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REDROW HOMES

GREAT WILSEY PARK, HAVERHILL: INFRASTRUCTURE RESERVED MATTERS APPLICATION

Lighting Strategy for Bats

Pursuant to Condition 44 of DC/15/2151/OUT

April 2019
8110.Lighting.vf1

ecology solutions for planners and developers

CONTENTS

PLANS

APPENDICES

1. INTRODUCTION

1.1 Background

1.1.1 Ecology Solutions was commissioned by Redrow Homes in October 2018 to prepare materials to address the requirements of planning conditions for the development at Great Wilsey Park (reference: DC/15/2151/OUT). A series of Reserved Matters Applications (RMAs) is to be submitted in early 2019. The location of the site is shown on Plan ECO1. The existing situation is illustrated on Plan ECO2.

1.1.2 Condition 44 requires that such applications be supported by a Lighting Strategy for Bats. The condition states:

All reserved matters applications shall be supported by a lighting strategy for bats based on appendix 4.3 of the ES and the mitigation measures in the relevant sections of the ES and additional supporting reports. The lighting strategy must include:

- **Plan of the phase of development being considered showing the lighting strategy and how it relates to the overall lighting strategy in figure 30 in the ES**
- **Location of features to be protected including existing and new linear features and associated unlit dark corridors or buffer**
- **Location and design of bat boxes, bricks and / or tubes to new buildings, woodland edges and suitable trees.**

Reason: To ensure that wildlife habitats and protected species are not affected adversely by the development.

1.2 Purpose of this Report

1.2.1 This report has been prepared to address the requirements of condition 44, providing details of the lighting strategy for bats to be adopted within the infrastructure phase of the development. Note that this relates solely to the construction and operation of the principal road and cyclepath infrastructure, and not to the residential parcels, which are the subject of a separate application.

2. REVIEW OF OUTLINE ES INFORMATION

2.1 Appendix 4.3: Prevention of Lighting Impacts on Bats

2.1.1 Appendix 4.3 of the ES, cited in condition 44, was produced by Vanguardia Consulting in August 2015. Entitled *Prevention of Lighting Impacts on Bats*, it sets out the principles by which adverse effects on identified bat populations will be avoided during and following development of the site.

2.1.2 The main points of the report are reviewed below to provide context to this strategy. It should be noted that the 2015 report has been given full consideration as part of the development of the Ecological Implementation Strategy, the Landscape and Ecological Management Plan and the Biodiversity Monitoring Strategy, all submitted in support of the Infrastructure Reserved Matters Application.

2.1.3 The introduction of the report notes (at paragraphs 2.3 and 2.4) that:

Artificial lighting that spills onto a route used by bats can deter them. This report shows how this will be prevented whilst allowing the appropriate artificial lighting for the amenity and safety of residents and users of the Development.

All roads on the Development will need to be illuminated. There will be some locations where bat routes cross lit roads. At those points bat hop overs will be provided to assist bats to cross the road undeterred.

2.1.4 The report is therefore clear that there will be necessary interruptions to existing bat flightlines, but that good design can mitigate for these effects. It also makes clear that the safety of residents and drivers is the primary consideration.

2.1.5 Suffolk County Council's lighting requirements, as set out in section 3 of the report, are as follows:

- **Lighting unit: Philips-Indal Stela B Long with 14 LED light source. These units have a particularly sharp optical cut-off, thus containing light spill very well. They emit all of their light downwards; there is no light above the horizontal plane.**
- **Mounting height: 6 metres.**
- **Hours of use: Dusk to midnight, then switched off at midnight until 5 a.m. Lighting levels: 5 lux, and in sensitive areas 3 lux or 2 lux. Specific local amenity and environmental requirements will be considered at detailed design stage when selecting the lighting level for each street and footpath / cyclepath.**
- **Control: Telensa county-wide remote management system- remote setting of light level (dimming) and switching times, down to individual streets and lighting units. Enables any identified light pollution problem to be mitigated in the future**

2.1.6 Regarding the lighting unit, paragraph 3.2 notes that:

…the low illuminance requirements, the possibility of dimming even further when and where necessary, and the excellent optical cut-off characteristic of the preferred lighting unit, all combine to make it much easier to create a lighting solution that has no impact on bats.

