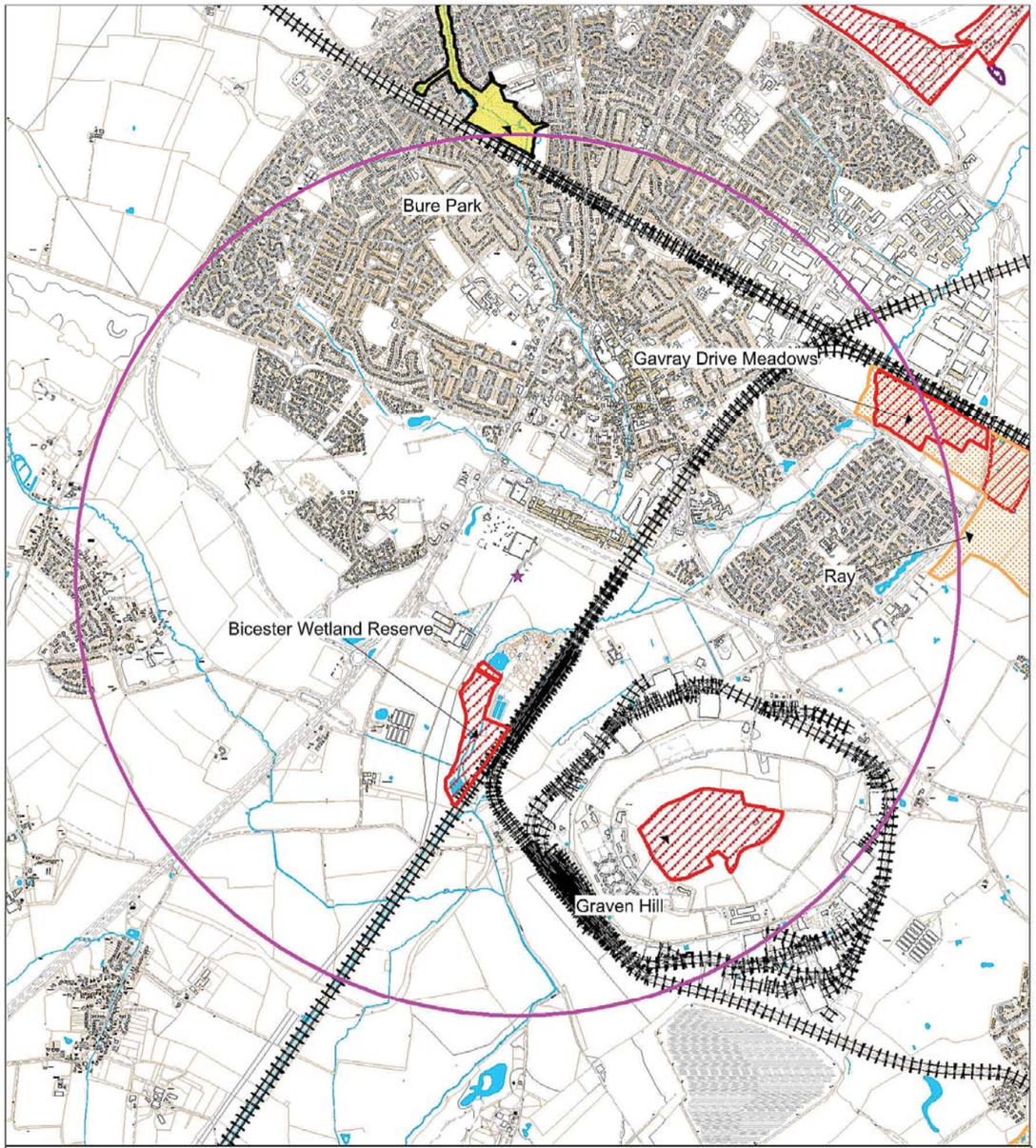
Bicester
Designated Wildlife Sites



Local Nature Reserves
Local Wildlife Sites
Conservation Target Area
Search Area
Search central grid reference
Scale: 1:25000

Bure Park Local Nature Reserve - Brief Description

Habitats there include grass meadow, young broad-leaved woodland, hedges and scrub. A small river (the Bure) runs through the site, feeding a small pond which is home to great crested newts. A balancing pond at one end of the Reserve is fed by run-off from the area.

http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_details.asp?C=0&N=bure park&ID=1288

Oxfordshire Local Wildlife Site Citation

BICESTER WETLAND RESERVE

Site Code: 52Q16

Grid Reference: SP577262 Area (ha): 7.8

Local Authority: Cherwell Last Survey Date(s): 12/08/2013

Date Selected or Reconfirmed: 2014

Site Description

This site is managed by Banbury Ornithological Society in co-operation with Thames Water Utilities Ltd. This site is mostly maintained as wet grassland by outflow from the sewage works. It includes a small area of reedbed, open water (including shallow water for waders and deeper areas for other species), wet ditches, banks with tall herb and a dry grassland field to the east. The margins around the open water have swamp vegetation and areas of wet grassland. There is has abundant hard rush, reed sweet-grass, reed canary-grass and great willowherb with floating sweet-grass, bulrush and watermint. A series of ditches control the water levels and have wetland plants including common spike-rush and common marsh-bedstraw.

The site is important for over-wintering wildfowl including teal, pintail, pochard, wigeon and gadwall (all Birds of Conservation Concern Red listed). Amber listed species include snipe and water rail. It is also very important for birds which require wet grassland such as jack snipe, little ringed plover and green plover.

SECTION 41 HABITATS OF PRINCIPAL IMPORTANCE: Reed bed, coastal and floodplain grazing marsh

SECTION 41 SPECIES OF PRINCIPAL IMPORTANCE: curlew, bittern, common linnet, twite, cuckoo, black-tailed Godwit, yellow wagtail, willow tit, marsh tit, lapwing, reed bunting,

RED DATA BOOK SPECIES: none

NATIONALLY SCARCE SPECIES: none

BIRDS OF CONSERVATION CONCERN:

Red list: lapwing, linnet, bittern, twite, cuckoo, black-tailed Godwit, yellow wagtail, willow tit, marsh tit, dunlin, fieldfare, turtle dove and starling

Amber list: common sandpiper, kingfisher, northern pintail, northern shoveler, teal, wigeon, mallard, gadwall, greylag goose, common swift, pochard, tufted duck, house martin, little egret, reed bunting, merlin, common snipe, jack snipe, grey wagtail, curlew, willow warbler, green woodpecker, golden plover, sand martin, common tern, common whitethroat, little grebe, common shelduck, green sandpiper, common redshank, barn owl, water rail, meadow pipit, common ringed plover, common kestrel, oystercatcher, swallow, black-headed gull, red kite, northern wheatear, bearded tit and wood sandpiper

TYPICAL SPECIES OF LOWLAND FEN: common spike-rush, floating sweet-grass, reed sweet-grass, reed canary-grass, bulrush, brooklime, hedge bindweed, great willowherb, water mint, bittersweet and common marsh bedstraw, purple loosestrife and wild angelica.

Produced by TVERC 27/03/2015

Oxfordshire Local Wildlife Site Citation

GRAVEN HILL

Site Code: 52V01

Grid Reference: SP588209 Area (ha): 16.3

Local Authority: Cherwell Last Survey Date(s): 14th July 2011

Date Selected or Reconfirmed: 2011

Site Description

Graven hill Wood caps a low rounded hill on heavy soil. Earthworks in the wood suggest that the area was formerly less wooded, at least in the Saxon period. The site is on a Ministry of Defence site close to Bicester. It caps a low rounded hill on heavy clay soil. Earthworks in the wood suggest that the area was formerly less wooded, at least in Saxon times. It is oak and ash woodland and has a mixed shrub layer including locally abundant hazel with hawthorn, English elm, Midland hawthorn, field maple and blackthorn.

The field layer has abundant dog's mercury, pendulous sedge and tufted hair-grass with false brome, wood meadow-grass, common dog violet, primrose, enchanter's nightshade and ground ivy. There are small amounts of hairy brome, giant fescue, wood millet, remote sedge, wood sedge, bugle, yellow archangel and three-veined sandwort. To the east the woodland has been thinned and the shrub layer is sparse. Here, there are locally abundant bluebells.

SECTION 41 HABITATS OF PRINCIPAL IMPORTANCE: Lowland Mixed Deciduous Woodland

SECTION 41 SPECIES OF PRINCIPAL IMPORTANCE: none

RED DATA BOOK SPECIES: none

NATIONALLY SCARCE SPECIES: none

BIRDS OF CONSERVATION CONCERN:

Red list: grasshopper warbler

Amber list: willow warbler

ANCIENT WOODLAND INDICATOR SPECIES:

These are hairy brome, remote sedge, wood sedge, pendulous sedge, Midland hawthorn, spurge-laurel, creeping soft-grass, bluebell, holly, yellow archangel, yellow pimpernel, wood millet, three-nerved sandwort, wood meadow-grass, aspen, barren strawberry, primrose, early dog-violet, field rose and bush vetch.

There are previous records for wood anemone (2002), blackcurrant (1987), red currant (2002), goldilocks buttercup (1987), narrow-leaved everlasting pea (2002) and pignut (1987).

