

THE DELL, PAKENHAM

16/12/2022

BIODIVERSITY ENHANCEMENT STRATEGY, METHOD STATEMENT AND LIGHTING STRATEGY

Preface

This strategy is to be read in conjunction with the Ecological Appraisal Report (July 2021) submitted with planning application [DC/21/1882/FUL](#)

This statement aims to satisfy condition 4, 5, 6 and 7 of the planning permission which states:

4- *“Prior to commencement of development, a Method Statement for bats, nesting birds, reptiles, amphibians and hedgehogs shall be submitted to and approved in writing by the local planning authority. This will contain precautionary mitigation measures and/or works to reduce potential impacts to these species during the construction phase. The measures and/works shall be carried out strictly in accordance with the approved details and shall be retained in that manner thereafter.*

Reason: To conserve Protected and Priority species and allow the LPA to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife & Countryside Act 1981 (as amended) and s40 of the NERC Act 2006 (Priority habitats & species)”

5- *“All mitigation and enhancement measures and/or works shall be carried out in accordance with the details contained in the Preliminary Ecological Appraisal (Eco-Check, July 2021) as already submitted with the planning application and agreed in principle with the local planning authority prior to determination.*

This may include the appointment of an appropriately competent person e.g. an ecological clerk of works (ECoW) to provide on-site ecological expertise during construction. The appointed person shall undertake all activities, and works shall be carried out, in accordance with the approved details.

Reason: To conserve and enhance protected and Priority species and allow the LPA to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife & Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats & species).”

6- *“Prior to any works above slab level, A Biodiversity Enhancement Strategy for protected and Priority species shall be submitted to and approved in writing by the local planning authority. The content of the Biodiversity Enhancement Strategy shall include the following:*

a) Purpose and conservation objectives for the proposed enhancement measures;

b) detailed designs to achieve stated objectives;

c) locations of proposed enhancement measures by appropriate plans; d) timetable for implementation demonstrating that works are aligned with the proposed phasing of development;

e) persons responsible for implementing the enhancement measures;

f) details of initial aftercare and long-term maintenance (where relevant).

the works shall be implemented in accordance with the approved details prior to occupation and shall be retained in that manner thereafter.

Reason: To enhance protected and Priority species & habitats and allow the LPA to discharge its duties under the s40 of the NERC Act 2006 (Priority habitats & species).”

7- *“Prior to occupation, a lighting design scheme for biodiversity shall be submitted to and approved in writing by the local planning authority. The scheme shall identify those features on site that are particularly sensitive for bats and that are likely to cause disturbance along important routes used for foraging; and show how and where external lighting will be installed (through the provision of appropriate lighting contour plans, Isolux drawings and technical specifications) so that it can be clearly demonstrated that areas to be lit will not disturb or prevent bats using their territory. All external lighting shall be installed in accordance with the specifications and locations set out in the scheme and maintained thereafter in accordance with the scheme. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority.*

Reason: To allow the LPA to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife & Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats & species)”

The following table summarises the recommended mitigation and enhancements made within the report, along with the measures taken within the design in order to meet - and in some cases exceed - these recommendations.

