# Whitcher Wildlife Ltd.
# Ecological Consultants.

## STONEWALL HOUSE, BIRDWELL.

## OS REF: SE 34403 02092.

## PRELIMINARY ECOLOGICAL APPRAISAL.

**Ref No:** **191210.**

**Date:** **6th January 2020.**

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# 1. INTRODUCTION.

1.1. A Planning application has been submitted to Barnsley Council to erect seven houses on land currently the garden curtilage of Stonewall House. The Local Authority requires a Preliminary Ecological Appraisal in support of that planning application.

1.2. Whitcher Wildlife Ltd has been commissioned to carry out that Preliminary Ecological Appraisal of the site to determine if there are any ecological issues with the planned development.

1.3. The site survey was carried out on 16th December 2019. This report outlines the findings of that survey and makes appropriate recommendations.

1.4. Appendices I and II of this report provide additional information on protected species and are designed to assist the reader in understanding the contents of this report.

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# 2. SURVEY METHODOLOGY.

2.1. Prior to visiting the site, the survey area was cross referenced to maps and aerial photographs to give a general idea of the habitats and potential issues within the area and to identify potential access and walking routes.

2.2. The survey area was walked where access was agreed and public rights of way were used where no access was agreed. All habitats within and immediately around the survey area were documented and the dominant species within that habitat listed in line with the JNCC Handbook for Phase 1 Habitat surveys.

2.3. The survey area and immediate surrounding area was thoroughly searched for evidence of badger (*Meles meles*) activity by looking for the following signs in line with Harris S, Cresswell P and Jefferies D (1989). *Surveying Badgers*. Mammal Society: -

* Badger setts.
* Badger latrines or dung pits.
* Badger snuffle holes and evidence of foraging.
* Badger paths.
* Badger prints in areas of soft mud.
* Badger hairs caught on fencing.

2.4. The survey area was searched for watercourses and where found all watercourses within the survey area and for approximately 50m in each direction were thoroughly searched for evidence of water vole (*Arvicola amphibius*) activity by looking for the following signs, in line with Rob Strachan, Tom Moorhouse and Merryl Gelling (2011). *Water Vole Handbook: Third Edition*: -

* Water vole burrows.
* Water vole faeces and latrines.
* Water vole feeding stations.
* Water vole runs.
* Water vole prints in areas of soft mud.
* Water vole lawns.
* Predator field signs.

2.5. The survey area was searched for watercourses and where found all watercourses within the survey area and for approximately 50m in each direction were thoroughly searched for evidence of otter (*Lutra lutra*) activity by looking for the following signs in line with the P Chanin (2003). *Monitoring the Otter* and *Conserving Natura 2000 Rivers: Monitoring Series No10 Guidelines: -*

* Otter prints in soft mud.
* Otter spraints.
* Otter Holts.

2.6. The survey area was searched for watercourses and waterbodies. Where found, and where safe to enter the water, all were thoroughly searched for the presence of crayfish, for approximately 50m in each direction of the site, by searching under rocks and logs. Where stated, crayfish traps were also deployed into the watercourse. All survey work was carried out in accordance with the *Conserving Natural 2000 Rivers Monitoring Series No 1, Protocol for Monitoring the White Clawed Crayfish*.

2.7. The survey area was searched for mature trees and derelict buildings and where found these were checked for potential bat roosting sites in line with Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition)* by looking for the following signs: -

* Holes, cracks or crevices.
* Bat Droppings.

2.8. The land immediately adjacent to the survey area was assessed for bat roosting potential and bat foraging potential. Connective routes and flight lines were also assessed whilst on site and using maps of the area.

2.9. The area within 500m of the survey site was cross referenced to maps to highlight all ponds close to the site. Where possible, all ponds identified were accessed using agreed access or public rights of way to assess the potential for great crested newts (*Triturus cristatus*) to be present.

2.10. The survey area was assessed for the potential for reptiles and suitable reptile habitats. Where applicable the area was also searched for the presence of reptiles.

2.11. Where appropriate, the habitat within and surrounding the survey area was searched for species such as hazel, oak, honeysuckle, bramble and other species which may provide potential habitat for hazel dormice (*Muscardinus avellanarius*). Field signs such as feeding remains and nests were also searched for where possible, in line with P Bright, P Morris and T Mitchell-Jones *the Dormouse Conservation Handbook 2nd Edition*.

2.12. Where appropriate, the area within and surrounding the survey area was assessed for its potential to house habitat for red squirrels. Field signs of red squirrels

were searched for at least every 50m, looking for any dreys, feeding signs or sightings of red squirrels.

2.13. All surveys were carried out in line with the Chartered Institute of Ecological and Environmental Management (CIEEM) survey standards and advice.

2.14. This document is prepared in line with The National Planning Policy Framework (NPPF). This sets out the government policy on biodiversity and nature conservation and places a duty on Planning Authorities to give material consideration to the effect of a development on legally protected species when considering planning applications. The NPPF and the Planning Practice Guidance on "Natural Environment" also promote sustainable development by ensuring that developments take account of the role and value of biodiversity and that it is conserved and enhanced within the development.

2.15. This report is prepared in line with the Natural Environment and Rural Communities (NERC) Act that came into force on 1st Oct 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.

2.16. The survey was undertaken by Derek Whitcher who has over twenty years' experience of surveying for wildlife and has run his own wildlife consultancy since 1998. He has extensive experience of a wide variety of survey techniques for a variety of species of protected wildlife supplemented by attendance on a wide range of training courses through CIEEM, FSC and BCT. As a member of CIEEM he is committed to continuous professional development, a continual process of learning and career development, a condition of CIEEM membership. He holds current Natural England survey licences for barn owl, bat, great crested newt and white clawed crayfish.

