
ECOLOGICAL IMPACT ASSESSMENT

Land West of The Oaks,
Westholme Road, Masham

July 2017



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Site:

Land West of The Oaks,
Westholme Road
Masham
HG4 4EL

Dates:

Walkover and scoping survey: 19th January 2017

eDNA test: 10th May 2017

Emergence survey buildings and oak TN 5: 29th June 2017

Transect survey: 22nd June 2017

Emergence survey on in-field ash TN10: 22nd June 2017

Emergence survey on oaks TN12 and TN 14: Scheduled 13th July

Client:

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Masham
North Yorkshire
HG4 4EL

Client's agent:

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Local Planning Authority:

Harrogate Borough Council

MAB ref:

2016-106

EclA: Land west of The Oaks, Masham 2017

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1. Summary

An ecological assessment has been undertaken on 2.7 ha of land on the outskirts of Masham in North Yorkshire. Outline planning permission is being sought for a mixed residential/light industrial development.

The development will result in the demolition of two single-storey breeze block buildings and a small brick/stone barn. Some areas of low potential bat roost habitat were identified at the scoping survey stage (between timbers, in crevices and under tin sheeting) but the emergence survey confirmed that no bats are roosting in the buildings. A few little owl and barn owl droppings were identified in one of the buildings but the emergence survey found no presence of owls. Birds' nests – notably swallow, were observed in the buildings. Barn owl, little owl and swallow should be mitigated for prior to demolition.

The site is comprised of hardstanding with stored piles of rubble, brick and soil; the remainder of the habitat is improved grassland with low botanical interest; there is one small area of species-poor wet grassland on the southern boundary of the site.

Hedgerows on site are generally species-poor, gappy and one is cut short; a bat transect survey confirmed that these are not being used as commuting routes by bats, but there is some foraging by pipistrelles along the hedges and around mature trees. Hedgerows are not classed as 'important' under the Hedgerow Regulations; all are being retained as part of the scheme. Gapping-up with native species will increase bird nest habitat on site and habitat for bats.

There are six mature trees on the site. Four of these are on the boundaries and two are in field trees. The majority of these trees are being retained but one oak (Target note TN14) is scheduled for removal. The in-field ash TN10 and the oak TN5 were both found to have common pipistrelle day roosts during emergence surveys. Tree

emergence surveys are scheduled for 13th July on the veteran oak TN12 and TN14 (which is scheduled for removal).

These trees, with identified bat roosts, will be retained as part of the development, mitigation at reserved matters stage will be proposed to ensure that there is no severance of habitat to ensure commuting routes to the roosts are maintained and no lighting is directed towards the trees. This will require more tree inspections / bat surveys to confirm roost status. Root protection areas (RPA's) will require protection.

A pond was identified within 200m of the development. An eDNA was undertaken on the pond and confirmed the pond as positive for GCN. The development will need to take place under the terms of a European Protected Species Mitigation Licence (EPSML); a population class size assessment (PCSA) will need to be carried out on the pond between March and June. A method statement for GCN will be drawn up once the PCSA has been established. A receptor site for GCN within the development area, allowing connectivity to the pond, will need to be established. The method statement will also include surrounding the site with temporary amphibian fencing, trapping out GCN from the site, and mitigation. The development will need to include a drainage system that does not harm GCN.

Swinney Beck runs just outside the northern boundary. There was no evidence of water vole but a 3 to 6m buffer zone between the ditch and development should be established to ensure that it continues to function as a wildlife corridor and that the water quality is maintained.

2. Introduction

MAB Environment and Ecology Ltd was commissioned to undertake a Preliminary Ecological Appraisal (PEA) of land at Westholme Road, Masham North Yorkshire. covers an area of approximately 2.7 ha. The site location plan is shown on Figure 1 below, with the red line planning application boundary showing the survey area. A mixed residential/ light industrial development is proposed. See sketch plan at Figure 2.

The objectives of this report are to:

- Identify species and habitats on site, with particular reference to protected and notable species
- Detail the need for any further ecological survey work
- Assess the potential impact of the proposed development on habitats and protected or notable species
- Identify potential opportunities for biodiversity enhancement
- To outline any necessary or recommended mitigation and compensation proposals

Ecologists from MAB Environment and Ecology Ltd are members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and follow the Institute's Code of Professional Conduct when carrying out ecological work.

EcIA: Land west of The Oaks, Masham July 2017

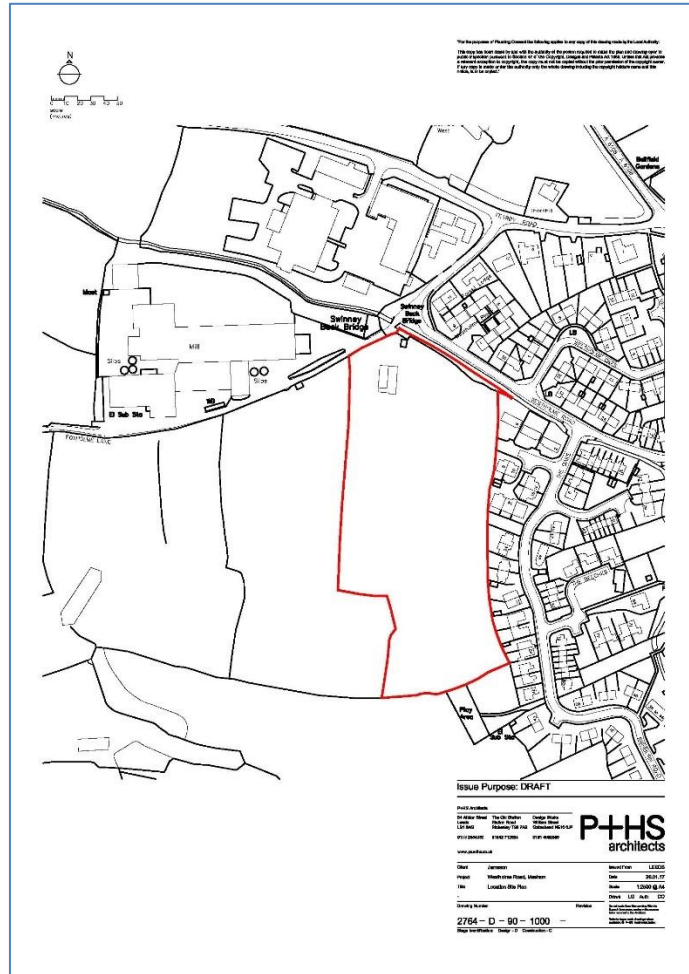


Figure 1 - Site location plan showing proposed development



Figure 2 Sketch site plan

3. Planning policy and Legislation

3.1 Planning policy

3.1.1 Harrogate Draft Policy NE 3; protecting the Natural Environment

Development should not result in any loss of biodiversity, and should seek to provide net gains. The council will work through appropriate Local Nature Partnerships and others to assess existing and potential components of ecological networks, including SINC's. Protected species and priority habitats and species are identified nationally in Biodiversity 2020 and under the Wildlife and Countryside Act. The preservation, restoration and recreation of priority habitats and ecological networks and the protection and recovery of priority species populations will be promoted and their positive conservation will be sought through development management.

The restoration and re-creation of priority habitats, networks and priority species populations identified in the Harrogate District BAP will be encouraged as part of any development.

Development will only be permitted where an appraisal has demonstrated that significant harm resulting from the development can be avoided through locating on an alternative site with less harmful impacts, adequately mitigated, or as a last resort, compensated for.

The council will protect and enhance sites of importance for natural heritage, biodiversity and geo diversity from development as follows:

International Sites: Special Areas of Conservation (SAC's), Special Protection Areas (SPAs), Ramsar sites

Development likely to have significant effect on a Natural 2000 site or its features of interest will be subject to an appropriate assessment. Where an assessment is unable to conclude that a development will not adversely affect the integrity of the site, development will only be permitted where there are no alternative solutions, and there are imperative reasons of overriding public interest. These can be of a

social or economic nature except where the site has been designated for a European priority habitat or species.

National sites: SSSI's

Development likely to have an adverse effect on a SSSI will only be permitted where an appraisal has demonstrated:

The objectives of the designated area and the overall integrity of the area would not be compromised:or

Any adverse effects on the qualities for which the area has been designated are clearly outweighed by social or economic benefits of national importance.

Local sites

Development that affects the interest features of Local Sites will only be permitted where an appraisal has demonstrated that significant harm resulting from the development can be avoided through locating on an alternative site with less harmful impacts, adequately mitigated, or, as a last resort, compensated for .

Planning permission will not be granted for development resulting in the loss of deterioration of irreplaceable habitats, including historic wetlands and species-rich grasslands, ancient woodland and the loss of aged or veteran trees, unless the need for and benefits of the development in that location clearly outweigh the loss.

3.1.1 National Planning Policy Framework (England) NPPF

The government published the NPPF on 27th March 2012. Text excerpts from NPPF are shown where they may be relevant to planning applications and biodiversity including protected sites, habitats and species.

In conserving and enhancing the natural environment, the NPPF states that “the planning system should contribute and enhance the natural and local environment by:

- a) Recognising the wider benefits of ecosystem services
- b) minimising impacts on biodiversity and providing net gains in biodiversity where possible contributing to the Government’s commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures

- c) Preventing both new and existing development from contributing to or being put at unacceptable risk from or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability”

In paragraph 111, the NPPF refers to brownfield land as follows “planning policies and decisions should encourage the effective use of land by re-using land that has been previously developed (brownfield land), provided that it is not of high environmental value”.

Where proposals or activities require planning permission, the NPPF states that “..local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- a) If significant harm resulting from a development cannot be avoided) through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning should be refused.
- b) Proposed development on land within or outside a Site of Special Scientific Interest (SSSI) likely to have an adverse impact on a SSSI (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site’s notified special interest features is likely, an exception should only be made where the benefits of the development, at this site clearly outweigh both the impacts that it is likely to have on the features of this site that make it of special scientific interest and any broader impacts on the national network of SSSI’s.
- c) Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted.
- d) Opportunities to incorporate biodiversity in and around developments should be encouraged.
- e) Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland, unless the need for, and benefits of , the development in that location clearly outweigh the loss and

- f) The following wildlife sites should be given the same protection as European site:
- I. Potential Special Protection Areas (SPA) and possible Special Areas of Conservation(SAC)
 - II. Listed or proposed Ramsar sites; and
 - III. Sites identified, or required, as compensatory measures for adverse effects on European sites, potential SPA's, possible SAC's and listed or proposed Ramsar sites.

In respect of protected sites , the NPPF requires the local planning authorities to make “distinctions...between the hierarchy of international, national and locally designated sites so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks”

In paragraph 125 the NPPF stipulates that “by encouraging good design, planning policies and decisions should limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation” This applies to protected species that area a material consideration in the planning process including bats and may also apply to other light sensitive species.

3.2 . Legislation

3.2.1 Natural Environment and Rural Communities (NERC) Act 2006 – Habitats and Species of Principal Importance (England and Wales)

The NERC Act came into force on 1st October 2006. Sections 41 and 42 (S41 and S42) of the Act require the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England and Wales respectively. The list has been drawn up in consultation with Natural England (NE) and Countryside Council for Wales (now NRW) as required by the Act. In accordance with the Act the secretary of state keeps this list under review and will publish a revised list if necessary, in consultation with NE and NRW.

The S41 and S42 lists are used to guide decision makers such as public bodies, including local and regional authorities, and utilities companies, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England and Wales, when carrying out their normal functions, including development control and planning. This is commonly referred to as Biodiversity Duty. Guidance for public authorities on implementing Biodiversity Duty has been jointly published by Defra and the Welsh Assembly. One of the key messages in this document states that “conserving biodiversity includes restoring and enhancing species populations and habitats, as well as protecting them”. In England, local authorities are required to take measures “to promote the preservation, restoration and recreation of priority habitats, ecological networks and the protection and recovery of priority species” linking to national and local targets through policy and by association, therefore, through development control.

In 2007, the UK biodiversity Action Plan (BAP) Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK post 2010 Biodiversity Framework, which covers the period from 2010 – 2020 now succeeds the UK BAP. The UK priority list contained 1150 species and 65 habitats requiring special protection and has been used as a reference to draw up lists of species and habitats of principal importance in England and Wales.

In England, there are 56 habitats of principal importance and 943 species of principal importance on the S41 list. These are all the habitats and species that are found in England that were identified as requiring action in the UK BAP and which continue to be regarded as conservation priorities in the subsequent UK post -2010 Biodiversity Framework.

In Wales, there are 54 habitats of principal importance and 557 species of principal importance on the S42 list. This includes three marine habitats and 53 species that were not on the list of UK BAP priority habitats, but which are recognised as of principal importance for Wales.

