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Bat Scoping, Preliminary Ecological Appraisal and Phase 1 Habitat Assessment

Land South of Nyton Road, Westergate

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Report Commissioned by: Planning Solutions

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Report Summary

1. The Ecology Co-op has been commissioned by Planning Solutions to undertake a Phase 1 Habitat survey, Preliminary Ecological Appraisal and Bat Scoping Assessment at Land south of Nyton Road, Westergate. A site walkover survey visit was carried out on the 14th September 2017, to evaluate the site for habitats potentially suitable to support EU and UK protected species. The purpose of this report is to record the findings of the survey and identify potential ecological constraints to a proposed residential development. This survey was undertaken by Paul Whitby MCIEEM and Briony Hill GradCIEEM.
2. The site is located west of Westergate a village situated east of Chichester, West Sussex. The size of the area surveyed is approximately 0.9 hectares in area and includes Byfields and Nightingale Cottage and their associated garden spaces and outbuildings and a southern parcel of land. The following habitats are present; broadleaved woodland, ruderal, poor semi-improved grassland, amenity grassland, dense and scattered scrub and mixed parkland scattered trees with species poor hedgerows and hedgerows with trees, brick walls and fences along the sites boundaries and through the site.
3. Due to the site supporting reptile habitat and ponds within 500 meters of the sites boundaries, further surveys have been recommended for these species. Bat surveys in the form of climbed assessment of trees and activity surveys are recommended given the suitable habitats present for bats. Given evidence of commuting badgers mitigation is advised along with a repeat site visit 8 weeks prior to construction. Mitigation is also advised for hedgehogs and stag beetles.
4. If the residential properties, Nightingale Cottage or Byfields or small barn are to be demolished bat emergence surveys will be necessary given that they have the potential to support roosting bats. Section 4.1.2 details the necessary surveys.
5. Approximately half of the site is composed of broadleaved semi-natural woodland a priority habitat. The extent to be lost is currently unknown with no proposed plans drawn up at the time of writing this report. It is recommended that this habitat is retained given its moderate-high ecological value.
6. A 'Mitigation Statement' should be produced once all the recommended phase 2 surveys have been completed. This will outline suitable enhancement measures such as woodland enhancement, tree planting, hedgerow enhancement and the instillation of bird and bat boxes to benefit wildlife at the site.

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

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

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



CONTENTS PAGE

1 INTRODUCTION	5
1.1 Purpose of the Report	5
1.2 Background	5
1.3 Legal Protection of Protected Species	7
2 METHODOLOGY	7
2.1 Phase 1 Habitat Survey	7
2.2 Preliminary Ecological Appraisal	7
2.2.1 Badgers	7
2.2.2 Bats	7
2.2.3 Breeding Bird Habitat	8
2.2.4 Dormice	8
2.2.5 Great Crested Newts	8
2.2.6 Reptiles	9
2.2.7 Riparian Mammals	9
2.2.8 Other notable species	9
2.3 Desk Study	9
3 RESULTS	9
3.1 Phase 1 Habitat Survey/site Context	9
3.2 Preliminary Ecological Appraisal	18
3.2.1 Badgers	18
3.2.2 Bats	19
3.2.3 Breeding Birds	27
3.2.4 Dormice	28
3.2.5 Great Crested Newts	28
3.2.6 Reptiles	29
3.2.7 Riparian Mammals	30
3.2.8 Other notable species	30
3.2.9 Designated Sites and Wider Ecological Impact Significance	30
3.3 Constraints/Limitations	30
4 DISCUSSION AND RECOMMENDATIONS	31
4.1 Preliminary Ecological Appraisal	31
4.1.1 Badgers	31
4.1.2 Bats	31
4.1.3 Breeding Birds	32
4.1.4 Dormice	33
4.1.5 Great Crested Newts	33
4.1.6 Reptiles	34
4.1.7 Riparian Mammals	34
4.1.8 Other Notable Species	34
4.2 Development Impact Assessment	35



5	APPENDIX 1 – LEGISLATION AND POLICY.....	36
6	APPENDIX 2 - ARTIFICAL LIGHTING AND WILDLIFE	38



1 INTRODUCTION

1.1 Purpose of the Report

This report gives details of a combined preliminary ecological appraisal and Phase 1 Habitat Survey for the potential presence or likely absence of protected species and or valuable habitats to be found on Land to the rear of Byfields, Nyton Lane, Westergate. The grid reference for the site centre is SU 93695 05551.

Where necessary, appropriate mitigation measures to protect wildlife as well as compensate for any potential harm to habitats of value that could take place are outlined.

This survey assessment was carried out by Paul Whitby, a full member of the Chartered Institute for Ecology and Environmental Management (CIEEM), Chartered Ecologist (CEcol) and and licensed bat surveyor (Natural England bat licence no: 2015-15959-CLS-CLS) and was assisted by Briony Hill GradCIEEM.

This survey and report was carried out and produced at the request of Planning Solutions.

1.2 Background

The Ecology Co-operation was commissioned to assess the current ecological value of Land to the rear of Byfields which is situated just south of Nyton Lane west of Westergate a village located east of Chichester, West Sussex (see figure 1 and 2). The size of the area surveyed is approximately 0.9 hectares in area and supports habitats including residential buildings, broadleaved woodland, ruderal habitat, poor semi improved grassland, amenity grassland, dense scrub, scattered scrub, mixed parkland scattered trees with species poor hedgerows and hedgerows with trees, brick walls and fences along the sites boundaries and through the site.

The assessment was carried out further to a proposal for a residential development upon this land which is expected to include the demolition of Byfields and Nightingale cottage and associated outbuildings.



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

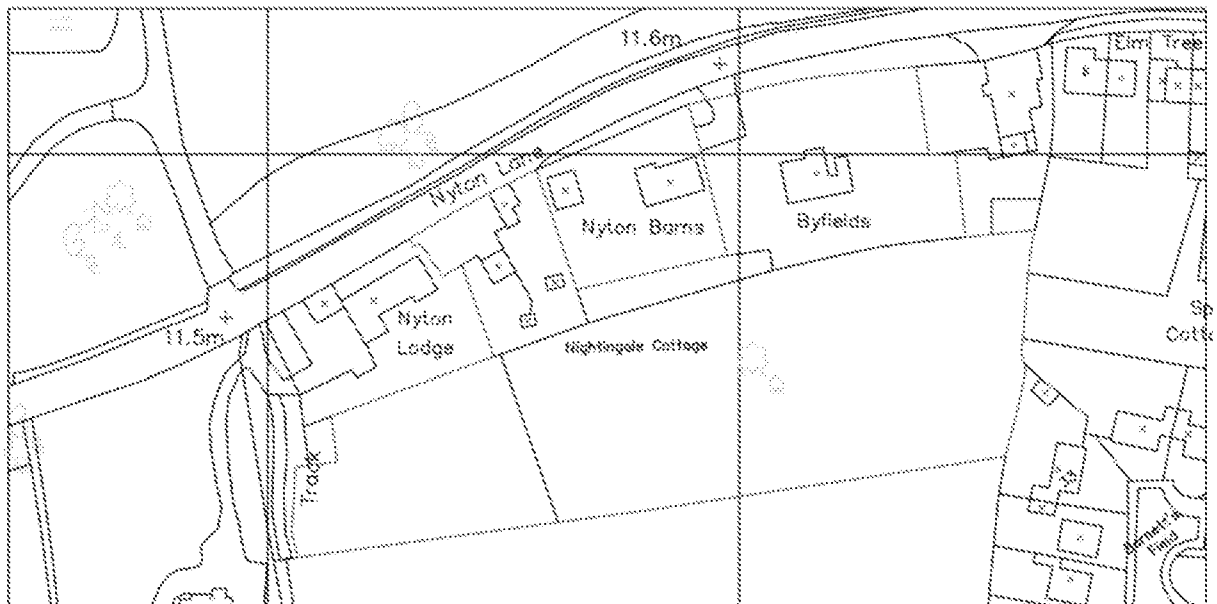


Figure 2. Existing site plan with the site boundary shown in red.



