

Ecological Impact Assessment of land
at Maes-yr-Esgob

Llanrhaeadr-ym-Mochnant
Llanfyllin
Powys
SY10 0LL

(SJ12726.25962)

CONTENTS

	Page
Summary	2
1. Introduction	3
1.1 Background and survey objectives	3
1.2 Proposed works	3
2. Methodology	4
2.1 Desk study	4
2.2 Habitat survey	4
2.3 Protected species survey	4
2.3.1 Bats	4
2.3.2 Great Crested Newt	5
2.3.3 Badger	5
2.3.4 Breeding birds	5
2.3.5 Other protected and priority species	5
3. Results and evaluation	6
3.1 Desk study	6
3.2 Habitat survey	6
3.2.1 Habitat descriptions	6
3.2.2 Habitats in the site surrounds	9
3.2.3 Flora	9
3.2.4 Invasive non-native plant species	9
3.3 Protected species survey	10
3.3.1 Bats	10
3.3.2 Great Crested Newt	10
3.3.3 Badger	11
3.3.4 Birds	11
3.3.5 Other protected and priority species	12
4. Potential impacts	12
4.1 General	12
4.2 Protected species	12
4.2.1 Bats	12
4.2.2 Birds	13
4.3 Survey limitations	13
4.4 Legal status	13
4.5 Personnel	14
5. Proposed avoidance measures, mitigation and enhancements	14
5.1 Avoidance measures and mitigation	14
5.1.1 Habitats	14
5.1.2 Bats	14
5.1.3 Other	15
5.2 Enhancement recommendations	15
5.2.1 Habitats	15
5.2.2 Species	17
6. References	19

SUMMARY

Background

Churton Ecology was commissioned to carry out an Ecological Impact Assessment of land at Maes-yr-Esgob, Llanrhaeadr-ym-Mochnant, Llanfyllin, Powys SY10 0LL.

The site supports occasionally cut, improved grassland and a small area of tall ruderal vegetation. The proposal is for the residential development of the site.

Method of study

A desktop search and general protected species walkover of the site and surrounds aimed to establish the presence or absence of bats, Badgers, breeding birds and other protected species and habitats with potential to be negatively affected by the proposal.

Ecological features

The site supports habitats of low biodiversity value. Bats are considered to be an important ecological feature of the site's potential area of influence.

Mitigation and enhancement measures

With avoidance and mitigation measures in place for bats there will be no significant residual adverse effect on protected species or habitats.

With enhancements in place there could be a maintenance or increase in the biodiversity value of the site.

1 INTRODUCTION

1.1 Background and survey objectives

Churton Ecology was commissioned by Powys County Council to carry out an Ecological Impact Assessment of land at Maes-yr-Esgob, Llanrhaeadr-ym-Mochnant, Llanfyllin, Powys SY10 0LL (SJ12726.25962).

