MMA LIGHTING CONSULTANCY
Exterior Lighting Design Specialists

Jacks Lane, Takeley – S38 Public Right Of Way

Lighting Impact Assessment

MMA Project Number: MMA18229

Date: 05/12/2023

Produced by: MMA Lighting Consultancy Ltd

Revision: R3

Issued by: -
MMA Lighting Consultancy Ltd
Summer Field House
99 Old Bath Road, Charvil, Reading, Berkshire, RG10 9QN
Tel: +44 (0) 0118 321 5636
Fax: +44 (0) 0118 321 5636
[redacted]
info@mma-consultancy.co.uk

CONTENTS

JACKS LANE, TAKELEY – S38 FOOTPATH

LIGHTING IMPACT ASSESSMENT

1.0 INTRODUCTION

1.1 This lighting impact assessment and strategy document has been prepared for the proposed highway improvements located at Jacks Lane, in Takeley, Essex. The land is proposed for the improvement of a public right of way (ProW)/byway leading to a proposed residential development from the existing local centre in Prior's Green.

1.2 The report has been prepared to assess, in terms of artificial lighting, the likely effects of the proposed development. The lighting assessment includes information on the baseline lighting conditions within the area and considers possible mitigation measures to reduce potential light spill into neighbouring properties and ecology receptors, upward light (which can create sky glow), and visual source intensity (glare). Lighting class proposals will be included as part of this assessment.

1.3 This new development will require external lighting along the route of the existing public right of way running to the east of the site towards the Burgattes Road, Priors Green. The safety of the pedestrians and users of the byway from within this new development should be considered as one of the priorities along with minimising the impact of the artificial lighting on the 'Dark Skies' local wildlife and heritage assets. As such a good quality sustainable external lighting solution will be required to ensure the safety and security of users whilst very carefully considering ecological restraints and local residents.

1.4 The lighting design of this site has been carried out by a competent person governed by the Institution of Lighting Professionals.

1.5 MMA Lighting Consultancy Ltd has been commissioned by Weston Homes, to provide a lighting impact assessment for the proposed development at the Jacks Lane site in Takeley.

1.6 MMA Lighting Consultancy Limited accepts no responsibility or liability for:

a) The consequence of this documentation being used for any purpose or project other than that for which it was commissioned.

b) The issue of this document to any third party with whom approval for use has not been agreed.

2.0 SITE DESCRIPTION

Existing site

2.1 The development is located on Jacks Lane in Takeley which is located between Stansted Airport and the market town of Great Dunmow. A site location plan is shown below in Figure 1:

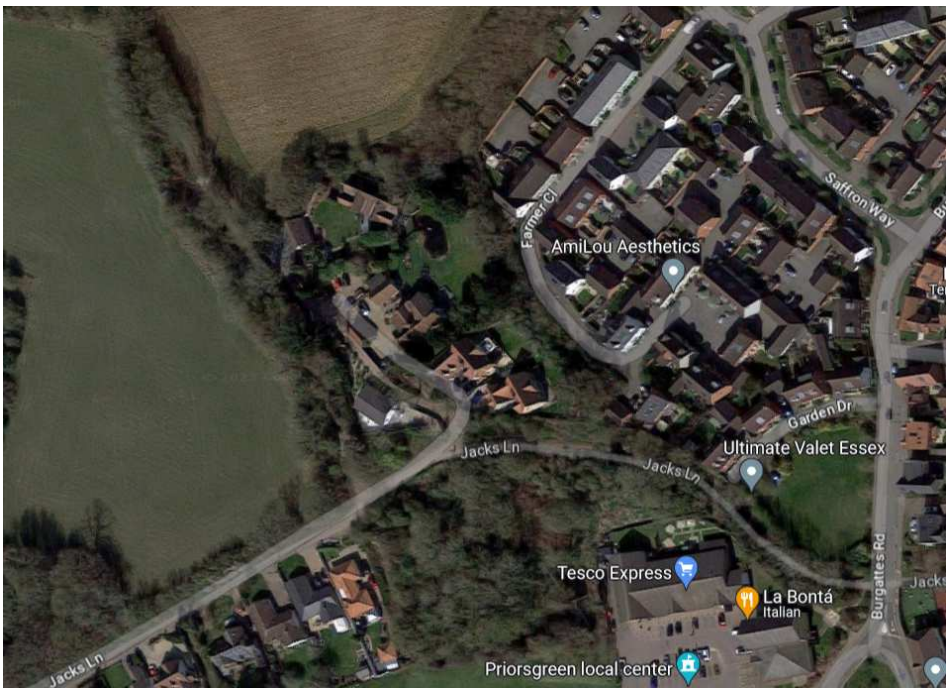


Figure 1: Aeriel Photograph of Site Location

Proposed Development

2.2 The proposed development subject to this assessment is the improvement of an existing well-established PROW/byway by replacing the wearing course with an all-weather surface and the installation of suitable lighting columns.

2.3 Latest development layout shown below in Figure 2:

Figure 2: Latest development layout

3.0 POLICY & GUIDANCE

Environmental Protection Act 1990 / Clean Neighbourhoods and Environment Act 2005

3.1 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), states: "artificial light emitted from premises so as to be prejudicial to health or nuisance."

National Planning Policy Framework

3.2 The National Planning Policy Framework (NPPF), published in September 2023, sets out the governments planning policies for England and how they are expected to be applied and provides a framework for local plans. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

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

Relevant British Standards

3.3 The most applicable British Standards for lighting that relates to the proposed development are:

- BS5489-1:2020 Code of practice for the design of road lighting Part 1: Lighting of roads and public amenity areas
- BS EN 13201 2015 – Road Lighting. Performance Lighting
- BS EN 12464-2:2014 – Light and Lighting. Lighting of Work-Places. Outdoor Lighting.

Institution of Lighting Professionals, Bat Conservation Trust Lighting Guidance (August 2023)

3.4 The Bat Conservation Trust and the ILP produced a paper in 2023, Guidance Note 08 "Bats and Lighting in the UK", discussing the appropriate lighting levels, types of lamps, colour temperatures etc. which are suitable for lighting areas where bats are present.

3.5 The guidance laid out in GN08/23 regarding the lighting of areas near dark corridors (4.27, 4.28, 4.29) has directly influenced the equipment used in lighting the Footpaths at Jacks Lane. Namely the use of LED Lanterns with integral rear shields using a 3000k Warm White light source.

3.6 As per GN08/23 (4.36), dimming is recommended for this site and as adoptable, CMS would be used by the Local Authority for the proposed lighting on Jack Lane. CMS controlled dimming of the lanterns will reduce light spill into the sensitive areas / dark corridors along the footpaths during the hours of darkness. Please see sections 7 and 8 of this document for further information.

Bat Conservation Trust 2014 Interim Guidance

3.7 The Bat Conservation Trust 2014 interim guidance provides recommendation to help minimise the impact of artificial lighting.

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

3.8 Guidance notes produced by the Institution of Lighting Professionals are among the most commonly referenced guidance notes for good practice within the lighting design industry.

3.9 Obtrusive light (or sometimes referred to as light pollution) refers to any light emitted in a direction in which it is not required or wanted and as such is detrimental to other users. The assessment has been carried out in accordance with the published guidance documents from the ILP.

3.10 Light intrusion refers to the spilling of light beyond the boundary of the area to be lit. This includes the intrusion of light into bedroom windows.

3.11 Sky glow refers to the brightening of the sky above towns cause by direct or reflected upward light.

3.12 Glare refers to the uncomfortable brightness of a light source when viewed against a dark background. Figure 3: illustrates the different types of intrusive light taken from Guidance Notes for the Reduction of Obtrusive Light; 2021 Institution of Lighting Professionals (ILP).

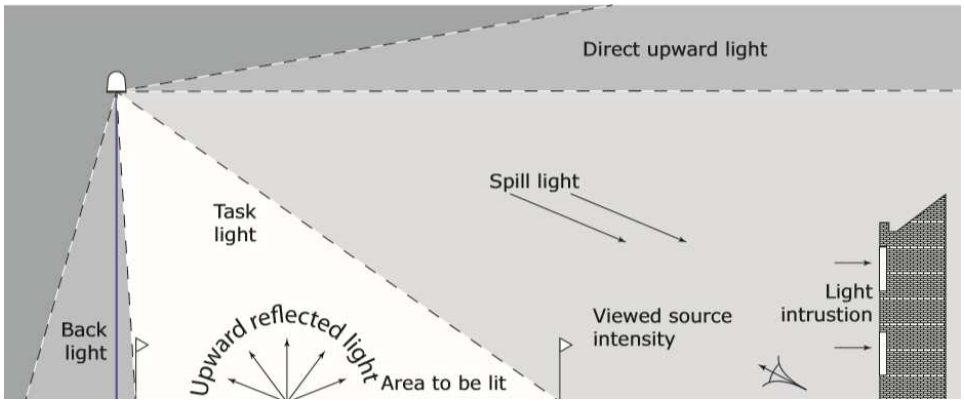


Figure 3: Light Obtrusion characteristics

4.0 ASSESSMENT METHODOLOGY

4.1 A desk-top study has been undertaken to identify relevant legislation, planning policy and good practice guidance in relation to lighting. The methodology takes guidance from the Institution of Lighting Professionals PLG04 document "Guidance on Undertaking Environmental Lighting Impact Assessments". This sets out good practice which was followed during the assessment.

4.2 The scope of the assessment shall cover the effects of artificial lighting as a result of the proposed development. The assessment will consider the following:

- Assess the existing baseline lighting conditions on the immediate surroundings.
- Assessment of the proposed lighting performance requirements for the various components of the proposed development site, with reference to the Environmental Zone Criteria set out in the Guidance Notes for the Reduction of Obtrusive Light (ILP, 2021)
- To limit light pollution and sky glow.
- To limit obtrusive light, spill light and glare to neighbouring land and properties.
- To limit potential light spill to vegetation.
- To limit the effect of artificial light on local wildlife.

5.0 BASELINE CONDITIONS

5.1 The application site is an existing PRoW/byway starting at Burgattes Road in Priors Green, Takeley.

5.2 The route is accessed via Burgattes Road and runs west to Jacks Lane, then north to tie into the proposed development. Burgattes Road is owned and maintained by Essex County Council (ECC) and is currently lit as shown in figure 4:

Figure 4: Burgattes Road.

5.3 The existing lighting surrounding the development along Burgattes Road consists mainly of 8m high lamp columns with light-emitting diode (LED) luminaires.

5.4 The existing lighting at the access point appears to be designed and installed to comply with BS5489-1:2020 & BS EN 13201-2:2015.

5.5 The environment surrounding the application site is 'Low District Brightness', categorised as an E2 Environmental Zone in accordance with the ILP Guidance Notes.

5.6 Existing lighting in the surrounding area has been designed using the Essex County Council standard specification document.

5.7 It is assessed that the existing lighting in surrounding streets and the location of Stansted Airport just over 1 mile to the northwest will already produce a certain level of Sky Glow in the locality. This should be taken in consideration when assessing the overall impact of the proposed lighting on this site.

6.0 RECEPTOR SENSITIVITY

6.1 There are currently no specific guidance documents or papers available to determine the sensitivity of a receptor in terms of lighting impact. 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 as detailed in the GN01: 2021 Table 2 - Environmental Zone and the ILP 'Guidance Notes for the Reduction of Obtrusive Light' GN01. This document defines the highest sensitivity being applied as an E0 intrinsically dark zone, and the lowest sensitivity to an E4 urban zone. The Environmental Zones are defined in figure 5 (Section 8) below and the classification of sensitivity of natural resources / receptor will correspond to each Environmental zone as detailed below. For other receptors such as residential receptors the description will be used to determine sensitivity.

6.2 For the purpose of this assessment receptor sensitivity descriptions and criteria have been based on the descriptions shown below.

High Sensitivity

The receptor/ environment is fragile and has limited capability to accommodate change in artificial light conditions without fundamentally altering its present state or character or is of international or national importance. Recovery would be difficult or impossible.

Human (Amenity) – receptors which are sensitive to a change in lighting such that the quality of life would be affected (i.e. lighting is designated a statutory nuisance)

Human (Safety) - receptors where a change in the lighting has the potential to either dramatically improve or reduce safety (for pedestrians, drivers, or workers).

Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E0 or E1

Ecological – where a change in the lighting affects the habitats, breeding or feeding of fauna (e.g. protected habitats or other special areas) or growth patterns of fauna / crops.

Medium Sensitivity

The receptor/ environment has moderate ability to accommodate change in artificial light conditions without significantly altering its present state/ character. The receptor/ environment has a degree of adaptability and resilience and is likely to accommodate the changes caused by an impact, although there may still be some residual modification as a result.

Human (Amenity) – receptors which are sensitive to a change in lighting however not such that the quality of life would be affected.

Human (Safety) - receptors where a change in the lighting has the potential to either improve or reduce safety (for pedestrians, drivers, or workers).

Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E2

Ecological – where a change in the lighting affects the movement or feeding patterns of fauna but the receptor can adapt.

Low Sensitivity

The receptor/ environment is tolerant of and can accommodate change in artificial light conditions without detriment to its character or is of low or local importance. The receptor/ environment is adaptable and is resilient to change. Nearly all impacts can be absorbed within it without modifying the baseline conditions.

Human (Amenity) – receptors which would not noticeably be aware of a change in lighting. (i.e. in areas of medium to high luminance)

Human (Safety) - receptors where a change in the lighting has limited potential to affect safety (for pedestrians, drivers, or workers).
Natural Receptors i.e., Artificial Sky Glow – Sensitivity of receptor based on assigned Environmental Zone – E3 or E4

Ecological – area with limited wildlife.

7.0 ECOLOGY

7.1 MMA Lighting Consultancy Ltd has taken ecology into consideration for this development site and considers sensitive receptors to any proposed lighting to be extremely important. In doing so the findings of Ecology Solutions in their report has been considered as detailed below. Maintaining flight paths, feeding patterns, nesting and mating areas should also be considered when proposing any street lighting to ensure that wildlife continues to flourish.

7.2 The ecological consultant, Ecology Solutions deployed static detectors in two locations along the byway over a period of 5 days that detected a total of 308 registrations from positions 1 and 1060 registrations from position 2.

7.3 Static detectors found significant Common Pipistrelle presence overall, constituting 95% of recordings. Some Soprano Pipistrelle presence and minor Noctule presence was also noted. Early (pre-sunset) Common Pipistrelle recordings indicate that this species is roosting within or near to the site, possibly within the trees along the byway identified as having suitable roost features.

7.4 No notable species were recorded / observed. However, previous reports of Brown Long-eared Bat and Barbastelle presence within the wider Warish Hall Farm site suggests that these species may be present in the locality. Owing to the relatively minimal loss to vegetation that will occur during the development of the byway, including the retention of all trees, it is considered that adverse effects on bats will be minimal.

7.5 Within the proposed lighting scheme it is recommended by the Bat Conservation Trust, together with guidance documents from the Institution of Lighting Engineers, a correlated colour temperature (CCT) of 3000k should be used across the site to ensure minimum impact on the sensitive ecology areas.

7.6 The lantern proposed for use on this site has an internal rear louvre to control rear spill. Any lantern in the design shown as backing on to a dark corridor, boundary or sensitive area can be fitted with an external black painted shield if required, to further reduce spill light.

