



WATER HALL LANE, PENISTONE.

OS REF: SE 245-037.

PRELIMINARY ECOLOGICAL APPRAISAL.

Ref No: 181032.

Date: 23rd October 2018.

TABLE OF CONTENTS.

	Page Number
1. INTRODUCTION.	3
2. SURVEY METHODOLOGY.	4
3. SURVEY RESULTS.	8
4. EVALUATION OF FINDINGS.	21
5. RECOMMENDATIONS.	24
6. REFERENCES.	27
Appendix I. BADGER INFORMATION.	28
Appendix II. WATER VOLE INFORMATION.	30
Appendix III. OTTER INFORMATION.	31
Appendix IV. CRAYFISH INFORMATION.	32
Appendix V. BAT INFORMATION.	34
Appendix VI. NESTING BIRD INFORMATION.	36
Appendix VII. SCHEDULE 9 INVASIVE PLANT SPECIES INFORMATION.	37
Appendix VIII. HABITAT SUITABILITY INDEX INFORMATION.	40
Appendix IX. ANNOTATED MAP OF THE SURVEY AREA.	47
Appendix X. TARGET NOTES.	48
Appendix XI. DATA SEARCH RESULTS.	51

1. INTRODUCTION.

1.1. A planning application is to be submitted for the demolition of existing farm buildings and the construction of a new dwelling house on land off Water Hall Lane, Penistone.

1.2. Whitcher Wildlife Ltd has been commissioned to carry out a Preliminary Ecological Appraisal in support of a planning application.

1.3. The site survey was carried out on 5th October 2018 and this report outlines the findings of that survey and makes appropriate recommendations.

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

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. This survey was carried out by James Campbell MCIEEM. Since 2003 James has had experience in a professional capacity as a Wildlife Consultant carrying out Ecology Surveys and Phase 1 Habitat surveys and is a full member of CIEEM. James holds licences with several licensing bodies including: -

- Natural England Survey Licences in respect of bats, great crested newts, white clawed crayfish and barn owls.
- Scottish Natural Heritage Licences in respect of bats and great crested newts.
- Countryside Council for Wales Licences in respect of bats and great crested newts.

He has also successfully completed numerous courses run by CIEEM, BCT and FSC regarding protected species and in carrying out Phase 1 Habitat surveys. He is also

confined spaces trained and qualified to NVQ Level 2 in tree climbing and aerial rescue.

3. SURVEY RESULTS.

3.1. Data Search Results.

3.1.1. Barnsley Biodiversity Records Center, South Yorkshire Bat Group and South Yorkshire Badger Group were contacted for records of protected species and protected sites within the survey area. The results of this data search are included in Appendix XII of this report.

3.1.2. South Yorkshire Bat Group provided numerous records of bat sightings and bat roosts within the surrounding area. The nearest record is of a bat trapped in a residential property 120m to the south of the survey area from 2005. There is a record of several Noctule, Brandts and Common Pipistrelle bat roosts 170m to the south of the survey area from 1987 to 1998. These shows that bats are roosting near to the survey area, but these roosts will not be impacted on by the proposed works.

3.1.3. Barnsley Biological Records Center provided a large number of records. The nearest record of bats was a Common Pipistrelle bat roost on Barnsley Road to the North of the survey area in 2008 and numerous sightings of foraging along the same road during 2015. These show that bats are foraging and roosting close to the survey area.

3.1.4. There are records of badger known to be 950m to the north east of the survey area and there is also a healthy badger population to the north and east of the survey area. However, there are no records of urban badgers or badger setts within the survey area.

3.1.5. Barnsley Biological Records Center provided a record of Scout Dike Reservoir, a local wildlife site located approximately 0.8 miles to the north west of the survey area. The proposed works will not have an impact on Scout Dike Reservoir.

3.1.6. The data search has been summarised above. However, the full data search can be provided on request as it is too large to be included in this report and should not be published in the public domain.

3.2. The Surveyed Area.

3.2.1. The survey area is a large grazing field and an area of agricultural buildings located off Water Hall Lane to the north of Penistone. The aerial photograph below shows the location of the survey area outlined in red and the immediate surrounding area.



3.3. Description of Habitats.

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

- Improved Grassland.
- Running Water.
- Wall.
- Fence.
- Bare Ground.
- Buildings.
- Defunct Hedgerow.
- Other Habitat.
- Scattered Broad Leaved Trees.
- Tall Ruderal.
- Ephemeral/Short Perennial.

3.3.2. Improved Grassland.

The survey area was predominantly improved grassland. There was a large area to the west of the survey area and several areas within the area of buildings to the east. The species present within the improved grassland include: - dock (*Rumex*), dandelion (*Taraxacum*), meadow buttercup (*Ranunculus acris*), white clover (*Trifolium repens*), common thistle (*Cirsium vulgare*), ragwort (*Jacobaea vulgaris*), common couch (*Elymus repens*), creeping bent (*Agrostis stolonifera*), Yorkshire fog (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*) and cocks' foot (*Dactylis glomerata*).



3.3.3. Running Water.

The River Don flows along the western and northern boundary of the survey area. The river is approximately approximately 5m wide and up to 1m deep in places with poached, shallow vegetated banks.



3.3.4. Wall.

The site has small areas of stone walls and concrete walls along and within the site boundary.



3.3.5. Fence.

The majority of the site boundary is demarcated in areas with post and wire, post and panel and post and cattle fence.



3.3.6. Bare Ground.

There were areas of bare ground within the survey area. The areas vary from concrete from manure stores and dismantled buildings to bare soil where the vegetation has been removed.



3.3.7. Buildings.

There were two agricultural buildings identified within the survey area that could provide shelter for roosting and foraging bats and nesting birds.



3.3.8. Defunct Hedgerow.

There was a small area a Leylandii (*Cupressus leylandii*) hedgerow identified along the south eastern boundary of the survey area.



3.3.9. Scattered Broad Leaved Trees.

The northern and eastern boundary were dominated by large mature trees with species including: - cracked willow (*Salix fragilis*), sycamore (*Acer pseudoplatanus*), goat willow (*Salix caprea*), ash (*Fraxinus excelsior*), alder (*Alnus*), white poplar (*Populus alba*) and elder (*Sambucus*).



3.3.10. Other Habitat.

There are several areas of other habitat within the survey area including piles of earth, bricks, stones, wood chippings, tree roots and demolished buildings.



