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Landscape and Ecology Management Plan

Site Name

42 Bulmershe Road

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The Keen Partnership

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Report Summary

Purpose	The Ecology Co-operation was commissioned by The Keen Partnership to provide a Landscape and Ecology Management Plan (LEMP) with regards to a proposed development at 42 Bulmershe Road. This document outlines site-wide mitigation for habitats and protected species as well as targeted enhancement measures. It also includes management objectives, responsibilities and maintenance schedules including remedial responsibilities, should they be necessary. It will be submitted to Reading Borough Council in order to discharge condition 7 of the approved planning application: 180471. The proposals include demolition of the existing garage and erection of a three-storey side extension comprising three one bed flats with car parking and cycle storage.
Context	A Bat Scoping Assessment at the site was undertaken in October 2018 by The Ecology Co-op. No further surveys were recommended, but avoidance of the nesting bird season (1 st March to August 31 st) for any vegetation clearance was outlined.
Pre-construction measures	Section 3 of this report outlines pre-construction mitigation measures including avoidance of the nesting bird season (1 st March to 31 st August) when removing vegetation during site preparation.
Construction phase measures	Section 4 of this report details mitigation measures during the construction phase of the development, including protection measures for a retained mature tree.
Operational phase measures	Section 5 sets out mitigation measures during the operational phase of the development, which includes a sensitive lighting scheme for commuting and foraging bats (Appendix 2).
Biodiversity Enhancements	Section 6 sets out the proposed habitat enhancement measures for the site, including flowering lawn as well as bird and bat boxes.
Post-construction management	Post construction management for the retained ecological features and proposed biodiversity enhancement features is detailed in full in section 7. Section 8 details competencies/standards/specifications of works.
Toolbox talk	Site staff must be briefed, prior to the commencement of construction, on the ecological issues related to the project and the importance of contacting an ecologist in the event that any wildlife is identified within the construction zone.



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1 INTRODUCTION

1.1 Purpose of the Report

The Ecology Co-operation was commissioned by The Keen Partnership to provide a Landscape and Ecology Management Plan (LEMP) with regards to a proposed development at 42 Bulmershe Road. This document outlines site-wide mitigation for habitats and protected species as well as targeted enhancement measures. It also includes management objectives, responsibilities and maintenance schedules including remedial responsibilities, should they be necessary. It will be submitted to Reading Borough Council in order to discharge condition 7 of the approved planning application: 180471. This is as follows:

“7. No development shall commence on site (including demolition or preparatory works) until details of a habitat enhancement scheme are submitted to and approved in writing by the Local Planning Authority. The scheme is to include a programme for implementation and ongoing maintenance. The habitat enhancement scheme shall thereafter be implemented and adhered to in accordance with agreed programme.”

REASON: Details are required prior to commencement as insufficient information was submitted with the application and in order to avoid harm to habitats and species whilst securing biodiversity enhancement in the long term. This accords with Paragraph 175 of the NPPF (2019), Policy EN12 of the Reading Borough Local Plan 2019, the Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2017.”

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.

1.2 Background

The full address is 42 Bulmershe Road, Reading, RG1 5RJ and the central grid reference for the site is SU 735 729. The location of the site is shown in Figure 1.

The site comprises a single garage, an area of self-seeded scrub and accumulations of stored building materials.

The proposals include demolition of the existing garage and erection of a three storey (including basement) side extension comprising three 1 bed flats, with associated car parking, landscaping, and cycle storage (see Figure 2).



Figure 1. An aerial image showing the location of the application site. The approximate boundary of the proposed construction zone is outlined in red. Images produced courtesy of Google maps (Map data ©2024 Google).