2.1.7 Paragraph 5.1 notes that it:

…is widely agreed that impacts on bats can be prevented by reducing light spill below 1 lux along routes used by bats.

2.1.8 Paragraph 5.2 goes on:

…where bat routes cross a lit road in a built-up area it is not possible to achieve this without affecting safety and amenity for road users and pedestrians. In these instances the solution is to provide a bat hop over to encourage bats to raise their flying height above the level of nearby lighting units and thus continue to fly in a dark space.

2.1.9 Section 6 of the report is concerned with street lighting for roads and footpaths / cyclepaths adjacent to sensitive ecological areas. As illustrated in Figure 2a of the report, features such as woodland edges and hedgerows, along which some bat species will typically move, will be a minimum of 15m away from the nearest street lighting unit. Figure 2b of the report (a light spill diagram) shows that in following this protocol, light spill is tightly contained and will not adversely affect the feature in question.

2.1.10 Section 8 provides an illustration, at Figure 4, of a typical bat hop-over arrangement at lit crossing points.

2.2 ES Mitigation Measures

2.2.1 Mitigation measures in terms of the potential effects of lighting on bats are set out in Appendix 9.8 of the ES, the Bat Survey Report. These are summarised below.

- No lighting of trees identified as bat roosts;
- Minimum 15m buffer along woodland edges, to maintain a lighting level of 1 lux or less;
- Woodland remans connected to dark corridors that extend to the wider environment;
- Dark corridors across the site designed to ensure and incorporate habitats of value to bats for foraging, potential roosting and commuting into the wider area;
- Dark corridor routes for bats to incorporate natural dark routes already present;
- To maintain linkages and an area of darkness (below 1lux) across gaps created by the road accesses through the hedgerows, young plantation woodland and tributary corridor, hop-overs to be established;
- These comprise trees that are already semi-mature (6m in height) planted at either side of the road so that the canopies of these trees will be allowed to interlink over this section of road;
- These standard trees to be planted immediately following the removal of hedgerows / trees to facilitate road access; and
- Green infrastructure to be established early in the process.

2.2.2 Construction phase mitigation measures are to include the following:

- During the construction period no lighting to be present at night;
- Lighting to be directed to where it is needed, to avoid light spillage, particularly along the hedgerow and woodland edges;
- Buffer zones not to be illuminated; and
- Any upward lighting should be avoided.

2.2.3 These measures have been given full consideration in developing the landscape and lighting strategy for the Infrastructure RMA.

3. INFRASTRUCTURE RMA LIGHTING STRATEGY

3.1 Figure 30 of the ES, the Bat Lighting Mitigation Strategy, is included at Appendix 1 to this report. The Infrastructure RMA forms a substantial part of the Redrow site, which is the first phase of the development of Great Wilsey Park.

3.2 Figure 30 shows the design and location of bat hop-overs, and the position of dark corridors to serve as bat foraging and dispersal routes. All of these factors have been fully incorporated into the Infrastructure RMA scheme, as illustrated on Plan ECO3.

3.3 Across the site, dark corridors have been designed to ensure and incorporate habitats of value to bats for foraging, potential roosting and commuting into the wider area.

3.4 Development will be buffered from features of value to bats, such as hedgerows and woodland edges, that will be incorporated within the dark corridor, the buffer zones have been designed to be of sufficient size (a minimum of 10 or 15m) that will ensure that the features utilised by bats will maintain a light level of below 1 lux.

3.5 Habitat corridors to be created extending out of the site to the north have been designed with native species planting (2m in height) which will ensure that a dark corridor (below 1 lux) is maintained on the outer edge of the new habitats to increase linkages to the wider environment and provide additional foraging habitat for bats following completion of the development.

