

Appendix 5.1 SURVEY METHODOLOGY

Habitat Survey Methodology

- 1.1. Updated surveys were carried out to ascertain the general ecological value of the land contained within the boundaries of the application site and to identify the main habitats and associated plant species, with notes made on faunal species using the application site.
- 1.2. The application site has been subject to a number of habitat surveys by previous consultants RPS in 2008 and 2009, Atkins in 2012, Ecology Solutions in 2012, 2016 and 2018 and ARUP in 2020.
- 1.3. Ecology Solutions reviewed the findings of these previous habitat surveys, and considering the portion of time that has passed since the last survey conducted an updated habitat surveys in June 2021 in order to ensure the baseline information remains accurate and robust.
- 1.4. All surveys were based around extended phase 1 survey methodology¹, whereby the habitat types present are identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas identified would then be examined in more detail.
- 1.5. The habitats present within the application site were classified into areas of similar botanical community types with a representative sample of those species present at the time of the application site survey being described where necessary.
- 1.6. The updated habitat survey was undertaken within the recommended optimal survey period for Phase 1 habitat and botanical surveys and it is therefore considered that the timings of the surveys allowed an accurate evaluation of the intrinsic ecological interest of the application site to be made.

Faunal Survey Methodology

- 1.7. Obvious faunal activity, such as birds or mammals observed visually or by call during the course of the surveys, was recorded. Specific attention was paid to any potential use of the application site by protected species, BAP species, or other notable species. Specific surveys were undertaken for the following species and groups:
 - Badgers;
 - Bats;
 - Otter and Water Vole;
 - Breeding Birds;
 - Smooth Newts; and
 - Reptiles

¹Joint Nature Conservation Committee (2010). *Handbook for Phase 1 Habitat Survey – a Technique for Environmental Audit*. England Field Unit, Nature Conservancy Council, reprinted JNCC, Peterborough

Badgers

- 1.8. A specific survey to search for evidence of Badgers *Meles meles* within the application site was undertaken by Ecology Solutions in 2012, and by ARUP in 2020, with further checks undertaken as part of Ecology Solutions' updated habitat surveys in 2021.
- 1.9. The surveys comprise two main elements. Firstly searching thoroughly for evidence of Badger setts. For any setts that are encountered standard survey practice would record the location of each sett entrance, even if the entrance appeared disused. The following specific information is recorded where appropriate:
 - (i) The number and location of well-used or very active entrances; these are clear from any debris or vegetation and are obviously in regular use and may, or may not, have been excavated recently.
 - (ii) The number and location of inactive entrances; these are not in regular use and have debris such as leaves and twigs in the entrance or have plants growing in or around the edge of the entrance.
 - (iii) The number of disused entrances; these have not been in use for some time, are partly or completely blocked and cannot be used without considerable clearance. If the entrance has been disused for some time all that may be visible is a depression in the ground where the hole used to be and the remains of the spoil heap.
- 1.10. Secondly, any evidence of Badger activity, such as well-worn paths and run-throughs, snagged hair, footprints, latrines and foraging signs, are recorded so as to build up a picture of the use of the application site by Badgers

Bats

- 1.11. All buildings and trees within the application site were assessed for their potential to support bats.
- 1.12. The probability of a building being used by bats as a summer roost site increases if it:
 - is largely undisturbed;
 - is pre-20th Century;
 - has a large roof void with unobstructed flying spaces;
 - has access points for bats (e.g. along gaps at the eaves, under gaps in the roofing tiles, or along gaps within the wall built structure);
 - has a roof void is not too draughty;
 - has wooden cladding;
 - has hanging tiles; and/or
 - is in a rural setting and close to woodland and water features.
- 1.13. Conversely, the probability decreases if a building is of a modern or prefabricated design / construction, is located within an urban setting, has a small or cluttered roof voids, has few potential access points or is a heavily disturbed premises.

