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## **Mitigation Statement, Habitat Creation and Ecological Enhancement**

**Land at Sunny Corner, Copse Lane,  
Walberton**

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**Project No: 2255**

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## **Report Summary**

1. The Ecology Co-operation was commissioned by Mr and Mrs Holden to outline necessary mitigation for land proposed for development on land at Sunny Corner, Copse Lane, Walberton in West Sussex where it was determined that the site supports a good population of slow worms, a population of dormice and some common species of bat along with an Annex II species foraging along the boundaries of the site.
2. Pre-construction work includes the installation of semi-permanent reptile fencing around the whole of the proposed construction zone, to include the working footprint of the site, additional landscaping areas, any material storage areas and areas to be tracked over by machines. Following the installation of this fencing, reptile trapping visits would take place from as early as mid-March, with a target of up to 60 visits or until 10 visits have been made under suitable weather conditions, without identifying reptile presence. Preconstruction work will also include the planting of hedgerows as early as possible prior to the commencement of construction so that dormouse habitat is establishing.
3. Site staff must be briefed prior to the commencement of construction on the importance of protecting the reptile fencing and avoiding any adverse impacts upon the site boundaries and clear construction boundaries will need to be marked to ensure there is no risk of disturbing boundary hedgerows.
4. Enhancement measures proposed include the installation of bat roosting features, creation of wildflower meadow habitat, installation of bird nesting features and new hedge creation along with the enhancement of existing hedgerows.
5. Post construction management is detailed in section 4.

This report has been prepared by The Ecology Co-operation Ltd, with all reasonable skill, care and diligence within the terms of the Contract with the client. This report only becomes the property of the client once payment for it has been received in full.

We disclaim responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



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## **1 INTRODUCTION**

### **1.1 Purpose of the Report**

This document has been written to demonstrate how the development will minimise its impact upon protected species, reduce the impact that this development will have upon biodiversity and provide targeted enhancement measures for Land at Sunny Corner on Copse Lane in Walberton, West Sussex. It outlines all mitigation and compensation measures that are designed to ensure that valuable habitats are either protected, replaced or enhanced on Land at Sunny Corner further to a proposal to build 9 residential properties on this land.

All of the prescribed mitigation measures described within this document will be issued to relevant works contractors to ensure that they are carried out in full. Implementation of this will be overseen by a suitable ecological consultancy, and the works contractor will be given contact details for an ecologist so that any issues can be resolved promptly.

This report was commissioned and produced at the request of Mr and Mrs Holden.

### **1.2 Background**

The Ecology Co-op has been commissioned to outline mitigation works on Land at Sunny Corner, Copse Lane in Walberton. Following surveys at this site by The Ecology Co-op in 2017, it was determined that the site supports a population of dormice (*Muscardinus avellanarius*) across the hedged field boundaries and a 'good' population of slow worms. In addition, the site is used by foraging and commuting bats. Whilst there was no evidence of roosting bats on the site itself, some trees with low to moderate potential to support roosting bats were identified.

The site supports suitable habitat for nesting birds and therefore it is important that all vegetation clearance takes place outside of the nesting bird season (1<sup>st</sup> March to 31<sup>st</sup> August), unless a hand search by a suitably qualified ecologist is carried out first.

## Land at Sunny Corner – Mitigation Statement



**Figure 1.** An aerial image showing the location of the site. The site boundary is outlined in red.

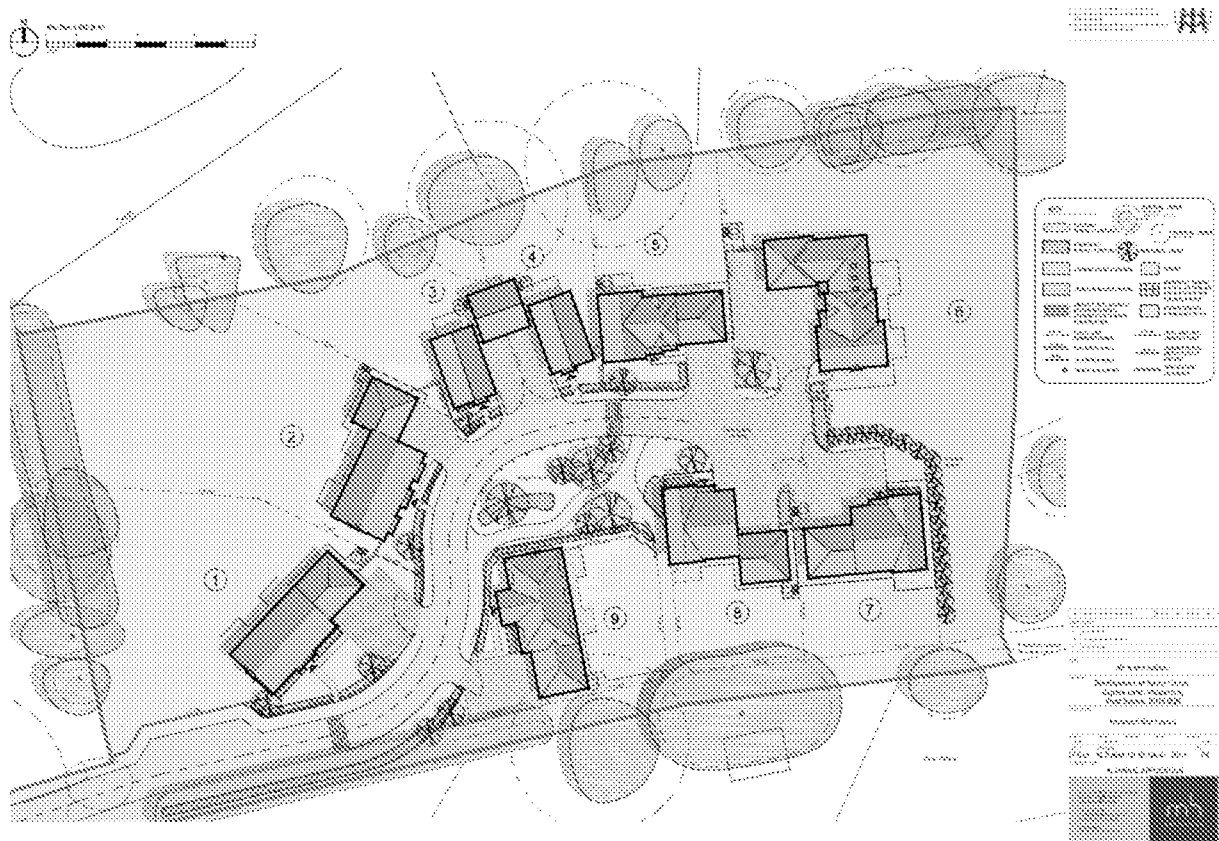


**Figure 2.** The proposed layout of the Sunny Corner development, with a red line indicating the site ownership boundary.