Produced by TVERC 27/03/2015

Oxfordshire Local Wildlife Site Citation

GAVRAY DRIVE MEADOWS

Site Code: 52W01

Grid Reference: SP595226 Area (ha): 15.2

Local Authority: Cherwell Last Survey Date(s): February 2014

Date Selected or Reconfirmed:

Site Description

These meadows form a mosaic of small damp fields with ponds, divided by thick hedges with old trees. Most of the fields are probably former hay meadows over medieval ridge and furrow field patterns, and have a sward mostly dominated by tufted hair-grass with some meadow foxtail and meadow barley. However, fields 5 and 6 appear to be old pasture, with ragged robin, dropwort, devil's-bit scabious and common spotted orchid. Fields 7, 11 and 12 contain devil's-bit scabious and betony. Great burnet is frequent in fields 7 and 11, and scattered in fields 12, 14 and 16. Sneezewort and pepper saxifrage were only found in field 11. Common marsh bedstraw, bugle, greater bird's-foot trefoil, common knapweed and short-fruited willowherb are occasional throughout the fields. There is a very good range of rushes and sedges across the site, with nine species of sedge: glaucous, common, carnation, brown, hairy, false fox, spiked, slender tufted and oval. Grasses include yellow oat-grass, sweet vernal grass, tall fescue, meadow fescue and red fescue. In the drier areas, slightly acid conditions are indicated by frequent tormentil, lesser stitchwort and sweet vernal grass, especially in fields 5, 6, 14 and 15.

Most of the ponds in the western half of the site are shaded and./or only damp in summer. They have a species-poor vegetation of compact rush, plicate sweet-grass and tufted water-forget-me-not. CPM surveyed the ponds on the west side of the north-south road and reported great crested newt (a priority Biodiversity Action Plan species) in 3 ponds and a channel. Smooth newts were found in all ponds and the channel, and one palmate newt was recorded in field 9. The large water-filled pond in field 14 (on the eastern side of the road) contains greater reedmace, gypsywort, marsh foxtail, tufted water-forget-me-not, sharp-flowered rush and soft rush. The brook running along the western margin of the County Wildlife Site contains reed canary-grass, redshank, water chickweed and greater water plantain.

The hedges across the entire site are mostly tall and thick, and contain hawthorn with bramble, blackthorn and elder, as well as occasional crack willow, field maple, oak, ash, crab apple, English elm, dogwood, holly, wayfaring tree, guelder rose, buckthorn, hop and honeysuckle. They are probably post-medieval, as they dissect the ridge and furrow pattern that runs through most of the fields. The hedge that separates fields 5 and 6 from fields 7 and 12 is a double hedge, with black bryony, mature oak, ash and crack willow, including one large collapsed crack willow pollard. The hedge that runs along the eastern edge of fields 11 and 12 is also double. These double hedge lines include Midland hawthorn, wood meadow-grass, great hairy brome and three-nerved sandwort; all four are ancient woodland indicator species (characteristic of woodlands more than 400 years old). The gappy hedge line between fields 11 and 12 contains five large mature oaks. The hedges around fields 8 and 9 contain abundant English elm suckers, as well as hawthorn and bramble. The bullace plum (*Prunus domestica* ssp. *insititia*), a rare and declining species in the county, is found in the hedge between fields 8 and 9.

Numerous birds are using the proposed County Wildlife Site, including reed bunting (which was seen flying across the road between fields 14 and 4), willow warbler, garden warbler, blackcap, whitethroat, lesser whitethroat, chiffchaff, bullfinch, linnet, song thrush, yellowhammer, sedge warbler, hobby and kestrel. Common pipistrelle, noctule, *Myotis sp.* and, possibly, serotine bats were recorded foraging over the site (CPM). Butterflies include large skipper, ringlet, common blue, small heath and marbled white. Twenty-six species of ground beetles were found in fields 5, 6, 11 and 12, including the nationally scarce *Bembidion gilvipes*.

SECTION 41 HABITATS OF PRINCIPAL IMPORTANCE: lowland meadows

SECTION 41 SPECIES OF PRINCIPAL IMPORTANCE: Reed bunting (3 or 4 singing males), song thrush (2 or 3 singing males), bullfinch, linnet; great crested newt.

RED DATA BOOK SPECIES:

NATIONALLY SCARCE SPECIES: *Bembidion gilvipes* a ground beetle

BIRDS OF CONSERVATION CONCERN:

Red list: Bullfinch, reed bunting, song thrush, yellowhammer, linnet.

Amber list: Dunnock, willow warbler.

TYPICAL SPECIES of LOWLAND MEADOW: Great burnet, greater bird's-foot trefoil, betony, cuckooflower, devil's-bit scabious, sneezewort, pepper saxifrage, brown sedge, carnation sedge, common sedge and meadow barley.

Produced by TVERC 27/03/2015

Ray CTA (Conservation Target Area)

The alluvial floodplain of the River Ray extending along a number of small tributary streams and including some areas of land between these streams. This area extends into Buckinghamshire. The area extends onto the clay to included known areas of wet grassland and the main areas of ridge and furrow.

Joint Character Area: Thames and Avon Vales

Landscape Types: Alluvial Lowland with some areas of Clay Vale.

Geology: Mainly alluvium along the Ray. Alluvium is also present in narrow bands along the small streams and there are Oxford Clay mudstones away from the streams and river.

Topography. Flat riverside land. **Area of CTA:** 1192 hectares

Biodiversity:

- Lowland Meadow. The key habitat in this area. It is found in a number of SSSIs and Local Wildlife Sites mainly at least partly on the alluvium. North-west of Blackthorn Hill there is a larger group of meadows which are largely on the Oxford Clay. Remnants of this habitat are found elsewhere especially between Bicester and Blackthorn Hill and in some meadows in Buckinghamshire including BBOWT's recent addition to their Upper Ray Meadows Reserve at Leaches Farm.
- Wet Grassland/Floodplain Grazing Marsh. Wet grassland is found in meadows along with lowland meadow habitat with remnants elsewhere. Parts of the BBOWT Upper Ray Reserves have been restored to floodplain grazing marsh.
- Hedgerows. Some rich and well structured hedgerows with brown and black hairstreak.
- Ponds at Leaches Farm BBOWT reserve.
- Other Species: true fox sedge is found in a number of sites in the area.

Access: Largely restricted to bridleways and footpaths. There are a number of BBOWT nature reserves. Dorothy Bolton Meadow & Leaches Meadow currently have no public access, whilst Long Herdon & Grange are accessed via a public footpath. Access routes to a further two BBOWT reserves at Cow Leys and Leaches Farm are by existing public footpaths.

Archaeology: Extensive ridge and furrow.

Oxfordshire Biodiversity Action Plan Targets associated with this CTA:

1. Lowland meadow – management[1], restoration and creation (with a focus on MG4 hay meadows).
2. Floodplain grazing marsh - management, restoration and creation (with a focus on breeding waders).
3. Reedbed – creation.
4. Ponds – creation (particularly of pond complexes).
5. Hedgerows – management (good management of existing hedgerows on short and long-term rotation, which will benefit brown and black hairstreaks and other wildlife).
6. Rivers – management and restoration (resource protection of watercourses to maintain and improve water quality).

[1] "Management" implies both maintaining the quantity, and maintaining and improving the quality of existing BAP habitat and incorporates the following target definitions: "Maintaining extent" and "Achieving Condition".

GUIDANCE ON THE VARIOUS STATUTORY AND NON-STATUTORY WILDLIFE SITE DESIGNATIONS.

SITE DESIGNATIONS THAT PROTECT THE UK'S NATURAL HERITAGE THROUGH STATUTE

LOCAL NATURE RESERVES (LNRS) (IN ENGLAND, SCOTLAND AND WALES)

Under the National Parks and Access to the Countryside Act 1949 LNRs may be declared by local authorities after consultation with the relevant statutory nature conservation agency. LNRs are declared and managed for nature conservation, and provide opportunities for research and education, or simply enjoying and having contact with nature.

NATIONAL NATURE RESERVES (NNRS)

NNRs contain examples of some of the most important natural and semi-natural terrestrial and coastal ecosystems in Great Britain. They are managed to conserve their habitats or to provide special opportunities for scientific study of the habitats communities and species represented within them.

NNRs are declared by the statutory country conservation agencies under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981. In Northern Ireland, Nature Reserves are designated under the Amenity Lands Act (Northern Ireland) 1965.

RAMSAR SITES

Ramsar sites are designated under the Convention on Wetlands of International Importance, agreed in Ramsar, Iran, in 1971. Originally intended to protect sites of importance especially as waterfowl habitat, the Convention has broadened its scope over the years to cover all aspects of wetland conservation and wise use, recognizing wetlands as ecosystems that are extremely important for biodiversity conservation in general and for the well-being of human communities. The Convention adopts a broad definition of wetland, namely "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". Wetlands "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands".

There is only one Ramsar site in Berkshire or Oxfordshire, South West London Waterbodies.

SITES OF SPECIAL SCIENTIFIC INTEREST (SSSI) (ENGLAND, SCOTLAND AND WALES)

The SSSI series has developed since 1949 as the national suite of sites providing statutory protection for the best examples of the UK's flora, fauna, or geological or physiographical features. These sites are also used to underpin other national and international nature conservation designations. Most SSSIs are privately-owned or managed; others are owned or managed by public bodies or non-government organisations.

Originally notified under the National Parks and Access to the Countryside Act 1949, SSSIs have been renotified under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004.