7.7 It is important that the lighting can be minimised by using accepted methods of lighting control, essentially limiting illuminance, and controlling light spill. It is proposed that the external lighting shall be installed on 6m street lighting columns. Generally lighting shall be selected to provide safety and security without polluting the site boundary.

7.8 Dimming and trimming the street lighting output at strategic times of the evening allows for a reduction in the overall lighting impact on ecologically sensitive areas and will help to reduce the general evening ‘sky glow’ from the site. It is recommended that an appropriate ‘Stepped Dimming’ profile be considered for this site and that should look similar to the example profile that is set out below: -

Suggested Stepped Dimming profile: -

Dusk – 21.00 – 100% output *
21.00 – 00.30 – 75% output *
00.30 – 05.30 – 0% output *
05.30 – 06.00 – 75% output *
06.00 – Dawn – 100% output *

8.0 LIGHTING DESIGN REQUIREMENTS

8.1 The lighting design of this site should be carried out by a competent person governed by the Institution of Lighting Professionals.

8.2 It is recommended that the street lighting design proposals for this site shall be designed in accordance with BS5489-1:2020 & BS EN 13201-2:2015.

8.3 Institution of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light (GN01: 2021) should be adhered to. This will ensure that lighting designs produced are suitable and sensitive to their surroundings.

8.4 External street lighting should be designed to ensure that it is focused in the appropriate areas, preventing upward light above the horizontal plane. Design proposals should aim to reduce unnecessary light pollution, energy consumption and nuisance light spill onto neighbouring properties.

8.5 It is assumed that all street lighting will be positioned to avoid light spill beyond the PRoW in order to avoid and minimise effects on sensitive ecological habitats.

8.6 Selected luminaires shall prevent upward light spill and should have a colour rendering index (Ra) greater than or equal to 60Ra. Colour rendering index relates to the accuracy of colours perceived, relative to daylight.

8.7 As part of this assessment we consider the use of 6m columns for all adoptable and non-adoptable routes to be suitable.

8.8 All luminaires shall have a 3000 Kelvin Correlated colour temperature (CCT) to minimise impact of the artificial lighting on ecologically sensitive areas.

8.9 The site shall be classed as a “P Class” in accordance with BS5489-1:2020, BS EN 13201-2:2015.

8.10 Guidelines for the environmental zones published by the Institution of Lighting Professionals, provides Guidance Notes for the Reduction of Obtrusive Light (GN01: 2021). The environmental zone for this site is considered to be an E2 Zone as shown in Figure 5 below:

Table 2: Environmental zones

Zone	Surrounding	Lighting environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low district brightness (SQM ~15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements, small town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

Figure 5: Environmental Zone Table from ILP GN01/21

8.11 Essex County Council have a number of luminaires currently approved for use on residential roads on their network. The current Urbis Axia 3 luminaires provide a wide range of optics suitable for this sensitive site and have integrated rear louvres to reduce spill light, so it is recommended for use on this site. Figure 6 shows image of the luminaire:

Figure 6 - Urbis Axia 3 LED luminaire.

8.12 Any lantern specified for the new development / scheme will be supplied with DALI enabled drivers to enable dimming to be undertaken at set times.

8.13 All proposed luminaires should have a minimum IP rating of IP65 which is the recommended minimum requirement for Ingress Protection.

8.14 Luminaires will need to have the facility to enable additional shields to be fitted to further prevent the back / sideways spill of light if needed. A luminaire with a deflector is shown in Figure 7:

Figure 7 – Example Luminaire fitted with rear light deflector.

8.15 Proposed luminaires should be designed to fit 'post top' without an outreach bracket.

8.16 Five-degree tilts should **NOT** be applied to the lantern in the lighting design calculations, as tilting the lantern encourages light to spill above the horizontal plane and other light ingress issues.

8.17 Roads being offered for adoption shall have a Central Management System (CMS) or SMART Lighting, so that any installed lighting in sensitive areas can be significantly reduced during the hours of darkness or lights switched off entirely. This type of solution could further assist with minimising the potential impact of any proposed lighting on the local wildlife in the surrounding area to the site. Other advantages of CMS or SMART Lighting is the financial gain in reducing the electricity consumption across times when lighting systems are dimmed or switched off.

8.18 Final CMS dimming or trimming profiles should be as directed by the local authority lighting engineer.

8.19 As directed by the local authority and general street lighting design guidance, all external lighting shall produce only UV-free, narrow spectrum, low-intensity light output, with a wavelength of 550nm or more.

8.20 Until such times that constant lumen output systems become the ‘norm’, deterioration of light source flux over time, together with dirt accumulation on fittings, must be taken into account in the design by using the appropriate Maintenance Factor (MF). Where obtrusive lighting calculations are required a MF of 1.0 should always be used in order to present a worst-case scenario perspective.

9.0 LIGHTING LEVELS

9.1 Artificial lighting will be required as part of amenity, safe passage, security and health and safety requirements during periods of darkness. The associated potential obtrusive light effects toward surrounding light-sensitive receptors would be minimised through the controlled application of lighting in accordance with current best practice.

9.2 The indicative lighting criteria adopted for the purposes of this assessment are taken from relevant British Standards and recognised national guidance documentation. All criteria adopted for the final scheme of lighting shall be subject to appropriate risk assessment and technical approval by the adopting local authority where required.

9.3 For the purposes of this assessment the PRoW route has been identified as a 'subsidiary access road', with the development deemed to be within an 'E2' Environmental Zone (Figure 5 above) with normal usage by pedestrians and cyclists. Therefore, in accordance with BS 5489-1:2020 Table A.5 a 'P5' lighting class has been deemed to be suitable as seen in Figure 7 below:

Lighting classes for subsidiary roads

Traffic flow	Lighting class		
	E1 to E4[A)]	E1 to E2[A)]	E3 to E4[A)]
	Pedestrian and cyclists only	Speed limit $v \leq 30$ mph	Speed limit $v \leq 30$ mph
Busy [B)]	P5	P4	P3
Normal [C)]	P5	P5	P4
Quiet [D)]	P6	P5	P4

NOTE 1 Table A.5 assumes no parked vehicles; see risk assessment in A.3.3.2.

NOTE 2 An EV lighting class using vertical illuminance, from BS EN 13201-2:2015, Table 6, can be specified in addition to the general lighting class when there are particular concerns about crime and personal safety. EV is calculated at the typical height of a human face (1.5 m) and in relevant viewing orientations.

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 The actual overall uniformity of illuminance, U_o needs to be as high as reasonably practicable (see 7.2.6).

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N2].

NOTE 6 The illuminance classes are suggested minimum levels. A risk assessment needs to be carried out to ensure that the light levels are adequate, particularly for pedestrians and cyclists.

Figure 7 Table A5 – Lighting classes for subsidiary roads.

9.4 Where the proposed lighting Class of 'P5' has been selected for the footpath, horizontal lighting illuminance levels are set out in the British Standards, these would be required as a minimum and are detailed below: -

P5

Average maintained illuminance (Eav) = 3.00 Lux – 4.50 Lux
Minimum illuminance (Emin) = 0.60 Lux
Overall Uniformity = 0.20 Uo

10.0 IMPACTS

During Construction

10.1 During construction phase, it is likely that the site will be affected through the use of temporary site lighting either for health and safety purposes, site security, or both. It is assumed that the main impacts will be spill light and luminous intensity. These levels relate to residential areas.

10.2 Lighting for health and safety will be needed where work is required to take place during the hours of diminishing ambient lighting levels which is likely to occur if the construction works are carried out in the winter months or if night-time working is required.

10.3 Any and all temporary lighting installed within the site should meet all requirements set out in the above 'Section 8.0 Lighting Design Requirements'.

Post Construction

10.4 The site is classified as Environmental Zone E2, with the proposed lighting for the site being assessed in accordance with the limiting criteria for that zone, Figure 8 illustrates GN01:2021 Table 2 – Obtrusive light limitations for exterior installations.

Table 3 (CIE 150 table 2): Maximum values of vertical illuminance on properties.

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

Figure 8 GN01:2011 Table 3 – Obtrusive light limitations for exterior installations

10.5 **Notes to table:**

- Ev is Vertical illuminance in Lux measured flat on the glazing at the centre of the window.
- Curfew = the time after which stricter requirements (for the control of obtrusive light) will apply subject to the conditions of the local planning authority.

10.6 The effect of artificial light associated with the site is predicted to have a minor adverse effect on the environment if unmitigated. Modern road lighting luminaires, when mounted with 0° tilts, do not typically produce significant upward light, therefore the effects of upward light/ULR (upward light ratio) are predicted to be negligible.

10.7 Any and all temporary lighting installed within the site should meet all requirements as set out in the above 'Section 8.0 Lighting Design Requirements'.

11.0 MITIGATION MEASURES

During Construction

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

- During construction, specifying working hours, use of lighting, location of temporary floodlights in the construction compound and agreeing these with the local council. Lighting to be switched off when not required specifically for construction activities or required health and safety or security.

- Adhere to best practice measures as recommended by the Institution of Lighting Professionals (ILP), Health & Safety Executive (HSE) and CIE (International Commission on Illumination) guidance. Lighting solutions will be selected to reduce light pollution.

- Specifically, designed luminaires will be selected to minimise upward spread of light. The optics in the lanterns will control the distribution of light to avoid overspill, sky glow and glare.

- Glare will be kept to a minimum by ensuring the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare.

- Restrict lighting to the task area using horizontal cut-off optics and zero tilts.

- Operate curfew and minimise the duration of any lighting (switch off or part-night dimming).

Post Construction

11.2 The detailed lighting design will be designed to use current best practice and technology. The impacts of external lighting will be minimised by the installation of lighting to the minimum specification required to provide a safe night-time environment for residents, therefore lighting will be designed to comply with the minimum illuminance levels given within the appropriate guidance. The detailed lighting design will satisfy the requirements of the ecologist in order to maintain the integrity of habitats for wildlife around the site.

11.3 Designing out and minimising the need for lighting to be installed is always the best method of reducing light pollution. However, where this is not possible, the careful choice of illuminance and luminance criteria is key to successfully limiting the impact that light may have on its surrounding environment.

11.4 Care should be taken to minimise glare from all luminaires installed, by ensuring the correct luminaires are selected and suitably installed, in line with the recommendations within the ILP Guidance Notes for the Reduction of Obtrusive Light.

11.5 Restriction of luminaire mounting heights would be one of the key means of mitigating the environmental impact of external lighting. Luminaires that are column mounted can be restricted to a maximum height of 6 metres to all adoptable and non-adoptable roads. It should be noted that if the mounting height is reduced there may be the requirement for the number of luminaires to be increased.

11.6 Lighting would need to be provided in the form of column mounted luminaires. Luminaires would be pointed directly into the development and away from the adjacent sites. The optics in the lanterns would be specified to control the distribution of light avoiding overspill, sky glow and glare. Black painted shields shall be fitted to columns where appropriate.

11.7 Where lighting is installed within the site it should meet all the requirements as set out in the above 'Section 8.0 Lighting Design Requirements'.

12.0 CUMUATIVE EFFECTS AND RESIDUAL EFFECTS

Cumulative

12.1 The appearance of sky glow was considered as part of the assessment of the external lighting conditions. During the lighting assessment, it was noted that the PRoW is bounded by an existing lit environment with the local centre adjacent to the route and the site is close to Stansted Airport 1.2 miles to the north west.

12.2 Although the introduction of artificial lighting at the site along the route could have an effect, the mitigation measures incorporated into the lighting strategy would mean that the significance of the overall impact is reduced and the resultant impact would be negligible.

Residual during construction

12.3 It is considered that following the implementation of the mitigation measures outlined in Section 8.0 and 11.0 of this document. Overall, there will be minor adverse residual effect of lighting during the construction phase of the development site. Subject to sensitive lighting design, the effects on key areas of wildlife habitat identified in the ecology report is expected to be negligible.

Residual post construction

12.4 It is considered that there will be overall minor negative effects from the lighting of the proposed scheme on residential receptors and road users. The use of well located, modern light fittings, will minimise glare, light spill and reduce sky glow contributions to the existing sky glow above Takeley as a whole. Subject to sensitive lighting design, including positioning and design of luminaires and use of remote monitoring systems, the effects on key areas of wildlife habitat identified in the ecology report is expected to be negligible.

13.0 EXPLANATION ON THE OUTLINE DESIGN

13.1 The initial design provided is demonstrated by the production of a Scale Print drawing in PDF format. The drawing shows horizontal illuminance with values ranging from 2 Lux down to 0.1 Lux. This is to demonstrate the light falling at the site boundary at ground level.

13.2 A Vertical Calculation report has also been produced to show the lux levels (Eav) on the vertical plane.

- Pages 3 and 14 give an overview of the site with column positions.
- Pages 4, 6, 8, 10, 12, 15, 17, 19 and 21 show the positions of the calculations grids behind each column to indicate where the lux readings are taken from.
- These calculation grids are placed behind each column and show the vertical lux levels recorded from a height of four meters which is two meters below each lantern.
- The results shown on pages 5, 7, 9, 11, 13, 16, 18, 20 and 22 demonstrate that the lux levels (Eav) are below 0.40 lux as instructed by the ecologist from Place Services.

13.3 The Axia lantern proposed for use on this site has an internal rear louvre to control rear spill. Any lantern in the design shown as backing on to a dark corridor, boundary or sensitive area can be fitted with an external black painted shield if required, to further reduce spill light.

13.4 All luminaires across the site have been proposed using a 3000 Kelvin Correlated colour temperature (CCT) to minimise impact of the artificial lighting on ecologically sensitive areas.

13.5 3000K lanterns meets the requirements as set out in the Institution of Lighting Engineers Guidance Note Bats and artificial lighting in the UK and meets the requirements of the Bat Conservation Trust.

13.6 The use of 3000K lanterns will need to be agreed with Essex County Council before any works commence.

13.7 The client has indicated that there is no existing underground or overhead HV lines present or MP/IP/HP Gas Services. Current statutory service record plans should be obtained by the contractor/overseeing organisation before commencement of any street lighting installation or removal works.

14.0 CONCLUSION AND SUMMARY

14.1 In conclusion, subject to the implementation of the above proposals and agreements with the adopting Highway Authority, a compliant lighting scheme can be designed and installed with an acceptably low impact on the surrounding residential properties, sensitive boundaries, and wildlife. The likely cumulative effect of artificial lighting may be a slight increase in sky glow. However, given the baseline situation in the surrounding area to the development overall effects are not likely to be visual.

14.2 During the construction phase, the lighting impacts are likely to be associated with the requirements for temporary lighting to illuminate the contractor's compound and work areas. Installed lighting will involve the use of well located, modern light fittings which are directionally controlled and will be in accordance with current best practice standards and the developers' requirements. Overall, where an effect arises the effect on sensitive receptors during the construction phase will be short term and temporary in nature and considered to be of minor negative significance. However, as lighting would be temporary and mobile, units can and should be relocated if recognised as having a negative impact on sensitive receptors.

14.3 During the operational phase, the likely impacts include the introduction of artificial light sources as part of the proposed development, which will result in changes to the current baseline conditions. The proposed lighting scheme will comply with all relevant British Standards and the Institution of Lighting Professionals lighting guidelines and will serve to ensure that the safety and security of all areas of the development can be effectively maintained.

