climb enclosure, output limited to 100 lumens supplied by DW Windsor or equall and approved.

Isoline Legend

- 0.2 Lux
- 0.5 Lux
- 1.0 Lux
- 2.0 Lux
- 4.0 Lux
- 5.0 Lux
- 10 Lux

Notes

1. Do not scale from this drawing.
2. All measurements are in millimeters unless stated otherwise.
3. This drawing shall be read in conjunction with all relevant architectural, structural, mechanical and electrical services information.
4. This drawing is provided for planning purposes only to show the impact of the external lighting strategy.
5. The lighting to the boardwalk has been designed to BS 5489 class P5. :P5 = 3.0 Lux E/Av, 4.5 Lux E/Av Max and 0.6 Lux E/Min).
6. Isolines contours represent values of illuminance calculated in lux.
7. Levels of illumnance are calculated and shown at ground level with a maintenance factor of 1 to represent the worst case scenario.
8. The external lighting for the boardwalk has been designed to minimise the impact on bats. Luminaries have been specified in 2700K 'warm white'. Luminaries selected have 0% upward light output; the external lighting scheme as shown, has an upward light ratio of 0%.
9. Refer to accompanying Designers Risk Assessment for details of design risks identified.

Rev	Details:	By / Chkd / App	Date
P01	Preliminary issue	TB / BB	24.05.22

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CLIENT
gleeson land
Promoting Land. Unlocking Value.

PROJECT TITLE
Downlands Farm
Uckfield
East Sussex

DRAWING TITLE
Boardwalk External Lighting Strategy
Levels of Horizontal Illuminance
at Ground Level
Full Output Shown MF=1

SCALE AT A0
1:200

DISCIPLINE
Lighting

DRAWING NUMBER
4243-LB-EX-XX-DR-E-7080-41
Project - Originator - Zone - Level - Type - Role - NBS class - Sequential Number

STATUS
Preliminary

ISSUE
P01

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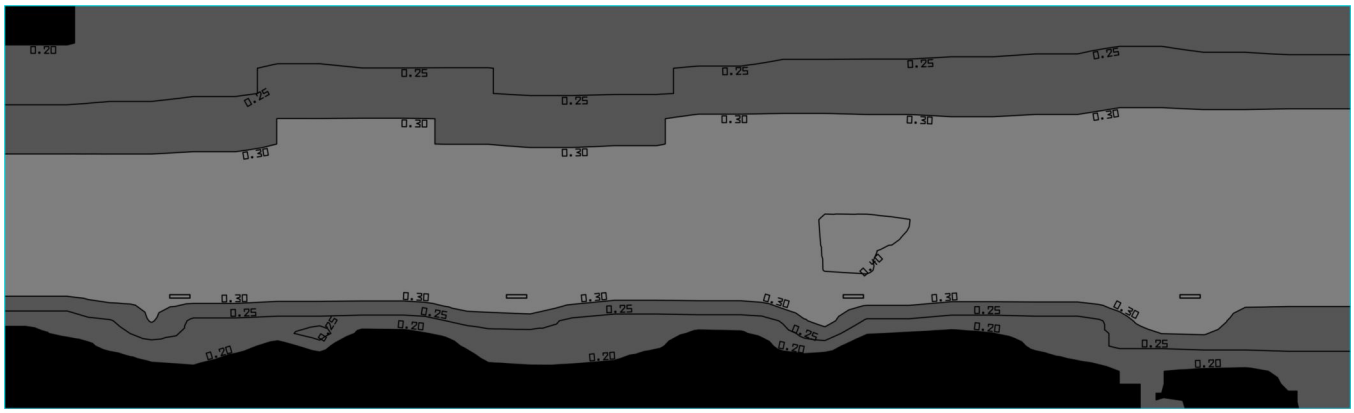
THE LIGHTING BEE

APPENDIX D

Vertical Calculation Plane Results for the Boardwalk

Site 1 (Light scene 1)

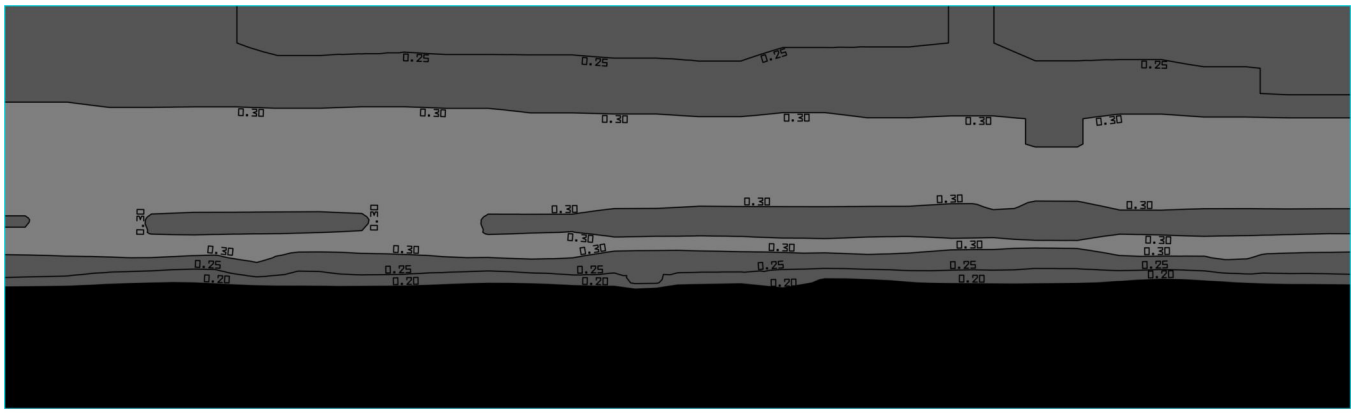
Calculation surface- 1.2m north behind lights