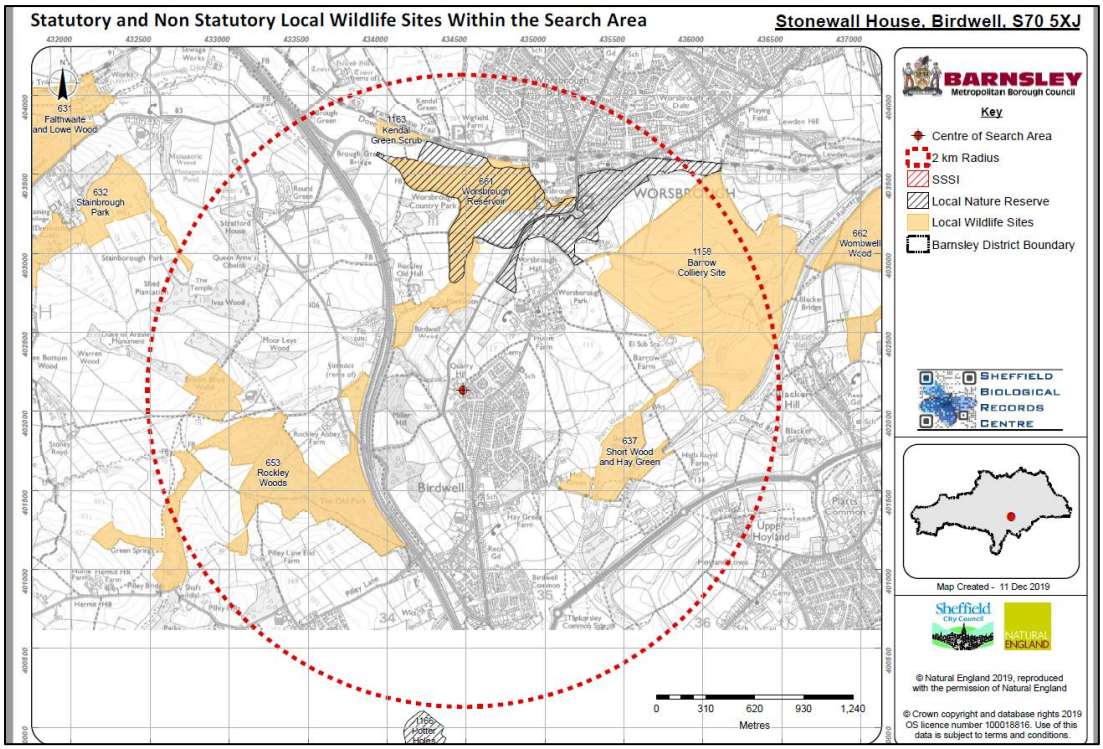
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# 3. SURVEY RESULTS.

## 3.1. Data Search Results.

3.1.1. A data search for designated sites and protected species within 1km of the site was submitted to Barnsley Biological Records Centre.

3.1.2. The data search response identified a number of Local Wildlife Sites and Nature Reserves in the surrounding area but none close to the proposed development area, as shown below. The closest sites are Worsborough Reservoir to the north and Rockley Woods to the west on the opposite side of the M1 motorway.




3.1.3. The data search return included a number of great crested newt and amphibian records. These were mainly for Stainborough Park but there are also records for Rockley and Worsborough Reservoir. These are separated from the site by a very busy main road, a barrier to movement.

3.1.4. Abundant bird, flowering plant, fungus and invertebrate records were provided but none are relevant to this site.

3.1.5. Grass snakes have been identified in Worsborough Reservoir but these are on the opposite side of a busy main road.

3.1.6. No other records relevant to this site were identified.

### 3.2. The Surveyed Area.

The aerial photograph below shows the location of the site shown by the red arrow and the surrounding area. The site is located on the edge of the residential area of Birdwell to the south and east. To the west there is the busy A61 trunk road with open countryside and woodland to the west leading down to the M1 motorway.




### 3.3. Description of Habitats.

Appendix III of this report contains an annotated map marked up with the varying habitats that are cross referenced to target notes in Appendix IV of this report. The habitats on and adjacent to the site are: -

- Amenity Grassland.
- Species Poor Hedgerows.
- Introduced Shrubs.
- Scattered Trees.
- Standing Water
- Wall
- Bare Ground.
- Buildings.

3.3.1. Amenity Grassland.

The main area of the site comprises a closely mown and manicured lawn. The sward was very short and the dominant species at this time of year was moss. Other species include perennial ryegrass *(Lolium perenne)*, annual meadow grass *(Poa annua)* and red fescue *(Festuca rubra)* with daisy *(Bellis perennis)*, white clover *(Silene acaulis)*, creeping buttercup (*Ranunculus Repens*), greater plantain (*Plantago major*), speedwell *(Veronica spp.)* and thistle *(Cirsium sp(p)).*



3.3.2. Species Poor Hedgerows.

The entire site is surrounded by immaculately trimmed Lleylandii (*Cupressocyparis leylandii*) conifer and laurel (*Prunus laurocerasus*) hedgerows.




3.3.3. Introduced Shrubs.

Around the perimeter of the site, inside the hedgerows and in island beds across the site there are well kept borders containing predominantly shrub species including Rhododendron (*Rhododendron ponticum*), spindle trees (*euonymus eruopaeus*), pampas grass (*Cortaderia selloana*), tamarisk (*Tamarix Sp*), holly (*Ilex aquifolium*), firethorn (*pyracantha coccinea*), spirea (*Spiraea japonica*), hypericum (*Hypericum Hidcote*), pieris (*Pieris japonica*), yew (*Taxus baccata*), evergreen honeysuckle (*Lonicera nitida*), Staghorn sumac (*Rhus typhina*), variegated laurel (*Aucuba japonica)*, viburnum (*Viburnum tinus*), hydrangea (*Hydrangea paniculate*), Elephant's ears (*Bergenia cordifolia*), ivy (*Hedera helix*), magnolia (*Magnolia aquifolium)*, cotoneaster (*Cotoneaster horizontalis*), skimmia (*Skimmia japonica*), photinia (*Photinia robusta*), hebe (*Hebe pagei*), senecio (*Senecio brachyglotis*), forsythia (*Forsythia intermedia*), escallonia (*Escallonia Sp*) and various ornamental conifer species.








3.3.4. Scattered Trees.

There are scattered trees across the site. There is a large and mature sycamore (*Acer pseudoplantus*) tree at the northern end of the site, ash (*Fraxinus excelsior*) trees, eucalyptus (*Eucalyptus sp*) and ornamental species along with specimen ornamental conifers.