3.3.11. Tall Ruderal.

There were several areas of tall ruderal species identified along the river bank and around the buildings. The species include cow parsley (*Anthriscus sylvestris*), common nettle (*Urtica dioica*), hogweed (*Heracleum*), Himalayan Balsam (*Impatiens glandulifera*), Japanese knotweed (*Fallopia japonica*), rosebay willow herb (*Chamaenerion angustifolium*), mug wort (*Artemisia vulgaris*), white dead nettle (*Lamium album*), and rape (*Brassica napus*).



3.3.12. Ephemeral/Short Perennial.

Areas of ephemeral/short perennial species were identified throughout the survey area. The species within these areas include bindweed (*Convolvulus arvensis*), fat hen (*Chenopodium album*), cleavers (*Galium aparine*), groundsel (*Senecio vulgaris*), ribwort plantain (*Plantago lanceolate*), plantain (*Plantago*), smooth sow thistle (*Sonchus oleraceus*), nipplewort (*Lapsana communis*), common ivy (*Hedera*).



3.4. Description of Fauna.

3.4.1. The hedgerow and the River Don flowing along the northern boundary of the survey area are habitats of principal importance covered by the NERC Act 2006.

3.4.2. There were no badger setts identified within the survey area. However, a badger dung pit was identified on the edge of the area of improved grassland. As shown below on the aerial photograph.



3.4.3. The River Don was identified flowing along the northern boundary of the site. The river is approximately 5m wide and up to 1m deep in places with shallow vegetated banks. The photograph below shows the River Don looking to the north.

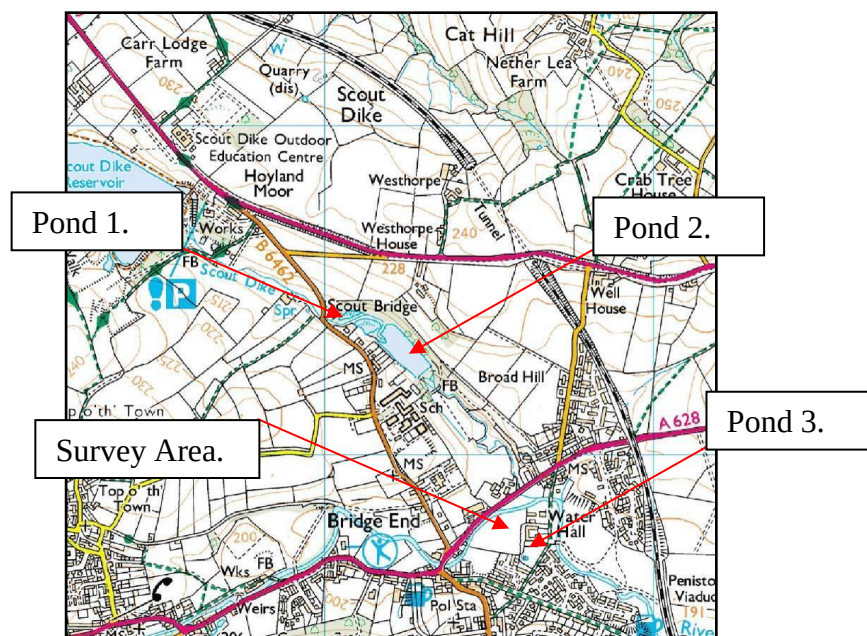


3.4.3.1. The river provides a potential habitat for water vole and otter although no field signs identified within the survey area during this survey.

3.4.3.2. The watercourse will provide a habitat for white clawed crayfish. However, signal crayfish are known to be present within this watercourse.

3.4.4. Two large fishing ponds were identified to the north of the survey area. These ponds are regularly stocked with fish and regularly maintained. One small pond was identified to the south of the survey area 50m to the south of the survey area. There are no records of great crested newts in the Barnsley Biological Record Center data search results.

3.4.4.1. The Ordnance Survey map below shows the location of the site and the two ponds.



3.4.4.2. The following table shows the Habitat Suitability Index (HSI) Scores for each of the ponds. This is a method of calculating the potential presence of great crested newts in a pond by awarding points against specified criteria.

HSI		Pond 1	Pond 2	Pond 3
SI1	Location	1	1	No access available.
SI2	Pond Area	N/A	N/A	
SI3	Pond Drying	0.9	0.9	
SI4	Water Quality	0.67	0.67	
SI5	Shade	0.2	1	
SI6	Fowl	0.67	0.67	
SI7	Fish	0.01	0.01	
SI8	Ponds	0.6	0.6	
SI9	Terrestrial Habitat	0.67	0.67	
SI10	Macrophytes	0.5	0.5	
Total score		0.38	0.45	
Presence		Poor	Poor	

3.4.4.3. An explanation of the HSI criteria is included in Appendix VIII of this report.

3.4.5. Two buildings have been identified within the survey during this survey.

3.4.5.1. **Building 1** was a single storey barn, which was well sealed with no open doors or windows. The walls comprise breeze block which was generally all well pointed with some small gaps, with a corrugated cement sheet roof and ridge. The trees and vegetation around the building cover approximately 50% of the walls and roof.



3.4.5.1.1. Building 1 has some small gaps on the walls and will provide a low potential for roosting bats. However, no bat field signs were identified on the internal or external inspection of the building during this survey.

3.4.5.1.2. No nests or nesting bird activity was identified during this survey.

3.4.5.2. **Building 2** was a single storey barn, which was open fronted and used for storing farm machinery. The walls comprise breeze block, which was all well pointed except in a small section where the wall was damaged.



3.4.5.2.1. The roof and ridge were covered with corrugated cement sheets, which were all in position and in a good condition.

3.4.5.2.2. Building 2 has some small gaps on the walls and will provide a low potential for roosting bats. No bat field signs were identified on the internal or external inspection of the building during this survey.

3.4.5.2.3. No nests or nesting bird activity was identified during this survey.

3.4.5.3. The majority of the trees around the western, northern and eastern site boundary are mature and have multiple features suitable for roosting bats. No bat roosts or bat field signs were identified during this survey.

5.5. The vegetation within the survey area will provide a suitable habitat for nesting birds during the nesting season. The nesting season extends from March to September. No nests were identified within the survey area during this survey.

5.6. The survey area provides limited suitable habitat for reptiles as there is little refugia and very little foraging habitat. No reptiles were identified during this survey.

5.7. The site does not provide a suitable habitat for dormice as there is a lack of suitable connective habitat and the site is outside their natural range.