14.4 Potential effects would be managed such that the potential increase in the general ambience of the area would be balanced against the overall existing illuminance in order to minimise sky glow.

14.5 The effects on sensitive receptors will be mitigated through following all the principles set out in this document and by the implementation of a stringent final detail lighting design.

14.6 Suitable detailed designs should meet all standard criteria as set out in the current local authority standard specification documents, current guidance documents from all appropriate and relevant institutes and all relevant British Standards that are appropriate to lighting.

14.7 All final detailed designs should be subject to a design check by the adopting local authority. Once detailed designs are checked and agreed then technical approval will be provided by the local authority. No lighting should be installed on site unless technical approval has been granted by the local authority.

14.8 This report has been prepared to the best of our knowledge, any lighting designs proposed shall be carried out by a competent lighting person in accordance with the Institution of Lighting Professionals guidance and recommendations.

Prepared By: -

[redacted] Simon Winch 5th December 2023

.. (Signed) …….. (Print Name) ……..…… (Date)

Reviewed By: -

[redacted] Mark Chandler 5th December 2023

(Signed) …….. (Print Name) ……..…… (Date)

APPENDIX A LIGHTING TERMINOLOGY

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 [redacted]

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

Schréder
Experts in lightability™

ROAD

AXIA 3

PRO FLEX™

Engineered for performance, designed for the customer experience

With customer feedback playing a critical part in our innovative design process, we developed AXIA 3. More than a luminaire, it is a platform delivering sustainability, cost-effectiveness and customer experience all while supporting smart city frameworks. Based on experience from the hundreds of thousands AXIA luminaires installed worldwide, this third generation luminaire pushes the boundaries with photometric innovation, ease and speed of installation and FutureProof connectivity.

Available in three sizes, AXIA 3 enables towns and cities to maximise efficiency when lighting numerous environments, from bike paths, squares and car parks to residential streets, carriageways, urban roads and large boulevards. This lightweight and compact luminaire combines quality of light with a minimal carbon footprint. It excels in easy installation and carefree maintenance, reducing operating costs.

IP 66

IK 10

URBAN & RESIDENTIAL STREETS

BIKE & PEDESTRIAN PATHS

RAILWAY STATIONS & METROS

CAR PARKS

LARGE AREAS

SQUARES & PEDESTRIAN AREAS

ROADS & MOTORWAYS

Concept

AXIA 3 is a robust yet compact luminaire, designed with a focus on miniaturisation and superior efficiency. Composed of high-pressure die-cast aluminium, as well as composite materials, AXIA 3 is available in three sizes. Thanks to its reduced weight, this road luminaire is easy to handle during installation. The AXIA 3.1, which can be fitted with up to 16 LEDs, is perfectly suited to low-height applications, whereas AXIA 3.2 and 3.3, with up to 32 or 64 LEDs, are ideal for lighting urban and large roads, carriageways and avenues. The AXIA 3 range is equipped with ProFlex™ photometric engines, providing the highest efficiency thanks to their ability to maximise the lumen output and to provide very extensive light distributions.

AXIA 3 comes pre-cabled, hence there is no need to open the luminaire. The complete range is available with an integrated universal fixation part adapted for post-top and side-entry mounting on various spigots (Ø32mm with adapter, Ø42-48mm, Ø60mm and Ø76mm). The inclination angle can be adjusted on-site for both post-top (-5°/+15°) and side-entry (-10°/+10°) configurations to optimise lighting, reduce power consumption and control light pollution.

This highly efficient, cost-effective and connected-ready luminaire, offers towns and cities the ideal solution to improve lighting levels, increase safety, generate energy savings and reduce their ecological footprint. AXIA 3 is the ideal tool to provide another 25 years of efficiency, sustainability and safety.

The ProFlex™ photometric engine provides the highest efficiency.

The AXIA 3 range has a universal fixation part for spigots ranging from Ø32 to Ø76mm.

TYPES OF APPLICATION

- URBAN & RESIDENTIAL STREETS
- BIKE & PEDESTRIAN PATHS
- RAILWAY STATIONS & METROS
- CAR PARKS
- LARGE AREAS
- SQUARES & PEDESTRIAN AREAS
- ROADS & MOTORWAYS

KEY ADVANTAGES

- Maximised savings in energy and maintenance costs
- ProFlex™ photometric engines offering high efficiency lighting, comfort and safety
- 3 sizes to provide the most accurate solutions for numerous road and urban applications
- Easy installation: pre-cabled and equipped with universal fixation part adapted for side-entry and post-top mounting
- Adjustable inclination for optimised photometry and uniformity
- Connected-ready

The inclination is adjustable on-site for optimised photometry and further energy savings.

AXIA 3 is connected-ready and can operate with various sensors and control systems.

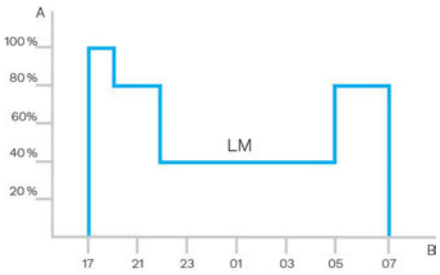
ProFlex™

The ProFlex™ photometric engine integrates the lenses into a polycarbonate protector. This integration increases the output and reduces the reflection inside the optical unit. The polycarbonate used for the ProFlex™ photometric engine offers essential characteristics such as high optical clarity for a superior light transmission, better impact resistance compared to glass and a long life span with UV-stabilisation treatment. The ProFlex™ concept enables a compact design with a thin optical compartment. It provides extensive light distributions so that the spacing between the luminaires can be increased.

Custom dimming profile

Intelligent luminaire drivers can be programmed with complex dimming profiles. Up to five combinations of time intervals and light levels are possible. This feature does not require any extra wiring.

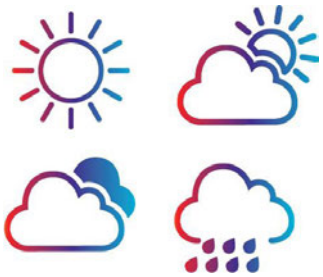
The period between switching on and switching off is used to activate the preset dimming profile. The customised dimming system generates maximum energy savings while respecting the required lighting levels and uniformity throughout the night.



A. Dimming level | B. Time

Daylight sensor / photocell

Photocell or daylight sensors switch the luminaire on as soon natural light falls to a certain level. It can be programmed to switch on during a storm, on a cloudy day (in critical areas) or only at nightfall so as to provide safety and comfort in public spaces.



PIR sensor: motion detection

In places with little nocturnal activity, lighting can be dimmed to a minimum most of the time. By using passive infrared (PIR) sensors, the level of light can be raised as soon as a pedestrian or a slow vehicle is detected in the area.

Each luminaire level can be configured individually with several parametres such as minimum and maximum light output, delay period and ON/OFF duration time. PIR sensors can be used in an autonomous or interoperable network.

Schréder EXEDRA is the most advanced lighting management system on the market for controlling, monitoring and analysing streetlights in a user-friendly way.

Standardisation for interoperable ecosystems

Schréder plays a key role in driving standardisation with alliances and partners such as uCIFI, TALQ or Zhaga. Our joint commitment is to provide solutions designed for vertical and horizontal IoT integration. From the body (hardware) to the language (data model) and the intelligence (algorithms), the complete Schréder EXEDRA system relies on shared and open technologies. Schréder EXEDRA also relies on Microsoft™ Azure for cloud services, provided with the highest levels of trust, transparency, standards conformance and regulatory compliance.

Breaking the silos

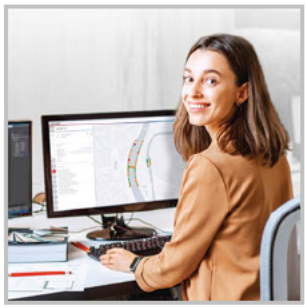
With EXEDRA, Schréder has taken a technology-agnostic approach: we rely on open standards and protocols to design an architecture able to interact seamlessly with third-party software and hardware solutions. Schréder EXEDRA is designed to unlock complete interoperability, as it offers the ability to:

- control devices (luminaires) from other brands
- manage controllers and to integrate sensors from other brands
- connect with third-party devices and platforms

A plug-and-play solution

As a gateway-less system using the cellular network, an intelligent automated commissioning process recognises, verifies and retrieves luminaire data into the user interface. The self-healing mesh between luminaire controllers enables real-time adaptive lighting to be configured directly via the user interface. OWLET IV luminaire controllers, optimised for Schréder EXEDRA, operate Schréder's luminaires and luminaires from third parties. They use both cellular and mesh radio networks, optimising geographical coverage and redundancy for continuous operation.

Tailored experience



Schréder EXEDRA includes all advanced features needed for smart device management, real-time and scheduled control, dynamic and automated lighting scenarios, maintenance and field operation planning, energy consumption management and third-party connected hardware integration. It is fully configurable and includes tools for user management and multi-tenant policy that enables contractors, utilities or big cities to segregate projects.

A powerful tool for efficiency, rationalisation and decision making

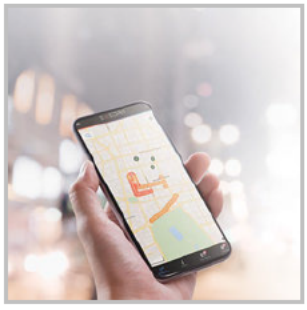
Data is gold. Schréder EXEDRA brings it with all the clarity managers need to drive decisions. The platform collects massive amounts of data from end devices and, aggregates, analyses and intuitively displays them to help end-users take the right actions.

Protected on every side

ISO 27001
BUREAU VERITAS
Certification

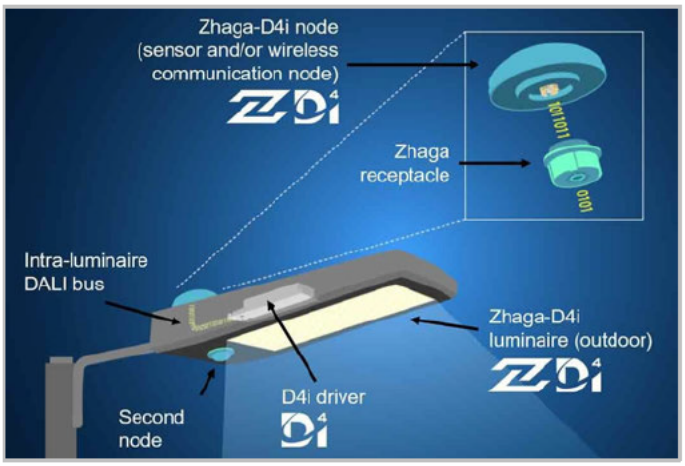
Schréder EXEDRA provides state-of-the-art data security with encryption, hashing, tokenisation, and key management practices that protect data across the whole system and its associated services. The whole platform is ISO 27001 certified. It demonstrates that Schréder EXEDRA meets the requirements for establishing, implementing, maintaining and continually improving security management.

Mobile App: any time, any place, connect to your street lighting



The Schréder EXEDRA mobile application offers the essential functionalities of the desktop platform, to accompany all types of operator on site in their daily effort to maximise the potential of connected lighting. It enables real-time control and settings, and contributes to effective maintenance.

The Zhaga consortium joined forces with the DiiA and produced a single Zhaga-D4i certification that combines the Zhaga Book 18 version 2 outdoor connectivity specifications with the DiiA's D4i specifications for intra-luminaire DALI.



Standardisation for interoperable ecosystems

Member of Zhaga

As a founding member of the Zhaga consortium, Schréder has participated in the creation of, and therefore supports, the Zhaga-D4i certification program and the initiative of this group to standardise an interoperable ecosystem. The D4i specifications take the best of the standard DALI2 protocol and adapt it to an intra-luminaire environment but it has certain limitations. Only luminaire mounted control devices can be combined with a Zhaga-D4i luminaire. According to the specification, control devices are limited respectively to 2W and 1W average power consumption.

Certification program

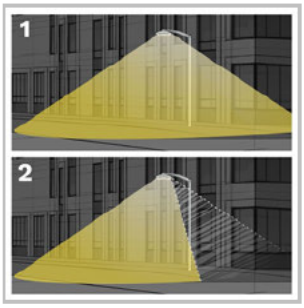
The Zhaga-D4i certification covers all the critical features including mechanical fit, digital communication, data reporting and power requirements within a single luminaire, ensuring plug-and-play interoperability of luminaires (drivers) and peripherals such as connectivity nodes.

Cost-effective solution

A Zhaga-D4i certified luminaire includes drivers offering features that had previously been in the control node, like energy metering, which has in turn simplified the control device therefore reducing the price of the control system.

With the PureNight concept, Schréder offers the ultimate solution for restoring the night sky without switching off cities, while maintaining safety and well-being for people and preserving wildlife. The PureNight concept guarantees that your Schréder lighting solution satisfies environmental laws and requirements. Well-designed LED lighting has the potential to improve the environment in all respects.

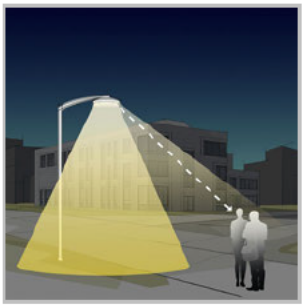
Direct the light only where it is wanted and needed



Schréder is renowned for its expertise in photometry. Our optics direct light only where it is wanted and needed. However, light trespass behind the luminaire might be a key concern when it comes to protecting a sensitive wildlife habitat or avoiding intrusive lighting towards buildings. Our fully integrated backlight solutions easily address this potential risk.

1. Without backlight
2. With backlight

Offer maximum visual comfort to people



Because of the lower installation height compared to road lighting, visual comfort is an essential aspect of urban lighting. Schréder designs lenses and accessories to minimise any type of glare (distracting, discomforting, disabling glare and blinding glare). Our design offices harness a range of possibilities to find the best solutions for each project and ensure that we provide a gentle light that delivers the best night-time experience.

Protect wildlife

If not well designed, artificial lighting can badly affect wildlife. Blue light and excessive intensity can have a damaging effect on all types of life. Blue light radiation has the ability to suppress the production of melatonin, the hormone that contributes to the regulation of the circadian rhythm. It can also alter the behavioural patterns of animals including bats and moths, as it can change their movements towards or away from light sources. Schréder favours warm white LEDs with minimal blue light, combined with advanced control systems including sensors. This enables permanent adaptation of the lighting to the real needs of the moment, minimising disturbance to the fauna and flora.

Choose a Dark Sky certified luminaire

The International Dark-Sky Association (IDA) is the recognised authority on light pollution. It provides leadership, tools and resources to industries and companies willing to reduce light pollution. The IDA's Fixture Seal of Approval programme certifies outdoor lighting fixtures as being Dark Sky Friendly. All products approved by this programme must comply with the following criteria:

"- The light sources shall have a maximum correlated colour temperature of 3000K;

- Uplight allowance limited to 0.5% of total output, or 50 lumens, with no more than

10 lumens in the 90-100 degree UL zone;

- The luminaires must have a dimming capability to 10% of full rating;

- The luminaires must be equipped with a fixed mounting option;

- The luminaires must have Safety Certification by an independent laboratory."

This approved Schréder range of luminaires complies with these requirements.

