TAYLOR WIMPEY UK

LAND AT SWANBRIDGE ROAD, SULLY

ECOLOGICAL APPRAISAL

16 SEPTEMBER 2016

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ECOLOGICAL APPRAISAL

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Issue	Revision	Stage	Date	Prepared by	Approved by	Signed
1	-	Draft	16 September 2016	Annabelle Phillips	Matthew Watts (Director)	

CONTENTS

SUMMARY

Soltys Brewster Ecology were commissioned to undertake an ecological appraisal of an area of land at Swanbridge Road in Sully which is proposed for residential development. The ecological baseline conditions at the site were established in August 2016 through a combination of desk study and Extended Phase 1 Habitat Survey and automated monitoring for bats. These surveys were designed to update the results of a suite of surveys undertaken on the current site and the land to the north in 2012/ 2013 which informed a planning application for residential development on the land adjacent to the north of the site.

Desk based consultation confirmed that the site does not hold any form of statutory or non-statutory nature conservation designation. Cog Moors Site of Special Scientific Interest (SSSI) is located approximately 400m to the north of site and is designated due to the large continuous area of damp mesotrophic (neutral) semi-natural grassland it supports, with several stands of tall sedges and populations of uncommon plant species. The SSSI is not considered of particular relevance to the site due to the physical separation from the site and the existing site conditions (arable land and hedgerows). Local records indicated the presence of a variety of bird and bat species in the surrounding area, as well as records of Great Crested Newt *Triturus cristatus* approximately 700m to the east of the site.

The Phase 1 Habitat Survey identified that the site includes the northern portion of an arable field surrounded by hedgerow. The arable land was generally considered to be of limited ecological interest and represent the most suitable areas of the site for development. A pond is also located c.70m to the north of the site.

During surveys undertaken in 2012/ 2013 Great Crested Newt were confirmed to be present in the pond to the north of the site. Great Crested Newts are a European protected species and the presence of breeding Great Crested Newts is a key ecological consideration. The presence of this species in close proximity to the site will need to be considered as part of the planning submission and mitigation measures to include the retention and enhancement of habitat as well as measures to prevent harm to Great Crested Newts during construction are presented within a separate Method Statement document (Soltys Brewster Ecology, 2016).

The hedgerows around the field boundaries were considered of value in a local context and the indicative masterplan indicates these features would be largely retained with a new native hedgerow planted along the southern boundary of the site. Consideration should also be given to the use of these features by foraging bats and birds and site lighting design should maintain these features as a dark corridor as far as practicable to limit any potential impacts on foraging bats/ birds.

A mitigation strategy for reptiles has also been prepared for the site (Soltys Brewster Ecology, 2016) and other considerations would include the avoidance of the bird-breeding season (March-August) for any vegetation clearance.

1.0 INTRODUCTION

1.1. Soltys Brewster Ecology were commissioned by Taylor Wimpey UK to undertake an ecological appraisal of land at Swanbridge Road in Sully which is proposed for residential development (see indicative masterplan in Appendix I). The site is located to the east of Sully at a central grid reference of ST 1611 6843.

1.2. The site associated with the current development proposals is located immediately south of a parcel of land South of Cod Road which has a resolution to grant outline planning permission for residential development (Application Reference 2013/01279/OUT). The planning application for Land South of Cog Road was supported by an Environmental Impact Assessment (Taylor Wimpey, 2013) with the ecology chapter including a suite of habitat and protected species surveys to identify the baseline ecological conditions and inform the impact assessment. A Great Crested Newt Method Statement (Soltys Brewster Ecology, 2015) and Reptile Mitigation Strategy (Soltys Brewster Ecology, 2015) were also submitted and agreed with the Local Authority and Natural Resources Wales as part of the planning application process.

1.3. This report presents the findings of an ecological appraisal of the current application site undertaken in August 2016 and outlines the ecological constraints/opportunities associated with the proposed development at the site (see Indicative Masterplan in Appendix I). This report should be read in conjunction with the associated Great Crested Newt Method Statement (Soltys Brewster Ecology, 2016) and Reptile Mitigation Strategy (Soltys Brewster Ecology, 2016) in order to provide a comprehensive view of ecological constraints and mitigation proposed for the current development proposals.

2.0 METHODOLOGY

2.1. In order to establish the baseline ecological conditions on the site and in the adjoining habitats a combination of desk-based review of existing site information, an Extended Phase 1 Habitat survey and automated monitoring for bats was undertaken.

Desk study

2.2. The desk study primarily involved a review of data supplied by South East Wales Biodiversity Records Centre (SEWBReC) as part of the Land South of Cog Road application to identify any records of rare, protected or notable flora and fauna within the site boundary and surrounding 1km area. 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). A review of the previous surveys undertaken by Soltys Brewster in 2012 and 2013 on Land South of Cog Road was also undertaken.

Extended Phase 1 Habitat Survey

2.3. The fieldwork was undertaken on 19th August 2016 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 the site were classified and mapped as accurately as possible. All 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.

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 priority habitats listed under Section 7 of the Environment Act Wales.

2.3 Any trees present within or immediately adjacent to the site were assessed for their potential to support roosting bats and were categorised in relation to potential roosting features they support (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.
- **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 with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats.
- **Negligible** – Negligible habitat features on site likely to be used by roosting bats.

Automated Bat Monitoring

2.4 Manual bat activity and automated monitoring was undertaken within the current site and the Land South of Cog Road site in 2013. Habitat conditions within both sites remain unchanged since the 2013 surveys were

[1] Full member of the Chartered Institute of Ecology and Environmental Management.

undertaken however in order to provide an indication of current levels of bat activity and any changes to species composition using the site, automated detectors (Anabat Express units) were deployed along the northern and eastern boundary of the site from 19th - 22nd August and 12th – 16th September 2016.

3.0 RESULTS

Desk Study

3.1 The site itself does not contain any statutory or non-statutory nature conservation designations. Cog Moors Site of Special Scientific Interest (SSSI) is located approximately 400m to the north of site. The SSSI is designated due to the large continuous area of damp mesotrophic (neutral) semi-natural grassland it supports, with several stands of tall sedges and populations of uncommon plant species. The SSSI is not considered of particular relevance to the site due to the physical separation from the site and the existing habitats on the Swanbridge Road site (arable land and hedgerows).

3.2 The SEWBReC species data revealed a number of records of protected or otherwise notable species of flora and fauna in the surrounding area. Records within the surrounding 1km include Pipistrelle *Pipistrellus sp.* and other unspecified bat species *Chiroptera sp*, Great Bittern *Botaurus stellaris*, Eurasian Hobby *Falco subbuteo*, Pied Flycatcher *Ficedula hypoleuca*, Brambling *Fringilla montifringilla*, Black Redstart *Phoenicurus ochruros*, Eurasian Curlew *Numenius arquata*, Northern Lapwing *Vanellus vanellus*, Fieldfare *Turdus pilaris*, Merlin *Falco columbarius*, Barn Owl *Tyto alba*, Great Crested Newt *Triturus cristatus* and Dingy Skipper *Erynnis tages*.

3.3 Most of these records were associated with habitats in areas other than the site and were not considered of particular relevance to the site based on the known habitat preferences of the species listed above, the physical separation from the site and the site conditions. However, records of Great Crested Newt were considered of relevance to the site based on their proximity and the presence of a pond c.70m north of the current site which is known to support Great Crested Newt. Records of mobile species such as birds and bats in the surrounding area are considered of some relevance to the site, and in particular the trees and hedgerows, which may provide nesting habitat for birds/ foraging and commuting habitat for bats locally.

