POBL GROUP

LAND AT CHURCH FARM, ST ATHAN

PRELIMINARY ECOLOGICAL APPRAISAL

NOVEMBER 2022

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DOCUMENT REF : E22113301/DOC 01 – NOVEMBER 2022

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[redacted]	[redacted]	[redacted]	[redacted]	[redacted] (Ecologist)		

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SUMMARY

Soltys Brewster Ecology were instructed by Pobl Group to undertake a preliminary ecological appraisal of an area of land found at Church Farm in St Athan. The area has been allocated for residential development as part of the Vale of Glamorgan adopted LDP. The ecological baseline conditions at the site were established in October 2022 through a combination of desk study and Extended Phase 1 Habitat Survey.

Desk based consultation confirmed the site holds no statutory or non-statutory designations for nature conservation. There are three locally designated Sites of Importance for Nature Conservation (SINCs) within a 1km search radius of the site although none were considered of particular relevance due to their physical separation from the site and designating features which would not be affected by the proposed works. Several Ancient Woodland sites can also be found in the same search radius – none of which would be affected by the proposed works.

The desk study returned several records for protected fauna and flora within 1km of the site (extended to 2km for bats). This included foraging/commuting records for at least eight different bat species as well as the locations of several known bat roosts. Evidence of Hazel Dormice (Dormice nests) has previously been recorded to the north-west of St Athan, with further records of [redacted] Otter, Brown Hare, Hedgehog and Harvest Mouse also found within a 1km radius of the site. Herpetofauna (reptile and amphibian) records included those for Slow Worm, Grass Snake and Common Toad – mostly associated with residential gardens found throughout St Athan and Gileston. The desk study also returned a list of priority and protected bird and invertebrate species found within 1km of the site, with records of Lapwing, Fieldfare and Starling associated with the habitats found within the allocated site.

An Extended Phase 1 Habitat survey undertaken in October 2022 identified a limited range of habitats present at the site, all of which are typically associated with agricultural farmland. The site consists of two adjacent field parcels covered entirely in heavily grazed improved grassland that was considered to be of limited ecological importance. Habitats considered of greater ecological importance in context of the site include the boundary hedgerows which have the potential to support foraging/commuting bats, nesting birds and other small mammals. The use of the site by [redacted] on an irregular basis could also not be precluded. As part of the local green infra-structure (GI) network, these boundary features should be retained as far as possible and kept as part of any development so as to maintain habitat connectivity and provide wildlife corridors to allow for continued movement of wildlife through the site.

Dependent on the potential impacts of the development design, consultation with the local authority ecologist or further survey work would be recommended to inform a planning submission at the site and to inform any specific mitigation or enhancement measures with regards to bats and Hazel Dormice. Any future vegetation clearance (i.e. scrub,

hedgerows and trees) should also follow a precautionary approach (e.g. undertaken outside of the nesting bird season) to minimise the risks to any potential nesting birds and common reptiles/amphibians that may be present.

Opportunities for local biodiversity enhancement also exist at the site including bat and bird boxes on new buildings and retained trees; the creation of 130mm x 130mm gaps at the bottom of any garden and boundary fencing as to allow continued connectivity through the site for Hedgehog and other small mammals; the design of SuDS features to benefit biodiversity; the use of native species in any soft landscaping scheme; and the management of any retained grassland/hedgerow features so as to enhance the habitat for local biodiversity.

INTRODUCTION

1.1 Soltys Brewster Ecology were commissioned by Pobl Group to undertake a preliminary ecological appraisal of an area of land found at Church Farm in St Athan. The area has been allocated for residential development as part of Vale of Glamorgan's adopted Local Development Plan (LDP). A survey to establish the ecological conditions and identify any ecological constraints or opportunities at the site is required to inform a planning application at the site.

1.2 The allocated site is located directly adjacent to Gileston Road and the B4265 carriageway, in the south-eastern extent of the village of St Athan (central grid reference: ST 01893 67701) and comprises an area of approximately 8.4ha in size as shown in Appendix I. The allocated site consists of two adjacent agricultural field parcels with associated boundary hedgerows. No buildings or structures are found within the site boundaries however, existing residential housing can be found directly to the west with buildings/structures associated with Church Farm and St Athan Primary School to the north. Elsewhere outside of the site boundaries, further agricultural field parcels can be found to the east and south – the fields located directly adjacent to the eastern boundary are currently being promoted as a candidate site for residential development.

1.3 The current report presents the findings of an ecological desk study and Extended Phase 1 Habitat survey that was undertaken at the allocated site in October 2022. The current report describes the existing ecological conditions as well as identifying any potential ecological constraints/opportunities associated with the proposed residential development at the site.

2.0 METHODOLOGY

2.1 In order to establish the baseline ecological conditions at the allocated site and adjacent habitats, a desk-based consultation and Extended Phase 1 Habitat survey was undertaken at the site in October 2022.

Desk study

2.2 The desk study involved consultation with the South East Wales Biodiversity Records Centre (SEWBReC) to identify any records of rare, protected or notable flora and fauna at the site and within a radius of 1km (extended to 2km for bats as per the Bat Conservation Trust's good practice guidelines) extending from the central point of the site (Appendix II). 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) or Sites of Importance for Nature Conservation (SINCs).

Extended Phase 1 Habitat Survey

2.3 The fieldwork was undertaken on 14th October 2022 by a suitably experienced ecologist[1] 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 [redacted] *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 as well as local habitats adopted by the Vale of Glamorgan Local Biodiversity Action Plan (LBAP).

2.5 During the field survey any trees at the 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 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.

[1] Associate Member of the Chartered Institute of Ecology & Environmental Management (CIEEM), with experience of habitat and protected species surveys

- **Moderate** – A 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 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.

3.0 RESULTS

Desk Study

SEWBReC Records

3.1 Consultation with SEWBReC confirmed that the site boundaries contained no statutory or non-statutory designations for nature conservation. There are a number of SINCs found within a 1km radius of the site (see Table 1) however, none of these sites were considered of any ecological relevance to the allocated site given the physical separation distance and their qualifying features which mostly consist of priority habitats and vegetation which are not present at the site and would not be affected by the proposed development. A number of Ancient Semi-natural Woodland and Restored Ancient Woodland sites were also returned within the 1km search radius (see Appendix II). Similarly, these were not considered of any ecological relevance as none are located at or immediately adjacent to the site and will therefore not be directly affected by the proposed works.

3.2 The Site does lie within the 'B-Lines' network. This is an initiative run by Buglife which involves the identification and restoration of 'insect pathways' throughout British cities, towns and countryside by creating a series of wildflower-rich habitat stepping-stones. The B-Lines network is not afforded any legal protection, but it is of relevance to the site in terms of enhancement measures as part of the development (see Section 5).