Protected habitats/species	Status	Potential effect	Recommended mitigation and enhancements	Design Intent to meet recommendations
Protected sites	The site is within the impact zone of Pakenham Meadows SSSI	No significant impacts predicted on protected sites and their qualifying features.	None required.	Owing to the distance to the protected site, the habitats affected on site, and the limited impacts predicted beyond the area of works, we expect no impacts on any protected sites or on their qualifying features.
Protected habitats and habitats subject to conservation designations	<p>The site is located within a wider landscape that is of medium value for biodiversity, the site itself is bordered by dwellings, gardens, mature deciduous trees and roads, these are of low to moderate ecological interest. Within the 2km search area there is one statutory designated site, The Pakenham meadows SSSI.</p> <p>Habitats affected on site mainly consisting of rough amenity grassland, ornamental plants and shrubs, mature trees, tall ruderal areas, hedging and buildings.</p>	Low-scale loss of habitats for wildlife.	<p><i>Mitigation</i></p> <p>Boundary hedgerows and trees to be protected by Heras fencing in accordance with BS:5837 (2012)</p> <p>Construction work to be carried out in accordance with BSI (2012), BS 5837:2012, to protect trees and their root protection areas.</p> <p>Soft landscaping scheme to include planting of new native trees, and/or hedgerows on site, and WFG20 Germinal amenity species rich amenity grassland in addition to ornamental plants and shrubs.</p>	The soft landscaping scheme includes the planting of new trees and species-rich hedgerows within the site, using native species as specified with the proposed landscape plan submitted to satisfy
Bats	<p>The bungalow had low roosting potential and after a survey no bat emergence or active roosts were identified.</p> <p>A maternity roost was present within a large mature oak beyond the north-west corner of the site within a private garden and outside the application site.</p>	<p>No mitigation licence required</p> <p>Low-scale loss and potential disturbance through artificial light of commuting and foraging habitats on site.</p>	<p>Sensitive lighting and retention of boundary trees and hedging which provide a corridor to and from the trees. See attached lighting calculations and lux contour map.</p> <p>Due to the proximity of the bungalow to a tree roost and the small possibility of bats being present under the roof tiles, lead flashing etc. a supervised roof strip is advised prior to demolition.</p> <p>- At present the availability of bat roosts within the site is limited. The combination of trees, hedges, grassland, etc. are valuable to foraging and commuting bats.</p> <p>Bat Boxes- As a biodiversity enhancement and to compensate for the potential disturbance, areas for bats to roost in should be created and will include 3 boxes and 2 bricks.</p> <ul style="list-style-type: none"> • 2 x Eco-Roost Pentagon Bat Box on a mature tree or building within the site. • 1 x Eco-Roost Kent Box on a mature tree or building within the site. • 2 x Eco-Roost Bat Bricks in gable walls of new dwellings 	The landscape lighting scheme will follow guidance from the Bat Conservation Trust and CIE 150:2003. No lighting will directly face existing or newly planted commuting and foraging habitats. New lighting systems will have a minimal spread of light only directed at the area requiring lighting and will include warm-white (long wavelength) lights with UV filters fitted as close to the ground as possible, with lighting units angled below 70° and equipped with movement sensors, baffles, hoods, louvres and horizontal cut off units at 90°.