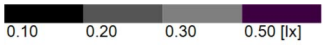


Properties	Ē	E_{min}	E_{max}	g_1	g_2
Calculation surface- 1.2m north behind lights Perpendicular illuminance (adaptive) Height: 3.000 m	0.27 lx	0.098 lx	0.40 lx	0.36	0.25

Site 1 (Light scene 1)

Calculation surface - 1m south in front lights

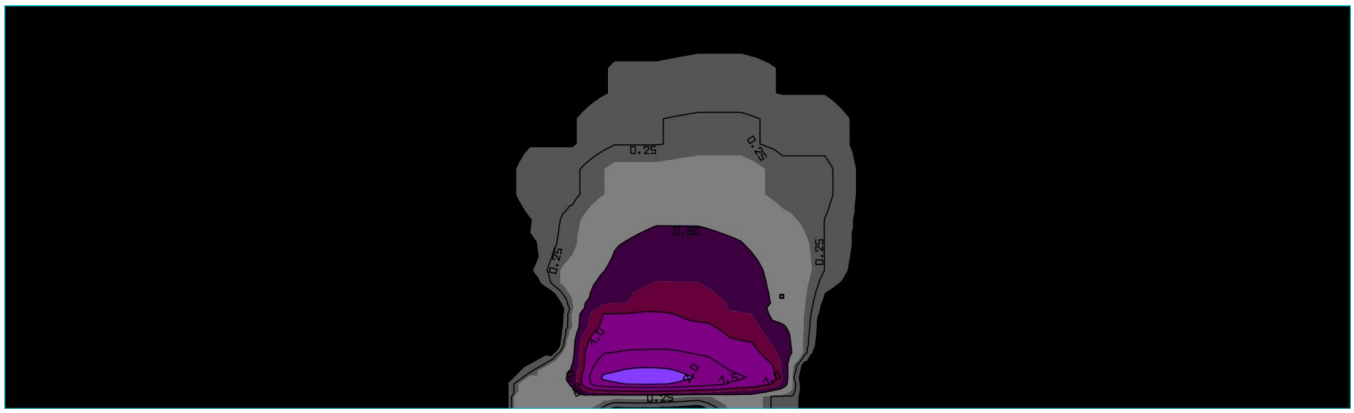


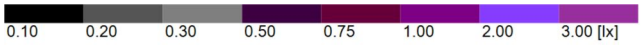


Properties	Ē	E_{min}	E_{max}	g_1	g_2
Calculation surface - 1m south in front lights Perpendicular illuminance (adaptive) Height: 3.000 m	0.20 lx	0.000 lx	0.36 lx	0.00	0.00

Site 1 (Light scene 1)

Calculation surface - cross section





Properties	$\bar{E}$	E_{min}	E_{max}	g_1	g_2
Calculation surface - cross section Perpendicular illuminance (adaptive) Height: 3.000 m	0.15 lx	0.000 lx	2.10 lx	0.00	0.00

THE LIGHTING BEE

APPENDIX E

Luminaire Data Sheets and Manufacturers Data


DW
Windsor
Garda®
Illuminated handrail

BSkyB Headquarters, London

Garda®

Contents

Service	3
Profiles	7
Systems	14
Modules	17
On location:	
River Ettrick, Selkirk	23
St James's Palace, Cirencester	25
Teddington Lock Footbridge, London	27
Southampton University, Southampton	29
Wembley Royal Steps, London	31
Malthouse Bridge, Bury St Edmunds	33
Electrical Connections	35
Specification Guide	37

Your first choice illuminated handrail solution; unrivalled in quality and performance

Garda is a bespoke, award-winning illuminated handrail system that combines style and performance to deliver high quality lighting for internal and external applications. With four LED modules available to provide a wide range of light levels and colour temperatures, plus a choice of symmetric and asymmetric distributions, Garda offers a versatile and virtually maintenance-free solution that can be tailored to the individual needs of your project.