GENERAL INFORMATION

Recommended installation height	4m to 12m | 13' to 39'
Driver included	Yes
CE mark	Yes
ENEC certified	Yes
ENEC+ certified	Yes
ROHS compliant	Yes
Dark Sky friendly lighting (IDA certification)	Yes
Zhaga-D4i certified	Yes
Testing standard	LM 79-08 (all measurements in ISO17025 accredited laboratory)

HOUSING AND FINISH

Housing	Aluminium Composite materials
Optic	Polycarbonate
Protector	Polycarbonate (with integrated lenses)
Housing finish	Polyester powder coating
Standard colour(s)	RAL 7040 window grey RAL 9005 Jet black
Tightness level	IP 66
Impact resistance	IK 10
Vibration test	Compliant with modified IEC 68-2-6 (0.5G)

OPERATING CONDITIONS

Operating temperature range (Ta)	-30°C up to +45°C / -22°F up to 113°F

· Depending on the luminaire configuration. For more details, please contact us.

ELECTRICAL INFORMATION

Electrical class	Class I EU, Class II EU
Nominal voltage	220-240V – 50-60Hz
Power factor (at full load)	0.9
Surge protection options (kV)	10
Electromagnetic compatibility (EMC)	EN 55015 / EN 61000-3-2 / EN 61000-4-5 / EN 61547
Control protocol(s)	1-10V, DALI
Control options	Bi-power, Custom dimming profile, Photocell, Remote management
Socket	Zhaga (optional) NEMA 3-pin (optional) NEMA 6-pin (optional) NEMA 7-pin (optional)
Associated control system(s)	Schréder EXEDRA
Sensor	PIR (optional)

OPTICAL INFORMATION

LED colour temperature	2700K (WW 727) 3000K (WW 730) 4000K (NW 740)
Colour rendering index (CRI)	>70 (WW 727) >70 (WW 730) >70 (NW 740)
ULOR	0%
ULR	0%

· Meets IDA Dark Sky requirements when fitted with LEDs of 3000K or less.

· ULOR may be different according to the configuration. Please consult us.

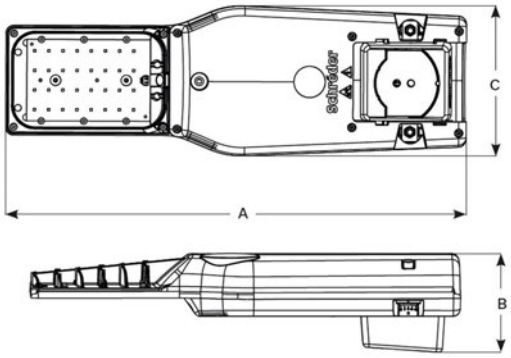
· ULR may be different according to the configuration. Please consult us.

LIFETIME OF THE LEDS @ TQ 25°C

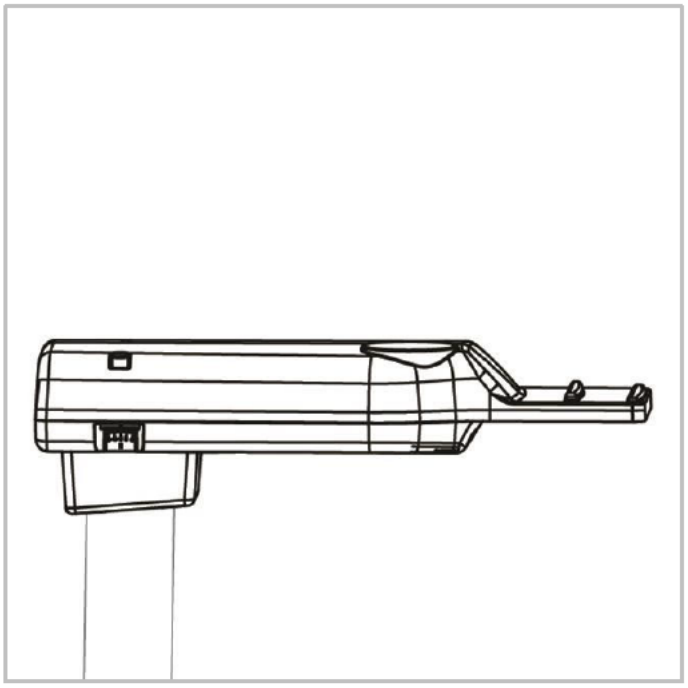
All configurations	100,000h - L90

DIMENSIONS AND MOUNTING

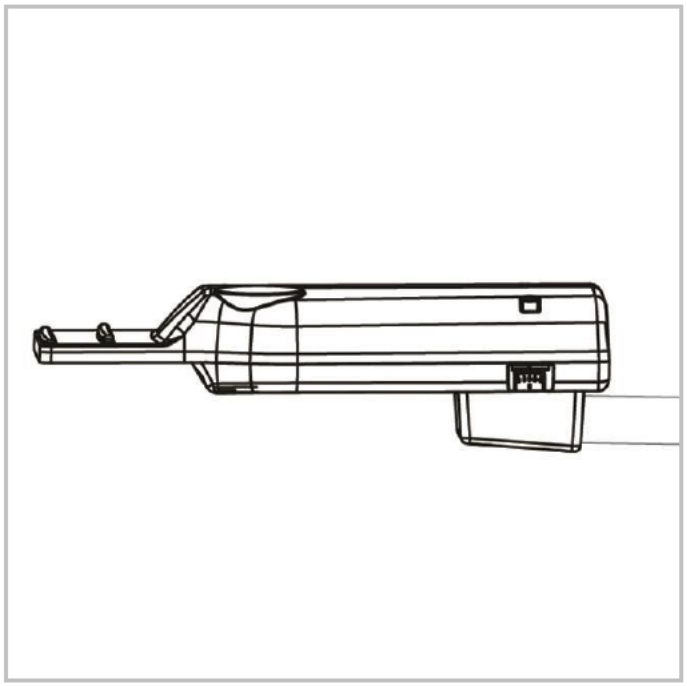
AxBxC (mm | inch)	AXIA 3.1 : 513x130x191 | 20.2x5.1x7.5 AXIA 3.2 : 585x130x191 | 23.0x5.1x7.5 AXIA 3.3 : 550x130x277 | 21.7x5.1x10.9
Weight (kg | lbs)	AXIA 3.1 : 3.6 | 7.9 AXIA 3.2 : 4.8 | 10.6 AXIA 3.3 : 6.0 | 13.2
Aerodynamic resistance (CxS)	AXIA 3.1 : 0.03 AXIA 3.2 : 0.03 AXIA 3.3 : 0.04
Mounting possibilities	Side-entry slip-over – Ø32mm Side-entry slip-over – Ø42mm Side-entry slip-over – Ø48mm Side-entry slip-over – Ø60mm Post-top slip-over – Ø60mm Post-top slip-over – Ø76mm



AXIA 3 | Post-top - Slip-over mounting for Ø60 or Ø76mm spigot - 2xM10 screws



AXIA 3 | Side-entry - Slip-over mounting for Ø32 (with accessory) or Ø42-60mm spigot - 2xM10 screws



AXIA 3.1

Photometry

PRO FLEX™

	Luminaire output flux (lm)						Power consumption (W)		Luminaire efficacy (lm/W)
	Warm White 727		Warm White 730		Neutral White 740				
Number of LEDs	Min	Max	Min	Max	Min	Max	Min	Max	Up to
8	600	2500	700	2600	800	3000	8	23	147
16	900	5100	900	5400	1100	6100	11	44	153

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %

AXIA 3.2

Photometry

PRO FLEX™

	Luminaire output flux (lm)						Power consumption (W)		Luminaire efficacy (lm/W)
	Warm White 727		Warm White 730		Neutral White 740				
Number of LEDs	Min	Max	Min	Max	Min	Max	Min	Max	Up to
24	2000	8400	2100	8800	2400	9900	15	76	165
32	2700	9500	2800	9900	3200	11300	20	78	170

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %

AXIA 3.3

Photometry

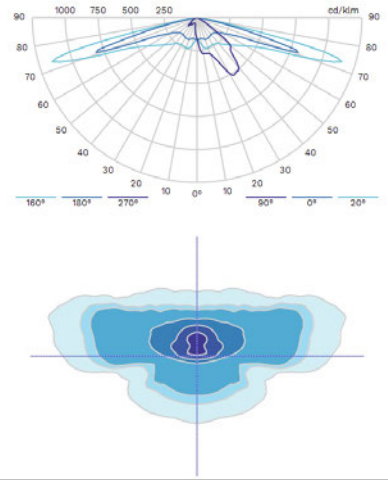
PRO FLEX™

	Luminaire output flux (lm)						Power consumption (W)		Luminaire efficacy (lm/W)
	Warm White 727		Warm White 730		Neutral White 740				
Number of LEDs	Min	Max	Min	Max	Min	Max	Min	Max	Up to
48	4000	14800	4200	15600	4800	17700	29	129	175
64	5300	19800	5600	20800	6400	23600	38	170	177