3.2.2 Government Circular 06/2005 and Standing Advice from NE

Paragraph 99 of Government Circular 06/2005 advises that *“it is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision. The need to ensure ecological surveys are carried out should therefore only be left to coverage under planning conditions in exceptional circumstances, with the result that the surveys are carried out after planning permission has been granted”*.

The reasoning behind this statement stems from the fact that, without appropriate protected species surveys to confirm presence or likely absence and where an effect upon the species is considered likely should the development proposal proceed, planning permission may be inadvertently granted for an action that would contravene protected species legislation or the local planning authority may not have due regard to its duty in respect of protected species in advance of determination and this could result in issues in the ability to implement the planning permission. For example, if a situation were to arise where protected species were discovered after planning permission had been granted, it may not be possible to incorporate mitigation measures into the scheme, at least without a major change to the scheme design that would require re-submission to the planning authority.

Paragraph 118 of the NPPF advises that when determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying certain principles. One of these principles advises that if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused.

Paragraph 98 of Circular 06/2005 advises that *“the presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Local authorities should consult with NE before granting planning permission. They should consider attaching appropriate planning conditions or entering into planning obligations under which the developer would take steps to secure the long-*

term protection of the species. They should advise developers that they must comply with any statutory species' protection provisions affecting the site concerned...."

Standing advice from NE provides advice to planners on deciding if there is a 'reasonable likelihood' of protected species being present. It also provides advice on survey and mitigation requirements. When determining an application for development that is covered by standing advice, in accordance with guidance in Government Circular 06/2005, Local planning authorities are required to take the standing advice into account. NE advises that standing advice is a material consideration in the determination of applications in the same way as a letter received from NE following consultation.

3.2.3 European Protected Species (Animals)

The Conservation of Habitats and Species Regulations 2010 (as amended) consolidates the various amendments that have been made to the original (1994) Regulations which transposed the EC Habitats Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Council Directive 92/43/EEC) into national law.

"European protected species" (EPS) of animal are those which are present on Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). They are subject to the provisions of Regulation 41 of those Regulations. All EPS are also protected under the Wildlife and Countryside Act 1981 (as amended). Taken together these pieces of legislation make it an offence to:

- a) Intentionally or deliberately capture, injure or kill any wild animal included amongst these species
- b) Possess or control any live or dead specimens or any part of, or anything derived from these species
- c) Deliberately disturb wild animals of any such species
- d) Deliberately take or destroy eggs of such an animal or
- e) Intentionally, deliberately or recklessly damage or destroy a breeding site or resting place of such an animal, or obstruct such a place

For the purposes of paragraph c), disturbance of animals includes in particular any disturbance which is likely

- a) To impair their ability
 - I. To survive , to breed or reproduce, or to rear or nurture their young, or
 - II. In the case of animals of a hibernating or migratory species , to hibernate or migrate; or
- b) To affect significantly the local distribution or abundance of the species to which they belong

Although the law provides strict protection to these species, it also allows this protection to be set aside (derogation) through the issuing of licences. The licences in England are currently determined by NE for development works. In accordance with the requirements of the Regulations (2010), a licence can only be issued where the following requirements are satisfied:

- a) The proposal is necessary “to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance to the environment
- b) There is no satisfactory alternative
- c) The proposals ‘will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range’.

3.2.4 Birds

All nesting birds are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use of being built , or take or destroy its eggs. In addition to this, for some rarer species (listed on Schedule 1 of the Act), it is an offence to disturb them whilst they are nest building or at or near a nest with eggs or young, or to disturb the dependent young of such a bird.

The conservation of Habitats and Species (Amendment) Regulations 2012 has placed new duties on Local Authorities and National Park Authorities (and others) in relation to wild bird habitat. Regulation 9A(2) and (3) require that “in the exercise of their functions as they consider appropriate” these authorities must take steps to contribute to the “preservation, maintenance and reestablishment of a sufficient diversity and area of habitat for wild birds in the UK, including by means of upkeep, management and creation of such habitat....” These authorities are also required, under Regulations 9A(8) to “use all reasonable endeavours to avoid any pollution or deterioration of habitats of wild birds”.

3.3 UK and Local Biodiversity Action Plans

3.3.1 The UK Biodiversity Action Plan (BAP) identified a number of species as priorities of conservation. Those of particular relevance to this site are:

Soprano pipistrelle bat (*Pipistrellus Pygmaeus*)

Brown long-eared bat (*Plecotus auritus*)

Noctule bat (*Nyctalus noctula*)

Brown hare (*Lepus europaeus*)

West European hedgehog (*Erinaceus europaeus*)

Otter (*Lutra lutra*)

Common toad (*Bufo bufo*)

Great crested newt (*Triturus cristatus*)

White-clawed freshwater crayfish (*Austropotamobius pallipes*)

3.3.2 The Harrogate LBAP (2012) also identified a number of habitats and species as priorities for conservation, including wood pasture, parkland and veteran trees, all species of bat, recreation and conservation of species rich hedgerows, otter.

4. Methodology

4.1 The site was surveyed and report written by Ione Bateau MCIEEM, a director of MAB Environment & Ecology Ltd since 2006. Ione holds a Class Survey Licence WML CL15 (volunteer bat roost visitor Level 1) and WML CL18 (Bat Survey Level 2) – registration number 2015-13361-CLS-CLS. Ione is licensed by Natural England to survey for GCNs (CL08 Great Crested Newt Class 1, Registration number 2015-19109-CLS-CLS)

4.2 The North and East Yorkshire Ecological Data Centre (NEYEDC) was commissioned to provide records of protected or notable species within 2km of the site.

4.3 Bat roost records for a 2km radius around the site were commissioned from the North Yorkshire Bat Group.

4.4 Any buildings on site were assessed for their degree of potential to support roosting bats. This includes assessing the building design, materials and condition. The location of the site and the surrounding habitat were also assessed for value to bats. This includes proximity of the site to good bat foraging habitat such as woodland and water bodies and if the site is linked to such habitats by linear features like hedgerows, woodland edges or rivers which bats use to commute around the environment.

4.5 The interior and exterior of the buildings were inspected during the day using halogen torches (500,000 candle power), ladders, and a flexible endoscope (a Sea Snake LCD inspection scope). All normal signs of bat use were looked for, including bats, bat droppings, feeding waste, entry and exit holes, grease marks, dead bats, and the sounds / smells of bat roosts.

4.6 All signs of breeding bird activity and barn owl (*Tyto alba*) activity were looked for. Signs looked for included white droppings, often vertical down walls or beams; active nests and nesting materials; (birds flying into and out of barns: generally summer only); bird feathers, particularly swift (*Apus apus*), swallow (*Hirundo rustica*) and

house martin (*Delichon urbica*), bird corpses, feeding waste (including pellets), and the sound/smell of birds.

4.7 Trees marked for removal or directly affected by the development scheme were assessed during the day from the ground using close focusing binoculars and a halogen torch (500,000 candle power). Features such as woodpecker holes, splits, cracks, rot holes, dense ivy, and peeling bark were looked for which are commonly used by bats for roosting and for shelter. Any features were then inspected for any signs of bat use, including scratches or staining around potential access points, bat droppings bats, and the sounds / smells of bat roosts.

4.8 Other trees within the site and areas of vegetation were also assessed for value to bats and their importance as foraging and commuting habitat.

4.9 Emergence surveys were carried out using 5 surveyors on the buildings on the 29th June 2017 with ultra-sound detectors (Pettersson D240x, Pettersson D230, and BatBox Duet). The D240x detector was set to 10x expansion with manual triggering with an Edirol R09 WAV solid state recording device for the time expansion channel, with heterodyne output through the other channel. The D230 and Duet used heterodyne detection and were set to 50 kHz. Time expansion recordings were analysed with BatSound software. Surveyors used were Emma Telfer (ET); Sarah Emerson (SE); Sam Jones (SJ); Katie Lees (KL); Sam Newton (SN).

- Emma Telfer GCIEEM has three years experience of conducting bat surveys for MAB. She holds a Class Survey Licence WML-A34 (Bat Survey Level 2) registration number 2016-20709-CLS-CLS. Emma has received BCT training in surveying for bats and bat ecology and is also a trainee volunteer bat roost visitor.
- Sarah Emerson GCIEEM has two years' experience conducting bat surveys and holds a Class Survey Licence WML-A34 (Bat Survey Level 2) registration number: 2016-26716-CLS-CLS.

- Katie Lees is a biology graduate and is in her second year of working for MAB ecology as a bat surveyor.
- Sam Jones is a biology graduate and trainee bat surveyor.
- Sam Newton is a biology graduate and trainee bat surveyor.

An emergence survey on TN10 ash tree was carried out on 22nd June 2017 by Sam Jones (as above) with ultra-sound detector (Pettersson D240x). The D240x detector was set to 10x expansion with manual triggering with an Edirol R09 WAV solid state recording device for the time expansion channel, with heterodyne output through the other channel. Time expansion recordings were analysed with BatSound software.

4.10 A bat transect survey was carried out by Sarah Emerson on 22nd June 2017 (as above). The activity survey took the form of a point count survey which involved stopping at selected points throughout the site and recording bat activity for five minutes at each location. Listening points were spaced along each route to include a range of habitats present within the site and to cover as much of the site as possible. A note was also taken of bat passes observed when walking between points. The survey began at sunset and lasted 90 minutes. Recorded bats were then labelled on a site map to represent and compare bat activity throughout the site and within the different habitats.

4.11 A Phase 1 Habitat Survey was conducted following standard published guidelines (JNCC 2010). This involved a walkover of the site, mapping all habitats present and noting dominant species. The survey was extended to include records of protected or notable fauna and the habitats were evaluated for their potential to support such fauna.

4.12 Hedgerows within or forming the external boundaries to the site which have a continuous length of or exceeding 20m were surveyed in accordance with the Hedgerow Regulations 1997. Survey results were used to determine whether any of the hedgerows meet criteria listed in Part II of Schedule 1 and would therefore be

deemed an 'important' hedge under the regulations. Hedgerows forming the boundary of the curtilage of a dwelling-house are not covered by the regulations and were not surveyed.

4.13 Aerial photographs and MAGIC were studied to identify whether any ponds lie within 500m of the development.

4.14 The site was surveyed for evidence of badgers. Field signs included setts (noting number of entrances and evidence/level of recent activity); latrines; well worn pathways; footprints; snuffle holes; hairs caught in boundary fences; scratching posts; smells.

4.15 All signs of water vole activity were looked for. Signs included latrines (discrete piles of droppings); feeding stations or chopped vegetation; lawns (grazed areas at entrances to the tunnels); tunnel entrances above and below the water line; paths and runs at the water's edge; runs within the vegetation; footprints in the mud; and sightings/sounds of water voles entering the water.

4.16 Field samples were taken from the pond on 10th May 2017 for qPCR analysis of great crested newt environmental DNA (eDNA). A single visit was made to the pond. Water sample collection followed the field protocol adopted by Biggs et al.

5. Constraints

None

6. Site Description

Westholme Road, Masham is located on the eastern side of Masham (central grid reference: SE220 807). The site comprises sheep-grazed fields, hardstanding with stored items, a hedge along the southern and western boundaries and mature / veteran trees. There are three buildings on site. Swinney Beck flows just outside the southern boundary of the site. Surrounding land use to the east and north is residential. To the west and south is permanent pasture, with some arable. Field boundaries are marked by hedges with some tree lines and scattered mature trees. Within the wider area and within bat commuting distance there are some large areas of woodland, part of Swinton Estate, and the wooded corridor of the River Burn which offer high quality bat foraging habitats.



Figure 3 - Site location plan showing red line site boundary (1:50,000).