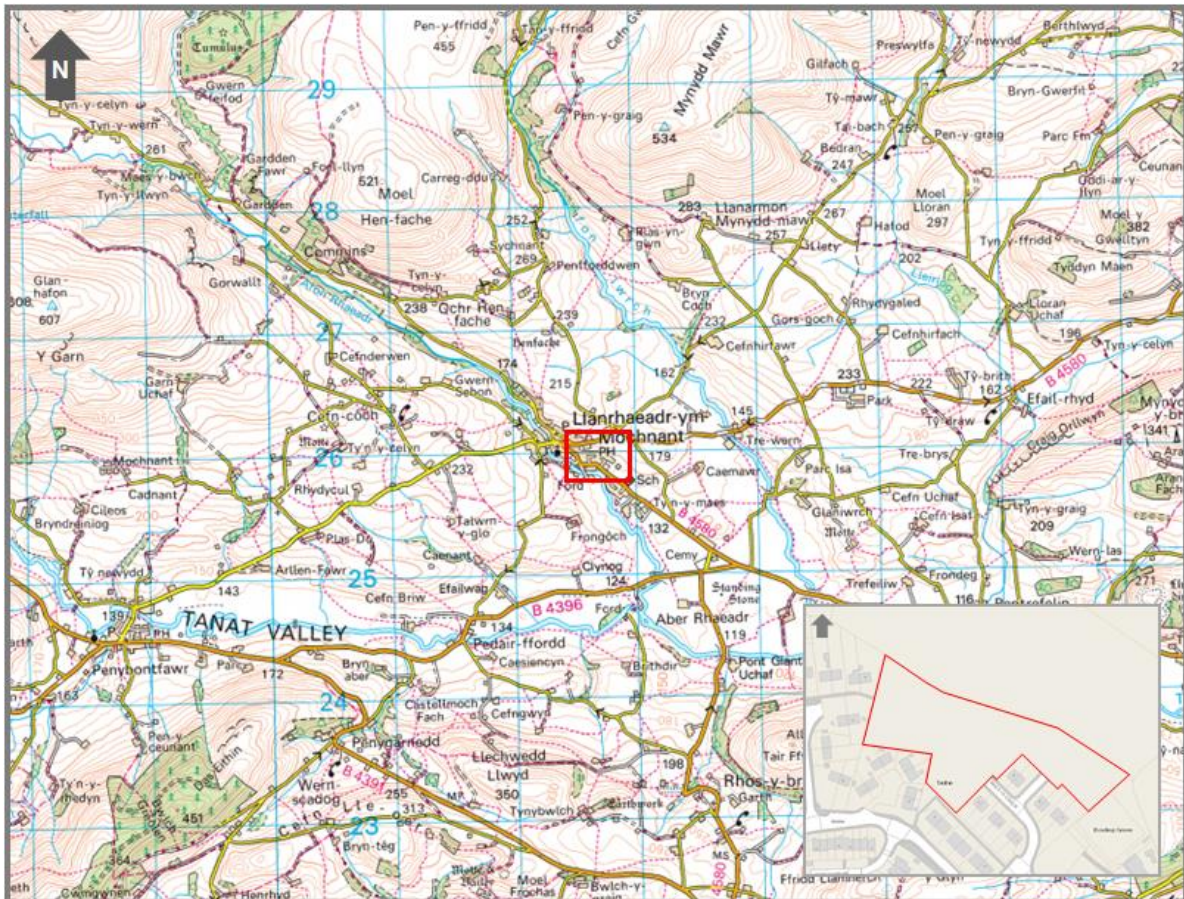


Fig 1: Site location
OS map licence no.100048619

A desktop search and general protected species walkover of the site and surrounds aimed to establish the presence or absence of bats, Badgers, breeding birds and other protected species and habitats with potential to be negatively affected by the development.

The site supports occasionally cut, improved grassland and a small area of tall ruderal vegetation.

1.2 Proposed works

The proposal is for the residential development of the site, covering an area of approximately 0.7ha.

2 METHODOLOGY

2.1 Desk study

Sites of international, national and local conservation significance were sought within 2km of the site. Records for protected, priority and other notable species of flora and fauna were sought within 1km of the site - records have only been included where there is potential for these species to be affected by the proposed development and/or where the development could provide enhancements for species that have been recorded in the local area. Searches were conducted using the following sources:

- Biodiversity Information Service (BIS)
- MAGIC maps

OS maps and aerial photographs (Google Earth) were used to identify landscape features of potential ecological interest including hedgerows, tree-lines, ponds, streams, ditches and areas of likely (semi-)natural value.

2.2 Habitat survey

A survey of the site and surrounds was conducted on 29/09/2022 by Rob Thorne following the JNCC (1993) Phase 1 methodology.

Habitats were assessed and their importance/value noted based on botanic diversity and/or their potential to support uncommon or rare species of flora and fauna (e.g. axiophytes/Red Data Book species).

2.3 Protected species survey

2.3.1 Bats

Field survey

Trees with features thought suitable to support bat roosts were identified on and adjacent to the site. A tree roost assessment was carried out from ground level using a high powered torch and binoculars.

Habitat suitability assessment

A general habitat suitability assessment of the site and surrounds was carried out to determine the likely value of foraging and commuting habitats.

2.3.2 Great Crested Newt

Desktop search

Ponds and other potential breeding habitats were sought within 250m of the site – sites larger than 5ha may trigger the need for assessing ponds within 500m of the site; however, at 0.75ha, the site is well below this threshold.

2.3.3 Badger

Field survey

Burrows were sought within the site and the 30m surrounds (at least). Other evidence of site use such as paths, snuffle holes, feeding remains and hairs (in burrow spoil or snagged along trails) was also sought. The field boundaries, and specifically the field corners, were searched for evidence of territorial latrine marking activity.

2.3.4 Breeding birds

Field survey

Birds seen or heard during the survey were recorded and old nests were attributed to species where possible.

Habitat suitability assessment

Habitats, with potential to support common, priority or Schedule 1 species of nesting bird were identified within the site and the immediate surrounds.

2.3.5 Other protected or priority species

Habitat suitability assessment

Habitats thought suitable to support other protected or priority species potentially relevant to the site location were also sought. Where no suitable habitats exist and/or where no impacts can be reasonably predicted, species can be discounted from further survey, impact assessment and mitigation - in this instance Dormouse [no linked scrub, tree or hedgerow removal is proposed] and Reptiles.

3 RESULTS AND EVALUATION

3.1 Desk Study

Statutory and non-statutory sites and priority habitats

There are no sites of international or national conservation significance within at least 2km of the site.