Breeding birds	<p>Nesting habitats for birds present on Site within bramble stands and hedgerow base.</p> <p>Foraging habitats for birds including birds of prey within site.</p> <p>Site habitat not suitable for ground nesting birds.</p>	<p>The development will result in the loss of nesting habitat in the form of buildings, scrub and trees, and could see the damage or destruction of active nests if clearance is undertaken during the nesting season.</p>	<p><i>Mitigation</i></p> <p>Works to the buildings, trees and hedgerows on site to be conducted outside bird nesting season or if not possible, immediately following a nesting bird check by a qualified ecologist.</p> <p>Planting of new native trees and hedgerows on site, and areas of tall grassland to be retained on site.</p> <p><i>Enhancement</i></p> <p>To increase nesting opportunities generally, nest boxes will be installed. Installation of the nest boxes will be supervised by 'Eco-Check Ltd' or an experienced ecologist to ensure the correct positioning for each species. The types of nest boxes will cover a range of species and will include 6 boxes.</p> <ul style="list-style-type: none"> • 2 x Eco-Roost (32mm) • 2 x Eco-Roost (28mm) • Eco-Roost wren roundhouse boxes • Eco-Roost deep nest boxes for robins 	<p>Any works affecting or in close proximity to bird nesting habitats (including removal of any hedgerows, trees, and works to the buildings) will be conducted outside the main nesting season, which lasts from March to end of August. If this is not possible, a check of these habitats will be conducted by a qualified ecologist immediately prior to starting any works. If any nesting birds are found, an appropriate protection zone from the nest will be required and maintained until the young have fledged.</p> <p>To compensate for the minor loss of nesting and foraging habitats and enhance the value of the site for birds, new species-rich native hedgerows and trees will be planted within and around the site. They will include a mixture of deciduous, evergreen and fruit species to provide a variety of nesting, sheltering and foraging features.</p>
Great crested newts	One record of GCN within the last 15 years.	<p>Potential loss of GCN terrestrial habitat along with death or injury of the local population.</p> <p>Risk of harming GCN if present on site during works.</p>	<p><i>Mitigation</i></p> <p>Grass to be kept cut short prior to works commencing</p> <p>Any spoil or debris arising from works to be moved straight into a skip or removed from site to prevent use by herpetofauna.</p>	
Reptiles	Minor records of reptiles, habitat mostly unsuitable.	<p>Low-scale loss of habitat.</p> <p>Risk of injuring or killing individual reptiles if present on site during works.</p>	<p><i>Mitigation</i></p> <p>Site clearance to be undertaken by hand, with special care and outside hibernating season.</p> <p>Grassland on site to be maintained at maximum height of 10cm before and during works.</p> <p>Any refuge created on site to be removed off site within the same day.</p> <p>Any excavations on site to be covered overnight or have a ramp.</p> <p>Construction materials to be stored off the ground on pallets.</p> <p>Areas of rough grassland to be retained on site edges, or new hedge or scrub to be planted.</p>	<p>Any site clearance (such as the removal of scrub and piles of brush, compost and building materials) will be undertaken by hand and with special care to ensure that no animals potentially sheltering underneath are harmed. The removal of these features will be conducted outside the hibernating season (which typically lasts from October to March)</p> <p>To discourage animals from the site during the works, the following measures will be taken: Grassland maintained at height of 10cm; any refuge created on site to be removed off site within the same day; any excavations on site to be covered overnight or have a ramp; construction materials to be stored off the ground on pallets and areas of rough grassland to be retained on site edges and new hedge or scrub to be planted.</p>
Hedgehogs and Small Mammals	Garden habitat suitable for hedgehogs and other small mammals	Low-scale habitat loss in short term. Risk of injuring or killing individual reptiles if present on site during works	Ecological Clerk of Works- ECoW- To undertake pre-works site inspection and removal of any suitable refuge/hibernacula.	Habitat Bank/Pile to be created in a sheltered, undisturbed corner of the site to provide a refuge. One hedgehog house to be installed in each garden.

Detailed Designs

Bat Boxes

At present the availability of bat roosts within the site is limited. The combination of trees, hedges, grassland, etc. are valuable to foraging and commuting bats. Bat Boxes- As a biodiversity enhancement and to compensate for the potential disturbance, areas for bats to roost in should be created and will include 3 bat boxes and 2 bat bricks.

- 2 x Eco-Roost Pentagon Bat Box on a mature tree or building within the site.
- 1 x Eco-Roost Kent Box on a mature tree or building within the site.
- 2 x Eco-Roost Bat Bricks in gable walls of new dwellings

These boxes are to be installed on the boundary trees within the site or on the new buildings, ideally one on each elevation to provide the best variation in temperature, shelter and flight lines. If only one elevation is used this should be south-east facing as this provides the most shelter and warmth.

Bird Boxes:

To increase nesting opportunities generally, nest boxes will be installed. Installation of the nest boxes will be supervised by 'Eco- Check Ltd' or an experienced ecologist to ensure the correct positioning for each species. The types of nest boxes will cover a range of species and will include 6 boxes.

- 2 x Eco-Roost (32mm)
- 2 x Eco-Roost (28mm)
- 1 x Eco-Roost wren roundhouse boxes
- 1 x Eco-Roost deep nest boxes for robins

Tree and Hedge Planting

A new double row staggered hedge with spaced tree standards to be created along the boundaries of the site.