- 1.14. The main requirements for a winter / hibernation roost site are that it maintains a stable (cool) temperature and humidity. Sites commonly utilised by bats as winter roosts include cavities / holes in trees, underground sites and parts of buildings. Whilst different species may show a preference for one of these types of roost site, none are solely dependent on a single type; bats therefore utilise roosting sites on a transient basis.
- 1.15. Internal and external inspections of the buildings were undertaken where access and health and safety allowed. Features that may provide suitable opportunities for roosting bats and evidence for their presence was searched for. Particular attention was paid to the roof structure with evidence searched for with regard to past and present activity within any voids and around joists and gaps between rafters and beams. Specific searches were made for bat droppings that can indicate present or past use and extent of use, as well as other signs to indicate the possible presence of bats, e.g. feeding remains, presence of stained areas, or areas that are conspicuously cobweb-free.
- 1.16. Tree Survey. The trees within the application site were appraised for their likely potential to support bat roosts. For a tree to be classed as having some potential for roosting bats it must have one or more of the following characteristics:
- obvious holes, e.g. rot holes and old woodpecker holes;
 - dark staining on the tree below a hole;
 - tiny scratch marks around a hole from bats' claws;
 - cavities, splits and / or loose bark from broken or fallen branches, lightning strikes etc; and
 - very dense covering of mature ivy over trunk.
- 1.17. All surveys were undertaken with due regard to *Bat Surveys – Good Practice Guidelines* published by the Bat Conservation Trust² and *Bat Workers Manual 3rd Edition* published Joint Nature Conservation Committee³.
- 1.18. Activity Surveys. A series of dedicated activity surveys were undertaken across the application site (including along the proposed haul route) between May and August 2021 in order to ascertain the level of foraging and species present and identify any important areas for foraging and commuting. Surveyors began surveying shortly after sunset until two hours after sunset and were equipped with EchoMeter2 (EMT2) bat detectors to aid identification of bats and record data. Surveyors walked transects in order to include all features of potential value to foraging and commuting bats such as hedgerows, treelines and scrub. All bat data recorded was subsequently analysed using Kaleidoscope bat sound analysis software. The dates and weather conditions for each survey are shown in Table 2 below.

Survey Date	Weather Summary
11/05/21	10°C, 90% cloud cover, dry, slight breeze
10/06/21	15°C, 100% cloud cover, dry, very gusty
20/07/21	19°C, 5% cloud cover, dry, slight breeze
23/08/21	16°C, 5% cloud cover, dry, slight breeze

Table 1: Bat activity survey dates and weather conditions

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

³ Mitchell-Jones, A.J., & McLeish, A.P., 2004. *Bat Workers Manual 3rd Edition*. JNCC.

- 1.19. EchoMeter4 (EM4) static detectors were also utilised, detectors were deployed for a minimum period of five consecutive nights in strategic locations to ascertain longer term data regarding the use of the site by foraging and commuting bats.
- 1.20. Emergence Surveys. Targeted emergence and re-entry surveys of building B1 within the application site were also undertaken in order to detect the presence of any roosting bats. These were conducted on the evening of 19th July, the morning of 20th July and the evening of 24th August and the morning of 25th August.

Otter and Water Vole

- 1.21. An assessment of the suitability of the watercourses 250m to the north (downstream) and 100m to the south (upstream) of bridge A and B to support Otter *Lutra lutra* and Water Vole *Arvicola amphibius* was undertaken, with specific surveys for Otters and Water Vole undertaken in August 2021. In addition, the larger waterbodies in the application site and wider area were searched for any signs of Otter.
- 1.22. Otter survey work involved careful searching along the banks of suitable water habitat for any signs of the presence of Otter, including spraints (faeces), footprints or other signs such as holts (place of shelter).
- 1.23. Water Vole survey work involved careful searching along the banks of suitable water habitat, using the standard methodology as advocated within the Water Vole Conservation Handbook⁴.
- 1.24. The aim of the surveys was to determine the presence / absence, and where necessary distribution and abundance, of Water Voles within the application site through the detection of signs such as burrows, feeding stations, latrines, faeces, and potentially from sightings of the animals themselves.
- 1.25. The surveys also allowed an assessment of the suitability of the existing habitats present to support Water Voles to be undertaken.