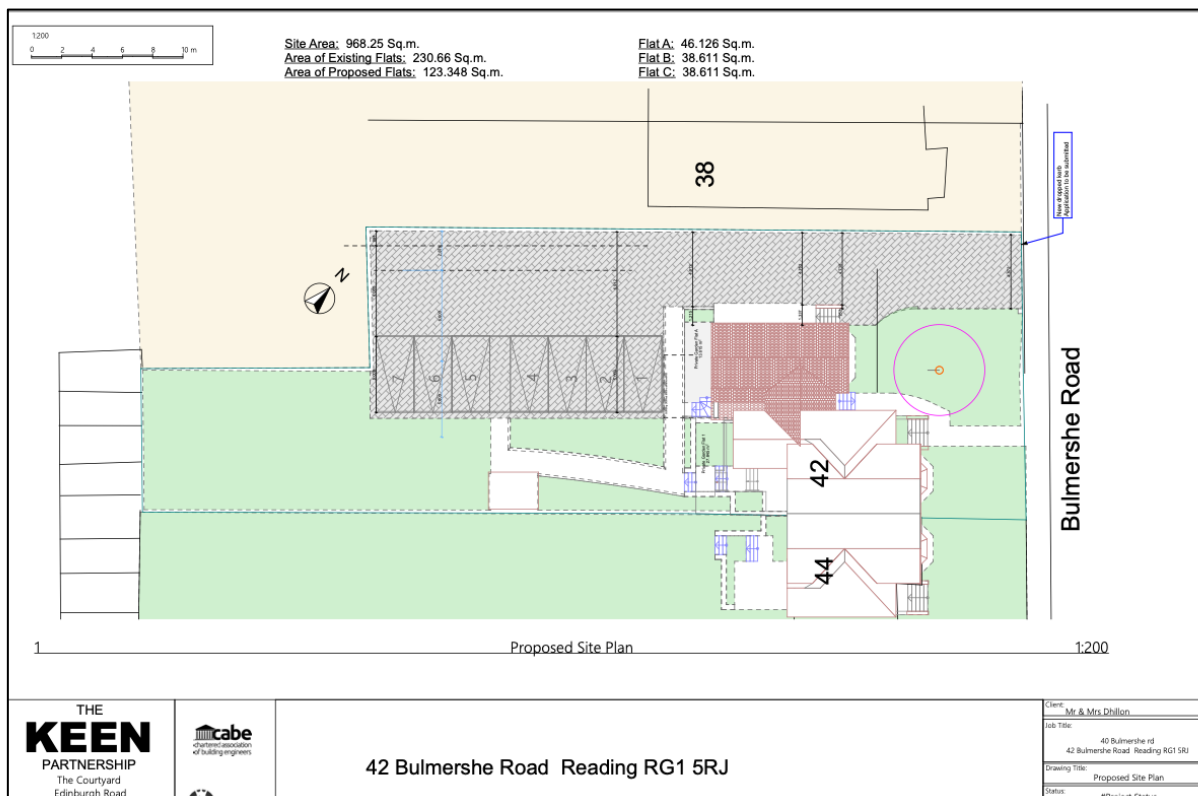


Figure 2. Proposed plans for the development at 42 Bulmershe Road, Reading. Provided courtesy of The Keen Partnership. PL-03, D, dated 08/11/2019.



1.3 Summary of Previous Survey Work

A Bat Scoping Assessment at the site was undertaken in October 2018 by The Ecology Co-op¹. No further surveys were recommended, but avoidance of the nesting bird season (1st March to August 31st) for any vegetation clearance was outlined.

2 LEGAL PROTECTION

Legal protection applying to relevant bird, mammal and herpetofauna species is detailed in Appendix 1 of this report. This includes both national and European legislation that protects badgers, bats, dormice, reptiles, and breeding birds.

2.1 Management Plan Strategic Vision

The aims and objectives for the landscape and biodiversity elements of this development project are as follows:

- retain and protect valuable existing 'green assets' where possible, including a mature tree.
- creation of new green assets including: flowering lawn.
- minimise impacts and ensure compliance with legislation on key species: bats (roosting, commuting and foraging) and breeding birds;
- provide targeted and appropriate habitat enhancement features for bats and birds.

3 PRE-CONSTRUCTION MITIGATION MEASURES

3.1 Vegetation Removal

In line with the recommendations within the Bat Scoping Report¹, any vegetation removal to prepare the site will be timed outside of the breeding bird season (1st March to 31st August). Where this is not possible, a nesting bird check by a suitably qualified ecologist will be required to confirm the absence of any nests in trees within 5m of the construction footprint prior to works starting. If any active nests are identified, a buffer of at least 5m will be maintained and the nest left undisturbed until the young have fledged, or works will be postponed.

¹ The Ecology Co-op (2018). *Bat Scoping Report - Land at 42 Bulmershe Road, Reading, RG1 5RJ*.