5.8. The site does not provide a suitable habitat for red squirrel as there is a lack of suitable vegetation.

5.9. Japanese Knotweed and Himalayan Balsam were identified within the survey area during this survey. Both of these species are Schedule 9 invasive plant species listed on the Wildlife and Countryside Act 1981. They were identified on the southern banks of the River Don as shown on the aerial photograph below. Other smaller areas of Himalayan Balsam were identified further along the banks.



4. EVALUATION OF FINDINGS.

4.1. The improved grassland, which extends across the majority of the site, with areas of bare ground surrounded by various types of fencing, walls and buildings all have a **Low Ecological Value**. Loss of these habitats will have a **Low Impact at Site Level**.

4.2. The running water, other habitats, scattered broad leaved trees and the areas of tall ruderal species provide a **Medium Ecological Value** habitat as they provide shelter for nesting birds and the scattered trees and buildings provide shelter and foraging habitat for bats. Their loss will have a **Medium Impact at Local Level**.

4.3. The defunct species poor hedgerow identified on the site boundary is a Habitat of Principal Importance under the NERC Act 2006. The removal of this section of hedgerow will therefore have a **Medium Impact at Local Level**.

4.4. The River Don which flows along the northern site boundary is also a Habitat of Principal Importance under the NERC Act 2006. Any works that will affect the river could have a **Medium Impact at Local Level**.

4.5. No badger setts were identified within the survey area during this survey. However, a badger dung pit was identified on the field boundary. This was an old dung pit and no recent badger activity was identified within the site boundary or immediate surrounding area. Therefore, there will be **No Impact** on badgers during the proposed works.

4.6. The River Don, which flows along the northern boundary of the survey area will provide a suitable habitat for water vole and otter although, no field signs were identified during this survey. It is possible that otters pass along the river to feed but there was no holt present. There could be a **Low Impact at Local Level** on these species if the works are to affect the banks of the watercourse or the watercourse itself.

4.6.1. Signal crayfish are recorded in The River Don, which flows along the northern boundary of the survey area therefore it is highly unlikely that white clawed crayfish will be present. Therefore, the proposed works will have **No Impact** on white clawed crayfish.

4.7. Two large fishing ponds were identified to the north of the survey area during this survey and one small garden pond to the south of the survey area. The two to the north of the survey area will not provide a suitable habitat for great crested newts and both score **poor** on the Habitat Suitability Index (HSI). The one to the south could not be visited during this survey so could not be assessed. However, there are no records of great crested newts within 500m of the survey area and it is highly unlikely that there will be great crested newts on the site. There will be **No Impact** on great crested newts as a result of the proposed works.

4.8. Two buildings were identified within the survey area that were assessed for the suitability to support roosting bats. No bat roosts or bat field signs were identified during this survey although there is potential for small numbers of opportunist bats to seek refuge within the buildings and therefore both buildings were assessed to provide a **no potential** for roosting bats. However, single bats can seek temporary refuge almost anywhere. The proposed works would therefore have a **High Impact at Site Level** on any bats which could seek refuge in the buildings.

4.9. The trees along the site boundaries provide a suitable habitat for foraging and commuting bats and are therefore assessed to have a **High Ecological Value**. If these trees were to be removed, this would represent a **High Impact** on foraging bats. If these are to be retained there will be **No Impact** on foraging bats.

4.10. The vegetation and the buildings within the survey area will provide suitable habitat for various species of bird during the nesting season, which extends from March to September each year. If any vegetation clearance or demolition works are carried out during this time, there will be a **High Impact** on any nesting birds present.

4.11. The survey area does not provide a suitable habitat for reptiles as the surrounding land is mainly arable and grazing farmland, industrial land and busy roads. The proposed works will have **No Impact** on reptiles.

4.12. The site provides no suitable habitat for dormice as there is lack of suitable connective habitat and the site is outside the natural range of the species. There will be **No Impact** on dormice during the proposed works.

4.13. The site provides no suitable habitat for red squirrels and no suitable habitat was identified within the surrounding area during this survey. There will be **No Impact** on red squirrels during the proposed works.

4.14. Japanese knotweed (*Fallopia japonica*) and Himalayan balsam (*Impatiens glandulifera*) were identified along the banks of the watercourse within the survey area. These species are non-native invasive plant species listed on Schedule 9 of the Wildlife and Countryside Act 1981. If the proposed works will affect the banks of the watercourse there will potentially be a **High Impact at Site Level** by causing these species to spread.

5. RECOMMENDATIONS.

5.1. This Preliminary Ecological Appraisal report is designed to advise the client of the initial survey results so that they may be considered within the site development plan.

5.2. Once all surveys have been completed and the development plans have been finalised, the report must be converted into an Ecological Impact Assessment (EcIA) where details of further survey results, mitigation and biological enhancements are included, to arrive at an assessment of the residual impact of the proposed development. This format will be suitable to submit to the Local Authority.

5.3. It is recommended that the banks of the River Don are retained undisturbed. If the development of the site impacts on the banks of the watercourse, a further water vole and otter survey is recommended before works commence.

5.4. As both buildings have been assessed to have no potential for roosting bats there will be no requirement for any further survey work regarding bats. However, care should be taken during the proposed works as single bats can seek temporary refuge almost anywhere. If a bat is identified during the proposed works all works in that area should cease, the bat protected from harm and the undersigned be contacted for a suitable course of action.

5.5. If any of the mature trees on the site boundary are to be affected by the proposed works a more detailed survey for bats will be necessary. This can be in the form of a tree climbing survey at any time of year or a dusk emergence survey carried out between May and August.

5.6. It is recommended that vegetation clearance works, or demolition works, are carried out outside the nesting bird season, which extends from March to September. Any vegetation clearance or demolition required during the bird nesting season will need to be preceded by a nesting bird survey, carried out by a suitably experienced person. Any nests identified during this survey will need to be left undisturbed until the young have fledged.

5.7. Under the terms of National Planning Policy Framework, biodiversity enhancement measures should be provided within the development. The following biodiversity enhancement are recommended: -

5.8. Native planting of fruit bearing trees and shrubs should be provided where possible to enhance the biodiversity of the site and the surrounding area.

5.9. All Japanese knotweed (*Fallopia japonica*) plants identified on the banks of the River Don and surrounding soil will be systematically sprayed with herbicide containing Glyphosate as part of a managed programme over a suitable period of time to allow the elimination of the plant and its rhizomes.

5.9.1. All Himalayan balsam (*Impatiens glandulifera*) plants identified on the banks of the River Don will be pulled from the ground before the plant is in seed which is during the summer months. The plant will then be bagged and removed from the site as contaminated waste and disposed of accordingly.