## **1.3 Rationale**

### **Reptiles**

Slow Worms, Adder, Grass Snakes and Common Lizards are protected against intentional killing or injuring and trade under part of subsection 9(1) and all of subsection 9(5) of the Wildlife and Countryside Act 1981. Destruction of known habitats whilst reptiles are present may therefore lead to an offence.

### **British bats**

(*Vespertilionidae* and *Rhinolophidae*) are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), and receive full protection under Section 9. These species are also all listed as European Protected Species on Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations 1994 which gives them full protection under Regulation 39. Protection was extended by the Countryside and Rights of Way Act 2000 (the CRow Act). Under the above legislation it is an offence to:

- kill, injure or take an individual;
- possess any part of an individual either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by these species for shelter, rest, protection or breeding;
- intentionally or recklessly disturb these species whilst using any place of shelter or protection; or
- sell or attempt to sell any individual.

All species of British bat are included as priority species in the UK Biodiversity Action Plan and as species of principal importance for the conservation of biological diversity in England under Section 74 of the Countryside and Rights of Way (CRow) Act 2000.

### **Birds**

All species of bird are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended). Protection was extended by the Countryside and Rights of Way (CRow) Act 2000. Under the above legislation it is an offence to intentionally:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

Certain species are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and receive protection under Sections 1(4) and 1(5). The protection was extended by the Countryside and Rights of Way (CRow) Act 2000. There are special penalties where the offences listed above are committed for any Schedule 1 species and it is also an offence to intentionally or recklessly:

- disturb any such bird when it is building its nest or while it is in or near a nest containing dependent young; or
- disturb the dependent young of any such birds

### **Hazel Dormice**

Dormice are given full protection under Schedule 5 of the Wildlife and Countryside Act 1981, as amended. Protection to the species is also afforded by Schedule 2 of the Conservation (Natural Habitats &c) Regulations, 1994, making the hazel dormouse a European Protected Species. These two pieces of legislation operate in parallel, although there are some small differences in scope and wording. Under the provisions of Section 9 of the Wildlife & Countryside Act, it is an offence to:



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- Intentionally kill, injure or take a dormouse;
- Possess or control and live or dead specimen or anything derived from a dormouse (unless it can be shown to have been legally acquired);
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a dormouse;
- Intentionally or recklessly disturb a dormouse while it is occupying a structure or place which it uses for that purpose.
- Schedule 2 of the Conservation (Natural Habitats &c) Regulations, 1994 make it an offence to:
- Deliberately capture or kill a dormouse;
- Deliberately disturb a dormouse;
- Damage or destroy a breeding site or resting place of a dormouse;
- Keep transport, sell or exchange, or offer for sale or exchange a live or dead dormouse or any part of a dormouse.

The dormouse is a Priority Species under the UK Biodiversity Action Plan (UK BAP), and has been adopted as a Species of Principal Importance in England under section 41 of the NERC Act 2006.

## ***2 PRE-CONSTRUCTION MITIGATION MEASURES***

### ***2.1 Reptile Fencing Installation***

The whole of the proposed construction zone, to include the working footprint of the site, additional landscaping areas, any material storage areas and areas to be tracked over by machines, will need to be fenced with semi-permanent, amphibian and reptile- proof fencing. A semi-permanent polypropelene material that is tough and stabilised against ultraviolet light should be installed to a depth of not less than 20cm below ground and supported by stakes every 2 metres fixed with clout nails and washers (See Figure 3). The fencing should be backfilled with earth and tightly compacted to make sure that it acts as an impassable barrier. The advantage of the semi-permanent fence is that it is less susceptible to damage by dogs, deer, foxes and other animals as well as any accidental damage by construction staff and is suitable for developments where fencing may need to remain in-situ over a long period of time.



**Figure 3.** An example of the semi-permanent fencing material that will be used.

The fencing would be required to make a continuous fence line to separate the construction site from all adjacent green habitats, where reptiles might migrate onto the site and would need to remain in-situ until all construction work deemed a risk to reptiles has been completed- i.e. earthworks and associated landscaping. This will prevent any animals from the surrounding areas to migrate onto the site during works. The fencing would need to be tied off at the existing access along the western boundary of the site (Figure 4). Cut backs will be built in at these points to direct reptiles away from the fenced area and the stream running along the western boundary near the existing access will act as a barrier to movement on to the site for this species. Figure 4 shows the proposed route for the reptile fence around the construction zone on Land at Sunny Corner, Walberton.

The installation of the fencing would need to be overseen by an ecologist, with a hand search conducted of the fencing construction line ahead of a trencher or small excavator digging the trench for the installation of the fence. The fence will be installed outside of the reptile hibernation period (generally October to late February dependent of weather conditions) to minimise the risk of killing or injury of reptiles during the fence installation.

**Construction method:**

1. At least 24 hours prior to the construction, the fence route would be hand searched by a suitably qualified ecologist and strimmed (using brush- cutters where necessary) of vegetation to a height of no more than 5cm and a two metre width, with all cuttings raked off and removed. This will ensure that reptiles are discouraged from the fencing construction zone. The strimming process will be completed in two passes, with the grass cut to a height of 10- 15cm on the first pass, to reduce the risk of harming reptiles during the strimming process. In the unlikely event that any nesting birds are found along the fencing route, then strimming will have to wait until the nesting birds and chicks have fledged and moved on.



