

NEIL ATHERTON

THE LONG HOUSE, BLACKSMITH'S WAY, COEDKERNEW, NEWPORT

**PRELIMINARY ECOLOGICAL APPRAISAL
AND
BUILDING INSPECTION REPORT**

20th OCTOBER 2021



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PRELIMINARY ECOLOGICAL APRAISAL AND BUILDING INSPECTION
REPORT

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SUMMARY

Soltys Brewster Ecology were commissioned by Neil Atherton (the client) to undertake an ecological appraisal at The Long House, Blacksmith's Way, Coedkernew, Newport. The proposal is to construct two new properties in the garden of the existing property. This may require the removal of a small single storey extension on the end of the existing property. A planning application has been submitted and an ecological appraisal requested.

Consultation with SEWBrEC confirmed that the property and its associated curtilage do not fall within or adjacent to a site designated for nature conservation. There are no sites designated for bats within the 10km search buffer. The nearest designated site is a SINC site known as Celtic Springs 426m to the east consisting of post-industrial mosaic habitat including neutral and calcareous grassland. There are two more SINC sites whose boundaries just fall into the search area (1km) around the property. The Gwent Levels SSSI St Brides also just falls within the search area at 905m from the site. Only 4 bat records were returned by the data search but this is considered to be a reflection of recording effort rather than actual presence. A numbers of records were returned for protected mammals including Dormouse and Hedgehog which are considered within the assessment. Large numbers of records for birds, insects and flowering plants were returned but mostly in association with the woodlands or Gwent Levels SSSI.

The Main house roof is considered to have some low potential for bats. The smaller structures on site are all considered to have negligible potential. The daytime internal and external inspection found no evidence to suggest that any of the structures are used by bats. The roof of the main house will not be directly impacted by the proposal. As no evidence of current or recent use of the building by roosting bats was identified, a licence will not be required to undertake the proposed works. There are therefore no timing or other implications for the proposal.

No evidence of current or previous use of the building by nesting birds was observed during the survey.

Some small amount of foraging habitat for Hedgehog will be lost as a result of the proposal and suitable mitigation measures are outlined. Dormouse are considered and it is concluded that provided adjacent trees are not affected by the proposal Dormouse are also unlikely to be impacted by the proposal.

This report details the methodology and results of the building inspection conducted. It draws conclusions and makes recommendations for enhancements for biodiversity that could be made within the proposal.

1.0 INTRODUCTION

- 1.1 Soltys Brewster Ecology were commissioned by Neil Atherton (the client) to undertake an ecological appraisal at The Long House, Blacksmith's Way, Coedkernew, Newport (see Site Location Plan in Appendix I). The proposal is to construct two new properties in the garden of the existing property. This may require the removal of a small single storey extension on the end of the existing property. A planning application will be required and the Local Planning Authority has requested that an ecological appraisal be submitted to support the application. The following report is intended to provide the necessary information to support the planning decision and inform the works.
- 1.2 The community of Coedkernew is largely rural in nature with a large amount of commercial areas. There are only a few small residential areas, one of which runs along Blacksmith's way. It is bounded by the M4 to the north and the A48 to the south. There is a commercial unit to the east of this residential area. Despite these major roads nearby the setting is a rural one. The property is located on the west side of the road towards the southern settlement boundary (grid reference: ST 27501 84584). The property has a neighbouring row of cottages immediately to the east and then is surrounded by broadleaved woodland. The site is very well ecologically connected to the wider landscape.
- 1.3 The structure is a 2-storey building in a simple rectangle shape and with a pitched roof. There are three smaller structures within the garden curtilage, a garage/workshop and two smaller sheds. A survey to establish the ecological baseline with particular regard to bats and nesting birds is required in the first instance to inform the planning application and works.
- 1.4 The current report presents the findings of an ecological desk study and building inspection survey undertaken in September 2021.

2.0 METHODOLOGY

- 2.1 In order to establish the baseline ecological conditions on site, a combination of desk-based consultation and building inspection survey was undertaken in August 2021. The scope of survey work was based on best practice guidelines (BCT, 2016).

Desk study

- 2.2 The desk study involved consultation with the South East Wales Biodiversity Record Centre (SEWBRc) to identify any records of rare, protected or notable flora and fauna within 1km of the candidate site. The search criteria also included information relating to the location and citation details (where available) for any sites designated for their nature conservation interest such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs) or locally designated Sites of Importance for Nature Conservation (SINCs).

Extended Phase 1 Habitat Survey

- 2.3 The fieldwork was undertaken on 8th September 2021 by a suitably experienced ecologist¹ and followed standard Phase 1 Habitat Survey protocol (JNCC, 1990) as amended by the Institute of Environmental Assessment (1995). All habitats within and immediately adjacent to the site boundary were classified and mapped as accurately as possible. Habitats considered to have potential to support rare, protected or otherwise notable species of flora and fauna were noted, as were any direct signs of these species (e.g. Eurasian Badger *Meles meles* setts and dung-pits). Incidental observations of birds on or flying over the site were also recorded and any incidence of invasive weed species (e.g. Japanese Knotweed *Fallopia japonica*) noted.
- 2.4 A map of habitats was drawn up and target notes were used to identify features of ecological interest. Where possible, habitats were cross-referenced to any relevant important UK or Wales priority habitats as identified under Section 7 of the Environment Act (Wales) 2016.
- 2.5 The survey included an external inspection of the existing buildings in order to establish the potential for, or evidence of use by, roosting bats within the structures on site. Internal inspection was also undertaken wherever possible. This survey aimed to identify: -
- if bats are, or have been, present within the buildings to be lost and, if so, which species are present;
 - the type of roost (e.g. maternity roost, day roost used by males or non-breeding females, feeding perch, night roost, mating roost, transitional roost, hibernaculum);
 - how bats use the buildings (e.g. location of roosting bats, exit and entrance points to the roost); and
 - the intensity of use (e.g. likely number of bats, time and duration of use).

¹ Full member of the Chartered Institute of Ecology & Environmental Management (CIEEM) & NRW Bat licence holder
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- 2.6 Building inspections at the site involved the use of binoculars to identify possible access/entry points into all structures and aimed to identify any evidence of use by bats such as droppings, staining, prey remains etc. The survey was undertaken from ground-level around the exterior of the site buildings with ladder access (up to a maximum of 5.5m) where required and was assisted by the use of close-focus binoculars and a high-powered torch (1 million candlepower). Internal surveys were undertaken within the buildings wherever possible and notes were made of any relevant internal features.
- 2.7 The surveyor searched for roost evidence (droppings, staining, scratch marks, noise, etc.) as described above and an assessment of the buildings potential to support nesting birds was also undertaken. The scope of the bat inspection survey, including timing, survey effort etc., was based on guidelines published by the Bat Conservation Trust (BCT, 2016).
- 2.8 In addition, any trees at the development site were assessed for their potential to support roosting bats and were categorised in relation to the bat roosting features (BCT, 2016). The categories are as follows:
- **Known or confirmed roost**
 - **High** - A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
 - **Moderate** – A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status.
 - **Low** – A structure with one or more potential roost sites that could be used by individual bats opportunistically or; A tree of sufficient size & age to contain PRFs (Potential Roost Features) but with none seen from the ground or features seen with only very limited roosting potential.
 - **Negligible** – Negligible habitat features on site likely to be used by roosting bat.

Constraints

- 2.9 There were areas at the eaves in the internal loft spaces (1-3) that were difficult to visually inspect as these extended beyond and below the loft floor.
- 2.10 All structures except the Main house were partially covered with vegetation impeding the visual inspection to some degree.
- 2.11 These constraints are given due considered when drawing conclusions. It is not considered that they have had an effect on the overall conclusions drawn.

3.0 RESULTS

Desk Study

- 3.1 Consultation with SEWBRc confirmed that the property and its associated curtilage do not fall within or adjacent to a site designated for nature conservation. The nearest designated site is a SINC site known as Celtic Springs 426m to the east consisting of post-industrial mosaic habitat including neutral and calcareous grassland. There are two more SINC sites whose boundaries just fall into the search area (1km) around the property. These are LG Duffryn Site 1 (South Lake Drive) at 989m designated for standing water containing reed beds and as supporting habitat for birds (Cettis Warbler *Cettia cetti* in particular) and LG Duffryn Site 2 at 966m designated for neutral grassland that support the nearby Gwent Levels SSSI. The Gwent Levels SSSI St Brides also just falls within the search area at 905m from the site. The Gwent levels are designated for the series of drainage ditches or 'reens' that support large assemblages of aquatic invertebrates. There are no sites designated for bats within the 10km search buffer. Designated site locations are illustrated in Appendix II although due to the physical separation, none were considered of ecological relevance to the development proposals.
- 3.2 The data search returned three records for bats, an unknown species which was found within a building approximately 1164m to the east of the property, a single Noctule *Nyctalus noctula* 1359m and a single Greater horseshoe *Rhinolophus ferrumequinum* record more that 2km from the site. The low number of records in this instance is likely due to a lack of recording rather than an absence of species because there is plenty of suitable habitat in the area.