3.4 Surveys were undertaken within the current site and the land to the north in 2012/ 2013 to inform an outline planning application for residential development. These surveys identified a limited number of habitat types in the land to the north - principally improved grassland, species-poor hedgerows and a pond – with the current site being dominated by arable farmland. As identified above Great Crested Newt were identified as being present in the pond c.70m north of the current site boundary. A variety of bat species were recorded foraging and commuting within the current site including Common Pipistrelle *Pipistrellus pipistrellus*, Soprano

Pipistrelle *Pipistrellus pygmaeus*, *Myotis sp.*, Noctule *Nyctalus noctula*, Leisler's *Nyctalus leisleri* and Serotine *Eptesicus serotinus* bats with a single Lesser Horseshoe *Rhinolophus hipposideros* bat also recorded within the fields north of the current site.

3.5 Mitigation strategies for Great Crested Newt (Soltys Brewster Ecology, 2015) and reptiles (Soltys Brewster Ecology, 2015) have both been agreed for the site immediately adjacent to the north as part of the planning process.

Extended Phase 1 Habitat Survey

3.6 The distribution and extent of habitats within and adjacent to the site is illustrated in Figure 1 with accompanying target notes in Appendix II.

3.7 The application site itself consisted of part of an arable field surrounded by hedgerows on the northern, western and eastern elevations.

Arable Land

3.8 The site consists of the northern part of a single large arable field which had been ploughed and planted with a maize crop, and as such consisted almost entirely of bare earth with no visible botanical interest (Target Note 1, Plate 1). Field margins were narrow along the eastern and western elevations (<2m wide) and generally absent or <0.5m wide along the northern elevation. Where present the margins supported a limited range of species including Cocks Foot *Dactylis glomerata*, Common Couch *Elymus repens*, False Oat-Grass *Arrhenatherum elatius*, Alexanders *Smyrnium olusatrum* and Field Bindweed *Convolvulus arvensis* along with species indicative of nutrient enrichment such as Nettles *Urtica dioica* and Cleavers *Galium aparine*. Bramble *Rubus fruticosus* scrub was also encroaching from the adjacent hedgerows.

Hedgerows and Trees

3.8 The site is surrounded by hedgerows on the western, northern and eastern boundary (Target Notes 3, 4 & 6, Plates 1 & 2). The hedgerows along the northern and eastern site boundary were regularly trimmed resulting in a dense hedge approximately 2m in height. The western boundary hedgerow appeared to lack regular management with the exception of side trimming resulting in a taller hedgerow. Species within the hedgerows include Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, English Elm *Ulmus procera* and Hazel *Corylus avellana*. Nettles and Cleavers were dominant in the hedgerow bases with other species such as Ivy *Hedera helix* and Lords and Ladies *Arum maculatum* also noted. Although all hedgerows were found to be relatively diverse along their entire length none were noted as supporting five or more woody species within a 30m length and as such are classified as being species poor.

3.9 The hedgerows around the site boundary were generally devoid of trees, with the exception of a single multi-stem Ash in the centre of the northern boundary (Target Note 5) and a small number of trees within the taller, unmanaged hedge along the western site boundary (Target Note 6). A small group of predominantly Sycamore *Acer pseudoplatanus* trees were recorded in the southeast corner of the site (Target Note 2).

Plate 1. Arable land, hedgerow and narrow field margin along eastern site boundary (Target Note 3)

Plate 2. Taller hedgerow along the western site boundary (Target Note 6)

Fauna

3.10 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 listed under Section 7 of the 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

3.11 Great Crested Newts were recorded in the pond c.70m north of the current site during surveys undertaken in 2012 and 2013 with a peak count of 8 adults recorded during targeted amphibian surveys. Given the proximity to the pond the habitats within the current site are considered suitable to support Great Crested Newts during their terrestrial phase, as well as commoner amphibians such as Common Frog *Rana temporaria* which were also recorded during the 2012/ 2013 surveys. Due to access constraints associated with the land north of the current site an update to the amphibian surveys has not been undertaken although the continued presence of these species is assumed for the purpose of the current application.

Reptiles

3.12 The majority of habitats associated with the site (arable land) were considered unsuitable to support reptiles. However the hedgerow bases and narrow field margins were considered potentially suitable to support widespread reptile species such as Slow Worm *Anguis fragilis*.

Bats

3.13 The automated monitoring undertaken at the site in 2016 recorded generally low levels of bat activity associated with the northern and eastern site boundaries. Species recorded include Common Pipistrelle, Soprano Pipistrelle, Noctule, Serotine and *Myotis sp.*, with 96% of all calls recorded being Pipistrelle bats. 71% of all bats recorded were along the northern hedgerow.

3.14 Small numbers of other bat species were also recorded within the site and the surrounding area during surveys undertaken in 2013 including Leisler's and a single Lesser Horseshoe. The results of the bat surveys undertaken at the site in 2013 are displayed in Appendix III. Although generally low levels of bat activity were recorded during the 2016 monitoring the network of hedgerows around the site boundaries are likely to provide good foraging and commuting habitats for local bats.

Table 1. Bat species/ numbers recorded during 2016 automated monitoring

Date	Northern hedgerow	Eastern Hedgerow
19/08/2016	14 Common Pipistrelle 1 Soprano Pipistrelle	1 Common Pipistrelle
20/08/2016	20 Common Pipistrelle	No bats recorded
21/08/2016	12 Common Pipistrelle 1 Serotine	3 Common Pipistrelle
12/09/2016	43 Common Pipistrelle 7 Soprano Pipistrelle	25 Common Pipistrelle 3 Soprano Pipistrelle 1 Noctule
13/09/2016	62 Common Pipistrelle 4 *Myotis sp.*	32 Common Pipistrelle 2 *Myotis sp.*
14/09/2016	38 Common Pipistrelle 2 Soprano Pipistrelle 1 Serotine	13 Common Pipistrelle 4 Soprano Pipistrelle 1 Serotine
15/09/2016	19 Common Pipistrelle 2 Noctule	5 Common Pipistrelle 3 Soprano Pipistrelle

3.15 The trees around the site were predominantly semi-mature and lacked features which would be considered suitable to support roosting bats. However, a number of trees supported features offering some potential to roosting bats, albeit of Low potential (Target Notes 5 & 7). Such features included areas of dead wood, limb scars and Ivy cover.