1.3 Legal Protection of Protected Species

Legal protection applying to relevant bird, mammal, herpetofauna and invertebrate species and current nature conservation planning policy is outlined in Appendix 1 of this report.

2 METHODOLOGY

2.1 Phase 1 Habitat Survey

A phase 1 habitat survey¹ presents a standardised system for classifying and mapping wildlife habitats in all parts of Great Britain, including urban areas. The aim of the Phase 1 survey is to provide, relatively rapidly, a record of the vegetation and wildlife habitats present over large areas of countryside. The habitat classification is based principally on vegetation, augmented by reference to topographic and substrate features, particularly where vegetation is not the dominant component of the habitat.

Data is gathered through a site walk-over survey and use of on-line aerial photography to broadly categorise the habitats present using the JNCC Phase 1 classifications. The results are presented as a map showing the distribution of habitat categories across the site. Target notes are used to describe particular features of biodiversity interest and record indicator species where appropriate. In addition to this, notable habitats, such as local and national Biodiversity Action Plan habitats are highlighted.

The Phase 1 Survey methodology is a recognised tool for initial scoping of potential ecological constraints and identifying potential impacts as part of the planning application process.

2.2 Preliminary Ecological Appraisal

In accordance with the Guidelines for Preliminary Ecological Appraisal², habitats and features at the site were also evaluated for their potential to support legally protected species and habitats during the Phase 1 walkover survey. In addition, observations of any important plant communities, bird assemblages or other potentially valuable ecological features are recorded.

Details of initial survey methods for each species are given below.

2.2.1 Badgers

Habitats within the site and surrounding areas were broadly assessed for their potential to support badgers. Any signs of badger activity, for example setts, footprints, latrines, well-worn paths, foraging marks in the survey area were recorded. The survey methodology followed that of Harris et al (1989).³

2.2.2 Bats

Bats can use a wide range of features including loft spaces, cavity walls, loose tiles, mortice joints and cracks/gaps in a variety of built structures. They can also be found in trees with holes, splits, cracks,

¹ JNCC (2010) *Handbook for Phase 1 habitat survey: A technique for environmental audit*. Joint Nature Conservation Committee, Peterborough.

² CIEEM (2013) *Guidelines for Preliminary Ecological Appraisal*

³ Harris, S, Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society.



cavities, ivy and loose bark.

Trees were broadly assessed for their potential to support roosting bats and further surveys are recommended as appropriate.

A detailed bat scoping assessment was undertaken on the residential property and garage looking for any evidence indicating the presence of bats using buildings, such as rub marks, staining or droppings inside or outside any potential roost sites. If any definite signs of bats or other evidence had been found (such as actual sightings, droppings, urine stains, odour, scratch marks, grease stains and feeding remains), they would have been recorded.

The potential for roosting bats for each feature, or group of features was assessed as either negligible, low, moderate or high, in accordance with best practice (Collins, J.(ed.) (2016). Any evidence confirming the presence of bats that was found was clearly recorded including photos and samples where appropriate.

This assessment was undertaken on the 4th of August 2017 by Paul Whitby, MCIEEM, CEcol (Natural England license holder: WML A34 - Bat Survey Level 2) and assisted by Briony Hill GradCIEEM following best practice survey techniques as outlined by the Bat Conservation Trust (BCT).

2.2.3 Breeding Bird Habitat

The habitats contained within the site and adjacent areas were broadly assessed for their potential to support important bird species/assemblages, and breeding birds. . Any birds identified during the site visit were recorded. Particular attention was paid to notable species such as red-listed Birds of Conservation Concern⁴ and those species afforded special protection on Schedule 1 of the Wildlife and Countryside Act (1981).

2.2.4 Dormice

The site was broadly assessed for its potential to support hazel dormouse. This included use of on-line mapping resources to assess the surrounding area for connectivity to large blocks of woodland, scrub and extensive hedgerow networks. Further surveys are recommended as appropriate in accordance with best practice guidance⁵

2.2.5 Great Crested Newts

A desk study was undertaken to identify ponds within 500m of the site. Where access permission was granted, all ponds were assessed for their potential to support great crested newts using the Habitat Suitability Index (H.S.I.)⁶ in accordance with best practice guidance⁷. Further surveys are recommended

⁴ Eaton, M., Aebischer, N., Brown, A., Hearn, R., Lock, Leigh., Musgrove, A., Noble, D., Stroud, D., Gregory, R. (2015) *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds 108, pp 708-746.

⁵ Bright, P., Morris, P. and Mitchell-Jones, T. (2006) *The dormouse conservation handbook 2nd Ed*. English Nature, Peterborough.

⁶ Oldham, R.S., Keeble, J., Swan, M.J.S. and Jeffcote, M. (2000) Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). *Herpetological Journal* 10, 143-155.

⁷ English Nature (2001) *Great Crested Newt Mitigation Guidelines*. English Nature, Peterborough.



as appropriate and limitations to this survey are clearly set out in Section 3.11.

2.2.6 Reptiles

Habitats on the site were broadly assessed for their potential to support reptiles. Particular attention paid to those features that provide suitable basking areas (e.g. south-facing slopes), hibernation sites (e.g. banks, walls, piles of rotting vegetation) and opportunities for foraging (rough grassland and scrub). The common lizard (*Zootoca vivipara*), slow-worm (*Anguis fragilis*) grass snake (*Natrix natrix*) and adder (*Vipera berus*) are widespread and smooth snake (*Coronella austriaca*) and sand lizard (*Lacerta agilis*) have more restricted and isolated populations.

2.2.7 Riparian Mammals

Any watercourses identified during the desk study or field survey were assessed for their suitability to support otter, water vole and American mink.

2.2.8 Other notable species

The site habitats were broadly assessed for their potential to support species of principle importance for nature conservation (Section 41 NERC Act 2006) and other notable species. This includes mammals such as harvest mouse, hedgehog, brown hare and several bird species. The site was broadly assessed for its potential to support important invertebrate assemblages with particular attention paid to features such as standing dead-wood, wet flushes, bare earth banks and botanically rich areas.

2.3 Desk Study

A search for existing records of protected species, species of conservation concern and invasive non-native species was requested from the Sussex Biodiversity Records Centre (SxBRC) within a radius of 2km of the site.

A search of on-line mapping resources was undertaken to identify the location of any features of potential ecological interest including ponds within 500m (great crested newts), watercourses (riparian mammals, crayfish) and connectivity to woodland, scrub and hedgerow networks (dormice and bats).

