Platts Roundabout, Newbridge Road, Billingshurst, RH14 9HY



Lighting Assessment

31th January 2024

PRESENTED TO

Sexton Holdings Ltd

PRESENTED BY

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EXECUTIVE SUMMARY

Tetra Tech have undertaken a lighting assessment on behalf of Sexton Holdings Ltd, in order to quantify potential impacts in support of a Section 73 application for minor changes to the approved scheme for Planning Application DC/23/1892, including revisions to the motorcycle showroom on the site to increase the size of the building by 180 sqm, at Platts Roundabout, Newbridge Road, Billingshurst, RH14 9HY.

Lighting plans have been designed by Tetra Tech and used to produce a model of the proposed development within DIALux software in accordance with the appropriate criteria.

The assessment has concluded that the risk of the proposed scheme resulting in exceedances of either the ILP pre-curfew or post-curfew obtrusive light limitations at local residential receptors will be low.

Following the installation of an appropriate lighting scheme as detailed in this report, the risk of the proposed development resulting in exceedances of 1 lux along potential bat foraging/commuting routes and dark corridors is low at all ecological receptor locations. The risk of exceedances of 0.4 lux along the identified north western bat corridor is low, as recommended by the Bat Conservation Trust.

A comparison exercise undertaken shows that the proposed lighting scheme for the pending application does not result in increased light spillage towards the northern bat habitat when compared against the lighting assessment undertaken for the previously approved scheme (ref. DC/20/1165).

Modelled ULR predicts a sky glow figure (ULR) of 0.0% with the ILP sky glow limitation for an area classified as Environmental Zone E2 is 2.5% ULR. As such the indicative lighting scheme meets the ILP sky glow limitations and is therefore will result no impacts on the dark sky landscape.

Overall, there is a low risk of significant adverse impacts on local sensitive ecological receptors.

The assessment demonstrates that the proposed development does not conflict with any national or local planning policies.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
CIBSE	Chartered Institute of Building Services Engineers
CIE	Commission on Illumination
CMS	Central Management Systems
ILP	Institution of Lighting Professionals
LDF	Local Development Framework
LP	Local Plan
CS	Core Strategy
DPD	Adopted Development Plan Documents
SPD	Adopted Supplementary Planning Documents
SG	Endorsed Supplementary Guidance Documents
NGR	National Grid Reference
PPS	Planning Policy Statement
NPPF	National Planning Policy Framework
Lx	Lux
ULR	Upward Lighting Ratio

1.0 INTRODUCTION

Tetra Tech have undertaken a lighting assessment on behalf of Sexton Holdings Ltd, in order to quantify potential impacts in support of a Section 73 application for minor changes to the approved scheme for Planning Application DC/23/1892, including revisions to the motorcycle showroom on the site to increase the size of the building by 180 sqm, at Platts Roundabout, Newbridge Road, Billingshurst, RH14 9HY.

1.1 SITE LOCATION AND CONTEXT

The development site currently consists of disused land, the approximate national grid reference of which is 507969;125897.

The proposed site is bounded by:

- Newbridge Road to the south;
- the A29 beyond which lays residential properties to the east;
- farmland to the west; and
- the A272 to the north.

Reference should be made to **Figure 1-1** for a visual representation of the application site.

1.2 LIGHTING DESIGN AND ASSESSMENT - OVERVIEW

The proposed development will require the installation of a number of luminaires that have the potential to increase existing light levels at sensitive locations within the vicinity of the site. The following stages have therefore been undertaken in order to produce a suitable lighting layout and assess potential impacts:

- Baseline survey.
- Quantitative assessment of potential lighting impacts at existing light sensitive receptors bordering the proposed development site, based on the proposed external lighting design.
- Formulation of appropriate mitigation measures, where necessary, in order to minimise the potentially detrimental impacts of the proposed lighting scheme.

Figure 1-1 – Site Layout and Boundary



2.0 POLICY, LEGISLATION AND RELEVANT AGENCIES

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

- Guidance Notes for the Reduction of Obtrusive Light, The Institution of Lighting Professionals, 2021;
- National Planning Policy Framework, Department for Levelling Up, Housing & Communities, December 2023;
- Planning Practice Guidance on Light Pollution, Ministry of Housing, Communities & Local Government, 1st November 2019;
- The Conservation of Habitats and Species Regulations, as amended, 2017;
- Environmental Protection Act, 1990;
- Statutory Nuisance from Insects and Artificial Light, Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005, DEFRA 2006;
- Artificial Lighting and Wildlife Interim Guidance: Recommendations to Help Minimise the Impact of Artificial Lighting, Bat Conservation Trust, 2014;
- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, British Standards Institute, 2007;
- BS EN 13201-4: Road Lighting – Methods of Measuring Lighting Performance, 2003;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, British Standards Institute, 2013;
- PLG 04- Guidance on Undertaking Environmental Lighting Impact Assessments, ILP, 2013;
- Bats and artificial lighting in the UK, Institution of lighting professionals, Bat Conservation Trust, 2018, and;
- Horsham District Council Local Plan, 2021-2038.

2.2 LEGISLATIVE FRAMEWORK

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

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

Although light was described as a statutory nuisance, no prescriptive limits or rules have been set for assessment. Guidance within the National Planning Policy Guidance with regards to Light pollution has been referred to while producing this assessment as well as documents produced by the International Commission on Illumination (CIE), Institution of Lighting Professionals (ILP) and the Chartered Institute of Building Services Engineers (CIBSE).

2.3 DESIGN STANDARDS

2.3.1 National Standards

The appropriate lighting design criteria for the scheme are contained within:

- BS EN 12464-2: Lighting of Work Places - Outdoor Work Places, 2014;
- BS 5489-1: Code of Practice for the Design of Outdoor Lighting - Lighting of Roads and Public Amenity Areas, 2020; and,
- BS EN 13201-2: Road Lighting - Performance Requirements, 2020.