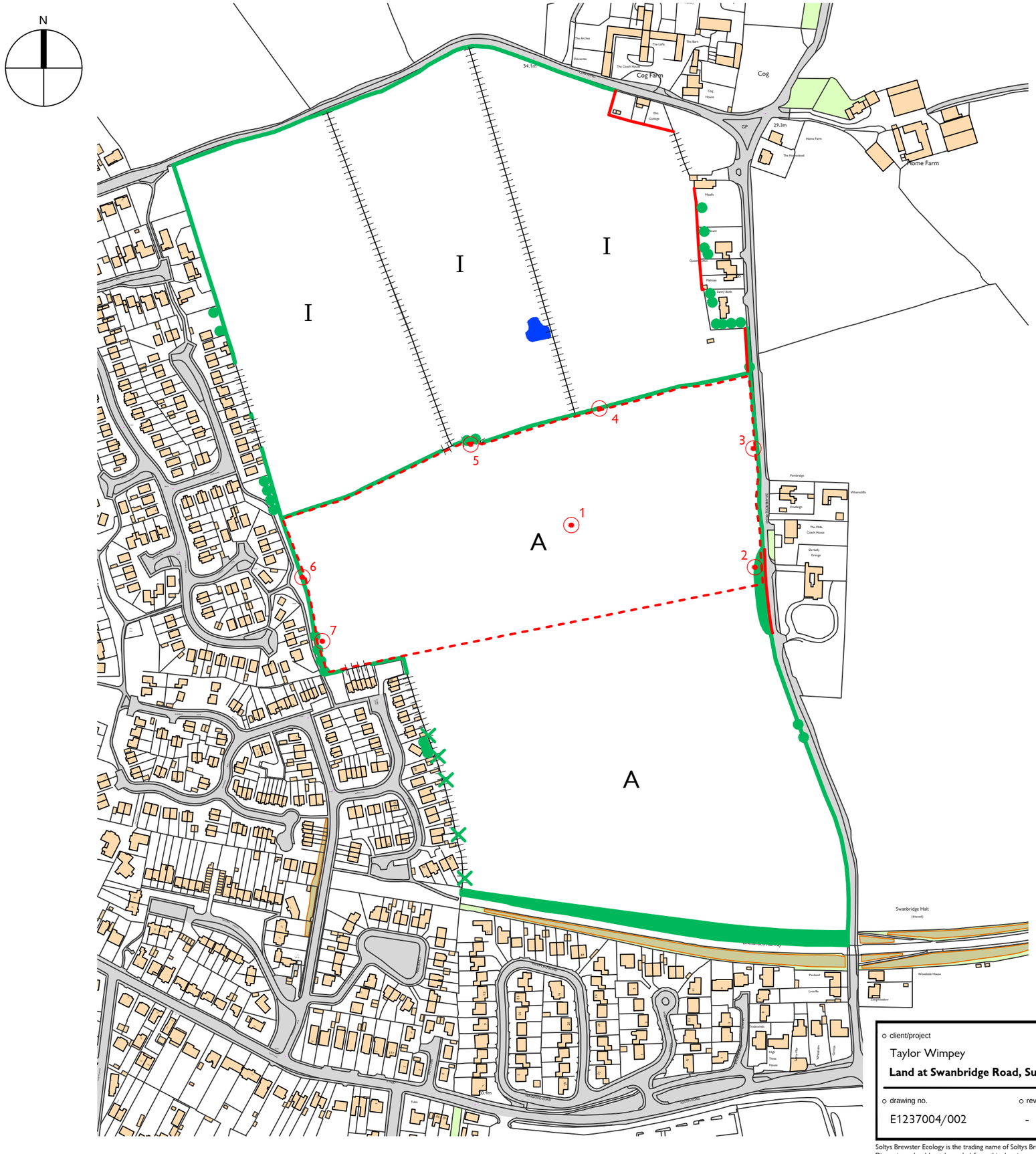
Birds

3.16 During the survey a number of bird species were noted on or flying over the site including House Sparrow *Passer domesticus*, Swallow *Hirundo rustica*, Blackbird *Turdus merula* and Robin *Erithacus rubecula*. The hedgerow and arable habitats across the site are considered suitable to support a variety of species and are likely to offer good foraging and nesting opportunities for birds. Other birds noted on or flying over the site in 2012/ 2013 include Skylark *Alauda arvensis* and Lapwing, the latter of which was observed opportunistically foraging on the site on a single occasion.

3.17 Although none of the bird species noted would be considered particularly rare a number are listed as birds of conservation concern. Skylark, Lapwing and House Sparrow are all included on the Red List of species of Conservation Concern in the UK (Eaton *et al.,* 2015).

Badgers

3.18 No evidence of Badgers or use of the site by Badgers was noted during the current site survey or during previous surveys undertaken on the site and the land to the north in 2012 & 2013.



Key:

- Broadleaved Semi-natural Woodland
- Scattered Broad-leaved Trees
- Species- poor Hedgerow
- I — Improved Grassland
- A — Arable Land
- Standing Water
- Fence
- Wall
- Site Boundary
- Target Note

Habitat mapping for area within the redline is based on a survey undertaken in August 2016. Habitat mapping for areas outside the red-line is based on a 2012 survey however is still considered likely to be accurate based on observation of these areas from within the current site in 2016.

client/project	drawing			
Taylor Wimpey **Land at Swanbridge Road, Sully**	Figure 1. Phase 1 Habitat Plan			
drawing no.	revision	scale	drawn	date
E1237004/002	-	NTS @ A3	AP	Sept 2016

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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.

National Planning Policy

4.2. In terms of planning policy, a number of over-arching policies are of relevance not least of which are those described within Planning Policy Wales (PPW, 2016), which sets out land use planning policies of the Welsh Assembly Government with Chapter 5 dealing with Conserving and Improving Natural Heritage and Coast. The advice contained within PPW is supplemented for some subjects by Technical Advice Notes (TAN's), with TAN 5 addressing Nature Conservation.

4.3. TAN 5 identifies a number of key principles, which the Town and Country Planning system in Wales should incorporate those relevant are detailed below:

- 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.

Environment Act (Wales)

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 Local Development Plan

4.4. The Vale of Glamorgan Local Development Plan (LDP) is in preparation and will guide the future development and land use of the County until 2026. A Deposit Local Development Plan (Vale of Glamorgan Council, 2013) has been prepared which contains the vision and objectives for the Plan, strategy, strategic policies, development management policies and policies for managing growth. Policies within the Deposit Plan considered of relevance to the site are listed below.

Policy MD 10 - Promoting Biodiversity

New residential, commercial and community development will be required, where possible, to positively contribute to biodiversity interests within the Vale of Glamorgan by:

1. Maintaining and enhancing existing important biodiversity features such as woodland, trees, hedgerows, wetland, watercourses, ponds, green lanes, geological features and habitats; and

2. Incorporating new biodiversity features either on or off site to enable a net gain in biodiversity interest. Where it is demonstrated that the impact of development on biodiversity cannot be addressed on site, developers will be required to provide alternative off-site compensation to maintain net biodiversity interest.

3. Demonstrating how they maintain features of importance for ecological connectivity, including wildlife corridors and 'stepping stones' that enable migration, dispersal and/or genetic exchange.

Where proposals have a negative impact on sites shown to be important for biodiversity, developers will need to demonstrate that the development could not be located elsewhere.

Vale of Glamorgan Unitary Development Plan (2006)

4.5. The Vale of Glamorgan Unitary Development Plan (UDP) remains in place until the LDP is adopted and decisions on planning permissions will be based on the UDP until this time. A number of policies within the UDP are considered of relevance to the site and these are detailed below.

Policy ENV 11 – Protection of Landscape Features

Development will be permitted if it does not unacceptably affect features of importance to landscape or nature conservation including: trees, woodland, hedgerows, river corridors, ponds, stone walls and species rich grasslands.

Policy ENV 12 – Woodland Management

The improvement, management and extension of woodland, tree cover and hedgerows, particularly of broad-leaf native species, will be favoured, especially where it:

i) Makes a significant improvement to the landscape such as derelict land, the urban fringe, or in the vicinity of major road/ rail corridors and quarries; or

ii) It helps diversify and extend wildlife habitats; or

iii) It adds recreational and educational opportunities.

Policy ENV 15 - Local Sites of Nature Conservation Significance

Development and land use change likely to have an unacceptable effect on a local nature reserve, a regionally important geological / geomorphological site, or a site shown to be of importance for nature conservation will not be permitted unless the reasons for the proposal clearly outweigh the local importance of the site. If development is permitted, appropriate conditions or agreed planning obligations will be used to ensure the impact on nature conservation is minimised.