The MAGIC website resource (www.magic.gov.uk) was used to identify the location of designated sites for nature conservation and EPS licences granted in relation to the survey site.

3 RESULTS

3.1 Phase 1 Habitat Survey/site Context

This site includes the Byfields property, Nightingale Cottage and their associated garden spaces and outbuildings and a parcel of land to the south of these properties. The following habitats are present; broadleaved woodland, ruderal habitat, poor semi-improved grassland, amenity grassland, dense scrub, scattered scrub, outbuildings and mixed parkland scattered trees with species poor hedgerows and hedgerows with trees, brick walls and fences along the sites boundaries and through the site.



Table 1. The habitats mapped at Land rear of Byfields, Nyton Road, Westergate.

Habitat type	JNCC Code	Area(Ha)/ Length (meters)	Target note including general species composition
Poor Semi-improved grassland	B6	0.07 Ha	This grassland sward is composed of cocksfoot (<i>Dactylis glomerata</i>), Yorkshire fog (<i>Holcus lanatus</i>), creeping bent (<i>Agrostis stolonifera</i>), with common hogweed (<i>Heracleum sphondylium</i>) occasional across this habitat. The structure is dense and tussocky (see figure 5).
Other tall herb and fern - ruderal	C3.1	0.19Ha	This habitat is present in three areas across the site. The western proportion of the site and has been described as ruderal given the dominant presence of ruderal species (see figure 6). The following plants were abundant and frequent; creeping thistle (<i>Cirsium arvense</i>), common nettle (<i>Urtica dioica</i>), cock's foot, common hogweed, broad-leaved dock (<i>Rumex obtusifolius</i>), sorrel sp. (<i>Rumex sp.</i>). Additional species present included; field bindweed (<i>Convolvulus arvensis</i>), hedge woundwort (<i>Stachys sylvatica</i>), dove's-foot crane's-bill (<i>Geranium molle</i>), white dead nettle (<i>Lamium album</i>), willow herb sp. (<i>Epilobium sp.</i>), ground ivy (<i>Glechoma hederacea</i>), Yorkshire fog, creeping buttercup (<i>Ranunculus repens</i>) and a small amount of bramble (<i>Rubus fruticosus</i>). At the south-eastern corner this habitat is comprised of common nettle, common hogweed, cocksfoot and some bramble (see figure 7). The area to the south has also be mapped as ruderal habitat which is dominated by nettle, with some bramble also present and non-native Virginia creeper (<i>Parthenocissus quinquefolia</i>). However hazel, elder, damson (<i>Prunus sp.</i>), alder (<i>Alnus glutinosa</i>) and silver birch (<i>Betula pendula</i>) are also present.
Broadleaved woodland – semi natural	A1.1.1	0.39Ha	This woodland habitat is dominated by sycamore (<i>Acer pseudoplatanus</i>) with elder (<i>Sambucus nigra</i>), hawthorn (<i>Crataegus monogyna</i>) and ash (<i>Fraxinus excelsior</i>) occasional and holly (<i>Ilex aquifolium</i>), apple sp. (<i>Malus sp.</i>) and goat willow (<i>Salix caprea</i>) rare. A number of the trees have dense ivy growth on their trunks. Across the eastern section of the woodland there is little understory and the ground is bare in areas. The following species were present common hogweed, common nettle,



			cow parsley (<i>Anthriscus sylvestris</i>), dandelion (<i>Taraxacum officinale</i>), creeping bent, broad-leaved dock and some ivy (see figure 8). The western section of the woodland has a denser understory with non-fruiting hazel (<i>Corylus avellana</i>), bay laurel (<i>Laurus nobilis</i>), gooseberry (<i>Ribes uva-crispa</i>), butchers broom (<i>Ruscus aculeatus</i>) and sapling sycamore and elder (see figure 9). There are areas of scattered bramble scrub which is dense along the southern boundary, nettle dominated ruderal habitat particularly to the north and ivy present across the ground. Much dead wood habitat is present.
Scrub dense/continuous	A2.1	0.02Ha	Dense bramble scrub is present at part of the eastern boundary of the site. Ivy, elder, bay laurel and sapling sycamore are also present.
Cultivated/disturbed land – amenity grassland	J1.2	0.17Ha	Amenity grassland makes up the majority of the garden spaces of Byfields and Nightingale cottage. At Nightingale Cottage this is comprised of the following species; Yorkshire fog, annual meadow grass (<i>Poa annua</i>), perennial rye grass (<i>Lolium perenne</i>), cocksfoot, creeping buttercup, ground ivy, greater plantain (<i>Plantago major</i>), daisy (<i>Bellis perennis</i>), dandelion, white clover (<i>Trifolium repens</i>) and broad-leaved dock (see figure 10). The amenity grassland within the garden space of Byfields is more diverse supporting Yorkshire fog, perennial rye, red fescue (<i>Festuca rubra</i>), white clover, red clover (<i>Trifolium pratense</i>), self-heal (<i>Prunella vulgaris</i>), creeping buttercup, dandelion, daisy, broad-leaved dock, cow parsley, ground ivy, germander speedwell (<i>Veronica chamaedrys</i>), common cat's ear (<i>Hypochaeris radicata</i>), oxeye daisy (<i>Leucanthemum vulgare</i>), yarrow (<i>Achillea millefolium</i>) and bittercress sp. (<i>Cardamine sp.</i>) (see figure 11). A small amount of nettle dominated ruderal habitat is present along the eastern boundary.
Buildings	J3.6	0.03Ha	This includes Nightingale Cottage and its associated outbuildings, which includes a small barn and two sheds, Byfields - a building supporting two residential properties - and a small wooden shed within the woodland. These are described in more detail in section 3.2.2.
Bare ground	J4	0.07Ha	A gravel hard standing area is present within the garden space of Nightingale Cottage. There is minimal vegetation



			growth in this area with dandelion, red and white clover, greater plantain and knotgrass (<i>Polygonum aviculare</i>). Shingle hard standing covers the parking area at Byfields.
Mixed Parkland/Scattered Trees	A3.3	16 m	Along the north boundary of the garden space of Byfields is a line of 2 mature scots pine trees (<i>Pinus sylvestris</i>) and sycamore trees. Within the garden space are scattered shrubs including holly, hazel and lilac (<i>Syringa sp.</i>).
Intact hedge species-poor	J2.1.2	22m	A hedge of variegated garden privet (<i>Ligustrum ovalifolium</i>) is present along the eastern boundary of the Byfields garden space.
Scrub scattered	A2.2	63m	A 'hedge' of dense scrub is located along part of the sites southern boundary.
Hedge with trees species-poor	J2.3.2	180m	A hedgerow, which is thin in sections, dominated by trees is located along the sites southern boundary. Sycamore is abundant, hawthorn frequent and holly, elder, ivy and brambles are occasional. The sycamore trees have grown out and overhang into the site. This habitat is located between Nightingale cottage and the southern parcel of land (See figure 12). Sycamore is abundant while false acacia (<i>Robinia pseudoacacia</i>), cypress (<i>Cupressus sp.</i>), bamboo (<i>Bambusoideae sp.</i>), apple and a single hazel is also present. It is defunct in places.
Brick wall	J2.5		Brick walls are present along the north and eastern boundaries of Byfields and the northern boundary of Nightingale.
Fence	J2.4		Wooden fences are present across the site.