5.10. As bird nesting potential is going to be lost during the development, when the vegetation and the redundant buildings are removed nesting boxes will be erected in suitable locations around the site. Examples of which are shown below.



5.11. Bat bricks should be erected in suitable locations around the site to enhance the suitability for roosting bats within the survey area. Examples of bat bricks are shown below.



Prepared by:	
James Campbell MCIEEM.	Date: 23 rd October 2018.

Checked by:	
Derek Whitcher. BSc, MCIEEM, MCMI	Date: 23 rd October 2018.

6. REFERENCES.

- Chartered Institute of Ecology and Environmental Management. 2017. **Guidelines for Preliminary Ecological Appraisal, Second Edition**. CIEEM, Hampshire.
- Chartered Institute of Ecology and Environmental Management. 2017. **Guidelines for Ecological Report Writing, Second Edition**. CIEEM, Hampshire.
1981. **Wildlife and Countryside Act**. <http://www.legislation.gov.uk/ukpga/1981/69> (accessed 18/02/16)
2000. **Countryside and Rights of Way Act**. <http://www.legislation.gov.uk/ukpga/2000/37/contents>.
2017. **The Conservation of Habitats and Species Regulations**. <http://www.legislation.gov.uk/uksi/2010/490/contents/made>.
2012. **National Planning Policy Statement**. <https://www.gov.uk/government/publications/national-planning-policy-framework--2>
- Anon. 1995. **Biodiversity: the UK Steering Group report. Vol 2: Action Plans**. HMSO, London.
- Joint Nature Conservation Committee. 2004 (ed.). **Handbook for Phase 1 habitat survey: A technique for environmental audit**. JNCC, Peterborough.
1992. **Protection of Badgers Act**. <https://www.legislation.gov.uk/ukpga/1992/51/contents>.
- Harris S, Cresswell P and Jefferies D. 1989. **Surveying Badgers**. Mammal Society. London.
- Strachan R, Moorhouse T, Gelling M. 2011. **Water Vole Handbook**. 3rd edition. WILDCRU (Wildlife Conservation Research Unit), Oxford.
- Chanin P. 2003(a). **Ecology of the European Otter**. Conserving Natura 2000, Ecology Series No.10. English Nature, Peterborough.
- Chanin P. 2003(b) **Monitoring the Otter *Lutra lutra***. Conserving Natura 2000 Rivers Monitoring Series No. 10. English Nature, Peterborough.
- Peay S. 2003. **Monitoring the White-Clawed Crayfish *Austropotamobius pallipes***. Conserving Natura 2000 Rivers Monitoring Series No. 1. English Nature, Peterborough.
- English Nature. 2001. **Great Crested Newt Mitigation Guidelines**.
- Langton T, Beckett C, Foster J. 2001. **Great Crested Newt: Conservation Handbook**. Froglife, Suffolk.
- Oldham et al. 2000. **Great Crested Newt Habitat Suitability Assessment. ARG UK Advice Note 5, May 2010**.
- Collins J. (ed.) 2016. **Bat Surveys for Professional Ecologist: Good Practice Guidelines**. 3rd ed. The Bat Conservation Trust, London.
- English Nature. 2004. **Bat Mitigation Guidelines**. English Nature, Peterborough, UK.
- BOCC4 Eaton et al. 2015. **Birds of Conservation Concern 4: The Population Status of Bird's in the UK, Channel Islands and Isle of Man**.
- Joint Nature Conservation Committee. 2004. **Common Standards Monitoring Guidance for Birds**. 2004 ed. JNCC, Peterborough.
- Froglife. 1999. **Froglife Advice Sheet 10: Reptile Survey**. Froglife, London.
- Bright P, Morris P, Mitchell-Jones T. 2006. **The Dormouse Conservation Handbook** 2nd edition. English Nature, Peterborough.
- Joint Nature Conservation Committee. 2004 (ed.). **Common Standards Monitoring Guidance for: Reptiles and Amphibians**. JNCC, Peterborough.
- Joint Nature Conservation Committee. 1996. **UK Strategy for Red Squirrel Conservation**. JNCC, Peterborough.

Appendix I. BADGER INFORMATION.

Ecology

Badgers are territorial animals who live in social groups called 'clans'. The territory of these clans can vary in size from 0.2km² to 1.5 km² with anywhere between two and twenty Badgers present. In areas where two clans meet territorial boundaries become well-defined, marked by a series of dung pits called latrines. In areas with relatively low Badger populations there will be less competition for territory and the number of territorial markings will be low or even non-existent.

Badgers use paths around their territory repeatedly, following a scent trail from previous use; thus, Badger paths become well worn. These paths are important to the Badgers and obstruction to these paths will interfere with the Badger's movement around their territory.

Badger setts are any structure or place which displays signs of current or seasonal use by a Badger. Within a Badger clan territory there can be several Badger setts which are categorised in the following ways:

- **Main Sett.** *There will normally be one main sett in a territory. This will generally be the largest sett in the territory, typically with five or more entrances, will be permanently occupied throughout the year and used as the breeding sett.*
- **Outlying Sett.** *These are the smallest setts with generally only one or two entrances. They are intermittently occupied and there can be any number in a territory.*
- **Annex Sett.** *A sett of intermediate size, located close to the main sett and connected by well-defined paths. These are occupied for prolonged periods and may be used as a second breeding sett if there are two breeding sows in the clan.*
- **Subsidiary Sett.** *A sett of intermediate size, similar to an annex sett but located at some distance from the main sett and not connected to the main sett by defined paths.*

Badgers can mate at any time of year, but delayed implantation controls the time of birth. Most cubs are born between January and March, but they can be born at any time between December and June. An average of two to three Badger cubs are born to each sow and will initially be totally dependent on their mother. Cubs do not appear above ground until during April or May when they are 8 – 10 weeks old and are not fully weaned until at least June of each year.

Badgers are omnivorous, but their preferred food source is worms and insects. Worms are most abundant in well-grazed pastureland while mixed woodland is a good source of insects and grubs. Badgers have a soft and supple nose with which they snuffle into the ground to find insects. When they do this, they leave distinct round holes known as snuffle holes or grubbings. Badgers easily find worms on the surface of well-grazed pastureland and often leave no visible indications of this foraging.

Surveys

Walkover surveys can be conducted to identify the presence of Badgers within an area. This will identify the presence of any setts, dung pits, paths or foraging activity.