- 3.3 A population of Dormouse is known to reside along the M4 corridor and this was flagged by the data search with a number of Dormouse records returned the nearest of which was at 660m from the site. Other mammals returned by the search include; Otter *Lutra lutra* associated with the reed network in the Gwent levels to the south, Weasel *Mustela nivalis*, Polecat *Mustela putorius*, Brown hare *Lepus europaeus*, Hedgehog *Erinaceus europaeus* and Common shrew *Sorex araneus*. Also the naturalised species the American mink *Neovision vison* and Grey squirrel *Sciurus carolinensis* are recorded in the area.
- 3.4 Amphibians known to occur in the area are Palmate *Lissotriton helveticus* and Smooth newt *L.vulgaris* and Common toad *Bufo bufo*. Two records exist for Adder *Vipera berus* within the 2km search buffer.
- 3.5 A large number of bird records (104 total) for 42 species were returned by the search. Many of the species are associated with specific habitats which do not occur on the site itself such as Barn Owl *Tyto alba* which would be associated with open farmland or the gulls, waders, ducks and geese associated with the Gwent levels and estuary beyond but unlikely to be present on the proposed development site. Species considered to be of relevance would be typical garden species like the House sparrow *Passer domesticus* and Dunnock *Prunella vulgaris* and due to the proximity of valuable woodland habitat woodland specialists such as the Green woodpecker *Picus viridis* and Spotted Flycatcher *Muscicapa striata* are also likely to be present on site.
- 3.6 Forty-eight species of flowering plants were returned by the search. Again, many are associated with the drainage ditches in the Gwent Levels such as the duckweeds and waterweeds. Of most relevance are the records for non-native invasive species; Sweet-flag *Acorus calamus*, Butterfly-bush *Buddleja davidii*, Pampas-grass *Cortaderia selloana*, Canadian *Elodea canadensis* and Nuttall's waterweed *E.nuttallii*, Orange balsam *Impatiens capensis*, Wilson's honeysuckle *Lonicera nitida*, Cherry Laurel *Prunus laurocerasus*, and Snowberry *Symphoricarpos albus*.

Extended Phase 1 Habitat Survey

- 3.7 The distribution and extent of habitats recorded at the site are illustrated on the Phase 1 Habitat Plan with accompanying target notes in Appendix III. The site consists of garden curtilage and supports a limited range of habitat types, predominantly poor semi-improved grassland, some ornamental planting and some more natural elements where native species have encroached into more managed areas. The adjacent Broadleaved woodland extends its canopy into the site and gives some elements a shady woodland feel.

Semi-natural broad-leaved woodland

- 3.8 The site is bounded on its western and southern boundary by semi-natural broad-leaved woodland. This is a very high-quality habitat and although the trunks lie outside the site boundary the canopy extends into the site indicating that the tree roots will also extend into the site.

Poor semi-improved grassland

- 3.9 The lawn was closely mown at the time of visit although the herb species present would suggest that it has not been treated with any chemicals. It mostly consists of Fescue *Festuca* spp and perennial rye grass *Lolium perenne* but there is a good range of herb species particularly in the eastern corner of the front garden (TN1) including; Narrow leaved plantain *Plantago lanceolata*, Barren strawberry *Potentilla sterilis*, Dandelion *Taraxacum officinale*, Creeping buttercup *Ranunculus repens*, Ivy *Hedera helix*, Hawkweed *Heiracium* spp. Selfheal *Prunella vulgaris*, Ground ivy *Glechoma hederacea*, Yarrow *Achillea millefolium*, Germander speedwell *Veronica chamaedrys*, Thyme-leaved speedwell *Veronica serpyllifolia* Primroses *Primula vulgaris*, Creeping cinquefoil *Potentilla reptans*. Broad leaved plantain *Plantago major*.

Ornamental planting

- 3.10 There are some flower borders around the garden, some are evidently still maintained while some out the back have become more overgrown with native species. Ornamental plants include Pampass grass, roses, Magnolia and cypress species. Some Cotoneaster was noted in one of the front flower beds (TN2).

Scattered trees

- 3.11 There are a number of small trees within the site boundary. They are a mixture of planted ornamental species such as the Magnolia, privet *Ligustrum* sp, plum *Prunus domestica* and conifers while others have most likely self-sown such as Ash *Fraxinus excelsior*, Hazel *Corylus avellana*, Elder *Sambuca nigra* and Willow *Salix fragilis*.
- 3.12 All the trees within the site are small specimens and none have any potential to support bat roosts. However, the trees are likely to support a range of common invertebrate species and provide nesting habitat for common bird species such as Blackbird.

Invasive species

- 3.13 Cotoneaster was noted as present on the site (TN2). Several species of Cotoneaster are listed under Schedule 9, Section 14 of the Wildlife and Countryside Act 1981 (as amended) and it is an offence "to plant or otherwise encourage" its growth. This could include disturbing surrounding soil which is likely to be full of seeds, if not correctly managed and the presence of this species would need to be considered as part of the proposal.

Buildings and hardstanding

- 3.14 There is some hardstanding around the buildings and for access. There are a total of four structures present on the site. The main residential property (B1) and three smaller structures, a large garage/workshop (B2), a small shed used as a log store (B3) and another shed closer to the house used for storage (B4). These were all inspected to assess their potential to support protected species primarily roosting bats or nesting birds. The buildings are considered in more detail below.

Building Inspection Survey

- 3.15 A summary of the building features and inspection survey is provided in the following section with further detail including target notes and supporting photographs in Appendix IV.
- 3.17 The main dwelling (B1) is a 2 storey, rectangular structure with an apex tiled roof. There is a small single storey extension on the western end and seven dormer windows creating more tile edges. Walls are painted textured render and the roof covering is large tiles possibly some kind of concrete/asbestos mix.
- 3.18 There are a few holes in the wooden fascia/soffit elements and single broken roof tile, but mostly the roof is in good condition. No sign of bats was seen on any of the external features.
- 3.19 Internally there are three enclosed loft spaces in the main roof and a fourth in the extension. These were found to be largely suitable in character for use by bats being quite open with timber trusses and felt. In the main loft spaces (Lofts 1-3) the eaves drop below the floor level making inspection difficult. Signs of rat and mouse presence was observed in all lofts although no evidence of use by bats (or nesting birds) was identified.
- 3.20 Overall, the main house roof is considered to have low potential for bats having a broken tile and some suitable holes in the soffits that could be used by individual bats opportunistically. Internal use of the lofts is considered unlikely and the extension element in isolation would be considered to have negligible potential.
- 3.21 The Garage/workshop (B2) has a UPVC roof covering which is not a typically suitable material for bats but there is felt and wooden timbers present in the roof construction. There are some small access points that mean crevice dwellers could access the internal space and then some limited potential to roost between the wooden beams and felt. However, the presence of windows makes the interior very light making day roosting unlikely. Overall, it is considered that the structure had negligible potential to support bats.
- 3.22 The woodstore (B3) has negligible potential to be used by bats lacking any suitable materials, the roof supports are metal and lacks felt, or suitable crevices. No evidence of use by bats was seen during the inspection.

3.23 The Shed (B4) is a similar construction to the woodstore and lacks timber or felt in the roof or cavities in the roof structure or walls. In addition, this structure has several windows making the interior light during the day. No evidence of use by bats was seen during the inspection of this structure and it is considered to have negligible potential for use by bats.

4.0 LEGISLATION, POLICIES AND PLANS

- 4.1 The following legislation and planning policy relating to nature conservation and biodiversity are considered of relevance to the area surveyed and to the proposed works at the site.

Legislation Pertaining to the Protection of Bats

- 4.2 Under Annex II of the *Council Directive 92/43/EEC 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* (EC Habitats Directive) some bat species are listed as of Community Interest, the conservation of which requires designation of Special Areas of Conservation (SACs); Under Annex IV of the EC Habitats Directive all bat species are listed as of Community Interest, in need of strict protection. In England and Wales, the EC Habitats Directive has been transposed into law in 1994 and, following recent amendments is set out in the *Conservation of Habitats & Species Regulation 2017* to give bats, their breeding sites and resting places a high level of strict protection making it an offence (subject to certain specific exceptions) to deliberately capture or kill/injure a bat, to damage or destroy a place used for shelter or protection or to deliberately disturb a bat in such a place. Case Law has placed an onus on local planning authorities to satisfy ‘three tests’ under the Habitats Directive when determining applications that could affect European Protected Species. Essentially, these three tests are: i) that there is no satisfactory alternative; ii) that the proposed development is in the over-riding public interest (including those of a social or economic nature) and iii) the proposed development would not adversely affect the Favourable Conservation Status (FCS) of the species locally. Even without the requirement for planning consent in this instance a licence will be required to undertake the works. To obtain the licence from Natural Resources Wales (NRW) the third test will need to be met which means appropriate measures will need to be in place to demonstrate how the works can be achieved without adversely affecting the FCS of the species present.
- 4.3 Bats are also afforded protection within England and Wales under the Wildlife and Countryside Act 1981 (as amended); Countryside and Rights of Way Act 2000; Natural Environment and Rural Communities Act 2006.