3.6 In order to maintain the linkages and an area of darkness (below 1 lux) across the gaps created by the road access through the hedgerows, young plantation woodland and tributary corridor a 'hop-over' will be created. This comprises trees that are already semi-mature (6m in height) planted at either side of the road so that the canopies of these trees will be allowed to interlink over this section of road. To minimise the potential effects to bats (particularly Barbastelle) during the development these standard trees will be planted immediately following the removal of hedgerows / trees to facilitate road access.

3.7 Other lighting considerations will also be implemented during construction and incorporated into the development in order to ensure minimal light spill from the site. Lighting will be directed to where it is needed, to avoid light spillage, particularly along the hedgerow and woodland edges; buffer zones will not be illuminated; lighting that is incorporated into the development design will be of a type that has a low attraction to insects; and any upward lighting will be avoided. During the construction period no lighting to be present at night.

3.8 The lighting strategy produced by Harttron in association with Royal Haskoning DHV on behalf of Redrow Homes is included at Appendix 2 to this report.

3.9 The report details the luminaires to be used, which are equivalent to the model cited in the previous section, as named in Appendix 4.3 to the ES.

3.10 The report shows the position of luminaires relative to the bat hop-overs at access road crossings. The figures illustrating horizontal luminance show that in the immediate vicinity of the luminaires the level of 3.69 lux, but that this declines to 0.74 lux a short distance away.

3.11 Lighting columns at bat hop-over locations are to be 4m in height rather than 6m as elsewhere in the site. This will increase the volume of the darker areas above the columns. Trees planted in these locations are to be a minimum of 6m in height, and therefore bats will be encouraged to fly up and over the illuminated area below. The design of the columns is directional, with light focused on the ground below rather than upwards.

3.12 These features will ensure that an effective dark corridor for bats is maintained at the bat hop-over locations.

3.13 The Reserved Matters Street Lighting Plan (reference PB8301-RHD-DE-H1-DR-D-1300) at Appendix 3 produced by Royal Haskoning DHV overlays the lighting scheme onto the proposed layout. The lux contours are shown, with the 0.74 contour in blue and the 0.4 contour in purple. It can be seen that this is reached a short distance from the lit routes, and that therefore the large majority of the green spine and linear park, as well as the woodlands, are in darkness.

4. LOCATION OF FEATURES TO BE PROTECTED

4.1 The locations of features to be protected, i.e. retained and new habitats, plus trees identified as bat roosts, are shown on Plan ECO3. These features are protected from lighting effects within a designated dark corridor.

4.2 The Reserved Matters Lighting Plan at Appendix 3 shows that the majority of the existing and proposed features will be in darkness. The 0.74 lux contour is reached within a short distance of the lit infrastructure.

5. LOCATION AND DESIGN OF BAT BOXES

5.1 The Infrastructure RMA does not include any buildings, and therefore all bat boxes proposed are designed for attachment to trees.

5.2 The locations of proposed bat boxes are illustrated in Plan ECO3. The following models are to be included (as set out in the Ecological Implementation Strategy and the Landscape and Ecological Management Plan):

- 20 Schwegler 2F Universal Bat Boxes;
- 20 Schwegler 1FF Flat Bat Boxes; and
- 5 Schwegler 1FW Hibernation Boxes.

5.3 All boxes are to be positioned well away from new light sources, on retained trees. The specifications are shown in Appendix 4.

6. SUMMARY AND CONCLUSIONS

6.1 Ecology Solutions was commissioned by Redrow Homes in October 2018 to prepare materials to address the requirements of planning conditions for the development at Great Wilsey Park (reference: DC/15/2151/OUT). A series of Reserved Matters Applications (RMAs) is to be submitted in early 2019.

6.2 Condition 44 requires that such applications be supported by a Lighting Strategy for Bats. The condition states:

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- **Location of features to be protected including existing and new linear features and associated unlit dark corridors or buffer**
- **Location and design of bat boxes, bricks and / or tubes to new buildings, woodland edges and suitable trees.**

6.3 This document reviews the information set out in Appendix 4.3 (*Prevention of Lighting Impacts on Bats*) and the ES accompanying the outline application. These measures have formed the basis of the approach taken to lighting and landscaping of the Infrastructure RMA and consideration of its affect on local bat populations.