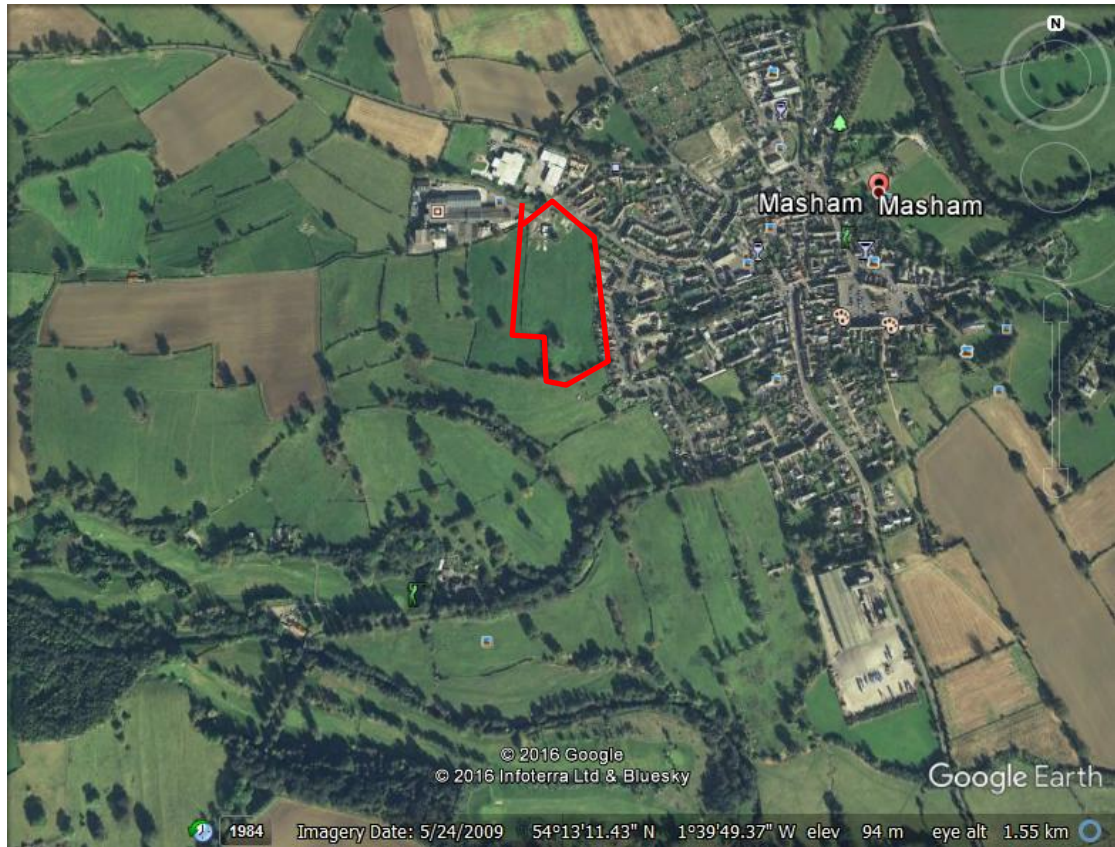


Figure 4 - Aerial view of the site and surrounding landscape.

7. Baseline ecological conditions

7.1 Designated sites

The Nidderdale Area of Outstanding Natural Beauty boundary is located just to the north of the site, approximately 500m away. There is also a Site of Special Scientific Interest (SSSI) with the search radius, see 7.2 . There are no other statutory designated sites within the 2km search area, and no national nature reserves.

Designation	Name or location of site	Grid reference
Area of Outstanding Natural Beauty (AONB)	Nidderdale	SE209 796
Site of Special Scientific Interest (SSSI)	Mar Field Fen	SE 222 819

The NEYEDC data search has also returned a total of two non-statutory sites of importance for nature conservation (SINC's) located close by. These are :

Site code	Site name	Grid reference	SINC status
SE 27-31	River Ure (Masham to Mickley) Hambleton	SE 232 792	SINC
SE 28-16	Marfield Gravel Pit	SE 218 821	SINC

Table 1 Designated sites within a 2km search radius

All of the above designated sites are shown on Figure 5 below. The site does not fall within the boundaries of and is not immediately adjacent to any of these sites.

EClA: Land west of The Oaks, Masham 2017

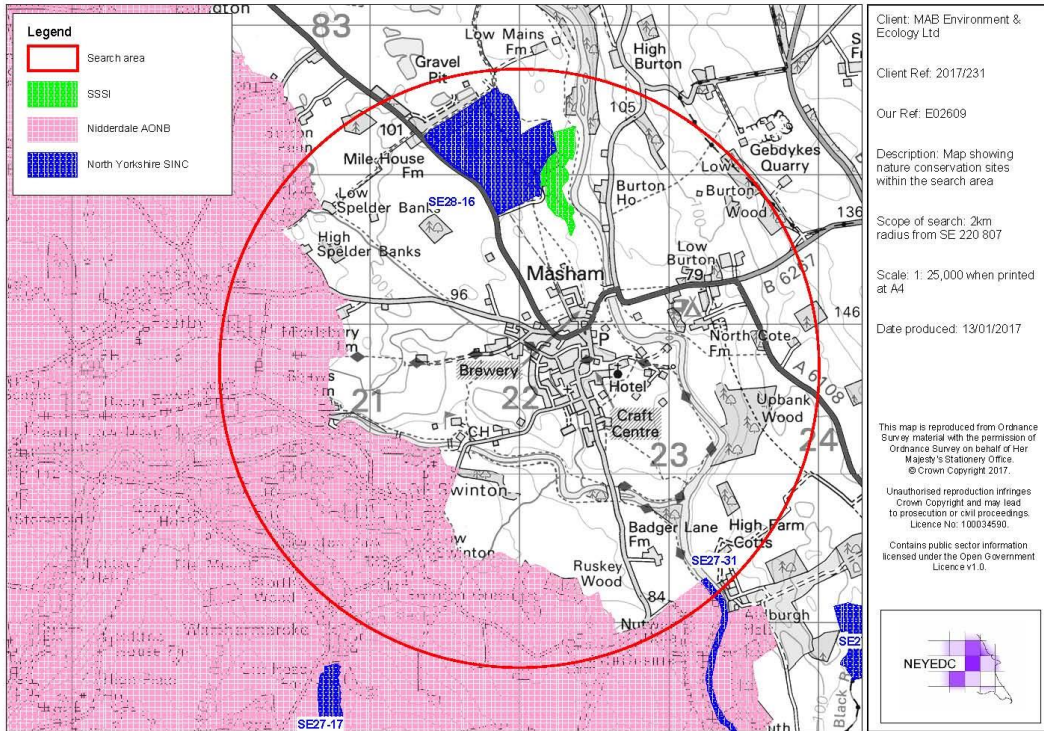


Figure 5 - Map showing conservation sites within the search area.

7.2 Habitats

Grassland

The Natural England Habitat inventories were searched (including Woodland Inventory & Grassland Inventory). The search has returned areas of Ancient and Semi-Natural Woodland, Ancient Replanted Woodland, Lowland Mixed Deciduous Woodland, Purple moor grass and rush pasture, Fen and Reedbeds. None of these are on the site itself. These areas are shown on Figure 6 below. None of these habitats are closer than 500m to the site.

Designation	Name or location of site	Grid reference
Fens Reedbeds Purple moor grass and rush pasture	Mar Field Fen	SE222 819
Ancient Replanted Woodland Lowland Mixed Deciduous Woodland	E bank of River Ure, High Burton	SE 225 824
	Low Burton Wood	SE235 819
	Upbank Wood	SE236 804
	Ruskey Wood	SE222 792
	N bank River Burn, Shaws Farm	SE209 803
Ancient and Semi Natural Woodland Lowland Mixed Deciduous Woodland	Swinton Park, S of Lake	SE 206 792
	North Wood	SE205 801

Table 2 Notable habitats within 2km search radius

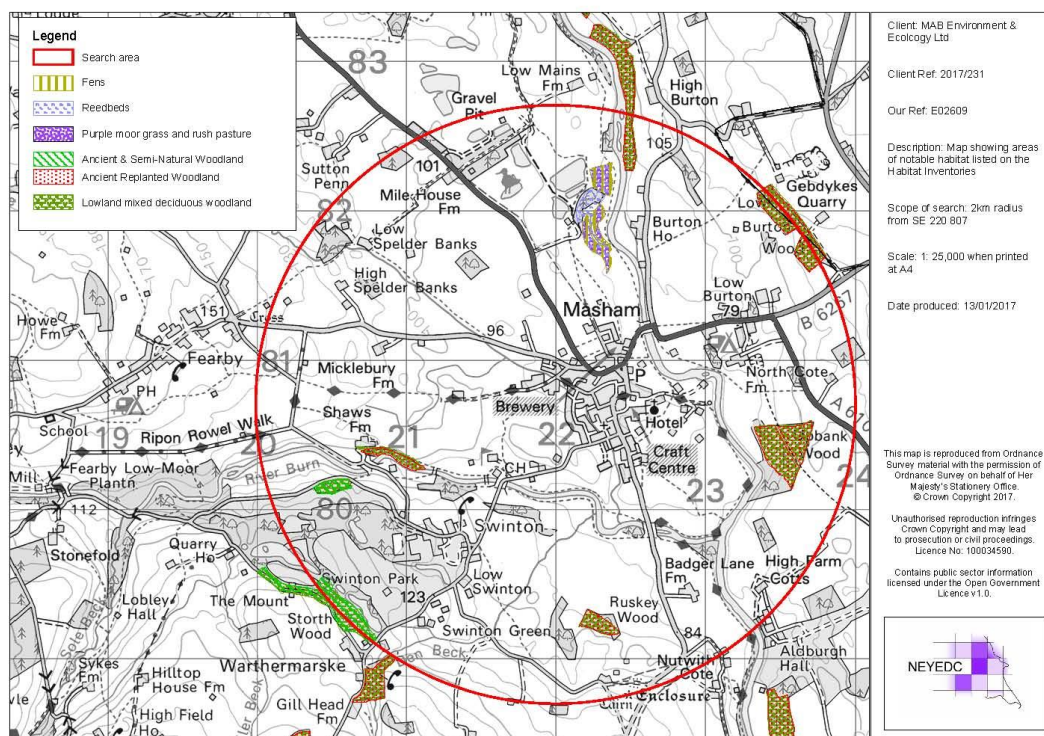


Figure 6 - Map showing areas of notable habitat listed on the Habitat Inventories.

Grassland within the site at Westholme Road is improved with a dominance of Rye grass (*Lolium perenne*) grazed by sheep; there is a small area of marshy grassland to the south of the site.

Ponds

From Magic OS maps and aerial imagery of the local area, there are no ponds visible within 500m of the development site area. See Figure 7. On the scoping survey a small pond was noted within the adjacent field. This is located approximately 200m from the southern site boundary, and is shown on Figure 8 below. The pond is separated from the development site by a field of grazed improved grassland. See Photo 37.

MAGIC

Ponds within 500m

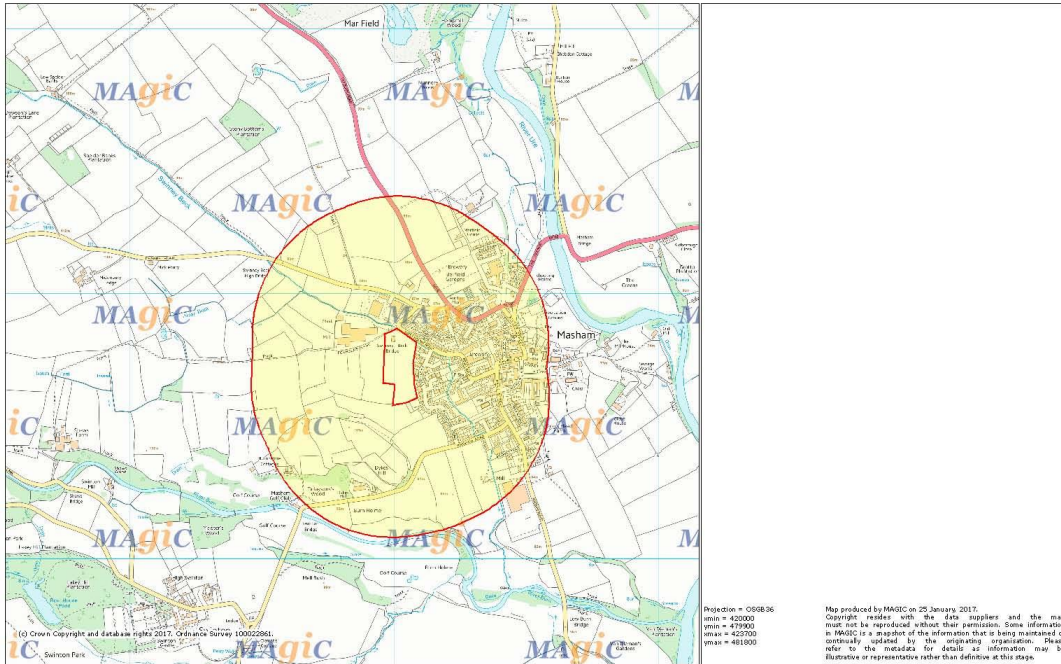


Figure 7 - OS map showing location of ponds (none) within the local area and 500m search area.