Bait marking techniques can be used to survey Badger territories. This involves feeding Badgers at each sett pellets of different colours over a period of at least two weeks. The colour of pellet found in dung pits and territorial latrines shows what areas each clan of Badgers is occupying.

Legislation

Badgers are protected under Schedule 6 of the Wildlife and Countryside Act (1981) and the Protection of Badgers Act (1992).

This makes it an offence to take, kill or injure a Badger, cruelly ill-treat a badger, use Badger tongs or firearms in the killing or taking (or attempt) of a Badger. It is also an offence to damage, destroy, obstruct access to, or any entrance of, a Badger sett, to cause a dog to enter a Badger sett or disturb a Badger while it is occupying a sett.

Appendix II. WATER VOLE INFORMATION.

Ecology

The Water Vole is the largest of the British voles. It lives in a series of holes or burrows at the water's edge and can be found along the banks of ditches, streams, rivers, lakes and canals. Although Water Voles live in colonies, the breeding females are territorial, each defining their contiguous territory with latrines during the breeding season. This lasts from March to October.

The Water Vole is herbivorous, feeding primarily on the lush aerial stems and leaves of waterside plants growing alongside the watercourse. Its activity is normally confined to the area within two metres of the watercourse. Bankside vegetation in this area is not only essential for food but also for cover from predators.

The Water Vole population has been on the decline in recent years. This is partly due to loss of suitable riverside habitats but also due to the increasing population of predators, particularly the escaped American Mink. Population decline has been dramatic and has accelerated over the last seven years. Surveys carried out by the Vincent Wildlife Trust show a loss of 67% of occupied sites and of 88% of the remaining population in the last seven years.

Surveys

Water Vole surveys will look for any signs of burrows, latrines, tracks and feeding signs along watercourse banks.

Legislation

Water Voles are protected under Schedule 5 of the Wildlife and Countryside Act (1981) 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 Water Vole, to interfere with any place used for shelter or protection, or to intentionally disturb any animal occupying such a place.

Appendix III. OTTER INFORMATION.

Ecology

Otters are nocturnal, are active all year around and live by undisturbed waters where there is plenty of cover; mostly by freshwater lakes, rivers and small streams as well as some coasts.

Fish are the otter's main source of food, especially eels and they therefore rely on good fish populations. They also eat amphibians and the occasional birds and small mammals.

An otter may use over 40km of river and needs many resting places throughout this range. A female otter will give birth to 1 to 3 cubs in a natal holt which is often away from the main river and must be completely undisturbed.

Surveys

Generally, the only evidence seen of the otter is its faeces or 'spraint', which are deposited along a watercourse in prominent positions. Surveys will look for the presence of these spraints, along with any tracks or potential holts or other resting places which may be used by otters.

Legislation

Otters are protected under Appendix II of the BERN Convention Act (1981), partly covered by Schedule 5 of the Wildlife and Countryside Act (1981), Schedule 6 of the Wildlife and Countryside Act (1981), Annex II and IV of the Habitats Directive, Annex II of the Conservation and Habitats Regulations (2010), Appendix I of the CRoW Act (2000) and are listed under section 41 of the Natural Environment and Communities Act (2006) making them a species of principal importance. Otters are considered to be 'Near Threatened' by the IUCN Red list.

This makes it an offence to disturb any animal while it is occupying a structure or place it uses for shelter or protection or to obstruct access to such a place.

Appendix IV. CRAYFISH INFORMATION.

Ecology

Crayfish are the largest and most mobile freshwater invertebrate. The White Clawed Crayfish (*Austropotamobius pallipes*) is the only native crayfish and this is protected under European and UK legislation.

White Clawed Crayfish are generally found in areas with relatively hard, mineral rich waters on calcareous and rapidly weathering rocks. They can be found in a wide variety of environments including canals, streams, rivers, lakes reservoirs and water-filled quarries.

White Clawed Crayfish are typically found in water between 0.75 and 1.25m deep but can occur in very shallow streams with as little water as 50mm and in deeper, slow flowing rivers. They are typically found under rocks and submerged logs, among tree roots and in river-banks. White Clawed Crayfish are omnivorous but primarily carnivorous eating macro invertebrates and carrion when available. They will also eat worms, insect larvae, snails, small fish, macrophytes, algae and calcified plants.

Crayfish can live for up to ten years and generally reach sexual maturity after three to four years. Breeding takes place between September and November when the water temperature drops consistently to below ten degrees centigrade. Over winter females will hold a clutch of eggs (between twenty and one hundred and twenty) beneath their tail. The juveniles are released from the mother from June in the south to August in the north.

The main threat to the indigenous White Clawed Crayfish is the spread of introduced non-indigenous species, particularly the larger, faster growing and aggressive North American Signal Crayfish (*Pacifastacus leniusculus*). They are also vulnerable to disease, particularly porcelain disease and crayfish plague, and the latter carried by the Signal Crayfish.

Crayfish are also extremely vulnerable to pollution incidents, particularly those involving biocides, silage and sheep dip.

As a result, White Clawed Crayfish are endangered across most of its range and has been given protection under both European and UK legislation.

Surveys

Walkover surveys will assess the potential habitat within a watercourse for Crayfish. If safe to do so and within the correct time of year, surveys can be conducted which involves the invasive search of the watercourse bed and banks for Crayfish. Torch surveys can also be conducted at dusk which will identify any active Crayfish at that time.

Trapping surveys can be carried out but require permission being sought to place traps in the watercourse.

Legislation

White Clawed Crayfish are protected under Appendix III of the BERN Convention (1982), Schedule 5 of the Wildlife and Countryside Act (1981), Annex II and V of the Habitats Directive, Annex II of the Conservation of Habitats and Species Regulations (2010) and are listed under Section 41 of the Natural Environment and Rural Communities Act (2006) making them a species of principal importance. White Clawed Crayfish are considered to be Endangered by the IUCN red list.

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

It is an offence to release or allow to escape any Crayfish species which is not ordinarily resident in the UK, or is listed on Schedule 9 of the Wildlife and Countryside Act (1981). These include North American Signal Crayfish, Noble Crayfish and Turkish Crayfish.

Licenses are available from Natural England to allow the taking of White Clawed Crayfish for certain specified purposes, including scientific or educational purposes and for conservation purposes. A Natural England Conservation License is also required for the purpose of conserving White Clawed Crayfish or introducing them to particular areas.

Appendix V. BAT INFORMATION.

Ecology

There are currently 18 species of bat residing in Britain, 17 of which are known to breed here. They are extremely difficult to identify in the hand and even more so in flight.