6.4 A lighting strategy has been produced by Harttron in association with Royal Haskoning DHV.

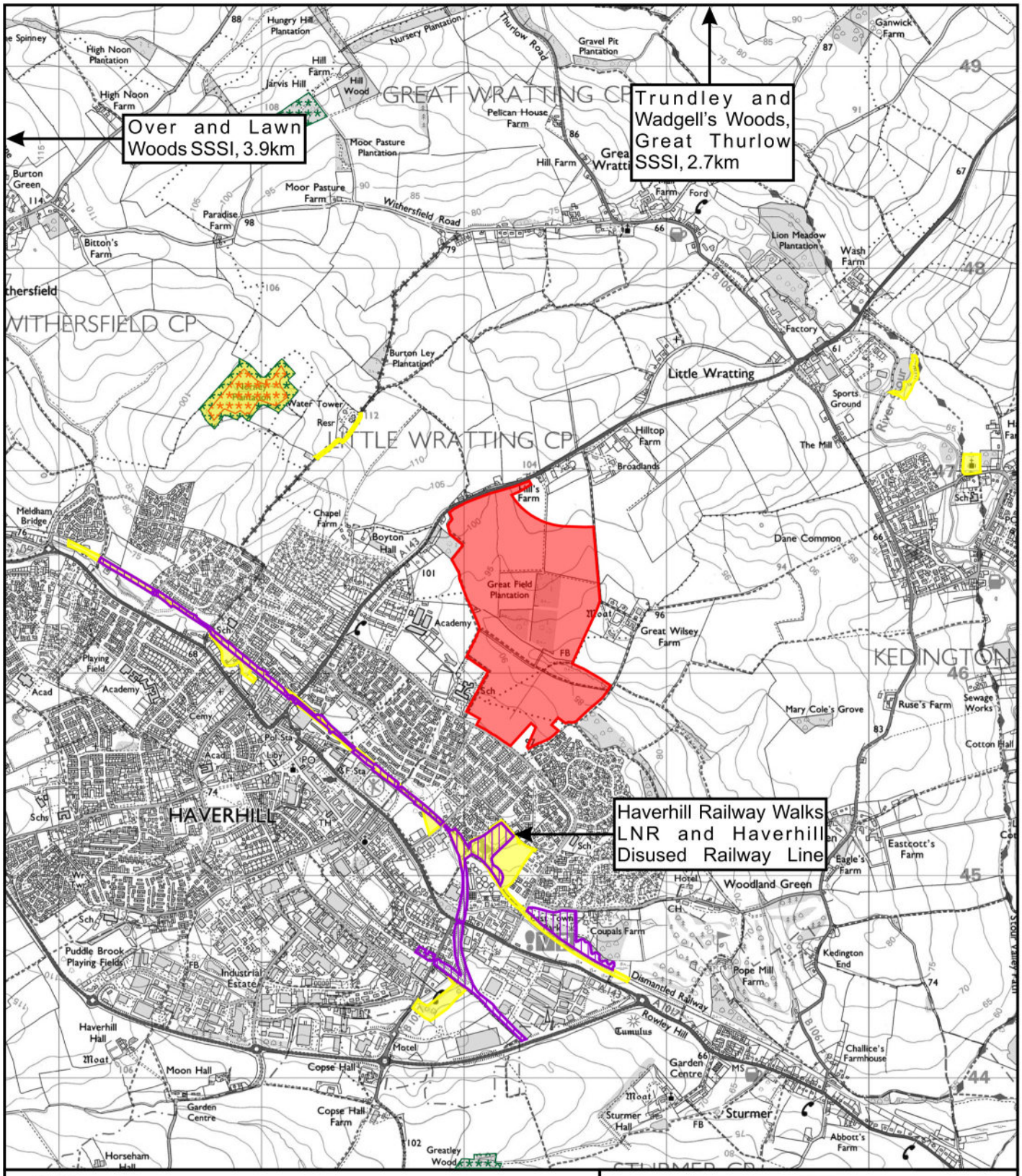
6.5 Luminaires proposed are in line with prescriptions given in the ES. Bat hop-overs have been incorporated at all road access points, with luminaires at this location being 4m in height, less than the 6m of new trees to be planted. Existing and proposed habitat features, including woodlands and hedgerows, will not be lit. Trees identified as bat roosts will not be lit; similarly bat boxes to be installed as enhancements. Specific measures are included to avoid potential adverse effects during construction.