Although separated by housing and a main road, the Afon Rhaeadr is located just 70m to the south of the site.

Evaluation and discussion

The River Tanat - of which the nearby stream is a tributary - is important for its water quality and associated range of protected and priority fauna species. Pollution in the operational phase could be damaging to the nearby stream and any associated eco-systems. The impact of this could be significant at the local level depending on the nature of the contamination.

Ultimately all drainage matters will be considered by the relevant planning consultees with appropriate recommendations made and incorporated into the design of the scheme. It is not the remit of this report to consider the effects of pollution on statutory or non-statutory sites for nature conservation, since there is no reasonable likelihood of this occurring with the system of planning control in place.

3.2 Habitat survey

3.2.1 Habitat descriptions

The site supports 0.75ha of occasionally cut, improved grassland. False Oat-grass is the most dominant grass species with less abundant, or localised, areas of Perennial Rye-grass, Cock's-foot, Rough Meadow-grass, Common Bent and Red Fescue. The field contains a few common herb species (particularly in the peripheries) including: Creeping Buttercup, Petty Spurge, Lesser Chickweed, Field Forget-me-not, Common Field Speedwell, Field Sorrel, Dandelion sp., Redshank, Common Orache, Smooth Sow-thistle, Creeping Thistle, Nettle, Bramble, Cleavers, Broadleaved Dock, Hard Fern, Cow Parsley, Common Hogweed, Broadleaved Willowherb, Great Willowherb and Rosebay Willowherb.

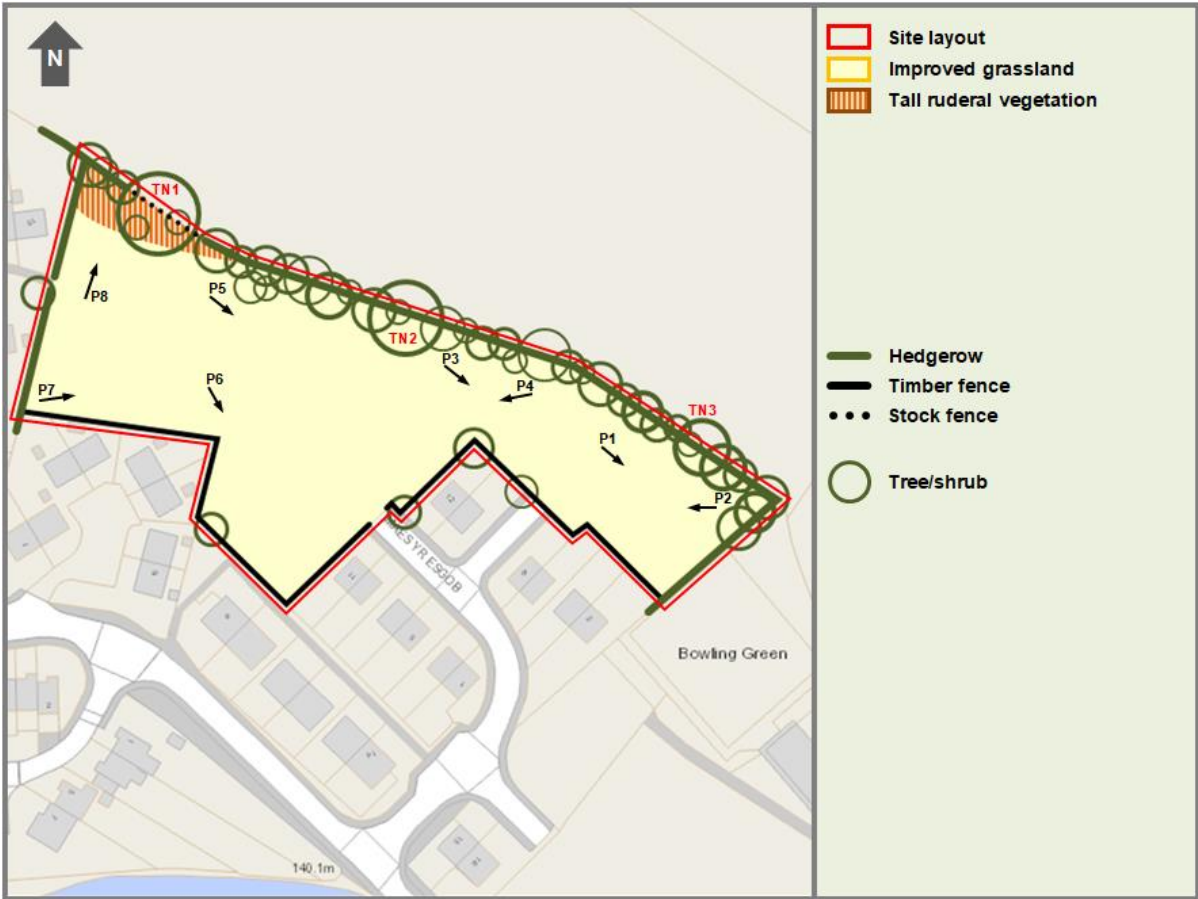


Fig 2: Phase 1 habitat map (with photo locations)