MAGIC

pond identified on survey

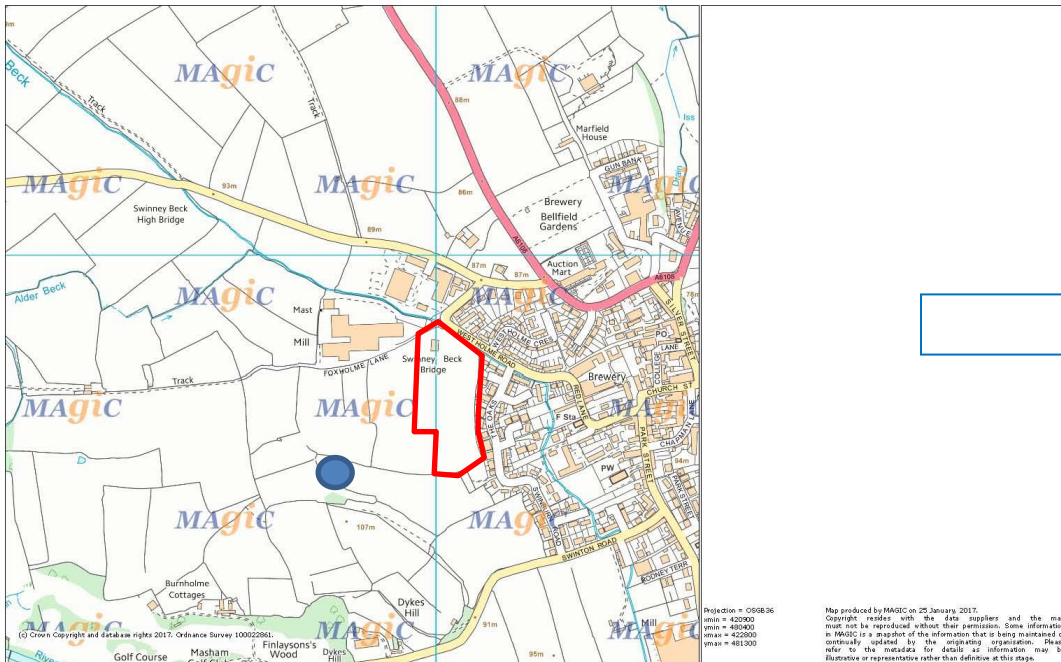


Figure 8 - OS map showing location of pond in relation to the development area.

Swinney Beck

Swinney Beck flows just outside the development site to the northern boundary. Banks are quite steep and bankside vegetation is tall ruderal, consisting of hogweed (*Heracleum sphondylium*), reed canary grass (*Phalaris arundinacea*), great willowherb (*Epilobium hirsutum*) and nettle (*Urtica dioica*). There is scrub regeneration on the northern bank – ash (*Fraxinus excelsior*), hawthorn (*Crataegus monogyna*), honeysuckle (*Lonicera periclymenum*), bramble (*Rubus fruticosus*).

Woodland

The Natural England Habitat inventories include areas of Ancient Replanted Woodland, Lowland Mixed Deciduous Woodland and Ancient and Semi Natural Woodland within the 2 km search area. These are all over 700m from the site. See Figure 6.

There is small area of broadleaved woodland on the southern boundary between the grassland and the beck. This is comprised of oak, hawthorn, elm, elder and hazel.

Other habitats

The search of the habitat inventories also returned areas of fen, purple moor grass and reedbeds at Marfield Fen. These areas are 800m away on the other side of Masham. There is upland heathland at Skipton Moor (SE 014 509 and SE 009 504). These areas are on the outer edge of the search area.

Other habitats on site include a strip of scrub woodland along the roadside to the north of the site. There are species poor, gappy boundary hedgerows.

The habitats found on site are highlighted within the phase 1 habitat map below (Figure 9). Target notes are included in Table 1, which gives more detailed information about the habitats present, along with species lists.

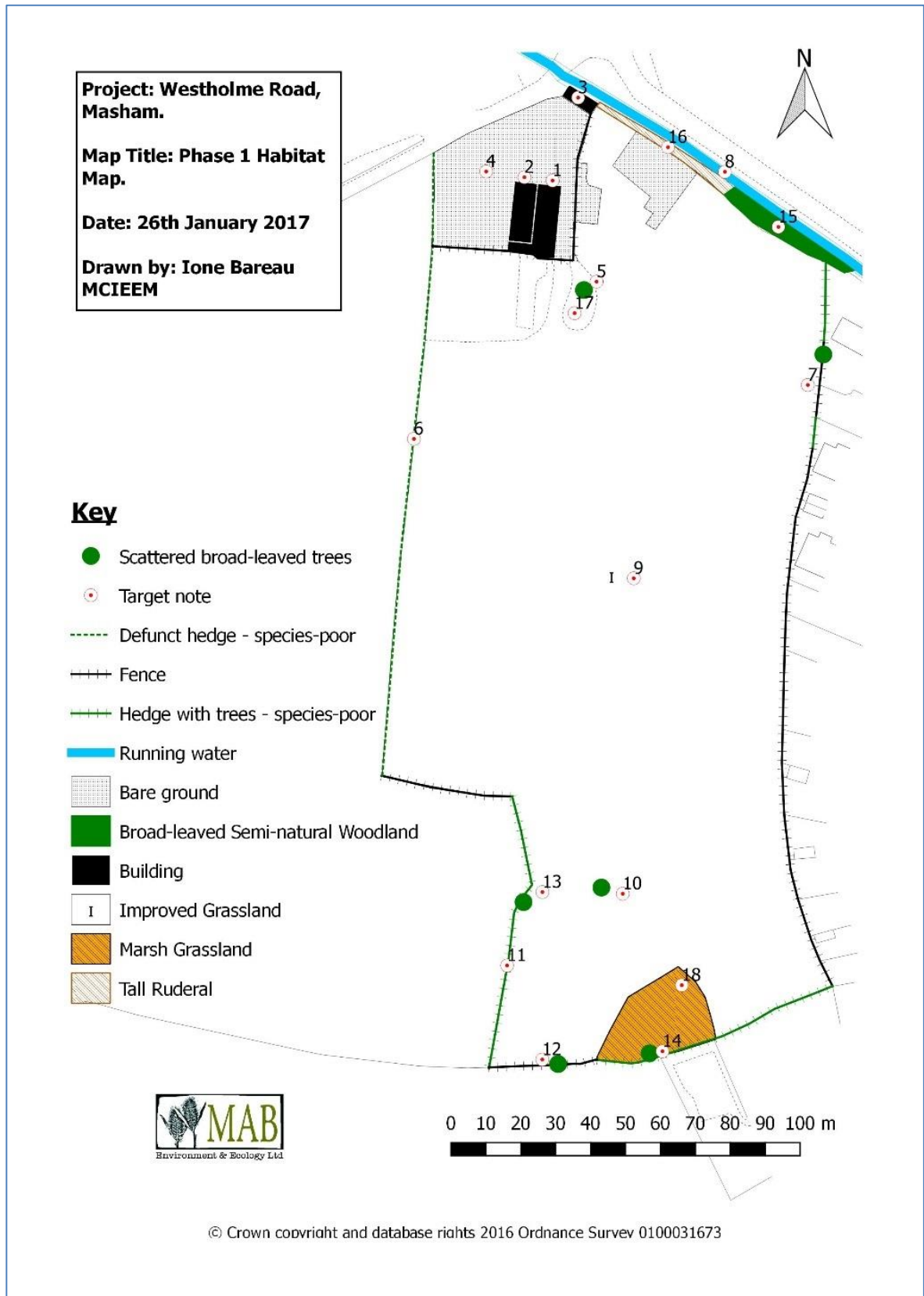


Figure 9 – Phase 1 habitat map.

EclA: Land west of The Oaks, Masham July 2017

Target note(TN)	Description	Notes on potential faunal /habitat value	Further survey
1	Building 1- Breeze block single storey agricultural building with tin roof. No crevices externally or internally. One birds' nest on breeze block pillar. Timbers generally cobwebby. No bat droppings but sheep lambing inside so floor covered in straw. Photos 1, 2 and 3.	Limited potential bat roost habitat (PBRH) but gaps between tin and wall tops which were inaccessible. Birds' nest.	
2	Building 2 is connected at the south end to Building 1. Old feed mill. Breeze block with asbestos sheet roof and metal roof trusses. No crevices. Lots of stored items. Very dusty. No bat droppings seen. Two little owl pellets; one barn owl pellet. Lots of barn owl streaking. Various birds nests – including swallow. Photos 5,6,7,8,9 and 10.	Limited PBRH but again some gaps under sheets and wall tops. Limited use by barn owl and little owl. Swallow.	Further pre-works barn owl check.
3	Single storey brick/ stone building with tin roof on wooden beams. Good conditions inside. Some external crevices in stonework. No bat droppings inside. Photos 11, 12 and 13.	Limited PBRH but some crevices.	
4	Hardstanding – has colonised with ephemeral species – white clover (<i>Trifolium repens</i>), herb Robert (<i>Geranium robertianum</i>), bramble (<i>Rubus fruticosus</i>), strawberry (<i>Fragaria vesca</i>) etc. Lots of stored items on pallets, piles of soil, stone etc. Photos 14, 15 and 16	Potential for amphibians under tiles, stones etc.	
5	Mature oak . Dead wood and splits. Photo 17	Bat roost. Protect Root Protection Area (RPA).	Further bat surveys/ tree inspections to confirm status of roost and inform possible requirement for EPS licences.
6	Hawthorn (<i>Crataegus monogyna</i>) hedge. Some elder (<i>Sambucus nigra</i>) and hazel (<i>Corylus avellana</i>). Cut very short and gappy. Photo 18	Some bird nesting potential. Not 'important' under Hedgerow Regs. Could be enhanced by gapping up with natives.	
7	Mature oak with ornamental ivy. Outside the site boundary but RPA will apply. Splits and dead wood. Hedgerow here is fragmented, as on edge of housing, and species poor. Holly (<i>Ilex aquifolium</i>), Hawthorn (<i>Crataegus monogyna</i>) and elder (<i>Sambucus nigra</i>). Photo 21 and 22.	PBRH in tree. Hedge is not important. Scope for gapping up. RPA to protect.	
8	Swinney Beck. Outside the development area; no signs of water voles. Bank sides	Keeping good water quality an issue.	

EclA: Land west of The Oaks, Masham 2017

	with great willowherb (<i>Epilobium hirsutum</i>), reed canary grass (<i>Phalaris arundinacea</i>), sticky willy (<i>Galium aparine</i>), Hogweed (<i>Heracleum sphondophyllum</i>), nettle (<i>Urtica dioica</i>). Photos 19.	Maintain wildlife corridor. Bird breeding habitat.	
9	Grazed fields of 'improved' grassland dominated by rye grass (<i>Lolium perenne</i>), meadow grass (<i>Poa sp</i>), cocksfoot (<i>Dactylis glomerata</i>), creeping thistle (<i>Cirsium arvense</i>) O, nettle (<i>Urtica dioica</i>), lesser celandine (<i>Ranunculus ficaria</i>) A, Photo 23 and 24.	Low value	
10	Large mature ash (<i>Fraxinus excelsior</i>). Splits, uplifted bark, holes etc Large RPA. Photo 25,26 and 27.	Bat roost of common pipistrelles. RPA to protect.	Further bat surveys/ tree inspections to confirm status of roost and inform possible requirement for EPS licences.
11	Hazel hedge (full height). Species-poor with one mature ash (TN13). Photo 28	Good bird nesting habitat and bat foraging. Scope for enhancement by gapping up with native species.	
12	Veteran oak. Lots of splits, holes, dead wood etc. Dead wood on ground. Photos 29, 30 .	High PBRH, bird nesting habitat and large RPA to protect. Dead wood provides habitat for saproxylic invertebrates.	Emergence survey scheduled for July.
13	Mature ash in hedge line. Some dead wood and holes. Photo 31 and 32.	Moderate PBRH.	No
14	Mature oak in hedge line. Hedge has more species than others. Hawthorn (<i>Crataegus monogyna</i>), elm (<i>Ulmus procera</i>), Elder (<i>Sambucus nigra</i>), hazel (<i>Corylus avellana</i>) Photo 33	Low PBRH but this will be felled as Category U.	Emergence survey scheduled for July.
15	Outside the development area. Small area of broadleaved woodland along beck side; almost just a wide hedge. Oak (<i>Quercus robur</i>), hawthorn (<i>Crataegus monogyna</i>), elm (<i>Ulmus procera</i>), sloe (<i>Prunus spinosa</i>), ivy (<i>Hedera Helix</i>), hazel (<i>Corylus avellana</i>) Photo 34.	Bird nesting habitat. Bat commuting / foraging.	
16	Tall ruderal vegetation along Swinney Beck Bank sides with great willowherb (<i>Epilobium hirsutum</i>), reed canary grass (<i>Phalaris arundinacea</i>), sticky willy (<i>Galium aparine</i>), hogweed (<i>Heracleum sphondophyllum</i>), nettle (<i>Urtica dioica</i>). Scrub has been cut down in western section – bramble (<i>Rubus fruticosus</i>),	Keeping good water quality an issue. Maintain wildlife corridor. Bird breeding habitat.	None

	honeysuckle (<i>Lonicera periclymen</i>), ivy (<i>Hedera helix</i>), hawthorn (<i>Crataegus monogyna</i>).Photo 20.		
17	Piles of soil, silage etc Photo 36		
18	Area of wet grassland - Yorkshire fog (<i>Holcus lanatus</i>), soft rush (<i>Juncus effusus</i>), <i>Poa sp</i> , marsh foxtail (<i>Alopecurus geniculatus</i>) crested dogtail (<i>Cynosaurus cristatus</i>) on edge of wetter area. Photo 35	Too small area for ground nesting birds. Species poor.	