Table 1: Non-statutory designated sites within 1km of the site boundary

Site Name	Citation	Location/Distance from Site
East Orchard Wood SINC	Parcel of Ash dominated semi-natural broadleaved woodland containing a number of indicator species of ancient woodland, with associated parcels of scrub, rank grassland and a stream. The woodland is considered likely to be an important habitat for Hazel Dormice *Muscardinus avellanarius* and foraging/roosting bats and is also known to contain a [redacted] (location unspecified).	Approx. 300m north of site
Oxmoor Wood SINC	Parcel of Ash dominated semi-natural broadleaved woodland containing at least 19no. different indicator species. Oxmoor Wood forms part of a network of	Approx. 725m north-east of site

	interconnected woodland sites associated with the Lower Thaw Valley considered likely to be important for bats and potentially Dormice. The woodland is also known to contain a [redacted]t (location unspecified).	
Lower Thaw Valley SINC	Coastal grazing marsh of the Lower Thaw Valley, made up of a collection of small and large fields dissected by drainage ditches, channels and embankments. Species of particular note include Slender Hare's-ear *Bupleurum tenuissimum*, Sea Wormwood *Artemisia maritima*, Sea Lavender *Limonium vulgare*, Parsley Water-dropwort *Oenanthe lachenalii* and Wild Celery *Apium graveolens*.	Approx 800m east of site

3.3 The desk study also revealed a number of protected species records associated with the site itself and throughout the local area. This included a list of foraging and commuting bats within a 2km radius of the site with species including Noctule *Nyctalus noctula*, Whiskered Bat *Myotis mystacinus*, Natterer's Bat *Myotis nattereri*, Serotine *Eptesicus serotinus*, Lesser Horseshoe Bat *Rhinolophus hipposideros*, Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Brown Long-eared Bat *Plecotus auritus* and other unidentified *Myotis sp*. A number of both recent and historic (>10 years old) bat roosts were also identified within the 2km search radius for bats, including the location of a Brown Long-eared Bat maternity roost (dated from 2009) found within 50m of the site's northern boundary.

3.4 Other priority/protected mammals found in the data search include a single record of Hazel Dormouse *Muscardinus avellanarius*, with a nest tube survey revealing several Dormice nests within a parcel of woodland found approximately 800m north-west of the site. While no known [redacted] are found within a 1km radius of the site, records of [redacted] are associated with Castleton Wood found approximately 800m to the east. Several records of Otter *Lutra lutra* were also found within a 1km radius of the site however this species was not considered to pose a constraint to the proposed works due to the lack of watercourses/suitable habitat found at or immediately adjacent to the site and as such Otter (or Water Vole *Arvicola amphibius* for similar reasons) are not mentioned any further in this report. Other S7 priority listed mammals recorded within 1km of the site include Hedgehog *Erinaceus europaeus*, Brown Hare *Lepus europaeus* and Harvest Mouse *Micromys minutus*.

3.5 Both Slow Worm *Anguis fragilis* and Grass Snake have previously been recorded within 1km of the site, with both of these records associated with residential gardens within St Athan. The only other herpetofauna (reptile and amphibian) record found within the 1km search radius was for a Common Toad *Bufo bufo* associated with a garden pond found in Gileston.

3.6 The desk study revealed a number of bird species listed under Schedule 1 of the Wildlife & Countryside Act (1981) (as amended) were found within 1km of the site including records of Fieldfare *Turdus pilaris*, Brambling *Fringilla montifringilla*, Redwing *Turdus iliacus*, Black Redstart *Phoenicurus ochruros*, Red Kite *Milvus milvus*, Hobby *Falco subbuteo*, Mediterranean Gull *Ichthyaetus melanocephalus*, Peregrine *Falco peregrinus*, Merlin *Falco columbarius*, Firecrest *Regulus ignicapilla*, Bittern *Botaurus stellaris* and King Fisher *Alcedo atthis*. The data search also included an extensive list of Priority bird species under Section 7 of the Environmental Act (Wales) 2016 found within 1km of the site including House Sparrow *Passer domesticus,* Linnet *Linaria cannabina*, Herring Gull *Larus argentatus*, Golden Plover *Pluvialis apricaria*, Curlew *Numenius arquata*, Song Thrush *Turdus philomelos*, Skylark *Alauda arvensis*, Grey Partridge *Perdix perdix*, Cuckoo *Cuculus canorus*, Yellow Wagtail *Motacilla flava*, Willow Tit *Poecile montanus*, Lapwing *Vanellus vanellus*, Wood Warbler *Phylloscopus sibilatrix*, Black-headed Gull *Chroicocephalus ridibundus*, Yellowhammer *Emberiza citrinella*, Common Reed Bunting *Emberiza schoeniclus*, Kestrel *Falco tinnunculus*, Dunnock *Prunella modularis*, Starling *Sturnus vulgaris* and Bullfinch *Pyrrhula pyrrhula*. Not all of the species listed above are considered of relevance to the proposal, such as those associated with habitats not found within the site boundaries (e.g. watercourses, coastal habitats and woodland). Lapwing, Fieldfare and Starling have however all previously been recorded at the site although not necessarily during the breeding season (e.g. Fieldfare is a autumn/winter migrant species).

3.7 A small number of priority invertebrate species listed under Section 7 of the Environmental Act (Wales) 2016 were found within 1km of the site including Black Oil-beetle *Meloe proscarabaeus*, Green-brindled Crescent *Allophyes oxyacanthae*, Beaded Chestnut *Agrochola lychnidis*, Cinnabar *Tyria jacobaeae* and Blood Vein *Timandra comae* moths.

3.8 A number of invasive species listed under Schedule 9 of the Wildlife and Countryside Act (1981) (as amended) have been recorded within the 1km search radius including Common Crane *Grus grus*, Wood Duck *Aix sponsa*, Grey Squirrel *Sciurus carolinensis*, Three-cornered Garlic *Allium triquetrum* and Montbretia *Crocosmiapottsii x aurea =C. xcrocosmiiflora*.

Extended Phase 1 Habitat Survey

3.10 The distribution and extent of habitats recorded in October 2022 at the site are illustrated on the Extended Phase 1 Habitat Plan in Appendix III. The Extended Phase 1 Habitat Survey revealed a limited number of habitat types at the allocated site, all of which are typically associated with agricultural farmland. The site was made up of two adjacent grassy field parcels with associated boundary hedgerows. No buildings are located within the site boundaries however, existing residential development can be found directly to the west, with buildings associated with Church Farm and St Athan Primary School found to the north. Elsewhere outside the site boundaries further agricultural land is found to the east and south.