A moderately steep bank, dominated by Bracken and tall ruderal vegetation is present in the north-west corner of the site. The bank contains some additional ground-flora species including: False Oat-grass, Cock’s-foot, Foxglove, Nettle, Bramble, Cleavers, Ivy, Broad Buckler-fern, Male Fern, Hedge Bindweed, Hedge Woundwort, Creeping Thistle, Rosebay Willowherb and Great Willowherb.



P1: Site: viewed from near the NE corner, looking SE



P2: Site: viewed from the NE corner, looking W



P3: Site: viewed centrally, looking SE



P4: Site: viewed centrally, looking WSW



P5: Site: viewed from near the NW corner, looking ESE



P6: Site: viewed centrally, looking SE



P7: Site: viewed from the SW corner, looking ENE



P8: Bracken bank with Oak tree (TN1): viewed from the SW

Evaluation and discussion

Improved grassland does not represent a priority habitat and is not considered to be an important ecological feature of the site.

The bank of tall ruderal vegetation to the north-west has some biodiversity value as it provides shelter, nectar and foodplants for various common invertebrates as well as foraging and nesting opportunities for small mammals and various bird species. Tall ruderal

vegetation is not a rare or priority habitat; however, it is still considered to have some biodiversity value. There are no current plans to remove or otherwise disturb this bank; however, the area has still been described under 'site habitats'.

3.2.2 Habitats in the site surrounds

The north boundary supports a tall, leggy hedgerow dominated by old Hazel coppice along the top of an old stone (retaining) wall with some Hawthorn, Holly, Blackthorn, Elder and Dog Rose. The hedge also supports a very large Oak (at TN1), a large coppiced Sycamore (at TN2) and a large coppiced Field Maple (at TN3). The hedgerow clearly has ancient origins although structurally it is in a moderate to poor (hedgerow) condition owing to a lack of management intervention.

The east boundary supports a line of immature *Leylandii* (at its north end) and a low, trimmed (modern) hedgerow section to the south (*Leylandii*, Hazel and Hawthorn).

The west boundary supports a trimmed (modern) Privet hedgerow. The south boundary is fenced with very occasional immature trees also present including: Goat Willow, Balsam Poplar, Silver Birch and Sycamore.

The site is bordered by grazed, improved grassland to the north, a bowling green to the east and residential housing to the south and west.

3.2.3 Flora

Desktop search

No rare or otherwise notable plant species thought to be potentially relevant to the habitats present on site have been recorded within 1km of the site.

Field survey

No rare or otherwise notable plant species were recorded in the survey area.

3.2.4 Invasive non-native plant species

Desktop search

Invasive non-native plant species recorded within 1km of the site include: Japanese Knotweed and Cotoneaster sp.

Field survey

No invasive, non-native plant species were recorded on or near the site.

3.3 Protected species survey

3.3.1 Bats

Desktop search

Bat species recorded in the 1km surround include: Pipistrelle sp., Soprano Pipistrelle bat, Whiskered bat, Brandt's bat, Daubenton's bat, Natterer's bat, *Myotis* sp., Brown Long-eared bat, Lesser Horseshoe bat and Noctule bat.

Field survey

The large Oak at TN1 is of an age and type thought likely to support potential bat roosting features. The tree is particularly notable for its size but it appears to be in relatively good condition since there is a history of bough lopping occurring - the field is used informally as a public open space.

Habitat suitability assessment

The site is open and lacks any features that are likely to be of particular interest to anything other than small numbers of foraging (generalist) bat species.

The north boundary hedgerow provides some foraging and commuting opportunities for a moderate range of potential bat species which may roost in the local area. The absence of large tracts of high quality foraging habitat linked to this hedgerow does, however, reduce its potential value and this is compounded by the fact that the hedgerow terminates at the edge of an open grassland field just 50m to the south-east.

Evaluation and discussion

The site is exposed and relatively isolated and the habitats present are common and widespread with better quality foraging habitats available nearby. Accordingly the site is not going to be of intrinsic (sustenance) value to local bat populations; however, bats roosting, commuting and foraging are still likely to be important ecological features of the site's potential area of influence.

3.3.2 Great Crested Newt

Desktop search

The site is located in the known geographic range for this species; however, the animal is patchily distributed in this part of the county and there are no historical records for this species within 1km of the site. Given the scale of the development, only ponds within 250m were considered to be potentially relevant to the proposal. No mapped ponds were identified within this area and there was nothing to indicate the potential presence of any unmapped

ponds (from aerial photography). The nearest pond is located 530m to the south-east. The pond density within 1km of the site is low and these may be partially isolated from one another by the presence of small upland streams.