Planning Policy Wales (2021)

- 4.4 This document set out the land use planning policies of the Welsh Government with Chapter 6 dealing with Distinctive and Natural places which covers Biodiversity and Ecological Networks. The advice contained within PPW is supplemented for some subjects by Technical Advice Notes (TAN’s), with TAN 5 addressing Nature Conservation.
- 4.5 TAN 5 identifies a number of key principles, which the town and country planning system in Wales should consider. Those relevant are detailed below:

- Work to achieve nature conservation objectives through a partnership between local planning authorities, Natural Resources Wales (NRW), voluntary organisations, developers, landowners and other key stakeholders;
- Integrate nature conservation into all planning decisions looking for development to deliver social, economic and environmental objectives together over time;
- Ensure that the UK's international obligations for site, species and habitat protection are fully met in all planning decisions;
- Look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally;
- Promoting approaches to development which create new opportunities to enhance biodiversity, prevent biodiversity losses, or compensate for losses where damage is unavoidable. Minimizing or reversing the fragmentation of habitats and improving habitat connectivity through the promotion of wildlife corridors;
- Local planning authorities should seek to protect trees, groups of trees and areas of woodland where they have natural heritage value or contribute to the character or amenity of a particular locality;
- The presence of a species protected under European or UK legislation is a material consideration when a local planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat.

Environment (Wales) Act, 2016

4.6 Part 1 of the Environment Act Wales' came into force in May 2016 and sets out the approach to planning and managing natural resources at a national and local level with a general purpose linked to statutory 'principles of sustainable management of natural resources' defined within the Act.

Section 6 - Biodiversity and resilience of ecosystems duty

4.7 Section 6 of the Act places a duty on public authorities to 'seek to maintain and enhance biodiversity' so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to 'promote the resilience of ecosystems'.

Section 7 - Biodiversity lists and duty to take steps to maintain and enhance biodiversity

4.8 This section lists living organisms and types of habitat in Wales which are considered of key significance to maintaining and enhancing biodiversity in relation to Wales. The Welsh Ministers are required to take all reasonable steps to maintain and enhance the living organisms and types of habitat included in any list published under this section, and encourage others to take such steps.

Local Planning Policy

Newport Local Development Plan 2011-2026 (Adopted January 2015)

4.9 The Newport Local Development Plan (LDP) was adopted in January 2015. It is the most up to date Development Plan covering the authorities' administrative area and is used in the determination of planning applications. The LDP sets out a range of policies and proposals relating to future development and deals with the use and conservation of land and buildings within Newport up to 2026. A number of policies within the LDP are considered of relevance to the site and these are detailed below.

GP5 General Development Principles – Natural Environment

Development will be permitted where, as applicable:

- I) The proposals are designed and managed to protect and encourage biodiversity and ecological connectivity, including through the incorporation of new features on or off site to further the UK, Welsh and/or Newport biodiversity action plans;*
- II) The proposals demonstrate how they avoid, or mitigate and compensate negative impacts to biodiversity, ensuring that there are no significant adverse effects on areas of nature conservation interest including international, European, national, Welsh section 4232 and local protected habitats and species, and protecting features of importance for ecology;*
- III) The proposal will not result in an unacceptable impact on water quality;*
- IV) The proposal should not result in the loss or reduction in quality of high quality agricultural land (grades 1, 2 and 3a);*
- V) There would be no unacceptable impact on landscape quality;*
- VI) The proposal includes an appropriate landscape scheme, which enhances the site and the wider context including green infrastructure and biodiversity networks;*
- VII) The proposal includes appropriate tree planting or retention where appropriate and does not result in the unacceptable loss of or harm to trees, woodland or hedgerows that have wildlife or amenity value.*

Trees, Hedgerows and Woodlands

Trees, woodlands and hedgerows form an important part of Newport's character as well as supporting a wide range of rare and common wildlife. Newport has a number of woodlands which are included in the Inventory of Ancient Woodland, and also secondary woodlands (non-ancient) and a network of hedgerows, all of which have an importance for amenity, wildlife and landscape character. They should therefore be protected and, where appropriate, enhanced as set out in TAN 5: Nature Conservation and Planning (2009) and TAN 10: Tree Preservation Orders (1997).

CE3 - Environmental Spaces and Corridors

In adjoining urban and village areas, and in areas identified for comprehensive development, sites having existing importance for their visual qualities, as wildlife habitats or for recreational or amenity purposes, will be safeguarded as “environmental spaces and corridors”. Development in these spaces will be permitted only where:

- i) the existing or potential environmental qualities of the site will be improved or complemented;*
- ii) there is no adverse impact on international, European, national, regional or local nature conservation interest;*
- iii) there is not a loss, without appropriate replacement, of a recreational, open space, or amenity resource for the immediate locality unless it can be demonstrated that there is an excess of provision or facilities can be enhanced through development of a small part of the site. Proposals to enhance or improve existing environmental space provision will be encouraged where practicable and additional provision will be sought in areas where a deficit has been identified.*

CE8 - Locally Designated Nature Conservation and Geological Sites

Locally designated sites are important to the overall biodiversity of Newport. They include Local Nature Reserves (LNRs), Sites of Importance for Nature Conservation (SINC), Regionally Important Geological and/or Geomorphological Sites (RIGS), Wildlife Trust Nature Reserves, ‘Green Corridors’ / ‘Ecological Networks’ and those habitats and species identified within the National and Local Biodiversity Action Plan (UKBAP and LBAP), Section 42 Habitats and Species of Principal Importance for the Conservation of Biological Diversity in Wales⁶⁹, the list for which is subject to periodic review. Proposal affecting locally designated sites will only be permitted where:

- i) There would be no overall loss of the nature conservation resource for which the site has been designated;*
- ii) There would be no significant adverse effect on the geological interest of the site;*
- iii) Appropriate mitigation or compensatory measures can be achieved.*

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 The combination of desk study and Extended Phase 1 Habitat survey identified a limited range of habitats dominated by poor semi-improved grassland, consistent with the current use as a garden. There are some elements of ornamental planting and some small, scattered trees. The broadleaved scattered trees are of some ecological value in a local context and should be retained in the first instance but where not possible they should be translocated within the site or replacement planting of comparable size/species provided.

5.2 Mature trees are present immediately outside the site boundary. Their root protection zones are likely to extend within the site boundary and will therefore need to be identified and protected throughout the development of the scheme.

Bats

5.3 There were limited features that could be used and the Main house roof is considered to have some very low potential for bats based on the criteria outlined in section 2.6. The smaller structures on site are all considered to have negligible potential. The daytime internal and external inspection found no evidence to suggest that any of the structures are used by bats.

5.4 The roof of the main house which has some very small amount of potential will not be directly impacted by the proposal. Therefore a licence will not be required to undertake the proposed works. There are therefore no timing or other implications for the proposal. The absence of bats is very difficult to prove, and many bat species are itinerant in nature and will often make use of multiple roosts during the course of the active months (typically April to October). In the unlikely event that a bat were discovered once works have begun, all work in the area will cease immediately and the project ecologist or Natural Resources Wales contacted for advice on how to proceed.

5.5 Features that will encourage bats to use the new built properties could be included in the proposal to create biodiversity enhancements. Examples are given in Appendix V.

5.6 No trees with potential to support roosting bats will be impacted as a result of the proposal.

Birds

5.7 No evidence of current or previous nests were observed during the survey. It is therefore not considered appropriate to restrict the timings of work on this basis although avoidance of the nesting season for the start of any demolition work (to the western annex) would be recommended – typically the nesting season extends from March – August inclusive. Under the Wildlife and Countryside Act (1981) (as amended) all wild birds and their nests are protected against damage or destruction whilst in use or being built. Therefore if any active nests

are found during the works then work must stop in the vicinity (5m) of the nest until such a time as the nest is no longer active.

Dormouse

- 5.8 There are records locally for this European Protected Species and the habitat immediately adjacent to the proposed development is suitable for this species to be present. It is considered that the species is unlikely to be present on the site itself (based on relative lack of suitable habitat) and any minor work to overhanging tree branches are unlikely to impact on this species. Providing additional lighting is not anticipated as part of the proposal (see 5.14 below) it is considered that even if present in the surrounding woodland this species is unlikely to be impacted by the proposal.