All appear to be diminishing in numbers, probably due to habitat change and shortage of food, caused by pesticides, as insects are their sole diet.

As their diet consists solely of insects, bats hibernate during the winter when their food source is at its most scarce. They will spend the winter in hollow trees, caves, mines and the roofs of buildings.

Certain species, particularly the pipistrelle (the commonest and most widespread British bat) can quickly adapt to man-made structures and will readily use these to roost and to rear their young.

Surveys

During walkover surveys, bat roosts can be identified by looking for:

- Suitable holes, cracks and crevices within any building, tree or other structure.
- Bat droppings along walls, window cills, or on the ground.
- Prey remains, such as insect wings.

Further investigations can be made using endoscopes, by carrying out aerial inspections of trees or by conducting bat activity surveys during dusk and dawn over summer months.

Legislation

Bats are protected under Appendix II and III of the Bern Convention (1982), Schedule 5 and 6 of the Wildlife and Countryside Act (1981), Annex IV of the Habitats Directive (some species under Annex II), Annex II of the Conservation of Habitats and Species Regulations (2010) and EUROBATs agreement. Numerous species are also listed under section 41 of the Natural Environment and Rural Communities Act (2006) making them species of principal importance.

All bats and their roosts are therefore protected in the UK. This makes it an offence to kill, injure or take any bat, to interfere with any place used for shelter or protection, or to intentionally disturb any animal occupying such a place.

The UK has designated maternity and hibernacula areas as Special Areas of Conservation (SAC's) under the Habitats Directive. Implementation of the UK Biodiversity Action Plan also includes action for a number bat species and the habitats which support them.

Where development proposals are likely to affect a bat roost site, a licence is required from Natural England.

Appendix VI. 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 VII. INVASIVE PLANT SPECIES INFORMATION.

Ecology

The Government has acknowledged the problems that can be caused by non-native invasive species. In 2008 the Government launched “The Invasive Non-Native Species Framework Strategy for Great Britain”. The strategy provides a framework for a more co-ordinated approach to invasive species management. It seeks to create a stronger sense of shared responsibility across government, key organisations, land managers and the public.

The Non-Native Species Secretariat has been established to oversee the implementation of the strategy. Details of the secretariat including risk assessments and action plans for some species are available at www.nonnativespecies.org.

In general, there are four basic methods of controlling weeds; mechanical, chemical, natural and environmental.

- ***Mechanical control*** includes cultivation, hoeing, pulling, cutting, raking, dredging or other methods to uproot or cut weeds.
Where this method is used all plant material must be considered “controlled waste” and must be disposed of properly.
- ***Chemical control*** uses approved herbicides.
- ***Natural control*** uses pests and diseases of the target weed to weaken it and prevent it from becoming a nuisance.
- ***Environmental control*** works by altering the environment to make it less suitable for weed growth, for example by increasing or decreasing water velocity.

Surveys

A site will be searched for invasive plant species growing on site, from mature plants to new shoots. A site will also be searched for dead stems indicating that plants that may have seasonally died back are present.

Legislation

Invasive species listed under Schedule 9 are prohibited from release into the wild. Schedule 9, Section 14(2) prohibits ‘planting’ or ‘causing to grow’ in the wild of any plant listed in Part 2 of Schedule 9.

The following is a list of all the species of plant listed under Schedule 9 of The Wildlife and Countryside Act 1981.

Common Name	Scientific Name	England & Wales	Scotland
Alexanders, Perfoliate	<i>Smyrnium perfoliatum</i>	✓	
Algae, Red	<i>Grateloupia luxurians</i>	✓	
Archangel, Variegated Yellow	<i>Lamium galeobdolon</i> subsp. <i>Argentatum</i>	✓	
Azalea, Yellow	<i>Rhododendron luteum</i>	✓	
Balsam, Himalayan	<i>Impatiens glandulifera</i>	✓	
Cotoneaster	<i>Cotoneaster horizontalis</i>	✓	
Cotoneaster, Entire Leaved	<i>Cotoneaster integrifolius</i>	✓	
Cotoneaster, Himalayan	<i>Cotoneaster simonsii</i>	✓	
Cotoneaster, Hollyberry	<i>Cotoneaster bullatus</i>	✓	
Cotoneaster, Small Leaved	<i>Cotoneaster microphyllus</i>	✓	
Creeper, False Virginia	<i>Parthenocissus inserta</i>	✓	
Creeper, Virginia	<i>Parthenocissus quinquefolia</i>	✓	
Dewplant, Purple	<i>Disphyma crassifolium</i>	✓	
False-acacia	<i>Robinia pseudoacacia</i>		✓
Fanwort	<i>Cabomba caroliniana</i>	✓	✓
Fern, Water	<i>Azolla filiculoides</i>	✓	✓
Fig, Hottentot	<i>Carpobrotus edulis</i>	✓	✓
Garlic, Three-Cornered	<i>Allium triquetrum</i>	✓	
Hogweed, Giant	<i>Heracleum mantegazzianum</i>	✓	✓
Hyacinth, water	<i>Eichhornia crassipes</i>	✓	✓
Kelp, Giant	<i>Macrocystis angustifolia</i>	✓	✓
Kelp, Giant	<i>Macrocystis integrifolia</i>	✓	✓
Kelp, Giant	<i>Macrocystis laevis</i>	✓	✓
Kelp, Giant	<i>Macrocystis pyrifera</i>	✓	✓
Kelp, Japanese	<i>Laminaria japonica</i>	✓	✓