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %

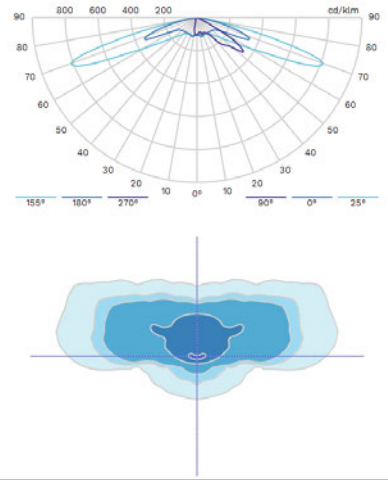
PRO FLEX™

5266



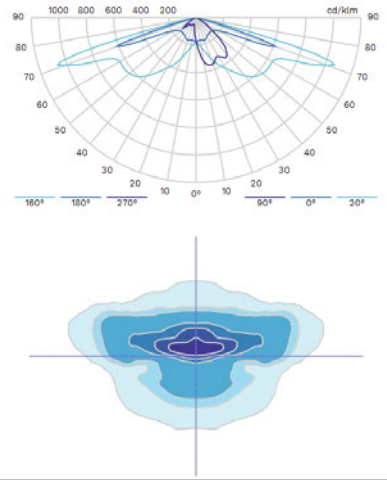
PRO FLEX™

5267 Rear louvers



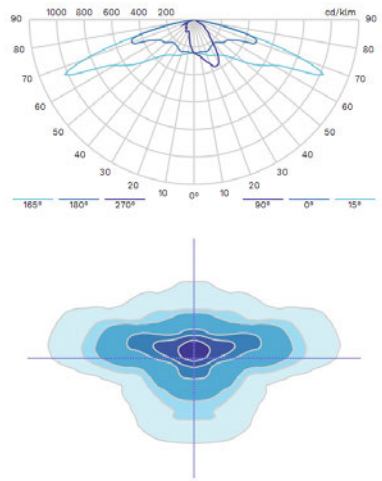
PRO FLEX™

5270



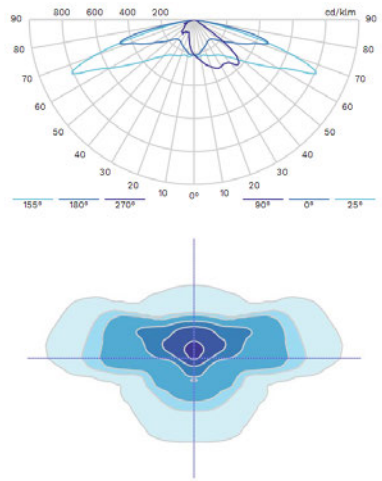
PRO FLEX™

5273



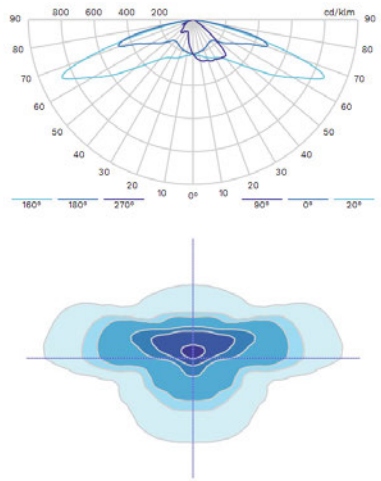
PRO FLEX™

5279



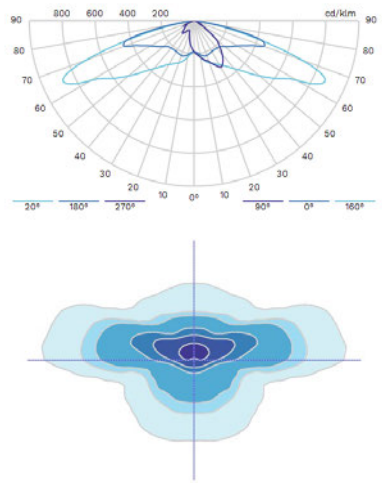
PRO FLEX™

5280



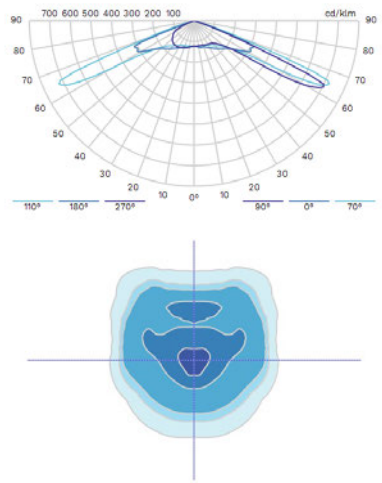
PRO FLEX™

5281



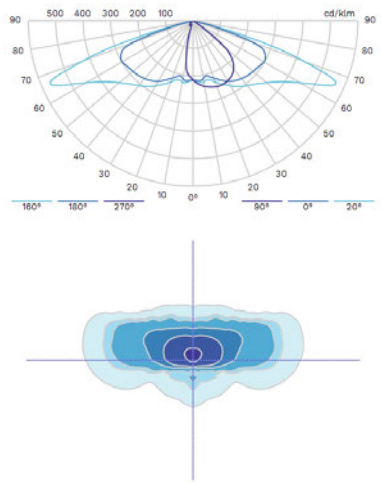
PRO FLEX™

5293

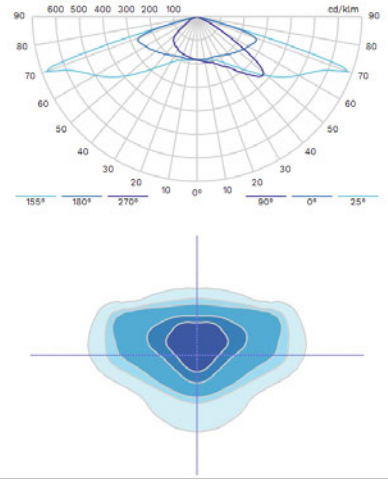


PRO FLEX™

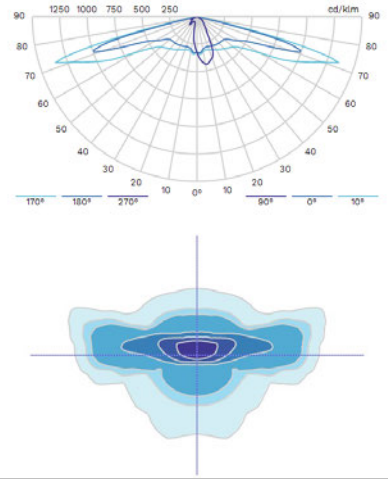
5294 Rear louvers



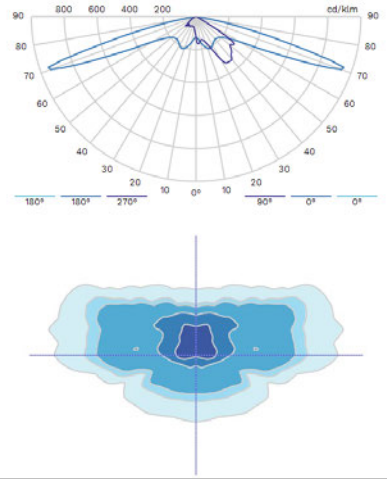
PRO FLEX™ 5295



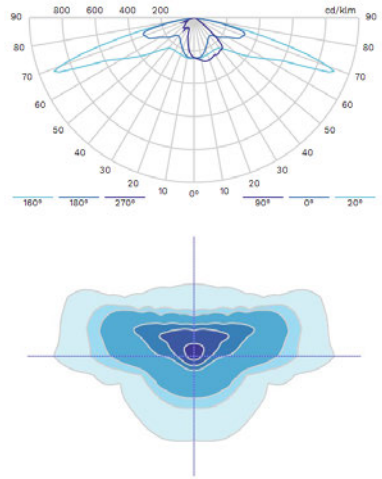
PRO FLEX™ 5296



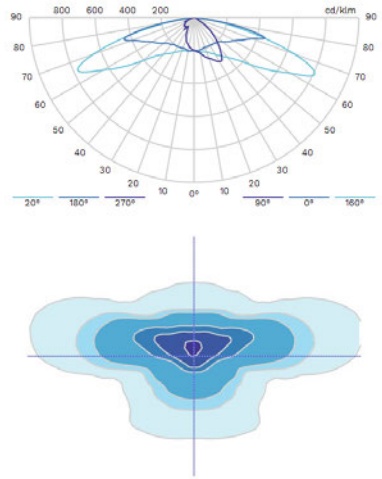
PRO FLEX™ 5316



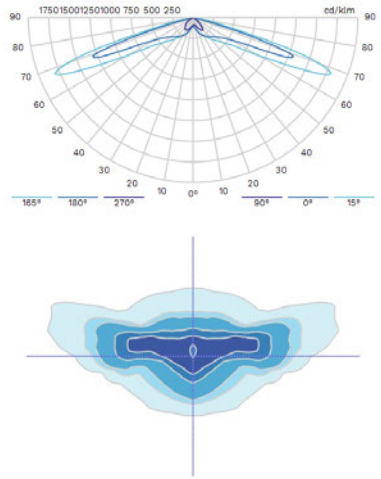
PRO FLEX™ 5321



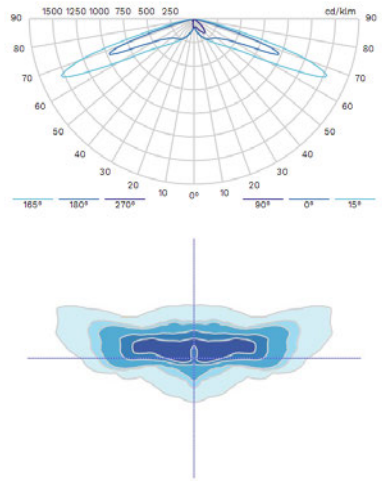
5364



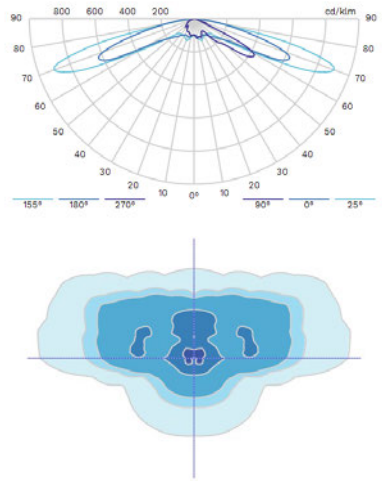
PRO FLEX™ 5383



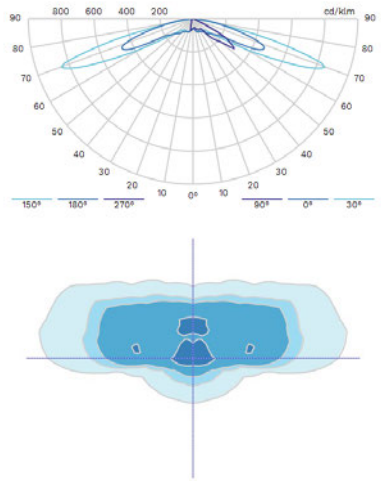
PRO FLEX™ 5383 BL



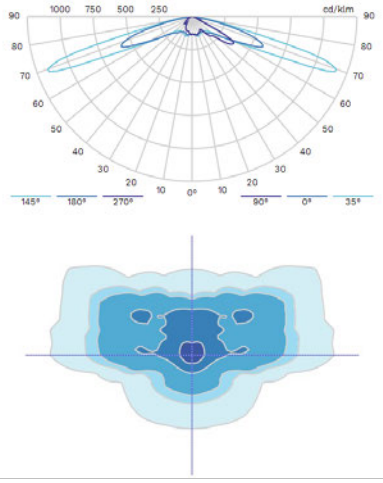
PRO FLEX™ 5384



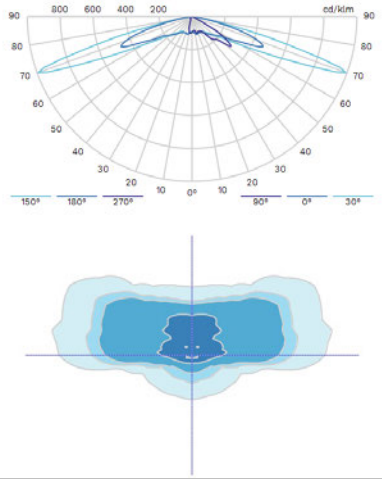
PRO FLEX™ 5384 BL



5385



5385 BL



NOTES

General Notes:

1. This drawing is to be read in conjunction with all other drawings.

2. Any discrepancies found between information shown on this or any other drawing should be reported to Weston Homes Engineer before works commencing.

Services Notes:

S1. Existing services are taken from statutory authority record drawings and are indicative only.

S2. All private electrical works to comp y w th current IEE regulations

S3. All excavation in public highway by UKPN.

S4. All on-site excavation, trenching and reinstatement by WH contractor

S5. All on-site ducts provided and laid by WH contractor

S6. All on-site cabling by UKPN.

S7. Trenches to be backfilled with suitable excavated material

S8. LV mains cables to be in open trench unless shown otherwise. Depth of cover to be 450mm in footways and 600mm in carriageways.

S9. Cables at road cross ng to be ducted in 125mm (I.D.) Rigiducts. Duct to comply with EN 12-24 and be marked Electricity'

S11. UKPN contact: XXXXX
Tel: XXXXX
Ref: XXXXX

LEGEND

- PROPOSED LOW VOLTAGE CABLE IN 50mm DUCT
- PROPOSED SERVICE CABLE FROM LOW VOLTAGE CABLE TO LIGHTING BOLLARD BY WH CONTRACTOR
- LAMP COLUMN TO BE TYPE KIRIUM PRO MINI 4 LED 3W LANTERN WITH DIAMOND OPTIC B4 BY D W WINDSOR (OR SIMILAR) ON 4m COLUMN
- FEEDER PILLAR

	Luminaire A
Supplier	Urbis Schreder
Type	AXIA 3.1 5294 Integrated lenses Rear louvers 8 OSLON SQUARE ,
Lamp(s)	8 OSLON SQUARE GIANT@400 mA WW 730 230V 01-37-041
Lamp Flux (klm)	1.53
Maintenance Factor	1.00
No. in Project	9

MMA LIGHTING CONSULTANCY
Exterior Lighting Design Specialists

PROJECT NAME:
Jacks Lane, Takeley Footpath

PROJECT No:
MMA18229

SCALE: **1:500**

DATE: **4 December 2023**

CALCULATION:
Horizontal Illuminance (lux)

DESIGNER:
MMA Lighting Consultancy Ltd

Jacks Lane, Takeley Footpath S38 - Scale Print - R3

6m Essex County Council specification columns with post top Urbis Axia 3.1 3000K Luminaires with built in rear louvres.

Lighting Class: P5 from BS5489-1:2020 (E2 Zone)
Eav: 3.00 - 4.50 Lux
Emin: 0.60

Base drawing number used in this calculation "15.21-104 to 105 Off-Site Footpath Electrical Layout - bound (1)"

PREPARED BY:

MMA Lighting Consultancy Ltd
99 Old Bath Road
Summer Field House
Charvil
Reading
Berkshire
RG10 9QN
Email: info@mma-consultancy.co.uk
[redacted]

DATE: 4 December 2023

DESIGNER: MMA Lighting Consultancy Ltd

PROJECT No: MMA18229

PROJECT NAME: Jacks Lane, Takeley Footpath

Jacks Lane, Takeley Footpath S38 - Vertical Calculations - R3

6m Essex County Council specification columns with post top Urbis Axia 3.1 3000K Luminaires and built in rear louvres.

Vertical grids are placed behind the columns as shown and Lux levels are shown from a hight of 4m which is 2m below the level of the lantern.

Base drawing number used in this calculation "15.21-104 to 105 Off-Site Footpath Electrical Layout - bound (1)"

Outdoor Lighting Report

PREPARED BY:

MMA Lighting Consultancy Ltd
99 Old Bath Road
Summer Field House
Charvil
Reading
Berkshire
RG10 9QN
Email: info@mma-consultancy.co.uk
[redacted]

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Location of Columns	557102.06	221511.80	184.90	92.97	1.50	1.50
2	Location of Columns	557032.48	221547.46	78.00	109.74	1.50	1.50
3	Column 1	557244.95	221534.35	17.38	4.00	0.50	0.50
4	Column 2	557217.66	221561.31	17.38	4.00	0.50	0.50
5	Column 3	557191.55	221575.20	17.38	4.00	0.50	0.50
6	Column 4	557160.14	221579.17	17.36	4.00	0.50	0.50
7	Column 5	557127.76	221576.46	17.37	4.00	0.50	0.50
8	Column 7	557078.45	221582.85	17.37	4.00	0.50	0.50
9	Column 8	557066.91	221610.34	17.38	4.00	0.50	0.50
10	Column 9	557046.90	221638.99	17.37	4.00	0.50	0.50
11	Column 6	557100.32	221562.57	17.37	4.00	0.50	0.50

Luminaires

Luminaire A Data

Supplier	Urbis Schreder
Type	AXIA 3.1 5294 Integrated lenses Rear louvers 8 OSLON SQUARE G
Lamp(s)	8 OSLON SQUARE GIANT@400mA WW 730 230V 01-37-041
LampFlux(klm)/Colour	1.53 WW 3000K/70
File Name	AXIA 3.1 5294 8 OSLON SQUARE GIANT 400mA WW 730 11W 457582 Integrated le...
Maintenance Factor	1.00
Lum. Int. Class	G4
No. in Project	9

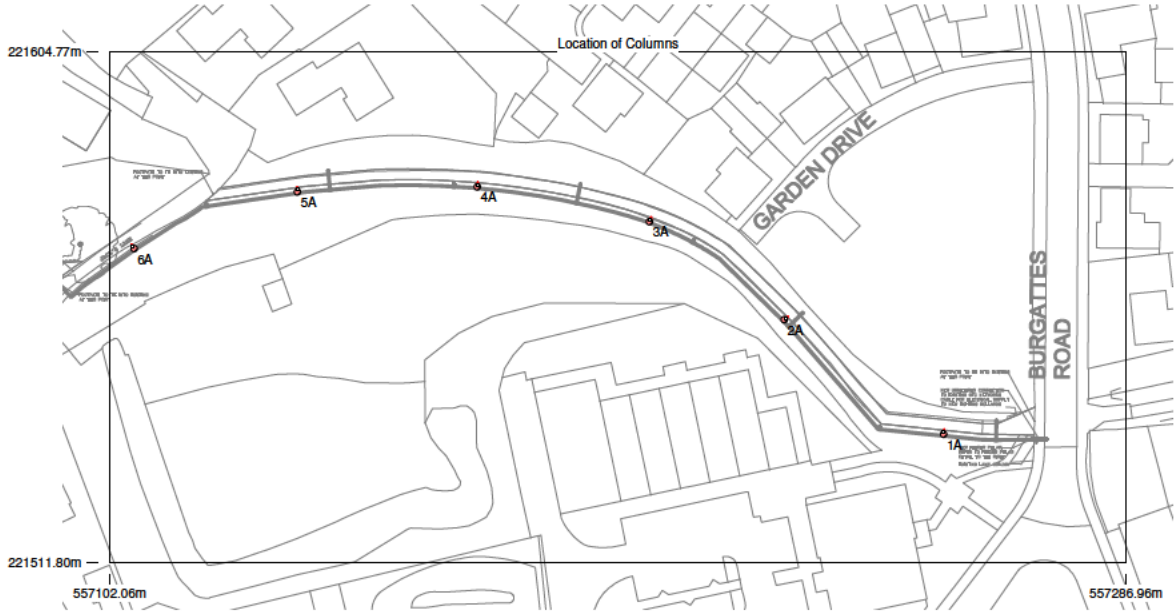
Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	557253.75	221535.19	6.00	84.00	0.00	0.00	0.40			
2	A	557224.77	221556.04	6.00	40.00	0.00	0.00	0.40			
3	A	557200.23	221573.84	6.00	70.00	0.00	0.00	0.40			
4	A	557168.92	221580.17	6.00	84.00	0.00	0.00	0.40			
5	A	557136.18	221579.28	6.00	93.00	0.00	0.00	0.40			
7	A	557082.55	221574.94	6.00	17.00	0.00	0.00	0.40			
8	A	557072.88	221603.64	6.00	36.00	0.00	0.00	0.40			
9	A	557053.09	221632.66	6.00	32.00	0.00	0.00	0.40			
6	A	557106.48	221568.96	6.00	122.00	0.00	0.00	0.40			

8514236226

Horizontal Illuminance (lux)