Evaluation and discussion

There is no potential breeding habitat within at least 530m of the site and the site supports poor to moderate terrestrial habitat. It is therefore the opinion of Churton Ecology that no further survey, impact assessment or mitigation is required in relation to this species.

3.3.3 Badger

Desktop search

There are no historical Badger records within 1km of the site.

Field survey

No signs of Badger were noted within at least 30m of the site.

Evaluation and discussion

Badger is not considered to be an important ecological feature of this site; therefore, no further survey, impact assessment or mitigation is required in relation to it.

3.3.4 Birds

Desktop search

Priority bird species and species of conservation concern recorded in the 1km surround and thought to be potentially relevant to the site (i.e. bird species that could benefit from ecological enhancements, since no habitat loss is proposed) include: Dunnock, House Sparrow, Swift, Swallow, Mistle Thrush, Goldcrest, Greenfinch and Long-tailed Tit.

Field survey

Several species were seen or heard calling nearby including Bullfinch (UK BAP), House Sparrow (UK BAP), House Martin, Raven, Robin, Chaffinch, Wren and Blackbird.

Habitat suitability assessment

The site is unsuitable for ground nesting bird species (e.g. Skylark, Curlew, Lapwing or Snipe). The boundary hedgerows, trees and shrubs have the potential to be used by a wide range of common and/or priority scrubland nesting bird species, several of which have been recorded in the 1km surround.

Evaluation and discussion

Nesting birds are not considered to be an important ecological feature of the site since no habitat loss is proposed; therefore, no further survey, impact assessment or mitigation is required in relation to this class of animal.

3.3.5 Other protected and priority species

There is limited potential for other protected or priority species to be negatively affected by the proposed development. There are a number of Hedgehog records within 1km of the site and one Grass Snake record.

4 POTENTIAL IMPACTS

4.1 General

This section considers the potential impacts (and subsequent effects) which might arise from the development in the absence of avoidance measures and/or mitigation. Wherever possible, the negative ecological impact of a development must be avoided. Any residual effects and their level of significance are further discussed with mitigation and/or enhancements in place.

It is important to note that the purpose of an ecological impact assessment is to consider impacts and effects in relation to species and habitats that have some level of international, national or local conservation significance – broadly speaking rare, uncommon or declining species and habitats. These are variously protected under domestic law and priority species have some limited protection under the provisions of the Environmental (Wales) Act – species and habitats listed on the UK/Local biodiversity/habitat action plan and consequently S7 of the Act.

4.2 Protected species

4.2.1 Bats

Significance of effects prior to mitigation

The development will not result in the damage, destruction or obstruction of a bat roost and no bats will be injured or killed by the proposal.

There will be no significant loss of potential bat foraging or commuting habitat; however, the illumination of the hedgerow to the north could result in the disturbance or deterioration of roosting, foraging and commuting habitats. It would be difficult to quantify the significance of the impact of lighting and its effect on bats, since the species and status of any populations

potentially present nearby is unknown. Therefore, it must be assumed (on balance) that a significant effect (at the local level) is possible.

Significance of residual effects after mitigation

With mitigation measures in place (appropriate lighting, habitat buffers and tree/shrub/hedgerow planting to maintain habitat connectivity) there should be no significant residual adverse effect on bat species that may roost in the local area.

Significance of residual effects after enhancements

The provision of bat tubes and other roosting features, integrated into some of the new buildings, could have a beneficial effect on local bat populations. Bat boxes could also be mounted on nearby trees.

4.2.2 Birds

Significance of effects prior to mitigation

N/A

Significance of residual effects after mitigation

N/A

Significance of residual effects after enhancement

The development could result in the provision of new bird nesting opportunities (boxes) suitable for various bird species. The impact of this could only have a significant beneficial effect on local bird populations.

4.3 Survey constraints

There were no significant survey constraints.

4.4 Legal status

Bats

All UK bat species are protected under The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and The Wildlife and Countryside Act 1981 (as amended). Essentially this makes it unlawful to; deliberately capture, injure or kill a bat; intentionally or recklessly disturb a bat whilst it occupies a roost or deliberately cause disturbance to (a bat) or significant group of bats; damage or destroy the roosting site of a bat; intentionally or recklessly obstruct access to a bat roost.

Notably, legal protection gives absolute protection to bat roosts and their continued functionality, regardless of deliberate, intentional or reckless action. Legal protection also extends to seasonal roosts which are not always occupied by bats throughout the year.