4 CONSTRUCTION PHASE MITIGATION MEASURES

4.1 Retained Tree

To prevent damage to the retained tree on site, a buffer of at least 5m will be installed around the base of the tree and reinforced with Heras fencing to prevent construction vehicles from tracking over the roots. The fencing will also include a dust membrane to prevent construction dust settling on the tree.

5 OPERATIONAL PHASE MITIGATION MEASURES

5.1 Bats

Bright external lighting can have a detrimental impact upon foraging and commuting bat flight paths. Guidelines issued by the Bat Conservation Trust must be considered while designing the lighting scheme (see Appendix 2). This includes the following measures:

- no 'upward pointing' or bare bulb lights to be installed anywhere on the developed site;
- all external lights upon lamp posts must not be more than 3.5m in height and must have shields installed to focus light directly onto areas of need only;
- no external lights are to be installed on the building above a height of 2m and all external lights must have shields to prevent light splash beyond the horizontal (90 degrees from the ground);
- narrow-spectrum light sources must be used to lower the range of species affected by lighting, minimising the use of ultra-violet light;
- white and blue wavelengths of the light spectrum must be avoided to reduce insect attraction (a peak wavelength of >550nm). Where white lights are required, they should be of a warm/neutral colour temperature (<2,700 Kelvin ratings);
- any pedestrian ground lighting must not exceed 3 lux;
- external lighting must be on PIR sensors, which detect large objects only, and are therefore not triggered by passing bats. These should be set to the shortest time duration;
- wall lights and security lights must be 'dimnable' and set to the lowest light intensity. The developed site should make the most of the up-to-date technology available to incorporate this.



6 BIODIVERSITY ENHANCEMENT MEASURES

Error! Reference source not found. below indicates the locations of the biodiversity enhancement measures at 42 Bulmershe Road including flowering lawn as well as bat and bird boxes.