6.6 The approach proposed is in line with the requirements of Appendix 4.3 and the ES, including the overall lighting strategy illustrated on Figure 30. The design and the measures to be adopted will avoid significant adverse effects on bats as a result of lighting. The strategy will ensure that bats will continue to be able to forage, disperse and roost within the site post-development.

PLANS

PLAN ECO1

Site Location and Ecological Designations



KEY:

- SITE LOCATION
- LOCAL NATURE RESERVE (LNR)
- COUNTY WILDLIFE SITE (CWS)
- ANCIENT WOODLAND
- ANCIENT REPLANTED WOODLAND

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8110: GREAT WILSEY PARK, HAVERHILL

PLAN ECO1: SITE LOCATION AND ECOLOGICAL DESIGNATIONS

PLAN ECO2

Ecological Features

KEY:

- SITE BOUNDARY
- ARABLE LAND
- WOODLAND
- IMPROVED GRASSLAND
- DITCH
- STOUR BROOK TRIBUTARY
- POND
- HEDGEROW
- TREE
- TRACK

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PLAN ECO2: ECOLOGICAL FEATURES

PLAN ECO3

Lighting Strategy

KEY:

- DARK CORRIDOR
- CONFIRMED BAT ROOST
- BAT HOP-OVER
- 45X SCHWEGLER 2F, 1FF AND 1FW BAT BOX
- BAT FORAGING ROUTES

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Based on Exterior Architecture Drawing No. ExA_1868_Illustrative Masterplan

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PLAN ECO3:
LIGHTING STRATEGY

APPENDICES

APPENDIX 1

Figure 30: Bat Lighting Mitigation Strategy (FPCR)

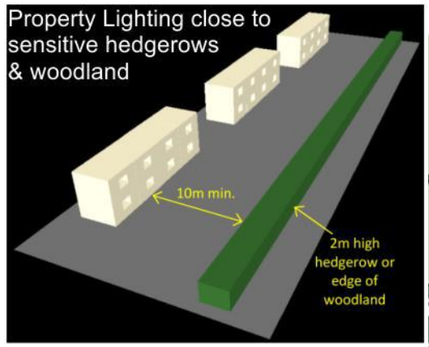

Figure 3a: Properties backing onto bat routes

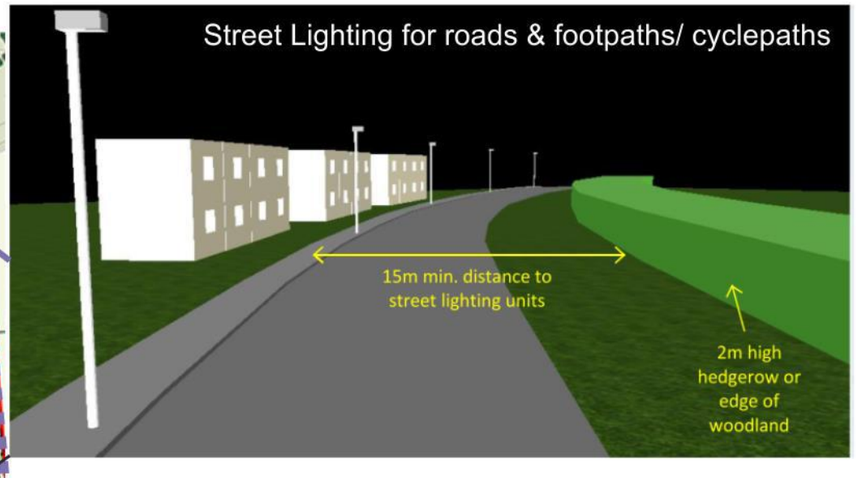

Figure 2a: Street lighting arrangement near bat routes

- Development Boundary
- Proposed Hop Over Location
- Bat Route - Dark Corridor
- Lit Cycle Paths
- Lit Roads