Good lighting design also includes luminaires that have been selected to minimise light intrusion and glare to pedestrians and drivers, as discussed within the ILP document 'Guidance Notes for the Reduction of Obtrusive Light'.

2.3.2 Best Practice Design

As well as meeting the statutory design standards outlined in section 2.3.1, the external lighting design has sought to meet a number of criteria to ensure that the environmental effects of artificial lighting are managed to a high standard. These criteria are as follows:

- All external lighting schemes must not have an upward lighting ratio (ULR) of more than 2.5%.
- All new column mounted luminaires shall be fitted with flat glass where appropriate to aid 2.5% upward light discharge.
- Where appropriate, luminaires on the site boundary will be fitted with light baffles to prevent light spill.
- Where possible, lighting will be controlled via Central Management System (CMS) time and light level sensors with controls capable of being adjusted and remotely set to adapt to local needs as required.

2.4 PLANNING POLICY AND GUIDANCE

2.4.1 National Policy

The National Planning Policy Framework (NPPF), December 2023 principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Practice Guidance (PPG) which previously guided planning policymaking. The NPPF broadly retains the principles of PPS 23: Planning and Pollution Control and with regard to light pollution, paragraph 191 states that:

> "*191 Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *[…] c. limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

The National Planning Practice Guidance web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 and updated for lighting on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. It states that "for maximum benefit, the best use of artificial light is about getting the right light, in the right place and providing light at the right time". In light of this guidance, the assessment has considered the following implications of the proposed lighting design:

"Does an existing lighting installation make the proposed location for a development unsuitable? For example, this might be because:

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

If the answer to any of the above questions is 'yes', consideration should be made for:

- *where the light shines;*
- *when the light shines;*
- *how much light shines; and*
- *possible ecological impact."*

2.4.2 Local Policy

Following a review of the Horsham District Local Plan, the following policy was identified as being relevant to potential light impacts associated with the proposed scheme:

> ***"Policy 24 Strategic Policy: Environmental Protection***
>
> *Minimise the impact of lighting on neighbouring uses, the wider landscape and biodiversity, including potential glare and spillage, particularly with regard to the South Downs International Dark Sky Reserve designation. Proposals where illumination is to be installed must be accompanied by a Lighting Assessment.*
>
> ***Policy 28: Settlement Coalescence***
>
> *Development between settlements will be resisted unless it can be demonstrated that the proposal meets all of the following criteria:*
>
> *[…]*
>
> *The related urbanising effects within the retained 'break' between settlements are minimised, including artificial lighting, development along and / or the widening of the roads between the settlements, and increased traffic movements. a. The support local wildlife and there is no adverse impact to nearby properties or habitats, by reason of noise, general disturbance, fumes or external lighting.*
>
> ***Policy 45: Community Facilities and Uses***
>
> *The provision of new or improved community facilities or services will be supported, where they meet the identified needs of local communities as indicated in the current Open Space, Sport & Recreation Study, the Community Facilities Study, the Playing Pitch and Built Facilities Strategies, the Infrastructure Delivery Plan and other relevant studies or updates, and / or contribute to the provision of Green Infrastructure and the Nature Recovery Network. Proposals for new or improved community facilities and services will be required to meet all of the following criteria:*
>
> *[…]*
>
> *Lighting proposals, including floodlighting, must minimise light pollution, help reduce crime, and must not cause significant nuisance to surrounding occupants or highway users, and not significantly harm habitats and species."*

3.0 METHODOLOGY

The lighting assessment includes the establishment of baseline ambient light conditions and an evaluation of impacts associated with the lighting design. This includes an assessment of change in light obtrusion at existing receptor locations.

Light modelling was undertaken using DIALux software, an independent lighting model which is capable of calculating daylight and artificial lighting scenes in interior and exterior scenarios. The model incorporates ILP, CIE 112 and BS EN 12464-2 calculation methodologies and is commonly used for lighting impact assessment.

3.1 LIGHTING DESIGN

The lighting design used in this assessment is primarily for the proposed car parks and access road. The design of the lighting has been undertaken in a manner such as to address two potentially conflicting needs; namely, on the one hand, to provide a safe environment for the movement of users when the natural lighting levels fall and, on the other hand, to meet the light obtrusion limitations stated within the relevant standards and guidance in order to avoid any detriment to local amenity and wildlife.

Modelling for the assessment includes luminaires considered appropriate for the access road and car parking areas of the development as shown below.

- SFC-CD-48L-250-NW-G2 SLENDERFORM CANOPY, 48 LED's, 4000K
- Thorn 96628333 LEDFIT M 90W A/S CL1 L840 [STD]
- Thorn 96628332 LEDFIT S 45W A/S CL1 L840 [STD]
- DW Windsor Zeppa 1 4K 350mA Zeppa 1 - 1 x LX2 113 15 LED MODULE
- DW Windsor Z KIRIUM MINI - 1LX2-90 114 15 LED MODULE
- DW Windsor Z KASKARA - WIDE REFLECTORS - WIDE LED SPACE- 700mA (3500Lm)

3.2 QUANTITATIVE LIGHTING ASSESSMENT

3.2.1 Obtrusive Light

Baseline light conditions were determined during a site survey of the existing site and the surrounding area. A lighting model was subsequently developed to represent the proposed external lighting scheme and to enable the obtrusive light from the proposed development to be calculated at local receptors.