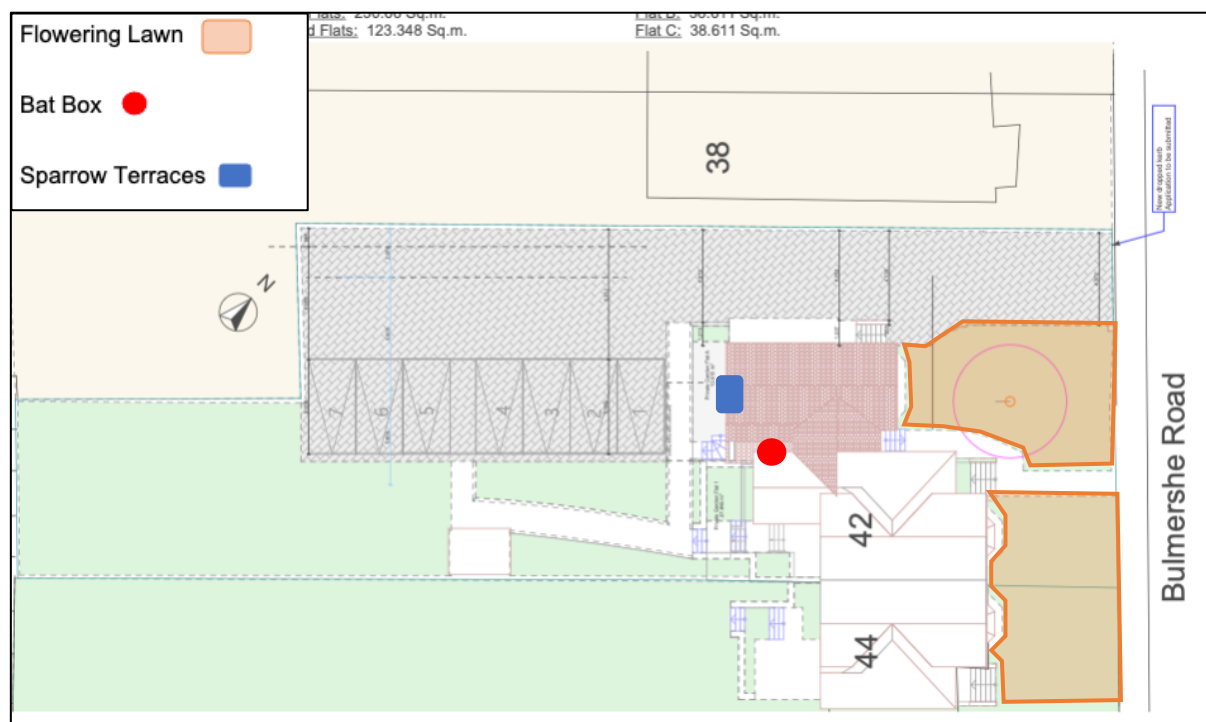


Figure 3. Suggested locations for biodiversity enhancements at 42 Bulmershe Road. Overlaid over plans provided courtesy of The Keen Partnership. PL-03, D, dated 08/11/2019.

6.1 Flowering Lawn Creation

Areas of communal greenspace across the development will be seeded with a flowering lawn mixture which includes low and slow growing species and responds well to frequent mowing. A suitable mixture is the EL1 – Flowering Lawn Mixture from Emorsgate Seeds. The detailed composition of this mixture is outlined in

Table **1** below. Other suitable mixtures are available, but the species included must all be of native British origin.

Good ground preparation is essential to the success of establishing this flowering lawn, followed by sowing the seed mix between late August and the end of September during mild and wet weather, or during mid-March to mid-May when the ground has sufficient moisture and there is very little risk of frosts, to ensure the best conditions for seedling establishment. The area should be rotavated to create an area of largely bare ground to allow the wildflower seed mix to establish. The seed should be surface sown by machine or broadcast by hand across the ground at a density of four grams per square metre. Any ground preparation under the retained tree should be done by hand to prevent damage to the roots.

**Table 1.** Composition of EL1 – Flowering Lawn Mixture.

Wildflowers		
%	Latin name	Common name
1.00	<i>Achillea millefolium</i>	Yarrow
1.00	<i>Anthyllis vulneraria</i>	Kidney vetch
0.40	<i>Betonica officinalis</i> - (<i>Stachys officinalis</i>)	Betony
1.5	<i>Centaurea nigra</i>	Common Knapweed
0.40	<i>Galium album</i>	Hedge bedstraw
1.5	<i>Galium verum</i>	Lady's Bedstraw
0.40	<i>Knautia arvensis</i>	Field scabious
0.50	<i>Leontodon hispidus</i>	Rough hawkbit
1.00	<i>Leucanthemum vulgare</i>	Oxeye Daisy
1.00	<i>Medicago lupulina</i>	Black medick
0.40	<i>Plantago lanceolata</i>	Ribwort Plantain
2.00	<i>Plantago media</i>	Hoary plantain
2.00	<i>Primula veris</i>	Cowslip
0.40	<i>Prunella vulgaris</i>	Selfheal
0.40	<i>Ranunculus acris</i>	Meadow Buttercup
1.60	<i>Ranunculus bulbosus</i>	Bulbous buttercup
4.00	<i>Trifolium repens</i>	White clover
Grasses		
8.00	<i>Agrostis capillaris</i>	Common Bent
28.00	<i>Cynosurus cristatus</i>	Crested Dogstail
24.00	<i>Festuca rubra</i>	Red-fescue
4.00	<i>Phleum bertolonii</i>	Smaller cat's-tail
16.00	<i>Poa pratensis</i>	Smooth stalked meadow grass

6.2 Enhancements for Bats

One bat box will be affixed onto the new building. A suitable box could be the Low Profile WoodStone Bat Box or Beaumaris WoodStone Bat Box (Midi), which are both suited to pipistrelle species *Pipistrellus spp.* which are most likely to be within the urban area of the development site. These boxes are shown in below in Figure 4. These will be installed 2.5 to 3m above ground level, with a clear flight path to the box. They should ideally be placed on the southern or eastern aspects of the building. Lighting will be directed away from these boxes to prevent disturbance to bats. Detailed information on reducing the impacts of artificial lighting on bats is outlined in Appendix 2.



Figure 4. Low Profile WoodStone Bat Box or Beaumaris WoodStone Bat Box.