Hallam Land Management Ltd

Great Wilsey Park, Haverhffolk

Bat Lighting Mitigation Strategy

N

NTS @ A3 REH 04/02/2016

Figure 30 **REV A**

FPCR Environment and Design Ltd, Lockington Hall, Lockington, Derby, DE74 2RH ▪ t: 01509 672772 ▪ f: 01509 674565 ▪ e: mail@fpcr.co.uk ▪ w: www.fpcr.co.uk ▪
masterplanning ▪ environmental assessment ▪ landscape design ▪ urban design ▪ ecology ▪ architecture ▪ arboriculture ▪

J:\\500\55055\ECO\2014Survey\Bats\Report\Figure30-BatLightingMitigationStrategy.cdr

APPENDIX 2

Outdoor Lighting Report (Harttron)

DATE:	**21 March 2019**
DESIGNER:	**MP**
PROJECT No:	**20320**
PROJECT NAME:	**Haverhill, Suffolk**

20320-A-01

P4 with S/P ratio of 1/.61

Bat Corridor Areas Only

Outdoor Lighting Report

PREPARED BY:

Harttron Ltd,
Units 3-3a,
Second Avenue,
Poynton Industrial Estate,
Poynton
Cheshire
SK12 1ND

T: 01625 850 855
F: 01625 850 856

c:\users\admin\desktop\20320-a-01.rtma

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	567201.56	245210.37	2135.01	2127.68	85.40	85.11
2	Grid 2	568119.88	246647.37	60.00	30.00	1.50	1.50
3	Grid 3	568136.46	246491.44	48.00	21.00	1.50	1.50
4	Grid 4	568148.56	245978.46	39.00	66.00	1.50	1.50
5	Grid 5	568409.45	245752.95	99.00	114.00	1.50	1.50

Luminaires

Luminaire A Data

Supplier	Philips
Type	BGP615_DX70_2400_10LED_5.1S_CLO_L90_NW
Lamp(s)	LED-HB 5.1S NW
Lamp Flux (klm)	2.40
File Name	Luma Micro_BGP615_DX70_2400_10LED_5.1S_CLO_L90_NW.ies
Maintenance Factor	0.76
Imax70,80,90(cd/klm)	328.4, 277.9, 0.0
Lamp S/P Ratio	1.61
No. in Project	10

Luminaire B Data

Supplier	Philips
Type	BGP615_DX70_3400_20LED_5.1S_CLO_L90_NW
Lamp(s)	LED-HB 5.1S NW
Lamp Flux (klm)	3.40
File Name	Luma Micro_BGP615_DX70_3400_20LED_5.1S_CLO_L90_NW.ies
Maintenance Factor	0.76
Imax70,80,90(cd/klm)	328.4, 277.9, 0.0
Lamp S/P Ratio	1.61
No. in Project	1

Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	568359.50	245810.54	4.00	313.00	0.00	0.00	0.30			
2	A	568381.06	245827.92	4.00	303.00	0.00	0.00	0.30			
3	A	568410.54	245828.45	4.00	107.00	0.00	0.00	0.30			
4	A	568434.80	245841.93	4.00	134.00	0.00	0.00	0.30			
5	A	568171.91	245978.01	4.00	344.00	0.00	0.00	0.30			
6	A	568188.05	245997.36	4.00	155.00	0.00	0.00	0.30			
7	A	568185.34	246017.32	4.00	337.00	0.00	0.00	0.30			
8	A	568150.52	246505.69	4.00	278.00	0.00	0.00	0.30			
9	A	568178.29	246497.72	4.00	96.00	0.00	0.00	0.30			
10	B	568151.51	246683.03	4.00	294.00	0.00	0.00	0.30			
11	A	568134.65	246666.57	4.00	113.00	0.00	0.00	0.30			