For quality that shines through, introduce Garda to your next scheme. Named 'Best on Market' by Lux

Service

Supporting you from concept to completion

When you specify a Garda handrail, you're in safe hands. With over 10 years' experience delivering illuminated handrail solutions across a wide variety of applications, DW Windsor can manage all aspects of your scheme, offering you complete peace of mind.



Malthouse Bridge, Bury St Edmunds

A Full Turnkey Solution

Aided by our expert team of designers, engineers and installers, we support your project at every step. We'll ask the right questions, at the right time to ensure your scheme is successfully delivered on time, and within budget.



Project Management

Acting as a single point of contact, your dedicated Project Manager will liaise with design, electrical and construction teams to ensure the smooth running of your project.



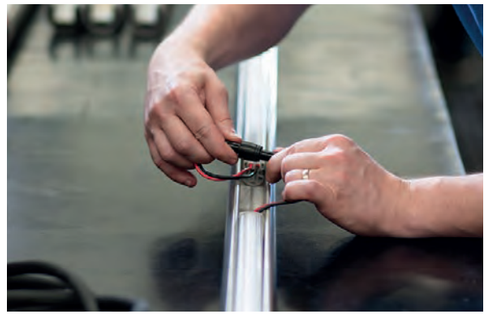
Design and Visualisation

Our designers will create a bespoke Garda arrangement to meet your individual needs, providing a scheme visualisation, predicted luminance levels and planned mounting positions.



In-depth Survey

Detailed site surveys are carried out for every Garda installation to fully understand the unique requirements of each location and establish exact dimensions for manufacture.



Bespoke Manufacture

All Garda handrail systems are manufactured in Britain by our experienced in-house fabricators using the highest quality materials and components.



Delivery and Installation

Working within the constraints of your building or structure, our specialist installation team will deliver and fit your chosen Garda solution to ensure the highest quality finish. Alternatively, if a project is time or cost sensitive, self-installation is now possible through Garda Kit.

Profiles

Quality that can be seen, felt and admired

All Garda handrails are hand-crafted from the highest grade materials, delivering beautiful solutions that you'll want to reach out and touch. Whether you're looking for elegance or have safety in mind, we have the right profile and finish for you.



Manchester School of Art, Manchester

Stainless Steel

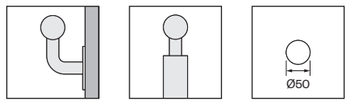
Selected for its excellent corrosion resistance and increased durability, our Seamless and Kit handrails are manufactured from premium grade 316 stainless steel and constructed using precision components for a superior fit and finish.



Stainless Steel - Seamless

Featuring a continuous, uninterrupted aesthetic without visible breaks or joins, our seamless stainless steel handrails deliver elegance and flexibility.

To ensure the highest quality finish is achieved for Seamless schemes, railing sections are cut, welded and machine brushed on-site by our expert installation team.

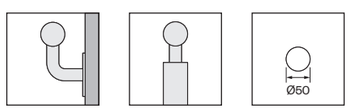




Stainless Steel - Kit

This modular system is highly adaptable and perfectly suited to any scheme. Engineered to support self-installation, Garda Kit bypasses the need for welding on site.

Joints are concealed and changes of direction are easily accommodated thanks to fixed and variable corner sections.



Aluminium

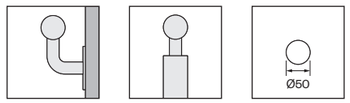
Whether it's to stand out or blend in, our aluminium Garda handrails offer a long-lasting, abrasion resistant solution that can be personalised to suit the individual requirements of your scheme.



Painted Aluminium

For installations that require a hard-wearing, high-grade painted appearance, our standard aluminium handrails can be powder coated in any custom finish.

Prefabricated sections are assembled on-site, with visible joins kept to a minimum thanks to our precisely crafted brackets and cover plates.

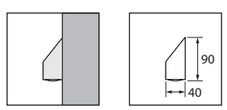




Garda Anti-Climb

Perfectly combining performance and safety, Garda Anti-Climb is the first-choice solution for safety-critical applications.

This innovative surface-mounted handrail system is designed to prevent anyone from using the product to climb a bridge or structure and cause injury. Also available as a cable carrying solution.



Bespoke Finishes

All our aluminium handrails are polyester powder coated for ultimate durability. Choose from a wide range of finishes — including custom RAL colours and warm to touch coatings — to perfectly complement or contrast your project's architecture.







Fitzwilliam Museum, Cambridge

Systems

Because every project is unique, so is our approach

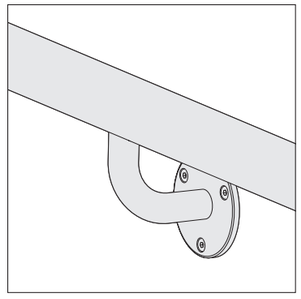
At DW Windsor, we recognise that no two schemes are alike, which is why we designed Garda to be as flexible as possible. With a wide range of mounting and infill options to choose from, we can design and deliver a unique solution for your next project.