Table 3: Target notes

Site photographs:



Photo 1 – Building 1



Photo 2 – Building 1 inside



Photo 3 Bird's nest Building 1



Photo 4 Buildings 1 and 2



Photo 5 Building 2 inside



Photo 6 Swallow nest Building 2



Photo 7 Bird's nest Building 2



Photo 8 Barn owl pellet and streaking Building 2



Photo 9 Asbestos with gap to wall top Building 2



Photo 10 Building 2



Photo 11 Building 3



Photo 12 Building 3 inside



Photo 13 Stonework with crevices Building 3



Photo 14 Hard standing with buildings and stored items



Photo 15 Stored items



Photo 16 Piles of soil



Photo 17 Mature oak tree TN5



Photo 18 Hawthorn hedge TN 6



Photo 19 Swinney Beck



Photo 20 Swinney Beck riparian strip of vegetation.



Photo 21 Mature oak. TN 7



Photo 22 Mature oak TN7.



Photo 23 Grassland



Photo 24 Grassland



Photo 25 Mature ash TN 10



Photo 26 Holes/ dead wood in ash TN 10



Photo 27 Uplifted bark in ash TN10



Photo 28 Hazel hedge TN 11



Photo 29 Veteran oak



Photo 30 Splits, dead wood, holes in veteran oak



Photo 31 Ash in hedge line TN11 /TN13



Photo 32 Holes in Ash TN 13



Photo 33 Hedge with mature oak TN 14



Photo 34 Small area of woodland TN 15



Photo 35 Wet grassland TN 18



Photo 36 Piles of soil, manure



Photo 37 Pond outside development site

7.3 Species and species groups

7.3.1 Plants

The data search identified the following protected or notable plant species present within the 2km search area (Marfield Gravel pit):

- Thyme-leaved sandwort (*Arenaria serpyllifolia*)

No records relate to the site itself.

7.3.2 Invertebrates

The desk study flagged up records for

- White-clawed freshwater crayfish (*Austropotamobius pallipes*)

These records (all historic) are from the River Burn just outside Masham and the River Ure.

Habitats on site are likely to provide limited habitat for a range of invertebrates, the southern part of the site within the marshy grassland will provide invertebrate habitat. Also the mature trees contain dead wood; the veteran oak has dead wood beneath it which will provide habitat for saproxylic invertebrates.

7.3.3 Amphibians and reptiles

There are no local records for reptiles. Common toad, common frog and palmate newt have been recorded locally, but there are no great crested newt (GCN) records. There is a pond within 200m of the development boundary and there is suitable habitat for refugia/hibernacula on site due to piles of stones, tiles, pavers etc. The majority of the grassland field offers suboptimal habitat due to the short sward height.

An eDNA test on the pond has confirmed presence of GCN with 6 positive replicates. See Appendix 3 for full eDNA results.

7.3.4 Birds

The NEYEDC data search returned eight bird species of conservation concern within 2km of the site:

- Mallard (*Anas platyrhynchos*)
- Common kingfisher (*Alcedo atthis*)
- Common swift (*Apus apus*)
- Greater Canada goose (*Branta Canadensis*)
- Common moorhen (*Gallinula chloropus*)
- Barn swallow (*Hirundo rustica*)
- House martin (*Delichon urbica*)
- Mute swan (*Cygnus olor*)

Barn swallow is the only bird listed above that could be supported on site and evidence of their nesting was found in Building 2. A pellet and streaking of Barn owl and pellets of little owl were also found in Building 2.

Suitable nesting habitat for birds is available within the mature trees and hedgerows.

7.3.5 Bats

7.3.5.1 Desk top study

Records held by the North Yorkshire Bat Group (NYBG) are provided below. The data search has returned a large number of roost records and in-flight records from the Masham area. Species recorded locally include common and soprano pipistrelle; brown long-eared bat, Daubenton's bat and noctule. There are no records relating to the site.

Species	Site	Grid ref.	Quantity	Date	Comment
Daubenton's Bat	Masham Great Bridge	SE22581 3		01-Aug-01	Maternity roost
Daubenton's Bat	Masham great bridge	SE22681 3		07-Jul-03	Roost
Daubenton's Bat	Masham great bridge	SE22681 3	8	01-Aug-01	Roost
Noctule Bat	Masham Great Bridge	SE22581 3		01-Aug-01	Roost
Noctule Bat	Masham great bridge	SE22681 3		01-Aug-01	In flight and feeding
Noctule Bat	30 Park Street, Masham	SE22374 80604	1	29-Aug-14	In flight
Common Pipistrelle	Swinton Park, Masham	SE21179 7		Jul-09	Roost
Common Pipistrelle	Swinton Park	SE21179 7	4	19-Jul-11	Roost
Common Pipistrelle	30 Park Street, Masham	SE22374 80604		29-Aug-14	In flight
Common Pipistrelle	SE211797	SE21179 7	1	02-Jul-14	Roost
Brown Long-eared Bat	2 Aldburgh Close, Masham	SE23033 81201		11-Feb-87	
Brown Long-eared Bat	2 Station Cottages, Masham	SE23281 2		15-Jul-02	Roost
Brown Long-eared Bat	Swinton Park, Masham	SE21179 7		Jul-09	Roost
Soprano Pipistrelle	Masham Great Bridge	SE22581 3		01-Aug-01	Roost
Soprano Pipistrelle	Masham great bridge	SE22681 3		07-Jul-03	Roost
Soprano Pipistrelle	Masham great bridge	SE22681 3		01-Aug-01	In flight and feeding
Soprano Pipistrelle	Park House, Park Square, Masham	SE22342 80808	266	04-Jul-05	Maternity roost

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Soprano Pipistrelle	Hemp Mill House, Marfield, Masham	SE222819	360	17-Jul-06	Maternity roost
Soprano Pipistrelle	Swinton Park, Masham	SE211797		Jul-09	Roost
Soprano Pipistrelle	Swinton Park	SE211797	1	19-Jul-11	Roost
Soprano Pipistrelle	30 Park Street, Masham	SE2237480604		29-Aug-14	In flight
Myotis bat sp.	Swinton Park, Masham	SE211797		Jul-09	Roost
Unknown	Hempmill House, Marfield Nature Reserve, Masham	SE22281		11-Jul-01	Roost
Unknown	The Barn, Swinton Grange, Masham, Ripon	SE212795	3	04-Jun-02	Bats inside building
Unknown	16 Park Street, Masham, Ripon	SE2238480666	20	05-Aug-02	Roost
Unknown	Marfield House Farm, Masham	SE222814		24-Sep-87	
Unknown	Fairview, Masham	SE22280		1988	
Unknown	2 Aldburgh Close, Masham	SE2303381201		12-Jun-84	Roost
Unknown	St Mary's church, Masham	SE22280		1988	
Unknown	2 Station Cottages, Masham	SE232812		15-Oct-00	
Unknown	St Mary's Church, Masham	SE226807		16-Apr-88	
Unknown	Flat 12 Maple Creek, Red Lane, Masham	SE220806	c.30	14-Jun-04	Roost
Unknown	1 Station Cottages, Masham	SE232812		17-May-04	Roost
Unknown	Black Sheep Brewery, Masham	SE222810		16-Jul-04	Bat on wall at brewery.
Unknown	24 Swinburn Road, Masham	SE2223080539		04-Aug-03	Roost
Unknown	Re Kings Head Hotel, Masham	SE223808		04-Sep-03	Roost
Unknown	St Mary's Church, Masham	SE226807		1992	Roost
Unknown	9 Park Drive, Masham	SE2244880547		31-Jul-90	Roost
Unknown	Maple Creek, Red Lane, Masham	SE222806		22-Apr-08	Roost
Unknown	Marfield Wetlands	SE217822		02-Feb-14	Roost in hide
Unknown	Marfield Wetlands (High Ridge Hide)	SE216823		25-Oct-11	Roost

7.3.5.2 Visual inspection

Building 1: No crevices between breeze block walls. No bat signs observed but building was being used by sheep so evidence may have been obscured. Tin sheeting roof with metal and wooden beams. Beams were very cobwebby. The only area of potential bat roost habitat was the gap between tin sheeting and wall tops.

Building 2: No crevices in breezeblocks but some gaps between asbestos sheeting and wall tops. Beams generally cobwebby.

Building 3: Stone and brick buildings with crevices in stone work. Conditions good inside for preservation of bat signs and no evidence so no void flying bats but some potential bat roost habitat for crevice dwellers such as pipistrelles.

Trees: all of the mature trees on site (oak and ash) have potential bat roost habitat within them due to knot holes, uplifted bark, dead wood, cavities and splits. In particular the veteran oak (TN12) and ash (TN10) have a large number of these habitat features. These features have the potential to provide dry and sheltered roosting opportunities for bats.

7.3.5.3 Bat Transect Survey

Date: 22/06/17

Start time: 21:45

End time: 23:10

Sunset: 21:45

	Temp (°C)	Wind (mph/BF)	Humidity (%rh)	rain	Cloud cover (%)
Start	16.3	0	65.6	Dry	100
Finish	13.7	0	74.2	-	100
Max	16.3	1.4	76.2	-	100
Min	13.1	0	65.6	-	100
Ave	14.8	0	71.1	-	100

Surveyors: Sarah Emerson (SE)

Equipment used: Elekon Batlogger M

Methodology: A transect route was walked around the site over about 90 minutes. 5 minute stops were made periodically around the route and any bats were recorded.

Results summary: Common pipistrelle bats, soprano pipistrelle bats, and a Myotis bat species were seen commuting over and foraging on the site. At least 2 common and 2 soprano pipistrelles were recorded foraging around the trees and hedgerows at the southern end of the site. A common pipistrelle bat was also recorded foraging around the buildings at the north of the site. A soprano pipistrelle bat was recorded commuting from the site towards town, and a Myotis bat species was recorded commuting in the other direction.

Observations:

SE Transect results			
Stop Number	Time	Species	Activity
1	21:50 – 21:55	No bats recorded	
2	22:00 – 22:05	No bats recorded	
3	22:10 – 22:15	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	Foraging behind hedgerow
4	22:20 – 22:25	Common pipistrelle, <i>Pipistrellus pipistrellus</i> and Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	2x common and 2x soprano foraging along south hedgerows
5	22:25 – 22:30	Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	Commuting towards town
6	22:30 – 22:35	No bats recorded	
7	22:35 – 22:40	Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	Commuting towards the south
8	22:40 – 22:45	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	Foraging by hedgerow
9	22:45 – 22:50	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	Foraging by hedgerow
10	22:50 – 22:55	No bats recorded	
11	22:55 – 23:00	Myotis species	Commuting from town
12	23:00 – 23:05	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	Foraging by northern buildings