SPECIAL AREAS OF CONSERVATION (SAC) AND SITES OF COMMUNITY IMPORTANCE (SCI)

SACs are designated under the EC Habitats Directive. SACs are areas which have been identified as best representing the range and variety within the European Union of habitats and (non-bird) species listed on Annexes I and II to the Directive. SACs in terrestrial areas and territorial marine waters out to 12 nautical miles are designated under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). New and/or amended Habitats sites which have been submitted to the European Commission by Government, but not yet formally adopted by the Commission, are referred to as candidate Special Areas of Conservation (cSACs). Sites which have been adopted by the EC, but not yet formally designated by governments of Member States are known as Sites of Community Importance (SCIs). In the UK, designation of SACs is devolved to the relevant administration within each country.

SACs, together with SPAs, form the Natura 2000 network.

SPECIAL PROTECTION AREAS (SPA)

SPAs are classified by the UK Government under the EC Birds Directive. SPAs are areas of the most important habitat for rare (listed on Annex I to the Directive) and migratory birds within the European Union. SPAs in terrestrial areas and territorial marine waters out to 12 nautical miles are classified under the Wildlife and Countryside Act 1981.

SPAs, together with SACs, form the Natura 2000 network.

NON-STATUTORY NATURAL HERITAGE CONSERVATION DESIGNATIONS

LOCAL WILDLIFE SITES

Local authorities for any given area may designate certain areas as being of local conservation interest. The criteria for inclusion, and the level of protection provided, if any, may vary between areas. Most individual counties have a similar scheme, although they do vary.

Most Local Wildlife Sites systems involve a panel of ecologists and others in the development of local criteria and the selection of the sites. Panels usually include a local government ecologist, an Natural England representative, the Local Wildlife Trust, the Local Environmental Record Centre and sometimes include a representative of local landowners and local naturalists.

These sites, which may be given various titles such as ‘County Wildlife Sites’ (CWS), 'Local Wildlife Sites' (LWS), 'Local Nature Conservation Sites' (LNCS), 'Sites of Importance for Nature Conservation' (SINCs), or Sites of Nature Conservation Importance' (SNCIs), together with statutory designations, are defined in local plans under the Town and Country Planning system and the National Planning Policy Framework and are a material consideration when planning applications are being determined.

As part of a national standardisation process these sites have recently been renamed as Local Wildlife Sites in Oxfordshire and Berkshire. Previously they were known as County Wildlife Sites in Oxfordshire and Wildlife Heritage Sites in Berkshire. Although the use of these names, especially in citations and descriptions, is being edited and replaced with Local Wildlife Sites or LWS it is likely that some references will remain to these former names until this is complete.

PROPOSED LOCAL WILDLIFE SITES AND EXTENSIONS

These are also included on designated sites maps. They are areas thought to include important areas of UKBAP habitat or priority or protected species populations. Extensions are likely to have similar habitats to the adjacent Local Wildlife Sites. Local Authorities are made aware of these sites. They will not have been fully surveyed and taken to the selection panel as yet.

NGO PROPERTIES / NATURE RESERVES

A variety of non-governmental organisations such as the John Muir Trust, Plantlife, the Royal Society for the Protection of Birds, Wildlife Trusts and Woodland Trust own or manage nature reserves or other areas of land that are important for biodiversity. These sites may be intended primarily for nature conservation, or for other purposes such as protection of landscape features or the provision public access to the countryside. These areas of themselves have no statutory basis, but a large number are also designated SSSIs / NNRs / SPAs / SACs / Ramsar sites, etc.

In Berkshire and Oxfordshire, BBOWT (Berks, Bucks & Oxon Wildlife Trust), Woodland Trust and RSPB sites fall into this category.

LOCAL GEOLOGICAL SITES (LGS)

Local Geological Sites formerly known as Regionally Important Geological and Geomorphological Sites (RIGS) are the most important places for geology and geomorphology outside statutorily protected land such as Sites of Special Scientific Interest (SSSI). As part of a national standardisation process these sites have recently been renamed as Local Geological Sites in Oxfordshire and Berkshire. Sites are selected under locally-developed criteria, according to their value for education, scientific study, historical significance or aesthetic qualities. Whilst not benefiting from statutory protection, LGS are equivalent to Local Wildlife Sites, and "…*consideration of their importance becomes integral to the planning process*".

OTHER SITES

Occasionally other sites might be shown on maps. These are likely to be sites with some wildlife interest, usually managed by local groups, local authorities or town councils but which do not have a specific statutory or non-statutory designation.

Some local authorities within Oxfordshire and Berkshire have identified other sites which are protected through policies in their local plans, including sites of local importance to nature conservation (SLINCs) in oxford city and district wildlife sites in Cherwell. For SLINCs we only show sites on maps that are not local wildlife sites or proposed local wildlife sites.

CONSERVATION TARGET AREAS/ BIODIVERSITY OPPORTUNITY AREAS

These landscape scale areas have been identified as supporting high concentrations of UKBAP habitats and species populations and the potential to restore habitats at a landscape scale. These areas act as a focus for targeting resources into habitat management and restoration.

ANCIENT WOODLAND

Ancient woodland areas within Bracknell Forest and Wokingham Borough are from an updated layer of ancient woodland produced by TVERC for Bracknell Forest Council and Wokingham Borough Council in 2015-16. This data has been provided to Natural England but has not yet been made available and thus differs from that shown on the Magic Map Interactive Map. For information of the methodology for selecting ancient woodland areas please contact TVERC.

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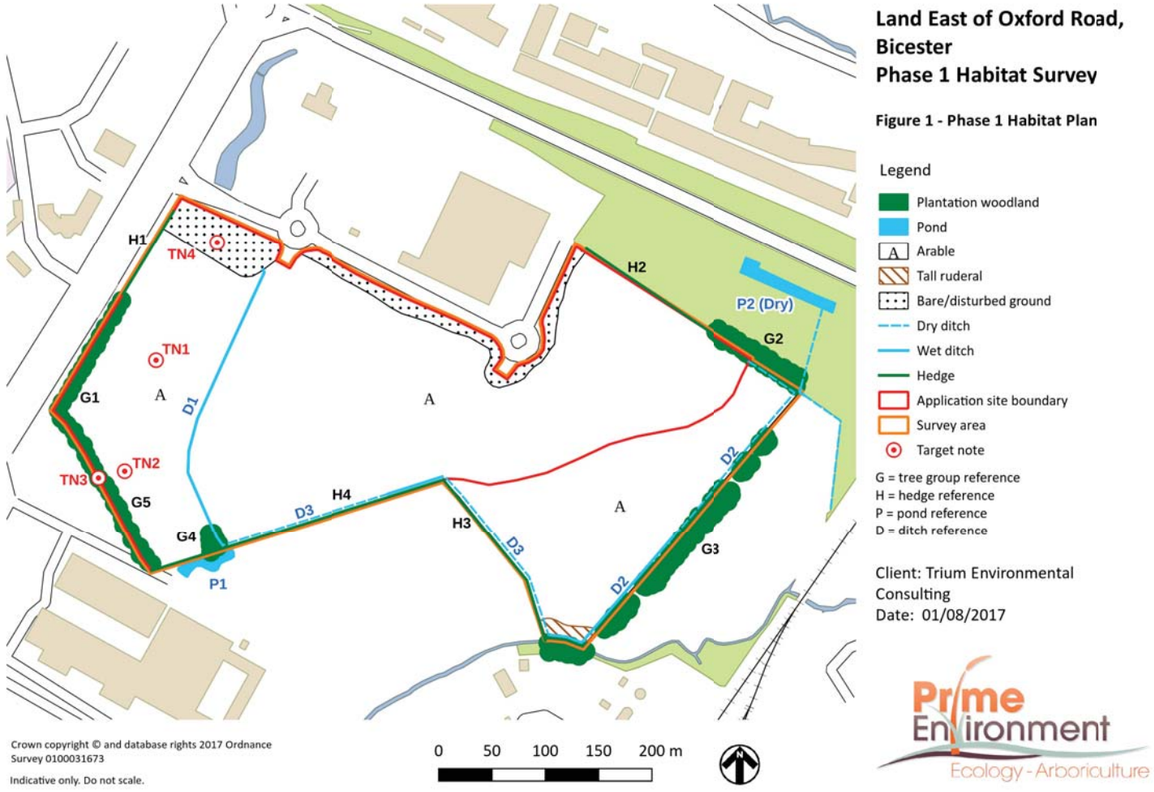
Appendix 4 – Figures and Target Notes

Target Notes	
No.	Description
1	Arable field in location that aerial photo implies was rough grassland.
2	Large log piles crated from clearance of this area of site and ditch banks
3	Large single mammal hole, likely outlier badger sett not currently occupied by badgers
4	Spoil heap and area of disturbed ground



Land East of Oxford Road, Bicester
Phase 1 Habitat Survey

Figure 1 - Phase 1 Habitat Plan

Legend

- Plantation woodland
- Pond
- A Arable
- Tall ruderal
- Bare/disturbed ground
- Dry ditch
- Wet ditch
- Hedge
- Application site boundary
- Survey area
- Target note

G = tree group reference
H = hedge reference
P = pond reference
D = ditch reference

Client: Trium Environmental Consulting
Date: 01/08/2017

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ES Volume II: Technical Appendices

Appendix 11.2: Bat Survey Report

Prime Environment
Ecology - Arboriculture

TRIUM ENVIRONMENTAL

CONSULTING

BAT ACTIVITY SURVEY

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OXFORDSHIRE

0271.0001

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Document Control

Report Issue	Notes
01	Interim document to client
02	Survey results and analysis added
03	August and September Results added (September transect omitted)
04	September transect results added
05	
Managing Office	Derby

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CONTENTS

1 Introduction

1.1 Terms of Reference

Prime Environment Limited (Prime Environment) was instructed by Trium Environmental Consulting LLP (the Client) to undertake bat activity surveys of Bicester Office Park adjoining Oxford Road and Lakeview Drive, Bicester, Oxfordshire (Ordnance Survey (OS) grid Reference SP 57958 21564) (The Site).