3.3.5. Standing Water.

There is one ornamental garden pond on the site. There were pond lilies growing within the pond along with other ornamental species and duckweed.



3.3.6. Wall.

There is a retaining wall along the roadside of the site and various small stone walls within the gardens.






3.3.7. Bare Ground.

Bare ground is present in the form of a tarmac drive and paved steps and patio areas.




3.3.8. Buildings.

There is an existing house and outbuildings on the site. Only one building is to be affected, the remainder remain. The building to be removed is dealt with in greater detail later in this report.




**3.4. Description of Fauna.**

3.4.1. No badger setts or badger field signs were found anywhere within the survey area.

3.4.2. There are no watercourses within the survey area to provide habitat for water voles, otters or white clawed crayfish.

3.4.3. There is one building on the site that is to be demolished while the house and garage will remain unaffected by the proposed development and were therefore excluded from the survey.

3.4.3.1. The building to be demolished is a garage and garden store shown below. It is built with well pointed, random stone walls and with a hipped roof covered with close fitting concrete roof tiles. There are no gaps cracks or crevices in the walls, the plastic eaves are close fitting, the roof tiles are all close fitting and the ridge tiles are all closely pointed.



3.4.3.2. Internally the building is lined with felt and there are no rips or tears.



3.4.3.3. No bats or bat field signs were found inside or outside the building and it was assessed to have negligible potential for roosting bats.

3.4.4. The bare ground and fence on the site are extremely low value habitat for foraging and commuting bats.

3.4.5. There is one garden lily pond on the site, shown in the photograph below.



3.4.5.1. This pond is small and isolated from other ponds by the adjacent main road and while there is a shrubbery around the pond, the surrounding habitat is all amenity grassland.

3.4.5.2. A Habitat Suitability Index assessment (HSI) was undertaken and is shown in the table below. The result is a score of 0.58, below average potential for the presence of great crested newts. Only 2% of ponds with a below average score contain great crested newts.

| HSI | | Pond |
|---|---|---|
| $SI_1$ | Location | 1 |
| $SI_2$ | Pond Area | 0.2 |
| $SI_3$ | Pond Drying | 0.9 |
| $SI_4$ | Water Quality | 1 |
| $SI_5$ | Shade | 1 |
| $SI_6$ | Fowl | 1 |
| $SI_7$ | Fish | 1 |
| $SI_8$ | Ponds | 0.1 |
| $SI_9$ | Terrestrial Habitat | 0.33 |
| $SI_{10}$ | Macrophytes | 0.7 |
| Total score | | 0.58 |
| Presence | | Below Average |

3.4.5.3. Further details of the Habitat Suitability Index technique are provided in the appendices.

3.4.6. The hedgerows and shrubberies provide ideal habitat for nesting birds between March and September, during the nesting season.

3.4.7. The site is open and exposed and totally unsuitable for reptiles with no opportunities for cover or shelter and the adjacent road a barrier to movement.

3.4.8. The site is assessed to be unsuitable habitat for hazel dormouse as it lies outside the natural range of the species.

3.4.9. The site is assessed to be totally unsuitable habitat for red squirrels and is outside their natural range.

3.4.10. Rhododendron and cotoneaster are both present within the garden shrubberies. These are both alien invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981). It is illegal to spread or cause to spread such plants into the wild.

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# 4. EVALUATION OF FINDINGS.

4.1. There are no statutory designated sites or Nature Reserves in the area around the site and therefore there will be **No Negative Impact** on designates sites or Nature Reserves.

4.2. There are two Priority Habitats as listed under the NERC Act 2006 on the site. The hedgerows will be retained while the pond will be lost as a result of the development and therefore the proposed development will have **a High Negative Impact** on NERC Priority Habitats.

4.3. The habitat to be affected by any proposed development is almost entirely amenity grassland of no ecological value and there will therefore be a **No Negative Impact** as a result of loss of grassland due to the proposed development.

4.4. No badger setts or badger field signs were found on the site and therefore there will be **No Negative Impact** on the species.

4.5. There are no watercourses on or near the site to provide habitat for water voles, otters or crayfish and therefore the proposed development will have **No Negative Impact** on those species.

4.4. There is one pond on the site that will be lost as a result of the proposed development. However, the pond is an ornamental garden pond with an HSI score of 0.58 making the presence of great crested newts very unlikely. In addition, the site is surrounded by residential areas to the west and a busy main road and retaining wall to the west making amphibian access to the site extremely difficult. The proposed works will have **No Negative Impact** on amphibians and great crested newts.

4.5. There is one building that will be affected by the proposed development. This was inspected and assessed to have negligible potential for roosting bats. Therefore, there will be **No Negative Impact** on roosting bats.

4.6. There is no suitable bat foraging or commuting habitat present on the site and therefore the proposed development will have **No Negative Impact** on foraging and commuting bats.

4.7. There are abundant opportunities for nesting birds in the hedgerows and shrubberies, most of which are to be retained. Therefore, provided those areas of vegetation that do need to be cleared are cleared outside the nesting season the proposed development will have **No Negative Impact** on nesting birds.

4.8. The site is assessed to be totally unsuitable for reptiles and therefore, there will be **No Negative Impact** on reptiles as a result of the proposed development.

4.9. The site is assessed to be totally unsuitable habitat for hazel dormouse and therefore the proposed development will have **No Negative Impact** on the species.

4.10. The site is assessed to be totally unsuitable habitat for red squirrels, with no suitable habitat present on the site. There will be **No Negative Impact** on the species.

4.11. There are two alien, invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act (1981) within the existing gardens on the site that are to be retained. There is therefore no potential for these plants to be caused to spread in the wild and the proposed development will have **No Negative Impact** on the spread of such plants.

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# 5. RECOMMENDATIONS.

5.1. It is recommended that as much as possible of the perimeter hedgerows, the shrubberies and the landscape planting is retained for nesting birds and foraging bats.

5.2. It is recommended that the pond is drained during the winter months when amphibians will not be present in the pond or breeding. If there is a requirement to drain the pond between March and October, it should first be checked by an ecologist to determine there are no breeding amphibians present.