The ILP has developed an Environmental Zone classification system for the categorisation of sensitive receptor locations based on typical levels of baseline obtrusive light. This 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 places
E1	Natural	Dark (SQM 20 t 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

For each Environmental Zone, recommended obtrusive light limits for exterior lighting installations have also been determined. These are summarised in **Table 3-2** to **Table 3-4**. **Table 3-2** shows the maximum allowable illuminance in the vertical plane for each Environmental Zone for Pre-curfew scenarios (after 07:00 hours) and Post-curfew scenarios (after 23:00). **Table 3-3** shows the maximum allowable luminous intensity emitted by the luminaires relative to the position of each luminous intensity receptor location depending on what the environmental zone is **Table 3-1** shows the maximum allowable Upward Light Ratio (ULR) for each environmental zone. If the modelled maximum values of vertical illuminance, the modelled maximum luminous intensity and the ULR are below the criteria in the tables below, they pass the assessment.

Table 3-2 – Maximum Values of Vertical Illuminance on Properties

Light technical parameter	Application conditions	Environmental Zone				
		E0	E1	E2	E3	E4
Illuminance in the vertical plane (Ev)	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

Table 3-3 – Limits for the Luminous Intensity of Bright Luminaires

Light technical parameter	Application conditions		Luminaire group (projected area Ap in m²)					
			0<A_p ≤0.002	0.002<A_p ≤0.01	0.01<A_p ≤0.03	0.03<A_p ≤0.13	0.13<A_p ≤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 Ap			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 AP representative area (m2)			0.0008	0.004	0.016	0.063	0.251	>0.5

NOTE:

1. D is the distance between the observer and the glare source in meters;
2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut off 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 A_p>0.5

Table 3-4 – Maximum Values of Upward Light Ratio (ULR) of Luminaires

Light technical parameter	Environmental Zone				
	E0	E1	E2	E3	E4
Upward light ratio (ULR)/%	0	0	2.5	5	15

The assessment determined the lighting levels and Environmental Zone classification in the vicinity of the proposed development through the baseline survey. Modelling of the lighting scheme was undertaken and

predicted obtrusive light values compared with the relevant guidelines, as detailed within **Table 3-2** to **Table 3-4** the potential environmental effects of the proposed development are identified, as far as current knowledge of the site and development allows. The significance of potential environmental effects is assessed according to their scale (magnitude) and the sensitivity of the receptors.

For the purposes of this assessment, the effects of the development are considered to be 'significant' if:

- The development is predicted to exceed the maximum sky glow ULR at any surrounding receptor; and,
- The development is predicted to cause either an exceedance of the ILP obtrusive light trespass limitation at a receptor or if the development is predicted to cause an increase of more than 10% at an existing receptor where the ILP obtrusive light trespass limitation is already being exceeded.

4.0 BASELINE

This section provides a review of the existing lighting levels at the site in order to provide a benchmark against which to assess potential impacts associated with the development.

4.1 BASELINE SURVEY

4.1.1 Survey Conditions

A baseline lighting survey was undertaken on 5th December 2018. The survey was undertaken before 23:00 to establish the existing pre curfew lighting conditions.

It should be noted that as there is currently no lighting installed at the site and following a review of the surrounding area shows there are not expected to be any changes to baseline lighting in the area since 5th December 2018.

4.1.2 Existing Light Sources

The existing main light sources surrounding the site are from the streetlights along the A29 and Newbridge Road.

4.1.3 Survey Locations

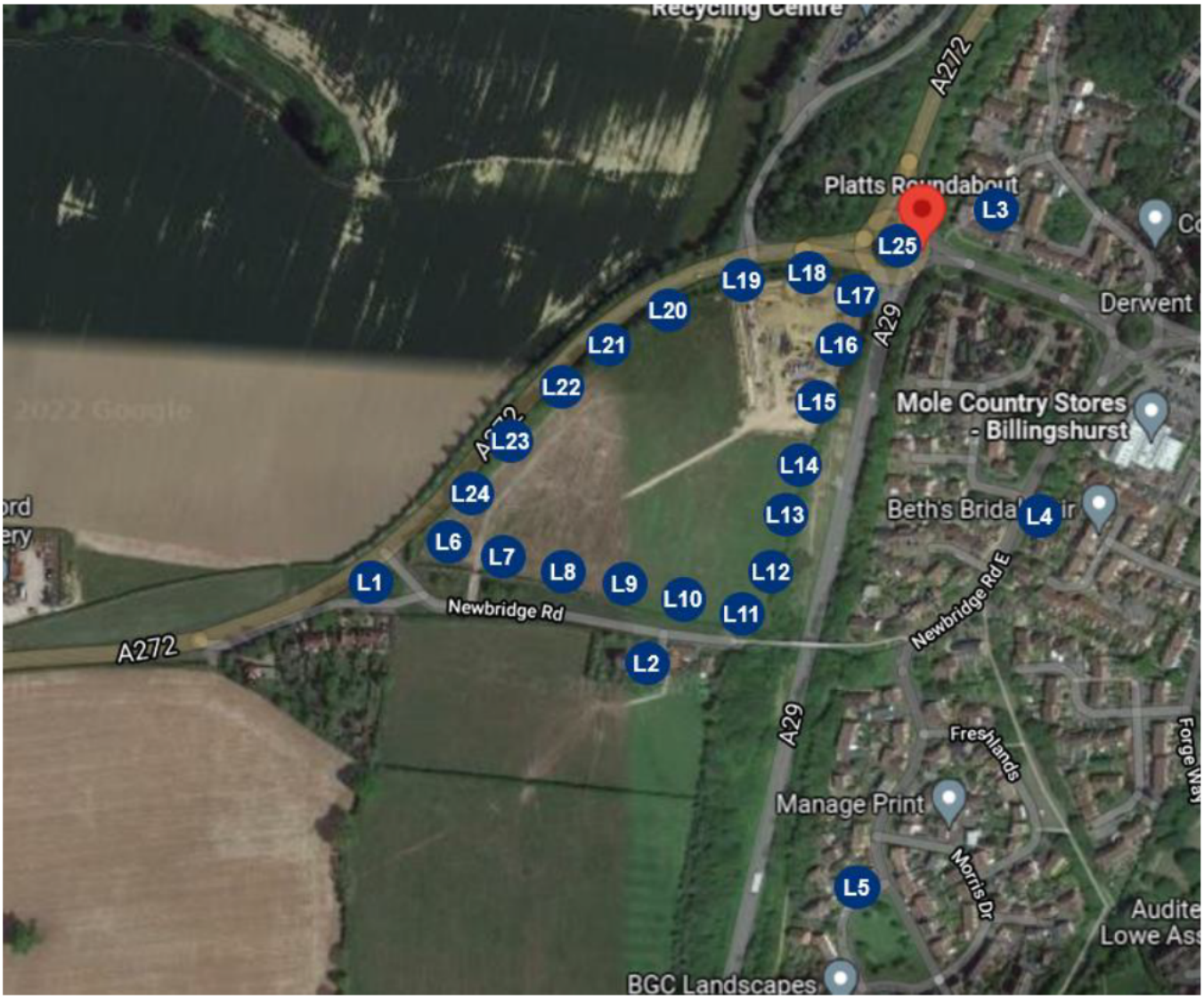
Light monitoring was undertaken at a number of survey locations to determine variations in baseline light levels within the vicinity of the site. Where possible, monitoring at the boundary of the receptor locations was undertaken to provide the best possible representation of existing light obtrusion. Where this was not possible, monitoring was undertaken at the most appropriate representative location. Reference should be made to **Figure 4-1** for an illustrative site map of the monitoring locations.