The Site is 12 hectares and comprises an arable field with rough grassland margins and hedgerows with trees. There is a ditch running across the Site in the west and dry and wet ditches at the field boundaries. The Survey Area is slightly larger than the Site (15 ha) as the Site does not include all of the field.

The project proposals are to develop the Site into a large business park with associated hard and soft landscaping. The application will be subject to a formal Environmental Impact Assessment (EIA).

The bat activity surveys were recommended following a Preliminary Ecological Appraisal[1] of the Study Area.

1.2 Aims and Objectives

The aims of the study were to:

- Identify the species of bat active within the Study Area
- Identify patterns of bat activity across the Study Area
- Quantify the levels of activity of bats.

Ecological information for the assessment was provided by bat transect and automated surveys.

Information regarding the habitats present within the Study Area and discussions and recommendations are presented in a separate report[1].

[1] Prime Environment (2017). *Preliminary Ecological Appraisal, Bicester, 0217.0001, Rev 2.0*. Prime Environment: Cromford.

Plate 1 - Aerial Photo

Red = The Study Area, Blue = the Site.

3 Method

The survey methodology was based on the BCT guidelines[2] for a site of Medium Habitat Quality. Surveys were spread throughout the bat activity season with surveys being undertaken once per month. Surveyors involved with the bat surveys are listed in Table 1.

Table 1. Surveyor details

Name	Bat Licence	CIEEM membership level
Jon Moore	Class 2	Full MCIEEM
Jo Pedder	Class 2	Full MCIEEM
Hayley Farnell	Class 2	Full MCIEEM
Andy Swan	Class 2	Full MCIEEM

3.1 Bats

3.1.1 Automated surveys

Automated bat surveys were undertaken by experienced and licenced surveyors listed in Table 1. Automated surveys were undertaken using AnaBat Express automated bat detectors. These units automatically record bat echolocation calls in zero crossing format.

Detectors were deployed over at least five consecutive nights on three occasions over the main bat activity period (May to September) at four locations within the Study Area (see Figure 1). Detectors were programmed to start 30 minutes before sunset and stop at 30 minutes after sunrise each day. Survey dates are provided in Table 2. 15 nights of survey were completed.

Table 2. Automated survey dates.

Month	Date start	Date end	Consecutive nights
May	24/05/2017	29/05/2017	5
June	23/06/2017	28/06/2017	5
July	07/07/2017	12/07/2017	5
August	04/08/2017	09/08/2017	5
September	06/09/2017	11/09/2017	5
Total			15

3.1.2 Transect surveys

Transect bat surveys were undertaken by experienced and licenced surveyors listed in Table 1. Survey design was based on the BCT guidelines.

Walked transects were undertaken using AnaBat Express detectors. The units automatically recorded bat sound and tagged each call with the geographic location of the unit when it recorded each bat pass, and the routes taken by the surveyor. Surveyors were also equipped with heterodyne bat detectors to enable bat activity of interest to be noted along the route (important commuting routes, roosting behaviour etc.).

[2] Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). The Bat Conservation Trust, London

Two transect routes were used to cover the Study Area with two laps each visit. Routes were circular and the order and starting point changed on each trip (see Figure 1). The survey lasted approximately 2 hours (starting at sunset). Surveyors aimed to complete the same number of laps each visit, to standardise the walking pace. Routes were chosen to include a selection of habitats which represent the site, i.e. hedgerows, tree lines, ditches and within open fields.

Five surveys were conducted through the main bat activity season (May, June, July, August, September). Surveys began at sunset and lasted for approximately 2 hours. Dates are in Table 3. Temperature, wind speed and cloud cover were recorded at the beginning and end of the survey, along with any significant weather changes during the survey (e.g. rain).

Table 3. Transect survey dates.

Month	Date start
May	30/05/2017
June	28/06/2017
July	12/07/2017
August	10/08/2017
September	19/09/2017

Figure 1. Plan showing routes of transect surveys, and the location of automated detectors.

3.1.3 Data analysis

Analysis of recordings was undertaken by Jon Moore (MCIEEM, Class 2 Survey Licence 2015-15080-CLS-CLS, 7 years' experience of bat sonogram analysis). The AnalookW 4.2n sound analysis software package was used to analyse the recorded bat echolocation data. All

analysis was guided by the bat call parameters published by Russ (2012[3]). Species were attributed to each file or group of files to calculate activity levels for each species. Species labels/codes are provided in Table 4. Species status and detection rate of calls are provided in Table 5.

There is considerable crossover between echolocation calls within British bat species. Where calls could not be attributed to a specific species, genus level identification was used where possible, any calls which could not be attributed to a genus were labelled as an unclassified bat – this includes files where only social calls are present, files with only one or two calls present, and files with poorly recorded calls. Files with no bat calls present, were labelled as noise and omitted from the data.

A bat pass was defined as the presence of a bat echolocation call or series of calls within one file. Each file records up to a maximum of 15 seconds of activity. Bat passes were extracted from the data and activity levels were calculated and graphically presented using Excel 2016. Bat passes per night (bp/n) was used as an index of activity. This was calculated by dividing the total number of bat passes by the number of survey nights for each location.

Table 4. Species labels

Genus group	Species label	Common name	Scientific
Barbastella	BABA	Barbastelle	*Barbastella barbastellus*
Big bats	BIG	Serotine OR Nyctalus species	*Eptesicus serotinus OR Nyctalus sp.*
Big bats	EPSE	Serotine	*Eptesicus serotinus*
Myotis	MYSP	Myotis species	*Myotis sp.*
Big bats	NYLE	Leisler's	*Nyctalus leisleri*
Big bats	NYNO	Noctule	*Nyctalus noctula*
Big bats	NYSP	Nyctalus species	*Nyctalus sp.*
Pipistrellus	PINA	Nathusius' pipistrelle	*Pipistrellus nathusii*
Pipistrellus	PIPI	Common pipistrelle	*Pipistrellus pipistrellus*
Pipistrellus	PIPN	Common OR Nathusius' pipistrelle	*Pipistrellus pipistrellus OR Pipistrellus nathusii*
Pipistrellus	PIPP	Common OR soprano pipistrelle	*Pipistrellus pipistrellus OR Pipistrellus pygmaeus*
Pipistrellus	PIPY	Soprano pipistrelle	*Pipistrellus pygmaeus*
Plecotus	PAUR	Brown long-eared bat	*Plecotus auritus*
Plecotus	PAUS	Grey long-eared bat	*Plecotus austriacus*
Plecotus	PLSP	Plecotus bat	*Plecotus auritus OR Plecotus austriacus*
Rhinolophus	RHFE	Greater horseshoe	*Rhinolophus ferrumequinum*
Rhinolophus	RHHI	Lesser horseshoe	*Rhinolophus hipposideros*
Unclassified	NoID	Unclassified bat	*Chiroptera*
n/a	Noise	Non-bat sound	Non-bat sound

[3] Russ, J. (2012). *British Bat calls: A Guide to species Identification.* Pelagic Publishing: Exeter.

Table 5. Species status and detection rate

Common name	Conservation status[a] (Common, Rarer or Rare)	Echolocation call detection rate[b]
Barbastelle	Rare	Low
Greater horseshoe	Rare	Medium
Lesser horseshoe	Rare	Medium
Grey long-eared	Rare	Low
Brown long-eared	Common	Low
Serotine	Rarer	High
Myotis – Alcathoe	Rare	Medium
Myotis – Bechstein's	Rare	Low
Myotis – Brandt's	Rarer	Medium
Myotis – Whiskered	Common	Medium
Myotis – Daubenton's	Common	Medium
Myotis – Natterer's	Common	Low
Leisler's	Rarer	High
Noctule	Common	High
Soprano pipistrelle	Common	High
Common pipistrelle	Common	High
Nathusius' pipistrelle	Rare	High
Unclassified bat	Unclassified	Unclassified
Non-bat sound	N/A	N/A

[a] There is no UK published list of the conservation status of bats. Status has been determined by applying a number of factors including: BCT statistics; Habitats Directive Annex II species; UK BAP Priority Species and the IUCN Red List.

[b] Detection rate is based on knowledge of echolocation characteristics, including amplitude and directionality. High detection calls are not directional and have a high amplitude and are attributed to bats which have a significant constant frequency component in their calls. Low detection calls are either directional or of low amplitude and often have significant frequency modulated components to their calls. Medium detection rates have components from both low and high rates.