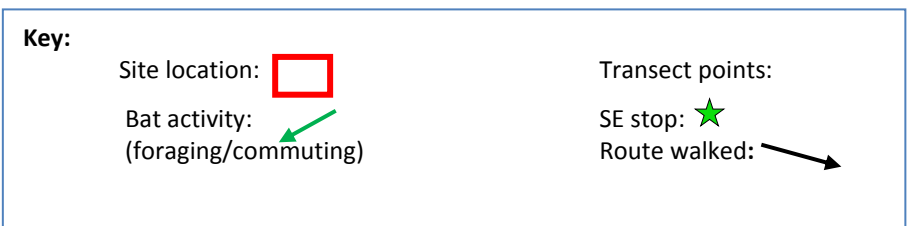
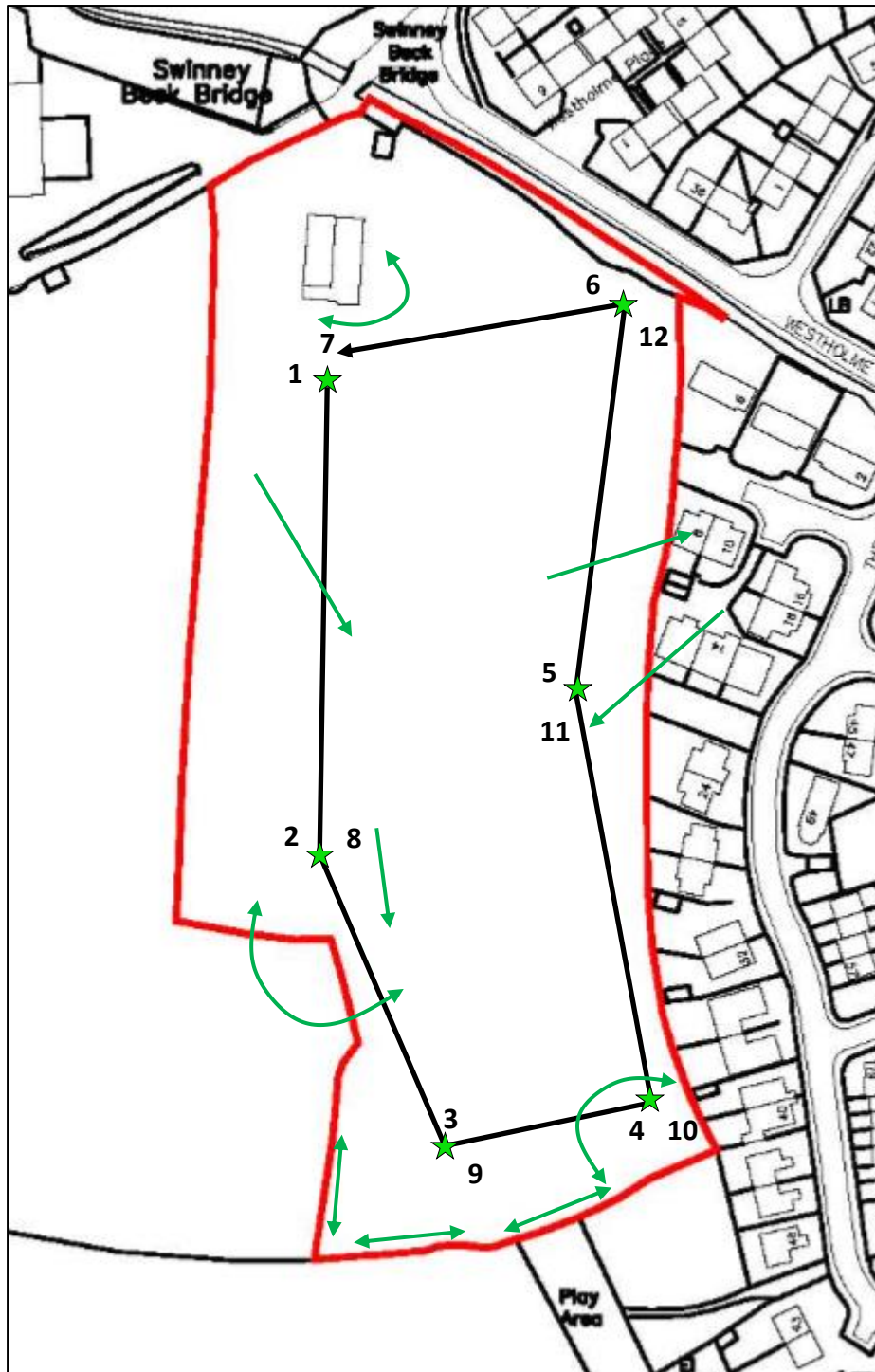


Figure 100 – Stop points and bat activity recorded during survey 1 (22/06/17).






7.3.5.4 Ash tree TN10 Emergence Survey**Date:** 22/06/17**Start time:** 21:30**End time:** 23:00**Sunset:** 21:45

	Temp (°C)	Wind (mph/BF)	Humidity (%rh)	rain	Cloud cover (%)
Start	16.3	0	65.6	Dry	100
Finish	13.7	0	74.2	-	100
Max	16.3	1.4	76.2	-	100
Min	13.1	0	65.6	-	100
Ave	14.8	0	71.1	-	100

Surveyors: Sam Jones (SJ).**Equipment used:** Pettersson D240x time expansion ultrasound detector with Edirol R09 recorder.**Results summary:**

A total of 2 common pipistrelle bats emerged from a crack in a branch of the ash tree. There was also some low-level foraging activity by a common pipistrelle bat, and 2 soprano pipistrelle bats around the hedgerow to the west of the tree recorded throughout the survey.

Observations:

Surveyor	Time	Species	Number	Activity	Annotations
SJ	22:06 – 22:14	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	2	Emergence from crack in upper branch	
SJ	22:20 – 22:29	Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	2	Foraging in hedgerow and between tree and hedgerow to the west	
SJ	22:23	Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	1	Commuting past tree to the north heading east	
SJ	22:27	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Commuting around tree heading west	
SJ	22:39 – 22:41	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Foraging between western hedgerow and tree	






Key:	
1	Target buildings
	ET Surveyor location
	Bat activity (emergence)
	Bat activity (foraging/commuting)

Figure 111: Surveyor locations and bat activity recorded around ash tree during survey 1. The aerial photo shows bat activity around the tree and the photo on the right shows the specific emergence location from a crack in the branch of the tree. (22/06/2017)

Bat Recordings

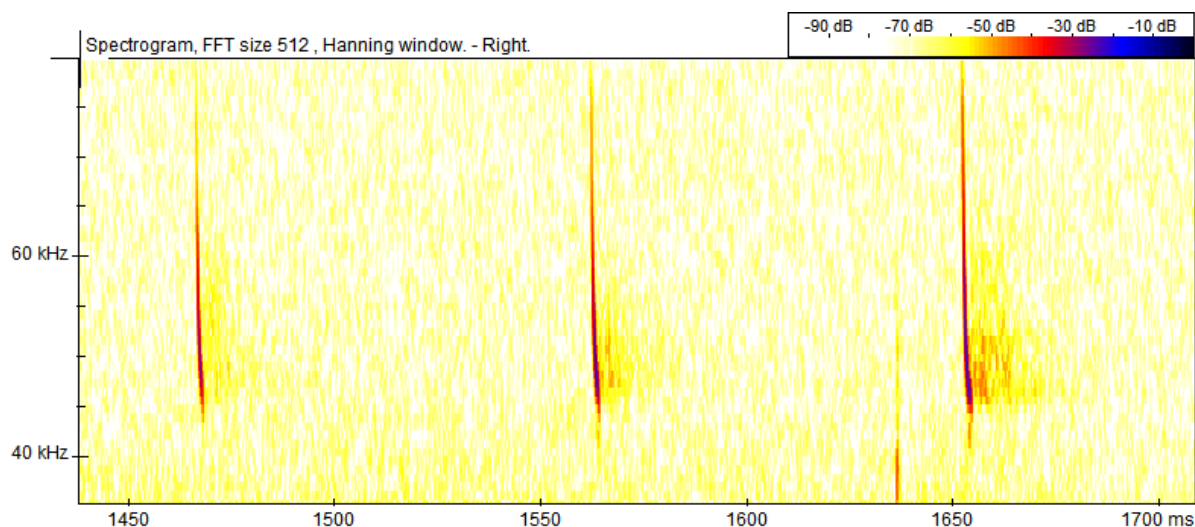


Figure 12: A sample of the bat recording visualised in Bat sound of the first emergence from tree at 22:06 showing the correct frequency range and the slight curved call shape of a common pipistrelle. (22/06/2017)

7.3.5.5 Buildings emergence survey 2 plus tree survey

Date: 29/06/17

Start time: 21:30

End time: 22:45

Sunset: 21:44

	Temp (°C)	Wind (mph/BF)	Humidity (%rh)	rain	Cloud cover (%)
Start	13.8	0.1	100	V. light rain	100
Finish	13.2	0	93	V. light rain	100
Max	13.9	0.6	100	V. light rain	100
Min	13.2	0	93	V. light rain	100
Ave	13.3	0.3	97	V. light rain	100











Surveyors: Sarah Emerson (SE); Emma Telfer (ET); Sam Newton (SN); Sam Jones (SJ); Katie Lees (KL).

Equipment used: 3x Pettersson D240x time expansion ultrasound detector with Ediol R09 recorders, 1x Pettersson D230x time expansion ultrasound detector, 1x Batbox Duet ultrasound detector.

Results summary:

A total of 4 bats emerged from the survey area, all from the oak near the survey buildings. 3 common pipistrelles emerged from the branches of the tree as well and one whiskered/Brandt's bat. There was some low-level foraging activity around the buildings and the tree to the south throughout the survey.

Observations:

Surveyor	Time	Species	Number	Activity	Annotations
ET and KL	21:44	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Commuting past tree from east	
ET	21:48	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	2	Emergence from branches of oak tree heading west	
KL and ET	21:48	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Commuting past tree from east	
ET, SN, and KL	21:53 – 22:17	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	3	Commuting past and through oak tree from east	
ET, SN, and KL	21:58	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Emergence from branches of oak tree heading west	
SJ	22:02	Myotis species	1	Commuting past to the north of site	
ET and SN	22:11 – 22:26	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	2	Foraging around south of building and flying into building	
SE, SJ, and SN	22:11 – 22:30	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Foraging to the north of building	
ET	22:15	Whiskered/Brant's, <i>Myotis mystacinus/brandtii</i>	1	Emergence from oak tree branches heading north	
SE	22:30 –	Common pipistrelle, <i>Pipistrellus pipistrellus</i>	1	Commuting past site to the west	

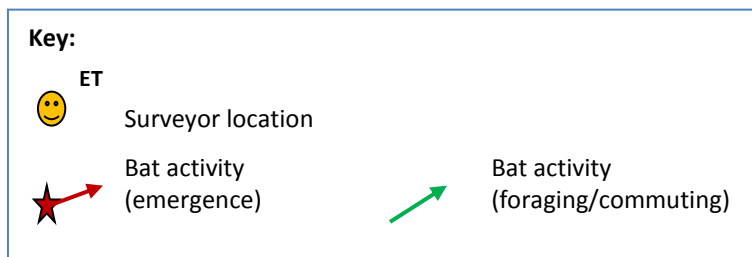
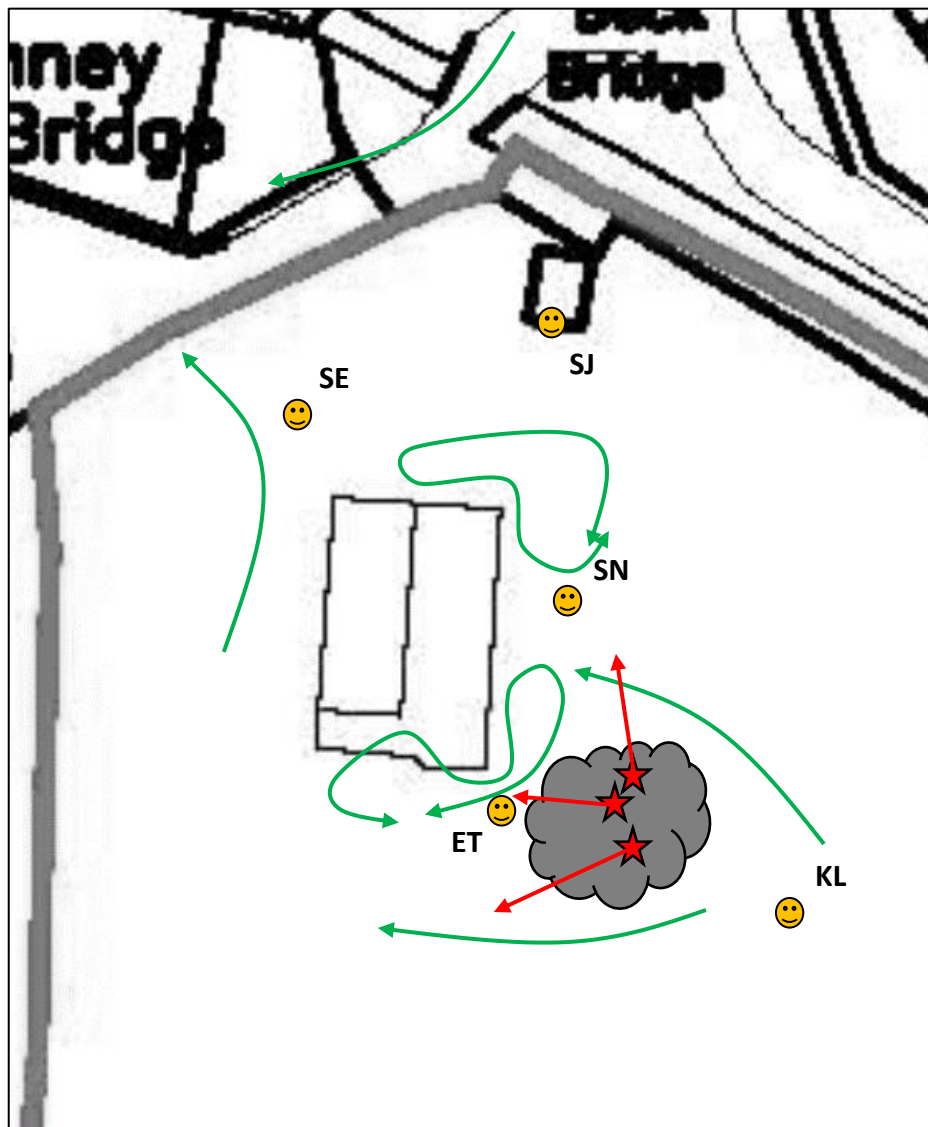