Birds

- 1.26. Specific breeding bird surveys were carried out following the Common Bird Census (CBC) technique. The CBC involves walking transect routes through the area being studied and recording and plotting all bird species observed or heard along with their behaviour.
- 1.27. The transect route is chosen so that the entire site is covered and all features likely to support breeding birds are surveyed. Routes and directions are varied between visits so that there is no tendency to visit a particular part of the plot later or earlier in the day.
- 1.28. Three visits were undertaken across April, May and June 2021. The dates and weather conditions of the surveys are shown in Table 1 below.

⁴ Strachan, R (1998), 'Water Vole Conservation Handbook' - from Environment Agency

Survey Date	Weather Summary
25/05/21	9°C, scattered clouds, dry
15/06/21	10°C, clear, dry
29/06/21	11°C, clear, dry

Table 2: Breeding Bird survey dates and weather conditions

- 1.29. On each survey an experienced ornithologist walked a circuitous route that took in all parts of the application site, recording the locations, numbers and activity of all bird species present within (and around) the area during this time. Over the three visits, this methodology should ensure that the vast majority of species present within the application site are recorded, although some species that may be using the area as part of a larger territory, for example nocturnal species such as Owls, may be missed.
- 1.30. To ascertain the breeding status of birds using the application site, the following criteria were applied following the methodology used in the 'Atlas' surveys of 1988-1991 (Gibbons et al, 1993). This accepts the following activities as denoting breeding (including those probably breeding although definite proof was lacking):
- Bird apparently holding territory;
 - Courtship and display;
 - Nest-building (including excavating nest-hole);
 - Distraction display or feigning injury;
 - Adult carrying faecal sac or food;
 - Adult entering or leaving apparently occupied nest site;
 - Nest with eggs or eggshells found, or bird sitting but not disturbed;
 - Nest with young; or downy young of ducks, game-birds, waders and other nidifugous species; and
 - Recently fledged young.
- 1.31. In addition, observations were made as part of the various species surveys undertaken across the application site in 2021.

Smooth Newts

- 1.32. A full licensed survey was undertaken in accordance with NIEA survey guidelines and detailed guidance provided by Natural England in relation to Great Crested Newts *Triturus cristatus* which is also considered to apply to Smooth Newt *Lissotriton vulgaris*. RPS have previously undertaken survey visits in 2009 and 2012, and ARUP conducted a suite of new surveys in 2020.
- 1.33. A total of 13 waterbodies were identified as having suitable to support smooth newt across the application site and were subject to survey. Surveys were undertaken on the 11th May 2021, 24th May 2021, 10th June 2021, 14th June 2021 and the 15th June 2021.

Reptiles

- 1.34. Specific surveys to identify the presence or absence of reptiles within the application site were undertaken from July to October 2022.
- 1.35. Following an initial assessment to identify areas of suitable reptile habitat within the application site, refugia surveys were undertaken. A total of 160 'tins' (0.5 x 0.5

metre squares of heavy roofing felt which are often used as refuges by reptiles) were distributed throughout all suitable reptile habitat within the application site in July 2022.

- 1.36. These tins were left in place for two weeks to 'bed in' and subsequently surveyed for reptiles beneath or upon the tins during suitable weather conditions.
- 1.37. Suitable weather conditions to carry out surveys are when the air temperature is between 9 and 18°C. Heavy rain and windy conditions should be avoided.
- 1.38. The tins provide shelter and heat up quicker than the surroundings in the morning and can remain warmer than the surroundings in the late afternoon. Being ectothermic (cold blooded), reptiles use them to bask and raise their body temperature which allows them to forage earlier and later in the day.