6.3 Enhancements for Nesting Birds

Two sparrow terraces (see Figure 5) will be affixed to the new properties. This can include Schwegler 1SP Sparrow Terraces or Sparrow Terrace Nest Boxes. These will be installed 2.5 to 3m above ground level, with a clear flight path to the box. They should ideally be placed on the southern or eastern aspects of the building, close to the eaves.



Figure 5. Schwegler 1SP Sparrow Terrace and Sparrow Terrace Nest Box.

7 POST CONSTRUCTION MANAGEMENT PLAN

7.1 Flowering Lawn

Flowering lawn mixtures will grow slowly and respond well to mowing regularly. Given the species included are perennial they may be slow to establish and won't flower in the first year. Weeds will likely be common in the first year, but regular mowing helps to reduce them over time.

In the first year, mow the lawn every two weeks during the active growing season and rake off the cuttings. Dig out any large or persistent weeds, such as docks. Once it has established, such regular mowing will not be required, especially outside of the active growing season.



7.2 Bat and Bird Boxes

The integral bat roosting features in buildings will be largely maintenance-free, and apart from an annual check that they remain in position, so are bat boxes. Any damaged boxes are to be replaced like for like. However, an important component to these habitat features will be managing the expectations of residents and other users of the development site, including dealing with any concerns, questions, or unauthorized interference. It is recommended that prospective buyers of these properties are made aware of the legal protection afforded to bats and birds, and their obligations as owners.

Bird nesting boxes, particularly sparrow terraces should be emptied of nesting material in winter to prevent the build-up of parasites. Bat boxes should only be maintained by a suitably qualified/licensed ecologist, as they may support roosting bats. Bird boxes should only be cleared of material in the winter months to prevent any disturbance to nesting birds.



8 COMPETENCIES, STANDARD AND SPECIFICATIONS OF WORKS

The following competencies/standards/specifications should be adhered to:

- all tree works are to be undertaken by a suitably qualified arboriculturalist;
- the installation of bat boxes is to be undertaken or overseen by a suitably qualified ecologist.

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



APPENDIX 1 - Wildlife Legislation and National Planning Policy

Introduction

The following text is intended for general guidance only and does not constitute comprehensive professional legal advice. It provides a summary of the current legal protection afforded to wildlife in general and certain species. It includes current national planning policy relevant to nature conservation.

The ‘Birds Directive’, ‘Habitats Directive’ and ‘Natura 2000 Sites’

The Council Directive 79/409/EEC on the Conservation of Wild Birds (“the Birds Directive”) sets a framework for the protection of wild birds. Under the Directive, several provisions are made including the designation and protection of ‘Special Protection Areas’ (SPAs) – areas which support important bird populations, and the legal protection of rare or vulnerable species.

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the “Habitats Directive”) directs member states of the EU to take measures to maintain the favourable conservation status of important habitats and species. This requires the designation of a series of sites which contain important populations of species listed on Annex II of the Directive (for example Bechstein’s bat *Myotis bechsteinii*, Barbastelle bat *Barbastella barbastellus* and white-clawed crayfish *Austropotamobius pallipes*. Together with ‘Special Areas of Conservation’ (SACs), SPAs form a network across Europe of protected areas known as the ‘Natura 2000 sites’.

Annex IV lists species in need of more strict protection, these are known as “European Protected Species (EPS)”. All bat species, common dormice *Muscardinus avellana*, otter *Lutra lutra* and great crested newts *Triturus cristatus* are examples of EPS that are regularly encountered during development projects.

The ‘Habitats Regulations’

The Conservation of Habitats and Species Regulations 2017, as amended (the “Habitats Regulations”) is the principle means of transposing the Habitats Directive and the Birds Directive, and updates the Conservation (Natural Habitats, &c.) Regulations 1994 (“the 1994 regulations”) in England and Wales.

‘Natura 2000’ sites, now known as National Site Network sites under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019, receive the highest level of protection under the Regulations which requires that any activity within the zone of influence of these sites would be subject to a Habitats Regulations Assessment (HRA) by the competent authority (e.g. planning authority), leading to an Appropriate Assessment (AA) in cases where ‘likely significant effects’ to the conservation objectives are identified.

For European Protected Species, Regulation 41 makes it a criminal offence to:

- deliberately capture, injure or kill any such animal;
- deliberately disturb wild animals of such species;
- deliberately take or destroy their eggs (where relevant);
- damage or destroy a *breeding or resting place* of such an animal;
- possess, control, sell or exchange any live or dead animal or plant, of such species;
- deliberately pick, collect, cut, uproot or destroy a wild plant of such species.