Hedging will be planted between October and April when the ground is moist and free from frost, set out in a staggered pattern in two rows 40cms apart. The native species will consist of 50% Hawthorn (*Crataegus monogyna*) with a mixture of at least five of the following species: - Blackthorn (*Prunus spinosa*), Field Maple (*Acer Campestre*), Hazel (*Corylus Avellana*), Hornbeam (*Carpinus Betulus*), Holly (*Ilex aquafolium*), Dogwood (*Cornus Sanguinea*) and Guelder Rose (*Viburnum opulus*), See Table 1.

The hedgerow shrubs will be planted as a mixture, but with the supplementary species (Guelder Rose, Spindle and Dog Wood) distributed in groups of 3 or 4 ensuring that the plants are incorporated into both rows and not in a single line within one row. The hedgerow shrubs will be individually protected by 0.6 m Tubex wide mouthed shrub guards supported by a 0.75 m pressure treated softwood stake, or by 0.6m spiral guards supported by a cane. The hedges will be maintained until fully established with losses replaced annually, and then managed by biennial flailing to achieve the characteristic low box profile shape.

The hedgerow mix is beneficial to wildlife and planting to the following specification.

PLANTING SCHEDULE				
HEDGEROW MIX (As necessary)				
SPECIES	DENSITY	AGE	ROOT	HEIGHT
10% Blackthorn (<i>Prunus spinosa</i>)	0.45m	1+1 or 1/1	BR	40-60cm
50% Hawthorn (<i>Crataegus monogyna</i>)	0.45m	1+1 or 1/1	BR	40-60cm
10% Guelder Rose (<i>Viburnum opulus</i>)	0.45m	1+1 or 1/1	BR	40-60cm
10% Dog Rose (<i>Rosa Canina</i>)	0.45m	1+1 or 1/1	BR	20-30cm
5% Dog Wood (<i>Cornus sanguinea</i>)	0.45m	1+1 or 1/1	BR	20-30cm
5% Holly (<i>Ilex aquifolium</i>)	0.45m	1+1 or 1/1	CG-3I	40-60cm
10% Hazel (<i>Corylus avellana</i>)	0.45m	1+1 or 1/1	BR	40-60cm

Table 1.- Hedgerow Planting Mix

Lawn planting

In areas where grass seed is required to be sown, WFG20 Germinal amenity species rich lawn mix should be used

Responsibility for Implementing Enhancement Measures

The implementation for the enhancement measures will be the responsibility of the site owner. A letter of compliance with the above recommendations to be submitted to the LPA prior to the site first being brought into use.

Contingency Procedures

In the event that breeding birds, roosting bats, herpetofauna or other protected species are found during the works the following procedures would be followed:

- An appropriately qualified ecologist would be contacted immediately and all work in the vicinity should cease until the ecologist has been able to make an assessment of the situation.
- If nesting or ground nesting birds are found within the working area following commencement of works, a buffer zone would be marked around the nest using high-visibility fencing and the nest subsequently monitored by an ecologist to ensure that the nest is not disturbed, damaged or destroyed by operations.

Task	Month	Comments
Enhancement		
Installation of bat boxes	Any	To be installed following manufacturers specification, prior to occupation of the building. Location in Figures 1.
Installation of bird boxes	Any	To be installed following manufacturers specification, prior to occupation of the building. Location in Figures 1.
Seed wildflower meadow.	March until October	Sow according to suppliers specifications.
Plant trees and hedgerows	October until April	Trees and shrubs to be planted, protected and supported following industry best practice. Mulch to be provided around tree base.
Habitat Management		
Check bat boxes externally	October to February	Replace lost or damaged boxes. Ecologist to check damaged bat box prior to removal if it can't be seen from the ground that it is empty.
Mow wildflower meadow	Spring Autumn	Grasses will start to grow before the wildflowers, a spring cut in April down to 10cm will reduce competition from grasses. Remove all grass cuttings to avoid adding fertility back to soil. Make a 'hay cut' to 10cm, leave cuttings to dry on surface for a week allowing cut flowers to shed their seed. Rake cuttings. Annual seeds need to reconnect with the soil, vigorous raking is required to break the surface.
Watering of trees and hedgerows.	May to September	Provide ample weekly watering during long hot periods.
Check trees	October to March	Dead or unhealthy trees to be replaced before end of subsequent April. Mulch, supports and protective measures to be replaced if required