### ***Land at Sunny Corner – Mitigation Statement***

2. The fencing construction zone will not be allowed to grow taller than 5cm prior to construction of the fence and materials will not be stored along the fencing route, which could otherwise attract amphibians and reptiles to them as refugia.
3. The entire length of the fence must first be established by excavating a 20cm wide 20cm deep trench, overseen under watching brief by a suitably qualified ecologist. Excavated earth will be piled on the outside edge of the trench so that it is easily backfilled once the fence has been installed.
4. Excavation work for the fencing trench will be carried out by an excavator or trencher not larger than 1.5 tons in weight to minimize ground disturbance.
5. Fence stakes will be positioned every 2 metres and will be sunk into the ground to a depth of at least 30cm to ensure they are secure.
6. The fencing material (which is supplied in 100kg rolls) will be rolled out along the outside edges of the trench and will be lifted into place when each full roll has been unravelled or cut into manageable sections.
7. The fencing sheet will be attached to the stakes using 2 clout nails and plastic washers at the top and 15cm from the bottom of each stake.
8. Once fixed the excavated earth will be backfilled along the trench and trodden in to ensure that it is lightly compacted to prevent animals from digging into it.
9. After establishment, fence checks would be undertaken every week to look for any signs of damage. Once construction has commenced, the fence checks and maintenance will become the responsibility of the works contractor.
10. Site staff must be briefed prior to the commencement of construction on the importance of protecting the reptile fencing and contacting an ecologist in the event that any reptiles or other wildlife is identified within the construction zone.

In order to prevent reptiles from migrating around the entrances to the site, the fence will have 'cut backs' on each of its ends (See Figure 5). This is where the fence loops back on itself, so that any animals travelling along the edge of the fence are guided away from the site entrance.



**Figure 4.** The proposed fencing route at Land at Sunny Corner, Walberton, to enclose the entire construction and landscaping zone of the site is shown in blue. The site boundary is shown in red.

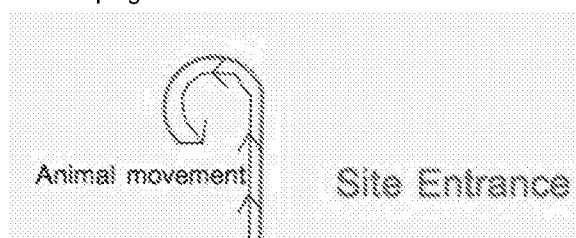


**Figure 5.** Cut backs' used to guide animals away from the site entrance.

## **2.2 Reptile Translocation Strategy**

In line with current guidelines outlined by the Amphibian and Reptile Group UK (ARGUK), a target total of 60 translocation visits will be made between mid-March and October, with 'tins' (which can be bitumen and or corrugated metal sheets) placed at a density of not less than 100 per hectare of suitable habitat in line with ARGUK guidelines. Translocation visits will be undertaken every working day where possible as long as the air temperature is between 9 degrees and 18 degrees in the morning or mid-afternoon in the absence of wet or very windy weather. All captured reptiles will be placed into a large smooth-sided bucket with some green hay at the bottom and released immediately into a suitable receptor site. All translocation details would be recorded into a table such as the example below and submitted to the council upon request as evidence of the work undertaken.

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**Table 1** – The table format that should be used to document the translocation process

| Date       | Start<br>Time/finish<br>of Survey | Air<br>Temperature<br>& refugia<br>temperature<br>°C | Weather Notes                                        | Species Total                                   | Notes |
|------------|-----------------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|-------|
| 31/05/2017 | 10:15/11:15                       | 15/25                                                | 100% high and<br>light cloud cover,<br>5-10 mph wind | 2M 3F 1 Juv<br>Slow Worm<br>1M Common<br>Lizard |       |

Although the target number of trapping checks is 60 visits, this should be used as a guide, with the total number of visits cut shorter if there is an early drop in captured numbers and at least 10 visits in suitable weather conditions are made without identifying any reptile presence within the construction zone. Although the construction zone will be declared free of reptiles following 5 clear visits after the target of 60 trapping visits has been achieved. Site staff must be briefed prior to commencement of construction on the importance of protecting the reptile fencing and contacting an ecologist in the event that any reptiles or other wildlife is identified within the construction zone.

### 2.2.1 Reptile Receptor Area

A search was carried out to identify potential receptor sites for the translocation of a 'good' population of slow worms found at Land at Sunny Corner in Walberton. The search results include at least three receptor sites within 3 miles of the site.

Three of the best locations are:

1. Slindon Estate which is managed by the National Trust and is located just over a kilometre away from the site. There is suitable habitat in the form of chalk grassland, orchards, meadows and Ancient woodland.
2. Avisford Park Golf Club which is located around 600m from the site and consists of suitable habitat to support a population of slow worms. There is suitable areas of long, rough grassland and suitable tree lines providing good connectivity to the wider landscape allowing the slow worms to move around successfully.
3. St. Mary's Church of England, Walberton is located just under a kilometre away from the site. There is suitable rough grassland within the graveyard that could support a population of slow worms.

All potential receptor sites will be contacted during the detailed planning stage of work to ensure that the most suitable location is chosen, that will allow the slow worm population to increase over many years.