Figure 3. Phase 1 map of the site at land South of Nyton Road, Westergate.



Polygons		Lines	
	A1.1.1 Broadleaved woodland - semi-natural		A2.2 Scrub - scattered
	A2.1 Scrub - dense/continuous		A3.1 Broadleaved Parkland/ scattered trees
	B6 Poor semi-improved grassland		A3.3 Mixed Parkland/ scattered trees
	C3.1 Other tall herb and fern - ruderal		J2.1.2 Intact hedge - species-poor
	J1.2 Cultivated/disturbed land - amenity grassland		J2.3.2 Hedge with trees - species-poor
	J3.6 Buildings		J2.4 Fence
	J4 Bare ground		J2.5 Wall
	J5 Other habitat		

Figure 4. Key for Phase 1 habitat map for Land South of Nyton Road, Westergate.



Figure 5. The poor semi-improved grassland upon the site.



Figure 6. A patch of ruderal habitat across the western section of the site.



Figure 7. Ruderal habitat at the south eastern corner of the site.



Figure 8. Western part of the broadleaved woodland with limited understory.



Figure 9. Eastern section of the woodland with a denser understory.

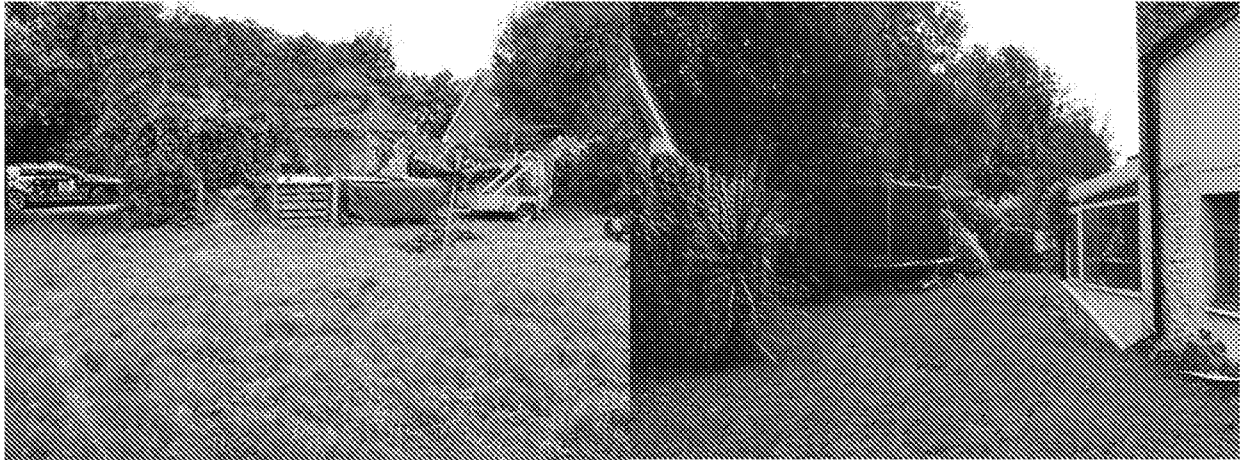


Figure 10. Garden space at Nightingale Cottage mostly comprised of amenity grassland.



Figure 11. The garden space at Byfields mostly comprised of amenity grassland.



Figure 12. The species poor hedgerows dominated by trees on the boundaries of the site.

3.2 Preliminary Ecological Appraisal

3.2.1 Badgers

A mammal run was identified across the eastern section of the woodland (see figure 13). Two badger hairs were identified on a barbed wire fence which is located through the woodland habitat. This indicates that badgers commute across the site. No mammal burrows were identified within the sites boundaries.

Records of badgers are not provided by the records center, due to the sensitive nature of this information.



Figure 13. Mammal runs within the eastern section of the broadleaved woodland.



3.2.2 Bats

Bat Scoping Assessment

The site is located in a rural setting with adjacent properties at low density. The wider landscape is dominated by arable fields with negligible value for foraging bats however these support hedged boundaries. There is also some pasture and nearby small woodland with woodland located within the sites boundaries. These hedgerows and woodland habitat of value for foraging and commuting bats. There is connectivity to these habitats which would allow bats to commute from roosting sites to foraging areas.

Byfields

This is a residential building, more than 30 years old, which supports two dwellings. It has brick walls and a hipped roof with concrete factory formed tiles (see figure 14). Four dormer windows are present on the western section of the building with one on the southern face and three on the northern face (see figure 15). The roof tiles are in good conditions and are tight fitting across the building except for a small number of lifted tiles around the chimney on the southern face (see figure 16). All the ridge and hip tiles are tightly pugged within no visible gaps despite weathering of the pugging in places. The vented plastic soffits are tight fitting with no suitable crevices present that might provide access for roosting bats (see figure 17). The lead flashing around the brick chimney is tight fitting with no visible gaps identified. Rough sawn timber cladding is present on the four dormer windows, on the gable ends of the building and on the eastern elevation of the garage (see figure 18). There are gaps between these wooden boards in all locations providing suitable roosting habitat for crevice dwelling bats. No evidence of bats was identified during the external assessment, however recent rain may have removed evidence such as droppings.

The western residential section of this building does not support a roof void. The void in the eastern residential section of Byfields could not be accessed at the time of the site visit.

A wooden shed is present within the garden space of Byfields. It has wooden shiplap walls which is tight fitting with no gaps present to support bats. The roof is composed of corrugated metal which, due to its thermoregulatory properties, rarely supports bats and there is no internal roof lining (see figure 19). Internally the building is brightly lit by windows leading to it being unsuitable for void dwelling species such as *Plecotus sp.*



Figure 14. Southern face of Byfields



Figure 15. The western section of the northern face of Byfields with three Dormer windows.



Figure 16. A small number of lifted roof tiles around the chimney on the southern face



Figure 17. The vented plastic soffits are tight fitting with no suitable roosting crevices present.



Figure 18. Rough sawn timber cladding on the western gable and on the north face of garage.



Figure 19. The wooden shiplap shed with a corrugated metal roof.

Nightingale Cottage

This residential cottage is understood to be more than 300 years old and has flint and brick walls with a gable roof with a bitumen lined single story extension on the southern elevation which has a bitumen lining on the western face (see figure 20 and 21). Numerous gaps, which could be used by crevice roosting bat species, are present between the handmade clay roof tiles across both roof faces, whilst the clay ridge tiles appear to be tightly pugged. There are wooden barge boards across the building and the eaves and very narrow with possible gaps present. A wooden soffit box is present on the single-story extension on the southern face at a height of approximately 2 meters (see figure 22). The bottom board is missing, leading to direct access to a cavity with bitumen lining which is stiffed with rockwool insulation making it potentially less suitable for roosting bats. Lead flashing is present at the base of the brick chimney. No evidence of bats was identified during the external assessment.

The void of Nightingales was inspected and it was noted that it was lined and was extremely heavily cobwebbed which indicates that the void has not been used by bats in the recent past (see figure 23).



Figure 20. The south and eastern faces of Nightingale Cottage which has a hand-made clay tiles gable roof with numerous gaps.



