



Appendix 13-PD-3: Methodology

Table of Contents

Appendix 13-PD-3: Methodology	1
1. Introduction	1
2. Methodology	1
3. References	19

Tables

Table 1: The Domin Scale.....	2
Table 2: Great Crested Newt Population Size Guidelines.....	5
Table 3: BTO Breeding Evidence and Codes	6
Table 4: Grading system of potential suitability of a feature to support roosting bats	10

Appendix 13-PD-3: Methodology

1. Introduction

1.1 Purpose of this Appendix

- 1.1.1 This Preliminary Environmental Information Report (PEI Report) appendix identifies and describes the field survey methodologies used and supporting guidance considered relevant to the assessment of the likely significant effects of the Scheme on terrestrial ecology.

2. Methodology

- 2.1.1 Methodologies and guidance relating to terrestrial ecology is outlined below. This informs the selection of study area, identification of ecological features that could be affected and their sensitivity, and the assessment methods.

2.1 UK Habitat

- 2.1.1 All habitats within the Preliminary Order Limits (where access is available) will be mapped and categorised utilising the methodology set out in the UK Habitat Classification Methodology Version 2.0 (Ref. 1) and the Habitat Condition Assessment criteria (Ref. 2). The surveys will be conducted by a qualified ecologist from April to September where possible, with optimal timing determined by habitat type.
- 2.1.2 A list of the botanical species present will be collected to inform and justify this classification. Photos will be taken of all distinct areas of habitat assessed.
- 2.1.3 All habitats identified during the UK habitat classification surveys will be assessed against the statutory biodiversity metric to determine their condition as either poor, moderate or good. Detailed notes will be collected to justify how each habitat was scored.
- 2.1.4 The survey will also include the identification of any invasive non-native species present on site.

2.2 Detailed Habitat/Vegetation Surveys (NVC)

- 2.2.1 NVC surveys will be conducted within the Preliminary Order Limits where UKHabitat surveys have identified a habitat as being particularly species diverse and/or sensitive and/or a type restricted in the UK/region. Surveys will be conducted from mid-April to August, with optimal timing determined by habitat type.

- 2.2.2 Surveys will be conducted by an experienced ecologist in accordance with the JNCC NVC User's Handbook (Ref. 3).
- 2.2.3 The surveyor will identify, map and record information for homogenous stands and mosaics of vegetation wherever they were found to occur. The vegetation will be mapped using ArcGIS Field Maps by walking the boundary of the stand to determine the extent as accurately as possible. In instances where community mosaics were found, these were mapped accordingly.
- 2.2.4 Quadrats were used to collect the NVC data, with sufficient sampling undertaken to characterise the communities present. Where practicable, a maximum of five quadrats were sampled for each NVC community (but not each stand of that community). The quadrat size will depend on the habitat the survey is being conducted in.
- 2.2.5 The presence and percentage cover (abundance) of every plant species present within each quadrat were recorded, which is estimated using the Domin Scale (**Table 1**).

Table 1: The Domin Scale

Cover within quadrat	Domin score
91-100%	10
76-90%	9
51-75%	8
34-50%	7
26-33%	6
11-25%	5
4-10%	4
<4% (many individuals)	3
<4% (several individuals)	2
<4% (few individuals)	1

- 2.2.6 The Domin scores for each quadrat were then used to derive a cover range and frequency for all of the species recorded.
- 2.2.7 In addition to the quadrat data, the flora present in the wider stand will be appraised and recorded, with a particular emphasis on species that are rare, protected or otherwise informative of environmental conditions.
- 2.2.8 Many plant species can be frequent in specific vegetation communities and inform understanding of the site conditions and community, whilst only

occurring at low cover values. As such, they can be easily missed by quadrats to the detriment of subsequent data analysis and interpretation.