3.2 Constraints

3.2.1 Age of data

Any ecology assessment must be considered as a 'snapshot' of the site conditions at the time of the survey; ecological constraints will change over time and therefore the findings of this report are considered to be valid for a period of one year from the report date, after which the report should be reviewed to assess whether updated surveys are necessary.

3.2.2 Determining numbers of bats

Whilst automated detectors are able to determine levels of bat activity at a survey location, it is not possible to use the data to accurately determine the number of bats present. For example, 10 bat passes may be from 10 different bats commuting past a detector; but equally could be one bat flying past the detectors multiple times.

3.2.3 Directional and low amplitude bat calls

Brown long-eared *Plecotus auritus* have been recorded during the surveys. Due to the low amplitude of the calls of these species, it is also likely that these bats are recorded less frequently than other bats with higher amplitude such as *Nyctalus* and *Pipistrellus* bats. It is therefore likely that brown long-eared bats are underrepresented in the data.

3.2.4 Survey effort

The BCT guidelines recommend one survey visit per month between April and October for sites of Medium Habitat Quality. To date monthly automated surveys have been completed between May and September 2017, and transect monthly between May and August 2017 (September survey postponed due to bad weather). It is considered that this is a valid sample of the activity of bats at the Site, and results will be updated upon completion of the September transect.

As there are no known hibernation sites on or near the Site, it is unlikely that the surveys in April and September/October would record any important transitional bat activity.

4 Results

4.1 Species and genera identified

Species recorded during surveys in the Study Area were as follows:

- Common pipistrelle *Pipistrellus pipistrellus*.
- Soprano pipistrelle *Pipistrellus pygmaeus*.
- Brown long-eared bat *Plecotus auritus*.
- Noctule bat Nyctalus noctula.
- Serotine *Eptesicus serotinus*

In addition to the above species, bat calls classified to the following genus level were also recorded:

- *Myotis*[4] species bat.
- *Nyctalus* species bat.

Bats with echolocation calls between the given parameters for the common and soprano pipistrelle were recorded in the data, as were calls between the parameters given for the common and Nathusius' pipistrelle, although Nathusius' was not positively identified. Whilst not positively identified, Leisler's bat *Nyctalus leisleri* calls may also be present in the data.

It should also be noted that either one or multiple *Myotis* species may be present[5]. It should also be noted that some quieter echolocating bats (such as brown long-eared and Natterer's bat *Myotis nattereri*) are difficult to record with bat detectors and may be under represented.

Totalling individual identified species and single species from unaccounted genera (*Myotis*), a minimum of six different bat species were recorded during the activity surveys. Considering the survey results and the known distribution and rarity of species and habitats on the site, up to a maximum of eleven species may have been recorded in Study Area, although this is considered unlikely.

[4] The call characteristics of the *Myotis* genus have a large overlap and so identification to species level is not usually possible from calls alone, although Bechstein's bat *M. bechsteini* and Natterer's bat can sometimes be identified due to their broadband calls.

[5] Total of six UK resident *Myotis* species. Given the known distribution and rarity of the species, and the habitat present on and around the Study Area, up to a maximum of four *Myotis* species may have been recorded in the Study Area i.e. Daubenton's, whiskered, Brandt's and Natterer's.

4.2 Automated survey results

4.2.1 Survey effort

Successfully completed sampling nights are shown in Table 6.

Accounting for all four sampling locations, a total of 100 sampling nights of the scheduled 100 nights were successfully completed, equating to a mean of 25 nights per sampling location. This accounts to a sampling success rate of 100%. The four automated detectors recorded bat activity for a total of 948.8 hours (4 units x 237.2 hours = 948.8 hours survey total).

Table 6. Completed automated survey nights.

	Completed survey nights at locations				
Month	**A**	**B**	**C**	**D**	**Site total**
May	5	5	5	5	20
June	5	5	5	5	20
June	5	5	5	5	20
August	5	5	5	5	20
September	5	5	5	5	20
Total	**25**	**25**	**25**	**25**	**100**
Mean per month	**5**	**5**	**5**	**5**	**5**
Successful completion	**100%**	**100%**	**100%**	**100%**	**100%**

4.2.2 Total activity levels

A total of 15,144 bat passes were recorded during the automated surveys. The distribution between each genus classification of bat is shown in Figure 2 and bat passes per night for each species in Table 7.

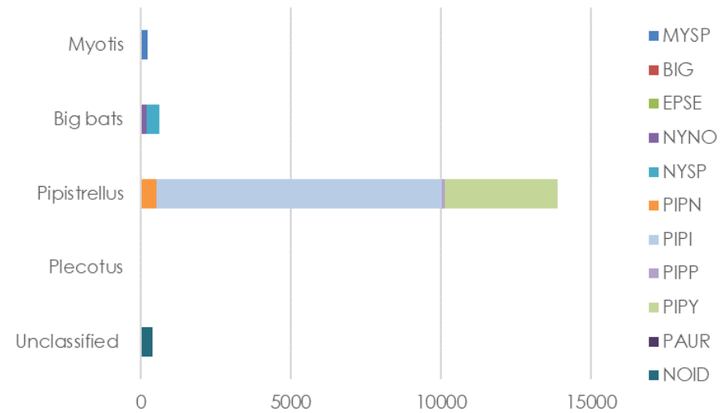


Figure 2. Total count of automated bat passes by bat genus classification, with species classification in the legend

Table 7. Bat passes per night by species and location

	Location						
Species	*A*	*B*	*C*	*D*	*Site total*	*Mean/ location*	*% of total*
MYSP	0.5	2.6	2.0	3.9	9.0	2.3	1.5
PAUR	0.1	0.2	0.3	0.0	0.5	0.1	0.1
BIG	0.2	0.2	0.0	0.0	0.4	0.1	0.1
EPSE	0.0	0.0	<0.1	0.0	<0.1	<0.1	<0.1
NYSP	4.0	1.3	1.8	0.9	16.8	4.2	2.8
NYNO	7.1	4.6	2.6	2.5	8.0	2.0	1.3
PIPN	7.2	12.1	1.2	0.6	21.2	5.3	3.5
PIPI	130.1	86.3	74.9	88.2	379.6	94.9	62.7
PIPP	0.2	3.9	0.4	0.2	4.7	1.2	0.8
PIPY	11.4	112.8	21.8	4.2	150.2	37.5	24.8
NOID	0.4	13.7	0.6	0.8	15.4	3.9	2.5
All bats	161.2	237.6	105.6	101.4	605.8	151.4	100.0

Pipistrellus species bats dominated activity levels accounting for 91.7% of total activity. *Nyctalus* species bats were the second highest amongst the genera with 4.1% of total activity followed by bats of the *Myotis* genus with 1.5%. *Plecotus* and *Eptesicus* species bats were the most infrequently recorded genera with 0.1% and 0.01% respectively. 2.5% of passes were classified as unidentified bats – this was influenced by the higher number of *Pipistrellus* species social calls in the September data.

4.2.3 Spatial distribution

Survey detector locations are shown on Figure 1. Total activity was highest at Location B (39%) and Location A (27%). The lowest was at Location D (17%) and Location C (17%). High levels of *Pipistrellus* species activity influenced activity at all locations (Figure 3).

Non *Pipistrellus* activity was dominated by *Nyctalus* activity which was highest at Location A and B. *Myotis* activity was highest at B and D. *Plecotus* was not recorded at D with seven passes at C, 2 at A and four at B. A single serotine pass was recorded, which was at C.

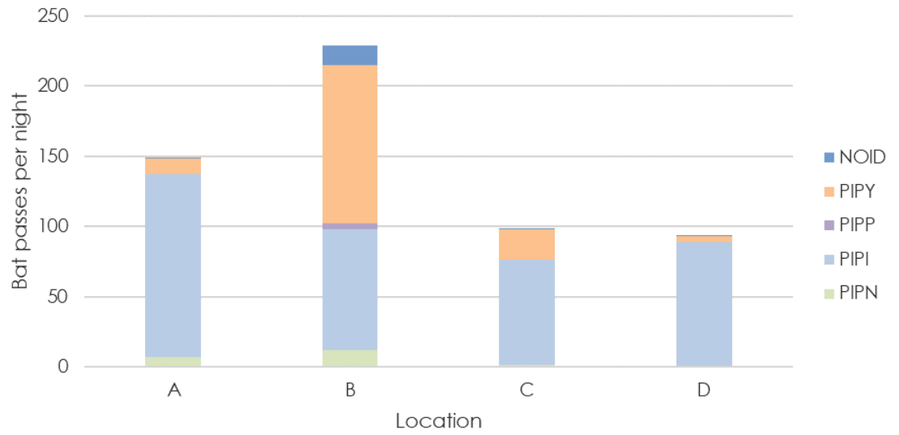


Figure 3. Bat passes per night at each location by *Pipistrellus* species bats

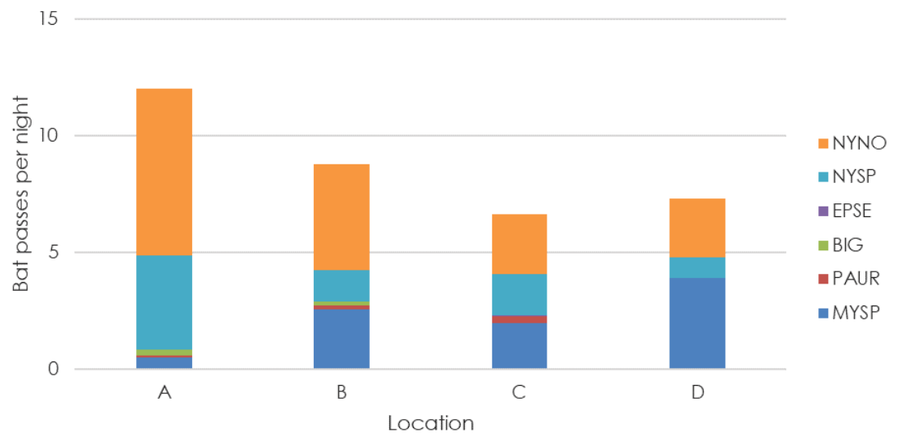


Figure 4. Bat passes per night at each location by non-*Pipistrellus* species bats

4.2.4 Temporal distribution

Figure 5 plots all activity recorded in each month of survey.