Museum of Art, Architecture and Technology, Lisbon

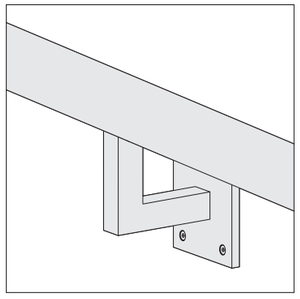
Bespoke to You

To support the needs of each individual project for Garda, we developed a wide selection of components that when combined, offer a personalised solution perfectly suited to your unique requirements.



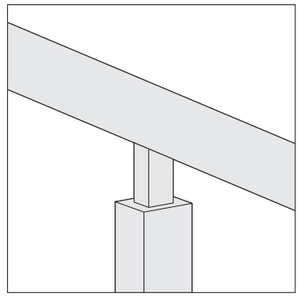
Round Wall Brackets

Attaches handrail to vertical surfaces, round profile



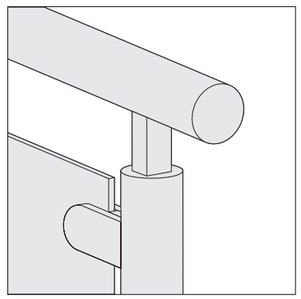
Square Wall Brackets

Attaches handrail to vertical surfaces, square profile



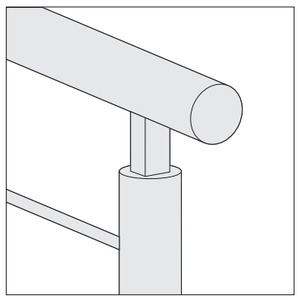
Stanchions

Provides support, available in round or square profiles.



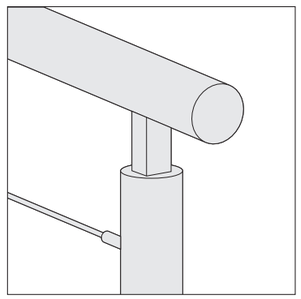
Glass Infill

Part of a balustrade system, providing style and safety.



Solid Rod Infill

Available in vertical or horizontal configurations.



Tension Wire Infill

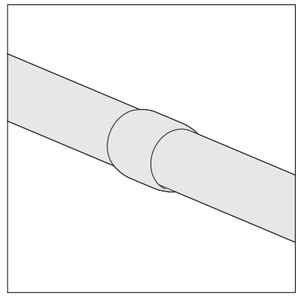
Part of a balustrade system, offers a minimal aesthetic.

Truly Unique Solutions

Whilst most projects can be achieved using a variety of standard parts, we understand that some applications may require more. For these schemes, our designers will work with you to develop a completely custom solution to meet your specific needs.

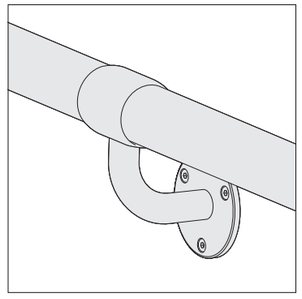
Garda Kit

Garda Kit is the ideal solution for time sensitive installations. Designed for self-installation, the versatile system provides added flexibility on site and can be easily customised thanks to a number of additional components.



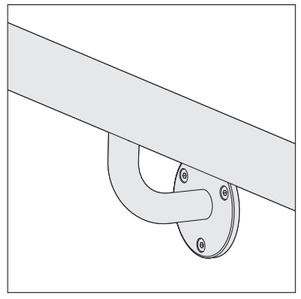
Inline Splice

Connects one Garda handrail section to another.



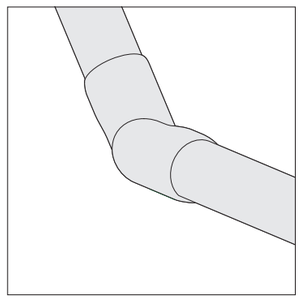
Splice Wall Bracket

Joins two handrail sections whilst also providing a mounting point.



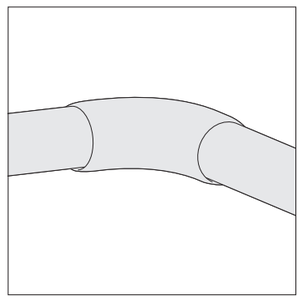
Flexible Wall Bracket

Attaches at any point to provide a flush wall mounting point.



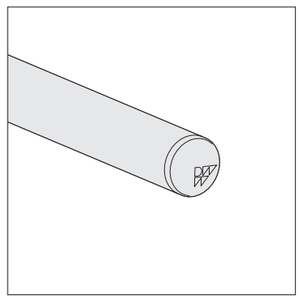
Variable Corner Joint

Designed to easily accommodate changes in direction.



Fixed Corner Joint

Links two Garda handrail sections together at a fixed 90° angle.



End Cap

Stylish end cap to complete your Garda handrail installation.