Knotweed, Giant	<i>Fallopia sachalinensis</i>	✓	
Knotweed, Hybrid	<i>Fallopia japonica</i> x <i>Fallopia sachalinensis</i>	✓	
Knotweed, Japanese	<i>Fallopia japonica</i>	✓	
Knotweed, Japanese	<i>Polygonum cuspidatum</i>		✓
Leek, Few-flowered	<i>Allium paradoxum</i>	✓	✓
Lettuce, water	<i>Pistia stratiotes</i>	✓	✓
Montbretia	<i>Crocasmia</i> x <i>crocosmiiflora</i>	✓	
Parrot's-feather	<i>Myriophyllum aquaticum</i>	✓	
Pennywort, Floating	<i>Hydrocotyle ranunculoides</i>	✓	
Potato, Duck	<i>Sagittaria latifolia</i>	✓	
Primrose, Floating Water	<i>Ludwigia peploides</i>	✓	
Primrose, Water	<i>Ludwigia grandiflora</i>	✓	
Rhododendron	<i>Rhododendron ponticum</i>	✓	
Rhubarb, Giant	<i>Gunnera tinctorial</i>	✓	
Rose, Japanese	<i>Rosa rugosa</i>	✓	
Salvinia, Giant	<i>Salvinia molesta</i>	✓	✓
Seafingers, Green	<i>Codium fragile</i>	✓	
Seafingers, Green	<i>Codium fragile tomentosoides</i>		✓
Seaweed, Californian Red	<i>Pikea californica</i>	✓	✓
Seaweed, Hooked Asparagus	<i>Asparagopsis armata</i>	✓	✓
Seaweed, Japanese	<i>Sargassum muticum</i>	✓	✓
Seaweeds, Laver (except native species)	<i>Porphyra</i> sp. except - <i>P. amethystea</i> <i>P. leucosticta</i> <i>P. linearis</i> <i>P. miniata</i> <i>P. purpurea</i> <i>P. umbilicalis</i>	✓	✓
Shallon	<i>Gaultheria shallon</i>		✓
Stonecrop, Australian swamp	<i>Crassula helmsii</i>	✓	✓
Wakame	<i>Undaria pinnatifida</i>	✓	✓
Waterweed, Curly	<i>Lagarosiphon major</i>	✓	✓
Waterweeds	All species of the genus <i>Elodea</i>	✓	

Appendix VIII. 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 (SI₉, 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).

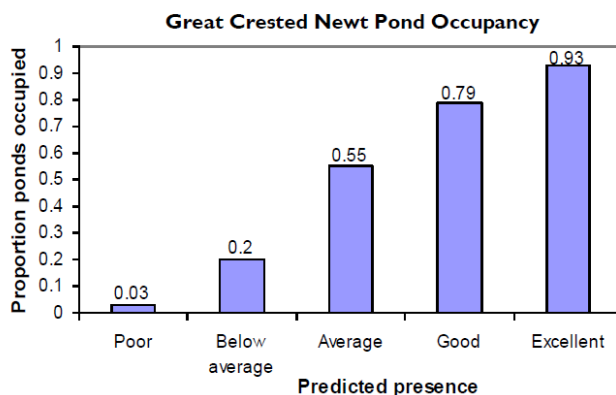
Some of the field scores are categorical, some are numerical. The numerical field scores are converted to SI scores by reading off the values from graphs produced by Oldham *et al.* (2000) reproduced in this Advice Note.

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 (SI₁ and SI₈) 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 (SI₁)

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

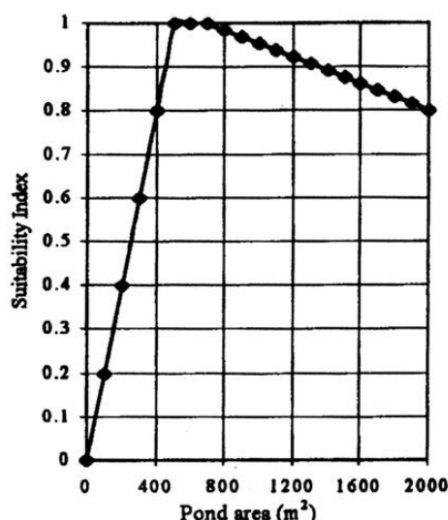
Zone C, location is unsuitable, SI = 0.01.

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 m².

It can be particularly difficult to read off SI scores for very small ponds. For ponds smaller than 50 m² use a score of 0.05.

For ponds larger than 2000 m² 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.

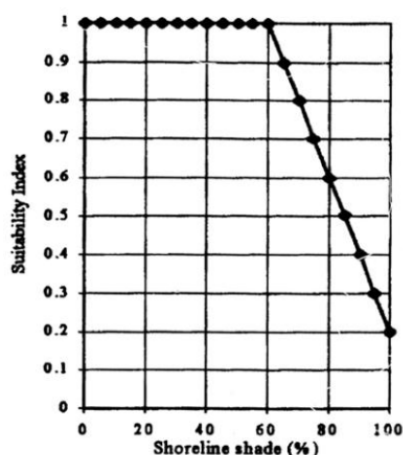
Factor 4. Water quality

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.

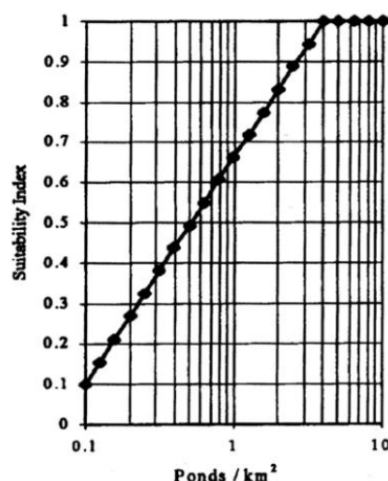
Factor 8. Pond count

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 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 km² and read off the SI value from graph.



Factor 9. Terrestrial habitat

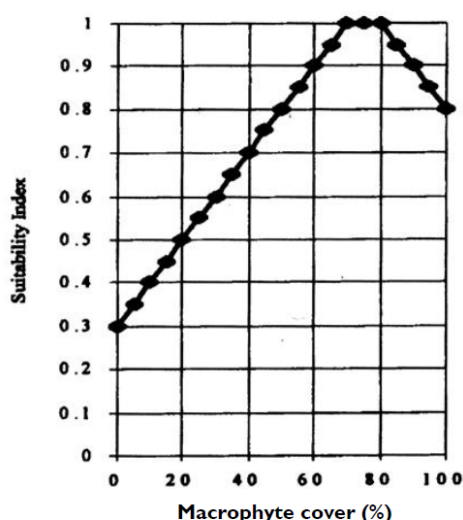
Scoring terrestrial habitat depends on the surveyor's understanding of newt habitat quality. Good terrestrial habitat offers cover and foraging opportunities and includes meadow, rough grassland with tall sward height, scrub, woodland or mature gardens. Terrestrial habitat should be considered within 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'.