Peak activity was recorded in May (195.5 bp/n) and September (212.9 bp/n). The lowest level of activity was recorded in August with 61.1. 175.6 bp/n were recorded in June and 109.5 in July.

As the Figure 5 shows there was a gradual reduction of big bat activity (*Nyctalus* and *Eptesicus*) throughout the season. *Myotis* bats showed an opposite trend by increasing in the Autumn. *Pipistrellus* activity showed a declining trend between May and August before rising again in September. Unclassified bat passes also increased in September which is considered to be associated with an increase in *Pipistrellus* bats social calls[6]. This rise in activity is likely associated with mating behaviour, and largely attributed to soprano pipistrelles at Location B.

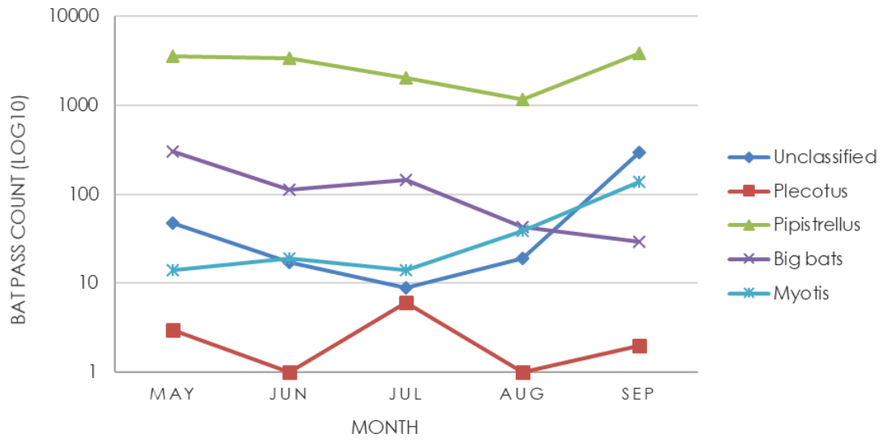


Figure 5. Distribution of activity across each month of survey by genus classification

Earliest bat passes are plotted in Figure 6. The earliest bat passes were of common pipistrelle at 14 minutes after sunset at Location C and at 17 minutes at Location D on the same night in June. This was likely the same bat or group of bats moving from Location C towards D. Mean earliest passes each night for this species was 35 minutes after sunset.

The earliest soprano pipistrelle was at 17 minutes after sunset in September at Location C, with a mean of 47 minutes each night. The earliest noctule was at 25 minutes after sunset, and *Nyctalus* at 35 minutes. The combined mean these classifications was 1 hour 24 minutes.

[6] Analyst opinion from knowledge of data - social calls were not identified and labelled for this level of analysis

The earliest Myotis was 31 minutes after sunset with a mean of 2 hours and 8 minutes. The earliest brown long-eared bat was 53 minutes after sunset with a mean of 2 hours 49 minutes. The single serotine pass was recorded at 90 minutes after sunset with a mean for the big bats classification of 2 hours 20 minutes.

Figure 7 plots bat passes in 30 minute intervals. The graph shows that there is little activity close to typical emergence times (sunset to 60 minutes dependent on species), with activity levels increasing from between 60 to 120 minutes and persisting throughout the night. This suggests that large roosts are not on or close to the site or commuting from these roosts across the site.

However, the results show that *Pipistrellus* species bats is high throughout the later periods of the night, and *Nyctalus* species activity is also higher than usually expected during these periods. Whilst the site is unlikely to be important for roosts (either present on site, adjacent or used for commuting from roosts), the timing of this activity suggests these bats are using the site for foraging and commuting between foraging areas.

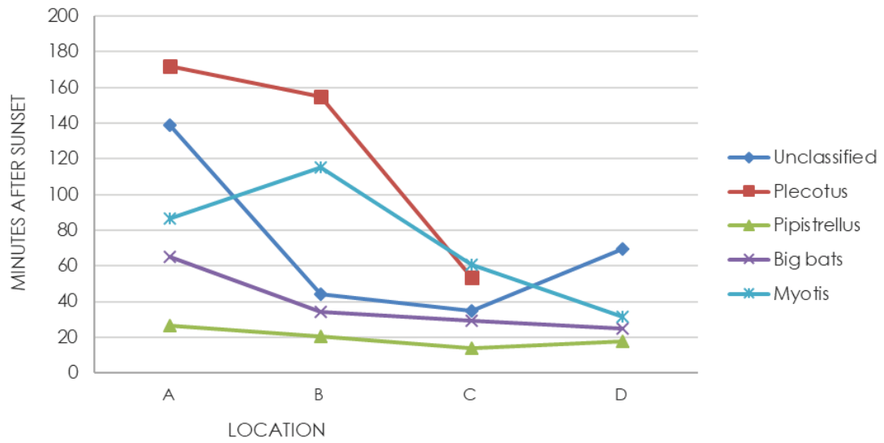


Figure 6. Chart showing the earliest bat passes by each genus classification

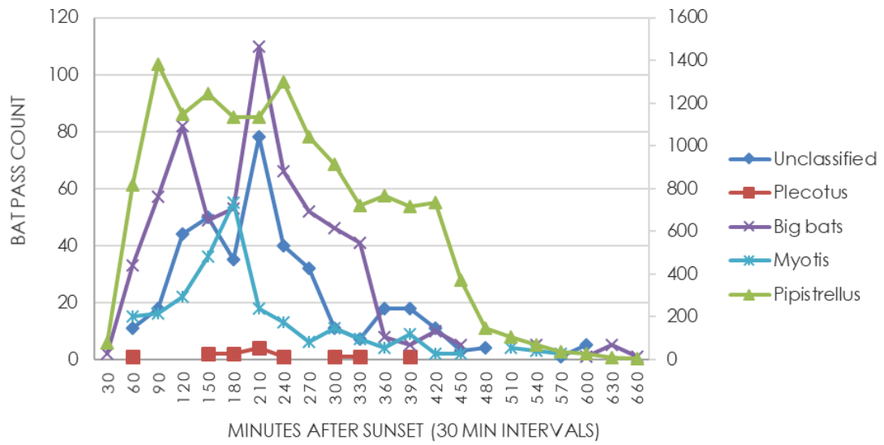


Figure 7. Chart of bat activity plotted against 30 minute time intervals of time after sunset over all survey nights. Pipistrellus are plotted on the secondary y axis (right). All other groups are on the primary y axis (left).

4.3 Transect results

4.3.1 Survey effort

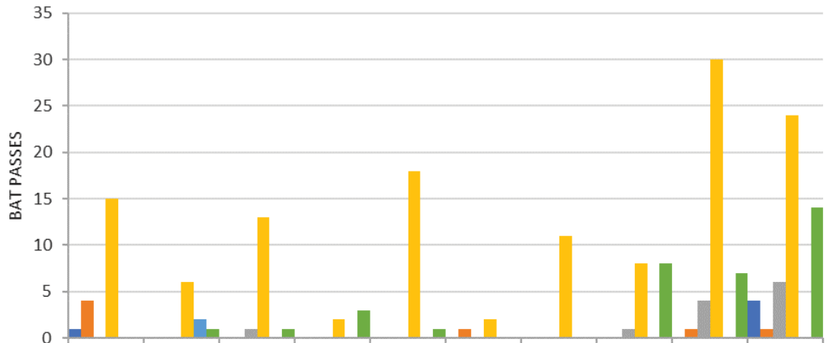
Two transect routes were successfully completed in four months (May, June, July, August), in good weather conditions with no rain or high wind. The four static detectors monitor bats for a longer time and give a better indication of abundance (4 units x 237 hours = 512 hours survey total).

The transect surveys are good for showing distribution of bats in areas where automated detectors are not used, but are a fairly small snap shot of the whole picture of bat activity (2 transects x 5 visits = 20 hours survey total).

4.3.2 Total activity levels

Total counts of bat passes are presented in

Table 8 and Figure 8. A total of 190 passes were recorded with a mean of 19.0 passes per transect per survey month. Activity was dominated by common pipistrelle bats with 68% of activity. Soprano pipistrelle were the second highest with 18%. The crossover between these two species constituted 1%. Noctule was 4% with *Nyctalus* 6%. *Myotis* were 3%..