Improved Grassland

3.11 Both of the field parcels that make up the allocated site were covered entirely in heavily grazed (cattle) improved grassland that was considered to hold little ecological value (see image on front cover page). This grassland was characterised by its short sward height and low floral diversity with species present including Perennial Rye Grass *Lolium perenne*, Cocksfoot Grass *Dactylis glomerata*, Sweet Vernal Grass *Anthoxanthum odoratum*, Common Daisy *Bellis perennis*, Silverweed *Potentilla anserina*, Thyme-leaved Speedwell *Veronica serpyllifolia*, Broadleaved Dock *Rumex obtusifolius*, White Clover *Trifolium repens*, Common Chickweed *Stellaria media*, Creeping Buttercup *Ranunculus repens*, Common Dandelion *Taraxacum officinale*, Common Field Speedwell *Veronica persica*, Common Sorrel *Rumex acetosa*, Dove's-foot Crane's-bill *Geranium molle*, Common Knotgrass *Polygonum aviculare* and Sheperd's Purse *Capsella bursa-pastoris.*

Hedgerows

3.12 The allocated site supports several hedgerows associated with the field boundaries - hedgerows are listed as a priority habitat under Section 7 of the Environmental Act (Wales) 2016. The entire western and southern site boundaries, as well as a section of the eastern site boundary, are marked by intact species-rich hedgerows (see Plate 1). All of these hedges were well-established and similar in appearance, standing between 2m and 3m in height and showing signs of recent management (cutting/flailing). These hedgerows were made up of 'woody' species such as Blackthorn *Prunus spinosa*, Hawthorn *Crataegus monogyna*, Field Elm *Ulmus minor*, Hazel *Corylus avellana*, Elder *Sambucus nigra*, Dogwood *Cornus sanguinea*, Field Maple *Acer campestr*, Holly *Ilex aquifolium*, Ash *Fraxinus excelsior* and Sycamore *Acer pseudoplatanus*. The understorey and ground flora layers of the southern and western boundary hedgerows were dense and continuous and consisted of Bramble *Rubus fruticosus*, Common Nettle *Urtica dioica*, Creeping Thistle *Cirsium arvense*, Bracken *Pteridium aquilinum*, Dog Rose *Rosa canina*, Traveller's-joy *Clematis vitalba*, Hedge Bindweed *Calystegia sepium*, Cow Parsley *Anthriscus sylvestris*, Birdeye Speedwell *Veronica persica*, Yarrow *Achillea millefolium*, Wild Carrot *Daucus carota*, Hogweed *Helminthotheca echioides*, Herb Robert *Geranium robertianum*, Cleavers *Galium aparine*, Ivy *Hedera helix*, Spear Thistle *Cirsium vulgare*, Ground-ivy *Glechoma hederacea*, Black Horehound *Ballota nigra*, Garlic Mustard *Alliaria*

petiolata and Great Mullein *Verbascum thapsus*. In comparison, the eastern boundary hedgerow's ground flora/understorey contained a similar species assemblage but was more gappy in certain areas where it has been grazed by sheep kept in the adjacent field parcel to the east.

3.13 A section of the eastern site boundary is also marked by a species-poor hedgerow with trees (see Plate 2). This hedgerow was defunct and consisted of strands of Holly, Hawthorn, Elm and Blackthorn with a gappy understorey layer that had also been grazed by sheep in an adjacent field parcel to the east. Finally, a remnant of an old hedgerow can be found separating the two field parcels and this was also described as defunct and species-poor (see image in front cover page). This hedgerow, which now resembles a treeline due to lack of management and over-grazing, consisted mostly of Hawthorn.

Plate 2 – Intact Species Rich hedgerow marking western boundary of allocated site

Plate 2 – Species Poor hedgerow with trees marking section of eastern boundary

Other

3.14 A metal fence marks a section of the northern site boundary, separating the site from the grounds of the adjacent St Athan Primary School. A low stone wall can also be found marking a small section of the eastern site boundary.

Invasive Species

3.15 The survey found no instances of any invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981) (as amended) at the site.

Fauna

3.16 In the course of the survey, a search of field signs for protected or notable species was undertaken and the potential of the habitats to support these species considered. In the context of this report, these species meet any of the following criteria:

- Species protected by British or international law;
- Priority species included on Section 7 (Environment Act, Wales);
- Nationally rare or nationally scarce species;
- Species of Conservation Concern (e.g. JNCC Red List, RSPB/BTO Red or Amber Lists);

Amphibians

3.17 The desk study found no records of Great Crested Newt *Triturus cristatus* (GCN) within the 1km search radius and there are no known permanent waterbodies or suitable breeding habitat at the site or within a 500m radius of the site (although there may be some unknown ponds within residential gardens throughout St Athan). The heavily grazed improved grassland fields represent sub-optimal terrestrial habitat for GCN and other common amphibian species and as such amphibians are not considered to pose a constraint to development at the site and are not mentioned any further in this report.

[redacted]

3.18 During the survey no [redacted] were identified at the allocated site or within the immediately surrounding habitats and neither was any other evidence of this species found (e.g. mammal pathways, guard hairs, footprints or latrines). Despite the lack of evidence [redacted] are known to be present in the local area, with at least one known record associated with the nearby Castleton Wood, and therefore the use of the grassy parcels at the site by commuting/foraging [redacted] on an irregular basis could not be precluded.

Bats

3.19 While the heavily grazed improved grassland fields likely provide very limited foraging resources for bats, the boundary hedgerows were considered suitable of supporting a range of foraging bat species. These linear features, particularly those in the eastern extent of the site which are not exposed to artificial lighting columns, also likely act as valuable commuting corridors for bats in the local area, allowing undisturbed travel across the site and to further suitable foraging habitats in the wider landscape.

3.20 There are no buildings/structures contained within the site boundaries, and all of the trees found at the site were considered to be unsuitable for supporting roosting bats as they had narrow trunks/branches with no obvious potential roosting features – Negligible Potential.

Birds

3.21 During the survey a number of bird species were heard/seen flying over or within the habitats present at the site including Robin *Erithacus rubecula*, Raven *Corvus corax*, Wood Pigeon *Columba palumbus*, Jackdaw *Corvus monedula*, Magpie *Pica pica*, Common Gull *Larus canus*, Blackbird *Turdus merula* and Meadow Pipit *Anthus pratensis* – none of which hold any conservation status. The open areas of grassland at the site were considered to be of poor suitability for ground nesting species (such as Skylark) as they are likely to be highly disturbed by grazing livestock with the short sward height providing little cover from predators (e.g. Buzzard *Buteo buteo*). The boundary hedgerows and broadleaved trees at the site are however likely to be used by a variety of tree/scrub nesting species.

Hazel Dormouse

3.22 No evidence of Hazel Dormice (e.g. Hazel nuts with characteristic signs of being gnawed by Dormouse) was found at the site during the current survey. The desk study did reveal that evidence of Dormice has previously been recorded within the local area with nest identified within a parcel of woodland found approximately 800m to the north-west of the site however, several physical barriers exist between this woodland and the site including the residential settlement of St Athan as well as several roads, and these features are likely to impede any movement of Dormice between the two areas. Furthermore the hedgerows at the site have poor connectivity to any other parcels of woodland in the local area which may be suitable of supporting a source population of this species and as such the likelihood of Dormice being present at the site was considered to be low.

Invertebrates

3.23 During the survey a small number of invertebrate species were observed at the site, none of which held any conservation status. While the grazed pastures are likely to be unsuitable of supporting a wide range of invertebrate species, the field boundaries and hedgerows are likely to support greater numbers of invertebrates in context of the site (i.e. in comparison to the grassland).