It is important that at least three new reptile and amphibian hibernacula be created in the proposed

[illegible]

### 2.3 Dormice

The removal of dense bramble and hawthorn scrub habitat could lead to the direct harm of dormice present at the time of the scrub being cut back, or the isolation of dormice within habitat cut-off by the scrub removal. For this reason, the following mitigation is proposed:

1. Creation of new hedging bordering the site will benefit dormice both in creating new foraging habitat and creating new connectivity to the woodland adjacent to the site and the surrounding landscape. The proposed new hedging will include planting 50% hawthorn, 10% blackthorn, 10% hazel, 10% wild privet, 10% dogwood and 10% wayfaring tree, which produce food for dormice across the whole of their active season. Honeysuckle should also be planted at a density of at least one plant per two linear metres, as this plant is important for dormice, both as a food source and for nesting.
2. Additional planting to support existing hedgerows is recommended along the boundaries of the site. Planting blackthorn along the existing hedgerows and within the newly created hedgerows will reduce the risk of dormouse predation by cats and, also increases the density of the hedgerows allowing dormice to move around the site and between favoured foraging habitats. Dormouse presence was identified along all boundaries of the site indicating that this species is utilising all suitable habitat.
3. The hedgerows should be managed to height of no less than 2 metres high and 1.5 metres wide to ensure they offer suitable cover and grow to a good fruiting height. The hedgerows should

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only be cut in February where possible, so the fruits associated with the hedgerow trees are available for as long as possible, whilst also avoiding the nesting bird season (1<sup>st</sup> March to 31<sup>st</sup> August).

4. All retained hedgerows will be protected during the construction phase by Heras fencing. A small 50cm high chicken wire fence line could be installed close to the base of the hedgerow to help deter cats from predating upon wildlife within the hedgerows.

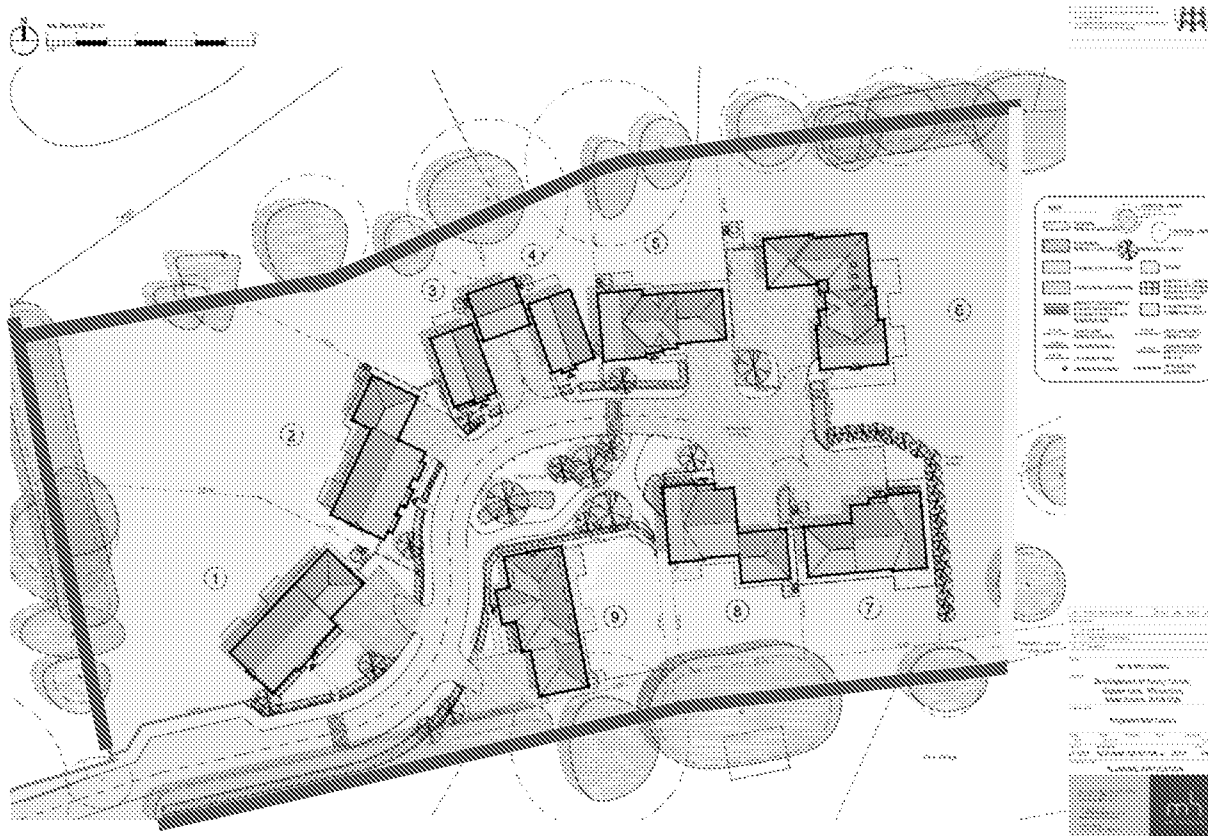


**Figure 7.** The blue lines indicate the proposed additional planting to support existing hedgerows and the yellow line indicated the proposed new hedging.

## 2.4 Nesting Birds

Any scrub, trees or hedgerows to be cleared must be removed outside of the nesting bird season (1<sup>st</sup> March to 31<sup>st</sup> August) unless features are first hand search by a suitably qualified ecologist.

# 3 CONSTRUCTION PHASE MITIGATION MEASURES

## 3.1 Wildflower Meadow Creation

A wildflower meadow should be established across sections of the garden areas belonging to each of the residential units numbered from 1 to 6. This will increase the value of this area as foraging habitat for bats, birds, reptiles and amphibians as well as pollinating insects. To establish this as a wildflower area a process of light rotovating and seeding should be employed with good ground preparation essential to the success of the wildflower meadow. The sowing process is best undertaken between late August and the end of September during mild and wet weather best suited to seedling establishment or



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during mid-March to mid-May when the ground has sufficient moisture and there is very little risk of frosts. The rotovating process is to create an area of largely bare ground to allow the wildflower seed mix to establish. Immediately following rotovating, a suitable seed mixture containing not less than 20 wildflower and grass species should be sown across the ground at a density of four grams per square metre. The species included must all be of native British origin. A recommended seed mixture is EM5 – Meadow Mixture for loamy soils, which is available from Emorsgate seeds ([www.wildseed.co.uk](http://www.wildseed.co.uk)). Table 2 details the composition of this mixture.