Policy ENV 16 - Protected Species

Permission will only be given for development that would cause harm to or threaten the continued viability of a protected species if it can be clearly demonstrated that:

i) There are exceptional circumstances that justify the proposals;

ii) There is no satisfactory alternative; and

iii) Effective mitigation measures are provided by the developer.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 The Extended Phase 1 Habitat survey revealed that the site includes the northern part of a larger arable field and is surrounded by hedgerows on the western, northern and eastern boundary. With the exception of the boundary hedgerows, the habitats on site were generally considered to be of low intrinsic ecological value.

5.2 The network of hedgerows and trees around the field boundaries were considered of value in a local context and the indicative masterplan (Appendix I) indicates the majority of these features would be retained with the exception of small breaches for highway/ pedestrian access. Retention of a buffer strip between any development and retained features that would allow adequate root protection for trees and shrubs would help to minimise the impacts of the development on existing wildlife using these boundary features. The retained boundary features should not form part of the boundary of residential gardens created as part of any development to ensure they are protected from removal or damage by residents.

5.3 To provide some enhancement as part of the proposed development and increase connectivity a new native hedgerow will be planted along the southern boundary of the site as illustrated in Indicative Masterplan in Appendix I.

Great Crested Newt

5.4 Great Crested Newt are known to be present within a pond c.70m north of the site boundary. Great Crested Newt are a European Protected Species (EPS) and as such a licence from Natural Resources Wales would be required in order to undertake any works at the site. A Great Crested Newt Method Statement has been prepared to provide full detail on the mitigation measure proposed (Soltys Brewster Ecology, 2016) and details the measures required to prevent killing or injury of newts during the construction phase, as well as measures to retain or enhance habitat for Great Crested Newts. Mitigation measures include the exclusion of newts from the development site by the use of newt exclusion fencing, the retention/ enhancement of habitats on site for Great Crested Newts (to include creation of a new pond) and the sensitive clearance of vegetation within the areas to be affected by development.

5.5 An area of c.1ha is to be retained and managed to provide continued aquatic and terrestrial habitat for newts along with retention of the northern hedgerow and all connections to it. The retained habitat will be protected from disturbance during the construction phase and newt exclusion fencing will be required to prevent the movement of newts into the construction zone where they could be at risk of killing or injury. Retained habitat will require on-going management/ maintenance work to ensure it remains suitable for use by Great Crested Newt.

Reptiles

5.6 The hedgerow bases and narrow field margins were considered to have some, albeit limited, potential to support common species of reptile such as Slow Worm. No reptile survey has been undertaken to inform the planning application however a Reptile Mitigation Strategy (Soltys Brewster Ecology, 2016) has been produced to identify the measures to be employed to minimise the risk to any reptiles which may be present within the site. This approach has been agreed with the Local Authority Ecologist.

Bats

5.7 The automated bat monitoring undertaken at the site in 2016 recorded generally low levels of bat activity associated with the boundary hedgerows with activity dominated by Pipistrelle bats with small numbers of other bat species were recorded during both the 2016 and 2013 surveys. The hedgerows across the site are likely to act as locally important habitat for foraging and commuting bats. It is therefore recommended that these features be maintained as dark corridors and any development seeks to minimise impacts on the retained and proposed hedgerows through sensitive design of site lighting to limit light spill onto these habitats (see Appendix IV).

5.8 A number of trees around the boundary of the site were identified as exhibiting features with a Low potential to support roosting bats including areas of dead wood and Ivy cover. Currently all these trees are identified for retention. However should felling or maintenance works such as pruning were required as part of the development it is recommended that they are felled in sections by a suitably experienced arborist in the spring (April) or autumn (September/October), with possible roosting features lowered to the ground by rope and retained for 48 hours to allow any bats to escape. In the unlikely event that roosting bats were found all works should cease immediately and Natural Resources Wales or the project Ecologist contacted for advice on how to proceed.

Birds

5.9 Given the high likelihood of a number of birds nesting on site any clearance of vegetation associated with future development should be undertaken outside of the bird nesting season (i.e. clearance possible between September and February inclusive). All wild birds are protected against killing and injury under the Wildlife and Countryside Act 1981 (as amended) and their nests against damage or destruction whilst in use or being built.

5.10 Mitigation for loss of nesting habitat for ground nesting bird species such as Skylark should also be considered. This could be via the provision of Skylark plots within arable land or appropriate grassland management within an off-site area. The provision of a mitigation strategy for nesting birds could be delivered via an appropriate planning condition.

Other considerations

5.11 Further recommendations include the use of native plant species or species of known benefit to wildlife in within soft landscaping areas. The incorporation of bird and bat boxes as part of any proposed development would also be recommended to provide localised enhancement for these groups.

5.12 In addition it is recommended all new boundary fencing to residential gardens are either raised 130mm off the floor or have a hole 130mm x 130mm cut in their base to allow terrestrial animals such as Hedgehogs to move around the development and through residential gardens.

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APPENDIX I INDICATIVE MASTERPLAN

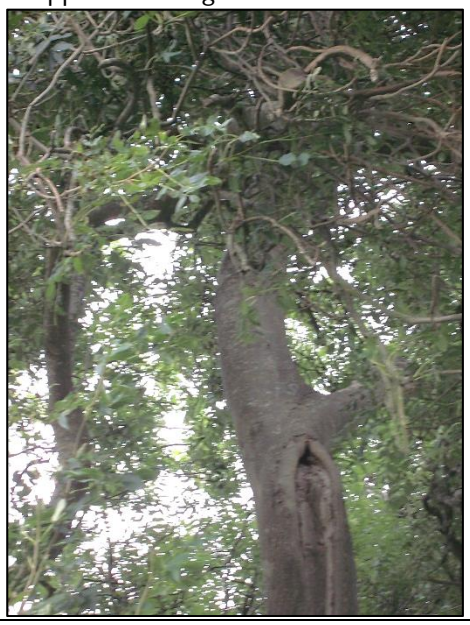
LAND AT COG ROAD, SULLY (SOUTH SITE)