5.3. It is recommended that all vegetation clearance be undertaken between September and February, outside the nesting bird season. Any necessary vegetation clearance within the nesting season should be preceded by a nesting bird survey undertaken by an ecologist. Any active nests found must be left undisturbed until the young have fledged.

5.4. It is recommended that at least one garden pond is provided in one of the new gardens on the site to replace the pond that will be lost.

5.5. The proposed development provides ideal opportunities to enhance the biodiversity of the area.

5.5.1. It is recommended that three new integrated bat bricks be installed in the new houses. The design should be as shown below or equivalent and the bricks should be installed in the top of gable end walls.



Habibat 001 Bat Box - Standard Smooth Red Brick



Habibat 001 Bat Box - Standard Smooth Blue Brick



Habibat 001 Bat Box - Standard Stone Finish

5.5.2. It is recommended that at least three swift nest boxes should be erected on the proposed new buildings. The design below or equivalent is recommended.





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| Prepared by: | |
|---|---|
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| Checked by: | |
|---|---|
| Jenny Whitcher Roebuck MCIEEM. | Date: 6th January 2020. |

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# Appendix I. NESTING BIRD INFORMATION.

***Ecology***

The nesting season will vary according to the weather each year but generally commences in March, peaks during May and June and continues until September. It is also worth remembering that some birds nest in trees and scrub, but others are ground nesting or prefer man- made structures or buildings.

***Surveys***

Nesting bird surveys search for potential nest sites in vegetation, buildings etc. Potential nesting sites are observed over a suitable period of time for bird movements or calling male birds that would indicate the presence of a nest. The presence of a nest can be identified from the field signs without the necessity to see the nest itself, thereby avoiding any disturbance of the nests. The best way to avoid this issue is to plan for vegetation clearance to be carried out outside the bird-nesting season.

***Legislation***

Nesting birds are protected under The Wildlife and Countryside Act 1981.

Part 1. -(1) Of the Act states that: - If any person intentionally: - kills, injures or takes any wild bird; takes, damages or destroys the nest of any wild bird while that nest is in use or being built; or takes or destroys an egg of any wild bird, he shall be guilty of an offence.

Part 1. -(5) of the Act states that: - If any person intentionally: - disturbs any wild bird included in Schedule 1 while it is building a nest or is in, on, or near a nest containing eggs or young; or disturbs young of such a bird, he shall be guilty of an offence and liable to a special penalty.

The Countryside and Rights of Way Act 2000 amends the above by inserting after “intentionally” the words “or recklessly”.

# Appendix II. GREAT CRESTED NEWT INFORMATION.

***Ecology***

Great Crested Newts breed in ponds and other water bodies. They can begin to migrate to their breeding ponds as early as the first frost-free days in late January with the majority reaching their breeding ponds by mid-March. Timing will be influenced by several factors, primarily evening temperatures above 5$^{o}$C and rainfall.

The peak egg-laying period is from mid-March to mid-May. The newts will lay their eggs individually, mainly on the leaves of submerged plants. The larva hatch after three weeks and then take another 2-3 months to complete larval development. Adult newts generally leave their breeding ponds from late May onwards.

Once the larvae have completed metamorphosis (the transition from aquatic larvae, efts, to land-adapted juveniles), they emerge from the pond. This emergence begins in late August and generally continues until late October. It takes 2-4 years to reach sexual maturity, during which time the newts will be land based.

Adults and immature newts spend the winter in places that afford protection from frost and flooding. This will generally be underground amongst tree roots, in mammal burrows, or under suitable refuges above ground like deadwood or rubble piles. Hibernation may last from October to February.

Whilst on land, outside the hibernation period, great crested newts will forage at night, taking a wide range of invertebrate prey.

Great Crested Newts therefore spend the majority of their time on land and only visit the ponds for breeding purposes.

Great Crested Newts will travel large distances between ponds and terrestrial refuges. It is recommended that anywhere within 500m of a pond should be treated as potential Great Crested Newt habitat.

***Surveys***

Walkover surveys will identify the suitability of any ponds within the area for Great Crested Newts by using an HSI assessment. The terrestrial habitat and their links will also be assessed.

Aquatic surveys of newts can be carried out through the trapping of ponds in suitable weather conditions during the breeding season, although these surveys do not provide accurate population estimates.

Terrestrial surveys and exclusions can be conducted between March and September when newts are moving out of breeding ponds.

An experienced surveyor must carry out the surveys and must be in possession of an appropriate Natural England Great Crested Newt survey license.

It is essential that Great Crested Newt surveys are planned well in advance of any development and ideally before Planning Consent is sought. Surveys can only be carried out at the appropriate time of year and repeat surveys are essential.

***Legislation***

Great Crested Newts are protected under Appendix II of the BERN Convention (1982), Schedule 5 of the Wildlife and Countryside Act (1981), Annex II and IV of the Habitats Directive, Annex II of the Conservation and Wildlife Regulations (2010) and are listed under section 41 of the Natural Environment and Communities Act (2006) making them a species of principal importance.

This makes it an offence to kill, injure or take any Great Crested Newt, to interfere with any place used for shelter or protection, or to intentionally disturb any animal occupying such a place.

If Great Crested Newts are to be affected by any development, a thorough assessment of the population is essential followed by the design of a comprehensive mitigation package. Only when this has been done can a license application be submitted to Natural England for approval. It takes 30 working days for a license application to be determined and the period that mitigation measures take can be measured in months. It is therefore essential to plan well in advance of development commencing.

# Appendix III. HABITAT SUITABILITY INDEX INFORMATION.

Amphibian and Reptile Groups of the United Kingdom

ARG UK Advice Note 5 www.arguk.org

## Great Crested Newt Habitat Suitability Index

**May 2010**

### Background

The Habitat Suitability Index (HSI) for the great crested newt was developed by Oldham *et al.* (2000). HSI scoring systems were originally developed by the US Fish and Wildlife Service as a means of evaluating habitat quality and quantity. An HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species. These ten suitability indices are retained in this current Advice Note.