Disturbance caused through excessive noise or lighting and/or alterations to the landscape could potentially impact on bat roosting, foraging and/or commuting habitats and may have legal implications with regards disturbance and roost deterioration laws. It is therefore the duty of the relevant competent authority to take habitat severance, disturbance and land use change issues and their potential for impact on bat populations into consideration when assessing applications for the relevant consent.

4.5 Personnel

Rob Thorne BA (Hons) MRSB has seventeen years' experience surveying sites for development and conservation purposes, covering Ecological Impact Assessment, botanical and vegetation surveys, and is competent to survey for a wide range of protected and priority species. He holds NE and NRW bat (16yrs) and Great Crested Newt (14yrs) survey and mitigation licences and is a long-time member of The Shropshire Bat Group. He holds, or is accredited to work under, survey licences for Barn Owl, White-clawed Crayfish and Dormouse. He is also an experienced reptile and Otter surveyor having undertaken large scale reptile surveys for Natural England (to inform SSSI designations) and the Wildlife Trusts and targeted Otter surveys of watercourses for The Shropshire Mammal Group (as well as for numerous development proposals). He is also experienced in reptile mitigation, habitat management and trans/re-locations and has carried out long-term studies of several Slow-worm populations.

5 PROPOSED AVOIDANCE MEASURES, MITIGATION AND ENHANCEMENT

5.1 Avoidance measures and mitigation

5.1.1 Habitats

Existing hedgerows, trees and shrubs must be retained wherever possible. Where hedgerows, trees and/or shrubs are to be removed (currently none are) increased numbers of native species must be planted elsewhere to offset the loss and to enhance the biodiversity value of the site (see enhancement chapter for woody species planting list).

5.1.2 Bats

If any external lighting is proposed, then a lighting plan may be requested as a condition of planning consent. Alternatively, a lighting plan can be submitted with the application to

reduce the number of conditions attached to the decision notice. The plan submitted must take into account the following guidance and summary recommendations:

- Bat Conservation Trust (2018) *Bats and artificial lighting in the UK – Bats and the Built Environment Series* Bat Conservation Trust, London
- Bat Conservation Trust (2014) *Interim Guidance: Artificial lighting and wildlife – Recommendations to help minimise the impact of artificial lighting* Bat Conservation, London
- Institute of Lighting Professionals (2011) *Guidance notes for the reduction of obtrusive light* Institute of Lighting Professionals, London

As a matter of best practice, external lighting must be minimised or avoided altogether. Where used, lighting must be fixed on the lowest column practical with light spread kept well below the horizontal using cowls, hoods, screens or simply by downward directionality. It is particularly important not to allow any light spill onto the north hedgerow or any habitats beyond. LED bulbs with a warm white colour spectrum (2700 Kelvins) must be used to reduce the blue light component most disturbing to bats. There must be no allowance for permanent security lighting. PIR systems must be set on a short timer and responsive only to larger moving objects. Bollards with low level lighting may be appropriate to guide pedestrians through the site, provided these are shielded from any of the peripheral features thought likely to be used by bats. It may also be possible to dim down or curtail the hours of lighting operation between midnight and 5am.

5.1.3 Other

It would be advisable to regularly cut or graze the field in the lead-up to the development. This will ensure that no protected or priority species can take up residence in the field during the lead-in period (e.g. Hedgehogs and Grass Snakes).

If it is necessary to leave a trench open overnight then it should be provided with a shallow sloping earth ramp, sloped board or plank. Any open pipework should be capped overnight. All open trenches and pipework should be inspected at the start of each working day to ensure no animal has become trapped.

5.2 Enhancement recommendations

5.2.1 Habitats

One potential enhancement could be the creation of a wildflower buffer strip along the north boundary hedgerow. The steep bank to the north-west could also be seeded and this would

provide potential habitat suitable for species recorded in the 1km surround such as Grass Snake and Hedgehog. These areas could be managed appropriately with an annual late-summer hay-cut.

Another potential enhancement would be the creation of new (native) hedgerows along any of the site boundaries that are currently open. Gaps in existing hedgerows could also be planted up with native woody species. Scattered native trees and shrubs can also be planted around the site to attenuate transmitted light and to provide habitat corridors, food sources, foraging areas and nesting habitats suitable for Hedgehogs, bats, reptiles and birds (e.g. priority species recorded within 1km of the site including Dunnock, Mistle Thrush, Goldcrest, Greenfinch and Long-tailed Tit). N.B. the Leylandii trees along the east boundary provide excellent nesting habitat suitable for Goldcrest and Greenfinch and can be retained.