Innovative Fastening System

With Garda Kit, handrail sections are securely joined together using an innovative fastening system. Housed within the handrail, tube clamps allow sections to be connected without any visible fixing points.

Modules

Solutions tailored to your individual needs

From buildings to bridges, stairwells to stations, Garda offers a safe lighting solution which provides guidance and support to pedestrians. Whether it's to drive footfall or create an impact, with multiple module options Garda can adapt to every setting.



Essex Street Steps, London

Garda Classic

Our most versatile module, Garda Classic offers both symmetric and asymmetric distributions in a variety of colour temperatures, making it suitable for a wide range of handrail applications.



Delivered Lumens	2700K (lm)	3000K (lm)	4000K (lm)
Symmetric Module			
300 mm	201	281	335
600 mm	402	563	670
900 mm	602	843	1004
1200 mm	803	1126	1338
Asymmetric Module			
300 mm	146	204	244
600 mm	293	410	489
900 mm	440	616	733
1200 mm	586	821	977

Power Ratings	48V AC (W)	48V DC (W)	24V AC (W)	24V DC (W)
Module Size				
300 mm	3.6	3.6	4.2	3.6
600 mm	7.2	7.2	8.3	7.2
900 mm	10.8	10.8	12.5	10.8
1200 mm	14.4	14.4	16.7	14.4

Typical Applications

- Stairwells
- Bridges
- Architectural

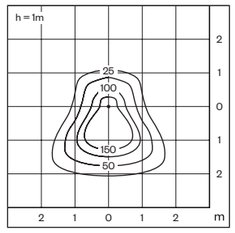
Light Details

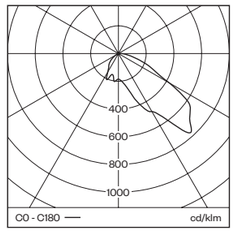


80 CRI

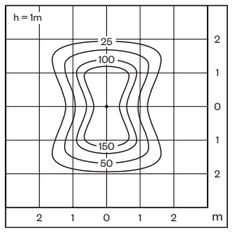
Flexible module option available

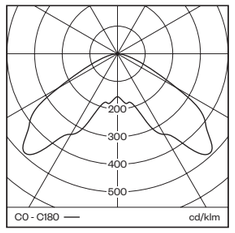
Asymmetric Module





Symmetric Module





Garda Pro

Our performance solution, Garda Pro is designed for schemes that require increased module spacings or higher light levels and uniformity. Garda Pro distributes light over a wider area, making it ideally suited to single-sided schemes.



Delivered Lumens	3000K (lm)	4000K (lm)
Asymmetric Module		
120 mm	122	131
300 mm	449	489
600 mm	894	972
900 mm	1349	1467
1200 mm	1800	1956

Power Ratings	48V AC (W)	48V DC (W)	24V AC (W)	24V DC (W)
Module Size				
120 mm	-	1.5	-	1.5
300 mm	-	4.4	-	4.4
600 mm	-	8.8	-	8.8
900 mm	-	13.2	-	13.2
1200 mm	-	17.6	-	17.6

Typical Applications

- Overpasses
- Ramps & Walkways
- Footpaths

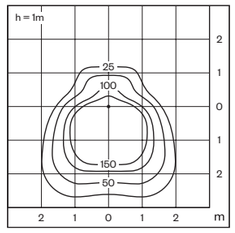
Light Details

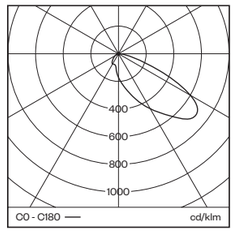


70 CRI

Flexible module option available

Asymmetric Module





Garda Comfort

Designed for applications with a focus on appearance, Garda Comfort offers a continuous, homogeneous light source with no visible LEDs. Advanced optics provide a highly diffused symmetrical distribution for maximum visual comfort.



Delivered Lumens	2700K (lm)	3000K (lm)	4000K (lm)
Symmetric Module			
300 mm	294	300	320
600 mm	647	654	703
900 mm	995	1005	1081
1200 mm	1352	1367	1470

Power Ratings	48V AC (W)	48V DC (W)	24V AC (W)	24V DC (W)
Module Size				
300 mm	-	-	-	3.8
600 mm	-	-	-	9.2
900 mm	-	-	-	14.3
1200 mm	-	-	-	21.0

Typical Applications

- Public Realm
- Residential
- Commercial

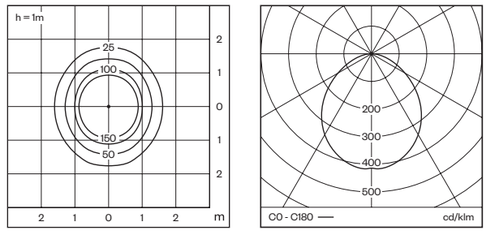
Light Details



90 CRI

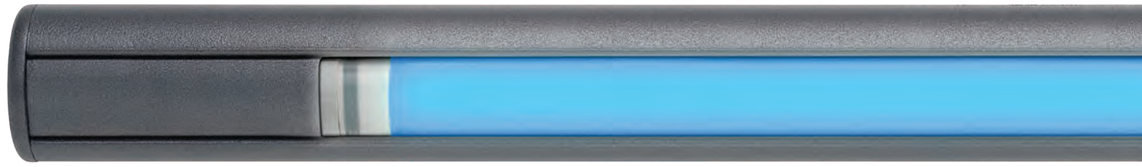
RGB Option

Symmetric Module



Garda RGBW

Garda RGBW provides functional white light with the option to quickly add vibrant colours to your scheme. Similar in appearance to the Garda Comfort module, Garda RGBW provides flexibility and the ability to enhance locations through colour.