730156148

DATE: 21 March 2019 DESIGNER: MP

PROJECT No: 20320 PROJECT NAME: Haverhill, Suffolk

Horizontal Illuminance (lux)

Grid 1

Results

Eav	2.90
Emin	2.90
Emax	2.90
Emin/Emax	1.00
Emin/Eav	1.00

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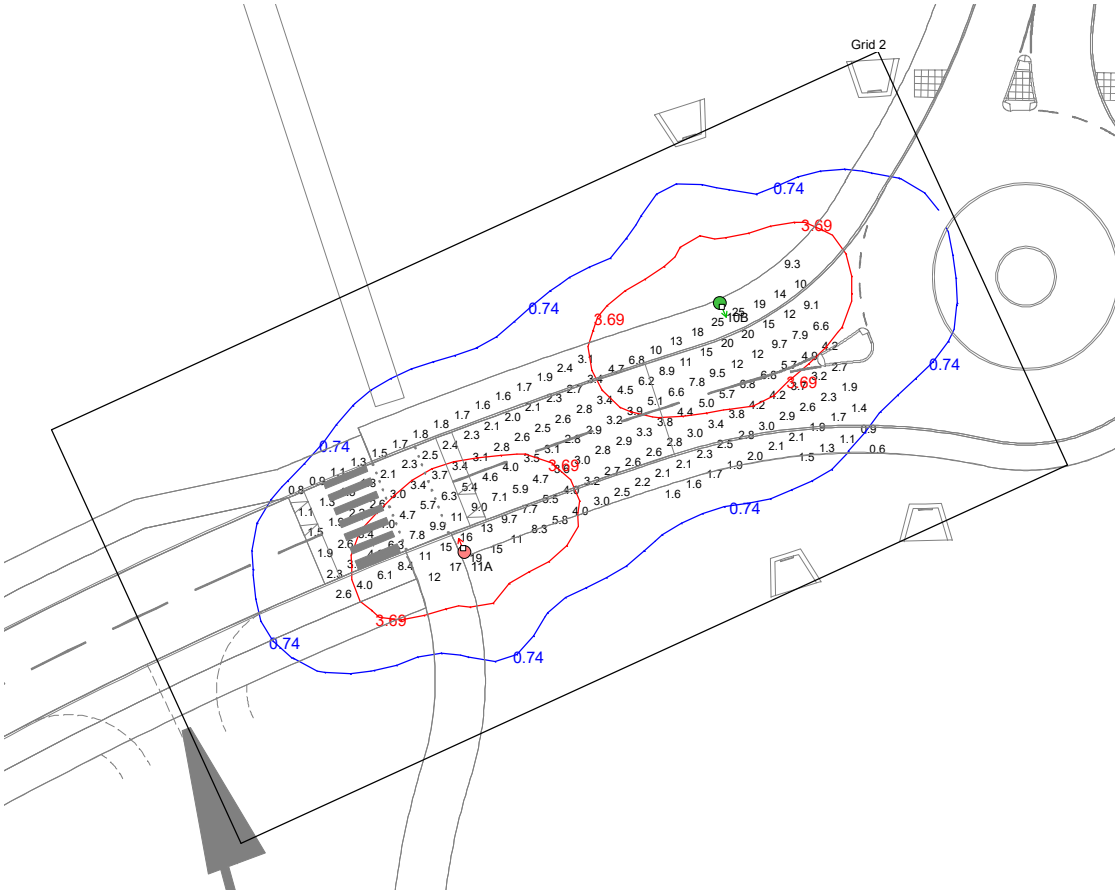
Horizontal Illuminance (lux)