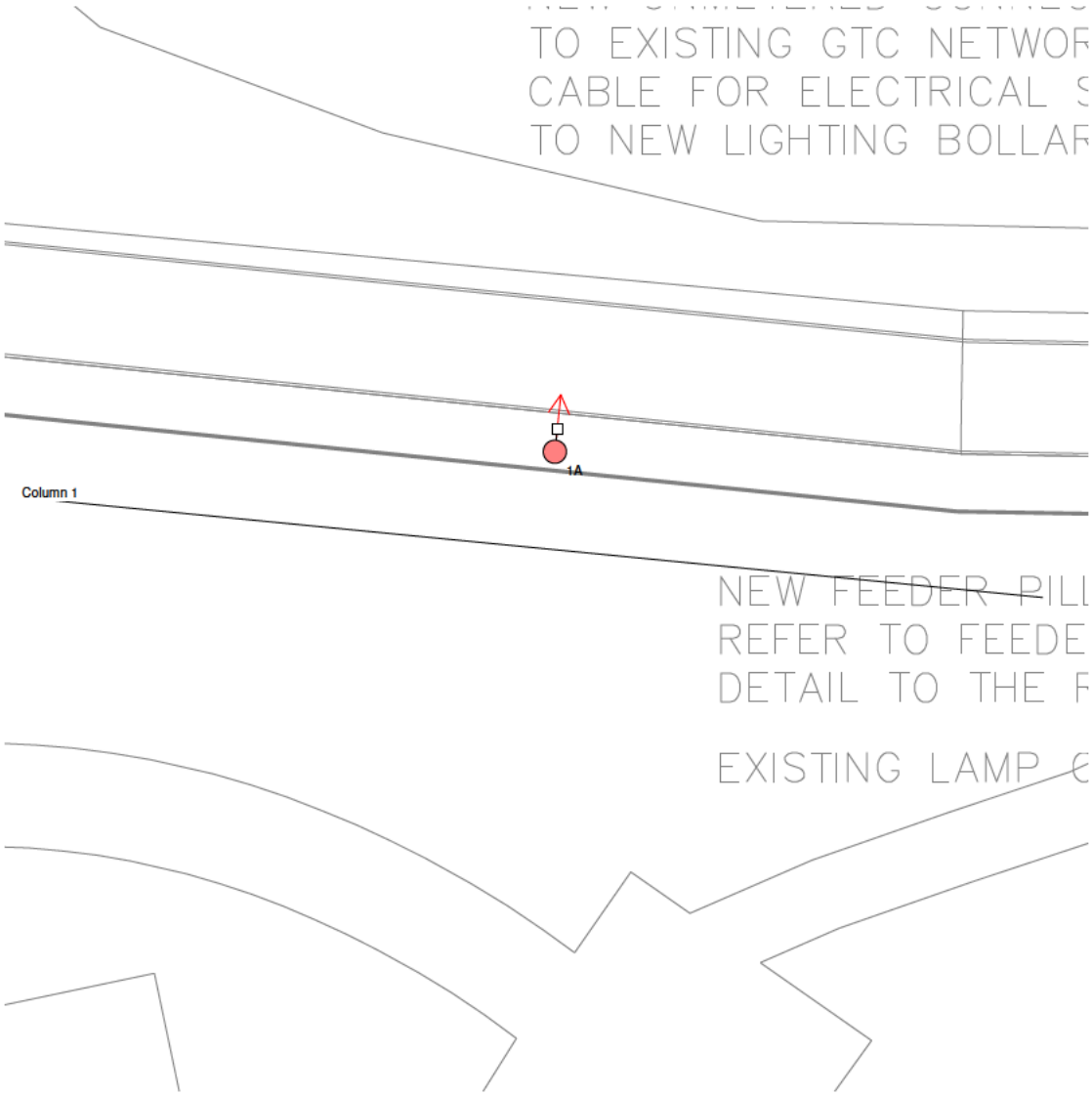
Location of Columns



Vertical Illuminance (lux)

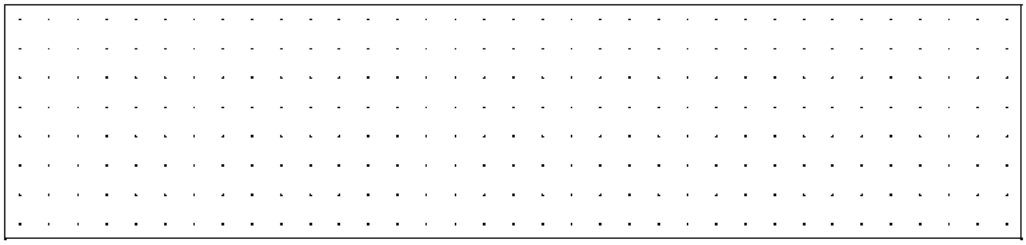
Observer direction = 0 deg. Height = 0.00

Column 1



Illuminance (lux)

Column 1



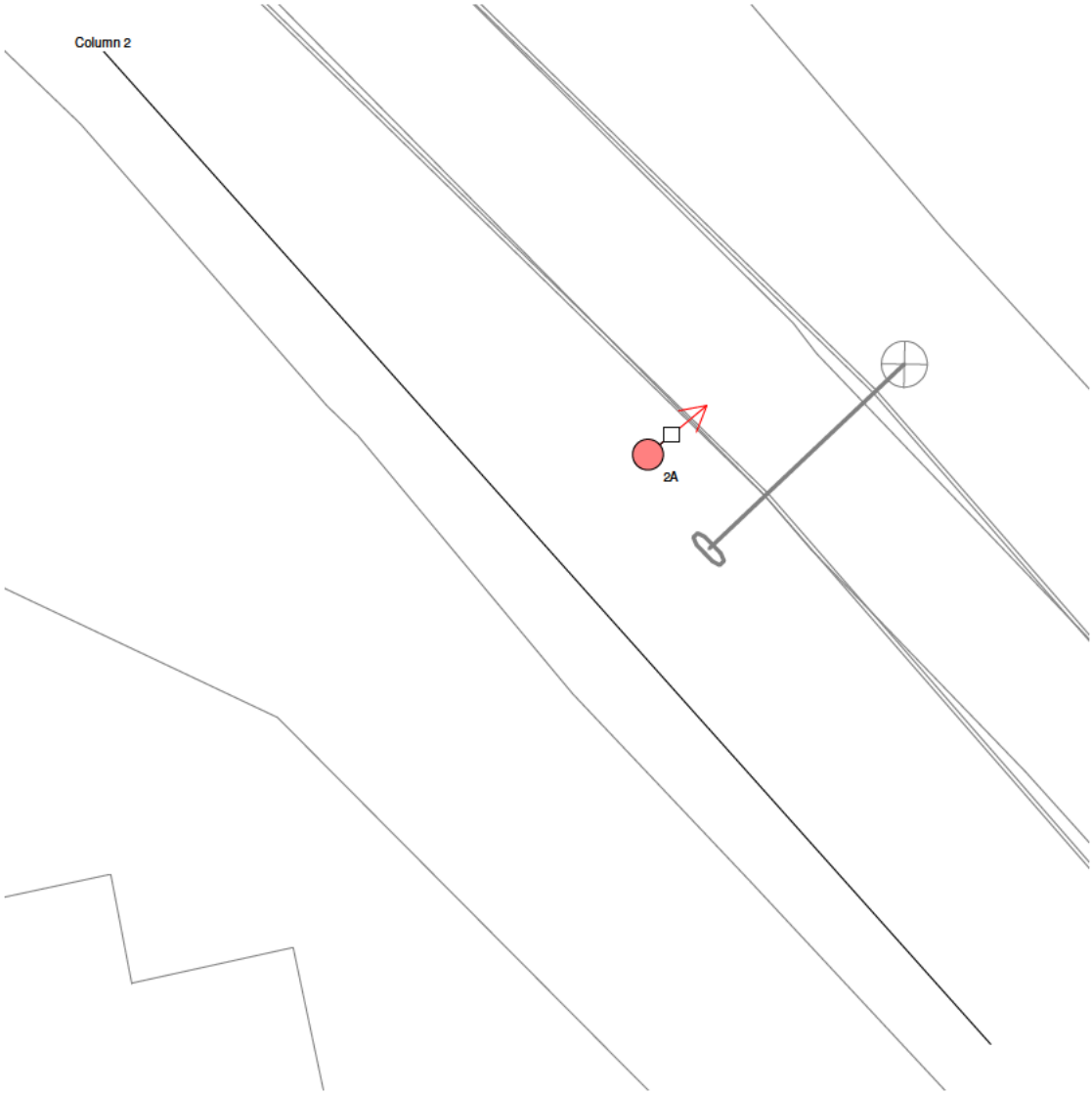
Results

Eav	0.29
Emin	0.09
Emax	1.90
Emin/Emax	0.05
Emin/Eav	0.32

Vertical Illuminance (lux)

Observer direction = 0 deg. Height = 0.00

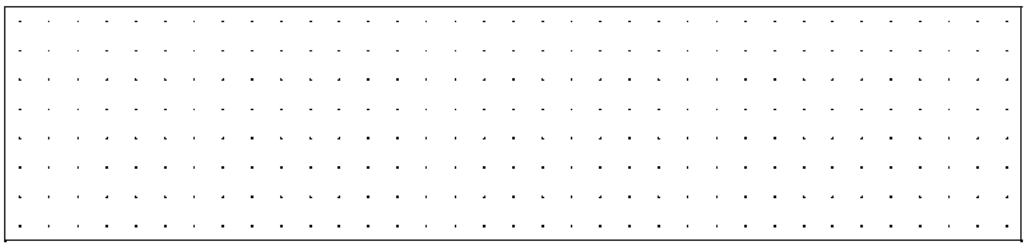
Column 2



8514236226

Illuminance (lux)

Column 2



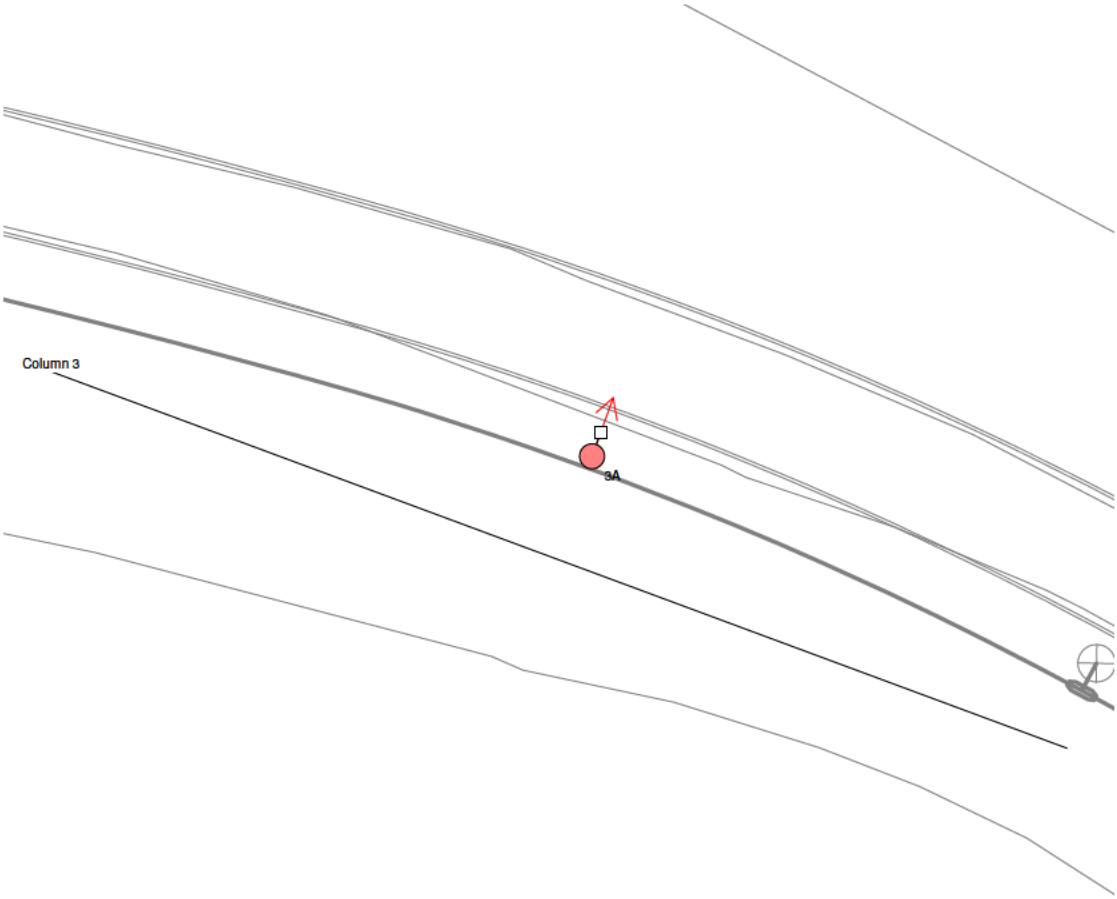
Results

Eav	0.28
Emin	0.06
Emax	1.74
Emin/Emax	0.04
Emin/Eav	0.22

Vertical Illuminance (lux)

Observer direction = 0 deg. Height = 0.00

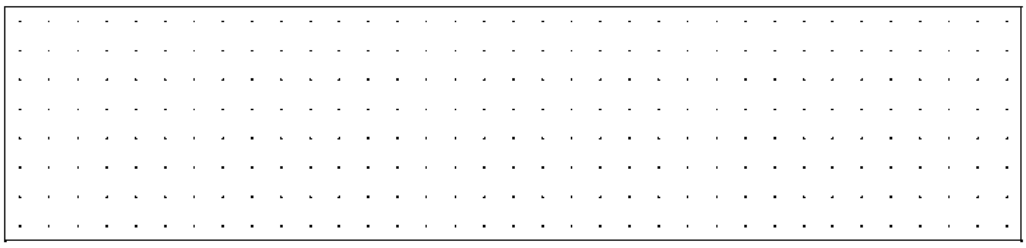
Column 3



8514236226

Illuminance (lux)

Column 3



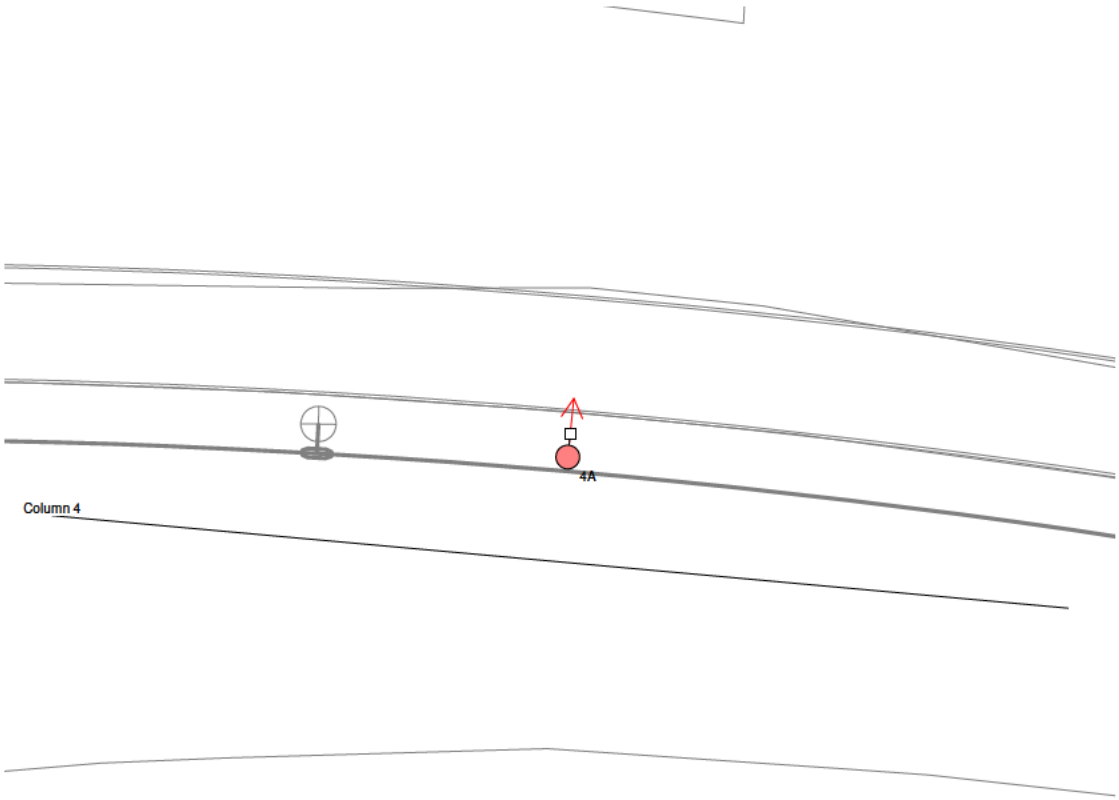
Results

Eav	0.29
Emin	0.08
Emax	1.79
Emin/Emax	0.05
Emin/Eav	0.29

Vertical Illuminance (lux)