The Habitats Directive and Habitats Regulations provide for the derogation from these prohibitions for



specific reasons provided certain conditions are met. An EPS licensing regime allows operations that would otherwise be unlawful acts to be carried out lawfully. Natural England is the licensing Authority and, in order to grant a license, ensures that three statutory conditions (sometimes referred to as the 'three derogation tests') are met:

- a licence can be granted for the purposes of “preserving public health or safety or for other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment” (Regulation 53 (2) (e);
- a licence can be granted if “there are no satisfactory alternatives” to the proposed action;
- a licence shall not be granted unless the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

Wildlife and Countryside Act (1981) as amended

This remains one of the most important pieces of wildlife legislation in the UK. There are various schedules to the Act protecting birds (Schedule 1), other animals including insects (Schedule 5), plants (Schedule 8), and control of invasive non-native species (Schedule 9).

Under the Wildlife and Countryside Act (WCA) 1981, all wild birds (with the exception of those listed on Schedule 2), their eggs and nests are protected by law and it is an offence to:

- take, damage or destroy the nest of any wild bird while it is in use or being built
- take or destroy the egg of any wild bird
- disturb any bird listed on Schedule 1, while it is nest building, or at a nest with eggs or young, or disturb the dependant young of any such bird.

Schedule 5 lists all non-avian animals receiving protection to a varied degree. At its strongest, the Act makes it an offence to intentionally kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturb animals while occupying such places. Examples of species with *full protection* include all EPS, common reptile species, water vole *Arvicola amphibius*, white-clawed crayfish *Austropotamobius pallipes* and Roman snail *Helix pomatia*. Other species are protected from sale, barter or exchange only, such as white letter hairstreak *Satyrrium w-album*.

The Act makes it an offence to intentionally pick, uproot or destroy any plant or seed, and sell or possess any plant listed on Schedule 8. It is also an offence to intentionally uproot any wild plant not listed on Schedule 8 unless authorised [by the land owner]. Species on Schedules 5 and 8 are reviewed every 5 years when species can be added or removed.

Measures for the prevention of spreading non-native species which may be detrimental to native wildlife is included in the Act, which prohibits the release of animals or planting of plants into the wild of species listed on Schedule 9 (for example Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens glandifera*, New Zealand Pygmyweed *Crassula helmsii*).

The Wildlife and Countryside Act 1981 (as amended) also prohibits certain inhumane methods of traps and devices for the capture or killing of wild animals and certain additional methods such as fixed trap, poisoning with gas or smoke, or spot-lighting with vehicles for killing species listed on Schedule 6 of the Act (this includes all bat species, badger, otter, polecat, dormice, hedgehog and red squirrel).



Natural Environment and Rural Communities (NERC) Act (2006)

The NERC Act (2006) created the statutory nature conservation body Natural England, and places a statutory duty on all public bodies, including planning authorities, under Section 40, to take, or promote the taking by others, steps to further the conservation of *habitats and species of principal importance for the conservation of biodiversity* in England (commonly referred to as the 'Biodiversity Duty'). This duty extends to all public bodies the biodiversity duty of Section 74 of the Countryside and Rights of Way (CROW) Act 2000, which placed a duty only on Government and Ministers. Section 41 of the NERC Act lists the habitats and species of principle importance. This includes a wide range of species from mosses, vascular plants, invertebrates through to mammals and birds. It originates from the priority species listed under the UK Biodiversity Action Plan (UK BAP) with some omissions and additions.

Environment Act (2021)

The Environment Act sets a target of halting the decline in species through the inclusion of a legally binding 2030 species abundance target. Aiming to restore natural habitats and enhance biodiversity, the Act requires new developments to improve or create habitats for nature (through mechanisms such as mandatory Biodiversity Net Gain), and tackle deforestation. Going forwards, UK businesses will need to look closely at their supply chains as amongst other measures they will be prohibited from using commodities associated with wide-scale deforestation. Woodland protection measures are also strengthened through the Act.