Indicative Masterplan

1:1000 @ A2

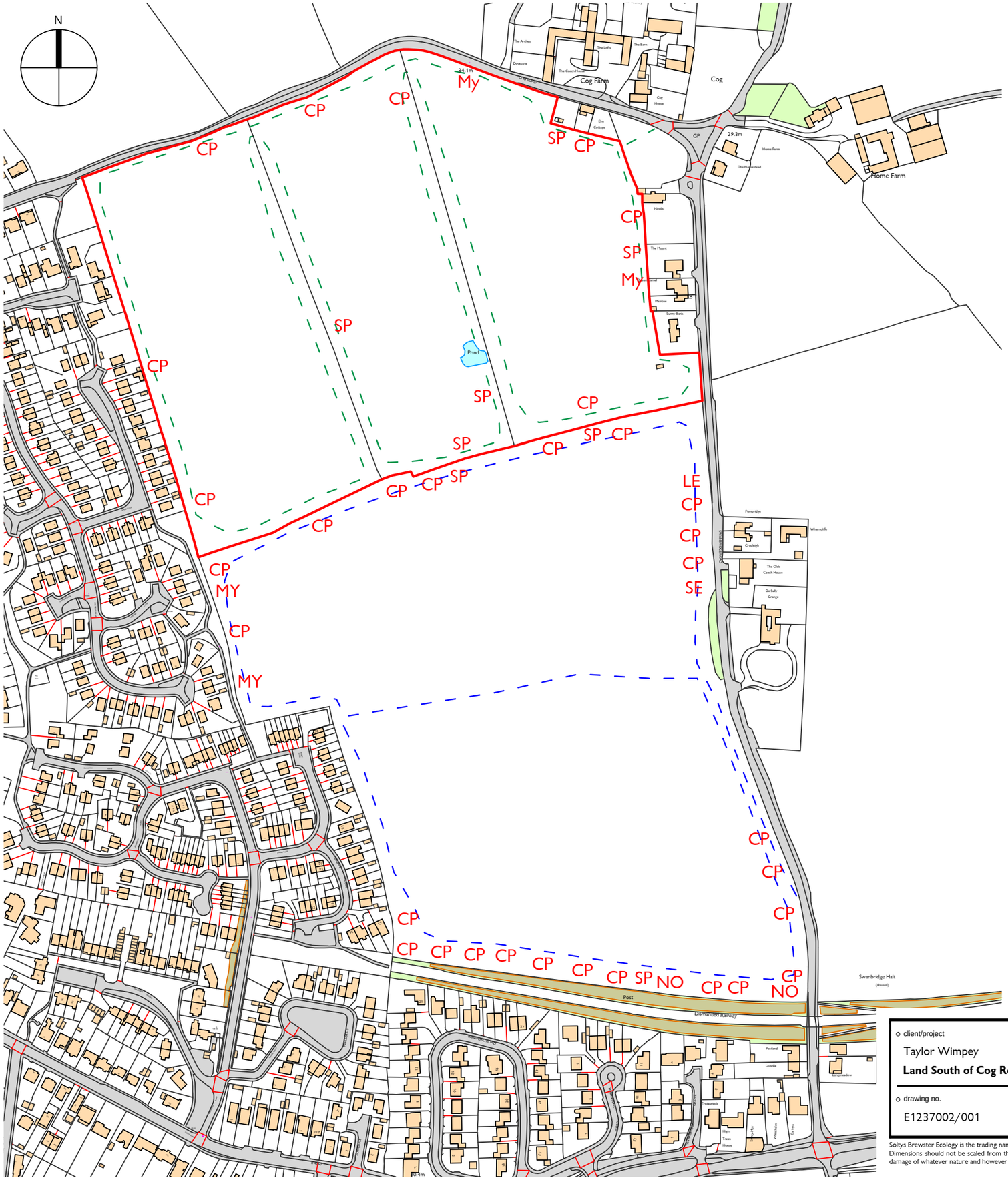
APPENDIX II TARGET NOTES TO ACCOMPANY PHASE 1 HABITAT SURVEY MAP

Target Note	Description/ Comment
Birds seen/heard: Swallow, Carrion Crow, Robin, House Sparrow, Wood Pigeon and Blackbird.	
1	Arable field planted with a Maize crop at the time of survey.
2	Small area of predominantly semi-mature Sycamore trees with English Elm also present. Trees lack features suitable to support roosting bats and are considered of Negligible bat potential.
3	Regularly trimmed hedgerow along eastern boundary and adjacent to Swanbridge Road. Species present include Hawthorn, Sycamore, English Elm, Blackthorn, Ash, Hazel, Dog Rose and Honeysuckle. Field margin between hedgerow and crop c.1-2m wide and dominated by Common Couch, False Oat Grass, Cocks Foot, Field Bind Weed and Alexanders with Bramble scrub encroaching from hedgerow. 
4	Northern boundary hedgerow supporting species including Elder, Hawthorn, English Elm, Blackthorn, Hazel and Dog Rose. Hedgerow managed by regular trimming to a height of c.2m. Margin between crop and hedge generally non-existent or at most c.0.5m wide and dominated by Nettles, Bramble, False Oat-grass, Common Couch, Field Bindweed with occasional Hogweed and Garlic Mustard. 

5	Multi-stem Ash tree with areas of dead-wood/ limb scars although all appear exposed and no features appear to lead into a significant cavity suitable for use by roosting bats. Tree of Low potential to support roosting bat. 
6	Tall, unmanaged hedge along western site boundary. Species present include Hawthorn, Blackthorn, Hazel, Field Maple, English Elm and Dog Rose with Bramble and Nettles dominant in the hedgerow base. Narrow margin <2m wide between crop and hedgerow containing similar species to those described in Target Notes 3 & 4. 

7	Ash tree with completely hollow trunk. Interior could be viewed from hole in base and appeared largely smooth with no cavities or holes suitable for use by roosting bats observed. Moderate cover of Ivy present on exterior and overall tree considered of Low potential to support roosting bats. 

APPENDIX III 2013 BAT SURVEY RESULTS



Key:

CP	Common Pipistrelle
SP	Soprano Pipistrelle
MY	*Myotis sp.*
NOC	Noctule
SE	Serotine
LE	Leisler's
	Transect Route 1
	Transect Route 2
	Site Boundary

Plan indicates bat passes/ locations recorded, not number of individual bats.

client/project		drawing		
Taylor Wimpey **Land South of Cog Road, Sully**		Figure 7.2 Bat Survey Plan		
drawing no.	revision	scale	drawn	date
E1237002/001	*	NTS @ A3	AP	Jul 2013

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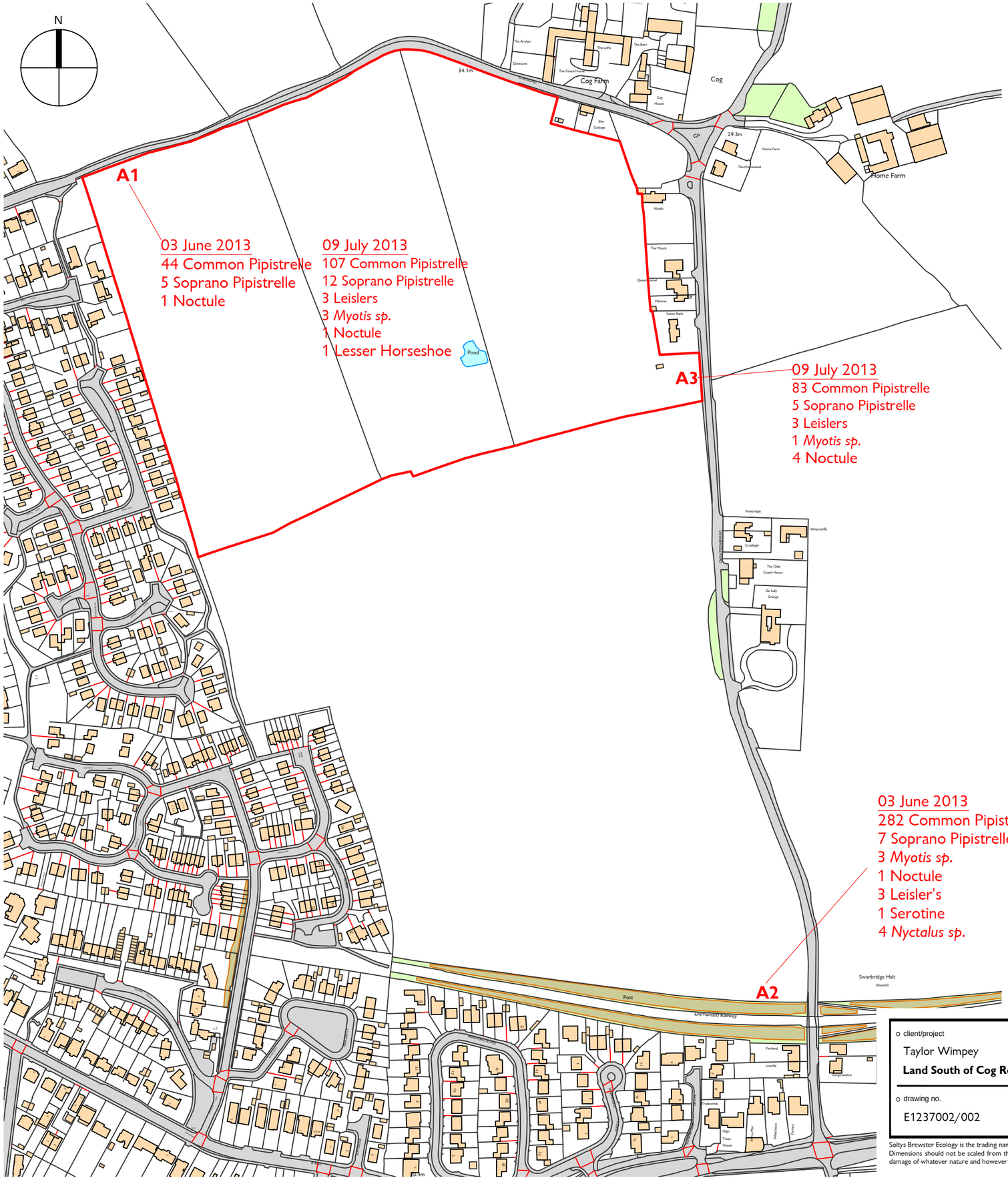