- 2.2.9 Following the field survey, NVC communities were attributed using surveyor experience and matching field data against published NVC floristic tables and descriptions. Stands were classified to sub-community level where possible, although in some cases vegetation could only be assigned to community level because it exhibited features or fine-scale patterns of two or more sub-communities.

2.3 Hedgerow Surveys

- 2.3.1 Hedgerows within the Preliminary Order Limits that will be directly impacted by the Proposed Development, will be subject to an assessment to identify their 'importance' under the Hedgerow Regulations 1997 (Ref. 4) and to inform the Biodiversity Net Gain (BNG) assessment. The surveys will be undertaken in accordance with the Hedgerow Survey Handbook (Ref. 5) and will be completed between May and September.

2.4 Great Crested Newt

- 2.4.1 A scoping exercise was conducted in 2023 to identify any waterbodies suitable for great crested newts within 500 m of the Preliminary Order Limits for all parts of the scheme. This exercise was subsequently updated in 2025 to scope out all ponds between 250 and 500 m of the Preliminary Order Limits for all parts of the scheme given the nature of the Proposed Development and the absence of significant hydrological connectivity or habitat corridors at greater distances than 250 m.
- 2.4.2 Once waterbodies were identified a scoping exercise was carried out to assess whether they had any habitat connectivity to areas of the Proposed Development or whether barriers (major roads/rivers) existed to prevent any potential great crested newt population accessing habitats within the Site boundary. Waterbodies separated by major barriers or with no habitat connectivity were scoped out of further assessment.
- 2.4.3 This exercise was used to determine the 2025/2026 survey scope.

Habitat Suitability Index

- 2.4.4 Habitat Suitability Index (HSI) surveys will be conducted on all waterbodies (with permitted access) identified by the desk study as having potential to support great crested newts and having habitat connectivity to areas of the Proposed Development (hereafter known as the 'Survey Area').
- 2.4.5 The HSI is a method for evaluating the suitability of waterbodies as habitat for great crested newt (Ref. 6). Ten habitat features of the waterbody are assessed in the field and from these data a suitability index is calculated.

2.4.6 The HSI of a waterbody is a numerical index (Ref. 7) which scores water bodies on a scale of between 0 and 1, using a geometric mean of the ten suitability indices, with the following suitability categories for the results:

- a. <0.5: poor likelihood of presence;
- b. 0.5 – 0.59: below average likelihood of presence;
- c. 0.6 – 0.69: average likelihood of presence;
- d. 0.7 – 0.79: good likelihood of presence; and
- e. >0.8: excellent likelihood of presence.

eDNA survey

2.4.7 Environmental DNA, or eDNA, refers to DNA that can be extracted from environmental samples without having to isolate the target organism.

2.4.8 eDNA surveys can prove presence or likely absence of great crested newt without the typical suite of nighttime presence/absence surveys being undertaken. The surveys follow a specific methodology accepted by Natural England (Ref. 8).

2.4.9 eDNA surveys will be conducted on all waterbodies within and up to 250 m of the Preliminary Order Limits, as determined by the HIS. Waterbodies with an HSI score greater than or equal to 0.60 will be scoped in for eDNA analysis. Surveys will be completed between 15 April and 30 June.

2.4.10 Water samples are taken from around the perimeter of each accessible waterbody using a 40 ml ladle, focusing on areas most likely to be used by great crested newt.

2.4.11 The samples are analysed in the laboratory by SureScreen Scientifics.

2.4.12 Using this method, two experienced surveyors, the lead of whom holds a Natural England Class 1 licence to survey for great crested newt, will undertake eDNA sampling on every pond with a suitable HIS score to determine the presence/ likely absence of great crested newt in these waterbodies located within the Survey Area.

2.4.13 Negative results from eDNA surveys are accepted by Natural England as evidence of likely absence of great crested newt from a waterbody, and further survey is not required.

2.4.14 Surveys will be undertaken in the optimal survey period (15th April to 30th June) and in optimal weather conditions.