Figure 12: Surveyor locations and bat activity recorded during survey 2 (29/06/2017)

Emergence Locations

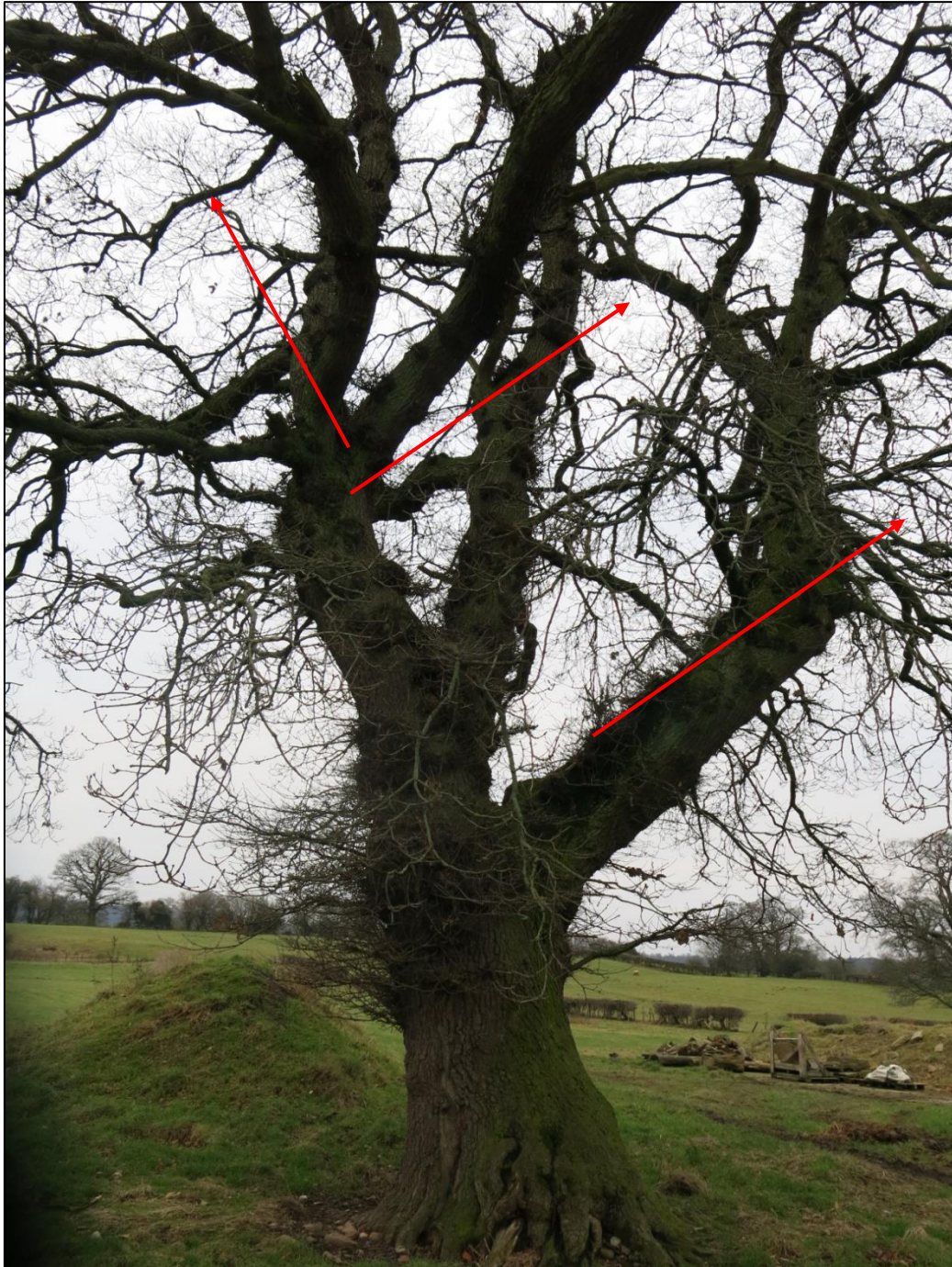


Figure 2: Approximate emergence locations from the branches of the oak tree (TN 5) near the survey buildings.

Bat Recordings

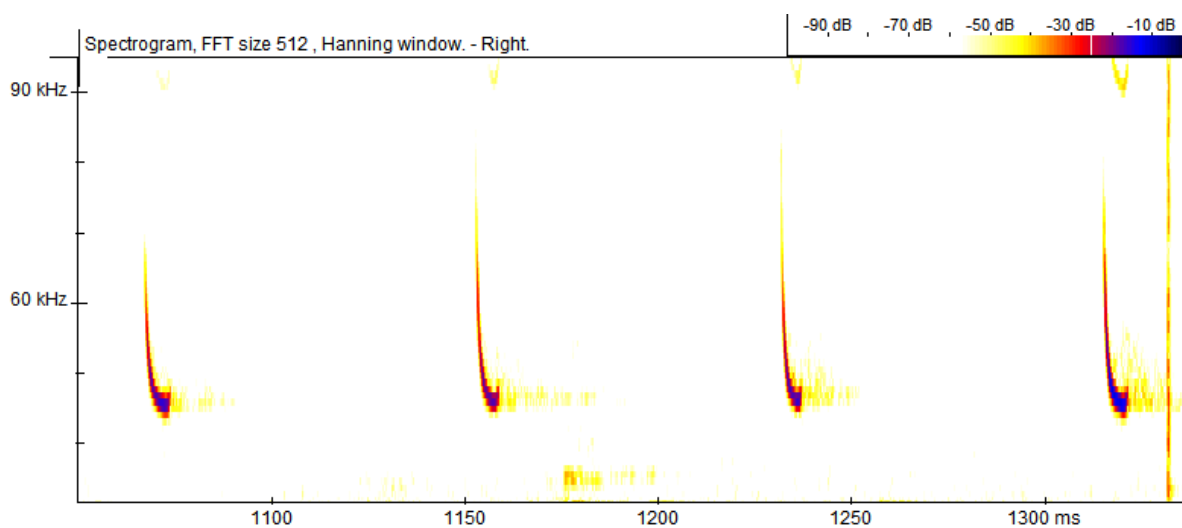


Figure 13: A recording visualised in Bat Sound of the 21:48 common pipistrelle emergence clearly showing the shape, frequency, and call duration of a common pipistrelle call. (29/06/17)

Emergence time	Bbar	Malc	Mbec	MbraMmys	Mdau	Mnat	NSL	Paur	Ppip	Ppyg
21:48	0	0	0	0.01	0	0.01	0.04	0	0.98	0.02
21:48	0	0	0	0.02	0	0.04	0.01	0.01	0.98	0.02
22:15	0.02	0	0.03	0.66	0.13	0.22	0	0.05	0.16	0.01

Bat classify analysis of the bat recordings of emergences from the oak tree. It shows the probabilities of calls being different species based on frequency and call length analysis. (29/06/17)

Badgers

The NEYEDC data search has returned no local records for badger. No field signs for badger were recorded during the site walkover.

Other mammals

The desktop study identified local records for European water vole (*Arvicola terrestris*) from 1972; many for European otter (*Lutra lutra*) for the River Burn, Ouse and Ure; and records for American mink (*Mustela vison*).

Swinney Beck offers suitable habitat for water vole but no field signs were seen during the initial walkover survey. Otter could utilise Swinney beck but it is very urban and there is no habitat for lying up or holts.

Full results of the data searches are provided within Appendix 2

8. Discussion

The majority of the site is improved grassland which is of little value ecologically; there is a small area of wet grassland towards the southern boundary but this area has few herbaceous species present.

The site provides good foraging habitat for bats around the mature trees and two sections of hedge, though the majority of the hedges are fairly gappy and cut very short; on a wider scale there is good connectivity to woodlands and the River Burn wooded corridor. A bat transect survey around the boundaries of the site found a few pipistrelle bats and a myotis bat foraging around the trees and along hedges but none of the hedges were being used as bat commuter routes.

The buildings provide some potential habitat for bats; this is limited to crevices in the brick/ stone barn (Building 3) and between roofing sheets and wall tops in Buildings 1 and 2. An emergence survey carried out in the optimal bat season found no bat roosts in any of the buildings on site.

Building 2 has been used as an occasional roost by little owl and barn owl. Other birds are also nesting notably swallow. No owls were noted in the emergence survey so it seems that the evidence backs up occasional roosting by both owl species.

The mature trees on site all have varying amounts of dead wood, splits, uplifted bark and knot holes; in particular the veteran oak TN12 and in field ash TN10. These features provide good habitat for bat roosting. All the trees are being retained except for TN14 which has been classed as category U in the arboricultural survey. Emergence surveys on TN10 the infield ash, and TN 5 the oak identified small common pipistrelle day roosts in both these trees.

Further surveys are scheduled for the other two trees on the 13th July 2017.

All the trees have large root protection areas (RPA's) which will need protecting during development from compaction and damage. Dead wood should be left in situ where possible particularly in the veteran tree as this will continue to provide habitat for saproxylic invertebrates.

There are large piles of stone and rubble stored on site which provide refuge and hibernation habitat for amphibians. There is a pond within 200m of the site; there are no GCN records within the 2km search radius. An eDNA test on the pond has confirmed presence of GCN; with a positive replicate count of 6. Further work is identified in the method statement but a receptor has been identified within the development area; close to the southern boundary to maintain connectivity with the pond.

Swinney Beck runs parallel to the northern boundary of the site. Though it is outside the development boundary; it is important to buffer this river from the development, by providing a 3m buffer zone. This will ensure that the wildlife corridor is maintained and water quality is not compromised while the development is ongoing.

9. Impact assessment

9.1 Habitats

No impact on any notable habitats; an area of wet grassland will be lost but this is species poor and common at a local level.

9.2 Bats

There will be no impact on bat roosts caused by the demolition of the existing buildings.

Hedgerows are not frequented as bat commuter routes, though there is some foraging activity; hedges are being retained so there will be negligible impact on

commuting bats post-development, but there may be some indirect impact on foraging bats by, for example, lighting.

The development has the potential to impact directly on bat roosts in trees, through disturbance, severance of flight line links, and tree surgery and felling in the future; indirect impacts may result from lighting and increased disturbance.

Further survey work (bat emergence surveys/ tree inspections) will be scheduled post planning to confirm status of tree roosts, direction of flight lines and whether an EPS licence is required. A mitigation plan will be drawn up to ensure that roost status is maintained post development.

9.3 Trees

The development may impact on RPA's; these will need to be identified and protected during the development process to avoid any impacts. Dead wood should be retained and if pruning is necessary should be laid on the ground to minimise impact to saproxylic invertebrates under the veteran oak TN 12.

9.5 Breeding birds

Demolition of the buildings will result in the loss of swallow nest sites and occasional roosting by little owl and barn owl. Loss of these sites will be mitigated by a 'log store' type building with fly in zone for swallows, owl boxes and bat boxes.

9.4 GCN

Grassland habitat on site is low quality for foraging GCN but there are piles of stone, paving and soil that may act as refugia for GCN. Removal of these has the potential to kill, harm or disturb GCN. A PCSA will be undertaken to establish the population size of GCN and establish whether they are using the pond for breeding. The development will need to take place under a European Protected Species Mitigation Licence (EPSML); this will involve amphibian fencing; creation of a receptor site for GCN at the southern edge of the site, creation of two newt banks, pitfall trapping of the site, destructive searches of rubble piles and GCN friendly drainage systems. The

GCN method statement will be drawn up once the PCSA is established but the site of the receptor area has been identified at the southern boundary.

9.5 Swinney Beck

The development has the potential to affect the water quality and sever the important wildlife corridor along the beck. A 3-6 metre corridor is planned along the beck to mitigate for this.

10. Mitigation and Compensation

- 3-6m buffer strip implemented along the length of Swinney Beck.
- The demolition or renovation of buildings should avoid bird nesting season or a bird check should be undertaken. A pre-development barn owl check should be undertaken two months prior to start of works to check that status of roosting is unchanged.
- Mitigation building (log store) incorporating barn owl box, swallow fly in zone and little owl box and bat habitat features.
- **GCN** PCSA for GCN to inform EPSML; method statement to identify receptor area for GCN; creation of two newt banks, amphibian fencing and destructive searches. Development drainage systems will need to be GCN friendly – kerbless, GCN kerbs around gully pots or with a SUDS drainage system.
- **Bats** Mitigation plan/method statement for bats: post planning tree inspections/surveys on trees with roosts to confirm roost status and assess EPSL requirement. These trees will be retained as part of the development and measures employed to ensure that there is no severance of commuting routes with space left around the trees and native tree planting to ensure routes are maintained. Indirect impacts such as lighting will also be mitigated for to ensure no effect on bat roosts.
- Further biodiversity enhancement through integral bat and bird boxes within the new builds.
- Hedgerows will be gapped up with native hedgerow species; this will increase bird nesting habitat and foraging potential for bats.