As part of on-going management, the sward should be cut and gathered to a height of approximately 5cm at least three times in its first year of establishment to control the flush of annual weeds which will grow during the first growing season. Thereafter the sward should be cut (with all cuttings removed and composted) between mid-August and late September every year. Cutting in the spring (March/April) should be included if the sward grows too vigorously.

To ensure that reptiles are not harmed during the rotovating process needed to establish the wildflower meadow habitat manipulation techniques must be used as detailed within 2.3 prior to this process. Cutting the grass sward very short prior to rotovating the ground will also help to prepare a more suitable growing base.

**Table 2** – Composition of EM5 – Meadow Mixture for loamy soils to be sown within the gardens of the residential units.

| <b>Wildflowers</b> |                             |                    |
|--------------------|-----------------------------|--------------------|
| <b>%</b>           | <b>Latin name</b>           | <b>Common name</b> |
| 0.5                | <i>Achillea millefolium</i> | Yarrow             |
| 3                  | <i>Centaurea nigra</i>      | Common Knapweed    |
| 1                  | <i>Daucus carota</i>        | Wild Carrot        |
| 2.5                | <i>Galium verum</i>         | Lady's Bedstraw    |
| 0.3                | <i>Geranium pratense</i>    | Meadow Cranesbill  |
| 0.5                | <i>Knautia arvensis</i>     | Field Scabious     |
| 0.5                | <i>Lathyrus pratensis</i>   | Meadow Vetchling   |
| 0.4                | <i>Leontodon hispidus</i>   | Rough Hawkbit      |
| 1                  | <i>Leucanthemum vulgare</i> | Oxeye Daisy        |
| 0.6                | <i>Lotus corniculatus</i>   | Birdsfoot Trefoil  |
| 0.5                | <i>Malva moschata</i>       | Musk Mallow        |
| 0.5                | <i>Plantago lanceolata</i>  | Ribwort Plantain   |
| 0.6                | <i>Plantago media</i>       | Hoary Plantain     |
| 0.5                | <i>Primula veris</i>        | Cowslip            |
| 2                  | <i>Prunella vulgaris</i>    | Selfheal           |
| 3                  | <i>Ranunculus acris</i>     | Meadow Buttercup   |
| 1.5                | <i>Rhinanthus minor</i>     | Yellow Rattle      |
| 1                  | <i>Rumex acetosa</i>        | Common Sorrel      |
| 0.1                | <i>Trifolium pratense</i>   | Wild Red Clover    |
| <b>Grasses</b>     |                             |                    |
| 10                 | <i>Agrostis capillaris</i>  | Common Bent        |
| 2                  | <i>Briza media</i>          | Quaking Grass (w)  |

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|    |                              |                             |
|----|------------------------------|-----------------------------|
| 2  | <i>Anthoxanthum odoratum</i> | Sweet Vernal-grass (w)      |
| 10 | <i>Festuca ovina</i>         | Sheep's Fescue              |
| 32 | <i>Cynosurus cristatus</i>   | Crested Dogstail            |
| 20 | <i>Festuca rubra</i>         | Slender-creeping Red-fescue |
| 3  | <i>Phleum bertolonii</i>     | Smaller Cat's-tail          |
| 1  | <i>Trisetum flavescens</i>   | Yellow Oat-grass (w)        |

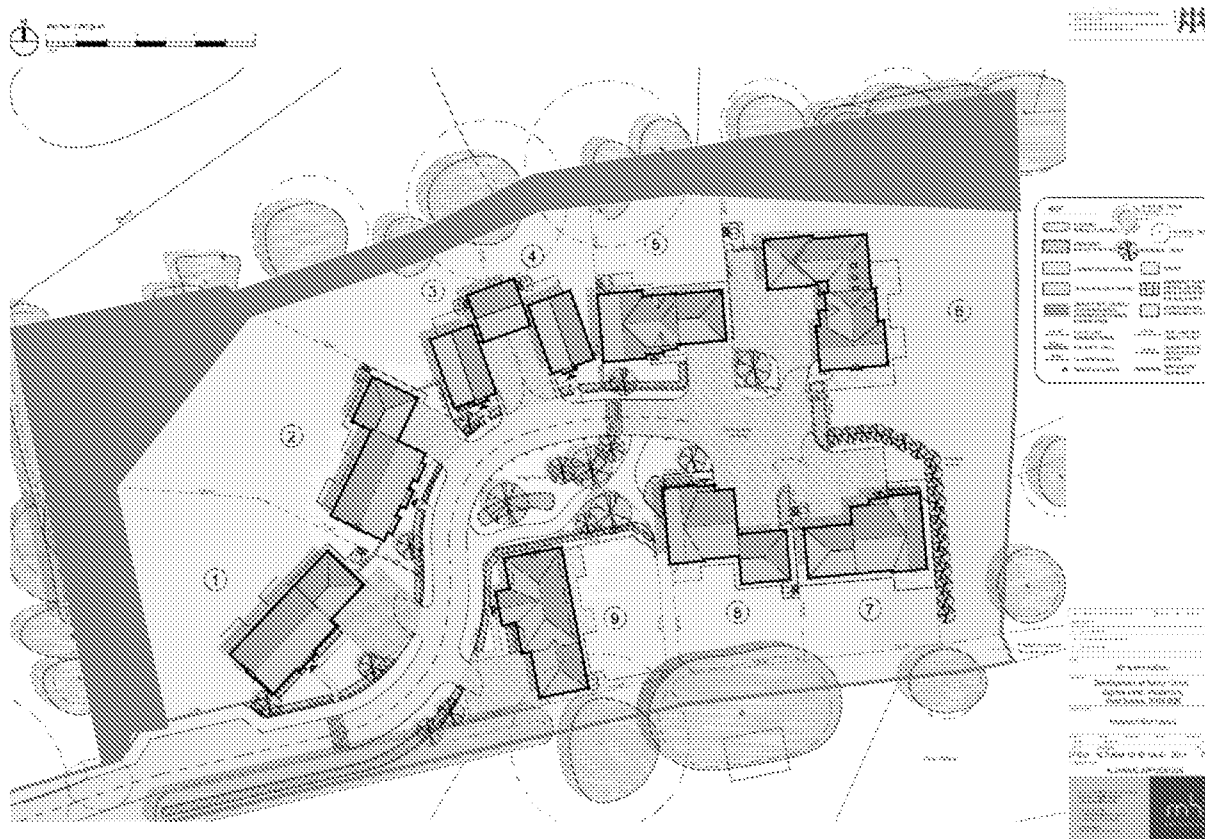


**Figure 8.** The dark green colour indicates the possible sections of the gardens that could be sown with wildflower mixture.