The purpose of the survey is as follows:

- The survey enables quantified light levels at (or as near as possible to) local sensitive receptor locations to be measured.
- The site survey also provides an understanding of any significant landforms and vegetation that can potentially provide a pathway screen between light sources and receptors.
- The survey enables the ILP environmental zone to be determined based on sound, quantified evidence.

The survey enables existing significant sources of artificial light and natural screens to be accounted for outside of the quantified model predictions.

Figure 4-1 – Light Monitoring Locations



The survey therefore provides a robust understanding of the current artificial lighting illuminance levels currently experienced around the development site. The locations of all the light monitoring locations are summarised in **Table 4-1** below and the results from the survey are contained in **Table 4-2**.

A series of measurements were taken at key points; a horizontal ground level measurement and four vertical measurements at 1.5m facing north, east, south and west in general accordance with the recommended monitoring method in the statutory guidance issued by the ILP. Illuminance levels can vary quite significantly over relatively small distances and even with slight changes in the plane of the lens. Therefore, the range of measurements taken over a monitoring length was recorded, to determine the minimum and maximum illuminance at receptor façades.

Table 4-1 – Base Light Monitoring Locations

Reference	Monitoring Location	Key Local Sources of Light
L1	South east of the site, adjacent to property on Newbridge Road	Residual lights
L2	Southern boundary of the site, adjacent to Newbridge Road	Residual lights
L3	North east of the site, adjacent to A272	Street Lighting on Holders Close
L4	East of the site, Newbridge Road East	Street Lighting on Newbridge Road East
L5	South east of the site, Morris Drive	Street Lighting on Morris Drive
L6	Southern Boundary	No Key Local Sources of Light
L7	Southern Boundary	
L8	Southern Boundary	
L9	Southern Boundary	
L10	Southern Boundary	
L11	Southern Boundary	
L12	Eastern Boundary	
L13	Eastern Boundary	
L14	Eastern Boundary	Lighting from A29 and Platts Roundabout
L15	Eastern Boundary	Lighting from A29 and Platts Roundabout
L16	Eastern Boundary	Lighting from A29 and Platts Roundabout
L17	Northern Boundary	Lighting from A29 and Platts Roundabout
L18	Northern Boundary	Lighting from A272 and Platts Roundabout
L19	Northern Boundary	Lighting from A272 and Platts Roundabout
L20	Northern Boundary	No Key Local Sources of Light
L21	Western Boundary	
L22	Western Boundary	
L23	Western Boundary	
L24	Western Boundary	
L25	North Eastern Boundary	Lighting from Platts Roundabout

4.1.4 Survey Results

The results of the monitoring are displayed in **Table 4-2**.

Table 4-2 – Survey Results

Reference	Recorded Illuminance (Lux)				
	Facing Up	Facing North	Facing East	Facing South	Facing West
L1	0.02	0.01	0.03	0.02	0.01
L2	0.06	0.03	0.18	0.23	0.02
L3	0.10	0.08	0.15	0.14	0.32
L4	3.91	8.28	0.65	0.32	8.66
L5	1.81	2.74	4.34	0.57	0.71
L6	0.04	0.04	0.04	0.01	0.01
L7	0.04	0.04	0.04	0.01	0.01
L8	0.05	0.04	0.04	0.01	0.01
L9	0.06	0.04	0.05	0.02	0.02
L10	0.07	0.04	0.07	0.04	0.01
L11	0.07	0.04	0.07	0.03	0.01
L12	0.05	0.04	0.05	0.03	0.01
L13	0.04	0.03	0.02	0.02	0.01
L14	0.07	0.04	0.04	0.03	0.02
L15	0.08	0.05	0.04	0.03	0.02
L16	0.14	0.81	0.39	0.05	0.04
L17	0.35	2.12	0.83	0.08	0.10
L18	0.27	0.19	0.09	0.05	0.04
L19	0.05	0.05	0.08	0.04	0.01
L20	0.06	0.06	0.08	0.04	0.01
L21	0.06	0.06	0.07	0.04	0.01
L22	0.04	0.05	0.05	0.04	0.01
L23	0.05	0.04	0.04	0.03	0.01
L24	0.04	0.04	0.04	0.02	0.01
L25	25.32	9.06	7.88	3.97	7.87

4.2 RECEPTORS

The term 'receptors' includes any persons, locations or systems that may be susceptible to changes in environmental factors as a consequence of the development.