Delivered Lumens	4000K (lm)
Symmetric Module	
300 mm	66
600 mm	164
900 mm	262
1200 mm	361

Power Ratings	48V AC (W)	48V DC (W)	24V AC (W)	24V DC (W)
RGB All On				
300 mm	-	-	-	3.8
600 mm	-	-	-	9.5
900 mm	-	-	-	15.2
1200 mm	-	-	-	20.9
4000K Only				
300 mm	-	-	-	1.3
600 mm	-	-	-	3.2
900 mm	-	-	-	5.1
1200 mm	-	-	-	7.0

Typical Applications

- Architectural
- Entertainment
- Retail

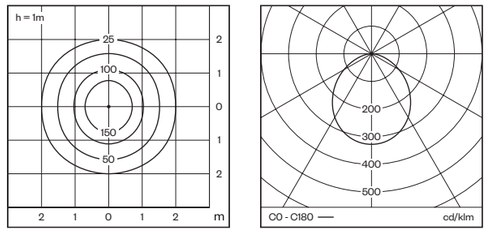
Light Details



78 CRI

RGBW

Symmetric Module (RGB All On)



River Ettrick, Selkirk

"A robust product that sits comfortably within the riverside environment and provides an energy efficient and environmentally friendly solution with minimal future maintenance."

Scottish Borders Council

Full case study available on our website:
dwwindsor.com/projects

St James's Place, Cirencester

Seamless light

This non-standard structural application involved mounting Garda directly to glass, with a tight 1.4m radius on the landings; achieved using our flexible LED modules.

Full case study available on our website:
dwwindsor.com/projects

Teddington Lock Footbridge, London

"Our challenge – reduce the amount of light pollution onto the river while achieving good lighting levels and uniformity. We trusted DW Windsor, who have experience with the Bat Conservation Trust, to design a solution that focused the light onto the deck of the bridge and eliminate dark patches."

London Borough of Richmond

Full case study available on our website:
dwwindsor.com/projects

Maritime Centre of Excellence, Southampton

Emergency lighting but not as you know it

Concealed battery packs provide 3-hour emergency lighting in this bespoke scheme. Garda further complements the already beautiful, maritime-themed staircase.

Full case study available on our website:
dwwindsor.com/projects

Wembley Royal Steps, London

"Our aim was to transform and simplify the experience of everyone using the Wembley Park estate and Stadium. It was crucial that the steps were safe and welcoming. Garda met all our expectations; secure, inviting and robust lighting, whilst also being visually appealing for visitors and the local community."