### 3.2 Creation and Enhancement of Hedgerows

A new species-rich native hedgerow is to be planted along the eastern boundary of the site, creating a wildlife corridor between two high value habitats for dormice and, providing increased foraging and commuting habitat for bats plus nesting areas for birds.

These new species rich hedgerows must use only native species from UK stock and include at least 50% blackthorn (*Prunus spinosa*) so that it is consistent with the surrounding landscape and traditional hedge planting schemes. The remaining 50% should be made up of five of the following species: hawthorn (*Crataegus monogyna*), spindle (*Euonymus europaeus*), dogwood (*Cornus sanguinea*), Wayfaring-tree (*Viburnum lantana*), field or dog rose (*Rosa arvensis/ Rosa canina*), guelder rose (*Viburnum opulus*), field maple (*Acer campestre*), wild privet (*Ligustrum vulgare*), beech (*Fagus sylvatica*) and hazel (*Corylus avellana*). It is also recommended that native honeysuckle (*Lonicera periclymenum*) is introduced along these lengths.



The landscaping plan will incorporate a variety of trees with only native trees sourced from UK stock to be used in all of the wider landscaping around the site boundaries (non-native trees and shrubs may still be used for landscaping the residential plots). This will create greater habitat for a variety of birds and invertebrates. Given the arrival of ash dieback, it is not recommended that any ash saplings are planted anywhere on the site.

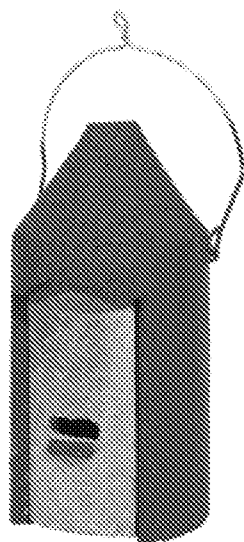
The hedgerows which are being retained should be enhanced and this can be done by planting some of the species suggested above.

### **3.3 Enhancements for Bats**

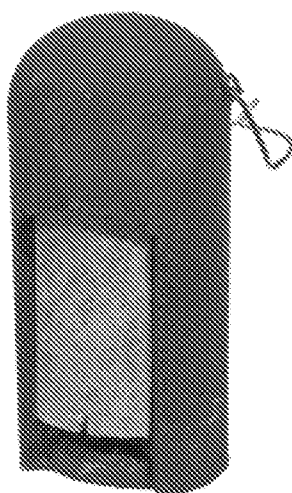
As a measure to enhance roosting opportunities for bats, features will be incorporated into four of the new residential buildings with one Schwegler 1FR bat tubes installed across the four buildings, and four bat access tiles, which can be designed to match the roof tiles proposed for use within the construction design, installed across two buildings to provide roosting areas for crevice-dwelling bat species. These features should be positioned upon buildings in close-proximity to boundary hedgerows or standing water (such as along the boundaries of the site). Roofs where access tiles are installed will not use a Tyvek type underlay, which has a tendency to fray and pose an entanglement risk to bats, but instead must consist only of bitumen roofing felt or a similar material. The exact locations of these features can be detailed within a subsequent detailed planning application.

Finally, five Schwegler woodcrete bat boxes (three 2F and two 2FN Schwegler bat boxes) would be hung on suitable mature trees upon the southern, western and northern site boundaries. The boxes would be hung by a suitably qualified ecologist to ensure that this positioning is most suitable, but generally locations above 3.5 metres in the most south-easterly facing aspect of a tree is best.

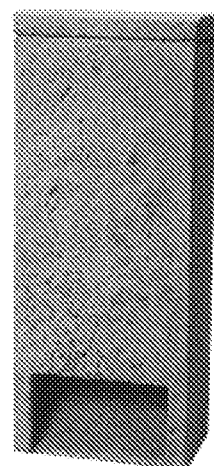
A tree protection order (TPO) is to be obtained for the tree line on the western boundary of the site to ensure the flight line is maintained in the long term, given that this habitat will be part of the garden spaces of two properties and it is used as a commuting route by barbastelle bats.



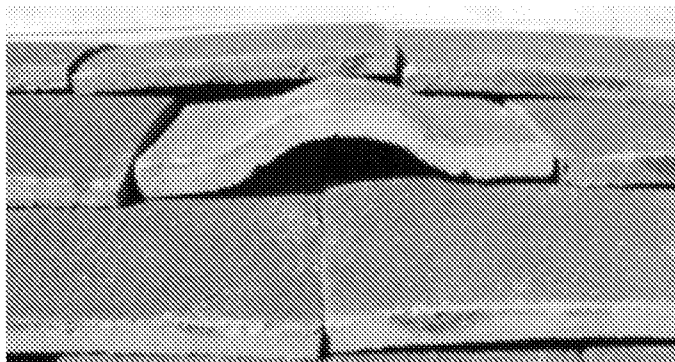
**2F Schwegler Bat Box**



**2FN Schwegler bat box**



**Schwegler 1FR bat tube**



**Example of a bat access tile**

### **3.4 Mitigation for Bats**

Bright external lighting can have a detrimental impact upon foraging and commuting bats, but importantly can also cause bats to be fooled into thinking that the light is from the sun, causing them to remain in their roosts for longer. Moderate species diversity has been recorded during the bat activity surveys undertaken with seven species including: common pipistrelle, Nathusius' pipistrelle, serotine, common noctule, brown long-eared bats, *Myotis spp.* and barbastelle bats were detected using static bat loggers. Bat activity is concentrated along the western boundary with the stream and the hedgerows along the southern boundary and the woodland along the northern boundary. As a result the site boundaries must be protected from artificial lighting with no street lamps or outside lights to face towards these boundaries or new species rich hedgerows proposed to be planted. In particular, a 'no light zone' should be established where the access road comes over the stream on the western boundary of the site, where possible. Guidelines issued by the Bat Conservation Trust should be incorporated into the lighting scheme at the Land at Sunny Corner development and the following measures must be implemented into the site design:

1. No 'upward pointing' or bare bulb lights will be installed anywhere on the development.
2. All external lights upon lamp-posts will not be more than 3.5 metres in height and will have shields installed to focus light towards footpaths and roads only (See Figure 9). No light will be allowed to emit light past horizontal (90 degrees from the ground).
3. A no-light zone to protect the western boundary and the proposed new species rich hedgerow along the east of the site from any artificial light. No lamp posts or other artificial lights should be positioned within 15 metres of these boundaries and no lights should be positioned to face towards these boundaries.
5. Any pedestrian ground lighting will not exceed 3 lux.
6. No external lights will be installed on new buildings above a height of 2 metres and all external lights will have shields to prevent light splash beyond horizontal.

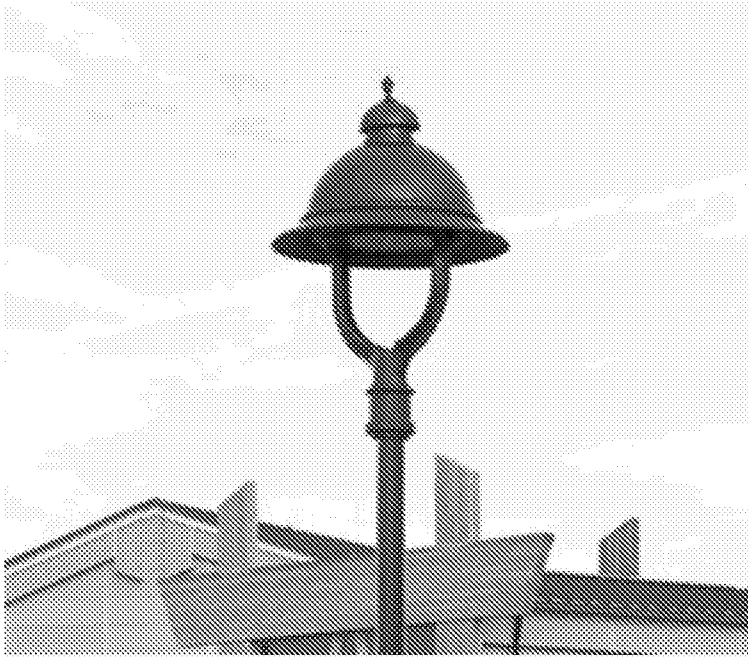
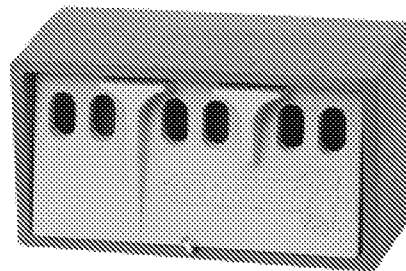


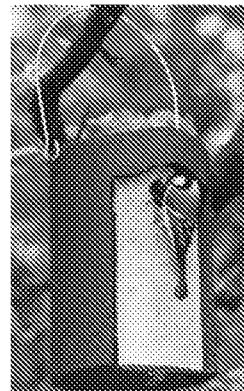
**Figure 9. An example of suitable downward shielded street lighting**

### ***3.5 Enhancements for nesting birds***

In order to enhance the site for nesting birds some common nesting bird boxes will be put up across the site. Two 1SP Schwegler 'sparrow terrace' should be placed upon new buildings in any location close to the soffit boards and three Schwegler 1B nest boxes for installing at least 3 metres high on trees along the southern and northern boundaries.



**1SP Schwegler Sparrow Terrace**



**Schwegler 1B nest box**

## **4 POST CONSTRUCTION MANAGEMENT**

### ***4.1 Management Plan Operations***

All planted hedgerows must only be cut outside the bird nesting season (1<sup>st</sup> March to 31<sup>st</sup> August) and where possible hedges shouldn't be cut until February, so that valuable winter food associated with fruiting hedge trees is retained for over-wintering birds.



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Bat and bird boxes on trees would be inspected to check they had not become detached or damaged each year.

The sections of wildflower meadow should be cut and gathered each year between mid-August and the end of September. This is important to ensure that species diversity of the area is maintained and grass species do not become dominant. Where necessary, a second cut could be taken in March or early April each year if the sward is growing too coarsely. Grass cuttings should be collected and composted or used to build hibernacula that will support hibernating reptiles and amphibians on a patch of ground that will remain dry throughout the year.

Should you need any further advice on the information provided above, please do not hesitate to contact The Ecology Co-op.



## 5 APPENDIX 2 - ARTIFICIAL LIGHTING AND WILDLIFE

### Interim Guidance: Recommendations to help minimise the impact of artificial lighting - produced by The Bat Conservation Trust

Wherever human habitation spreads, so does artificial lighting. This increase in lighting has been shown to have an adverse effect on our native wildlife, particularly on those species that have evolved to be active during the hours of darkness. Consequently, development needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially. When the impacts on different species groups are reviewed, the solutions proposed have commonalities that form the basis of good practice. These are outlined in the following document.

#### Overview of impacts

##### Invertebrates

Artificial light significantly disrupts natural patterns of light and dark, disturbing invertebrate feeding, breeding and movement, which may reduce and fragment populations. Some invertebrates, such as moths, are attracted to artificial lights at night. It is estimated that as many as a third of flying insects that are attracted to external lights will die as a result of their encounter.<sup>1</sup> Insects can become disoriented and exhausted making them more susceptible to predation. In addition, the polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates. Many invertebrates natural rhythms depend upon day-night and seasonal and lunar changes which can be adversely affected by artificial lighting levels.