The Act enables the reform of the Habitats Regulations and further improves protection for nature through the establishment of Local Nature Recovery Strategies that support national Nature Recovery Networks. In addition, the Act provides for the production of Protected Site Strategies and Species Conservation Strategies, aimed at supporting the design and delivery of strategic approaches to deliver better outcomes for nature.

Protection of Badgers Act (1992)

The Badger *Meles meles* is afforded specific legal protection in Britain under the Protection of Badgers Act (1992), and Schedule 6 of the Wildlife and Countryside Act 1981 (as amended) (see above).

Under this legislation, it is a criminal offence to:

- intentionally kill, injure, take, possess, or cruelly ill-treat, a Badger, or to attempt to do so;
- interfere with a sett, by damaging or destroying it;
- to obstruct access to, or any entrance of, a badger sett; or
- to disturb a badger when it is occupying a sett.

A licence may be obtained from Natural England to permit certain prohibited actions for a number of defined reasons including interference of a sett for the purpose of development, provided that a certain number of conditions are met. Note that licenses are not normally granted for works affecting badgers between the end of November and the start of July.

National Planning Policy Framework

The National Planning Policy Framework (NPPF 2023)² sets out the Government's view on how planners should balance nature conservation with development and helps ensure that Government meets its biodiversity commitments with regard to the operation of the planning system.

² HM Government (2023). National Planning Policy Framework. Department for Communities and Local Government. Available online at: https://assets.publishing.service.gov.uk/media/64f991c99ee0f2000fb7c001/NPPF_Sept_23.pdf.



Paragraph 185b, states that council plans should “*promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.*”

The Office of the Deputy Prime Minister (ODPM) Circular 06/2005, (2005)³. In accordance with the NPPF, it is important that developments should contribute to and enhance the natural and local environment by:

- minimising impacts on existing biodiversity and habitats;
- providing net gains in biodiversity and habitats, wherever possible;
- establishing coherent ecological networks that are more resilient to current and future pressures.

UK Post-2010 Biodiversity Framework

The UK Biodiversity Action Plan (UK BAP), first published in 1994, was the UK’s response to the commitments of the Rio Convention on Biological Diversity (1992) until 2010, when the UK BAP was replaced by the UK Post-2010 Biodiversity Framework. This framework covers the period 2011 to 2020 and forms the UK government’s response to the new strategic plan of the United Nations Convention on Biodiversity (CBD) published in 2010. This promotes a focus on individual countries delivering target for protection for biodiversity through their own strategies.

The most recent biodiversity strategy for England, 'Biodiversity 2020: A strategy for England's wildlife and ecosystem services' was published by Defra (2011), and a progress update was provided in July 2013 (Defra 2013).

'Biodiversity 2020' builds on the Natural Environment White Paper for England – 'The Natural Choice', published on 7 June 2011, and sets out the strategic direction for biodiversity policy for the next decade.

Biodiversity 2020 deliberately avoids setting specific targets and actions for local areas and species because the Government believes that local people and organisations are best placed to decide how to implement the strategy in the most appropriate way for their local area or situation.

Birds of Conservation Concern (BoCC)

In 1996, the UK’s leading non-governmental bird conservation organisations listed the conservation status of all bird species in the UK against a series of criteria relating to their population size, trends and relative importance to global conservation. The lists, known as the ‘Red’, ‘Amber’ and ‘Green’ lists (in order of decreasing concern) are used to inform key conservation policy and decisions. The lists are reviewed every five years and are a useful reference for determining the current importance of a particular site for birds. The most recent review was undertaken in 2021 (Stanbury et al, 2021), which provides an up to date assessment of the conservation status of birds in the UK.

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³ HM Government (2005) ODPM Circular 06/05 Government Circular: *Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7692/147570.pdf.



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APPENDIX 2 – Reducing Impacts of Artificial Light

Bright external lighting can have a detrimental impact upon foraging and commuting bat flight paths, but more importantly can also cause bats to remain in their roosts for longer. Artificial lighting can also cause significant impacts to other nocturnal species, most notably moths and other nocturnal insects. It can also result in disruption of the circadian rhythms of birds, reducing their fitness.