Native shrub species recommended for shrub, tree and hedgerow planting	
Taxon	Common name
<i>Corylus avellana</i>	Hazel
<i>Crataegus monogyna</i>	Hawthorn
<i>Quercus robur</i>	Oak
<i>Carpinus betulus</i>	Hornbeam
<i>Taxus baccata</i>	Yew
<i>Viburnum lantana</i>	Wayfaring tree
<i>Prunus avium</i>	Wild Cherry
<i>Sorbus aucuparia</i>	Rowan
<i>Euonymus europaeus</i>	Spindle
<i>Viburnum opulus</i>	Guelder Rose
<i>Acer campestre</i>	Field Maple
<i>Cornus sanguinea</i>	Dogwood
<i>Ilex aquifolium</i>	Holly
<i>Rosa canina</i>	Dog Rose
<i>Sambucus nigra</i>	Elder
<i>Frangula alnus</i>	Alder Buckthorn

Note: Blackthorn is best avoided as its suckering habit will soon scrub over any margins. Hawthorn should comprise 60% of the planting stock. The remaining 40% of the planting stock should comprise an even or varied mix of interplanting using the other species listed in the table above.

All planting must be carried out within the recognised planting season (November to March) and plants must be of local origin/provenance. Plants should be set out in a double staggered row using a total of 5 plants per linear metre, with rows set 225mm apart. All newly planted stock must be fully protected from rabbit damage by the use of tree/shrub guards.

In the second or third year new hedging plants should be hand trimmed to an even height of approximately 750mm to encourage side shoots and the development of a sound base to the hedge. For the following two or three years, the leaders should be allowed to grow unhindered and the sides trimmed only if necessary. After the first 5 years, mechanical hedge trimming can commence OR the native hedge could be allowed to grow up until tall enough to be laid/pleached (approximately 10 years).

It is recommended that the new hedges are subsequently cut only every two to three years to a height of 2 to 2.5m (to allow some fruiting), with cuts carried out in the late winter months. Some Field Maple could be allowed to grow into trees since these do not attain a great height.

Cutting of hedgerow should be done on rotation e.g. only one third cut every three years. It is also recommended that any existing hedgerows could be managed in a similar way to improve their biodiversity value.

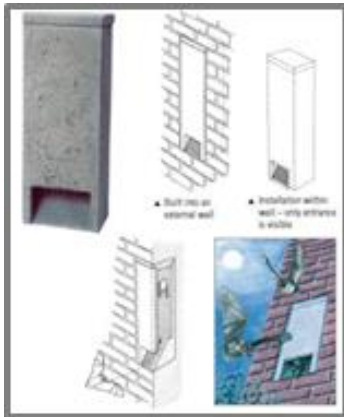
5.2.2 Species

Plot boundaries should be hedged or, if fencing is necessary, there must be enough space for species such as Hedgehog to move freely under these. Hedgehog boxes could also be installed in the base of existing boundary hedgerows.

Schwegler (woodcrete) 1FR bat tubes (or similar) could be integrated into the wall masonry on south, west and east facing building elevations (on peripheral buildings to the north or east). Additional bat boxes could be fixed to suitable trees along the north hedgerow. Bat access points could also be provided under a few ridge-tiles. Access to the ridge-tile roost would be a simple case of either propping up the ridge-tile, cutting out a 20mm (high) x 50mm (wide) notch in the foot of the ridge-tile or creating access through the mortar bed under the ridge-tile – depending on which ridge system is used. If there is any contact between the ridge-cavity and the breathable membrane (i.e. if the top batten is not tight up against the ridge-board or if the membrane is looped over the top of the ridge-board) then a layer of Type 1F bitumastic felt will be laid over the membrane (within the cavity) to stop bats getting entangled in the modern fibres. The tiles will need to be dabbed on at either end and mortared along the sides (leaving the access point open) to provide a suitable cavity inside.

Schwegler 9A House Martin nesting cups, Schwegler 1SP House Sparrow nesting terraces and other nest boxes suitable for species such as Starling and Swift (i.e. important building nesting species recorded from, or likely to be present in, the 1km surround), could be

installed in suitable locations on a number of the new dwellings. Bat boxes and Schwegler 2HW or 1HE open fronted nest boxes suitable for use by Wren and Robin could also be installed in suitable locations along the north hedgerow.



Examples of suitable bird and bat boxes/tubes

The locations of these would typically be provided at the Reserved Matters (or a prior to first occupation condition); however, where bat roosting features are to be integrated into the fabric of the building (such as a bat tube/ridge-tile roost) it is advisable to include these in the architectural drawings submitted with the application to avoid the need to retro-fit at a later date.