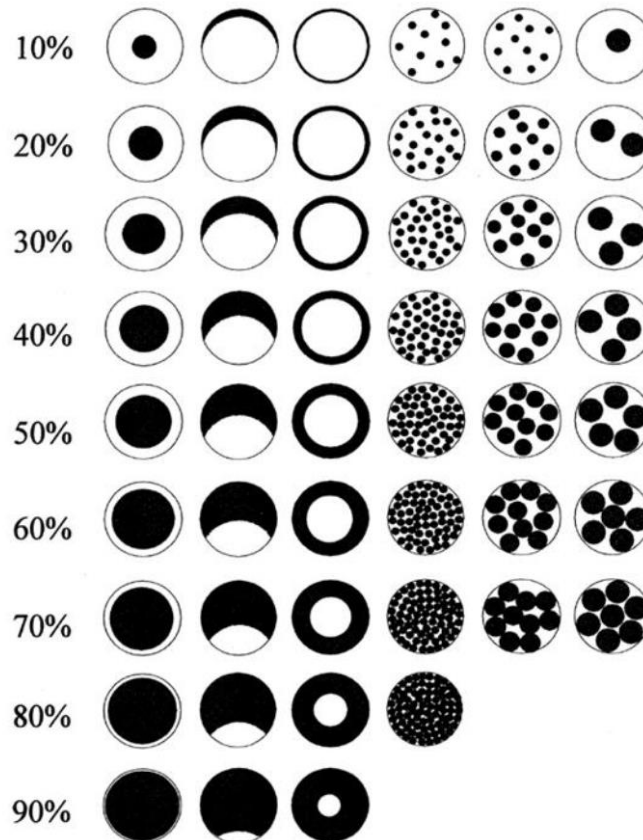
Factor 10. Macrophytes

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.

Publication date: May 2010.

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



**amphibian and reptile
conservation**



DICE
UNIVERSITY OF KENT

ef Esmée
Fairbairn
FOUNDATION

KRAG

Summary of scoring system

SI₁ Location

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

SI₂ Pond area

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

SI₃ 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

SI₄ 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.

SI₅ Shade

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

SI₆ 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

SI₇ 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.

SI₈ 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.

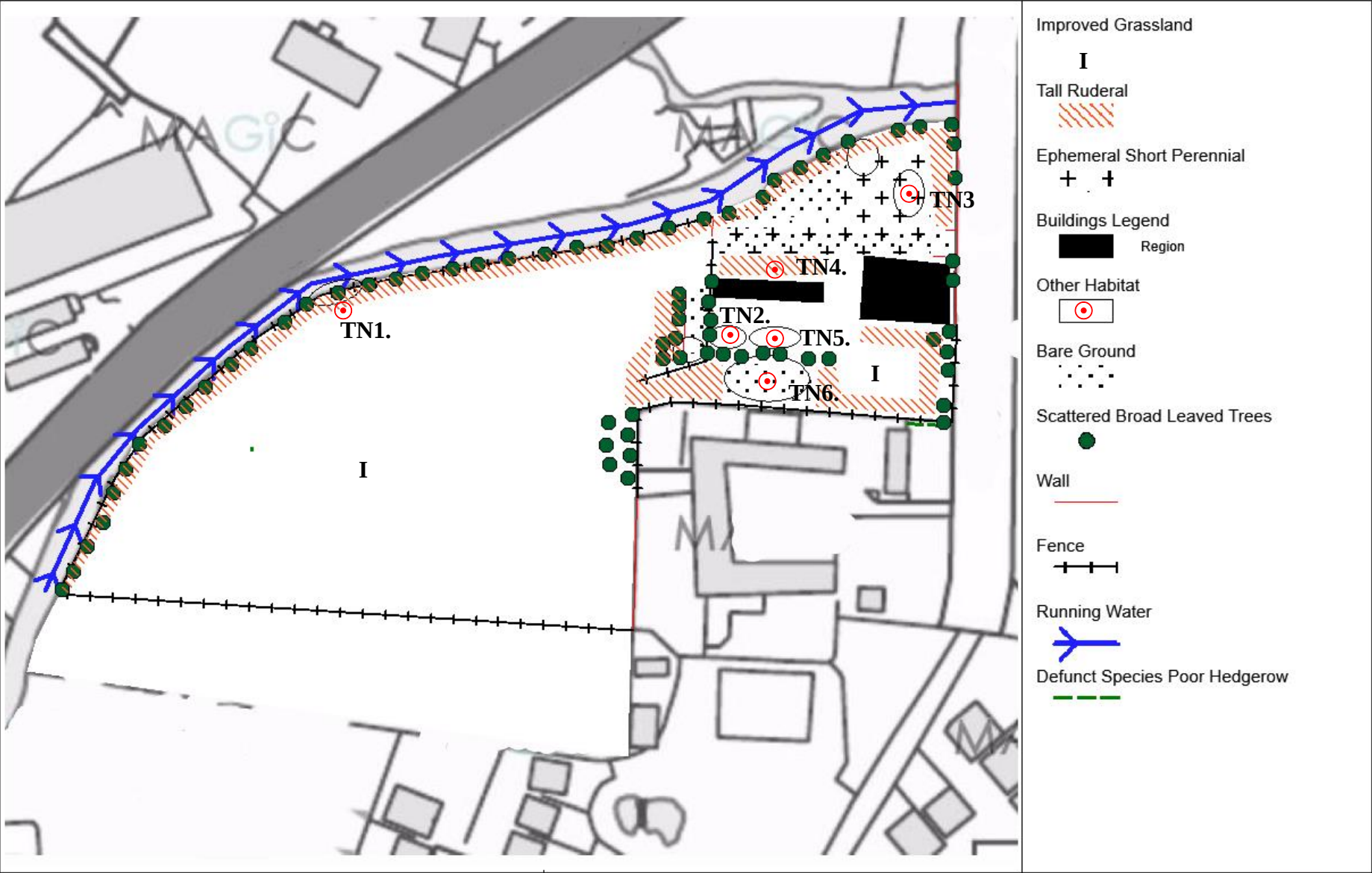
SI₉ Terrestrial habitat

Category	SI
Good	1
Moderate	0.67
Poor	0.33
None	0.01

SI₁₀ 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 IX. ANNOTATED MAP OF THE SURVEY AREA.



Site: Water Hall Lane, Penistone
Reference: 181032

Prepared by: James Campbell
Date: 11th October 2018



Appendix X. TARGET NOTES.

Target Note 1. Is an area of Japanese Knotweed and Himalayan Balsam on the banks of the River Don.

Target Note 2. Is an area where agricultural machinery is stored.

Target Note 3. Is a pile of soil, wood chippings, brick and stone.

Target Note 4. Is an area of tall ruderal species with some stone and roofing materials.

Target Note 5. Is an area of clay pipes next to a pile of soil and debris.

Target Note 6. Is an area of bare ground with the remains of a collapsed agricultural building.

Appendix XI. DATA SEARCH RESULTS.

The data search has been summarised above. However, the full data search can be provided on request as it is too large to be included in this report and should not be published in the public domain.