	May		Jun		Jul		Aug		Sep	
	East	West	East	West	East	West	East	West	East	West
MYSP	1	0	0	0	0	0	0	0	0	4
NYNO	4	0	0	0	0	1	0	0	1	1
NYSP	0	0	1	0	0	0	0	1	4	6
PIPI	15	6	13	2	18	2	11	8	30	24
PIPP	0	2	0	0	0	0	0	0	0	0
PIPY	0	1	1	3	1	0	0	8	7	14

Figure 8. Transect results for each transect and month of survey. Date table shows bat pass counts.

Table 8. Bat pass counts and statistics for transect surveys

Transect		Species						
		MYSP	NYNO	NYSP	PIPI	PIPP	PIPY	Total
Total passes	East	1	5	5	87	0	9	107
	West	4	2	7	42	2	26	83
	Total	5	7	12	129	2	35	190
Mean passes per transect	East	0.2	1.0	1.0	17.4	0.0	1.8	21.4
	West	0.8	0.4	1.4	8.4	0.4	5.2	16.6
	Total	0.5	0.7	1.2	12.9	0.2	3.5	19.0

4.3.3 Spatial distribution

The transect routes are shown on Figure 1. The route took in the majority of the Study Area and sampled the different habitats present. The heat map in

Figure 9 shows that the only concentrations of activity picked up on transect surveys are along the southern and eastern boundaries of the site.

Figure 9. Heap map showing concentration of bat passes on the transect

4.3.4 Temporal distribution

Activity was consistent from May to the August surveys with a total of between 20 and 29 passes. There was a higher level of activity in September which accounted for 48% of total activity with 91 passes across both routes, and although dominated by *Pipistrellus* species activity, *Nyctalus* and *Myotis* were also recorded more frequently than previous months.

5 Discussion

Results of the surveys are discussed further below relating to both site and genera behavioural context.

5.1 All species

The majority of activity recorded was of pipistrelle bats (92%). Location A had the most non-pipistrelle bats.

The automated and transect results indicate different levels of activity. However, the automated data showed that many bats were arriving at site later during the night and are therefore less likely to be recorded during the transect survey period. Overall the site is likely to be more important for foraging bats and bats commuting between foraging areas, rather than important for commuting routes from roost sites. However, some bats are arriving at the site soon after they emerge from roosts suggesting small roosts or individual bats may be roosting nearby.

5.2 Myotis bats

These bats were predominately recorded in excess of an hour after sunset and it is therefore unlikely that an important roost is on or immediately adjacent to the site. The eastern area of the site is the most used; use of the western and central areas may be impacted by the light pollution in the area, to which *Myotis* species are generally more sensitive. Two passes per night is still a low amount of activity and it is unlikely the site is important to these bats.

5.3 Nyctalus bats

These bats emerge from roosts at approximately sunset, and they were not recorded close to sunset it is highly unlikely a roost is in the area. These bats are likely to be foraging on the Site and commuting through it. The results indicate that the western area of the Site is more important to these bats (which are less susceptible to the light pollution in this area). They are likely to be foraging for insects over the grassland field, field margins and ditch.

5.4 Pipistrellus bats

Activity was high for common pipistrelles across the Site but highest at Location A. Soprano pipistrelles were highest at B, which is largely effected by the increase in likely male mating behaviour from these bats in September, followed by Location C. These results are expected as being more associated with aquatic habitats soprano pipistrelles were higher nearer to the ponds and ditches in the south and eastern areas of the Site boundary.

The earliest bat passes were of common pipistrelle at 14 minutes after sunset at Location C and at 17 minutes at Location D on the same night in June. This was likely the same bat or group of bats moving from Location C towards D. The earliest soprano pipistrelle was at 17 and 20 minutes after sunset at Location C and B respectively on the same night in September. Similarly this may be soprano pipistrelles moving from C towards D

These are both early emerging bats. If a non-mating roost was on site or immediately adjacent, one would expect regular activity closer to sunset. However, it is likely that roosts

for both species are in the area as they were recorded at 14 and 17 minutes after sunset on a single night.

A male soprano was likely advertising to females near Location B in September. This means it is likely the bat has a roost nearby which it uses for mating with females – given there are mature trees in this area, it could be possible the roost was active in one of the trees. Unlike other species, which congregate in large numbers, pipistrelle mating roosts are common and widespread and often of single male bats, and are not considered to be of high conservation status.

Whilst bat passes were classified as the crossover between common and Nathusius pipistrelles, no Nathusius were positively identified. It is likely these passes were common pipistrelles echolocating outside of their normal range (e.g. low constant frequency calls during the navigating phase in wide open spaces).

5.5 Brown long-eared bats

Only 13 Brown-long eared bats passes were recorded. These were spread across locations A B and D, and were recorded in each month of survey. There is too little data (likely due to low detection rate of this species) to make any assumptions on the use of the site by these bats, however, the data suggests a roost is unlikely to be present on or adjacent to the site and they are using all areas of the site.

5.6 Serotine bats

A single serotine bat pass was identified. This was at Location C in May. A further 18 passes were classified as Big Bats (serotine or *Nyctalus*). So serotine activity may be higher, but still very low. The site is unlikely to be important for these bats.

6 Conclusions

At least six species of bat occur in the Study Area. *Pipistrellus* species bats dominated activity levels, the majority being common pipistrelle. Common pipistrelle were evenly distributed across the site, however, soprano pipistrelles were concentrated in the southwest and eastern area. A soprano mating roost of a single male bat was likely active near Location B in September – likely in a mature tree in this area.

Nyctalus species bat activity was higher than normally expected with levels highest in the western area of the site. As the western boundary and the northern boundary are flooded with light, it is likely the bats are foraging over the field.

Other species of bat were recorded, but all at relatively low levels of activity. No regular activity close to typical emergence time were recorded for any species. The results suggest that roosts are not in the immediate area to the Study Area during the time of surveys. However, with activity higher during the middle of the night the site is of importance for foraging bats.

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ES Volume II: Technical Appendices

Appendix 11.3: Great Crested New Survey Report

TRIUM ENVIRONMENTAL

CONSULTING

GREAT CRESTED NEWT eDNA

SURVEY

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0271.0001

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Document Control

Report Issue	Notes
01	Original document to client.
02	
03	
04	
05	
Managing Office	Derby

CONTENTS

1 Introduction

1.1 Terms of Reference

In June 2017 Prime Environment Limited (Prime Environment) was instructed by Trium Environmental Consulting LLP (the Client) to undertake an environmental DNA (eDNA) survey of waterbodies in the vicinity of OS Parcel 2200 adjoining Oxford Road, north of Promised Land Farm, Oxford Road, Bicester. (Ordnance Survey (OS) grid Reference SP 57958 21564) (The Site).

The Site is 12 hectares and comprises an arable field with rough grassland margins and hedgerows with trees. There is a ditch running across the Site in the west and dry and wet ditches at the field boundaries. The Survey Area is slightly larger than the Site (15 ha) as the Site does not include all of the field.

The project proposals are to develop the Site into a large business park with associated hard and soft landscaping. The application will be subject to a formal Environmental Impact Assessment (EIA).

1.2 Aims and Objectives

The aims of the study were to:

- Identify whether great crested newts occur in ponds close to the Site.

Ecological information for the assessment was provided by an eDNA sample analysis.

2 Methodology

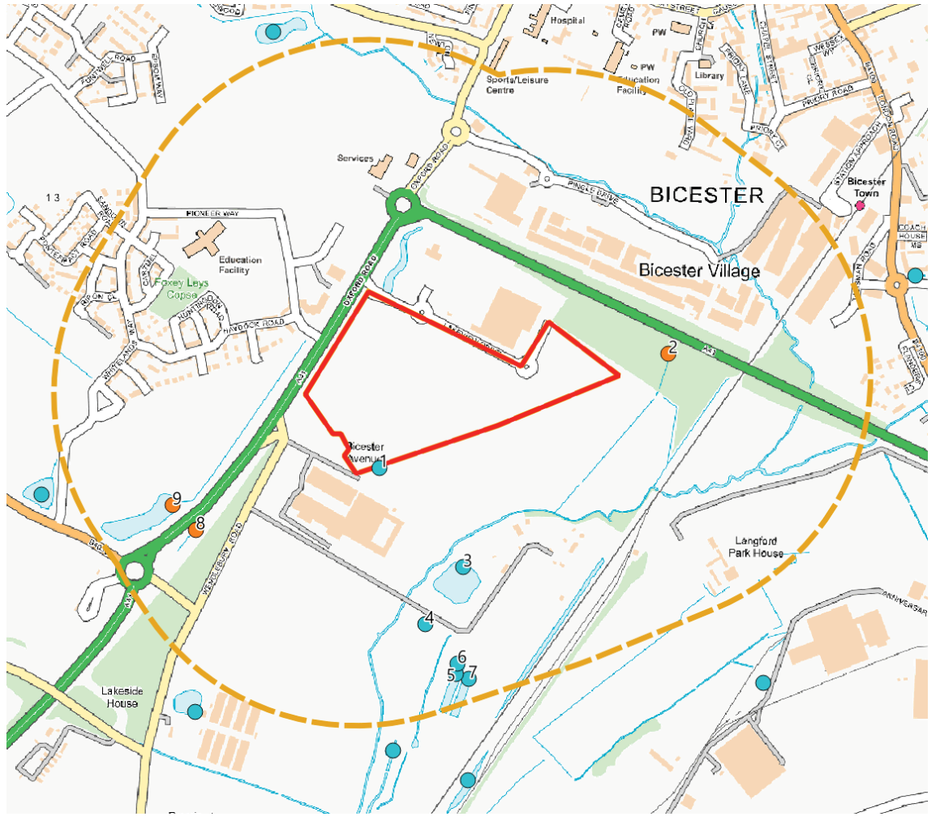
The survey was undertaken by Hayley Farnell MSc BSc (Hons) and Andy Swan Msc, Bsc (hons). Hayley has over 12 years' experience in environmental consultancy. Both are full members of the Chartered Institute of Ecology and Environmental Management (CIEEM) and hold a scientific licence for great crested newt surveys.