Hedgehog

- 5.9 This species is in decline nationally and are offered some limited protection via the Wildlife and Countryside Act (1981) (as amended) and a species of 'principal importance' under the Environment Wales Act 2016. Hedgehogs are present on the site and should be considered as part of the application.
- 5.10 The new buildings and associated hardstanding would result in a loss of foraging habitat for this species and as such mitigation should be provided.
- 5.11 It is recommended that close board fencing is not used in the design and that wire fences with hedge planting are used in keeping with the current boundary style. Gaps of 130mm x 130mm gaps at the bottom of fencing would allow for the continued connectivity for Hedgehog and other small mammals through the site (Peoples Trust for Endangered Species, 2020). The hedge planting would create increased areas for shelter and potential nesting.

Reptiles

- 5.12 There are some limited habitats on site that would typically be considered suitable to support common reptiles such as slowworm such as grass cuttings pile and the bottom of the flower beds for example. However, the grass cutting pile is situated such that it rarely gets any direct sunlight and the presence of the dense woodland habitat around the site means that it is quite isolated for this species group. It is considered unlikely for reptiles to be present in this instance.

Invasive species

- 5.13 The cotoneaster and pampass grass will not be impacted by the proposal and as such the potential for them to spread is limited. However, it would be considered good practice for a programme for clearing/removing these species from the site as part of the development.

Other considerations

- 5.14 Further recommendations include the use of native species in any soft landscaping scheme and the use of diverse seed mixes for lawns/gardens to enhance the habitat for local invertebrates, birds and small mammals including Hedgehogs.
- 5.15 Any proposed lighting should avoid light spillage onto sensitive habitats particularly the woodland boundaries (see Appendix VI for technical lighting note). This woodland is likely to be used by a range of protected species that are nocturnal principally bats and Dormouse. Although the extract in Appendix VI is specifically for bats the principles apply for all nocturnal species.

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APPENDIX I SITE LOCATION PLAN AND PROPOSAL PLAN



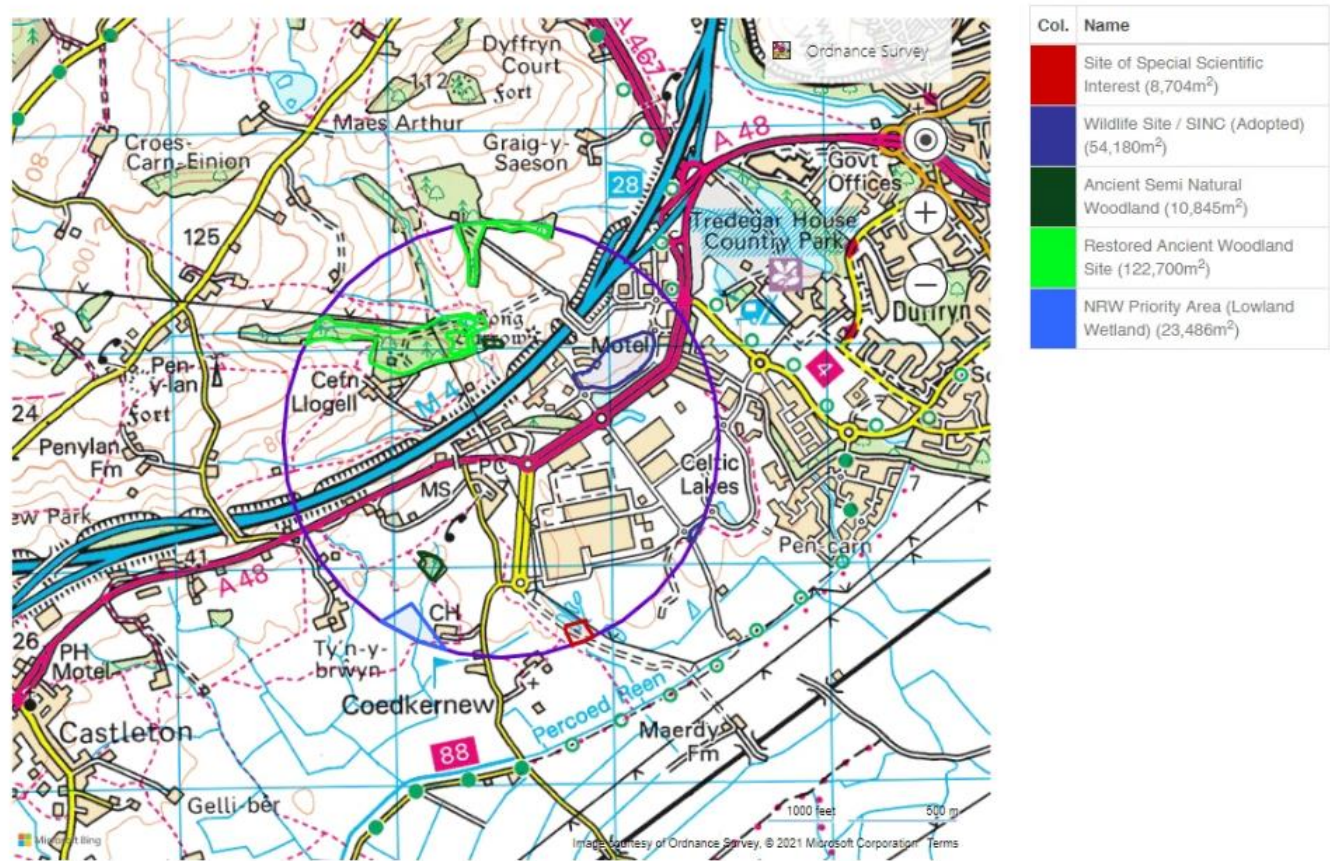


APPENDIX II DESIGNATED SITES MAP

Wildlife Site / SINC (Adopted)
LG Duffryn Site 1 (South Lake Drive) (989 m)
LG Duffryn Site 2 (966 m)
Celtic Springs (426 m)

Site of Special Scientific Interest
Gwent Levels - St. Brides (905 m)

Designated Sites Map



APPENDIX III PHASE 1 HABITAT MAP AND TARGET NOTES

Target Note	Description/Comment
	Birds seen/ heard: Wood pigeon, Great tit, Robin Other sightings: Hedgehog faeces observed in the front and rear garden 
1	More diverse section of lawn. Less grass (Festuca and ryegrass) more herbs including: Narrow leaved plantain, Barren strawberry, Dandelion, Creeping buttercup, Ivy, Hawkweed spp. Self heal, Ground ivy, Yarrow, Germander speedwell, Thyme leaved speedwell, Primroses, Creeping cinquefoil. Broad leaved plantain.
2	Cotoneaster
3	End of B4, overgrown with bramble and clematis
4	A boarder which has been overgrown with native species including bramble, Elder, bindweed, Nettle, Privet (ornamental variety?) and herb robert