Key:

- A — Automated bat detector location
- Site boundary

Numbers indicate calls recorded/ bat passes, not number of individual bats.

client/project: Taylor Wimpey **Land South of Cog Road, Sully**		drawing: Figure 7.2 Automated Bat Detector Survey Results		
drawing no. E1237002/002	revision *	scale NTS @ A3	drawn AP	date Jul 2013

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APPENDIX IV ADVICE NOTE ON BATS AND LIGHTING (2014)

The following advice in relation to Bats and lighting provides a summary of the review of available evidence compiled by the Bats and Lighting Research Project at the University of Bristol. The full report should be reviewed for further information on any of the summary points identified below. The citation for the full report is:

> ***Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation guidance. Lighting Research Project, University of Bristol.***

Introduction

Urbanisation and development affect bat habitats, either through direct loss or disturbance from light and noise pollution or human activities. Changes in habitat affect the quantity, quality and connectivity of foraging, drinking and roosting resources available to bats. Linear landscape features such as hedgerows, river banks and canals are important for bats, often being used for foraging and commuting (Limpens & Kapteyn 1991; Verboom *et al.* 1999).

Bat habitats and roosts are under increasing pressure and disturbance from suburban development and its associated artificial lighting. Connectivity of habitat and foraging areas to roosts is fundamental to the survival of many bat populations (Verboom & Huitema 1997). Lighting schemes can damage bat foraging habitat directly through loss of land and spatial exclusion of bats due to high illuminance, or indirectly by severing commuting routes from roosts, through light spillage polluting hedgerows, tree lines and watercourses (Racey 2006). Lighting around roosts has also been shown to delay emergence, causing bats to miss the peak in insect prey abundance (Downs *et al.* 2003).

Legislation pertaining to lighting in Britain

There is no legal duty for a lighting authority to illuminate roads in Britain and lighting is installed because the perceived benefits outweigh the negatives. Recent research by The Highways Agency (in England) found that the safety benefits of motorway lighting were 1/3 lower than previously thought. Additional field trials to switch-off lights on motorways have found lower numbers of accidents when lights were off than when illuminated (http://www.highways.gov.uk/knowledge/30236.aspx). A number of authorities have been trialling part night lighting solutions and even complete removal. The results have been mixed but a significantly large number of projects have shown no detriment from implementation of these changes.

Street lighting (A roads, B roads, pedestrian lighting)

There are over 7.5million street lights in the UK (Anon. 2009). Common light types used for external applications in the UK.

Common types of street light used in the Britain.

	Colour	% UV	Correlated colour temperature (k)[2]	Approx % of UK Lighting stock
Low pressure sodium (LPS / SOX)	Yellow/orange	0.0	1807	44%
High pressure sodium (HPS / SON)	Pinkish / off white	0.3	2005-2108	41%
Compact fluorescent	Warm white	0.5-1.0	2766-5193	15%
Metal Halide (e.g. Philips CosmoPolis)	Blue-white	2.0-7.0	2720-4160 CosmoPolis 2720	N/A
Light emitting diode (LED)	White/warm - white	0.0	2800-7000	N/A

Predicting the impacts of lighting on bats

There are many aspects of ecological light pollution which are yet to be investigated, and so a precautionary approach is important. It is important to consider the following when predicting the impacts of lighting on bats:

i. Impacts may be cumulative
Lighting is one of many anthropogenic impacts on bats and so it is important to consider impacts of lighting in the context of the site and other conditions affecting the species or colony. For example even a small amount of lighting may have a disproportionate impact on bats at sites where there are already high levels of disturbance, therefore impacts must be assessed in the context of other disturbances on the colony/roost in question.

ii. Impacts will vary according to site, species and behaviour
The impacts of lighting on bats is species specific and varies according to the specific behaviour being affected. Impacts on a site by site basis can be based on knowledge of the species involved and the type of behaviour affected.

iii. Impacts may occur over different temporal scales
Some impacts may occur over very short time frames making them more obvious (e.g. spatial avoidance) and therefore more likely to be recorded. However, lighting may impact behaviours over longer time scales (e.g. reduced breeding success) and may be harder to record and therefore underestimated.

iv. Impacts may occur at both the individual or population level
Lighting may impact on a few individuals in a colony or population, i.e. causing temporary avoidance of a commuting route used by a small percentage of bats occupying a roost. However, there may be effects at the population level, e.g. reduced juvenile growth rates due to reduced foraging or delayed emergence caused by lighting (e.g. see Boldogh *et al.* 2007).

v. Impacts may be indirect occurring at the ecosystem or community level

[2] refers to the colour appearance of the light emitted by a light source and is measured in degrees Kelvin (K). The CCT of a light source is calculated by relating the colour of the lamp to the light colour of a reference source when heated to a particular temperature. CCT gives a general measure of the "coolness" or "warmth" of the light source: CCT ratings below 3200K are considered warm whereas ratings above 4000K are considered cool. CCT gives an indication of the general appearance of the light, but not its spectral power distribution, and so two lamps that appear the same may have different colour rendering properties.

Lighting can impact bats via changes at the ecosystem level. Lighting may lead to a competitive advantage for some species which benefit from the increased foraging opportunities provided by moths attracted to lights with high UV content. This may lead to competitive exclusion of those species unable to take advantage of new artificially illuminated areas (Arlettaz *et al.* 2000). Indirect effects include effects on bats' insect prey. Bats have a competitive advantage over moths at street lights (Svensson & Rydell 1998), which interferes with the relationship between predator and prey.

A summary of the key impacts per species according to behaviour types is provided in Table 5.1. These are based on current knowledge and may change as more evidence emerges, so are given as guidance only and specific levels of impact will vary on a site by site basis. Low impact does not mean there is no impact, but suggests that impact is likely to have a negligible impact on the population. Further research is required to have high confidence in many of these predictions and therefore they should be used as guidance only.

Table 5.1 Summary of predicted impacts of lighting according to bat behaviour.