Population Assessment Surveys

2.4.15 Two experienced surveyors, the lead of whom holds a Natural England Level 1 Class licence to survey for great crested newt will be present during each

survey and will follow the standard good practice guidelines (Ref. 9) which are summarised below.

- 2.4.16 Where there is a positive record of great crested newt (e.g. through eDNA), if an estimate of adult population size is necessary, six survey visits are required between mid/late March and mid-June with at least two during the peak period mid-April to mid-May.
- 2.4.17 The peak count from each survey method is used to determine the population size see Table 2 below for the guidelines.

Table 2: Great Crested Newt Population Size Guidelines

Peak Count of GCN	Population Size
1-10	Small
11-100	Medium
>100	Large

2.5 Reptiles

- 2.5.1 Surveys will be completed in locations which will be affected and unavoidable by the Proposed Development, where the habitat survey identified areas as particularly suitable for reptiles.
- 2.5.2 Surveys will be completed in accordance with Froglife's Advice Sheet 10 for Reptile Surveys (Ref. 10) and the Herpetofauna Workers' Manual (Ref. 11). Surveys will be undertaken in April, May and September during the active season in temperatures between 10 and 17°C, with intermittent sunshine and little wind.
- 2.5.3 Surveys will involve the placing artificial refugia within habitat suitable for reptiles at a density of at least ten refugia per hectare. Sentence on materials and size. Artificial refugia will be 0.5 m² in size and made of corrugated tin, roofing felt, wood or black plastic. The artificial refugia will be left for two weeks to allow any reptiles in the area to acclimatise to their presence, find and make use of them.
- 2.5.4 Following this, seven survey visits will be undertaken in which the artificial refugia, as well as any naturally occurring refugia, and terrestrial habitats will be checked for the presence/ likely absence of reptiles. Any reptiles, or evidence of reptiles such as sloughed skins, will be recorded during the survey visits. Survey visits thereafter will be undertaken at least two days apart.

2.6 Breeding and Wintering Birds

- 2.6.1 The bird surveys involve experienced ornithologists walking a transect route at each site. All birds seen and/or heard within and up to 200 m from each

Survey Site (as defined from the Indicative Construction Areas) are recorded using standard British Trust of Ornithology (BTO) species symbols.

Binoculars are used to assist with recording to minimise disturbance. The bird survey records were captured using tablet devices to improve data collection efficiency and mapping precision and to include weather data.

- 2.6.2 The transect routes were devised to include habitats that are likely to be attractive to birds in order to inform baseline conditions for the assessment within each element (Parts 1 to 4) of the Proposed Development.
- 2.6.3 The bird surveys are undertaken in suitable weather conditions with good visibility, avoiding fog, heavy rain, blizzards and strong winds when bird behaviour may be atypical or when surveying may be impractical.

Breeding Birds

- 2.6.4 The breeding bird survey methodology used is adapted from the British Trust for Ornithology's (BTOs) Common Bird Census (Ref. 12). The breeding bird survey involves five monthly visits between late-March and early-July.

Breeding bird surveys require additional assessment of the breeding status of each species recorded at the Survey Sites using the criteria adopted by the BTO Bird Atlas 2007-11 (Ref. 13), with each species being assigned to one of four levels as shown in **Table 3**.

Table 3: BTO Breeding Evidence and Codes

Breeding status criteria	Description
Non-breeding	
F	Flying over
M	Species observed but suspected to be still on migration
U	Species observed but suspected to be summering non-breeder
Possible breeding	
H	Species observed in breeding season in suitable habitat
S	Singing male present (or breeding calls heard) in breeding season in suitable breeding habitat
Probable breeding	
P	Pair observed in suitable nesting habitat in breeding season
T	Permanent territory presumed through registration of territorial behaviour (song etc) on a least two different days a week or more apart at the same or many individuals on one day
D	Courtship and display (judged to be in or near potential breeding habitat)
N	Visiting probable nest site