Table 2- Management Plan and Timings

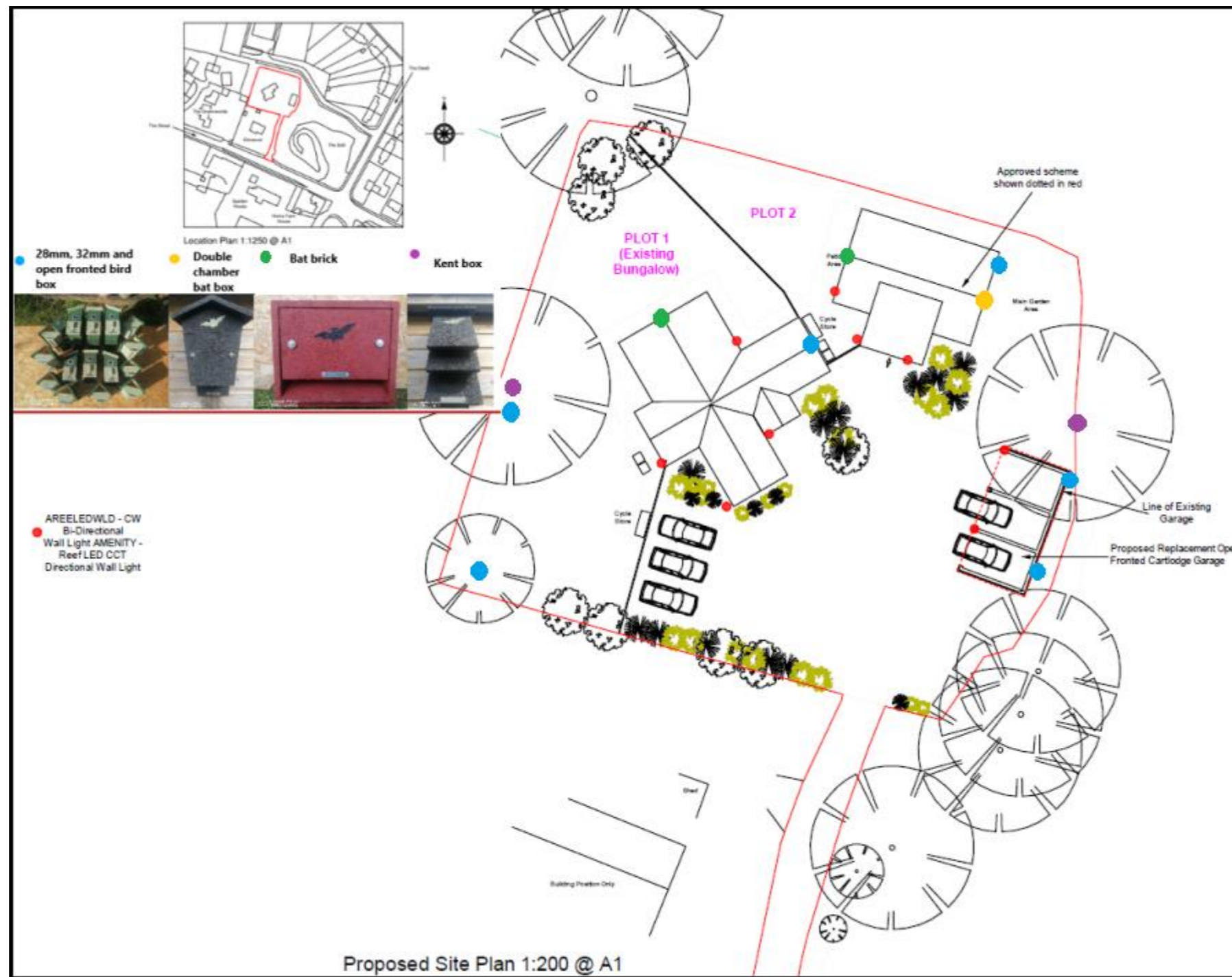


Figure 1- Site Plan and location of bird and bat boxes, bat bricks and external lights.