In the HSI system proposed by Oldham *et al.* (2000) one of the suitability indices ($SI_9$, terrestrial) involves more lengthy measurement and calculation than the others. In using the HSI system with volunteer surveyors in Kent, Lee Brady has substituted a simpler evaluation of terrestrial habitat quality (a four-point scale), for ease of use.

Several other, local, surveys have utilised the HSI, but incorporating their own variations on the original system. In 2007 a workshop was held at the Herpetofauna Workers' Meeting to evaluate the use of the HSI for the great crested newt, with the aims of:

- Identifying components of the system that may need clarification or refinement
- Agreeing on a standard that can readily be used by volunteers and professionals alike.

The outputs of the workshop and subsequent consultation have been used to formulate the current Advice Note. As far as possible a conservative approach has been adopted in modifying the use of the original HSI suitability indices. However, a major departure is the adoption of Lee Brady's four-point evaluation of terrestrial habitat. This differs from the original HSI in that it has been developed with respect to newt presence/absence at a pond, rather than estimating population size.

### Use and limitations of the HSI

The HSI for great crested newts is a measure of habitat suitability. **It is not a substitute for newt surveys**. In general, ponds with high HSI scores are more likely to support great crested newts than those with low scores. However, the system is not sufficiently precise to conclude that any particular pond with a high score will support newts, or that any pond with a low score will not do so.

There is a positive correlation between HSI scores and the numbers of great crested newts observed. In general, high HSI scores are likely to be associated with greater numbers of great crested newts. The relationship is not sufficiently strong, however, to allow estimations of the numbers of newts in any particular pond.

HSI scoring can be useful in:

- Evaluating the general suitability of a pond, or ponds, for great crested newts
- Comparing general suitability of ponds across different areas
- Evaluating the suitability of receptor ponds in a proposed mitigation scheme
- Identifying habitat management priorities.

### How to collect data and calculate the HSI

The HSI is a geometric mean of ten suitability indices:

$$HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$$

- Ten factors are scored for a pond, in the field and from map work (field scores).
- The ten field scores are converted to SI scores, on a scale from 0.01 to 1 (0.01 is used as the lower end of the scale in stead of 0, because multiplying by 0 reduces all other SI scores to 0).
- The ten SI scores are multiplied together.
- The tenth root of this number is calculated $(x)^{1/10}$ i.e. $x$ to the power of 0.1.

The calculated HSI for a pond should score between 1 and close to 0 (the calculations above do not allow the HSI to be exactly 0).

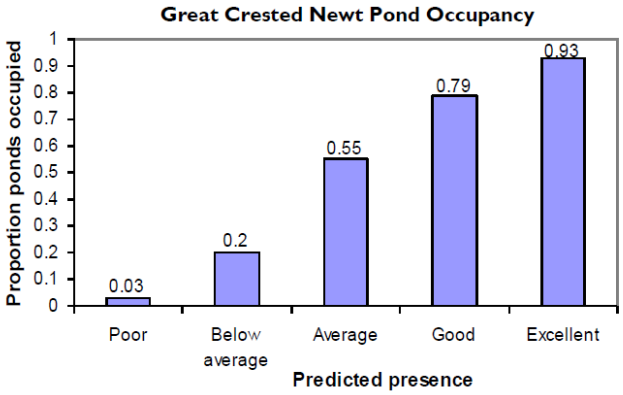
Some of the field scores are categorical, some are numerical. The numerical field scores are converted to SI scores by reading off the values from graphs produced by Oldham *et al.* (2000) reproduced in this Advice Note.

Full details of the scoring system, including descriptions of the criteria used in the categorical scores are given in *Details of suitability indices and definitions of categories* (below). Scores for two of the factors ($SI_1$ and $SI_8$) can be gained as desktop/map exercises and so do not have to be completed in the field. The remaining factors should be recorded as field scores, and later converted to suitability indices, in some cases reading SI scores from the graphs provided. A summary of data to collect is given in the appendix *Summary of scoring system*.

## Categorisation of HSI scores

Lee Brady has developed a system for using HSI scores to define pond suitability for great crested newts on a categorical scale:

| HSI | | Pond suitability |
|---|---|---|
| < 0.5 | = | poor |
| 0.5-0.59 | = | below average |
| 0.6-0.69 | = | average |
| 0.7-0.79 | = | good |
| > 0.8 | = | excellent |




The graph shows occupancy of ponds by great crested newts in south-east England. 248 ponds were surveyed on three to six occasions, using egg-searching, torching and bottle-trapping. As pond suitability increases from 'poor' to 'excellent', so does the proportion of ponds occupied by great crested newts.

## Details of suitability indices and definitions of categories

### Factor 1. Geographic location ($SI_1$)

Sites should be scored according to the zone in which they occur. This scoring can be carried out either in the field, or as part of a desktop exercise.

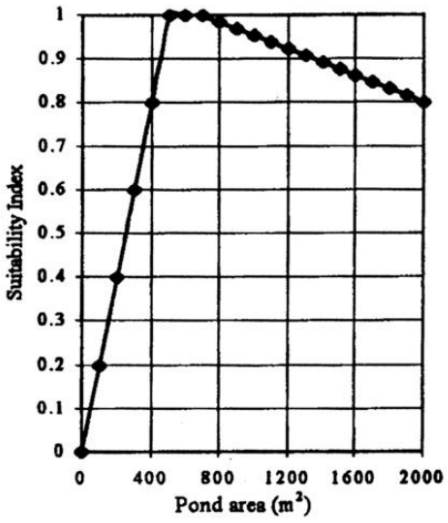
Zone A, location is optimal, SI = 1
Zone B, location is marginal, SI = 0.5
Zone C, location is unsuitable, SI = 0.01.

Some sites will fall on boundary lines between zones. In such cases, select medium-value scores i.e. Zone B.



**Factor 2. Pond area**

Pond area is the surface area of the pond when water is at its highest level (excluding flooding events). This is usually in the spring. If the pond is being measured at another time of year, the spring time area should still be evident from vegetation types and evidence of a draw down zone around the pond.




Pond area should be measured as accurately as possible. There are several ways of doing this, for example by measuring axes of regularly shaped ponds, either by pacing out in the field, or taking measurements from a map. Irregularly shaped ponds may have to be treated as a series of geometric shapes, calculating the area for each and adding together.