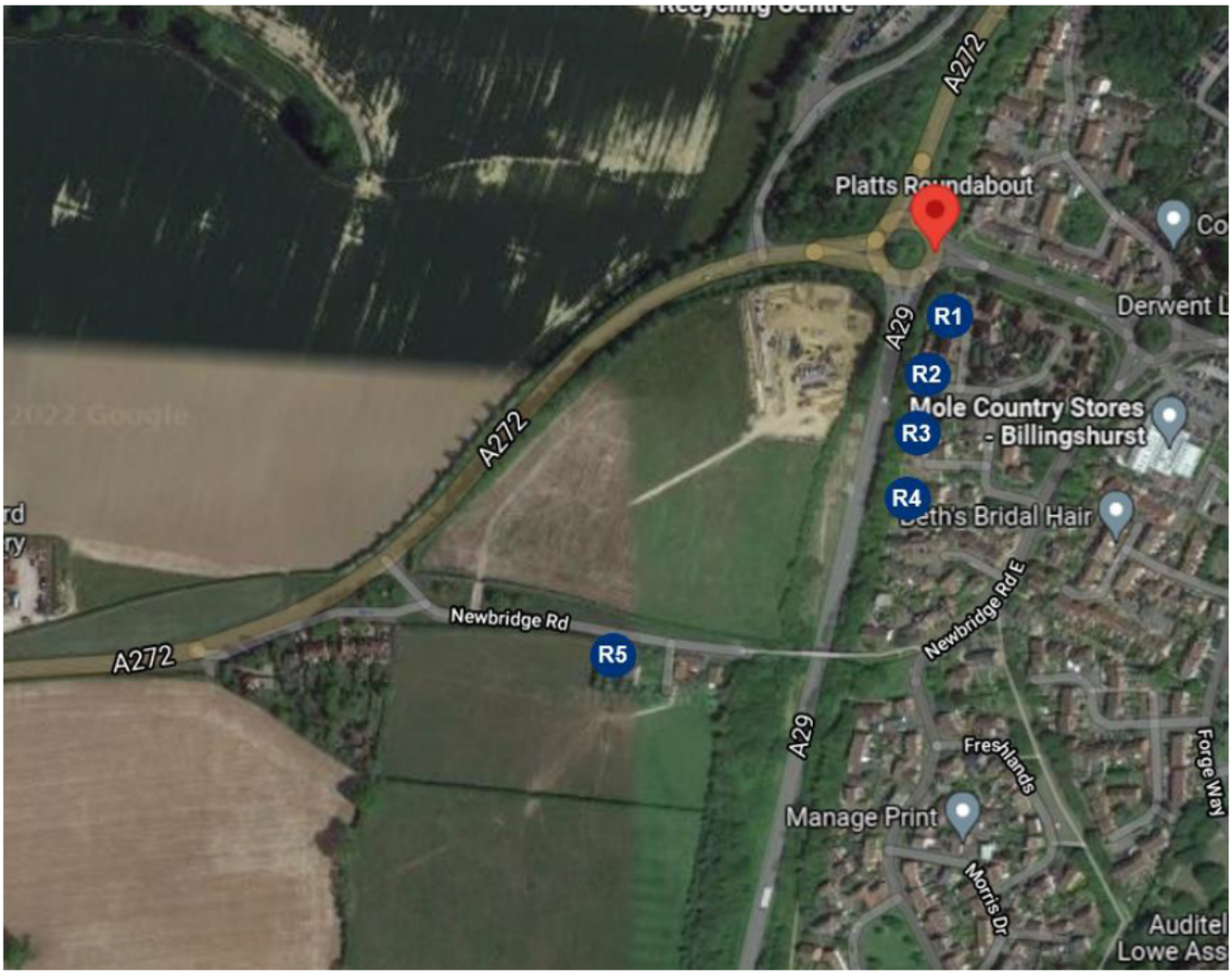
4.2.1 Residential Receptors

During the site survey, key residential properties were identified which have the potential to be affected by obtrusive light from the proposed development, as shown in **Table 4-3**. Reference should be made to **Figure 4-2** for an illustration of the residential receptors used for the purposes of this assessment. All the identified residential receptors are considered to be within ILP Environmental Zone E2. Each receptor was input into the model at a height of 4.0m (bungalows and single-storey building at height of 1.5m) at a distance of 10 cm from the building façade to represent illuminance at first-floor window level, representing a typical bedroom, which is deemed to be the most sensitive receptor room.

Table 4-3 – Residential Receptors

ID	Description	ILP Environmental Zone
R1	10 Pond Close, Billingshurst, RH14 9HY	E2
R2	8 Pond Close, Billingshurst, RH14 9HY	E2
R3	4 Pond Close, Billingshurst, RH14 9HY	E2
R4	13 Platts Meadow, Billingshurst, RH14 9HX	E2
R5	Bridgewater Farm Newbridge Road West, Billingshurst, RH14 9LS	E2

Figure 4-2 – Modelled Residential Receptors



4.2.2 Ecological Receptors

Lighting associated with the operational phase of the proposed development has the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2017) and subsequent amendments require competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Areas of Conservation). For the purposes of this assessment, it was determined that a number of bat species utilise the hedgerows and trees surrounding the site for commuting/foraging purposes. In order to represent a worst-case

scenario, the assessment has assumed that potential bat species on site will be highly sensitive to artificial light.