Observer direction = 0 deg. Height = 0.00

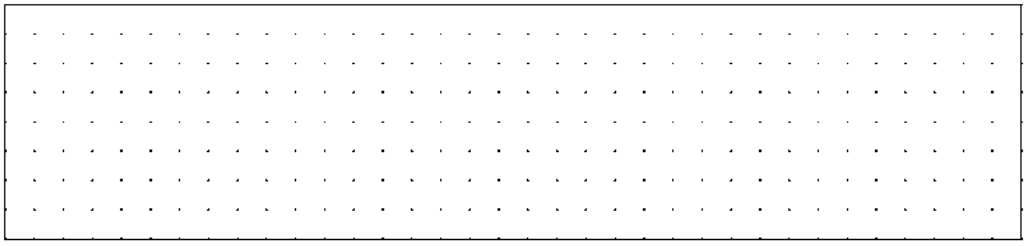
Column 4



8514236226

Illuminance (lux)

Column 4



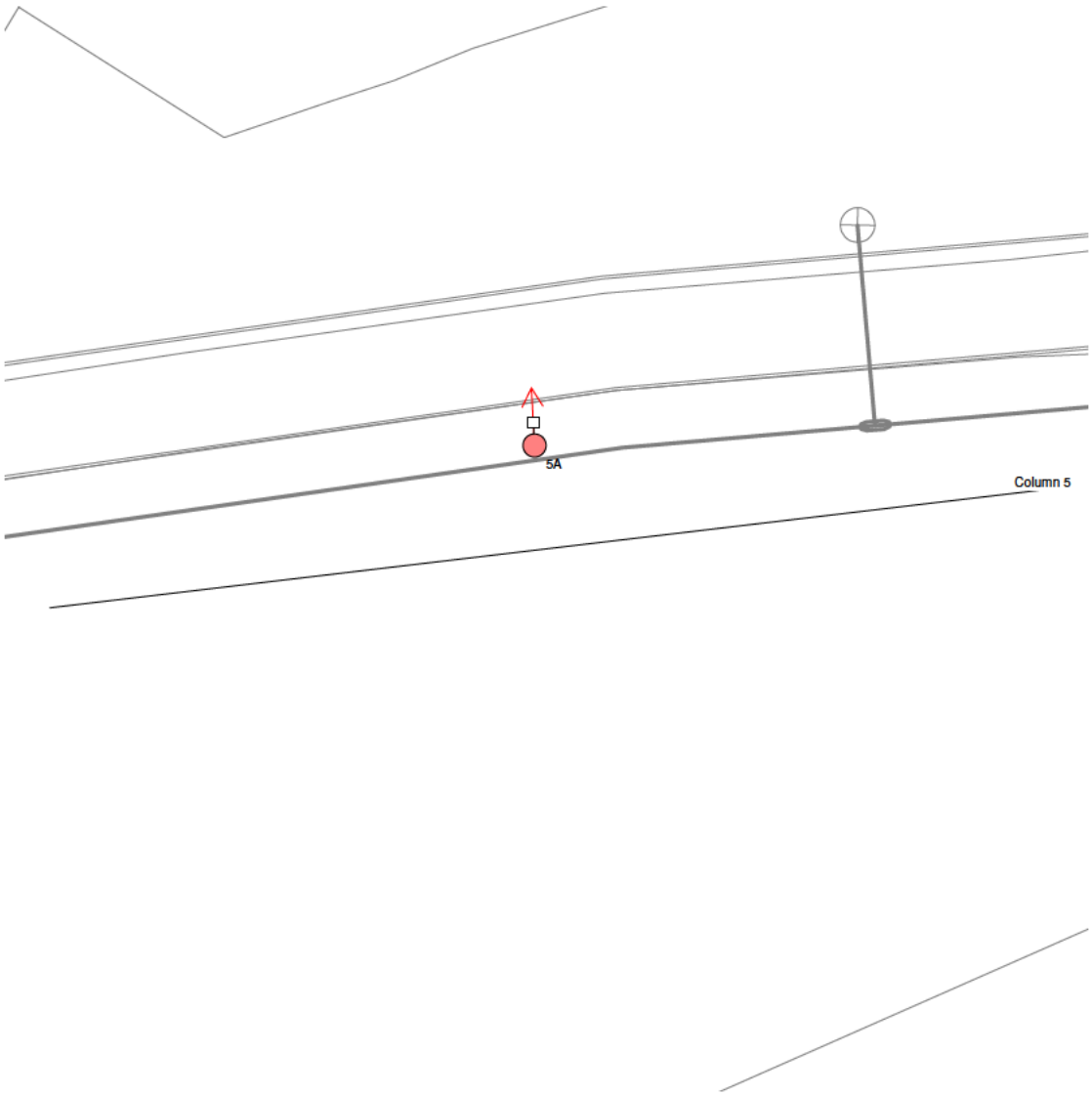
Results

Eav	0.28
Emin	0.04
Emax	1.75
Emin/Emax	0.02
Emin/Eav	0.14

Vertical Illuminance (lux)

Observer direction = 0 deg. Height = 0.00

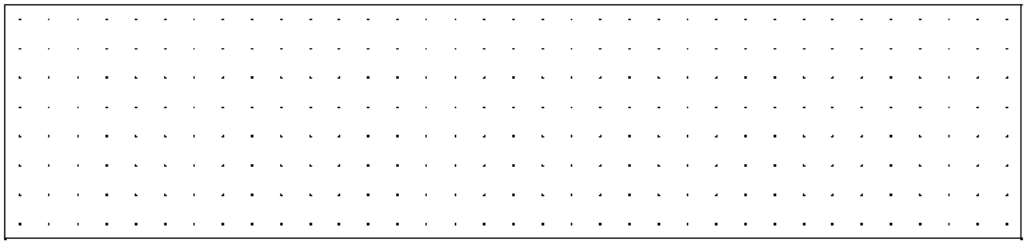
Column 5



8514236226

Illuminance (lux)

Column 5



Results

Eav	0.29
Emin	0.05
Emax	1.69
Emin/Emax	0.03
Emin/Eav	0.15

Horizontal Illuminance (lux)

Location of Columns

8514236226

Vertical Illuminance (lux)

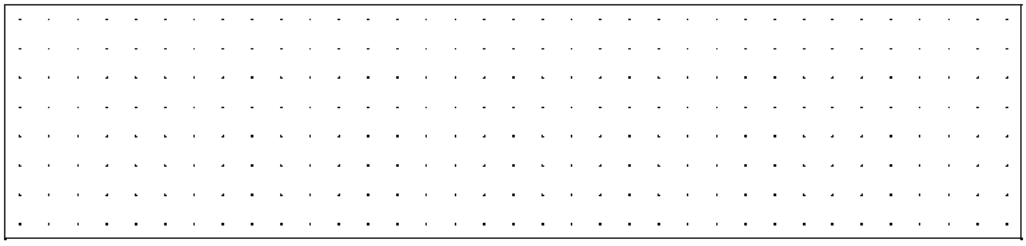
Observer direction = 0 deg. Height = 0.00

Column 7

8514236226

Illuminance (lux)

Column 7



Results

Eav	0.29
Emin	0.10
Emax	1.78
Emin/Emax	0.05
Emin/Eav	0.33

Vertical Illuminance (lux)

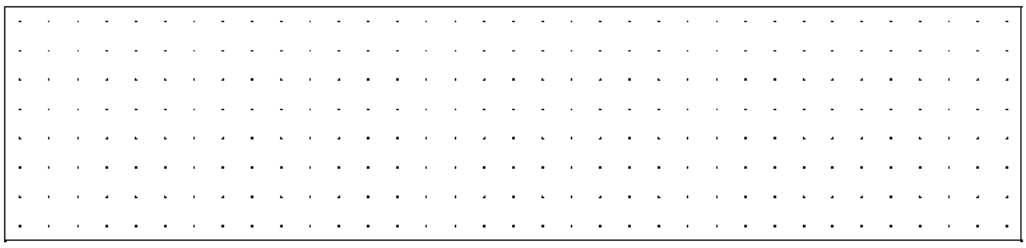
Observer direction = 0 deg. Height = 0.00

Column 8

8514236226

Illuminance (lux)

Column 8



Results

Eav	0.32
Emin	0.04
Emax	1.51
Emin/Emax	0.02
Emin/Eav	0.12

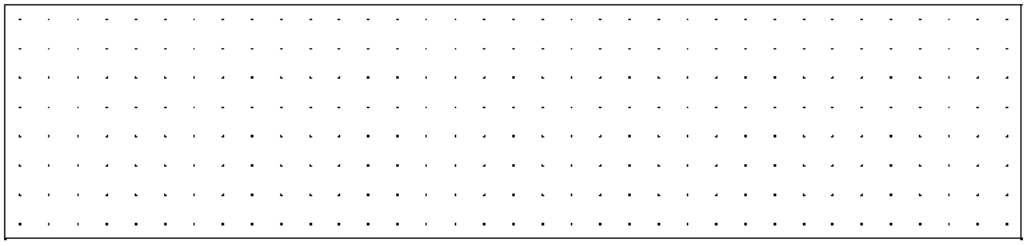
Vertical Illuminance (lux)

Observer direction = 0 deg. Height = 0.00

Column 9

Illuminance (lux)

Column 9



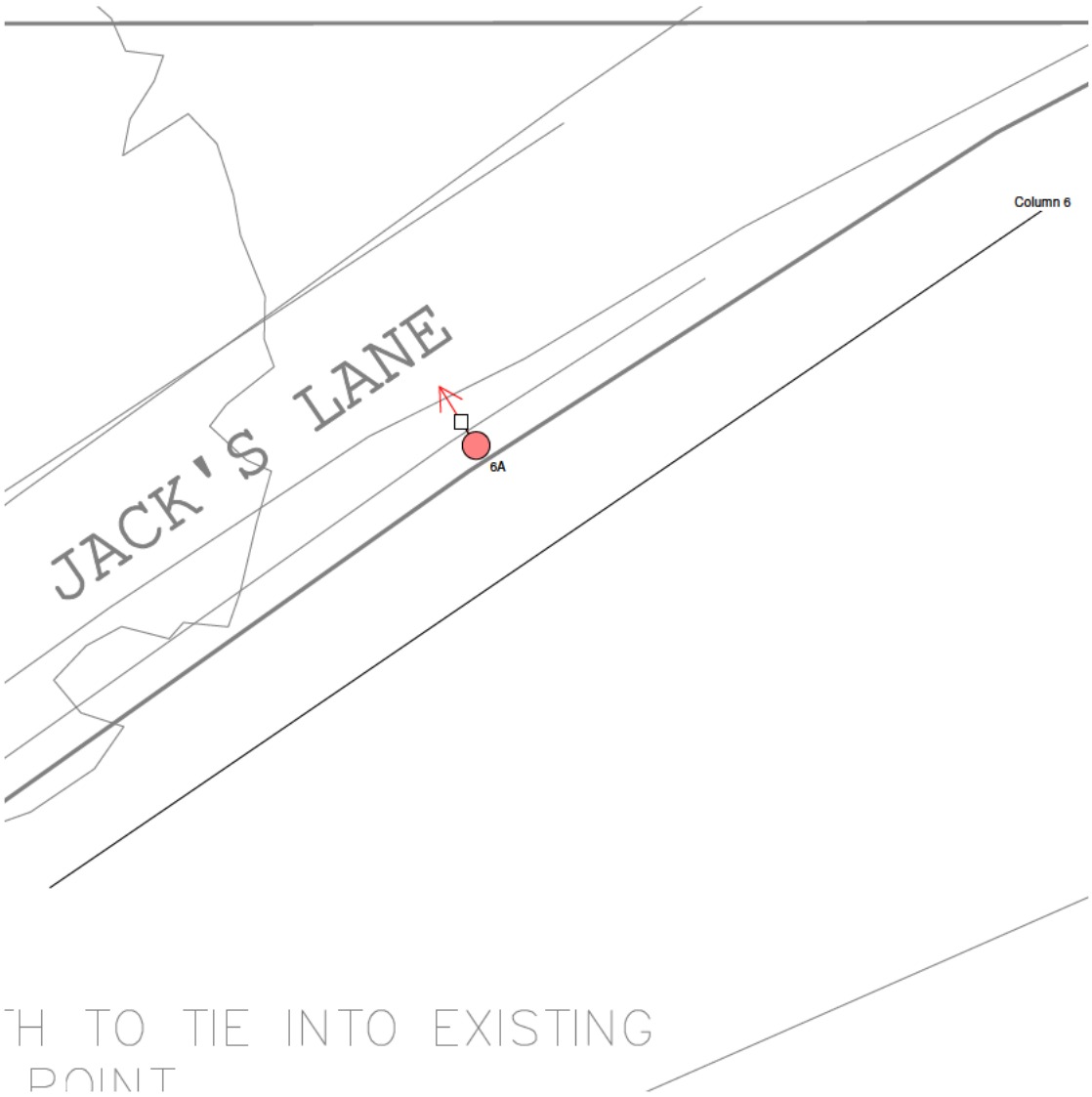
Results

Eav	0.29
Emin	0.08
Emax	1.82
Emin/Emax	0.04
Emin/Eav	0.27

Vertical Illuminance (lux)

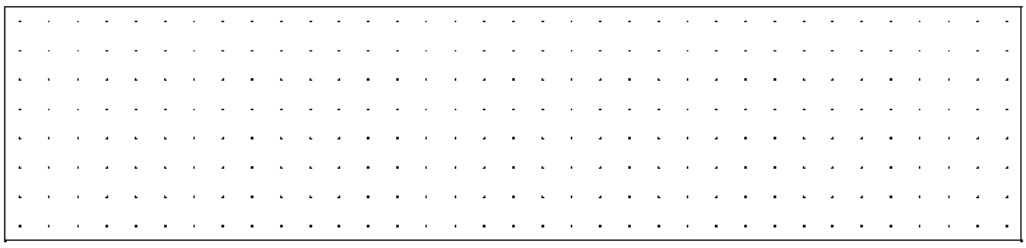
Observer direction = 0 deg. Height = 0.00

Column 6



Illuminance (lux)

Column 6



Results

Eav	0.29
Emin	0.07
Emax	1.74
Emin/Emax	0.04
Emin/Eav	0.25

DATE: 4 December 2023

DESIGNER: MMA Lighting Consultancy Ltd

PROJECT No: MMA18229

PROJECT NAME: Jacks Lane, Takeley Footpath

Jacks Lane, Takeley Footpath S38 - Area Calculation - R3

6m Essex County Council specification columns with post top Urbis Axia 3.1 3000K Luminaires with built in rear louvres.