Since it can be difficult reading off SI scores from the graph, pond area should be rounded to the nearest 50 $m^2$.

It can be particularly difficult to read off SI scores for very small ponds. For ponds smaller than 50 $m^2$ use a score of 0.05.

For ponds larger than 2000 $m^2$ omit this factor from the HSI calculation (as there are no data for such large ponds). i.e. $HSI = (SI_1 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/9}$.

**Factor 3. Permanence**

Pond permanence should be deduced from local knowledge and personal judgement. A landowner may know how often a pond dries. However, if not, the surveyor should make a judgement based on water level at the time of the survey, and taking seasonality into consideration. For example, a pond that is already dry by late spring is likely to dry out every year, etc.

| Category | SI | Criteria |
|---|---|---|
| Never dries | 0.9 | Never dries. |
| Rarely dries | 1.0 | Dries no more than two years in ten or only in drought. |
| Sometimes dries | 0.5 | Dries between three years in ten to most years. |
| Dries annually | 0.1 | Dries annually. |

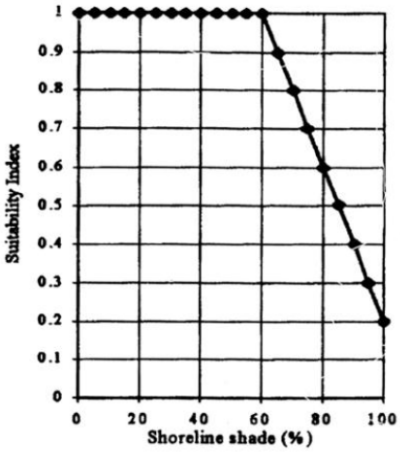
**Factor 4. Water quality**

The assessment of water quality is subjective and should be based on invertebrate diversity, the presence of submerged water plants and knowledge of the water sources feeding the pond. Water quality should not be confused with water clarity. Sometimes clear water can be devoid of invertebrates, and turbid ponds can support a wealth of invertebrates. There is no quick and simple invertebrate index of water quality. However, some species are indicators of water quality.

| Category | SI | Criteria |
|---|---|---|
| Good | 1.0 | Water supports an abundant and diverse invertebrate community. Netting reveals handfuls of diverse invertebrates, including groups such as mayfly larvae and water shrimps. |
| Moderate | 0.67 | Moderate invertebrate diversity |
| Poor | 0.33 | Low invertebrate diversity (e.g. species such as midge and mosquito larvae). Few submerged plants. |
| Bad | 0.01 | Clearly polluted, only pollution-tolerant invertebrates (such as rat-tailed maggots), no submerged plants. |

Other cues may also provide information about water quality. For example, ponds subject to agricultural inputs are likely to have poor water quality.

**Factor 5. Shade**




Estimate percentage pond perimeter shaded, to at least 1m from the shore. Shading is usually from trees, but can include buildings. Shading should not include emergent pond vegetation. The estimate should be made during the period from May to the end of September.

**Factor 6. Waterfowl**

This factor is concerned with the impact of waterfowl upon the pond and newts. At high densities, as created when waterfowl are encouraged to use a pond by provision of food, the birds can remove all aquatic vegetation, pollute water and persistently stir sediments. Some waterfowl may also actively hunt adult newts and their larvae. Score as one of three categories.

| Category | SI | Criteria |
|---|---|---|
| Absent | 1 | No evidence of waterfowl impact (moorhens may be present). |
| Minor | 0.67 | Waterfowl present, but little indication of impact on pond vegetation. Pond still supports submerged plants and banks are not denuded of vegetation. |
| Major | 0.01 | Severe impact of waterfowl. Little or no evidence of submerged plants, water turbid, pond banks showing patches where vegetation removed, evidence of provisioning waterfowl. |

'Waterfowl' includes most water birds, such as ducks, geese and swans. Moorhens should be excluded because almost every pond has at least one or two.

**Factor 7. Fish**

Information on fish should be gleaned from local knowledge and the surveyor's own observations. Pond owners will usually be aware of stocking with fish for commercial or aesthetic reasons. However, stickleback (which can be significant predators of great crested newt larvae, when present in large numbers) are unlikely to be deliberately introduced to a pond, but may arrive through other means. Netting is useful in detecting smaller fish, such as sticklebacks, or the fry of larger species.

| Category | SI | Criteria |
|---|---|---|
| Absent | 1 | No records of fish stocking and no fish revealed by netting or observed by torchlight. |
| Possible | 0.67 | No evidence of fish, but local conditions suggest that they may be present. |
| Minor | 0.33 | Small numbers of crucian carp, goldfish or stickleback known to be present. |
| Major | 0.01 | Dense populations of fish known to be present. |

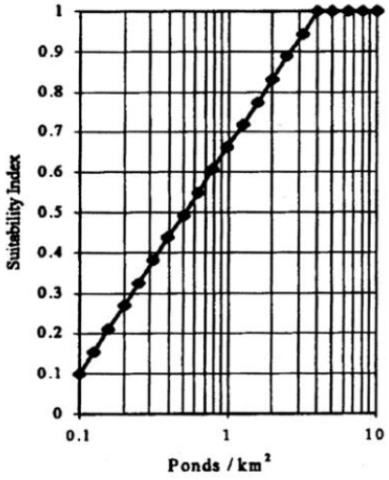
**Factor 8. Pond count**

This is the number of ponds occurring within 1 km of survey pond. Do not count the survey pond itself. Ponds on the far side of major barriers, such as main roads, should not be counted. Use 1:25,000 scale O.S. data, such as Explorer maps, GIS or web-based mapping sources, such as:

| | |
|---|---|
| Getamap | www.ordnancesurvey.co.uk/oswebsite/getamap/ |
| Magic | www.magic.gov.uk/site_map.html |
| Digimap | edina.ac.uk/digimap/ |

Pond counts can be carried out a by a survey coordinator and so do not necessarily have to be performed by surveyors.

Divide the number of ponds by π (3.14) to calculate the density of ponds per $km^2$ and read off the SI value from graph.