Following consultation with the project ecologist and a review of the 'Ecological Walkover Letter Report' published in April 2020, it was recorded that there were no roosting bats identified on the site and that the presence of commuting and foraging bats is low. The bats that were identified on site were predominantly found along the north and western boundaries. Following a bat survey on site in 2019, the presence of Barbastelle species was confirmed along the north western border.

For the purposes of the assessment, ecological receptor locations have been included at 14 points along the length of hedgerows and trees, at heights of 2m. **Table 4-4** below provides a reference for these locations whilst a full spatial illustration of modelled ecological receptors is included in **Figure 4-3**.

Table 4-4 – Ecological Receptors

ID	Description
E1	Western Boundary tree line
E2	Western Boundary tree line
E3	North western Boundary tree line
E4	Northern Boundary tree line
E5	Northern Boundary tree line
E6	Northern Boundary tree line
E7	Eastern Boundary tree line
E8	Eastern Boundary tree line
E9	Eastern Boundary tree line
E10	Eastern Boundary tree line
E11	Eastern Boundary tree line
E12	Eastern Boundary tree line
E13	Eastern Boundary tree line
E14	Western Boundary tree line

Figure 4-3 – Modelled Ecological Receptors



5.0 LIGHTING ASSESSMENT

Potential impacts associated with the proposed lighting design at locations in the vicinity of the site were assessed as described in the following sections.

5.1 OBTRUSIVE LIGHT MODELLING

The indicative lighting design is shown in Figure 5-1. Building plans were provided and were used to produce a lighting design within a DIALux model of the proposed development. Reference should be made to Figure 5-2 for a 3D representation of the proposed model. Buildings surrounding the development site were also included in the model at heights of 8m (2-storey building) and 4m (1-storey building).

The assessment has been undertaken with consideration for appropriate types of lighting used for the scheme, as shown below.

- SFC-CD-48L-250-NW-G2 SLENDERFORM CANOPY, 48 LED's, 4000K
- Thorn 96628333 LEDFIT M 90W A/S CL1 L840 [STD]
- Thorn 96628332 LEDFIT S 45W A/S CL1 L840 [STD]
- DW Windsor Zeppa 1 4K 350mA Zeppa 1 - 1 x LX2 113 15 LED MODULE
- DW Windsor Z KIRIUM MINI - 1LX2-90 114 15 LED MODULE
- DW Windsor Z KASKARA - WIDE REFLECTORS - WIDE LED SPACE- 700mA (3500Lm)

The assessment considers the effect of the proposed development in the pre-curfew and post-curfew periods. The assessment consists of a comparison between assumed baseline illuminance levels at each of the receptor locations against the predicted light obtrusion from the proposed development determined in lighting model. The assumed baseline illuminance levels are ILP Environmental Zone E2.

The ULR of the proposed development has been calculated and referenced to the maximum permitted limitations for the relevant Environmental Zones of the receptor locations, as detailed in **Table 3-2** to **Table 3-4**.