Breeding status criteria	Description
A	Agitated behaviour or alarm calls from adults, suggesting probable presence of nest or young nearby
B	Nest building or excavating nest-hole
Confirmed breeding	
DD	Distraction-display or injury feigning
UN	Used nest or eggshells found (occupied or laid within period of survey)
FL	Recently fledged young (nidicolous species) or downy young (nidifugous species). Careful consideration will be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat
ON	Adults entering or leaving nest-site in circumstances indicating occupied nest (including high nests or nest holes, the contents of which cannot be seen) or adults seen incubating
FF	Adult carrying faecal sac or food for young
NE	Nest containing eggs
NY	Nest with young seen or heard

- 2.6.5 Where breeding signs are recorded, it is assumed that a 'breeding territory' was present. Territory analysis was carried out following guidance in Marchant (Ref. 12) and Bibby *et al.* (Ref. 14) using the cumulative data from all survey visits to identify clusters of bird registrations indicative of the presence of territories. Determination of the number of breeding territories is calculated from when the same species was recorded in the same vicinity on two or more visits and showing signs of at least 'Probable' breeding (see breeding evidence criteria in Table 4).
- 2.6.6 The main output of this exercise is an estimated number and approximate locations of territories rather than a definitive proof of breeding for individual species, although proof of breeding can be obtained if certain behaviours are observed, such as the presence of adults visiting nest sites, incubating adults or fledged young. A range of breeding territories is reported for each species, reflecting the precautionary approach adopted given multiple registrations or signs of breeding across survey visits within suitable breeding habitat. Over-flying birds were recorded to establish their presence, but they were not considered to form part of the bird assemblage and were therefore excluded from territory analysis unless they were observed to land within the Survey Sites. Standard recording techniques were also used to

record non-breeding species, although these were excluded from territory analysis.

Wintering Birds

- 2.6.7 The wintering bird surveys follow the methodologies described by Bibby *et al* (Ref. 14) and Gilbert *et al* (Ref. 15).

2.7 Badger

- 2.7.1 Badger primary foraging habitat contains an abundance of worms in several habitats (Ref. 16). An assessment of habitat suitability (via aerial interpretation and UKHab surveys in 2025) identified habitats of primary importance for badger foraging, throughout the Preliminary Order Limits. Habitats included short, grazed grassland, mown grassland (amenity) improved grassland pasture, golf course, scrub, broadleaved woodland, riparian habitats, rough (ungrazed grassland) a network of hedgerows and field boundaries; all providing highly suitable habitat for badgers within the Preliminary Order Limits.
- 2.7.2 The desk study search of 2 km from the Preliminary Order Limits confirmed that badger distribution was also abundant within the wider landscape – badger records are confidential and not provided in the PEIR.
- 2.7.3 Badger survey area distance for sett searches and identifying evidence of badger activity has been extended to 50 m from the Indicative Work Area where defined (Parts 1, 2 and 3) or within the Preliminary Order Limits where the Indicative Work Area is not yet defined (Part 4). This is based on the predicted Zone of Influence (Zol) having limited potential for direct impacts on badger setts beyond 50 m, given the nature of the Proposed Development and the absence of significant barrier to movement at greater distances.
- 2.7.4 Badger setts located over 50 m from the Indicative Work Area or Preliminary Order Limits have been scoped out of any direct/indirect impacts. However, further surveys and assessment may be required to inform mitigation and licensing.
- 2.7.5 Targeted surveys of suitable habitat will be conducted within and up to 30 m of the Preliminary Order Limits, in accordance with Harris *et al.*, 1989 (Ref. 17).
- 2.7.6 Badger surveys can be performed at any time of year but optimal timing is October to December, then February to April when the vegetation cover is reduced and there is greater visibility of badger sett.
- 2.7.7 Experienced ecologists will perform a walkover survey that will require the ecologists to walk around the Site and within a 50 m buffer, where accessible, in search for evidence of badger field signs including:

- a. Setts;
- b. Paths;
- c. Snuffle holes;
- d. Hair;
- e. Footprints;
- f. Dung pits (latrines);
- g. Scratching posts;
- h. Bedding trails; and
- i. Rocks bearing claw marks.