LIGHTING STRATEGY

LIGHTING:

The recommendations contained within this report are based on the latest guidance: Bat Conservation Trust (BCT) Guidance Note 08/18 Bats and artificial lighting in the UK: Bats and the Built Environment series. The proposed location of external lighting and lighting calculations are included in a separate PDF-See accompanying Lighting Calculations PDF-QUO-72480-W7N4Z7

Legal Requirements for Lighting

It is important to remember that there is no legislation requiring an area or road to be lit. The building regulations for domestic buildings specify that 150 watts is the maximum for exterior lighting of buildings, but this does not apply to private individuals who install their own lighting. There are a number of British Standards that relate to various components of lighting – BS5489 for road lighting, BS12164 for outdoor workplaces, BS12193 for sports lighting – and there are also guidelines that relate to crime prevention, prevention of vehicular accidents and amenity use. BS5266-1:2011 relates to the design of emergency lighting and specifies that the minimum lighting level within an escape route from a building is 1 lux. While this represents an increase in lighting, because of the nature and infrequent use of emergency lighting (as most systems are non-maintained – off unless an emergency occurs) this should not pose an issue to bats.

Appropriate Luminaire Specifications

The following should be considered when choosing luminaires.

- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources will not be used.
- LED luminaires will be used due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700 OKelvin) will be adopted to reduce blue light component.
- Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires will be recessed where installed in proximity to windows to reduce glare and light spill.
- The use of specialist low-level downward directional luminaires to retain darkness above will be used (See Figure 3.0)
- Column heights will be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control will be used – See ILP Guidance for the Reduction of Obtrusive Light.
- Luminaires will be mounted on the horizontal, i.e no upward tilt.
- The external lights will be set on motion-sensors (PIR) and short (1-2min) timers.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Proposed Lighting Locations and Specification of Lights

• The specification of the lights proposed are detailed below but include a range of suitable lights including AMENITY - Reef LED CCT Directional Wall Light (See Figure 3) which is a LED downlight (maximum wattage 5.9w) which is capped at the top to prevent unwanted up-lighting but with directional wall lighting and minimal blowout. Lighting calculations with Lux Contours are provided below:

Dimensions : Ø85 mm x 170 mm



Figure 2- Proposed light fixture- 5.9w Reef LED CCT Directional Wall Light

In accordance with the Bat Conservation Trust's publication *Bats and artificial lighting* (BCT, 2018) light pollution by artificial lighting will be kept to a minimum and light spillage avoided. The following specific mitigation will be put in place to minimize disturbance to bats caused by the lighting of the site. The following mitigation strategies have been taken from Bat Conservation Trust Landscape and Urban Design for Bats and Biodiversity (Gunnell et al., 2012) and other referenced sources:

- Minimise light spill by eliminating any bare bulbs and upward pointing light fixtures. The spread of light should be kept near to or below the horizontal plane, by using as steep a downward angle as possible and/or shield hood. Flat, cut-off lanterns are best;
- Use light sources that emit minimal ultra-violet light (van Langevelde and Feta, 2001) and avoid the white and blue wavelengths of the light spectrum, so as to avoid attracting insects and thus potentially reducing numbers in adjacent areas;
- Limiting the height of lighting columns to eight metres and increase the spacing of lighting columns (Fure, 2006) can reduce the spill of light into unwanted areas;
- Avoid using reflective surfaces under lights or light reflecting off windows (e.g. on to trees);
- Only the minimum amount of light needed for safety and access should be used and or turned off when the site is not in use;
- Artificial lighting proposals should not directly illuminate boundary habitats, which may be of value to foraging or commuting bats and birds (e.g. green corridors);
- Lighting that is required for security reasons should use a lamp of no greater than 2000 lumens (150 Watts) and be PIR sensor activated, to ensure that the lights are not on only when required (Jones, 2000; Collins, 2016);