Reptiles

3.24 The allocated site was considered to be of limited suitability to support common reptiles. The heavily grazed improved grassland fields lack suitable cover/shelter opportunities and likely provide very limited foraging resources for reptiles. There is a low potential for the boundary hedgerows to support common reptiles such as Slow Worm which have previously been recorded within St Athan however, anything other than individual or small numbers of animals at the site was considered to be unlikely.

Other Species

3.25 Several Brown Hare were observed along the margins of the field parcels. Although Brown Hare are considered to be widespread and common, they are listed as a Priority Species under Section 7 of the Environment (Wales) Act 2016.

4.0 POLICIES AND PLANS

4.1 The following local and national planning policy relating to nature conservation and biodiversity are considered of relevance to the site.

Planning Policy Wales (2021)

4.2 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 & Planning.

4.3 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. Minimising 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

4.4 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

4.5 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

4.6 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

Vale of Glamorgan Council Local Development Plan 2011 - 2026 (Adopted 2017)

4.7 The Vale of Glamorgan Local Development Plan (LDP) 2011 – 2026 was adopted on the 28th June 2017. 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 the Vale of Glamorgan up to 2026. The Council is currently preparing a new Replacement Local Development Plan (RLDP) to replace the existing adopted LDP. A number of policies within the LDP are considered of relevance to the site and these are detailed below.

Section 6 – Managing Growth in the Vale of Glamorgan

Policy MG19 – European Protected Sites and Species

Development proposals likely to have an adverse effect on a European protected species will only be permitted where:

1. There are reasons of overriding public interest;

2. There is no satisfactory alternative; and

3. 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

Policy MG20 – Nationally Protected Sites and Species

Development likely to have an adverse effect either directly or indirectly on the conservation value of a site of special scientific interest will only be permitted where it is demonstrated that:

1. There is no suitable alternative to the proposed development; and

2. It can be demonstrated that the benefits from the development clearly outweigh the special interest of the site; and

3. Appropriate compensatory measures are secured; or

4. The proposal contributes to the protection, enhancement or positive management of the site.

Development proposals likely to affect protected species will only be permitted where it is demonstrated that:

1. The population range and distribution of the species will not be adversely impacted;

2. There is no suitable alternative to the proposed development;

3. The benefits of the development clearly outweigh the adverse impacts on the protected species; and

4. Appropriate avoidance, mitigation and compensation measures are provided

Policy MG21 – Sites of Importance for Nature Conservation, Regionally Important Geological and Geomorphological Sites and Priority Habitats and Species

Development proposals likely to have an adverse impact on sites of importance for nature conservation or priority habitats and species will only be permitted where it can be demonstrated that:

1. The need for the development clearly outweighs the nature conservation value of the site;

2. Adverse impacts on nature conservation and geological features can be avoided;

3. Appropriate and proportionate mitigation and compensation measures can be provided; and

4. The development conserves and where possible enhances biodiversity interests.

Section 7 – Managing Development in the Vale of Glamorgan

Policy MD9 – Promoting Biodiversity

New development proposals will be required to conserve and where appropriate enhance biodiversity interests unless it can be demonstrated that:

1. The need for the development clearly outweighs the biodiversity value of the site; and

2. The impacts of the development can be satisfactorily mitigated and acceptably managed through appropriate future management regimes.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 The combination of desk study and Extended Phase 1 Habitat survey identified a limited range of habitats at the site including S7 priority habitats in hedgerows, as well as parcels of improved grassland. The two heavily grazed field parcels were considered to be of limited ecological importance and represent the area of the allocated site most suitable for development. The boundary hedgerows represent the areas of greatest ecological importance in a local context, connecting the site to the wider environment and having potential to support a variety of species including foraging and commuting bats, nesting birds and other small mammals – these boundary features should be retained as far as practicable as part of any proposed development layout.

Priority Habitats

5.2 Hedgerows are listed as Priority Habitats under Section 7 of the Environmental Act (Wales) 2016 and as such should be retained and protected wherever possible as part of the local green infrastructure (GI) network, which could also incorporate grass buffers alongside the linear features. Doing so would maintain connectivity between habitats in the surrounding areas and to allow for continued movement of protected species around the site. New native tree and shrub planting within the defunct and species-poor hedgerow section (along eastern boundary) would enhance biodiversity locally and improve connectivity for commuting bats and other mobile species.

[redacted]

5.3 No direct evidence of [redacted] presence/activity was found at the site or in the immediately adjacent areas although the habitats present were considered suitable of supporting foraging/commuting [redacted] on at least an irregular basis. As mentioned in section 5.2, retention of the boundary hedgerows would limit any potential impacts to small mammals such as [redacted] by maintaining connectivity between habitats in the surrounding areas and allowing for their continued movement around and through the site. In the unlikely event that a [redacted] sett was found on site in the future, any on-going works will stop immediately, and the project or local authority ecologist contacted for advice. It is also recommended that during the construction phase of any future development any excavations are covered overnight, or a means of escape provided (e.g. rough sawn timber board of 300mm width placed at an angle less than 45 degrees) to minimise the risk to [redacted] and other mammals (e.g. Hedgehog or Brown Hare) that may become trapped.

Bats

5.4 The boundary hedgerows were considered suitable of supporting a number of foraging bat species and are also likely to be used as a navigational aid, connecting the site to the wider landscape. Dependant on the potential impacts of the development design (e.g., access locations, requirement for hedgerows removal) further bat

activity surveys (manual transects and automated surveys) may be required to establish how bats are using the site to inform any particular mitigation/avoidance measures. However, on the assumption that the boundary vegetation would be largely retained, and that development could utilise the existing site access points through either the western boundary off Gileston Road or through the northern boundary adjacent to Church Farm, at least in part (albeit that widening is likely to be needed), then further survey may not be necessary provided that the retained boundary vegetation can be maintained as a dark corridor for foraging/commuting bats. The requirement (or otherwise) for bat activity surveys could be discussed with the local authority once a point of access and proposed layout has been fixed.

5.5 The design of any site lighting should also seek to reduce artificial light spill onto retained boundary habitats and linear features. These habitat features should be maintained as dark corridors for bats and other nocturnal wildlife. See lighting guidance note produced by BCT & ILP (2018) for advice on how to mitigate for impacts of artificial lighting on bats (Appendix IV).

Birds

5.6 The hedgerows and broadleaved trees at the site were considered likely to support a number of tree/scrub nesting bird species. 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. Given the high likelihood of nesting birds being present within the abovementioned habitats, any future vegetation works (i.e. /hedge/tree/scrub removal) would be subject to seasonal constraints and should be undertaken outside of the nesting bird season (undertaken between September – February). If this is not possible an ecologist should be present to inspect habitats for the presence of nesting birds prior to removal and to supervise vegetation clearance.