2.7.8 Where setts are identified, the number of holes will be recorded and they will be classified as active, disused or partially active. Where possible the sett will be categorised as main, annexe, subsidiary or outlier. GPS references of setts and photographs of the entrances will be taken

2.7.9 No bait marking or territory analysis has been undertaken. Main setts of different clans are considered to be at circa 500 m (Ref. 18) apart.

2.8 Bat Roosts

2.8.1 Surveys will be completed in line with Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th edition (Ref. 19).

Preliminary Roost Assessment (PRA)

2.8.2 Structures (including bridges and buildings) will be subject to a PRA where they will be directly impacted through damage, destruction and/or obstruction, or are at risk of significant levels of disturbance, such that it could impair the ability of a population of bats to survive. Surveys can be completed at any time of year.

2.8.3 All structures within the Preliminary Order Limits of Parts 1a, 1b, 4a and 4b will be surveyed, along with structures within the Indicative Work Area of Parts 2 and 3. Additional structures up to 20 m of the Preliminary Order Limits will be surveyed where they are at risk of significant disturbance.

2.8.4 The survey will be led by a Natural England Level 1 or 2 bat licensed surveyor and include external checks for signs of bats and, where applicable safe to do so, an internal survey of any accessible roof spaces or other spaces with suitability for bat.

2.8.5 Close focusing binoculars will be used to conduct an external assessment of the structures from ground level. All potential bat access/egress points and features with potential roosting features (e.g. cracks, crevices, roof voids) will be identified and recorded along with any evidence that may have indicated the location of roosts, such as:

- a. Stains around entrance holes (resulting from the deposition of oil secretions in bat fur);
 - b. Scratch marks around entrance holes (resulting from bat claw holds);
 - c. Bat droppings;
 - d. Feeding remains; and
 - e. Odours or noise characteristics of bats.
- 2.8.6 The survey will also utilise high-powered torches to search for bats and signs of bats. Where such signs are found, the location and distribution will be marked on a plan of the building.
- 2.8.7 If any droppings are found, a sample will be sent off for DNA analysis to determine the species present.
- 2.8.8 On the basis of the external survey and if undertaken, the internal survey, the overall potential of the building or structure to support roosting bats will be classified using a scale of none, negligible, low, moderate, or high. This assessment is based on both the intrinsic suitability of the feature to support roosting bats and other evidence giving an indication of the likelihood of use (e.g. presence of droppings, cobwebs, or exposure to elements). The grading system used to determine the potential of a feature to support roosting bats is provided within **Table 4** (Ref. 19).

Table 4: Grading system of potential suitability of a feature to support roosting bats

Potential suitability	Description of roosting habitats in structures
None	No habitat features on site likely to be used by any roosting bats at any time of the year.
Negligible	No obvious habitat features on site likely to be used by roosting bats; however, uncertainty remains as bats can use small and apparently unsuitable features on occasion.
Low	A structure with one or more potential features that could be used by individual bats opportunistically at any time of the year. However, these potential roosting features do not provide enough space, shelter, protection, appropriate conditions, and/or suitable surrounding habitat to be used on a regular basis or by large numbers of bats.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions, and surrounding habitat but unlikely to support a roost of high conservation status, such as maternity or hibernation roosts.

Potential suitability	Description of roosting habitats in structures
High	A structure with one or more potential roost features (PRFs) that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions, and surrounding habitat. These structures have the potential to support high conservation status roosts, such as maternity or hibernation roosts.

2.8.9 In addition to the BRS, a structure may also be “Confirmed” as a bat roost whereby bats or signs of their activity have been confirmed.