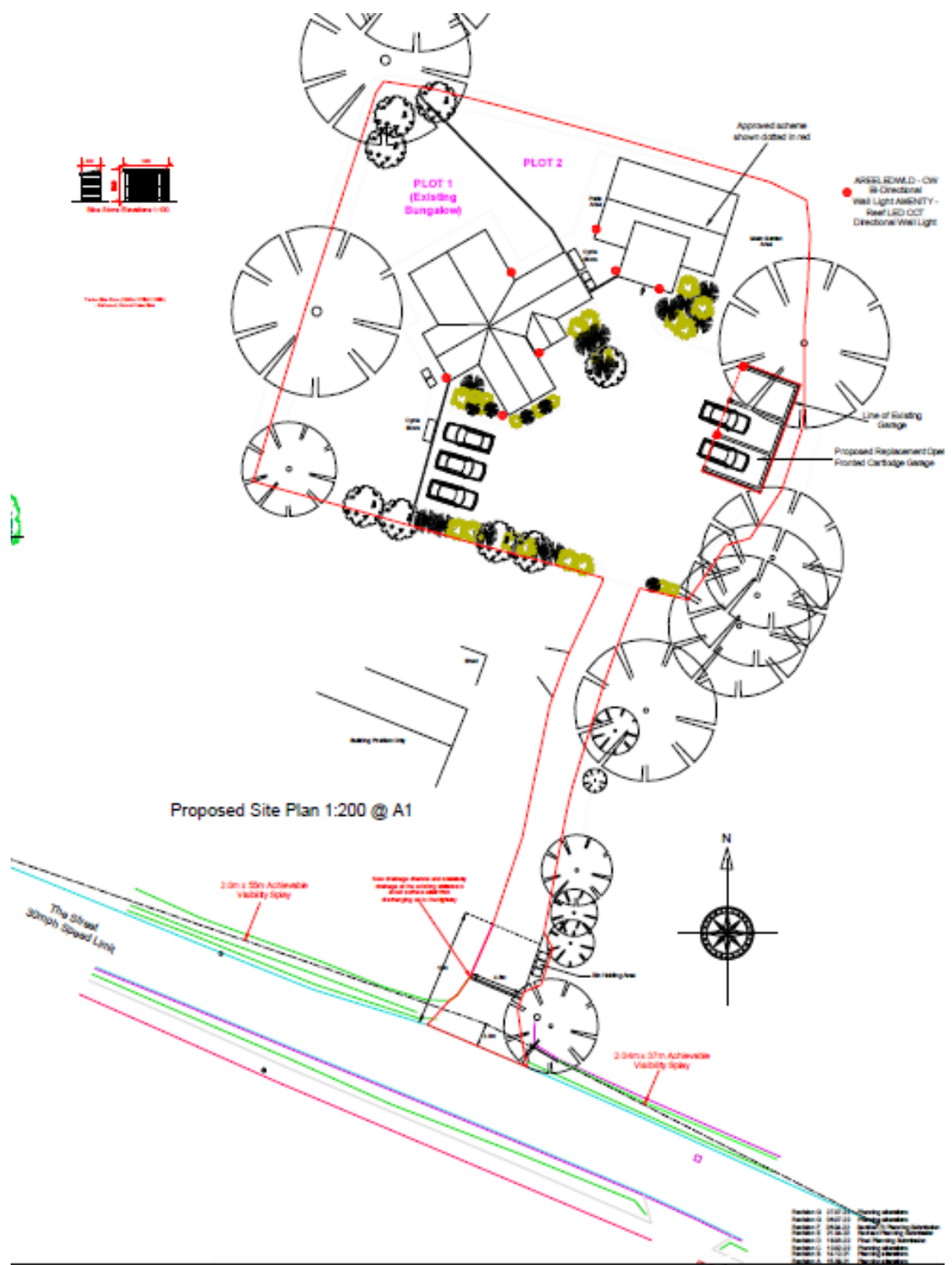


Figure -3-Proposed Location of External Lighting-See accompanying Lighting Calculations PDF-QUO-72480-W7N4Z7