Figure 5-1 – Indicative External Lighting *Layout*

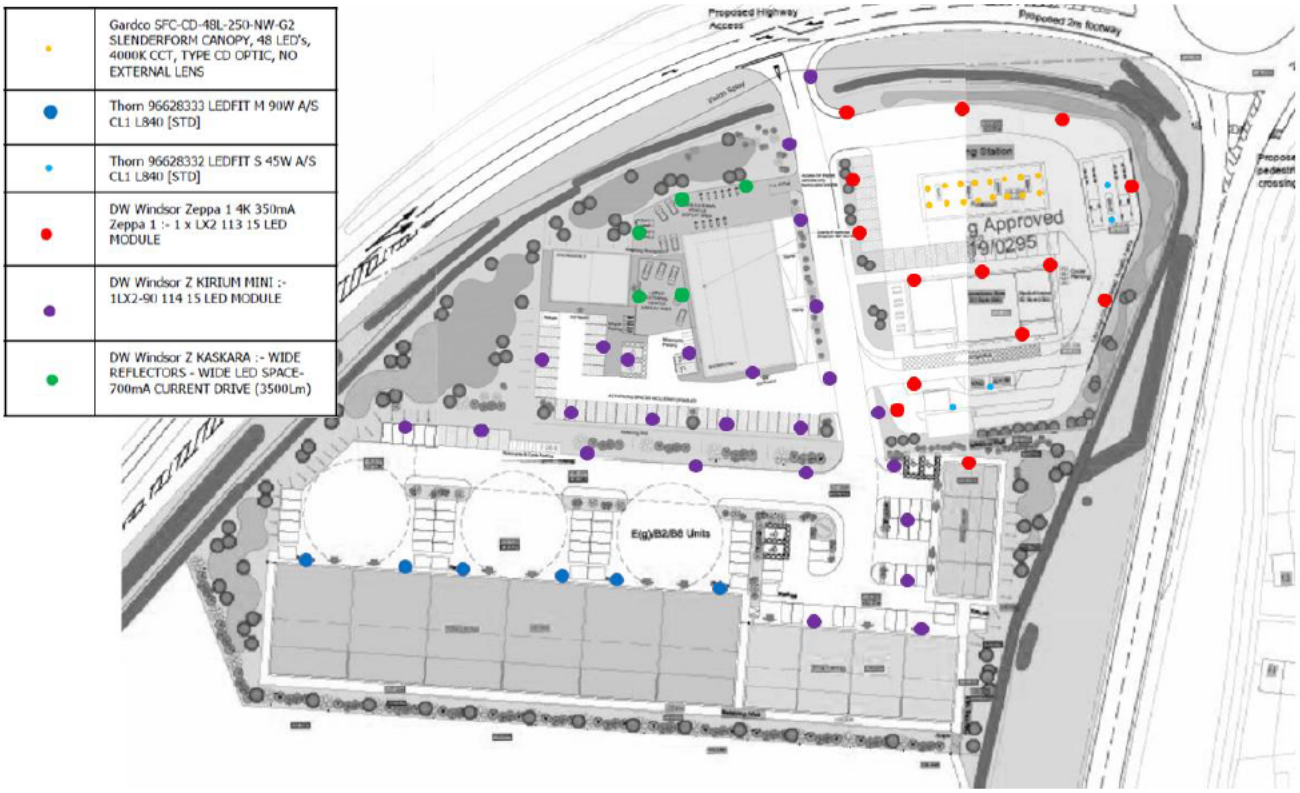
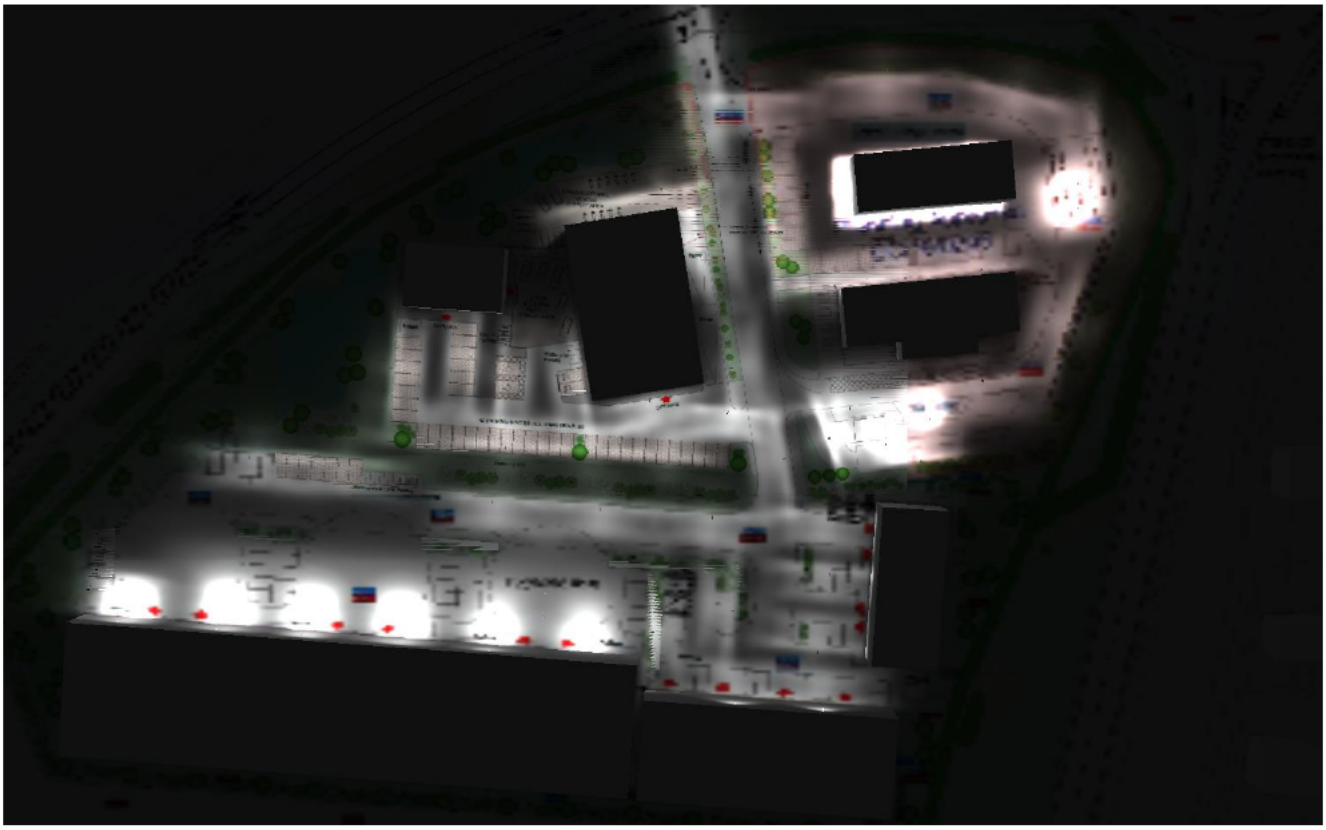


Figure 5-2 – 3D Visual Representation of Proposed External Lighting Model



The model is only able to accurately represent the effects of solid structures such as buildings and walls on light obtrusion. Non-solid barriers such as trees and hedges cannot be accurately modelled and therefore the effects of these are dealt with qualitatively outside the model calculations.

The ULR of the proposed development has been calculated and referenced to the maximum permitted limitations for the relevant Environmental Zones of the receptor locations, as detailed in **Table 3-2** to **Table 3-4**.

5.1.1 Model Results

5.1.1.1 Residential Receptors

Table 5-1, below, compares the modelled lighting arrangements to the ILP pre-curfew and post-curfew criteria limits for ILP Environmental Zone E2, in accordance with the classifications detailed in **Table 3-2** to **Table 3-4**.

Table 5-1 – Residential Receptor Assessment Results

ID	ILP Pre-curfew Criteria (Lx)	ILP Post-curfew Criteria (Lx)	Predicted Model Illuminance (lx)
R1	5.00	1.00	0.11
R2	5.00	1.00	0.10
R3	5.00	1.00	0.09
R4	5.00	1.00	0.04
R5	5.00	1.00	0.00

The ILP pre-curfew and post-curfew criteria do not exceed Zone E2 at all the residential receptor locations. The proposed development is not predicted to result in any significant adverse impacts with respect to local sensitive residential receptors.