2.8.10 Where suitability for hibernation is identified, the structure will be classified in line with Figure 4.1 of the Good Practice Guidelines (Ref. 19).

Ground-level Tree Assessment (GLTA)

2.8.11 National Tree Map (NTM) data has been used to scope GLTA surveys in the absence of an Arboricultural Constraints Plan. The NTM data will be ground-truthed so that the tree roosting resource can be assessed across each Part. Targeted GLTA surveys will be completed in areas of permanent works and/or potentially significant temporary impacts. GLTAs can be performed at any time of year; however, winter months are preferred where there is better visibility of potential roost features. Surveys will occur on trees within and up to 20 m of the Preliminary Order Limits, depending on the nature of the impact in each location.

2.8.12 GLTAs will be undertaken by two competent ecologists. The trees will be classified for their potential to support roosting bats using a scale of NONE, FAR and PRF, in line with Table 4.2 of the Good Practice Guidelines (Ref. 19).

2.8.13 Where all PRFs are clearly visible and accessible from ground-level, the PRF will be categorised as PRF-I or PRF-M, with hibernation potential assumed in PRF-M features. The suitability of PRF-M could lead to further nocturnal or tree climbing surveys, depending on the proposed impact of the works.

2.8.14 Close focusing binoculars, endoscopes, and torches will be used to conduct an external assessment of trees. All potential bat access/egress points and features with potential roosting features (e.g. knotholes, loose bark and split limbs) will be noted on the FieldMaps app. The use of torch and endoscope will be conducted by a Level 2 licensed bat worker, or by an experienced ecologist with close supervision by someone under a Level 2 bat licence.

Aerial Tree-Climb Inspection

- 2.8.15 Trees within and up to 20 m of the Preliminary Order Limits, which are due for removal or at risk of significant disturbance and cannot be fully assessed from ground-level, will be climbed at least once, where safe access is possible, to determine their suitability to support roosting bats. Tree climbs can be conducted at any time of year, although winter is preferred due to better visibility of PRFs.
- 2.8.16 A tree-climb inspection will consist of a detailed inspection of PRFs using torches, mirrors, and endoscopes.
- 2.8.17 During the tree-climb, surveyors will collect details including:
- a. Whether bats or competitors such as birds are present;
 - b. If bats are present, the bat species, whether they are awake or torpid, and the location and number of bats;
 - c. Whether there are any field signs;
 - d. Measurements of the tree and PRF, including entrance width and height;
 - e. The substrate within the PRF;
 - f. The PRF apex shape; and
 - g. Whether the PRF is dry, damp or wet.
- 2.8.18 Based on this assessment the suitability of the features may be re-categorised up or down.
- 2.8.19 Climbable features which are classed as PRF-M and at risk of direct impacts, will be climbed at least three times, with at least two climbs occurring between May and August a minimum of three weeks apart. If the surveyors cannot fully inspect the tree or PRFs then emergence surveys will be carried out instead to confirm presence/probable absence.

Emergence Surveys

- 2.8.20 Emergence surveys will be carried out at targeted locations identified during the PRA, GLTA and/or Aerial Tree-Climb Inspections within and up to 20 m of the Preliminary Order Limits, between May and the end of September.
- 2.8.21 The presence/absence surveys will comprise of a series of dusk emergence surveys, as recommended in best practice guidance (Ref. 19). Surveyors will be positioned around the trees or structures in such a way that all suitable features to support roosting bat species are adequately covered; the surveys will commence 15 minutes before sunset and continue until 1.5 hours after sunset, extending to 2 hours after sunset if late-emerging species are suspected.
- 2.8.22 Structures which support low suitability (see **Table 4** for potential suitability descriptions) will require one survey between May and August. Structures

which support moderate suitability will require two separate survey visits between May to September with at least one of the surveys between May and August. For high suitability structures, three separate surveys visits are required between May to September with at least two surveys between May and August.