Impact / Behaviour	High	Medium	Low
Maternity roost	All species	-	-
Night roost	*Rhinolophus hipposideros* *Rhinolophus ferrumequinum* *Myotis* spp. *Plecotus* spp.	*Pipistrellus* spp. *Nyctalus* spp. *Eptesicus serotinus* *Barbastella barbastellus*	-
Emergence	All species	-	-
Foraging	*Rhinolophus hipposideros* *Rhinolophus ferrumequinum* *Myotis* spp. *Plecotus* spp.	-	*Pipistrellus* spp. *Nyctalus* spp. *Eptesicus serotinus* *Barbastella barbastellus*
Commuting	*Rhinolophus hipposideros* *Rhinolophus ferrumequinum* *Myotis* spp. *Plecotus* spp.	-	*Pipistrellus* spp. *Nyctalus* spp. *Eptesicus serotinus* *Barbastella barbastellus*
Swarming	All species	-	-
Hibernation	All species	-	-

Key messages and recommendations:

Emergence and roosting

- Current evidence demonstrates that external light disturbance at emergence and return will have negative impacts for bats (especially *Rhinolophus*, *Myotis*, and *Plecotus* spp.) and should be avoided.
- Internal illumination of roosts is likely to impact negatively on long-term population growth and survival and should be avoided for all species.
- Direct illumination of a roost exit/entrance may cause roost abandonment for all species (particularly for *Rhinolophus* and *Myotis* spp.) and should be avoided.

Commuting

- Light disturbance along commuting routes will cause avoidance behaviour for *R. hipposideros* and *Myotis* spp. and should be avoided.

Foraging

- Light disturbance can reduce the availability of foraging areas for some species.
- A precautionary approach must be taken and illumination of foraging areas avoided, particularly for light sensitive species.

Hibernation

- There is limited evidence of the impact of lighting on hibernating bats. However illumination of hibernation sites should be avoided during the hibernation period.

Swarming

- There is a lack of evidence regarding the impact of lighting on bat swarming behaviour and so illumination of known or potential swarming sites should be avoided under the precautionary principle.

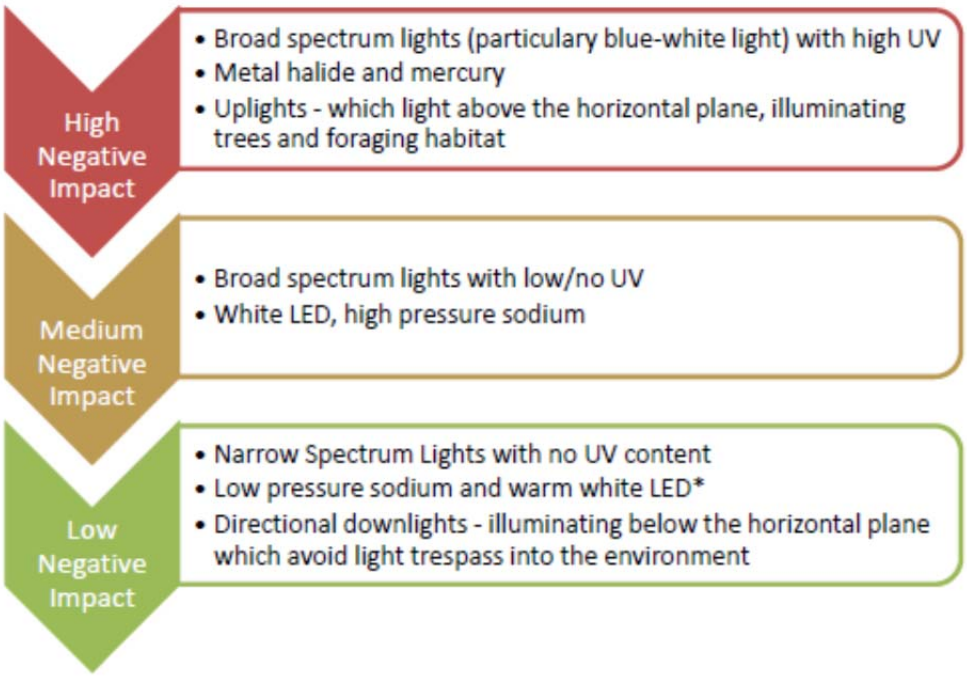
Summary of impacts of light types on bats

Light technology is rapidly developing and new light types are being installed and trialled across the UK. There is a general trend towards white light due to the increased colour rendering and increased perceived brightness for the human eye. Humans perceive white light as brighter than yellow light and so lower light intensities can be used to achieve the same perceived brightness. Commonly used emerging lamps include white LED (Philips Stela and DW Windsor Monaro), warm-white LED, and ceramic metal halide (e.g. Philips 5. CosmoPolis). Some companies are testing new light types to find a wildlife friendly lamp which has little or no impact on wildlife e.g. QL Philips Clearsky lamps which are said to prevent migrating birds from colliding with offshore platforms. To date no such product has been rigorously tested on bats. However, there is little evidence of the comparative impacts of different light types on different bat species and behaviours.

The figures overleaf provides a general summary of the **relative** impacts of light types on bats. However, there is a lack of evidence regarding the comparative impacts of different light types on bats and these summaries should be considered general rules of thumb until more detailed information is available.

Summary of the current evidence of the relative impacts of different light types on bats

Light type	Species	Impact	Evidence
White LED	*Rhinolophus hipposideros* and *Myotis* spp.	Reduced activity and spatial avoidance of commuting routes	Stone *et al.*, 2012
Warm white LED	Unknown at present	Unknown - though likely to have less impact on light sensitive species than white light types	
Low pressure sodium	*Nyctalus noctula*	Increased activity and foraging	Rydell & Baagoe 1996
	Pipistrellus spp.	No significant increase in activity compared to dark areas	Blake *et al.*, 1994
High pressure sodium	*Rhinolophus hipposideros and Myotis* spp.	Reduced activity and spatial avoidance of commuting routes; delayed commuting time	Stone *et al.*, 2009; 2011
	Pipistrellus spp., *Nyctalus noctula, Eptesicus serotinus*	Increased activity and foraging	Rydell & Baagoe 1996
Compact fluorescent	Unknown at present	Unknown - though likely to have a similar impact on light sensitive species as other white light types	
Mercury vapor lamps	*P. pipistrellus and Pipistrellus* spp. *Eptesicus* spp.	Increased activity (Rydell (1991) recorded increased activity of *Eptescius nilssoni* (a species not present in the UK) at mercury vapor lamps in Sweden in spring April – May)	Haffner & Stutz 1985; Blake *et al.* 1994, Rydell & Racey 1995.

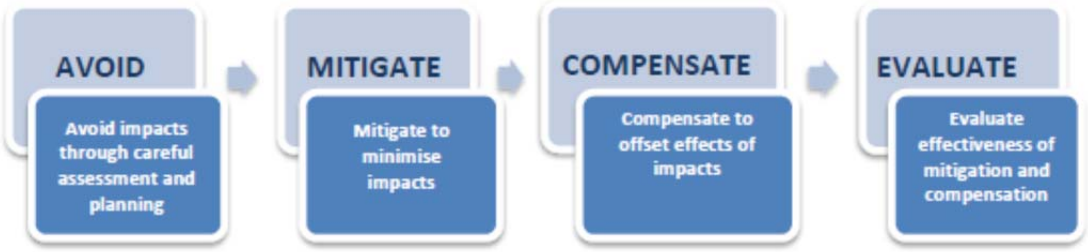


Approach to mitigation of artificial lighting

When mitigating the impacts of artificial lighting on bats it is important to ask the following key questions:

1. Do we need to light?
2. Where does the light need to be?
3. What is the light required for?
4. How much light is actually needed to perform the tasks required ?
5. When is the light required?