Figure 21. Western faces of Nightingale Cottage with a bitumen lined section.



Figure 22. The wooden soffit box, on the single-story extension on the southern face, which is missing the bottom board leading to direct access to a cavity with bitumen lining which is stiffed with rockwool insulation.



Figure 23. The void within Nightingale Cottage which is very heavily cobwebbed.



A small barn, approximately 5.5 by 4.5 meters in area, is situated to the south west of the residential property which has flint and brick walls and a gable roof (see figure 24). The building is in a poor condition and the roof has partially collapsed on the southern side. Numerous gaps, suitable to support crevice-roosting bats, are present between the hand-made clay tiles across the entire roof. Extensive ivy and Virginia creeper has grown up over the building, obscuring the view of the walls and part of the roof.

The building is currently used for storage and is heavily cluttered. It does not support a void with the internal aspect exposed to roof height which is approximately 4 meters from floor to apex (see figure 25 and 26). An internal inspection identified that the roof is unlined reducing its suitability for roosting bats. Internally the building is lit from a small window and a missing door reducing its suitability for void dwelling bat species such as *Plecotus sp.* Numerous gaps are present between the roof tiles and the at the eaves of the building. There is cobwebbing and ivy growth within the building. No evidence of bats was identified internally however a full internal investigation was not possible given the extent of the stored items.

A small slate tiled shed is present within the garden space of Nightingales. The roof tiles are unlined and no visible gaps between them. There is no void with the internal aspect exposed to roof height. Internally it is lit and exposed to the elements due to the dilapidated roof having a small number of missing roof tiles. As a result, it is not suitable for void dwelling species.



Figure 24. The small barn at Nightingale Cottage which has dense growth of ivy and Virginia creeper.



Figure 25. Internal aspect of the small barn used for storage with cobwebbing and ivy growth and numerous gaps between the roof tiles.

Woodland Shed

A small dilapidated shed is present within the woodland upon the site. It appears to have been formally used as an animal shelter and is small in size having a footprint of approximately 2 meters squared. The walls of the building are single skinned wooden panels with a transparent plastic sheet covering on the northern aspect. The wooden boarded roof with a bitumen cover has degraded and fallen apart. In addition to the northern face being open-sided, this results in the internal aspect of the shed being exposed to the elements making it unsuitable for roosting bats. (see figure 26).

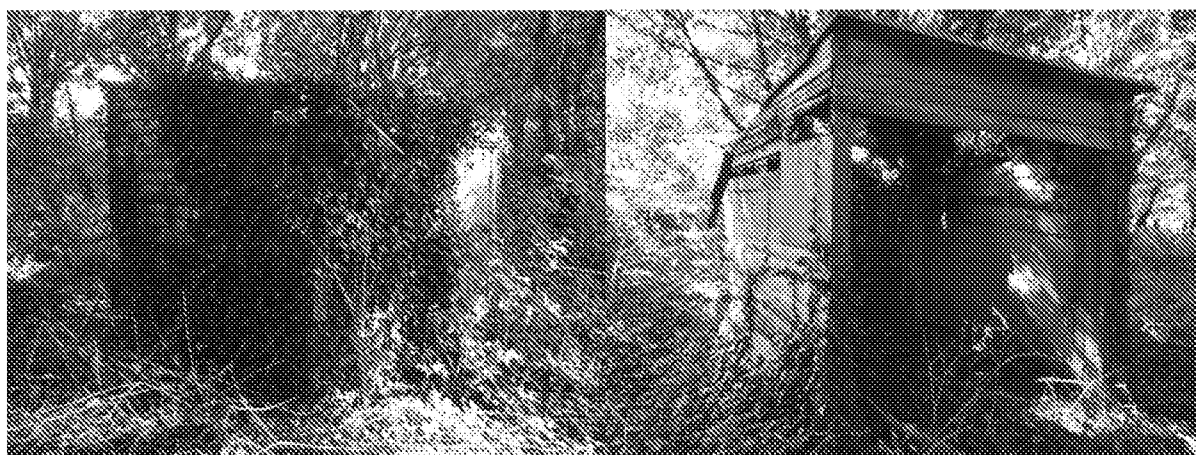


Figure 26. Left – the south and western faces of the shed. Right – the north and eastern faces of the shed.

Natural Roosting Habitat

The trees within the broadleaved woodland habitat were not assessed individually for their bat roosting potential and potential suitable roosting features. It was noted however that a number of trees had dense ivy growth on their trunks which has low potential to support bats between the ivy stems and the tree trunks and may obscure high potential roosting features (see figure 27).



Figure 27. Trees with dense ivy grown up their trunks.

Foraging Habitat

The site has high value for foraging bats with high invertebrate diversity associated with broadleaved woodland habitat and ruderal habitat.

Records for the following bat species were returned within the SxBRC records; serotine (*Eptesicus serotinus*), pipistrelle sp. (*Pipistrellus sp.*), common pipistrelle (*Pipistrellus pipistrellus*), long-eared sp. (*Plecotus sp.*), brown long-eared (*Plecotus auritus*).

In terms of recent bat roost records, there are multiple maternity brown long-eared roosts, recorded in 2014, at Slindon Wood located over 2km to the north east as a result this woodland has been recorded as a maternity woodland.

There are also 17 records for western barbastelle (*Barbastella barbastellus*), an Annex II species, dated from 2014 and 2015. Due to the sensitive nature of this information exact locations for these records are not provided however they are known to be located within the parish of Oving, Barnham, Aldingbourne, Slindon and Fontwell with individuals radio tracked and recorded foraging and commuting within these locations. In addition, multiple barbastelle maternity roosts have been identified within Slindon Wood, located over 2km to the north east of the site, with the woodland recorded as a maternity woodland for this species in 2013 and 2014.

3.2.3 Breeding Birds

All of the scrub, hedgerows, trees and woodland habitat have high potential to support a variety of common nesting birds.

Notable bird species recently identified within the SxBRC ecological data search include; lapwing,



curlew, turtle dove, cuckoo, nightjar, lesser spotted woodpecker, wood warbler, skylark, song thrush, spotted flycatcher, willow tit, marsh tit, linnet and yellowhammer.

The site is not suitable for lapwing, skylark or curlew. However, it has some potential to support the other species listed above.

Records for the following species, for which the site is considered as unsuitable for, were also returned; whooper swan, bewick swan, white stork, glossy ibis, marsh harrier, hen harrier, osprey, merlin, crane, kingfisher,

3.2.4 Dormice

This arboreal species favours broadleaved woodland, which covers approximately half of the site, where there are clear sources of food for as long of their active season as possible (March to October). The woodland has reduced suitability for this species given that it is dominated by sycamore and ash including small amounts of hawthorn, elder and bramble scrub whilst it lacked any fruiting hazel.

The woodland has connectivity to a small area of woodland to the west. This habitat however is isolated for any other woodland areas, parcels of woodland, tree lines or hedgerows with the potential to support dormice within the wider landscape.

The biodiversity records obtained from SxBRC did not identify any records for dormice within 2km of the site.

3.2.5 Great Crested Newts

No ponds are present within the sites boundaries however a search on aerial imagery and background mapping identified 5 ponds within 500 metres of the sites boundaries (see figure 28).