- 2.8.23 PRF-I on trees do not require any further survey. Impacted FAR, PRF and PRF-M trees that cannot be assessed from ground level or safely climbed will require three surveys, with at least two of the surveys between May and August.
- 2.8.24 During the visit, bat activity will be recorded in the form of digital recordings of bat calls, times and field data (flight direction, numbers and call type). Any recordings will subsequently be analysed to species level, wherever possible and excluding *Myotis sp.*, using specialist software.
- 2.8.25 If roosting bats are recorded during the surveys, a European Protected Species Mitigation Licence is likely to be required to permit works that would affect roosting bats.

Hibernation Surveys

- 2.8.26 No structures with classic hibernation suitability for bats will be impacted by the Proposed Development at this juncture.
- 2.8.27 Any impacted structures identified as offering non-classic hibernation potential for bats with accessible PRFs will be subject to at least two daytime endoscopic inspections in January and February to determine if hibernating bats are present. If a suitable internal space exists, automated static detectors will be deployed for two weeks in suitable weather conditions (overnight temperatures of 7°C or below).
- 2.8.28 Hibernation suitability will be assumed within the roosting resource for PRF-M trees.

2.9 Bat Activity

- 2.9.1 Activity surveys of Part 1a are scoped in due to the potential loss of high value bat foraging and commuting habitat within Minworth AWTP.
- 2.9.2 Surveys of Parts 1b and 4b are scoped in due to potential impacts to linear features from the proposed open cut pipelines.
- 2.9.3 Activity surveys are scoped out in Parts 2 and 3 as the canal will be retained as a linear feature throughout works, and no significant commuting or foraging habitat losses are predicted. Part 4a is scoped in due to the limited potential for permanent impacts, presence of connectivity along the River Ouse and GUC presence of woodland around the periphery of the site, although it is noted that the arable habitat within the majority of Part 4a is generally lower quality bat habitat.

- 2.9.4 Please note, while activity surveys to date have been completed in line with Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition [Ref. 20], the survey effort and assessment will be updated in 2026 to comply with the 4th edition guidelines (Ref. 19).

Nighttime Bat Walkovers

- 2.9.5 Nighttime bat walkovers will be conducted within the Preliminary Order Limits where permanent habitat loss is expected, or the temporary cumulative loss of habitat is sufficient that it could impair the survivability of local bat populations.
- 2.9.6 The surveys will be undertaken in Spring, Summer and Autumn for each transect route, with each survey visits at least three weeks apart to observe temporal changes, in accordance with good practice guidance (Ref. 19). The surveys will commence at dusk and continue for at least two hours, increasing to three if the automated static detectors are picking up species that are not showing up on the nighttime bat walkovers. The seasonal survey effort may be increased to monthly if the automated static detectors reveal bat activity of interest that requires more observation on site.
- 2.9.7 For each nighttime bat walkover, surveyors will position themselves near potential flight lines close to potential roost sources, such as groups of buildings or woodland. The location may vary between surveys, with each transect aiming for between 3-5 km, the length remaining consistent between survey visits, where possible. The surveyor will remain in that location until 30-60 minutes after sunset, depending on whether commuting bats are still being observed from potential roost sites, before proceeding to walk along a pre-determined route. All bat activity encountered while walking between points will be noted, and surveyors may detour from the route to observe bat behaviour of interest, such as potential hotspots of activity or roosting activity.
- 2.9.8 Surveyors will carry full spectrum bat echolocation detectors (Batlogger M) to determine which species were present. The time, location, numbers, species (where possible), direction and height of flight, and type of activity (direct, meandering, foraging) were recorded for each bat pass (a discrete burst of echolocation heard, or bat activity observed) during the survey. In addition, surveyors will note the appearance of bats for non-echolocating species, and how bats respond to permanent and temporary features on site, as well as changes in weather conditions.
- 2.9.9 Echolocation calls will be recorded and subsequently analysed with specialist software (BatExplorer) to verify bat calls. Survey visits will be conducted in where weather conditions allowed, with surveys scheduled to avoid nights with cold (<10°C), wet, or windy conditions.