**Factor 9. Terrestrial habitat**

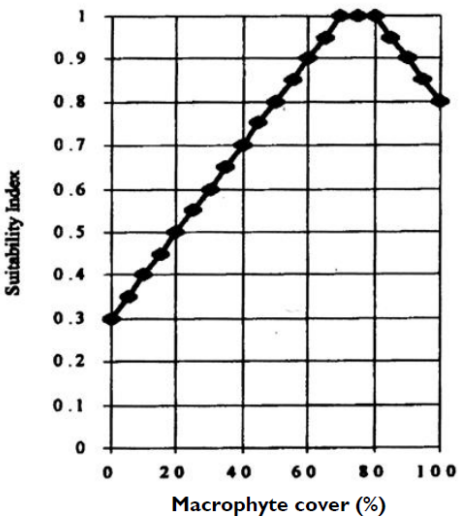
Scoring terrestrial habitat depends on the surveyor's understanding of newt habitat quality. Good terrestrial habitat offers cover and foraging opportunities and includes meadow, rough grassland with tall sward height, scrub, woodland or mature gardens. Terrestrial habitat should be considered within approximately 250 m from the pond, but only on the near side of any major barriers to dispersal (e.g. main roads or large expanses of bare habitat).

| Category | SI | Criteria |
|---|---|---|
| Good | 1 | Habitat that offers good opportunities for foraging and shelter (e.g. most semi-natural environments, such as rough grassland, scrub or woodland, also brownfield sites and low intensity farmland) covers more than 75% of available area. |
| Moderate | 0.67 | Habitat offers opportunities for foraging and shelter but may not be extensive (25-75%) of available area. |
| Poor | 0.33 | Habitat with poor structure (e.g. amenity grassland, improved pasture and arable) that offers limited opportunities (less than 25% of available area) for foraging and shelter. |
| None | 0.01 | No suitable habitat around pond (e.g. centre of arable field or large expanse of bare habitat). |

Great crested newts do not have specific terrestrial habitat requirements. However, good quality terrestrial habitat has structure. The presence of hedges, ditches, stone walls, old farm buildings, piles of loose stone or rock, rabbit burrows and small mammal holes all contribute towards 'good' terrestrial habitat. Note that it is rare to encounter a pond falling within the terrestrial habitat category of 'none'.

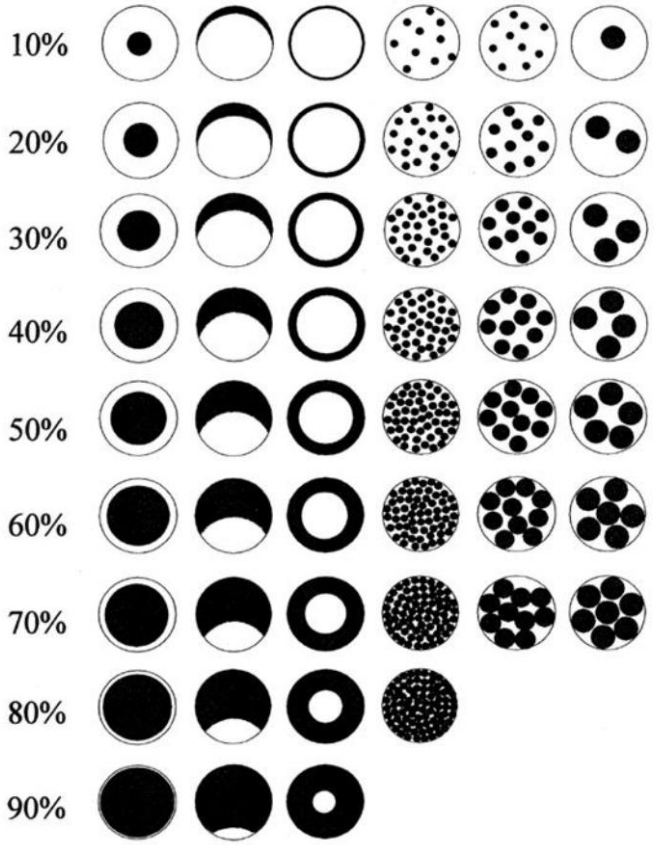
**Factor 10. Macrophytes**

Estimate the percentage of the pond surface area occupied by macrophyte cover. This includes emergents, floating plants (excluding duckweed) and submerged plants reaching the surface. Make an estimate between March and the end of September. Read off the SI value from graph.



**Guide for assessment of macrophyte cover in a pond**

The areas of dark shading simulate a variety of vegetation dispersion patterns.




**Reference**

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10(4), 143-155.

This Advice Note is an output from a workshop held at the Herpetofauna Workers' Meeting in January 2007. ARG UK is grateful to Lee Brady, Rob Oldham, David Sewell and John Baker for leading the workshop and/or contributing to this note, and workshop participants for providing useful suggestions. ARG UK is also grateful to the British Herpetological Society for permission to use graphics from the original paper on HSI, published in the *Herpetological Journal*.

This Advice Note can be downloaded from the ARG UK website www.arguk.org and should be cited as: ARG UK (2010). ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.

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ARG UK is the network of volunteer conservation groups concerned with the native amphibians and reptiles of the UK.

ARG UK Amphibian and Reptile Groups of the United Kingdom

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## Summary of scoring system

### $SI_1$ Location

| Field score | SI |
|---|---|
| A (optimal) | 1 |
| B (marginal) | 0.5 |
| C (unsuitable) | 0.01 |

### $SI_2$ Pond area

| Field score | SI |
|---|---|
| Measure pond surface area ($m^2$) and round to nearest 50 $m^2$ | Read off graph. |

### $SI_3$ Pond drying

| Field score | SI | Criteria |
|---|---|---|
| Never | 0.9 | Never dries |
| Rarely | 1.0 | Dries no more than two years in ten or only in drought. |
| Sometimes | 0.5 | Dries between three years in ten to most years |
| Annually | 0.1 | Dries annually |

### $SI_4$ Water quality

| Field score | SI | Criteria |
|---|---|---|
| Good | 1.0 | Abundant and diverse invertebrate community. |
| Moderate | 0.67 | Moderate invertebrate diversity |
| Poor | 0.33 | Low invertebrate diversity, few submerged plants |
| Bad | 0.01 | Clearly polluted, only pollution-tolerant invertebrates, no submerged plants. |