Grid 2



Results

Eav	5.32
Emin	0.56
Emax	25.26
Emin/Emax	0.02
Emin/Eav	0.10

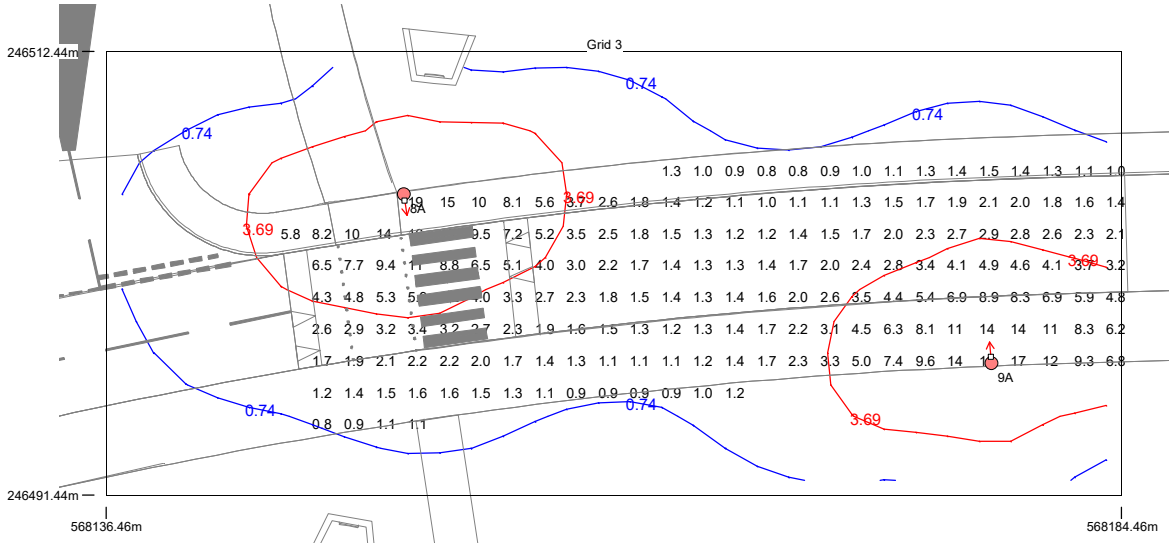
730156148

DATE: 21 March 2019 DESIGNER: MP

PROJECT No: 20320 PROJECT NAME: Haverhill, Suffolk

Horizontal Illuminance (lux)

Grid 3



Results

Eav	3.84
Emin	0.82
Emax	18.60
Emin/Emax	0.04
Emin/Eav	0.21

730156148

Horizontal Illuminance (lux)

Grid 4

Results

Eav	4.66
Emin	0.84
Emax	18.28
Emin/Emax	0.05
Emin/Eav	0.18

730156148

Horizontal Illuminance (lux)

Grid 5

Results

Eav	3.80
Emin	0.76
Emax	18.28
Emin/Emax	0.04
Emin/Eav	0.20

730156148

APPENDIX 3

Bat Box Specifications

Bat Boxes

Schwegler bat boxes are made from ‘woodcrete’ and have the highest rates of occupation of all types of box.
The 75% wood sawdust, clay and concrete mixture is ideal, being durable whilst allowing natural respiration and temperature stability. These boxes are rot and predator proof and extremely long lasting.

2F Bat Box

A standard bat box, attractive to the smaller British bat species. Simple design with a narrow entrance slit on the front.

Woodcrete construction, 16cm diameter, height 33cm.

1FF Bat Box

The rectangular shape makes the 1FF suitable for attaching to the sides of buildings or on sites such as bridges, though it may also be used on trees. It has a narrow crevice-like internal space to attract Pipistrelle and Noctule bats.

Woodcrete construction.
Width: 27cm
Height: 43cm
Weight: 8.3kg

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Bat Boxes

Schwegler bat boxes are made from ‘woodcrete’ and have the highest rates of occupation of all types of box.
The 75% wood sawdust, clay and concrete mixture is ideal, being durable whilst allowing natural respiration and temperature stability. These boxes are rot and predator proof and extremely long lasting.

1FW Bat Hibernation Box

This huge box is designed to provide a protected environment which is particularly important through the cold winter months when bats are hibernating. Three wooden panels within the box imitate crevices for roosting.

Woodcrete construction, 38cm diameter, height 50cm, weight 28kg.

This heavy box requires secure mounting if placed above the ground and should be sited away from public areas.

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e c o l o g y s o l u t i o n s f o r p l a n n e r s a n d d e v e l o p e r s