The following approach should be taken when developing a mitigation strategy:



Mitigation Strategies
Mitigation strategies will vary on a site by site basis according to the required level of lighting, use of the area, the surrounding habitat, the species of bat and specific behaviour affected.

No light
Where possible the ideal scenario would be to have no light at all at locations used by bats. This may be possible with good planning and involvement of lighting engineers at the survey and pre-planning stage. This may involve switching off existing units on site and ensuring areas used by bats have no new light units installed and will have no light trespass from nearby lights. If possible sites should contain light exclusion zones (dark areas) which are interconnected to allow bats to move freely from their roosts along commuting routes to their foraging grounds without being subject to artificial illumination.

Variable lighting regimes (VLR)
In many cases it is not feasible to have light exclusion zones in all in the areas occupied by bats at a site. In such cases new generation lighting controlled by CMS systems may be preferable to enable variable lighting regimes (VLR) to suit both human and wildlife use of the site. VLR involve switching off or dimming lights for periods of the night. Many county councils are adopting VLR using CMS controlled units, switching off/dimming lights when human activity is low (e.g. 12.30 – 5.30am). This technology could also be used to create a lighting regime that switches off lights during periods of high bat activity, such as commuting or emergence. Lights can also be dimmed (e.g. to 30% power) for periods of the night to reduce illumination and spill. The exact regime of lighting at a site will depend on the nature of public use and type and amount of bat activity, and will therefore vary between sites.

Habitat creation

- **Light barriers**: vegetation can be planted (e.g. hedgerows or trees) to reduce light spill so acts as a light barrier. Careful consideration should be given to the minimum size of the habitat required to restrict any light trespass when used as a light barrier. The size and depth of the corridor will vary according to the distance from the light source, light intensity, light spread and light type.

- **Dark corridors**: dark corridors can be created to encourage/guide bats away from lit areas or around lit obstacles (such as roads). Corridors should be placed with consideration for the use of the landscape as a whole in relation to key commuting routes, linking foraging sites and roosts. Corridors can be composed of man-made or natural materials (e.g. fences, brick walls, tree lines or hedges). Corridors with outgrown vegetation are preferable as they create dark fly ways sheltered from predators and the elements. Heavily clipped low hedges or tree-lines are less suitable. To increase their effectiveness dark corridors should be:

i. Well-connected within the bat landscape – linking to existing flight paths, roosts or foraging areas;
ii. Outgrown with mature vegetation providing shelter for bats from the weather and predators as they fly;
iii. Planted with native species to encourage insect populations, thereby allowing bats to forage along the corridors;
iv. Located away from roads to avoid traffic noise which will reduce the foraging efficiency of passive listening bats (Schaub 2008); and
v. Monitored/maintained long-term to ensure they remain functional, e.g. have not been removed or altered in a way that will reduce effectiveness.

Spacing and height of units

Increasing the spacing between light units can reduce the intensity and spread of the light to minimise the area illuminated and give bats an opportunity to fly in relatively dark areas between lights. Reducing the height of light units will keep the light as close to the ground as possible, reducing the volume of illuminated space. This will also give bats a chance to fly over the light units in the dark area above the light (as long as the light does not spill above the vertical plane). There are many low level lighting options for pedestrian and cycle path lighting which minimise spill and reduce overall illumination including: low level illuminated bollards, down-lights, handrail lighting or footpath lighting.

Reducing intensity

Reducing light intensity will reduce the overall amount and spread of illumination. For some bat and insect species this may be sufficient to minimise disturbance or the magnitude of any negative impacts. However, some species may require very low light levels to have little/no impact on bat behaviour. Stone *et al*., (2012) found that levels as low as 3.6lux caused spatial avoidance of a preferred commuting route by *Rhinolophus hipposideros.* Average light levels recorded along preferred commuting routes of *Rhinolophus hipposideros* under natural unlit conditions were 0.04 lux across eight sites (Stone 2011). When mitigating the impacts of lighting for such species very low lux levels may not be suitable for human needs. In such cases reducing intensity may not be an option and alternative strategies may be preferable (e.g. dark corridors or light barriers). A "light threshold" below which there is little impact on bats may not exist for some species which may be light averse regardless of intensity (e.g. possibly *Rhinolophus hipposideros*). Light intensity can be reduced by:

- *Dimming*: CMS technology can be used to reduce the power of lights on request (e.g. by 80%) and can be used as part of a VLR for periods of high bat activity;
- *Changing the light source:* new technologies such as ceramic metal halide (e.g. Philips CosmoPolis, 45 watts) often have a lower wattage compared to old lamp types (e.g. HPS, 75 watts), and can be used to reduce light intensity. However, there is a trade-off between reduced intensity and the pattern of light distribution. Some older light types such as HPS, produce a heterogeneous light environment whereby light intensity declines steeply away from the light source. However some new technologies such as LEDs produce a uniform light distribution resulting in a loss of dark refuges between the lamps (Gaston *et al.* 2012). In such cases it may be preferable to increase the spacing between the units to create dark refuges. In addition when changing the light source it is important to consider the effects of the spectral content of the light; or
- *Creating light barriers:* light intensity can be reduced at a particular site by creating a light barrier which restricts the amount of light reaching the sensitive area. Barriers can be in the form of newly planted vegetation walls, fences or buildings.

Changing the light type

When selecting a light type it is important to consider the colour appearance and rendering of the lamps in relation to human and bat vision. Different light types are likely to have different effects on bats, and these effects will be species and behaviour specific. Choosing the light type (colour/spectral distribution) will inevitably be a compromise between

the environmental and public requirements. Currently there is a lack of evidence of the comparative impacts of light types on bats. However, the following key principles can reduce potential negative impacts on bats and wildlife in general:

- *Avoid blue-white short wavelength lights*: these have a significant negative impact on the insect prey of bats. Use alternatives such as warm-white (long wavelength) lights as this will reduce the impact on insects and therefore bats
- *Avoid lights with high UV content:* (e.g. metal halide or mercury light sources), or reduce/completely remove the UV content of the light. UV has a high attractiveness to insects leading to direct insect mortality at street lights thereby reducing the availability of insect prey (Bruce-White & Shardlow 2011). Use UV filters or glass housings on lamps which filter out a lot of the UV content.

Reducing spill

Lighting should be directed only where it is needed to avoid trespass (spilling of light beyond the boundary of area being lit). Attention should be paid to avoid the upward spread of light near to and above the horizontal plane to minimise trespass and sky glow. Trespass can be minimised either prior to installation with careful lighting design and selection of appropriate lamp units, or post installation using a range of lamp modifications to restrict and direct light.

Prior to installation:

- Ensure a low beam angle of the lights (ideally less than 70° above the horizontal) (ILP, 2011)
- Install full horizontal cut off units (with no light more than 90° above the horizontal)
- Avoid the use of upward light (e.g. ground recessed luminaires or ground mounted floodlights up-lighting trees, buildings and vegetation)
- For security lighting use 'variable aim' luminaries which allow you to change the beam angle by moving the lamp
- LED lamps allow for directional lighting as individual/groups of LED bulbs can be switched off to direct light to specific angles and most luminaires are full cut off

Post installation:

- Install directional accessories on existing light units to direct light away from sensitive areas and minimise spill (e.g. baffles, hoods and louvres)
- Where possible change the angle of the lamp housing to reduce the angle of the beam below 70°

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