Hazel Dormice

5.7 The desk study revealed that evidence of Dormice has previously been recorded within a 1km radius of the site although no evidence of this species was found at the site during the current survey and their presence within the site's boundary hedgerows was considered to be unlikely given their relatively isolated location with poor connectivity to more suitable habitats in the wider landscape. Hazel Dormouse and their breeding and resting places are also afforded legal protection under the Conservation of Species and Habitats Regulations (2017) and Wildlife and Countryside Act (1981) (as amended). Retention of the hedgerows (particularly the species-rich and intact hedgerows) would minimise any potential impacts to this species. Dependant on the final development impacts/layout, further consultation with the local authority ecologist would be recommended as part of the planning submission to identify the requirement (if any) and scope for further surveys.

5.8 If required, further surveys would involve the deployment of nest tubes along the hedgerows at the site. As per best practice guidelines (Bright et al., 2006), nest tubes should be deployed in March/April and checked at

monthly intervals for the presence of Dormouse up until November. A minimum of 50no. nest tubes should be deployed to sample a site. Given the scale of the site it is likely that the minimum survey effort of 50no. nest tubes will be adequate to achieve full coverage and demonstrate an appropriate survey effort.

Reptiles

5.9 The field margins were considered suitable of supporting small numbers of common reptiles (and common amphibians) with the desk study revealing that Slow Worm, Grass Snake and Common Toad have previously been recorded within St Athan. All UK reptiles are protected against intentional killing and injuring under Schedule 5 of the Wildlife & Countryside Act (1981) (as amended) and are an important ecological consideration in terms of site development. Retention and protection of the hedgerows and adjoining grassy buffers would minimise any potential impacts to common reptiles (and amphibians) and would provide ample foraging/basking/sheltering opportunities to continue to support any small populations of reptiles that may be present at the site. A targeted reptile survey is therefore not deemed necessary for the site but on the assumption that individual or small numbers of reptiles may be present along the field/hedgerow margins, a precautionary approach to vegetation clearance should be adopted when reptiles are active (typically April-Sept). Doing so would minimise any risks as well as discourage any reptiles (and common amphibians) that may be present at the site from being within the vicinity of the working footprint. Vegetation clearance should be undertaken via a two-stage process where an initial cut to 100-150mm is undertaken with the use of hand tools (strimmers/brush-cutters), followed by a second cut to ground level after a minimum period of 48hrs. Arisings should be removed immediately following each cut.

Other Considerations and Enhancements

5.10 Hedgehogs are likely to use the habitats present at the site and so the design of any future development at the site should consider the presence of Hedgehog and other small mammals at the site by incorporating a gap of 130mm x 130mmm at the bottom of garden and boundary fencing to ensure continued connectivity as part of the development[2]. Other enhancement measures to provide localised biodiversity benefits, not discussed above, include the installation of bat and bird boxes onto new buildings and retained trees; the use of native species or those with a known biodiversity benefit in any soft landscaping scheme; the design of SuDS features to benefit biodiversity (e.g. attenuation features designed to hold water during most parts of the year); and the management of retained hedgerows/grassland corridors to maintain connectivity and enhance the habitats for biodiversity locally.

[2] Based on the 'Hedgehog Street' principle advised by the People's Trust for Endangered Species (PTES) and other conservation groups: https://www.hedgehogstreet.org/

Avoidance, Mitigation & Enhancements

5.11 The avoidance, mitigation and enhancements described in the sections above are summarised below:

Avoidance

- Retention and protection of the priority habitats (hedgerows) and grassland buffer strip.
- Vegetation clearance (hedges, trees and scrub) to avoid nesting bird season and to be undertaken over the winter period (between September – February).

Mitigation

- Design of site lighting to minimise artificial light spill onto boundary features to limit impacts to foraging/commuting bats and other nocturnal wildlife. Any increase in lux level to be less than or equal to 0.5 lux.
- Covering of any excavations overnight or means of escape provided during construction phase to minimise risks to [redacted] and any other small mammals that may become trapped.
- Sensitive approach to clearance of grassland parcels and fringe vegetation so as to minimise any risks to any common reptiles and amphibians that may be present.

Enhancements

- Inclusion of bat and bird boxes onto new buildings and/or retained trees.
- Strengthening of existing defunct/species-poor hedgerows with new native tree planting.
- Landscape plan to include native tree and shrub species or those with a known benefit to local biodiversity.
- Layout design to feature Hedgehog corridors, to allow for continued habitat connectivity throughout the final development.
- Design of any SuDS features to benefit local biodiversity.
- Implement Management Plan for retained and proposed planting to maintain value to biodiversity.

6.0 REFERENCES

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Bat Conservation Trust & Institution of Lighting Professionals (2018) *Bats and artificial lighting in the UK. Guidance Note 08/18*. Bat Conservation Trust, London.

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Jackson, D. (2015) *Bats & Trees – Information Leaflet*. Bat Conservation Trust, London.

Joint Nature Conservation Committee (JNCC) (2010) *Handbook for Phase I Habitat Survey. A technique for environmental audit.* JNCC, Peterborough.

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APPENDIX I SITE LOCATION PLAN (RED LINE BOUNDARY)

St Athan / Sain Tathan

Key

Site Boundary 84,384sqm
[8.438ha or 20.851acres]