### $SI_5$ Shade

| Field score | SI |
|---|---|
| Estimate percentage perimeter shaded to a least 1 m from shore. | Read off graph. |

### $SI_6$ Fowl

| Field score | SI | Criteria |
|---|---|---|
| Absent | 1 | No evidence of water fowl (although moorhen may be present) |
| Minor | 0.67 | Waterfowl present, but little sign of impacts |
| Major | 0.01 | Severe impact of waterfowl |

### $SI_7$ Fish

| Category | SI | Criteria |
|---|---|---|
| Absent | 1 | No records of fish stocking and no fish revealed during survey. |
| Possible | 0.67 | No evidence of fish, but local conditions suggest that they may be present. |
| Minor | 0.33 | Small numbers of crucian carp, goldfish or stickleback known to be present. |
| Major | 0.01 | Dense populations of fish known to be present. |

### $SI_8$ Pond count

| Field score | SI |
|---|---|
| Count the number of ponds within 1 km of the survey pond (not separated by major barriers) and divide by 3.14. This can be done from maps rather than in the field. | Read off graph. |

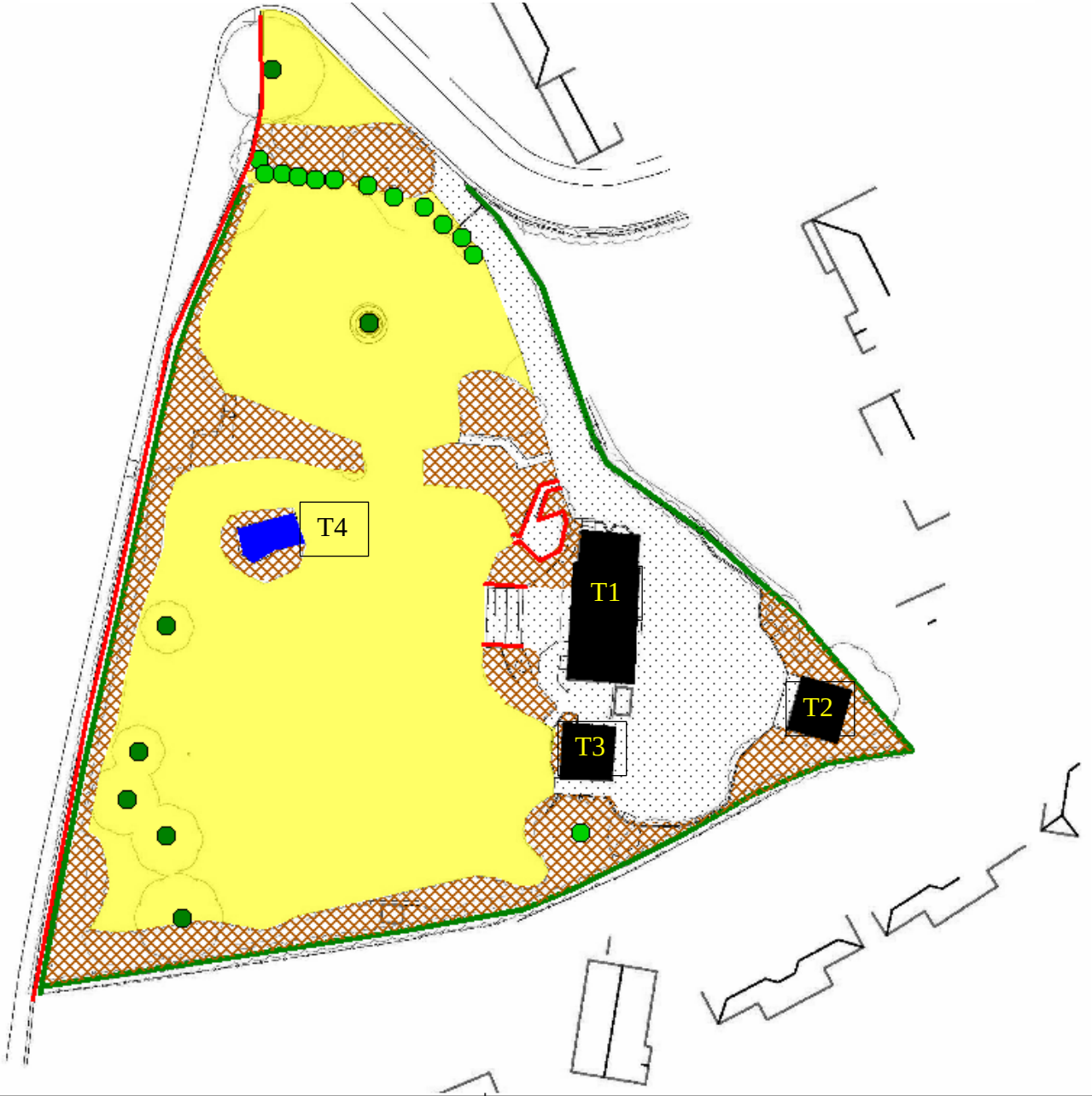
### $SI_9$ Terrestrial habitat

| Category | SI |
|---|---|
| Good | 1 |
| Moderate | 0.67 |
| Poor | 0.33 |
| None | 0.01 |

### $SI_{10}$ Macrophytes

| Field score | SI |
|---|---|
| Estimate the percentage of the pond surface area occupied by macrophyte cover (between May and the end of September) | Read off graph. |

# Appendix IV. ANNOTATED MAP OF THE SURVEY AREA.




Amenity Grassland

Introduced Shrub

Scattered Trees, Broad-Leaved

Scattered Trees, Coniferous

Bare Ground

Building

Standing Water

Hedge, Intact, Species Poor

Wall

**Site:** Stonewall House, Birdwell

**Reference:** 191210

**Prepared by:** Whitcher Wildlife Ltd

**Date:** 19th December 2019

# Appendix V. TARGET NOTES.

T1. Existing house to be retained.

T2. Existing Garage to be retained.

T3. Garage to be demolished.

T4. Pond.