LDA Design

Full case study available on our website:
dwwindsor.com/projects

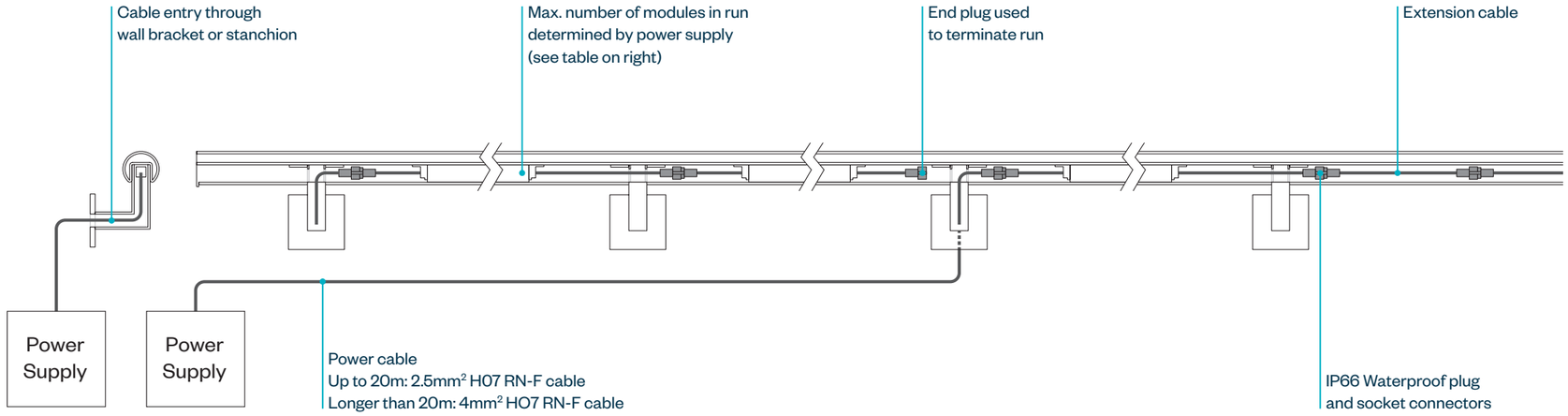
Malthouse Bridge, Bury St Edmunds

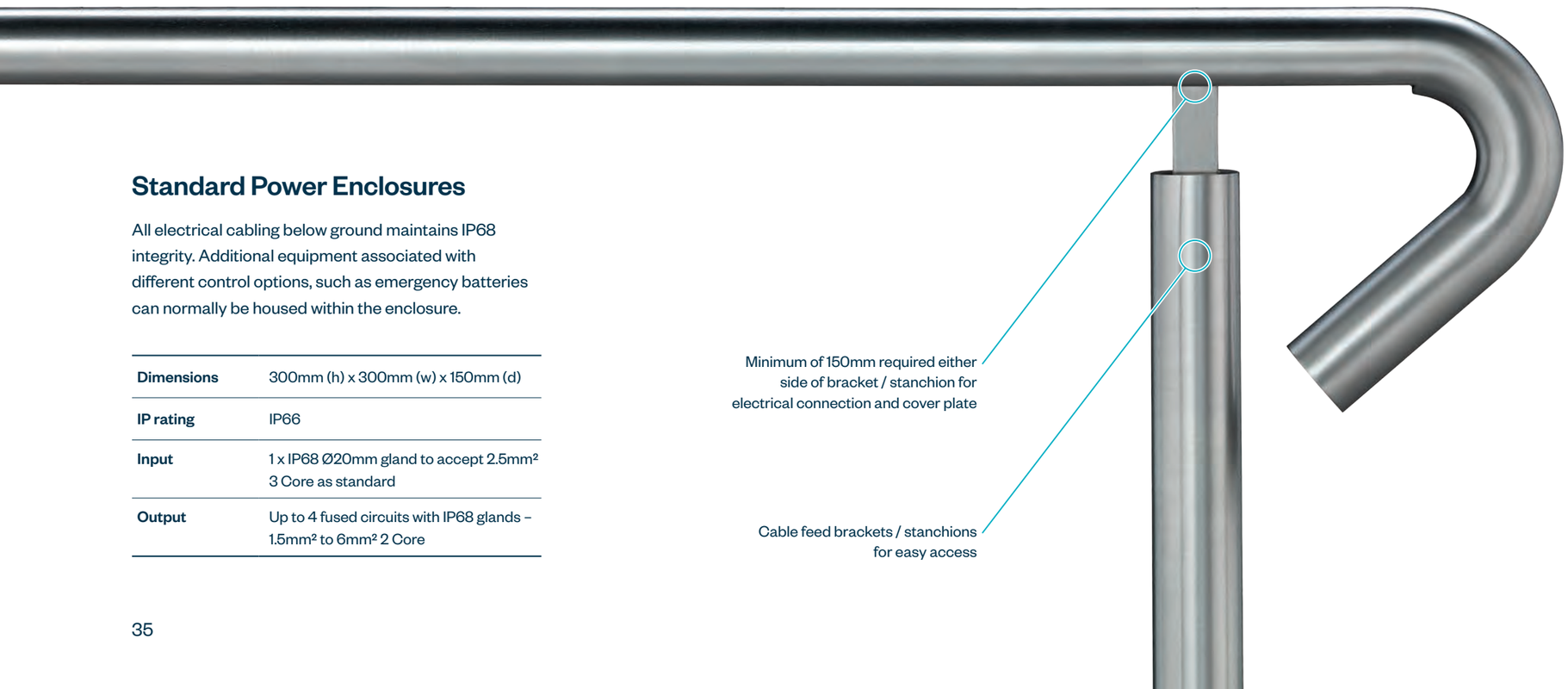
Performance with Safety in Mind

For safety-critical projects where there is a requirement for functional walkway lighting , consider Garda Antic-Climb; our patented, surface-mounted, linear handrail lighting system. Also available as a cable carrying solution.

To find out more, visit:
dwwindsor.com/garda/anti-climb

Electrical Connections





Standard Power Enclosures

All electrical cabling below ground maintains IP68 integrity. Additional equipment associated with different control options, such as emergency batteries can normally be housed within the enclosure.