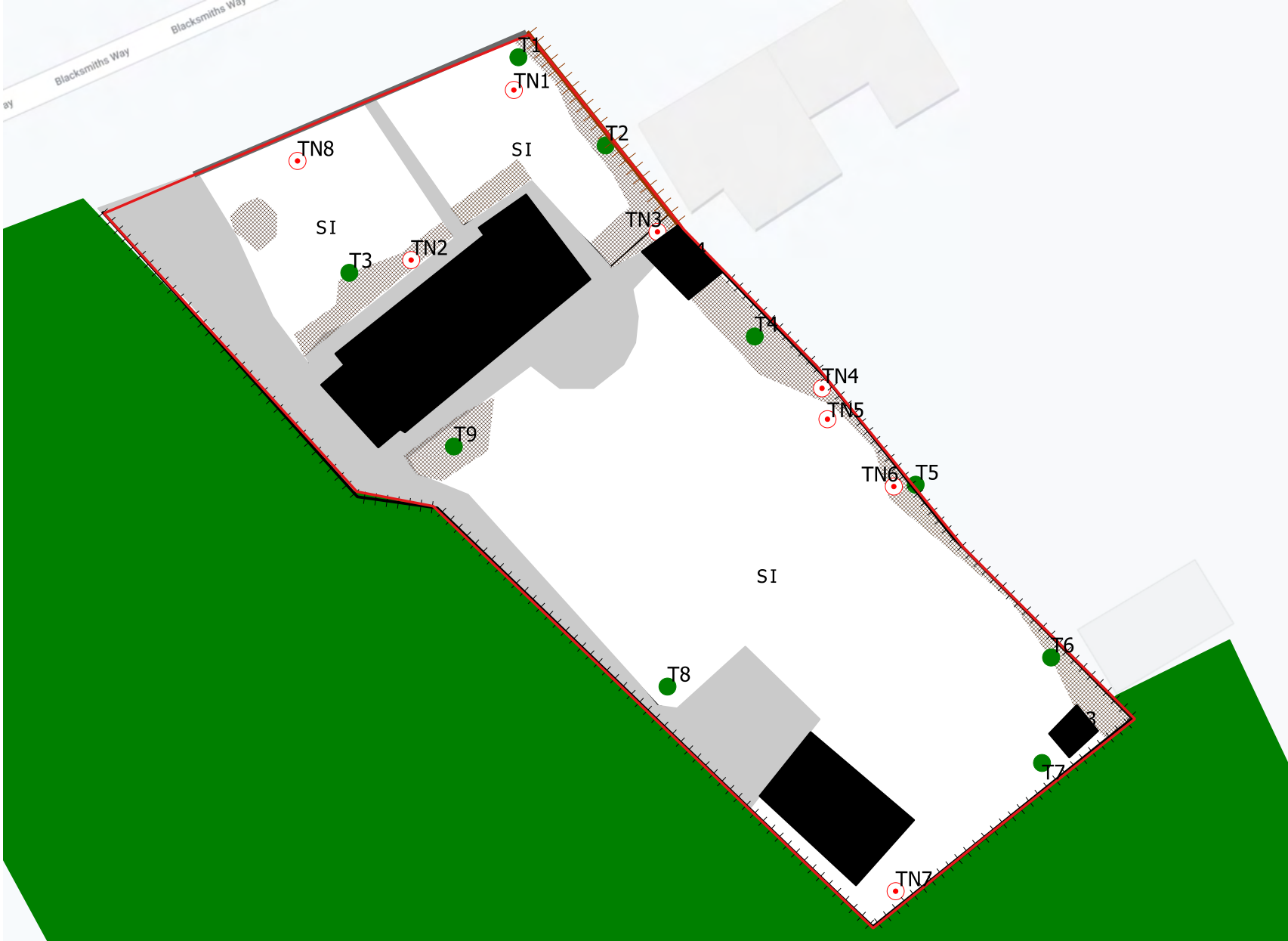
	
5	Wasp nest
6	Old stump with fungus 
7	Woodland edge type habitat with Ivy, Hawthorn, Ash, Nettle. Compost pile of grass cuttings.



8

Two tree stumps in the lawn





- Red Line - Site Boundary
 - Wall
 - Wooden fence
 - Wire fence
 - Target Notes
 - Trees
 - Ornamental Planting
 - SI Semi-improved Grassland
 - Broad leaved Woodland
 - Hardstanding
 - Buildings
- Google Satellite Image 2018



PRELIMINARY					PLANNING	DESIGN	TENDER	CONSTRUCTION
Client: N. Atherton					Drawing Title: Phase 1 Habitat Map			
Project: Blacksmith's Way								
Project Code: E21104901		Initials: DF		MW	19 October 2021			

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APPENDIX IV BUILDING INSPECTION RESULTS

Target Note	General description/comment	
Main House (B1)		
External		
1		
	Rotten fascia creating hole in corner and $\frac{3}{4}$ of the way up	
2		
	Broken roof tile	

3



Very small gap between soffit and wall

4



Hole in soffit approx. 3-4cm across by 40cm long – broken panel

5



Small hole behind down pipe

Internal

Loft 1



A-frame wooden construction. Felt present but looks like breathable membrane, has a shiny coating. In good state of repair, no gaps or holes etc. Insulation on floor but otherwise empty. Heavy cobwebbing at external wall apex. Old small wasp nest present. Inaccessible areas below floor level into gable edges.



Large amount of rat droppings and some mouse. Obvious runs are present within the felt.

Loft 2



Approximately 4-5m x 3m, similar to Loft 1. Has additional uprights but not “cluttered.”



Also contains the chimney stack. This is in good order with no cracks or gaps suitable for bat access. Same insulation flooring and roof felt. There are some gaps in the felt in this section but none showed evidence of use by bats. Another small wasp nest present. Rat droppings evident again and obvious runs in the felt.

Loft 3



Same construction and approximate size as previous two lofts. Small water tank present. The tank is not in use and empty. It is on a supporting platform lifted from the loft floor. There are obvious rat runs under the tank and large amounts of droppings evident.

		
Loft 4	 Half apex, triangular loft. Raw timbers and felt present. Felt in worse state than previous lofts, some segments hanging down. Some daylight around edges suggesting gaps. No sign of bats but mouse droppings are prevelant in this loft.	
Garage/Workshop (B2)		
External		



A rectangular, single storey structure with a flat slightly sloping roof. The walls are textured render, no gaps with a UPVC roof including soffits and fascias. Trees overhang on one side, There is a clematis and self-sown ash tree at one corner and ivy on another obstructing the visual inspection in some areas.

6



Suitable access gap where wall meets fascia.

7	 Hanging felt under soffit and UPVC visible under
Internal	
	 Open to the wooded ceiling joists. No evidence of use by bats.
Woodstore (B3)	
External	

	 Small rectangle, flat but slightly sloping roof. Pebble dash walls with corrugated tiles over metal supports. Wooded door and window frame. Wooden fascia overlaid with UPVC on the front, UPVC elsewhere. Set into vegetation.
Internal	
	 Roof supprts are metal. Daylight visible around eaves. Floor cluttered. No evidence of use by bats.
Shed (B4)	
External	

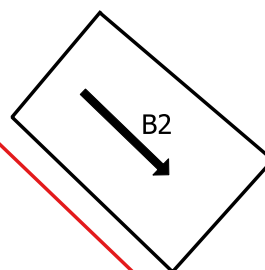
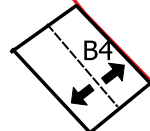
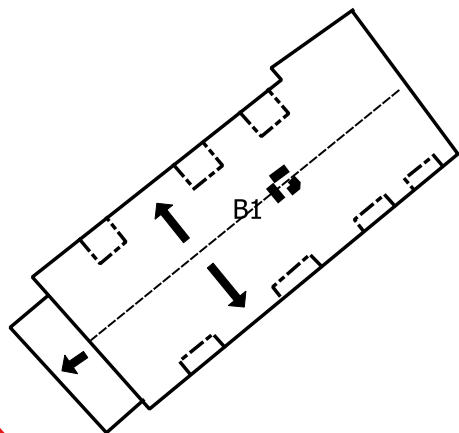


Walls are large slabs of render with an apex roof covered in corrugated tiles. Plywood facias, Wooden doors and window frame. Again tucked into a vegetated corner making a complete visual inspection impossible.

Internal



Used for storage. Roof supports are metal. I've ingress. Very light, with large windows. Mouse droppings evident but no evidence of bat use.



- Red Line - Site Boundary
 - Buildings - Outline
 - - - - - Dormer window
 - ■ Chimney
 - - - - - Ridge
 - ➔ Slope
- Google Satellite Image 2018



PRELIMINARY	PLANNING	DESIGN	TENDER	CONSTRUCTION
-------------	----------	--------	--------	--------------

Client: N. Atherton
Project: Blacksmith's Way

Drawing Title: Building
 Inspection

Project Code: E21104901

Initials: DF

MW

18 October 2021

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APPENDIX V RECOMMENDED BAT FEATURES



https://www.nhbs.com/ibstock-enclosed-bat-box-c?bkfno=208936&ca_id=1495&adlocale=uk&gclid=CjwKCAjw_L6LBhBbEiwA4c46upKysFfW-kQh0FrnvRZCGgL4T9FRomiyi-XgY3gVYMdHGqkRSIqNBoCDXIQAvD_BwE



<https://www.nhbs.com/1fe-schwegler-bat-access-panel?bkfno=183033>

APPENDIX V TECHNICAL LIGHTING NOTE

3. Mitigation of artificial lighting impacts on bats

This section provides a simple process which should be followed where the impact on bats is being considered as part of a proposed lighting scheme. It contains techniques which can be used on all sites, whether a small domestic project or larger mixed-use, commercial or infrastructure development. It also provides best-practice advice for the design of the lighting scheme for both lighting professionals and other users who may be less familiar with the terminology and theory.

The stepwise process and key follow-up actions are outlined in the flowchart overleaf, and are followed throughout the chapter.

The questions within this flow chart should be asked as early as possible, so that necessary bat survey information can be gathered in advance of any lighting design or fixing of overall scheme design.

Effective mitigation of lighting impacts on bats depends on close collaboration from the outset between multiple disciplines within a project. Depending on the specific challenges this will almost certainly involve ecologists working alongside architects and/or engineers; however, lighting professionals and landscape architects should be approached when recommended by your ecologist. This should be done as early in your project as possible in order to ensure mitigation is as effective as it can be and to minimise delays and unforeseen costs.