11. References

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Langton, T.E.S., Beckett, C.L., and Foster, J.P. (2001), Great Crested Newt Conservation Handbook, Froglife, Halesworth.

Appendix 1: Glossary of bat roost terms

Bat Roost Definitions:

Day roost: a place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.

Night roost: a place where bats rest or shelter in the night but are rarely found in the day. May be used by a single individual on occasion or it could be used regularly by the whole colony.

Feeding roost: a place where individual bats or a few individuals rest or feed during the night but are rarely present by day.

Transitional / occasional roost: used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.

Swarming site: where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites.

Mating sites: where mating takes place from later summer and can continue through winter.

Maternity roost: where female bats give birth and raise their young to independence.

Hibernation roost: where bats may be found individually or together during winter. They have a constant cool temperature and high humidity.

Satellite roost: an alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.

Appendix 2: NEYEDC records

Data search for species records within 2km radius of SE 220 807 NEYEDC, 27/01/2017

Scientific Name	Common Name	Taxonomic group	Location	Grid Reference	Custodian	Survey	Recorder	Dated	Measurement
Bufo bufo	Common Toad	amphibian	Nostarfield	SE28	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1976	
Bufo bufo	Common Toad	amphibian	North Yorkshire	SE27	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1970 - 1977	
Bufo bufo	Common Toad	amphibian	North Yorkshire	SE28	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1970 - 1977	
Lissotriton helveticus	Palimate Newt	amphibian	Masham	SE2280	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1974	
Rana temporaria	Common Frog	amphibian	North Yorkshire	SE27	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1970 - 1977	
Rana temporaria	Common Frog	amphibian	North Yorkshire	SE28	neyadc.org.uk	Herpetofauna records from The Naturalist	Unknown	1970 - 1977	
Alcedo atthis	Common Kingfisher	bird	River Ure, Marfield, Masham	SE227822	neyadc.org.uk	Water for Wildlife Project	Voluntear (YOAT)	19/09/1996	
Anas platyrhynchos	Mallard	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Anser anser	Graylag Goose	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Apus apus	Common Swift	bird	Masham	SE22508076	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	11/05/2014	15 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22308062	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	20/05/2013	20 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22308062	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	20/05/2013	20 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22388074	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	20/07/2012	2 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22458096	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	17/06/2012	12 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22408040	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2011	4 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22478105	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2011	8 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22408040	neyadc.org.uk	Swift Inventory of Nest Sites in the UK	Surveyor (General Public)	01/01/2011	1 Abundance Nest (Count)
Apus apus	Common Swift	bird	Masham	SE22548072	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2011	8 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22408040	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2011	4 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE21237970	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2010	50 Abundance None (Count)
Apus apus	Common Swift	bird	Masham [White Bear Pub]	SE22528074	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2010	9 Abundance None (Count)
Apus apus	Common Swift	bird	Masham	SE22358104	neyadc.org.uk	Swift Inventory of Screaming Parties in the UK	Surveyor (General Public)	01/01/2010	8 Abundance None (Count)

On behalf of MAB Environment and Ecology Ltd

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NEYEDC Ref: EE02609

Data search for species records within 2km radius of SE 220 807 NEYEDC, 27/01/2017

Scientific Name	Common Name	Taxonomic group	Location	Grid Reference	Custodian	Survey	Recorder	Dated	Measurement
Branta canadensis	Greater Canada Goose	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Cygnus olor	Mute Swan	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Delichon urbicum	House Martin	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Gallinula chloropus	Common Moorhen	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Hirundo rustica	Barn Swallow	bird	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226812	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	22/04/1996	11 Abundance native crayfish (Count)
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226812	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Bird	20/07/1994	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	nr. Shaws Farm	SE208803	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	01/09/1993	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	01/09/1993	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	03/09/1992	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	nr. Shaws Farm	SE208803	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	06/09/1991	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	29/08/1991	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	River Burn	SE226798	neyadc.org.uk	Swale & Ure Washlands crayfish records	Unknown	20/11/1990	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	20/11/1990	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	nr. Shaws Farm	SE208803	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	05/09/1990	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	30/07/1990	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	River Burn	SE226798	neyadc.org.uk	Swale & Ure Washlands crayfish records	Unknown	30/07/1990	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	Masham	SE226798	neyadc.org.uk	Environment Agency crayfish/ water voles/ mussets	Unknown	26/08/1988	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	River Burn	SE225798	neyadc.org.uk	Swale & Ure Washlands crayfish records	Unknown	26/08/1988	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	River Ure	SE2281	neyadc.org.uk	Swale & Ure Washlands crayfish records	Deaton	02/08/1986	
Austropotamobius pallipes	Freshwater Crayfish	crustacean	River Burn	SE2279	neyadc.org.uk	Swale & Ure Washlands crayfish records	Unknown	20/08/1984	
Arenaria serpyllifolia	Thyme-Leaved Sandwort	flowering plant	Marfield Gravel Pit	SE218821	neyadc.org.uk	North Yorkshire SINC survey - 2004 and before	Wilmore, Geoffroy (Mr)	22/09/2000	0 Abundance Individuals (DAFOR)

On behalf of MAB Environment and Ecology Ltd

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NEYEDC Ref: EE02609

EclA: Land west of The Oaks, Masham 2017

Data search for species records within 2km radius of SE 220 807

NEYEDC, 27/01/2017

Scientific Name	Common Name	Taxonomic group	Location	Grid Reference	Custodian	Survey	Recorder	Dated	Measurement
Arvicola amphibius	European Water Vole	terrestrial mammal	Masham	SE225812	neyadc.org.uk	Yorkshire water vole records (positive)	Lloyd-Evans	20/04/1972	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Gravel bar nr Marfield Quarry, Masham	SE225827	neyadc.org.uk	Water for Wildlife Project	Jay, Sylvia	18/04/2003	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Confl of Ure and small beck Nunnery Nook, Masham	SE225818	neyadc.org.uk	Water for Wildlife Project	Jay, Sylvia	18/04/2003	
Lutra lutra	European Otter	terrestrial mammal	River Ouse, N of Masham, Masham	SE222823	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	15/03/2002	
Lutra lutra	European Otter	terrestrial mammal	River Ure, 600m DIS from Masham Sewage Wks, Masham	SE231808	neyadc.org.uk	Water for Wildlife Project	Daniel, Alan	08/07/2001	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Towards Masham, Masham	SE27	neyadc.org.uk	Water for Wildlife Project	Unknown	14/08/2000	
Lutra lutra	European Otter	terrestrial mammal	River Ure, River Burn confluence and weir, Masham	SE238792	neyadc.org.uk	Water for Wildlife Project	Unknown	14/08/2000	
Lutra lutra	European Otter	terrestrial mammal	Marfield Quarry Pools, Marfield Quarry, Masham	SE218821	neyadc.org.uk	Water for Wildlife Project	Unknown (YOARP)	01/05/1997	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Marfield Quarry, Masham	SE218821	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	01/05/1997	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Marfield Quarry, Masham	SE218821	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	01/05/1997	
Lutra lutra	European Otter	terrestrial mammal	River Burn, Low Burn Bridge	SE225799	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	22/09/1996	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Masham Bridge, Masham	SE2281	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	01/04/1996	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Masham Bridge, Masham	SE2281	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	01/04/1996	
Lutra lutra	European Otter	terrestrial mammal	River Ure, Masham Bridge, Masham	SE2281	neyadc.org.uk	Water for Wildlife Project	Unknown (YOARP)	01/03/1996	

On behalf of MAB Environment and Ecology Ltd

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NEYEDC Ref: EE02609

Data search for species records within 2km radius of SE 220 807

NEYEDC, 27/01/2017

Scientific Name	Common Name	Taxonomic group	Location	Grid Reference	Custodian	Survey	Recorder	Dated	Measurement
Mustela vison	American Mink	terrestrial mammal	River Ure, Low Burn Bridge, Masham	SE225799	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	06/09/1996	
Mustela vison	American Mink	terrestrial mammal	River Ure, Marfield, Masham	SE227822	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	21/10/1997	
Mustela vison	American Mink	terrestrial mammal	River Ure, Marfield, Masham	SE227822	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	21/01/1997	
Mustela vison	American Mink	terrestrial mammal	River Burn, Low Burn Bridge, Masham	SE225799	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	14/01/1996	
Mustela vison	American Mink	terrestrial mammal	River Ure, Marfield, Masham	SE227822	neyadc.org.uk	Water for Wildlife Project	Volunteer (YOAT)	14/01/1996	
Mustela vison	American Mink	terrestrial mammal	River Ure, Swinton	SE2179	neyadc.org.uk	Water for Wildlife Project	Unknown	01/01/1983	

On behalf of MAB Environment and Ecology Ltd

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NEYEDC Ref: EE02609

Appendix 3 eDNA results



Folio No: E0690
 Report No: 1
 Order No: [No PO Received on paperwork]
 Client: MAB ECOLOGY
 Contact: Ione Bateau
 Contact Details: ione@mab-ecology.co.uk
 Date: 16/05/2017

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 12/05/2017
Date Reported: 16/05/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
31804	Westholme Road, Masham	SE217 805	Pass	Pass	Pass	Positive	6

SUMMARY

When Great Crested Newts (GCN); *Triturus cristatus* inhabit a pond, they deposit traces of their DNA in the water as evidence of their presence. By sampling the water, we can analyse these small environmental DNA (eDNA) traces to confirm GCN habitation, or establish GCN absence.

The water samples detailed below were submitted for eDNA analysis to the protocol stated in DEFRA WC1067 (Latest Amendments). Details on the sample submission form were used as the unique sample identity.

RESULTS INTERPRETATION

Forensic Scientists and Consultant Engineers
 SureScreen Scientifics Division Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE
 UK Tel: +44 (0)1332 292003 Email: scientific@surescreen.com
 Company Registration No. 08950940



Lab Sample No.- When a kit is made it is given a unique sample number. When the pond samples have been taken and the kit has been received back in to the laboratory, this sample number is tracked throughout the laboratory.

Site Name- Information on the pond.

O/S Reference - Location/co-ordinates of pond.

SIC- Sample Integrity Check. Refers to quality of packaging, absence of tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to results errors. Inspection upon receipt of sample at the laboratory. To check if the Sample is of adequate integrity when received. Pass or Fail.

DC- Degradation Check. Analysis of the spiked DNA marker to see if there has been degradation of the kit since made in the laboratory to sampling to analysis. Pass or Fail.

IC- Inhibition Check- PCR inhibitors can cause false results. Inhibitors are analysed to check the quality of the result. Every effort is made to clean the sample pre-analysis however some inhibitors cannot be extracted. An unacceptable inhibition check will cause an indeterminate sample and must be sampled again.

Result- NEGATIVE means that GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as no evidence of GCN presence. POSITIVE means that GCN eDNA was found at or above the threshold level and the presence of GCN at this location at the time of sampling or in the recent past is confirmed. Positive or Negative.

Positive Replicates- To generate the results all of the tubes from each pond are combined to produce one eDNA extract. Then twelve separate analyses are undertaken. If one or more of these analyses are positive the pond is declared positive for the presence of GCN. It may be assumed that small fractions of positive analyses suggest low level presence but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive.

METHODOLOGY

The laboratory testing adheres to strict guidelines laid down in WC1067 Analytical and Methodological Development for Improved Surveillance of The Great Crested Newt, Version 1.1

The analysis is conducted in two phases. The sample first goes through an extraction process where all six tubes are pooled together to acquire as much eDNA as possible. The pooled sample is then tested via real time PCR (also called q-PCR). This process amplifies select part of DNA allowing it to be detected and measured in 'real time' as the analytical process develops. qPCR combines PCR amplification and detection into a single step. This eliminates the need to detect products using gel electrophoresis. With qPCR, fluorescent dyes specific to the target sequence are used to label PCR products during thermal cycling. The accumulation of fluorescent signals during the exponential phase of the reaction is measured for fast and objective data analysis. The point at which amplification begins (the Ct value) is an indicator of the quality of the sample. True positive controls, negatives and blanks as well as spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared so they act as additional quality control measures.

The primers used in this process are specific to a part of mitochondrial DNA only found in GCN ensuring no DNA from other species present in the water is amplified. The unique sequence appropriate for GCN analysis is quoted in DEFRA WC 1067 and means there should be no detection of closely related species. We have tested our system exhaustively to ensure this is the case in our laboratory. We can offer eDNA analysis for most other species including other newts.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a 'spiked' DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in

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