Eco-Roost Bat Brick



Eco-Roost Double Chamber Bat Box



Eco-Roost Double Kent Box



Eco-Roost 28mm, 32mm and Open fronted bird boxes



Examples of Bat Boxes

It is important that the bat boxes are positioned sufficiently high above the ground to dissuade ground predators, a minimum of 4m up; and at a distance from sources of artificial lighting. The boxes should be located on the west, south and east facing sides of the trees / buildings giving bats a range of microclimates through the year and direct access to foraging and commuting habitat along site boundaries.

Schwegler 1FF Bat Box		<p>The 1FF bat box can be sited in trees or on buildings. Size: 43cm high x 27cm wide x 14cm deep.</p>
Schwegler 2F Bat Box		<p>The 2F bat box can be sited in trees or on buildings. Size: 33cm high x 16cm diameter.</p>
1FQ Schwegler Bat Roost (For External Walls)		<p>Suitable for a variety of crevice-dwelling bats, for larger roosts or maternity groups. Internal layout provides 3 different areas where bats can roost, offering different levels of light and temperature. Gaps ranging from 1.5cm to 3.5cm wide offering various places for bats to roost. Suitable to erect on most types of external brick, timber or concrete structures. Size: 60cm high x 35cm wide x 9cm deep.</p>
Improved Roost-Maternity Bat Box		<p>A large 3 crevice bat box. 3 separate crevices each with different temperature characteristics. Suitable for larger roosts or maternity groups of small crevice-dwelling species such as pipistrelle bats. Suitable to erect on buildings or trees. Size: 49cm high x 26cm wide x 13cm deep.</p>
Timber Double Chamber Bat Box		<p>This bat box is suitable for siting on trees in gardens or woodland and requires no annual maintenance. Should not be painted or treated with any type of preservative, as these can harm the bats. Size: 31.3cm high x 16cm wide x 16cm deep.</p>
The Kent Bat Box		<p>Made from untreated rough-sawn timbers ca.20mm thick. Crevices can be between 15mm and 25mm wide. Suitable to fit to walls, other flat surfaces or trees. Approximate dimensions (boxes vary in size): 24cm wide x 47.5cm high x 17cm deep.</p>

Bird Nesting Habitat

CedarPlus Nest Box

Available with 2 entrance hole sizes:

32mm hole – suitable for great, marsh and coal tits, redstart, nuthatch, pied flycatcher, house sparrow and tree sparrows.

26mm hole – to allow access only to blue, marsh and coal tits (and possibly wrens).

Height: 370mm; Width: 156mm; Depth: 175mm



Schwegler 1B Bird Box

The 1B nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes.

It is available in 4 colours: brown, green, white and red. The nest box can be attached to the tree or wall using an aluminium nail or by hanging over a branch and is made from Woodcrete to ensure that it is long-lasting.

Entrance hole sizes:

32mm hole – will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree and house sparrow.

26mm hole – suits blue, marsh, coal and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole.

Oval hole (29x55mm) – suits redstarts because more light enters the brood chamber. It is also suitable for all other species which nest in the 32mm boxes.

Height: 23cm; Diameter: 16cm



No. 10 Schwegler Swallow Nest

The Swallow Nest No. 10 consists of a woodcrete nesting bowl which is attached to a wooden panel of formaldehyde-free chipboard. The nest should be placed inside outbuildings such as sheds, barns or stables leaving a distance of at least 35mm between the top of the nest and wall top. Ensure there is always access for the birds through an open window or skylight, or other high level access (minimum of 50mm (H) x 70mm (W) gap). Multiple nests should not be placed at less than 1m intervals.

To avoid problems with droppings accumulating, a droppings board could be placed beneath each nest box to collect the droppings.



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