Pond 1 is located approximately 75 meters south west, Pond 2 approximately 80 meters north west, Pond 3 approximately 95 meters south west, Pond 4 approximately 202 meters south and pond 5 approximately 225 meters north of the site.

Pond 2 and 5 are located beyond Nyton Road and a stream to the north of the site. These are considered as suitable barriers to movement for this species. Furthermore Pond 2 is labeled as a fish pond on Magic Mapping. If this is the case it is highly unlikely that these ponds would support great crested newts, which are predated upon by fish, particularly at their larval stage.

These ponds were not assessed at the time of the site visit and therefore their suitability to support great crested newts cannot be concluded.

The terrestrial value of the site for amphibians is good. The ruderal habitat, grassland with a dense structure and broadleaved woodland which supports leaf litter, patches of scrub and ground cover, particularly across the eastern half, offer suitable foraging habitat and cover for this group of species.

The biodiversity records obtained from SxBRC identified the presence of great crested newts within 2km of the sites boundaries with three recent records provided. Two of these records, dated between May and June 2013 are associated with a pond located approximately 950 meters to the south west with two



females and a male recorded during a bottle trapping survey. A record, from 2007, for 100 adult great crested newts is associated with Tangmere Airfield which is located approximately 1.8 km to the west. Records for common toad, palmate newt, smooth newt and common frog were also returned.

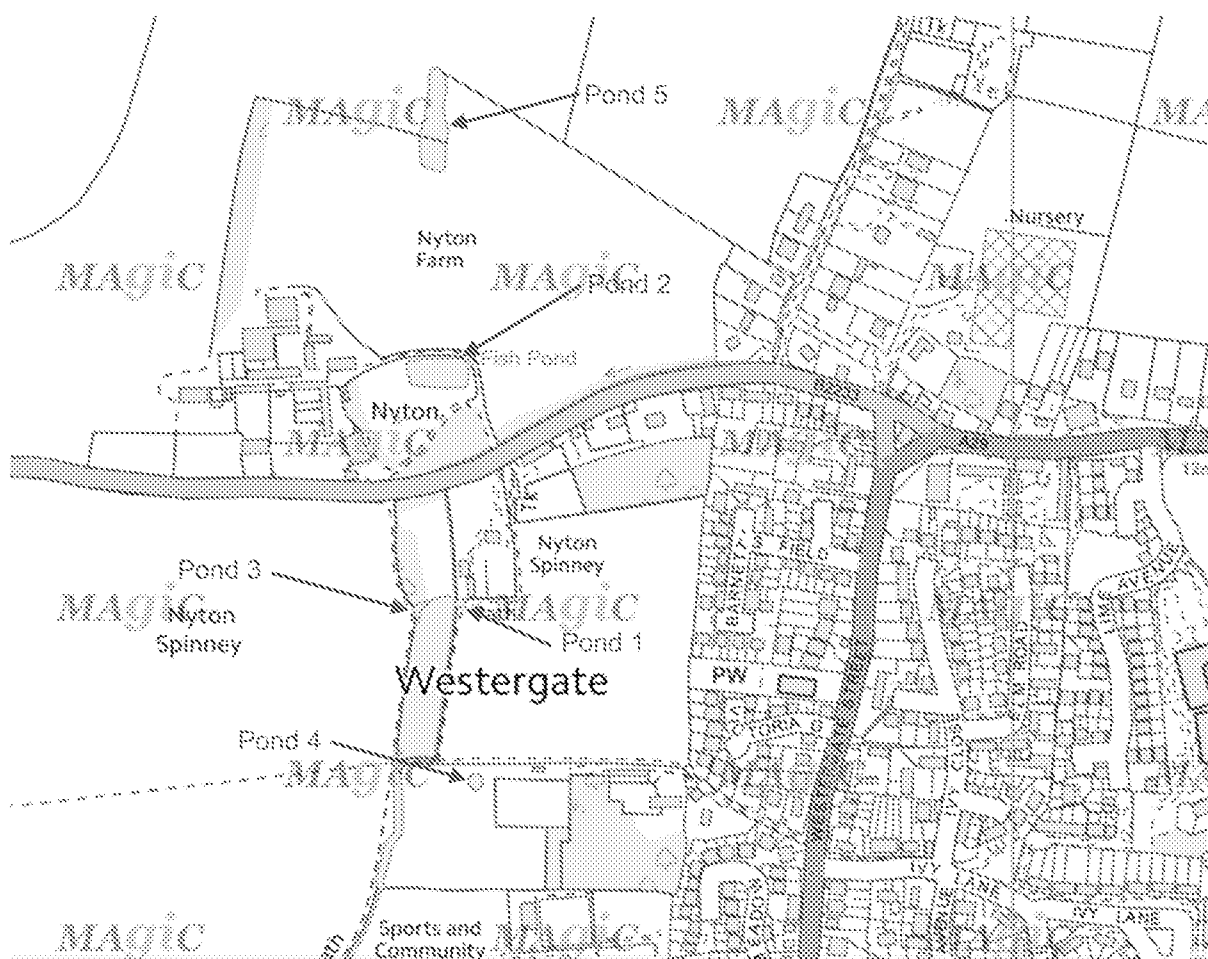


Figure 28. Ponds located within 500 meters of the sites boundaries.

3.2.6 Reptiles

The site is suitable for reptiles with the grassland and ruderal habitat providing foraging habitat, suitable cover from predators and basking sites which most native UK reptiles typically require. The broadleaved woodland is suitable habitat for adders known to inhabit woodland and also includes sunny glades meaning it has the potential to be used by other native reptile species.

The woodland supports dead wood piles and a grass compost heap and the garden space of Nightingale Cottage supports log piles and compost heaps which are suitable reptile hibernacula (see figure 29).

Records for slow-worms, grass snakes, adders and common lizards were identified within the biodiversity records obtained from SxBRC. The most recent records for slow-worms, grass snakes and common lizards are from 2010 whilst the adder record is from 1999.



Figure 29. Reptile hibernacula within the garden space of Nightingale Cottage.

3.2.7 Riparian Mammals

A stream is located to the north of the site on the other side of Nyton Lane. If this stream did support water voles they would not be found upon the site at any time given Nyton Lane would act as a barrier to movement.

3.2.8 Other notable species

SxBRC returned 10 records for stag beetles (*Lucanus cervus*) between 2013 and 2017. The closest is located approximately 20 meters to the west of the site and is dated from May 2017. There is much dead wood habitat within the broadleaved woodland, particularly across the eastern half.

Two purple emperor butterfly (*Apatura iris*) records from 2003 were returned within the SxBRC report.

A number of hedgehog (*Erinaceus europaeus*) records were identified by SxBRC with 13 records since 2005 of which 5 are from 2015. The site supports suitable habitat for this species with ruderal, scrub and woodland all present upon the site this

3.2.9 Designated Sites and Wider Ecological Impact Significance

A search was undertaken on the MAgIC website resource (www.magic.gov.uk) and no statutory or non-statutory designated sites were identified within 1km of the sites boundaries.

3.3 Constraints/Limitations

An initial site assessment such as this is only able to act like a 'snapshot' to record any flora or fauna that is present at the time of the survey. It is therefore possible that some species may not have been present during the survey, but may be evident at other times of the year. For this reason, habitats are assessed for their potential to support some species, even where no direct evidence (such as droppings) has been found.