It is not always easy to disentangle the effects of lighting on moths from other impacts of urbanisation. However, it is known that UV and green and blue light, which have short wavelengths and high frequencies, are seen by most insects and are highly attractive to them. Where a light source has a UV component, male moths in particular will be drawn to it. Most light-induced changes in physiology and behaviour are likely to be detrimental. They discern it to be 'light', so they do not fly to feed or mate.<sup>2</sup>

##### Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season<sup>3</sup>. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.<sup>4</sup>

##### Mammals

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas in which these mammals are active and foraging is likely to be disturbing to their normal activities and their foraging areas could be

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<sup>1</sup> Bruce-White C and Shardlow M (2011) A Review of the Impact of Artificial Light on Invertebrates - See more at: <http://www.buglife.org.uk/advice-and-publications/publications/campaigns-and-reports/review-impact-artificial-light#sthash.s7GPA1vL.dpuf>

<sup>2</sup> As above

<sup>3</sup> Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

<sup>4</sup> Rodriguez A., Garcia A.M., Cervera F. and Palacios V. (2006) Landscape and anti-predation determinants of nest site selection, nest distribution and productivity in Mediterranean population of Long-eared Owls, *Asio otus*. *Ibis*, 148(1), pp.133-145



## **Land at Sunny Corner – Mitigation Statement**

lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the national and European legislation that protects British bats and their roosts.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

As mentioned, many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross<sup>5</sup>. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

These are just a few examples of the effects of artificial lighting on British wildlife, with migratory fish, amphibians, some flowering plants, a number of bird species, glow worms and a range of other invertebrates all exhibiting changes in their behaviour as a result of this unnatural lighting.

## **Recommendations**

### **Survey and Planning**

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process<sup>6</sup>. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice guides<sup>7</sup>. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

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<sup>5</sup> Stone E. L., Jones G and Harriss (2009) Street lighting disturbs commuting bats. *Current Biology*, 19, pp 1-5

<sup>6</sup> See also: Institution of Lighting Professionals – Professional Lighting Guide (PLG 04) Guidance on undertaking lighting environmental impact assessments)



## **Land at Sunny Corner – Mitigation Statement**

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

This can help planners reach the right design through the setting of appropriate conditions relating to performance and mitigation measures at the planning stage.

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans<sup>8</sup>. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

When assessing or commissioning projects that include the installation of lighting schemes, particularly those subject to the EIA process, the following should be considered and relayed to applicants:

- **Ecological consultants should confirm the presence of any sensitive fauna and flora**, advising the lighting designers of bat routes and roosts and other areas of importance in order to ensure that reports correspond with each other.
- **Ecological consultants should consider the need for quantitative lighting measurements.** In some instances it may be necessary for further lighting measurements to be taken. For example, outside an important bat roost. These should follow best practice guidance from the ILP and would ideally be conducted by a Lighting Professional.
- **Where appropriate, professional lighting designers should be consulted** to design and model appropriate installations that achieve the task but mitigate the impacts. This should be done at the earliest opportunity. Early decisions can play a key role in mitigating the impact from lighting.
- **Reports submitted should outline the impacts of lighting in relation to ecology**, making clear reference to the ecological findings, highlighting any sensitive areas and detail proposed mitigation. Consideration should also be given to internal lighting where appropriate.
- **Post –installation checks and sign off upon commissioning should be carried out** by the lighting designer to ensure that the lighting installation has been installed in accordance with the design, that predictions were accurate and mitigation methods have been successful.

### **Principles and design considerations**

#### **Do not**

- **provide excessive lighting.** Use only the minimum amount of light needed for the task.
- **directly illuminate bat roosts** or important areas for nesting birds

#### **Avoid**

- **installing lighting in ecologically sensitive areas** such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.
- **using reflective surfaces under lights.**

#### **Do**

- **consider employing a competent lighting designer** who will apply the principals of providing the right light, in the right place, at the right time and controlled by the right system.
- **minimise the spread of light** to at, or near horizontal and ensure that only the task area is lit.



## Land at Sunny Corner – Mitigation Statement

Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required.

- **consider the height of lighting columns.** It should be noted that a lower mounting height is not always better. A lower mounting height can create more light spill or require more columns. Column height
- **consider no lighting solutions where possible** such as white lining, good signage and LED cats eyes. These options can also be effective. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- **use temporary close-boarded fencing until vegetation matures**, to shield sensitive areas from lighting.
- **limit the times that lights are on to provide some dark periods.** The task being lit often varies, for example roads are less used after 23.00hrs and car parks are empty. A lighting designer can vary the lighting levels as the use of the area changes reducing lighting levels or perhaps even switching installations off after certain times. This use of adaptive lighting can tailor the installation to suit human health and safety as well as wildlife needs.

## Technological specifications

Research from the Netherlands has shown that spectral composition does impact biodiversity.

- **Use narrow spectrum light sources** to lower the range of species affected by lighting.
- **Use light sources that emit minimal ultra-violet light**
- **Lights should peak higher than 550 nm**
- **Avoid white and blue wavelengths of the light spectrum** to reduce insect attraction and where white light sources are required in order to manage the blue short wave length content they should be of a warm / neutral colour temperature <4,200 kelvin.

Further guidance on the spectral composition of artificial lighting will be made available following the publication of research from the Netherlands.

## Further reading:

- A review of the impact of artificial light on invertebrates. Buglife. 2011
- Royal Commission on Environmental Pollution. 2009. Artificial light in the environment. London, HMSO
- The Ecological Consequences of Artificial Night Lighting" edited by Longcore and Rich
- Shedding Light: A survey of local authority approaches to lighting in England. CPRE 2014

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<http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/> <http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/>

<sup>8</sup> Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011