N

Scale 1:1250

0 25 50 75 100 125 150

REV.	DESCRIPTION	DATE

CLIENT

JOB TITLE
Church Farm St Athan

DRAWING TITLE
Location Plan - REP1

SCALE @ A1	DATE	DRAWN BY
1:1250	September '22	PC
JOB NO.	DRAWING NO.	REVISION
2311	LDP-REP-01	-

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NP20 4PH
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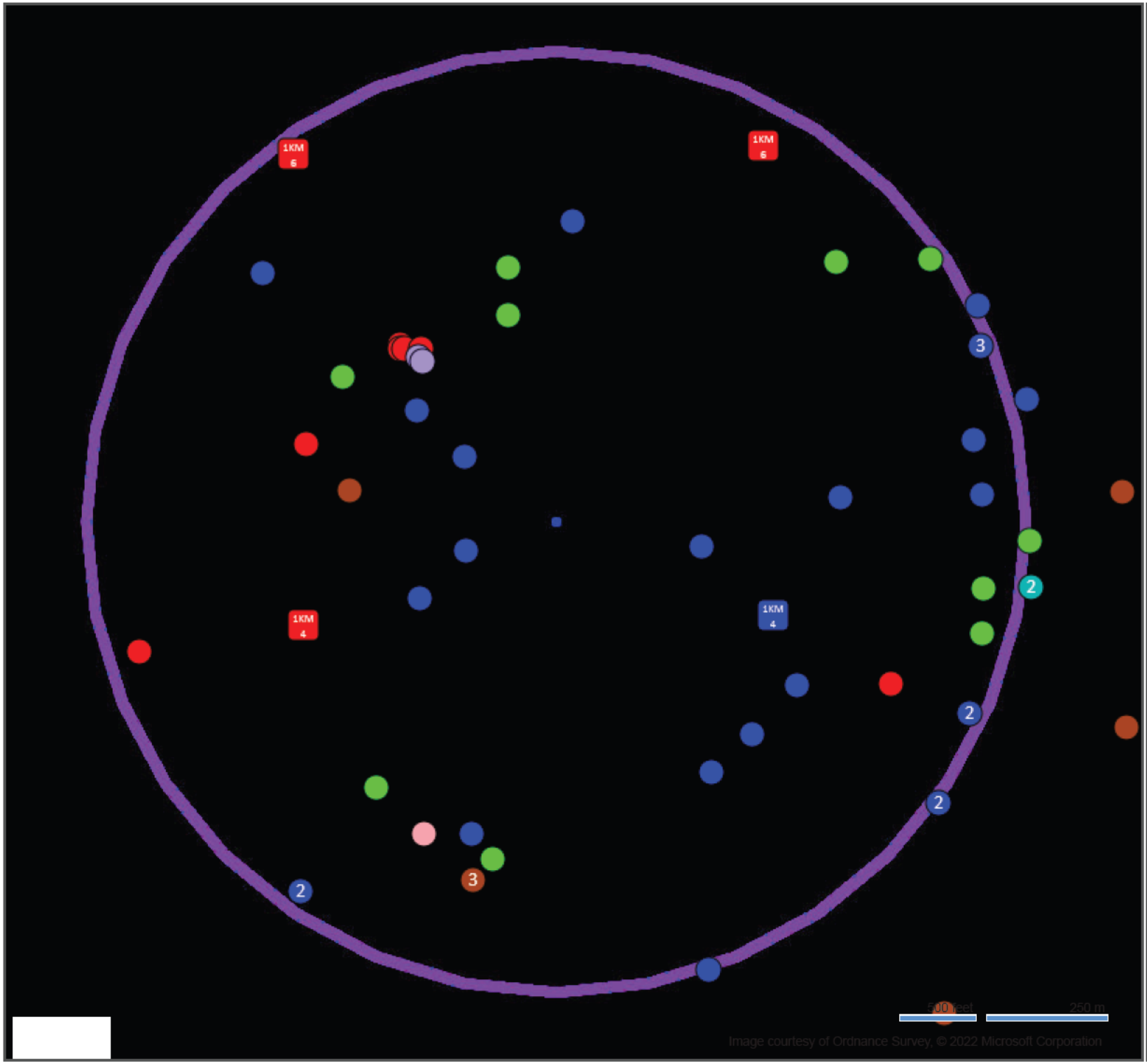
www.hammond-ltd.co.uk

APPENDIX II DESK STUDY INFORMATION RECEIVED FROM SEWBReC



Aderyn
LERC Wales' Biodiversity & Reporting Database

LOCAL ENVIRONMENTAL RECORDS CENTRES WALES
CANOLFANNAU COFNODION AMGYLCHEDDOL LLEOL CYMRU

eMapper for LERC Wales Aderyn Commercial

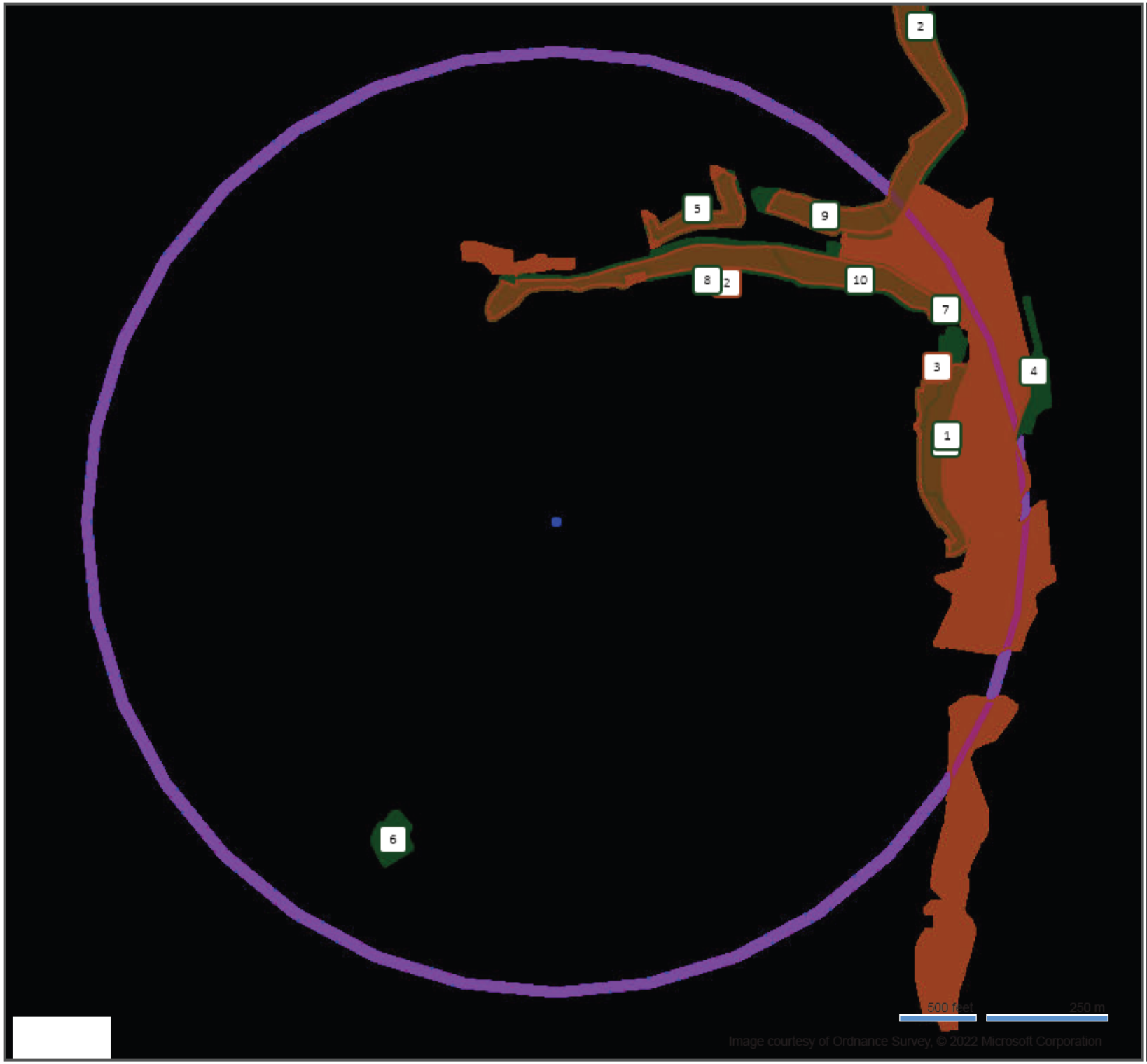
ben-satherley_20/10/2022_church-farm-st-athans / 5494/0223-584

Church Farm Species Map (Public Use)

Key

- Search Location
- Search Buffer (1000m)

- Bees, Wasps, Ants and Sawflies
- Birds
- Butterflies and Moths
- Fish
- Fungi, Lichen and Slime Moulds
- Mammals
- Other Invertebrates
- Plants
- Reptiles and Amphibians