Step 1: Determine whether bats could be present on site

If your site has the potential to support bats or you are at all unsure, it is highly recommended that an ecologist is appointed to advise further and conduct surveys, if necessary. This information should be collected as early as possible in the design process, and certainly before lighting is designed, so as to avoid the need for costly revisions.

If any of the following habitats occur on site, and are adjacent to or connected with any of these habitats on or off site, it is possible that newly proposed lighting may impact local bat populations:

- Woodland or mature trees
- Hedgerows and scrub
- Ponds and lakes
- Ditches, streams, canals and rivers
- Infrequently managed grassland
- Buildings – pre 1970s or in disrepair

If you are unsure about whether bats may be impacted by your project, and an ecologist has not yet been consulted, sources of information on the presence of bats within the vicinity of your site include the following.

- Local environmental records centres (LERC) – Will provide third-party records of protected and notable species for a fee. Search <http://www.alerc.org.uk/> for more information.
- National Biodiversity Network Atlas – Provides a resource of third-party ecological records searchable online at <https://nbnatlas.org>. Typically this is less complete than LERC data. Please note: Some datasets are only accessible on a non-commercial basis, while most can be used for any purpose, as long as the original source is credited.
- Local authority planning portals – Most local planning authorities have a searchable online facility detailing recent planning applications. These may have been accompanied by ecological survey reports containing information on bat roosts and habitats.
- Defra's MAGIC map – Provides an online searchable GIS database including details of recent European protected species licences and details of any protected sites designated for bat conservation.

The professional directory at the website of the Chartered Institute of Ecology and Environmental Management (www.cieem.net) will provide details of ecologists in your area with the relevant

Step 1

Could bats be present on site?

Consult local sources of ecological information or seek advice from an ecologist

Step 2

Determine the presence of – or potential for – roosts, commuting habitat and foraging habitat and evaluate their importance.

Appoint ecologist to carry out daytime and, if necessary, night-time bat surveys and to evaluate the importance of the site's features and habitats to bats.

Step 3

Avoid lighting on key habitats and features altogether.

No illumination of any roost entrances and associated flightpaths, nor on habitats and features used by large numbers of bats, by rare species or by highly light-averse species.

Step 4

In other locations of value for bats on site, apply mitigation methods to reduce lighting to a minimum.

Spatial design

Building design

Landscaping

Set dark habitat buffers and acceptable lux limits with ecologist guidance

Step 5

Demonstrate compliance with lux limits and buffers.

Lighting professional to prepare final lighting scheme design and/or lux calculations or undertake baseline light surveys as necessary. Post-completion bat and lighting monitoring may be required.

skills/experience. The early involvement of a professional ecologist can minimise the likelihood of delays at the planning stage (if applicable) and ensure your project is compliant with conservation and planning legislation and policy.

It should be noted that the measures discussed in this document relate only to the specific impacts of lighting upon bat habitat features on or adjacent to the site. If loss or damage to roosting, foraging or commuting habitat is likely to be caused by other aspects of the development, separate ecological advice will be necessary in order to avoid, mitigate or compensate for this legally and according to the ecologist's evaluation.

Step 2: Determine the presence of – or potential for – roosts, commuting habitat and foraging habitat and evaluate their importance

Your ecologist will visit the site in order to record the habitats and features present and evaluate their potential importance to bats, and the likelihood that bats could be affected by lighting both on and immediately off site. This may also include daytime building and tree inspections. On the basis of these inspections further evening surveys may be recommended, either to determine the presence of roosts within buildings and/or trees or to assess the use of the habitats by bats by means of a walked survey. Such surveys may be undertaken at different times during the active season (ideally May to September) and should also involve the use of automated bat detectors left on site for a period of several days. The surveys should be carried out observing the recommendations within the Bat Conservation Trust's Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).

The resulting report will detail the relative conservation importance of each habitat feature to bats (including built structures, if suitable). The ecologist's evaluation of the individual features will depend on the

specific combination of contributing factors about the site, including:

- The conservation status of species recorded or likely to be present
- Geographic location
- Type of bat activity likely (breeding, hibernating, night roosting, foraging etc)
- Habitat quality
- Habitat connectivity off-site
- The presence of nearby bat populations or protected sites for bats (usually identified in a desk study)

The evaluation of ecological importance for each feature is most commonly expressed on a geographic scale from Site level to International level, or alternatively in terms of that feature's role in maintaining the 'favourable conservation status' of the population of bats using it.

The ecologist should set out where any key bat roost features and/or habitat areas (ie flightpath habitat and broader areas of foraging habitat) lie on a plan of the site or as an ecological constraints and opportunities plan (ECOP) together with their relative importance. The ECOP and report can then be used to help guide the design of the lighting strategy as well as the wider project.

Step 3: Avoid lighting on key habitats and features altogether

As has been described in 'Artificial lighting', above, 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, measureable benefits can be subjective. Consequently, lighting design should be flexible and be able to fully take into account the presence of protected species

and the obligation to avoid impacts on them.

Sources of lighting which can disturb bats are not limited to roadside or external security lighting, but can also include light spill via windows, permanent but sporadically operated lighting such as sports floodlighting, and in some cases car headlights. Additionally, glare (extremely high contrast between a source of light and the surrounding darkness – linked to the intensity of a luminaire) may affect bats over a greater distance than the target area directly illuminated by a luminaire and must also be considered on your site.

It is important that a competent lighting professional is involved in the design of proposals as soon as potential impacts (including from glare) are identified by the ecologist in order to avoid planning difficulties or late-stage design revision. Your lighting professional will be able to make recommendations about placement of luminaires tailored to your specific project.

Where highways lighting schemes are to be designed by the local planning authority (LPA) post-planning, an ecology officer should be consulted on the presence of important bat constraints which may impact the design and illuminance in order for the scheme to remain legally compliant with wildlife legislation.

Where adverse impacts upon the 'favourable conservation status' of the bat population using the feature or habitat would be significant, an absence of artificial illumination and glare, acting upon both the feature and an appropriately-sized buffer zone is likely to be the only acceptable solution. Your ecologist will be best placed to set the size of such a buffer zone but it should be sufficient to ensure that illumination and glare is avoided and so the input of a lighting professional may be required. Further information on demonstrating an absence of illumination via lux/illuminance contour plans is provided in Step 5.

Because different species vary in their response to light disturbance (as discussed in section 1 'Bats'), your ecologist will be able to provide advice tailored to the specific conditions on your project, however examples of where the no-lighting approach should be taken in particular include:

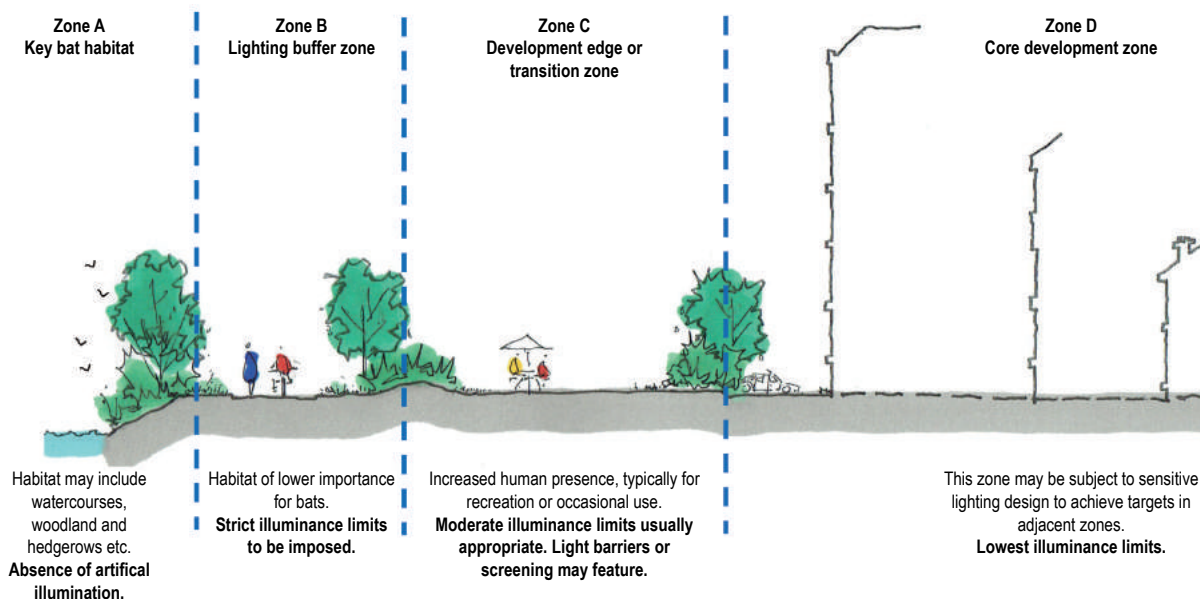
- Roosting and swarming sites for all species and their associated flightpath/commuting habitat.
- Foraging or commuting habitat for highly light-averse species (greater and lesser horseshoe bats, some *Myotis* bats, barbastelle bats and all long-eared bats).
- Foraging or commuting habitat used by large numbers of bats as assessed through survey.
- Foraging or commuting habitat for particularly rare species (grey long-eared bat, barbastelle, small *Myotis*, Bechstein's bat and horseshoe bats).
- Any habitat otherwise assessed by your ecologist as being of importance to maintaining the 'favourable conservation status' of the bat population using it.