4 DISCUSSION AND RECOMMENDATIONS

4.1 Preliminary Ecological Appraisal

The overall ecological value of the majority of the site is high. The broad-leaved woodland habitat, a priority habitat which covers approximately half of the site should be retained as far as possible given its high ecological value.

Due to the site supporting habitat for bats and reptiles and ponds with the potential to support great crested newts, further surveys have been recommended for these species. Given evidence of commuting badgers mitigation is advised. Mitigation is also advised for hedgehogs and stage beetles both BAP species.

4.1.1 Badgers

No badger burrows or setts were identified within the site during the assessment. A mammal run, most likely created by badgers moving through the site, was identified across the eastern section of the woodland with badger guard hair identified on a barbed wire fence located through the broadleaved woodland. The woodland upon the site is of value for this species and there are habitat of value within the wider landscape.

Badger setts can be established at any time of the year and therefore a repeat badger survey should be undertaken by a suitably qualified ecologist four weeks prior to any land clearance to check if any setts have been established within the site. In the event of a sett being established, surveys would be necessary to conclude the species and the use of the sett by a sand and hair trapping surveys.

Due to evidence of badgers commuting across the site the following precautionary mitigation will need to be put in place to minimise any potential harm to badgers during the construction process:

- No food or waste will be left out overnight.
- Tools at the site will be locked away after each days work.
- Any holes dug within the construction will either be covered up over the night or have ladders put in place to provide an escape route.

4.1.2 Bats

Bat Scoping

Byfields

Under the Bat Conservation Trusts Guidelines this building is considered to have 'moderate to high' potential to support roosting bats with wooden cladding, dormer windows supporting wooden cladding, and a small number of lifted tiles present.

As a result, three bat emergence surveys are recommended, however this could be scoped down to two surveys depending upon the initial findings. Bat emergence surveys are undertaken by surveyors positioning themselves in view of the features of interest upon the building and using ultrasonic detectors to record any bats emerging or re-entering these features around sunset or sunrise. Three surveyors would be required to cover all of the external features across this building. Furthermore, an inspection



of the roof void will be necessary as access was not possible at the time of the site visit.

The wooden shed has negligible potential to support bats and therefore no further surveys are necessary.

Nightingale Cottage

Under the Bat Conservation Trusts Guidelines the cottage is considered to have 'moderate' potential to support roosting bats. As a result, two bat emergence surveys are recommended. Two surveyors would be required to cover all of the external features across this building.

The small barn is considered to have 'low' potential to support roosting bats. As a result, one bat emergence survey is recommended upon this structure. Two surveyors would be required to cover all of the external features across this building.

The slate roof shed has negligible potential to support bats and therefore no further surveys are necessary.

Woodland Shed

Under the Bat Conservation Trusts Guidelines this building is considered to have 'negligible' potential to support roosting bats. As a result, no further surveys or mitigation is necessary.

Natural Roosting Habitat

The trees across the site were not individually assessed for their potential, however a number support dense ivy growth on their trunks which has low potential to support bats and may obscure high potential roosting features. Any trees with a trunk diameter greater than 15cm to be felled, must first be assessed for their potential to support roosting bats through a climbed assessment by a suitably qualified and licensed surveyor with aerial rescue certification for detailed inspection. An endoscope can be used to investigate cavities, splits and cracks in trees to look for bats or recent signs of bat use. It may become necessary for some emergence surveys following the tree climbing assessment if any large bat roosts are found, or the species of bats present cannot be identified. It is anticipated that between 5 and 10 trees may need to be climbed as part of this assessment.

Foraging Habitat

The woodland, tree lines and boundary hedges at the site could be used by bat species for foraging and commuting and therefore further surveys are necessary. Under Bat Conservation Trust Guidelines, to assess the use of the site by foraging and commuting bats, one activity survey visit per season spring (April/May), summer (June/July/August) and autumn (September/October) by two surveyors – three activity surveys in total. Additionally, bat loggers should be deployed within the site for 5 consecutive days once per season (Spring, Summer and Autumn). This information will establish the value of the woodland and other habitats present for foraging bats, whilst the importance of any commuting features such as hedgerows and tree lines can also be evaluated. It can also be established if the site is used by barbastelles an Annex II species.

4.1.3 Breeding Birds

All of the scrub, hedgerows, trees, woodland habitat and the shed and outbuildings have high potential to support a variety of common nesting birds. It will be essential for any future development to consider



the nesting bird season and any vegetation removal or building demolition should be timed outside of the nesting bird season (1st March to 31st August) unless features are first hand search by a suitably qualified ecologist and declared clear of any active bird nests. In the event that an active nest is identified a buffer of at least 5 meters would need to be established and the nest left undisturbed until the young have fledged.

The site should be enhanced for birds through the instillation of bird boxes. Full detailed recommendations for boxes should be detailed within a 'Mitigation Statement' to be produced following the completion of recommended phase 2 surveys.

4.1.4 Dormice

The broadleaved woodland, which covers approximately half of the site, has reduced suitability for this species given that it is dominated by sycamore and ash with small amounts of hawthorn, elder and bramble scrub and a lack of any fruiting hazel. Beyond the small area of woodland to the west which the woodland has connectivity to, this is isolated from any other woodland areas, parcels of woodland, tree lines or hedgerows with the potential to support dormice within the wider landscape. In addition, no dormouse records were identified by SxBRC within 2km of the site.

As a result it is considered unlikely that this species would be present within the sites boundaries and no further surveys are recommended.

4.1.5 Great Crested Newts

No ponds were identified on the site during the survey process however 5 ponds were identified within 500 metres of the site with the terrestrial value of the site being good for great crested newts. This includes the ruderal habitat, grassland, broadleaved woodland which supports leaf litter, patches of scrub and ground cover all offering suitable foraging habitat and cover for this group of species. Furthermore, great crested newt records within 1km of the site were identified by SxBRC.

Pond 2 and 5 can be scoped out as Nyton Road and a stream act as barriers to movement for this species and Pond 2 is marked as a fish pond reducing its suitability to support great crested newts.

Access should be sought for Pond 1, 3 and 4 to undertake a Habitat Suitability Index (HSI) assessment and determine their suitability to support great crested newts. Following this, if they are concluded as potential suitable to support great crested newts, it will be necessary to undertake further survey work with either an environmental DNA (eDNA) test or presence/absence great crested newt surveys required.

An eDNA assessment is made by taking at least 20 water samples from a pond between mid-April and the end of June and sending the samples to a laboratory for assessment for the presence of great crested newt DNA. In the event that great crested newts are identified a population assessment would be required.

A presence/absence survey follows best practice guidelines as described within Natural England's 'Great Crested Newt Mitigation Guidelines'. In accordance with these guidelines, four surveys are carried out on evenings when the ambient temperature is not less than 5 degrees Celsius between mid-March and mid-June, with two surveys being carried out between mid-April and mid-May. This timing



ensures that surveys are carried out when newts are most likely to be breeding, thus maximising the potential to identify newt presence and establish a population. If great crested newts are identified two further survey visits would be necessary to completed a population assessment with three surveys to be completed between mid-April and mid-May.