5.1.1.2 Ecological Receptors

While some bat species, such as Pipistrelle are more tolerant with light levels above this criterion, it reflects worst-case assumptions concerning the sensitivity of those species present to background illuminance levels. It is understood that most bat emergence requires light levels below 1 lux for late emerging species, up to 14 lux for those that emerge earlier (Noctule and Pipistrelle). These lighting levels of 1 lux are required to ensure that bat commuting, and foraging routes are not impacted and that dark corridors beyond the limits of the site are retained. As such, the assessment criteria represents a worst-case scenario in terms of impacts on emergence, commuting and foraging (Bat Conservation Trust, 2011).

Following consultation with the project ecologist and a review of the 'Ecological Walkover Letter Report' published in April 2020, it was recorded that there were no roosting bats identified on the site and that the presence of commuting and foraging bats is low. The bats that were identified on site were predominantly found along the north and western boundaries. Following a bat survey on site in 2019, the presence of Barbastelle species was confirmed along the north western border. As this is a bat species with particularly light adverse behaviours, the lux level criteria of 0.4 lux will be used in this location, in accordance with the Bat Conservation Trust guidance below.

The Bat Conservation Trust guidance states:

> *"Where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to*

be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light-averse behaviour (Stone, 2012)."

When determining the likely impacts of lighting associated with the proposed development on sensitive ecological receptors, the assessment has considered the effect of lighting pre-mitigation. Impacts are considered potentially significant where predicted illuminance exceeds 1 lux at ecological receptors (or 0.4 lux along the north-western boundary). If this is the case, further consideration should be given to mitigation measures. **Table 5-2** shows the modelled lighting arrangements for the ecological receptors surrounding the site vicinity.

Table 5-2 – Ecological Receptor Assessment Results

ID	Relevant Criteria (lx)	Predicted Model Illuminance (lx)
E1	0.4	0.30
E2	0.4	0.39
E3	0.4	0.14
E4	0.4	0.37
E5	1.0	0.40
E6	1.0	0.56
E7	1.0	0.46
E8	1.0	0.89
E9	1.0	0.78
E10	1.0	0.39
E11	1.0	0.14
E12	1.0	0.04
E13	1.0	0.02
E14	0.4	0.39

As illustrated by **Table 5-2**, no light trespass associated with the overall site exceeds 1 lux and all receptors located along the north western boundary do not exceed 0.4 lux as recommended by the Bat Conservation Trust. As such the proposed development does not result in model exceedances. Therefore, the proposed development is not predicted to result in any significant impact with respect to local sensitive ecological receptors.

5.1.1.3 Comparison with Approved Scheme (ref. DC/20/1165)

A comparison exercise has been undertaken to consider the results of this lighting assessment against those for the assessment previously completed for the approved scheme (ref. DC/20/1165). The results of the comparison exercise shown in **Table 5-3**, below, show that the proposed lighting scheme for the pending application does not result in increased light spillage towards the northern bat habitat when compared against the approved scheme.

Table 5-3 – Comparison of Ecological Receptor Assessment Results against approved scheme (ref. DC/20/1165)

ID	Pending Application Predicted Model Illuminance (lx)	Approved Scheme Predicted Model Illuminance (lx)
E1	0.30	0.78
E2	0.39	0.49
E3	0.14	0.85
E4	0.37	0.75
E5	0.40	0.67
E14	0.39	0.86

5.1.2 Dark Sky Assessment

The model has been used to calculate the predicted Upward Lighting Ratio (ULR) of the proposed external lighting scheme. Model outputs predict a sky glow figure (ULR) of 0.0%. As illustrated in **Table 3-2** to **Table 3-4** the ILP sky glow limitation for an area classified as Environmental Zone E2 is 2.5% ULR. As such the indicative lighting scheme meets the ILP sky glow limitations and is therefore will result no impacts on the dark sky landscape.

6.0 CONCLUSIONS

Tetra Tech have undertaken a lighting assessment on behalf of Sexton Holdings Ltd, in order to quantify potential impacts in support of a Section 73 application for minor changes to the approved scheme for Planning Application DC/23/1892, including revisions to the motorcycle showroom on the site to increase the size of the building by 180 sqm, at Platts Roundabout, Newbridge Road, Billingshurst, RH14 9HY.

Lighting plans have been designed by Tetra Tech and used to produce a model of the proposed development within DIALux software in accordance with the appropriate criteria.

The assessment has concluded that the risk of the proposed scheme resulting in exceedances of either the ILP pre-curfew or post-curfew obtrusive light limitations at local residential receptors will be low.

Following the installation of an appropriate lighting scheme as detailed in this report, the risk of the proposed development resulting in exceedances of 1 lux along potential bat foraging/commuting routes and dark corridors is low at all ecological receptor locations. The risk of exceedances of 0.4 lux along the identified north western bat corridor is low, as recommended by the Bat Conservation Trust.

A comparison exercise has been undertaken to consider the results of this lighting assessment against those for the assessment previously completed for the approved scheme (ref. DC/20/1165). The comparison exercise shows that the proposed lighting scheme for the pending application does not result in increased light spillage towards the northern bat habitat when compared against the approved scheme.

Modelled ULR predicts a sky glow figure (ULR) of 0.0% with the ILP sky glow limitation for an area classified as Environmental Zone E2 is 2.5% ULR. As such the indicative lighting scheme meets the ILP sky glow limitations and is therefore will result no impacts on the dark sky landscape.

Overall, there is a low risk of significant adverse impacts on local sensitive ecological receptors.

The assessment demonstrates that the proposed development does not conflict with any national or local planning policies.

APPENDIX A – REPORT CONDITIONS

This Report has been prepared using reasonable skill and care for the sole benefit of Sexton Holdings Ltd ("the Client") for the proposed uses stated in the report by Tetra Tech Limited ("Tetra Tech"). Tetra Tech exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

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The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections'. Environmental conditions can vary, and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. Tetra Tech accept no liability for issues with performance arising from such factors.