Aderyn
LERC Wales' Biodiversity & Reporting Database

LOCAL ENVIRONMENTAL RECORDS CENTRES WALES
CANOLFANNAU COFNODION AMGYLCHEDDOL LLEOL CYMRU

eMapper for LERC Wales Aderyn Commercial

ben-satherley_20/10/2022_church-farm-st-athans / 5494/0223-584

Church Farm Sites Map (Public Use)

Key

- Search Location
- Search Buffer (1000m)

Ancient Semi-natural Woodland

- **1**: Ancient Semi Natural Woodland
- **2**: Ancient Semi Natural Woodland
- **3**: Ancient Semi Natural Woodland
- **4**: Ancient Semi Natural Woodland
- **5**: Ancient Semi Natural Woodland
- **6**: Restored Ancient Woodland Site
- **7**: Restored Ancient Woodland Site
- **8**: Restored Ancient Woodland Site
- **9**: Restored Ancient Woodland Site
- **10**: Restored Ancient Woodland Site

Adopted SINC

- **1**: Oxmoor Wood
- **2**: East Orchard Wood
- **3**: Lower Thaw Valley

APPENDIX III EXTENDED PHASE 1 HABITAT SURVEY PLAN

Key

- Target Notes
- Site Boundary
- B4 Improved Grassland
- J2.1.1 Intact Species-rich Hedgerow
- J2.2.2 Defunct Species-poor Hedgerow
- J2.3.2 Species-poor Hedgerow with Trees
- J2.4 Fence / Wall

0 50 100 150

PRELIMINARY | PLANNING | DESIGN | TENDER | CONSTRUCTION

Pobl Group

Extended Phase 1 Habitat Plan

Land at Church Farm, St Athan

E22113301 / DR01 BS MW 10 November 2022

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APPENDIX IV BATS AND ARTIFICIAL LIGHTING IN THE UK GUIDANCE 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.

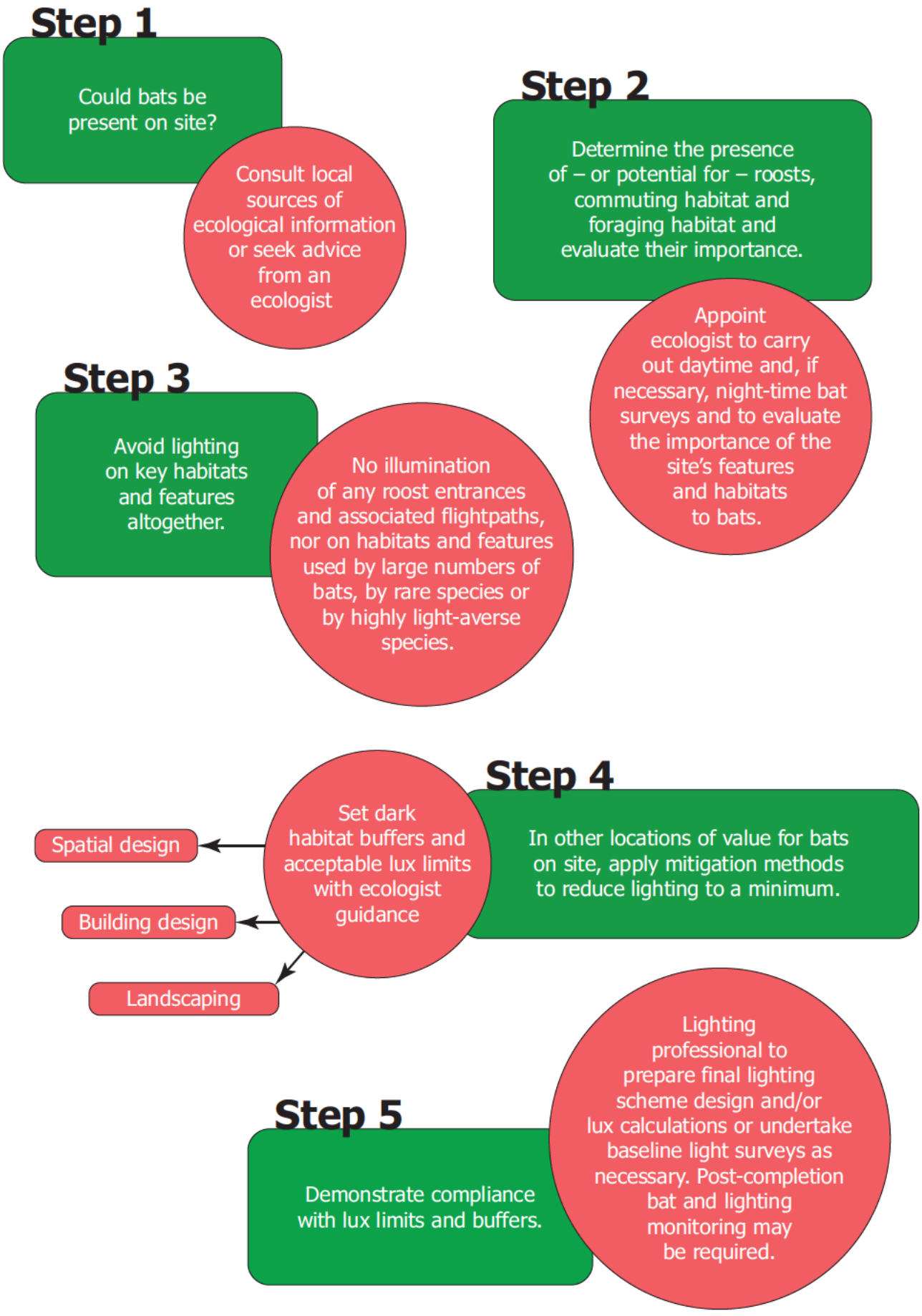
If any of the following habitats occur on site, and are adjacent to or connected with any of these habitats on or off site, it is possible that newly proposed lighting may impact local bat populations:

- 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
Set dark habitat buffers and acceptable lux limits with ecologist guidance
Spatial design
Building design
Landscaping
In other locations of value for bats on site, apply mitigation methods to reduce lighting to a minimum.
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:

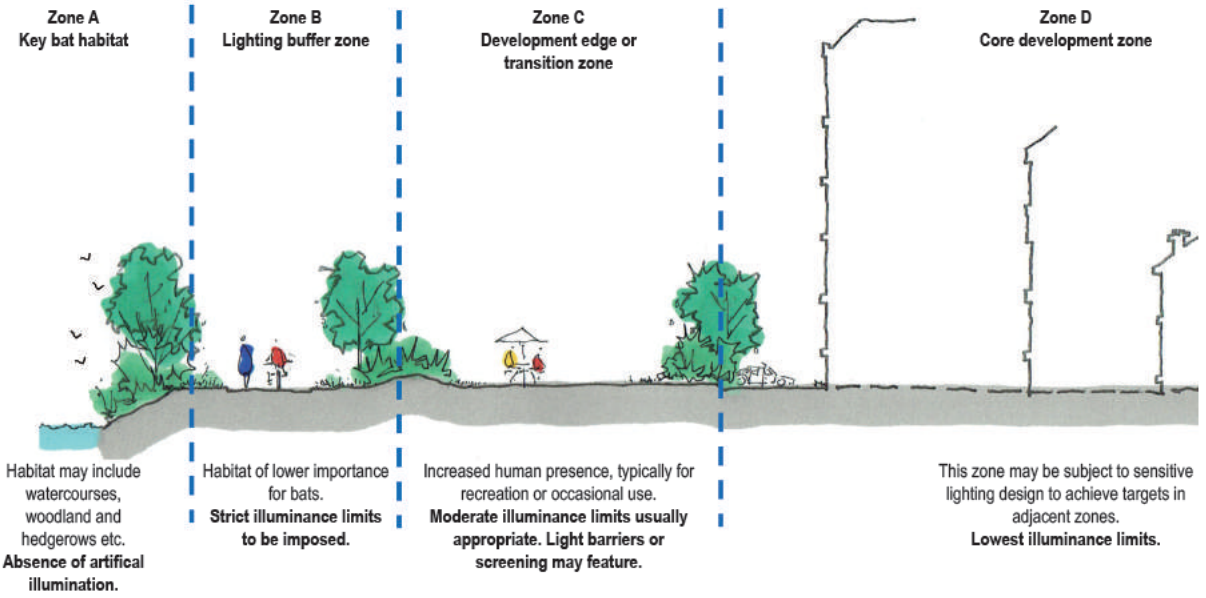
- Roosting and swarming sites for all species and their associated flightpath/commuting habitat.
- Foraging or commuting habitat for highly light-averse species (greater and lesser horseshoe bats, some Myotis bats, barbastelle bats and all long-eared bats).
- Foraging or commuting habitat used by large 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 in to 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

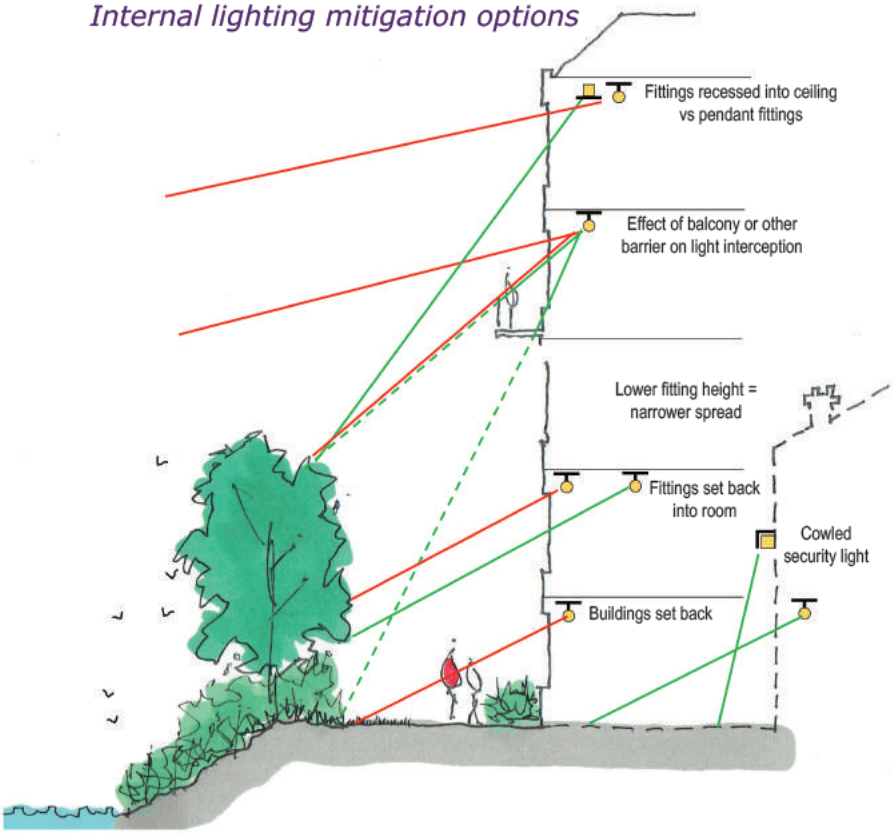
Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires.

- 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



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.

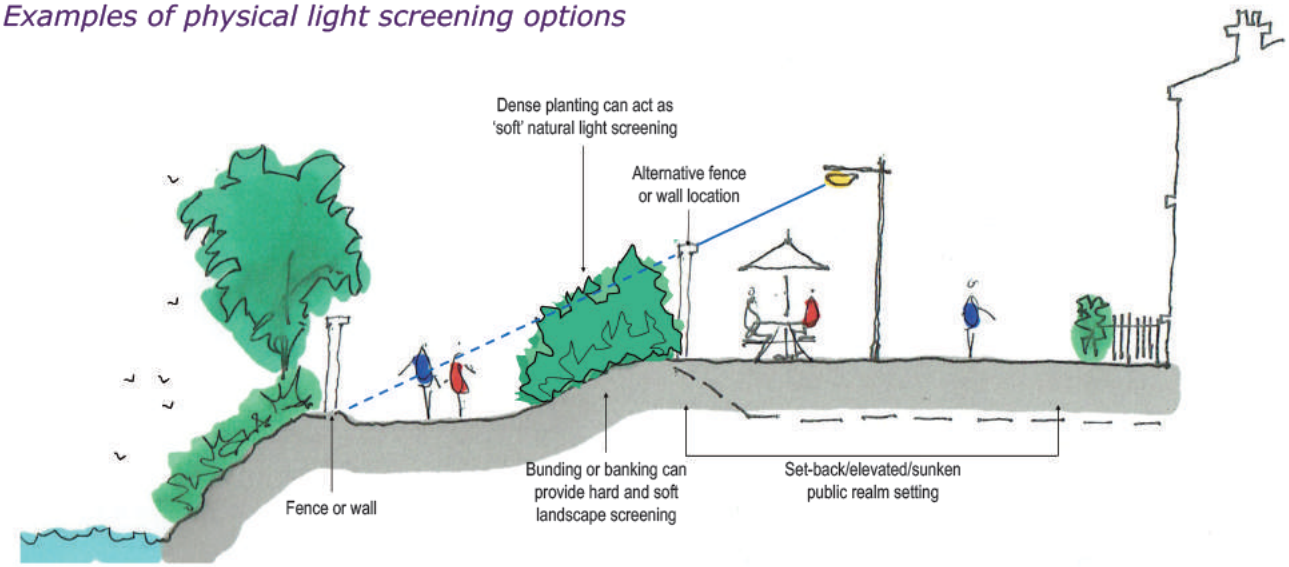
- It may be possible to include key habitats and features into unlit public open space such as parks and gardens.
- Buildings, walls and hard landscaping may be sited and designed so as to block light spill from reaching habitats and features.
- Taller buildings may be best located toward the centre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

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.

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