4.1.6 Reptiles

The site is suitable for reptiles with grassland, ruderal habitat and broadleaved woodland with sunny glades present upon the site along with numerous hibernacula. Furthermore, records for common lizards, slow-worms, grass snakes and adders were identified by SxBRC.

Due to the site supporting suitable habitat for this group of species and records for slow-worms, grass snakes, common lizards and adders being identified by SxBRC it is important that the used of the site by reptiles (if any) is understood so that if necessary, an appropriate mitigation strategy can be produced. Mitigation strategies are designed according to both the species, population and distribution of reptiles across the site and a reptile presence/absence survey is recommended to gather this information is required.

A reptile presence/absence survey can be conducted between April and mid October by placing a number of artificial refugia across the site (typically comprising of bitumen and/or corrugated metal sheeting), which are allowed to 'bed in' for a minimum of ten days before commencing the survey process. Seven surveys should be undertaken in the morning or late afternoon when the refugia have warmed in sunlight and the ambient air temperature is above 9 degrees Celsius. Surveys cannot be undertaken during periods of rainfall or strong winds and the optimal months for thus survey are April, May and September.

Should reptiles be identified at the site suitable mitigation would need to be outlined and put in place. This could include a reptile translocation at the site to ensure this group of species would not be injured or killed during earth removal by heavy machinery.

4.1.7 Riparian Mammals

Nyton Lane acts a significant barrier to movement to water voles should they be present within the stream located on the opposite side. As a result, it is considered unlikely that this species would be found upon the site at any time.

Existing disturbance to this steam is high given its location adjacent to Nyton Road and therefore the impact of construction is not considered significant, however the impact of dust and pollution should be considered. Therefore, good construction practice should be adhered to, with particular importance on dust suppression with vehicles to be sprayed upon leaving the site and dust suppressed during the demolition of any buildings.

4.1.8 Other Notable Species

Given the suitable dead wood habitat for stag beetles being present upon the site sympathetic measures should be taken with dead wood habitat retained insitu where possible or carefully moved to an area to which will remain undeveloped.

Two records for purple emperor was identified by HBIC. The site has low suitability for this species which



is associated with largely wooded areas that support willow trees, which are the food plant of the caterpillars. Only a small amount of immature goat willow identified upon the site.

The site supports some habitats of value for hedgehogs and a records for this species were identified by SxBRC. No further surveys are recommended and at present there are no set survey guidelines for hedgehogs, however precautions are recommended. As such in the event that any scrub, woodland or hedgerow habitat is to be removed this must be undertaken sensitivity with a hand search to be carried out prior to this work. If any hedgehogs are identified they should be carefully removed to a suitable nearby location that will remain undisturbed. If hedgehogs are discovered in hibernation (likely to be between November and early March), then either the area where the hedgehog is found should remain undisturbed with a buffer around the individual, or at the discretion of a suitably qualified ecologist, it may be possible to move the animal with the material that it is hibernating in to a safe location.

4.2 Development Impact Assessment

This development could see the loss of ruderal, grassland and broadleaved semi-natural woodland a priority habitat however the extend in currently unknown with no proposed plans drawn up at the time of writing this report. It is recommended that this habitat is retained given its moderate-high ecological value. There is the potential for Byfields and Nightingale cottage and its associated outbuildings to be lost as part of this development.

There is potential for protected species to be supported by the habitat upon the site and further surveys are required to understand what impact this development may have upon these species (if any).

A 'Mitigation Statement' should be produced once the recommended phase 2 surveys have been completed to outline protection measures for any protected species identified upon the site. This should outline a range of suitable ecological enhancement measures such as woodland enhancement, hedgerow enhancement and the instillation of bird and bat boxes to benefit wildlife at the site.

If any protected species are found during the proposed work, an ecologist must be contacted immediately for advice.

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



5 APPENDIX 1 – LEGISLATION AND POLICY

General

This section briefly describes the legal protection afforded to protected species. It is for information only and is not intended to be comprehensive or to replace specialised legal advice. It is not intended to replace the text of the legislation, but summarises the salient points.

Badger

Badger is protected in Britain under the Protection of Badgers Act 1992 and Schedule 6 of the Wildlife and Countryside Act 1981 (as amended).

The legislation affords protection to Badger and Badger setts, and makes it a criminal offence to:

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

Bats, Dormouse and Great Crested Newt

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

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

It is also an offence to set and use articles capable of catching, injuring or killing bats (for example a trap or poison), or knowingly cause or permit such an action. In the case of Dormouse and all species of British bat there is also protection under *Schedule 6* of *The Wildlife and Countryside Act 1981* (as amended) relating specifically to trapping and direct pursuit of these species.

Dormouse, Great Crested Newt and all species of British bat are included as priority species in the *UK Biodiversity Action Plan* and as species of principal importance for the conservation of biological diversity in England under *Section 74* of the *Countryside and Rights of Way (CROW) Act 2000*.

Reptiles

Common Lizard (*Lacerta vivipara*), Grass Snake (*Natrix natrix*), Slow-worm (*Anguis fragilis*), and Adder (*Vipera berus*) are listed under *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), in respect of *Section 9(5)* and part of *Section 9(1)*. This protection was extended by the *Countryside and Rights of Way (CROW) Act 2000*. Under the legislation it is an offence to:

- intentionally or deliberately kill or injure any individual of these species; or
- sell or attempt to sell any part of these species either alive or dead.



Nesting Birds

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

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

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

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

Roman Snails

In 2008, the Roman snail (*Helix pomatia*) was added to *Schedule 5* of the *Wildlife and Countryside Act 1981* (as amended), and it became an offence to intentionally kill, injure or take individuals of this species.



6 APPENDIX 2 - ARTIFICIAL LIGHTING AND WILDLIFE

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

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

Overview of impacts

Invertebrates

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

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

Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season³. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.⁴

Mammals

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

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

² As above

³ Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

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

lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their



need to avoid predators. However, this in itself has a knock-on effect on those predators.

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

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

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

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross⁵. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

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

Recommendations

Survey and Planning

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process⁶. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice guides⁷. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

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

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

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have



implications for obtrusive lighting / light pollution?

3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

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

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans⁸. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

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

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

Principles and design considerations

Do not

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

Avoid

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

Do

- **consider employing a competent lighting designer** who will apply the principals of providing the right light, in the right place, at the right time and controlled by the right system.
- **minimise the spread of light** to at, or near horizontal and ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required.
- **consider the height of lighting columns.** It should be noted that a lower mounting height is not always better. A lower mounting height can create more light spill or require more columns.



Column height

- **consider no lighting solutions where possible** such as white lining, good signage and LED cats eyes. These options can also be effective. For example, light only high-risk stretches of roads, such as crossings and junctions, allowing headlights to provide any necessary illumination at other times.
- **use temporary close-boarded fencing until vegetation matures**, to shield sensitive areas from lighting.
- **limit the times that lights are on to provide some dark periods**. The task being lit often varies, for example roads are less used after 23.00hrs and car parks are empty. A lighting designer can vary the lighting levels as the use of the area changes reducing lighting levels or perhaps even switching installations off after certain times. This use of adaptive lighting can tailor the installation to suit human health and safety as well as wildlife needs.

Technological specifications

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

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

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

Further reading:

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

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

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