Dimensions	300mm (h) x 300mm (w) x 150mm (d)
IP rating	IP66
Input	1 x IP68 Ø20mm gland to accept 2.5mm² 3 Core as standard
Output	Up to 4 fused circuits with IP68 glands – 1.5mm² to 6mm² 2 Core

Maximum LED Modules Per Circuit

Garda Classic	**300** (mm)	**600** (mm)	**900** (mm)	**1200** (mm)
48V AC Supply				
100 VA	16	8	5	4
160 VA	26	13	8	6
250 VA	42	21	14	10
400 VA	68	34	22	17
48V DC Supply				
52 W	11	5	3	2
100 W	21	10	7	5
150 W	32	16	10	8
300 W	64	32	21	16

Garda Pro	**120** (mm)	**300** (mm)	**600** (mm)	**900** (mm)	**1200** (mm)
48V DC Supply					
52 W	33	11	5	3	2
100 W	63	21	10	7	5
150 W	96	32	16	10	8
300 W	192	64	32	21	16

Garda Comfort	**300** (mm)	**600** (mm)	**900** (mm)	**1200** (mm)
24V DC Supply				
100 W	20	9	5	4

Garda RGBW	**300** (mm)	**600** (mm)	**900** (mm)	**1200** (mm)
24V DC Supply				
52 W	16	6	4	3
100 W	32	13	8	5
150 W	48	19	12	8

Specification Guide

Garda Product Codes

					Code	Example
Product						
Garda					GAR	GAR
Module Option						
	Classic - Symmetric				S	P
		Classic - Asymmetric			A	
			Pro		P	
				Comfort	C	
Colour Temp						
	2700K	2700K		2700K	2K	3K
	3000K	3000K	3000K	3000K	3K	
	4000K	4000K	4000K	4000K	4K	
				RGB	RGB	
				RGBW	RGBW	
Module Size						
			120		10	600
	300	300	300	300	30	
	600	600	600	600	60	
	900	900	900	900	90	
	1200	1200	1200	1200	12	
				Continuous	CON	
Material						
Stainless Steel Handrail - Seamless					SS	SS
Stainless Steel Handrail - Kit					SK	
Aluminium Handrail					AL	
Aluminium Anti-Climb					AC	
Finish						
Brushed Stainless Steel (Satin 240grit)					0	0
Painted (Please state RAL)					1	
Warm to Touch (Please state RAL)					2	
Mounting						
Wall Mounted					W	G
Glass Mounted					G	
Stanchion Mounted (Root)					R	
Stanchion Mounted (Flange)					F	
Loading						
None						3.0
0.74kn/M					0.74	
1.5kn/M					1.5	
3.0kn/M					3.0	
Infill						
None						GL
Wire					WI	
Bar					BA	
Glass					GL	
Electrical Specification						
Emergency					E	D
DALI					D	
Dual Circuits					DC	

Example Code: **GAR P 3K 600 SS 0 G 3.0 GL D**

Here to Help

We understand that specifications can be overwhelming which is why our team of Garda experts is always here to help. Together, we will refine and produce the handrail that is perfect for you.

Not sure where to start? Contact us at **garda@dwwindsor.co.uk**

Notes

- Module size is dependent on lighting design and design layout and may change
- Loadings are requested but not confirmed as being achievable until spacings are known
- Number of power supplies is determined by load, electrical specification and available power supply locations
- Standard brackets and stanchions are round tube - any other design will need to be instructed



St James's Place House, Cirencester

Garda®

IP66 | IK10 | CLASS III

Features

Suitable for both interior and exterior applications

Precise control, delivering light only where needed

Designed and manufactured in the UK

Fully managed service, including dedicated project manager

Profiles

Garda

Garda Kit

Garda Anti-Climb

Modules

Garda Classic (Asymmetric or Symmetric)

Garda Pro (Asymmetric)

Garda Comfort (Symmetric)

Garda RGBW (Symmetric)

L90 Lifetime Prediction

In excess of 100,000 hours

Colour Temperature

2700K (Classic and Comfort modules)

3000K

4000K

RGBW

Colour Rendering Index

80Ra (Classic module)

70Ra (Pro module)

90Ra (Comfort module)

78Ra (RGBW modules)

Finishes

Brushed stainless steel

Powder coated aluminium

Control

Variable resistance dimming

1-10V dimming

DALI dimming

DMX (via DALI converter)

Protection

Class III SELV supply (extra low voltage)

IP66 LED modules

IK10 impact resistance

Anti-tamper pin head bolts in cover plates

Surge protection

Short circuit protection

Emergency

Integrated emergency 3-hour battery backup available

Dual circuit

Electrical

48V AC (Classic modules)

48V DC (Classic and Pro modules)

24V AC (Classic modules)

24V DC (RGBW modules)

Construction

Stainless steel or aluminium body

Polycarbonate module glazing

bsi. ISO 9001 Quality Management FM 53278 | ISO 14001 Environmental Management EMS 562929 | ISO 45001 Occupational Health & Safety Management OHS 562930

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MADE IN BRITAIN

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Nov 2021

Due to continuous product development the details within this document are subject to change at any time. For the more up-to-date information please visit **dwwindsor.com.**



The Lighting Bee Ltd

Lighting Design | Impact Assessment | Daylight Analysis

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