During Preliminary Ecological Assessment[1] Ordnance survey mapping, aerial photos and the site visit were used to identify the presence of ponds within 500 m of the Site. Nine ponds were located (See Plan 1 below). Pond 1 is immediately adjacent to the Site, it is located within the garden centre and its overflow feeds Ditch 1. Pond 1 scores 0.79 in the HSI (good quality for great crested newts). Pond 2 is a water attenuation pond in an unmanaged field north of the Site. The pond was dry at the time of phase 1 habitat survey (May 2017) and appears to rarely hold water (based on the vegetation growing within it). Ponds 3,5,6 and 7 are part of the water treatment processes at the Thames Water site. These were not viewed for this survey, but are unlikely to be suitable for newts. Pond 4 is a series of connected ditches and scrapes at the Bicester Wetland Nature Reserve. This feature was not surveyed fully for the phase 1 survey, but observed by binoculars. It has a HSI score of 0.53 (below average quality for great crested newts. Ponds 8 and 9 are new attenuations ponds associated with a development to the west; the former is for road runoff from the new road access and the latter appears to be in what will be public open space. Neither held water at the time of phase 1 survey, although Pond 9 does have emergent plants indicating it is wet or at least damp for some of the year. HSI data is included in Appendix 1.

The HSI survey was undertaken at a time of year when newts lay eggs, but none were observed during the survey.

[1] Prime Environment (2017) *0271.0001 Bicester Preliminary Ecological Appraisal*

Plan 1
Pond Locations



Orange = dry at time of phase 1 habitat survey, blue = holding water at time of phase 1 habitat survey.

Access was attempted for all waterbodies within 250 m of the Site.

Nine ponds were identified in proximity to the Site which were planned to be subject to an environmental DNA (eDNA) survey. The survey followed Natural England's approved protocol[2]. The eDNA survey involves collecting samples from the water column in 20 places around the pond, following a strict collection and contamination protocol. Samples can be collected between 15th April and 30th June. The 20 samples are aggregated and six sets of this water preserved in alcohol, refrigerated and sent for analysis. The laboratory extracts environmental DNA – DNA held in the water from skin, faeces etc. using qPCR (quantitative Polymerase Chain Reaction).

[2] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014). *Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067.* Freshwater Habitats Trust: Oxford.

eDNA can provide a presence or absence result, but cannot infer the size of a population.

2.1 Constraints

Any ecology assessment must be considered as a 'snapshot' of the Site conditions at the time of the survey.

Ecological constraints will change over time and therefore the findings of this report are considered to be valid for a period of one year, after which the report should be reviewed assess whether an updated survey is necessary.

3 Results and Assessment

The eDNA analysis was negative for both ponds (see Appendix 1): great crested newts were not present in either pond in the year of the survey. It is therefore very unlikely that great crested newts breed in these ponds at any time.

Pond Reference	Access / water notes	eDNA result
1	Pond held water and eDNA samples retrieved without constraint	negative
2	Pond dry	n/a
3	Access permission withdrawn on day of survey - active water treatment site	n/a
4	Wetland held water. Samples taken from accessible shore	negative
5	Access permission withdrawn on day of survey - active water treatment site	n/a
6	Access permission withdrawn on day of survey - active water treatment site	n/a
7	Access permission withdrawn on day of survey - active water treatment site	n/a
8	Pond dry	n/a
9	Pond dry	n/a

No further consideration for great crested newts is required.

Appendix 1: eDNA results

SureScreen Scientifics

Folio No: E1538
Report No: 1
Order No: PO-109
Client: PRIME ENVIRONMENT
Contact: Jo Pedder
Contact Details: jpedder@primeenvironment.co.uk
Date: 21/08/2017

TECHNICAL REPORT

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

Date sample received at Laboratory: 06/07/2017
Date Reported: 21/08/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
33890	Bicester Nature Reserve	SP577210	Pass	Pass	Pass	Negative	0

SUMMARY

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

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

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

RESULTS INTERPRETATION

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

Site Name- Information on the pond.

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

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

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

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

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

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

METHODOLOGY

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

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

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

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen

Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a ‘spiked’ DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in different buildings at our premises for added

SureScreen Scientifics Ltd also participate in Natural England’s proficiency testing scheme and we also carry out inter-laboratory checks on accuracy of results as part of our quality procedures.

Reported by: Troy Whyte **Approved by:** Derry Hickman

End Of Report

Folio No: E1537
Report No: 1
Order No: PO-108
Client: PRIME ENVIRONMENT
Contact: Jo Pedder
Contact Details: jpedder@primeenvironment.co.uk
Date: 21/08/2017

TECHNICAL REPORT

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

Date sample received at Laboratory: 06/07/2017
Date Reported: 21/08/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
33888	Bicester Garden Centre 1	SP5771321390	Pass	Pass	Pass	Negative	0

SUMMARY

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

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

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

Site Name- Information on the pond.

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

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen

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Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a ‘spiked’ DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in different buildings at our premises for added

SureScreen Scientifics Ltd also participate in Natural England’s proficiency testing scheme and we also carry out inter-laboratory checks on accuracy of results as part of our quality procedures.

Reported by: Troy Whyte **Approved by:** Derry Hickman

End Of Report

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ES Volume II: Technical Appendices

Appendix 11.4: Legislative and Planning Policy Context

PLANNING POLICY CONTEXT - ECOLOGY

National Policy National Planning Policy Framework

Section 40 of the Natural Environment and Rural Communities Act 2006 places a duty on all public authorities in England and Wales to have regard, in the exercise of their functions, to the purpose of conserving biodiversity. A key purpose of this duty is to embed consideration of biodiversity as an integral part of policy and decision making throughout the public sector, which should be seeking to make a significant contribution to the achievement of the commitments made by government in its Biodiversity 2020 strategy.

This is delivered in part at a national level through the National Planning Policy Framework (NPPF). The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment. The following policies in the NPPF are relevant to ecology (policy text is abbreviated):

9. Pursuing sustainable development involves seeking positive improvements in the quality of the built, natural and historic environment, as well as in people's quality of life.

17. Within the overarching roles that the planning system ought to play, a set of core land-use planning principles should underpin both plan-making and decision-taking … Including contribution to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in the Framework.

109. The planning system should contribute to and enhance the natural and local environment by:

- protecting and enhancing valued landscapes, geological conservation interests and soils
- recognising the wider benefits of ecosystem services
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures
- preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate

113. Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites[1], so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks.

114. Local planning authorities should:

- set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure
- maintain the character of the undeveloped coast, protecting and enhancing its distinctive landscapes, particularly in areas defined as Heritage Coast, and improve public access to and enjoyment of the coast

117. To minimise impacts on biodiversity and geodiversity, planning policies should:

- plan for biodiversity at a landscape-scale across local authority boundaries
- identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation
- promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan
- aim to prevent harm to geological conservation interests
- where Nature Improvement Areas are identified in Local Plans, consider specifying the types of development that may be appropriate in these Areas

118. When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- the following wildlife sites should be given the same protection as European sites:

- potential Special Protection Areas and possible Special Areas of Conservation
- listed or proposed Ramsar sites[3]
- sites identified, or required, as compensatory measures for adverse effects on European sites, potential special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites

119. The presumption in favour of sustainable development (paragraph 14) does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined.

157. Crucially, Local Plans should … contain a clear strategy for enhancing the natural, built and historic environment, and supporting Nature Improvement Areas where they have been identified

Local Policy

Cherwell Local Plan 2011-2031

The Cherwell Local Plan 2011-2031 provides the planning policy framework for the District, and outlines the basis for decisions on land use planning affecting the Cherwell District.

Ecology and nature conservation policies in the Local Plan are included in 'Theme 3: Policies for Ensuring Sustainable Development (ESD)' and specifically within policies ESD9 – 11.

Policy ESD 9: Protection of the Oxford Meadows SAC relates to the conservation of a single site. This sufficiently distant from the application site to not be relevant to this application.

Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment sets out how designated sites in the region will be protected and how development should include features to benefit biodiversity.

Policy ESD 11: Conservation Target Areas refers to the approach to be adopted in Conservation Target Areas (CTA). The application site does not lie within or adjacent to a CTA, and as such this policy is not considered to apply to this case.

The Cherwell Local Plan 1996

There are several saved policies from the 1996 local plan which are relevant to ecology. Of relevance to this site are:

Policy C1 relates to the protection of nature conservation sites.

Policy C2 relates to the protection of species protected by legislation.

Policy C4 relates to the creation of new habitats.

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Appendix 12.1: Drawings and Photographs

LANDSCAPE AND VISUAL IMPACT

12

Appendix 12.1 Drawings and Photographs