Completely avoiding any lighting conflicts in the first place is advantageous because not only would proposals be automatically compliant with the relevant wildlife legislation and planning policy, but they could avoid costly and time-consuming additional surveys, mitigation and post-development monitoring. Furthermore, local planning authorities are likely to favour applications where steps have been taken to avoid such conflicts.

Step 4: 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

Example of illuminance limit zonation



ecological importance of each feature and species, and the lighting objectives for that area will need to be achieved.

It is important to reiterate the legal protection from disturbance that bats receive under the Wildlife and Countryside Act 1981, as amended. Where the risk of offences originating from lighting is sufficiently high, it may be best to apply the avoidance approach in Step 3.

Advice from an ecologist and lighting professional will be essential in finding the right approach for your site according to their evaluation. 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

Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. Buffer zones rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided into zones of increasing illuminance limit radiating away from the feature. Examples of this application are given in the figure above.

Your ecologist (in collaboration with a lighting professional) can help determine the most appropriate buffer widths and illuminance limits according to the value of that habitat to bats (as informed by species and numbers of bats, as well as the type of use).

Appropriate luminaire specifications

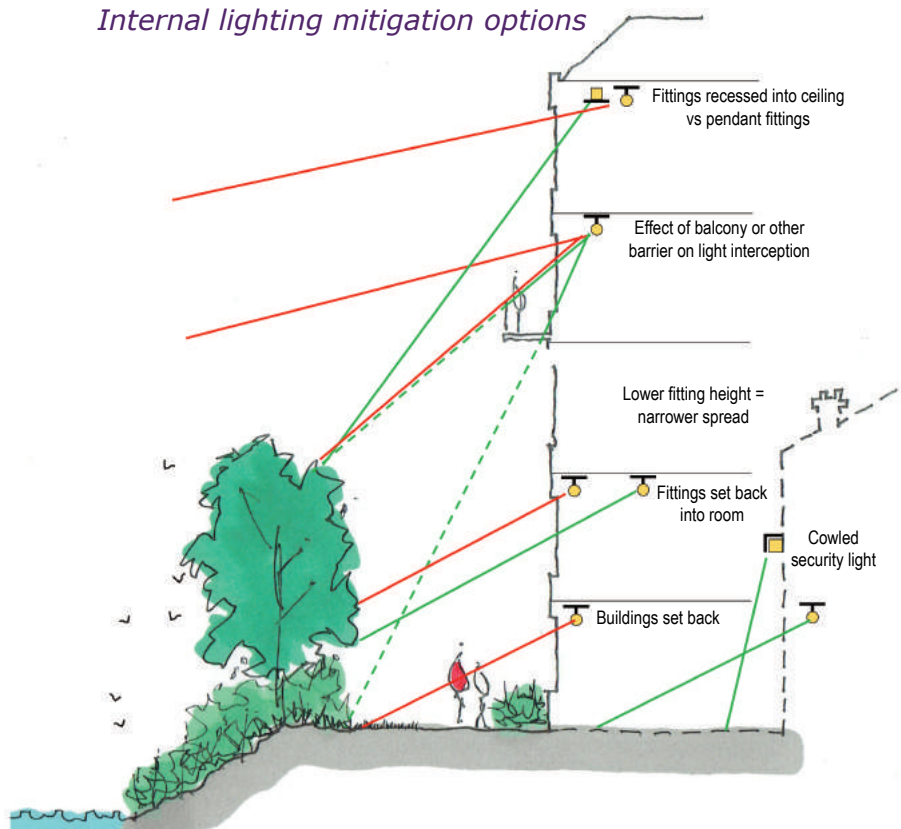
Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires.

- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill. (See figure overleaf.)
- The use of specialist bollard or low-level downward directional luminaires to

retain darkness above can be considered. However, this often comes at a cost of unacceptable glare, poor illumination efficiency, a high upward light component and poor facial recognition, and their use should only be as directed by the lighting professional.

- Column heights should be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used – See ILP Guidance for the Reduction of Obtrusive Light.
- Luminaires should always be mounted on the horizontal, ie no upward tilt.
- Any external security lighting should be set on motion-sensors and short (1min) 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.

Internal lighting mitigation options



- Taller buildings may be best located toward the centre of the site or sufficiently set back from key habitats to minimise light spill.
- Street lights can be located so that the rear shields are adjacent to habitats or optics selected that stop back light thereby directing light into the task area where needed.

Sensitive site configuration

The location, orientation and height of newly built structures and hard standing can have a considerable impact on light spill (see figure above for examples of good internal lighting design). Small changes in terms of the placement of footpaths, open space and the number and size of windows can all achieve a good outcome in terms of minimising light spill on to key habitats and features.

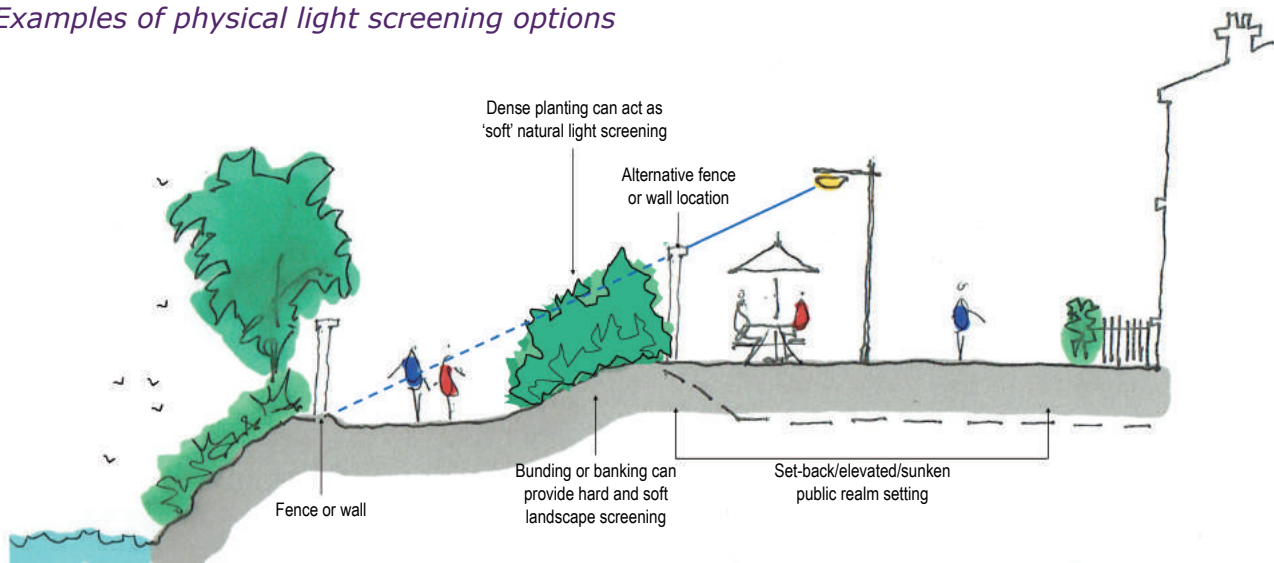
- It may be possible to include key habitats and features into unlit public open space such as parks and gardens.
- Buildings, walls and hard landscaping may be sited and designed so as to block light spill from reaching habitats and features.

Screening

Light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding (see figure overleaf for example of physical light-screening options). In order to ensure that fencing makes a long-term contribution, it is recommended that it is supported on concrete or metal posts. Fencing can also be over planted with hedgerow species or climbing plants to soften its appearance and provide a vegetated feature which bats can use for navigation or foraging.

The planting of substantial landscape features integrated to the wider network of green corridors such as hedgerows, woodland and scrub is encouraged by

Examples of physical light screening options



planning policy and would make a long-term positive contribution to the overall bat habitat connectivity and light attenuation. A landscape architect can be appointed to collaborate with your ecologist on maximising these natural light screening opportunities.

It should be noted that newly planted vegetation (trees, shrubs and scrub) is unlikely to adequately contribute to light attenuation on key habitats for a number of years until it is well established. Sufficient maintenance to achieve this is also likely to be required. Consequently, this approach is best suited to the planting of 'instant hedgerows' or other similarly dense or mature planting, including translocated vegetation. In some cases, it is appropriate to install temporary fencing or other barrier to provide the desired physical screening effects until the vegetation is determined to be sufficiently established.