Guidelines issued by the Bat Conservation Trust⁴ should be referred to when designing the lighting scheme. Note that lighting designs in very sensitive areas should be created with consultation from an ecologist and using up-to-date bat activity data where possible. The guidance contains techniques that can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. This includes the following measures:

Avoid lighting key habitats and features altogether

There is no legal duty requiring any place to be lit. British Standards and other policy documents allow for deviation from their own guidance where there are significant ecological/environmental reasons for doing so. It is acknowledged that in certain situations lighting is critical in maintaining safety, such as some industrial sites with 24-hour operation; however, in the public realm, while lighting can increase the perception of safety and security, measurable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully consider the presence of protected species.

Apply mitigation methods to reduce lighting to agreed limits in other sensitive locations – lighting design considerations

Where bat habitats and features are considered to be of lower importance or sensitivity to illumination, the need to provide lighting may outweigh the needs of bats. Consequently, a balance between a reduced lighting level appropriate to the ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved. The following are techniques which have been successfully used on projects and are often used in combination for best results:

- dark buffers, illuminance limits and zonation;
- sensitive site configuration, whereby the location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill;
- consideration of the design of the light and fittings, whereby the spread of light is minimised ensuring that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Consideration should be given to 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 should be carefully considered to balance task and mitigation measures. Consider no lighting solutions where possible such as white lining, good signage, and LED cat's eyes. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times;
- screening, whereby light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding;
- glazing treatments, whereby glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and

⁴ Bat Conservation Trust and Institute for Lighting Professionals (2018) Guidance note 8. Bats and Artificial Lighting. <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>



features;

- creation of alternative valuable bat habitat on site, whereby additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for any such habitat being lost to the development;
- dimming and part-night lighting. Depending on the pattern of bat activity across the key features identified on site it may be appropriate for an element of on-site lighting to be controlled either diurnally, seasonally or according to human activity. A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

Demonstrate compliance with illuminance limits and buffers

- *Design and pre-planning phase*; it may be necessary to demonstrate that the proposed lighting will comply with any agreed light-limitation or screening measures set as a result of your ecologist's recommendations and evaluation. This is especially likely to be requested if planning permission is required.
- *Baseline and post-completion light monitoring surveys*; baseline, pre-development lighting surveys may be useful where existing on or off-site lighting is suspected to be acting on key habitats and features and so may prevent the agreed or modelled illuminance limits being achieved.
- *Post-construction/operational phase compliance-checking*; as a condition of planning, post-completion lighting surveys by a suitably qualified person should be undertaken and a report produced for the local planning authority to confirm compliance. Any form of non-compliance must be clearly reported, and remedial measures outlined. Ongoing monitoring may be necessary, especially for systems with automated lighting/dimming or physical screening solutions.

Lighting Fixture Specifications

The Bat Conservation Trust recommends the following specifications for lighting on developments to prevent disturbance:

- Lighting spectra: peak wavelength >550nm
- Colour temperature: <2700K (warm)
- Reduction in light intensity
- Minimal UV emitted
- Upward light ratio of 0% and good optical control

Further reading:

Buglife (2011) A review of the impact of artificial light on invertebrates.

Royal Commission on Environmental Pollution (2009) Artificial light in the environment. HMSO, London.
Available at: <https://www.gov.uk/government/publications/artificial-light-in-the-environment>

Rich, C., Longcore, T., Eds. (2005) Ecological Consequences of Artificial Night Lighting. Island Press.
ISBN 9781559631297.

CPRE (2014) Shedding Light: A survey of local authority approaches to lighting in England. Available at: <http://www.cpre.org.uk/resources/countryside/dark-skies/item/3608-shedding-light>



Planning Practice Guidance guidance (2014) When is light pollution relevant to planning? Available at: <https://www.gov.uk/guidance/light-pollution>

Institution of Lighting Professionals (2021) Guidance Notes for the Reduction of Obtrusive Light GN01:2011. Available at: <https://www.theilp.org.uk/resources/free-resources/>

Voigt, C.C., Azam, C., Dekker, J., Ferguson, J., Fritze, M., Gazaryan, S., Hölker, F., Jones, G., Leader, N., Lewanzik, D. and Limpens, H., 2018. *Guidelines for consideration of bats in lighting projects*. Unep/Eurobats. Available at:

https://cdn.bats.org.uk/uploads/pdf/Resources/EUROBATGuidelines8_lightpollution.pdf?v=15421093

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