Lighting Class: P5 from BS5489-1:2020 (E2 Zone)
Eav: 3.00 - 4.50 Lux
Emin: 0.60

Base drawing number used in this calculation "15.21-104 to 105 Off-Site Footpath Electrical Layout - bound (1)"

Outdoor Lighting Report

PREPARED BY:

MMA Lighting Consultancy Ltd
99 Old Bath Road
Summer Field House
Charvil
Reading
Berkshire
RG10 9QN
Email: info@mma-consultancy.co.uk
[redacted]

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Grid 1	557089.21	221511.71	197.79	93.06	1.50	1.50
2	Grid 2	557032.48	221547.46	78.00	109.74	1.50	1.50

Luminaires

Luminaire A Data

Supplier	Urbis Schreder
Type	AXIA 3.1 5294 Integrated lenses Rear louvers 8 OSLON SQUARE G
Lamp(s)	8 OSLON SQUARE GIANT@400mA WW 730 230V 01-37-041
LampFlux(klm)/Colour	1.53 WW 3000K/70
File Name	AXIA 3.1 5294 8 OSLON SQUARE GIANT 400mA WW 730 11W 457582 Integrated le...
Maintenance Factor	1.00
Lum. Int. Class	G4
No. in Project	9

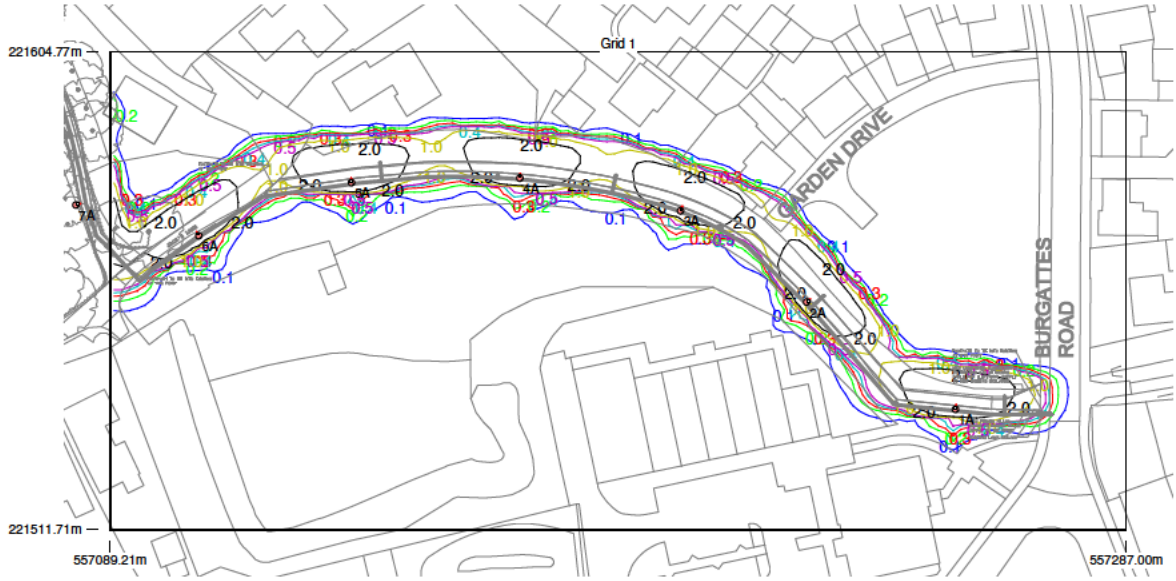
Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	557253.75	221535.19	6.00	84.00	0.00	0.00	0.40			
2	A	557224.77	221556.04	6.00	40.00	0.00	0.00	0.40			
3	A	557200.23	221573.84	6.00	70.00	0.00	0.00	0.40			
4	A	557168.92	221580.17	6.00	84.00	0.00	0.00	0.40			
5	A	557136.18	221579.28	6.00	93.00	0.00	0.00	0.40			
7	A	557082.55	221574.94	6.00	17.00	0.00	0.00	0.40			
8	A	557072.88	221603.64	6.00	36.00	0.00	0.00	0.40			
9	A	557053.09	221632.66	6.00	32.00	0.00	0.00	0.40			
6	A	557106.48	221568.96	6.00	122.00	0.00	0.00	0.40			

8514236226

Horizontal Illuminance (lux)

Grid 1

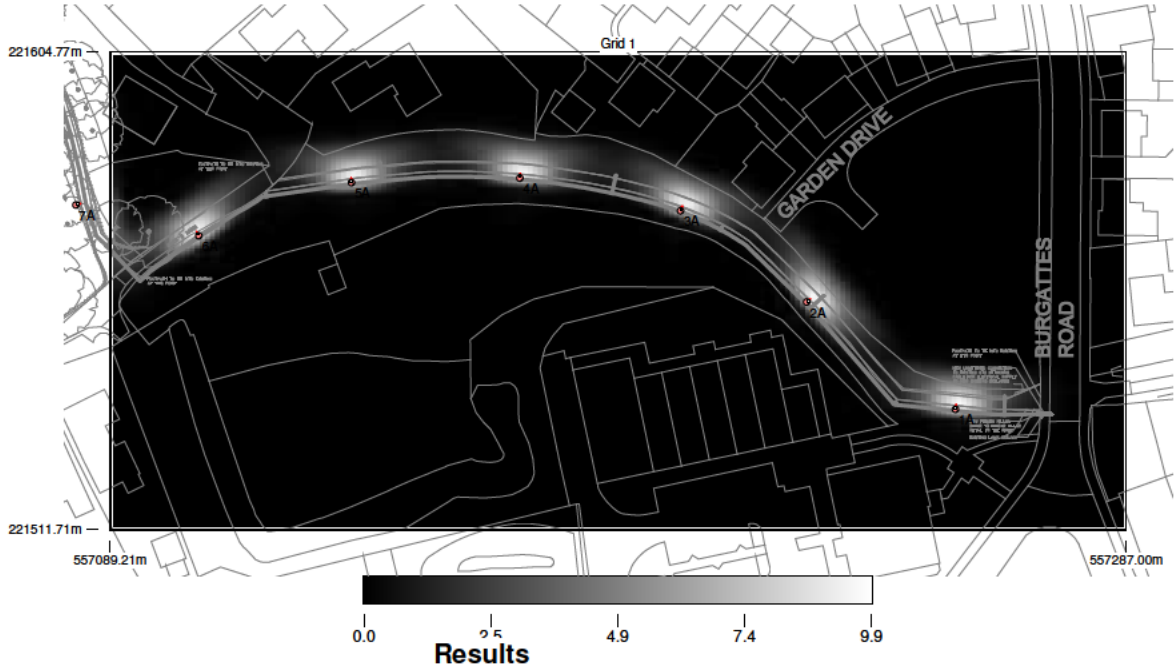


Results

Eav	3.69
Emin	0.73
Emax	9.86
Emin/Emax	0.07
Emin/Eav	0.20

Horizontal Illuminance (lux)

Grid 1



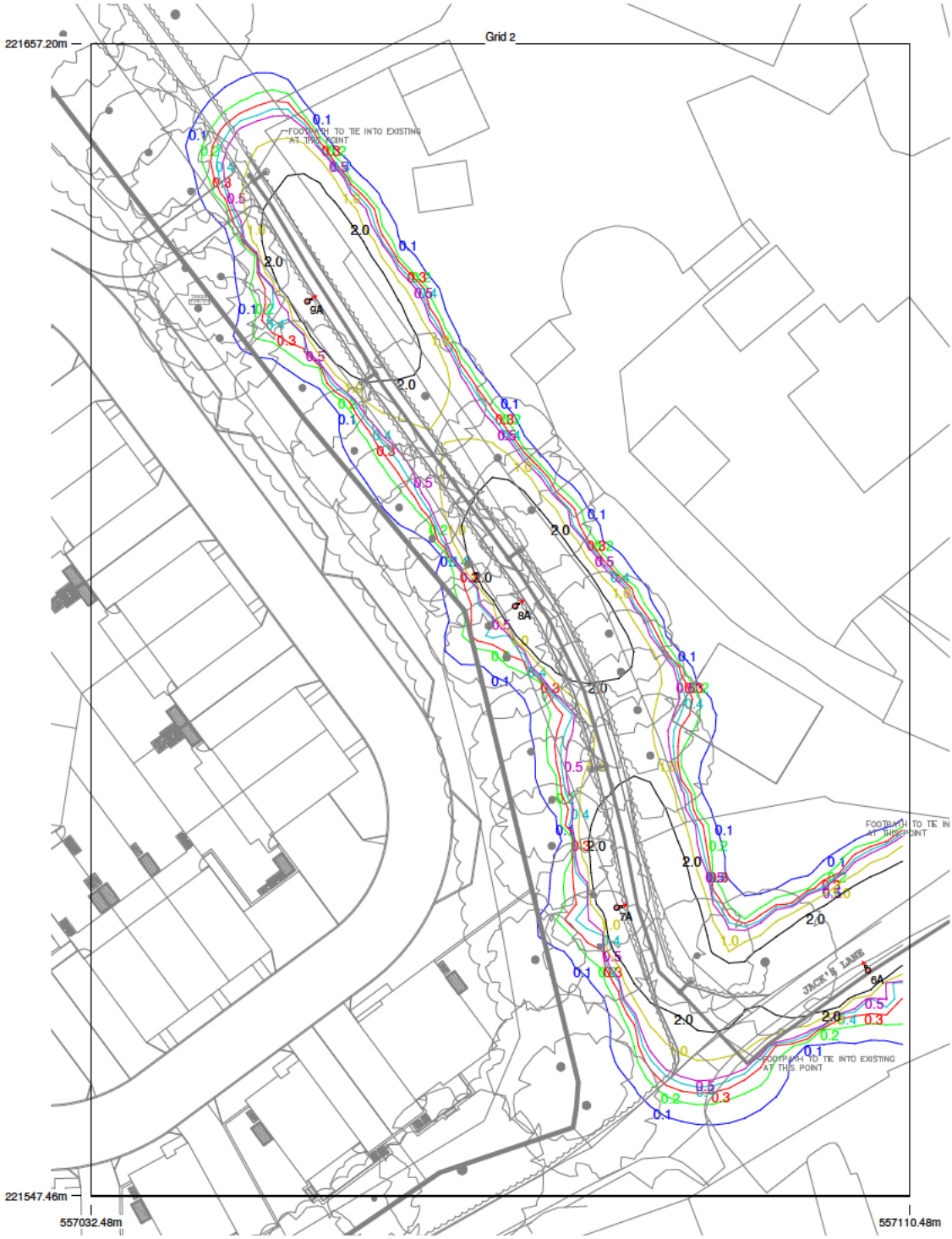
Results

Eav	3.69
Emin	0.73
Emax	9.86
Emin/Emax	0.07
Emin/Eav	0.20

8514236226

Horizontal Illuminance (lux)

Grid 2

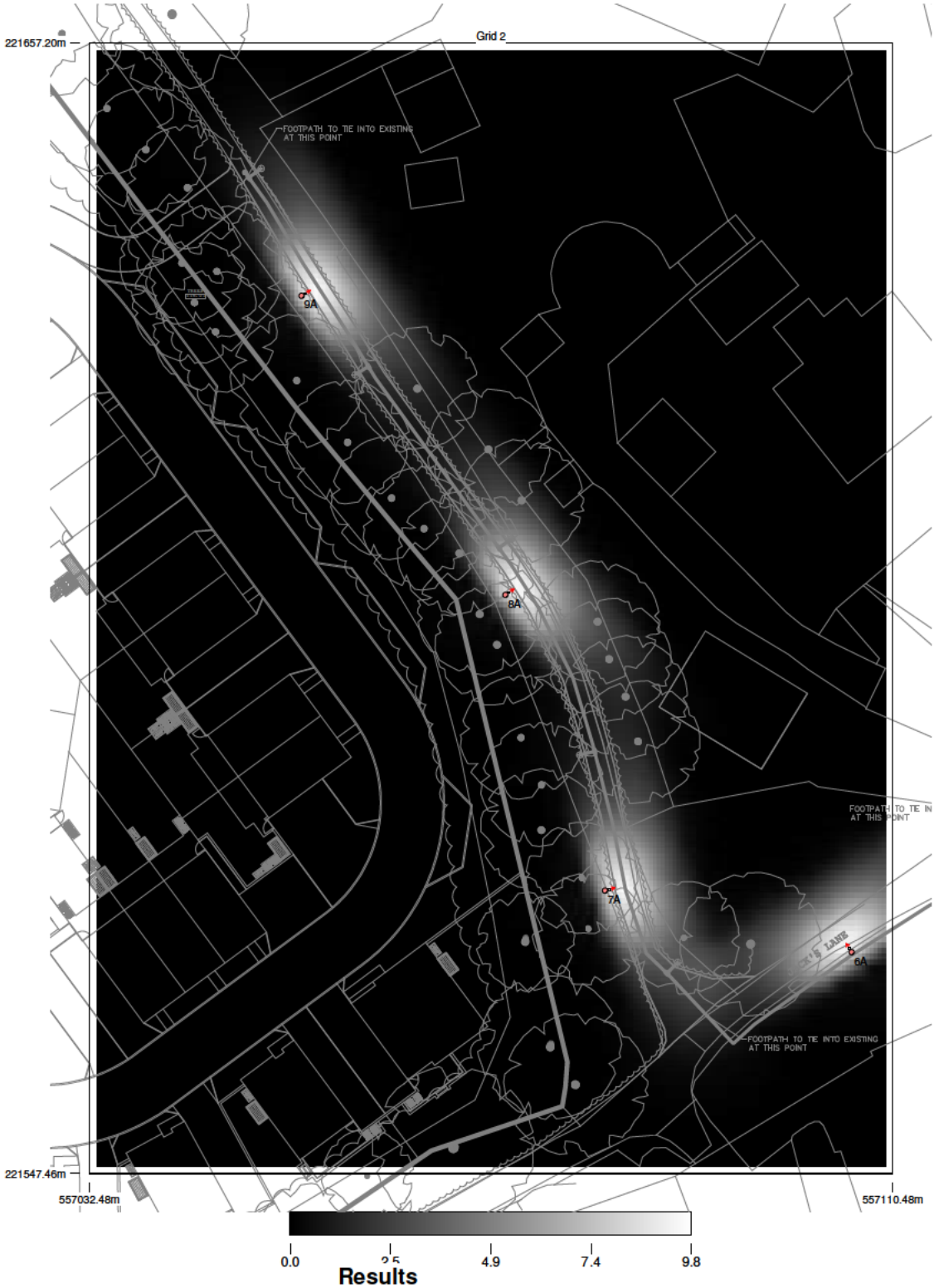


Results

Eav	4.09
Emin	0.80
Emax	9.82
Emin/Emax	0.08
Emin/Eav	0.20

Horizontal Illuminance (lux)

Grid 2



Results

Eav	4.09
Emin	0.80
Emax	9.82
Emin/Emax	0.08
Emin/Eav	0.20