Given the fact that planting may be removed, die back, or be inadequately replaced over time it should never be relied on as the sole means of attenuating light spill.

Glazing treatments

Glazing should be restricted or redesigned wherever the ecologist and lighting professional determine there is a likely significant effect upon key bat habitat and features. Where windows and glass

facades etc cannot be avoided, low transmission glazing treatments may be a suitable option in achieving reduced illuminance targets.

Products available include retrofit window films and factory-tinted glazing. 'Smart glass', which can be set to automatically obscure on a timer during the hours of darkness, and automatic blinds can also be used but their longevity depends on regular maintenance and successful routine operation by the occupant, and should not be solely relied upon.

Depending on the height of the building and windows, and therefore predicted light spill, such glazing treatments may not be required on all storeys. This effect can be more accurately determined by a lighting professional.

Creation of alternative valuable bat habitat on site

The provision of new, additional or alternative bat flightpaths, commuting habitat or foraging habitat could result in appropriate compensation for any such habitat being lost to the development. Your ecologist will be able to suggest and design such alternative habitats although particular consideration as to its connectivity to other features, the species to be used, the lag time required for a habitat to sufficiently establish, and the provision for its ongoing protection and maintenance should be given.

Dimming and part-night lighting

Depending on the pattern of bat activity across the key features identified on site by your ecologist, 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.

It should be noted that these systems depend on regular maintenance and a long-term commitment for them to be successful. Additionally, part-night lighting should be designed with input from an ecologist as they may still produce unacceptably high light levels when active or dimmed. Part-night lighting is not usually appropriate where lights are undimmed during key bat activity times as derived from bat survey data. Research has indicated that impacts upon commuting bats are still prevalent where lighting is dimmed during the middle of the night at a time when illumination for human use is less necessary (Azam et al, 2015). Thus this approach should not always be seen as a solution unless backed up by robust ecological survey and assessment of nightly bat activity.

Step 5: 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.

A horizontal illuminance contour plan can be prepared by a suitably experienced and competent lighting professional (member of the Chartered Institution of Building Services Engineers (CIBSE), Society of Light and Lighting (SLL), Institution of

Lighting Professionals (ILP) or similar to ensure competency) using an appropriate software package to model the extent of light spill from the proposed and, possibly, existing luminaires. The various buffer zone widths and illuminance limits which may have been agreed can then be overlaid to determine if any further mitigation is necessary. In some circumstances, a vertical illuminance contour plot may be necessary to demonstrate the light in sensitive areas such as entrances to roosts.

Such calculations and documentation would need to be prepared in advance of submission for planning permission to enable the LPA ecologist to fully assess impacts and compliance.

Because illuminance contour plots and plans may need to be understood and examined by non-lighting professionals such as architects and local planning authority ecologists, the following should be observed when producing or assessing illuminance contour plans to ensure the correct information is displayed.

- A horizontal calculation plane representing ground level should always be used.
- Vertical calculation planes should be used wherever appropriate, for example along the site-facing aspects of a hedgerow or façade of buildings containing roosts to show the illumination directly upon the vertical faces of the feature. Vertical planes can also show a cross-sectional view within open space. Vertical planes will enable a visualisation of the effects of illumination at the various heights at which different bat species fly.
- Models should include light from all luminaires and each should be set to the maximum output anticipated to be used in normal operation on site (ie no dimming where dimming is not anticipated during normal operation).
- A calculation showing output of luminaires to be expected at 'day 1' of operation should be included, where the luminaire and/or scheme Maintenance Factor is set to one.

- Where dimming, PIR or variable illuminance states are to be used, an individual set of calculation results should accompany each of these states.
- The contours (and/or coloured numbers) for 0.2, 0.5, 1, 5, and 10 lux must be clearly shown as well as appropriate contours for values above these.
- Each contour plan should be accompanied by a table showing their minimum and maximum lux values.
- Where buildings are proposed in proximity to key features or habitats, plots should also model the contribution of light spill through nearby windows, making assumptions as to internal luminaire specification and transmissivity of windows. It should be assumed that blinds or curtains are absent or fully open although low-transmittance glazing treatments may be appropriate. Assumptions will need to be made as to the internal luminaire specification and levels of illuminance likely to occur on 'day 1' of operation. These assumptions should be clearly stated and guided by the building/room type and discussions between architect, client and lighting professional. It is acknowledged that in many circumstances, only a 'best effort' can be made in terms of accuracy of these calculations.
- Modelled plots should not include any light attenuation factor from new or existing planting due to the lag time between planting and establishment and the risk of damage, removal or failure of vegetation. This may result in difficulties in the long term achievement of the screening effect and hamper any post-construction compliance surveys.
- The illuminance contour plots should be accompanied by an explanatory note from the lighting professional to list where, in their opinion, sources of glare acting upon the key habitats and features may occur and what has been done/can be done to reduce their impacts.

N.B. It is acknowledged that, especially for vertical calculation planes, very low

levels of light (<0.5 lux) may occur even at considerable distances from the source if there is little intervening attenuation. It is therefore very difficult to demonstrate 'complete darkness' or a 'complete absence of illumination' on vertical planes where some form of lighting is proposed on site despite efforts to reduce them as far as possible and where horizontal plane illuminance levels are zero. Consequently, where 'complete darkness' on a feature or buffer is required, it may be appropriate to consider this to be where illuminance is below 0.2 lux on the horizontal plane and below 0.4 lux on the vertical plane. These figures are still lower than what may be expected on a moonlit night and are in line with research findings for the illuminance found at hedgerows used by lesser horseshoe bats, a species well known for its light averse behaviour (Stone, 2012).

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. This data can then be used to help isolate which luminaires might need to be removed, where screening should be implemented or establish a new illuminance limit reduced below existing levels. For example, where baseline surveys establish that on- and off-site lighting illuminates potential key habitat, improvements could be made by installing a tall perimeter fence adjacent to the habitat and alterations to the siting and specification of new lighting to avoid further illumination. Further information and techniques to deal with modeling pre-development lighting can be found in ILP publication PLG04 *Lighting Impact Assessments* due to be published late 2018.

Baseline lighting surveys must be carried out by a suitably qualified competent person. As a minimum, readings should be

taken at ground level on the horizontal plane (to give illuminance hitting the ground), and in at least one direction on the vertical plane at, for example, 1.5m or 2m above ground (to replicate the likely location of bats using the feature or site). The orientation should be perpendicular to the dominant light sources or perpendicular to the surface/edge of the feature in question (such as a wall or hedgerow) in order to produce a 'worst case' reading. Further measurements at other orientations may prove beneficial in capturing influence of all luminaires in proximity to the feature or principal directions of flight used by bats. This should be discussed with the ecologist.

Baseline measurements should be taken systematically across the site or features in question. That is, they will need to be repeated at intervals to sample across the site or feature, either in a grid or linear transect as appropriate. The lighting professional will be able to recommend the most appropriate grid spacing.

Measurements should always be taken in the absence of moonlight, either on nights of a new moon or heavy cloud to avoid artificially raising the baseline. As an alternative, moonlight can be measured at a place where no artificial light is likely to affect the reading.

As all proposed illuminance level contours will be produced from modelled luminaires at 100% output, baseline measurements need to be taken with all lights on and undimmed, with blinds or screens over windows removed. Cowls and other fittings on luminaires can remain in place.

Where possible, measurements should be taken during the spring and summer when vegetation is mostly in leaf, in order to accurately represent the baseline during

the principal active season for bats and to avoid artificially raising the baseline.

The topography of the immediate surrounding landscape should be considered in order to determine the potential for increased or decreased light spill beyond the site.

Post-construction/operational phase compliance-checking

Post-completion lighting surveys are often required where planning permission has been obtained on the condition that the proposed lighting levels are checked to confirm they are in fact achieved on site and that the lighting specification (including luminaire heights, design and presence of shielding etc) is as proposed.

All lighting surveys should be conducted by a suitably qualified competent person and should be conducted using the same measurement criteria and lighting states used in the preparation of the illuminance contour plots and/or baseline surveys as discussed above. It may be necessary to conduct multiple repeats over different illumination states or other conditions specific to the project.

Results should always be reported to the LPA as per any such planning condition. A report should be prepared in order to provide an assessment of compliance by the lighting professional and a discussion of any remedial measures which are likely to be required in order to achieve compliance. Any limitations or notable conditions such as deviation from the desired lighting state or use of blinds/barriers should be clearly reported. Ongoing monitoring schedules can also be set, especially where compliance is contingent on automated lighting and dimming systems or on physical screening solutions.

4. References

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