6 REFERENCES

- Altringham J. (2011) *Bats: From Evolution to Conservation* Oxford University Press
- Altringham J. (2009) *British Bats* Collins
- Amphibian and Reptile Groups of the United Kingdom (2010) *Great Crested Newt Habitat Suitability Index* ARG UK
- Ausden, M. (2008) *Habitat Management for Conservation: A Handbook of Techniques (Techniques in Ecology & Conservation)* Oxford University Press
- Baker, J. Beebee, T. Gent, T. and Orchard, D. (2011) *Amphibian Conservation Handbook* ARG UK
- Bat Conservation Trust (2016) *Bat Surveys Good Practice Guidelines 3rd ed.* BCT
- Beebee, T. and Griffiths, R. (2000) *Amphibians and Reptiles* Collins New Naturalist
- Beebee, T. (2015) *Amphibians and Reptiles* Collins Pelagic Publishing
- Blakesley, D. and Buckley, P. (2016) *Grassland Restoration and Management* Pelagic Publishing
- Bright, P. Morris, P. and Mitchell-Jones, T (2006) *The Dormouse Conservation Handbook 2nd edition* English Nature
- CIEEM (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition.* Chartered Institute of Ecology and Environmental Management, Winchester
- CIEEM (2015) *Guidelines for Ecological Report Writing* Chartered Institute of Ecology and Environmental Management, Winchester
- Cresswell, W. and Whitworth, R. (2011) *English Nature Research Reports Number 576: An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt Triturus cristatus* English Nature
- Day, J. Symes, N. and Robertson, P. (2003) *The Scrub Management Handbook: Guidance on the management of scrub on nature conservation sites* English Nature
- Dietz, C. and Kiefer, A. (2018) *Bats of Britain and Europe* Bloomsbury Publishing Plc
- Dietz, C. and Nill, D. (2009) *Bats of Europe and Northwest Africa* A & C Publishers Ltd
- Dodd Jr, C. K. (2009) *Amphibian Ecology and Conservation: A Handbook of Techniques* Oxford Biology
- English Nature (2009) *Badgers and Development*
- English Nature (2001) *Great Crested Newt Mitigation Guidelines*
- Fahrbach, M. and Gerlach, U. (2018) *The Genus Triturus* Frankfurt am Main
- Frazer, D. (1983) *Reptiles and Amphibians in Britain* Collins New Naturalist
- Gent, T. and Gibson, S. (2003) *Herpetofauna Workers' Manual* Joint Nature Conservation Committee
- Gilbert, O.L. and Anderson, P. (1998) *Habitat Creation and Repair* Oxford University Press, USA
- Hedgerow Regulations* (1997) Crown Copyright.
- IEEM (2006) *Guidance for Ecological Impact Assessment in the UK*

Inns, H. (2011) *Britain's Reptiles and Amphibians Wild Guides*

Jones, G. [QC] (2012) *The Habitats Directive: A Developer's Obstacle Course?* Hart Publishing

Jehle, R. Thiesmeier, B. and Foster, J. (2011) *The Crested Newt – A Dwindling Pond Dweller* Laurenti-Verlag

JNCC (1993) *Handbook for Phase 1 Habitat Survey. A technique for environmental audit* (reprint). Joint Nature Conservation Committee, Peterborough.

Langton, T. Beckett, C. and Foster, J (2001) *Great Crested Newt Conservation Handbook* Froglife

Marnell F. and P. Presetnik (2010) *EUROBATS Publication Series No. 4: Protection of overground roosts for bats* UNEP / EUROBATS

Mitchell-Jones A.J. and McLeish A. (2004) *Bat Worker's Manual* Joint Nature Conservation Committee

Mitchell-Jones A.J. (2004) *Bat Mitigation Guidelines* English Nature

Natural England (2007) *Disturbance and protected species: understanding and applying the law in England and Wales* Natural England and Countryside Council for Wales

Natural England (2017) *GCN Method Statement WML-A14-2 (Version November 2017)* Natural England

Poulton S.M.C. (2007) *An analysis of the usage of bat boxes in England, Wales and Ireland*

Schofield H.W. (2010) *The Bats of Britain and Ireland* The Vincent Wildlife Trust

Stebbing R. E. and Walsh S. T. (1985) *Bat Boxes: A Guide to the History, Function, Construction and Use in the Conservation of Bats* Bat Conservation Trust

Smith, M. (1973) *Amphibians and Reptiles* Collins New Naturalist

Stace, C. (1991) *New Flora of the British Isles* Cambridge University Press

Treweek, J. (1999) *Ecological Impact Assessment* John Wiley and Sons

Wilkinson, J. W. (2015) *Amphibian Survey and Monitoring Handbook* Pelagic Publishing

jncc.defra.gov.uk/page-5705 (2015) UK BAP Priority species and habitats

www.magic.gov.uk Magic (for maps and conservation data) Natural England

Google Earth aerial photographs and and/or Bing maps

wtp2.appspot.com/wheresthepath.htm

www.getamap.ordnancesurveyleisure.co.uk/