Automated Static Bat Detectors

- 2.9.10 Detectors were deployed at two locations in Part 1a. Additional locations will be determined in line with proposed bat transects for the other Parts of the Proposed Development.
- 2.9.11 Static bat detectors will be placed at strategic and appropriate locations along each transect route. The static detectors will be zip-tied to suitable trees at around chest height in a manner that allows them to be reasonably concealed and not obviously visible. All microphones will be located at least one meter above the ground, with detectors set to default settings to record in full spectrum.
- 2.9.12 In locations assessed as having Low Suitability, static detectors will be set up to record bat calls from sunset to sunrise for the recommended minimum of five consecutive nights per season in spring, summer and autumn. In locations of Moderate to High Suitability, static detectors will be deployed for a minimum of five consecutive nights from April to October in suitable weather conditions. Following this, the statics will be collected and the results analysed, using specialist software.

Bat Crossing Point Surveys

- 2.9.13 Pre and post-construction monitoring will be conducted at hedgerow intersections impacting high value bat commuting habitat, should any be identified.
- 2.9.14 Surveys will be conducted at targeted locations, where required, along the route using methodology in accordance with the 2015 Defra research report WC10601 (Ref. 21). This will be determined using bat activity data, desk study data, and vegetation/tree removal data.
- 2.9.15 Further information will be provided following consultation with Natural England.

2.10 Hazel Dormouse

- 2.10.1 All Habitat Suitability Assessments and presence/absence surveys will be undertaken in accordance with the Hazel Dormouse Conservation Handbook (Ref. 22) and the Hazel Dormouse Mitigation Handbook (Ref. 23).
- 2.10.2 Dormouse surveys are scoped out of Part 1a and Part 4a due to the localised nature of the works, lack of recent records, and/or low risk of impact will dormouse be present. Targeted surveys will be conducted in Parts 1b, 2, 3 and 4b. Locations of the survey will be determined using desk study data, reintroduction sites, aerial mapping and vegetation/tree removal data.

Habitat Suitability Assessment

- 2.10.3 Habitat suitability assessments will be completed of woodland, scrub and hedgerow habitat impacted by the Proposed Development within targeted sections of the Proposed Development to identify areas for presence/absence surveys.

Presence/Absence Surveys

- 2.10.4 A combination of nut searches, nest tube surveys and/or footprint tunnels will be used to ascertain the presence/absence of hazel dormouse, with not all survey types used at each location.
- 2.10.5 Nut searches will ideally be conducted in late summer or early autumn, when the nuts are least likely to be obscured by fallen leaves. They will be conducted where mature hazel shrubs occur, and a minimum of 100 opened nuts checked for a round entrance hole with a smooth edge, which is characteristic of dormice. If there is no fruiting hazel present, searches will be conducted on linked, adjacent habitats.
- 2.10.6 Nest tube surveys can be conducted to ascertain presence/ probable absence. The tube will be securely attached and suspended horizontally below a branch. Tubes will be placed 15-20 m apart along a transect. The tubes will be placed along the edges of suitable habitat from mid-late April onwards during the active season. The tubes will be checked monthly for nests. This will involve placing a bung at the entrance of the tube and the inside taken out enough to see whether a nest is present. If a nest is present, the tube will be taken down and checked by a licensed ecologist. If dormice are present, they will be sexed and aged if necessary. Any active animals will be returned to the nest, and the tube reattached to the tree. If litters of dormice are discovered, they will be left undisturbed.
- 2.10.7 Footprint tunnels do not require a survey licence and will be deployed between May and October over a consecutive three-month period. Tunnels will be deployed two weeks prior to beginning surveys to allow the dormice to acclimatise to the tunnels. White card will be inserted into the tunnel; masking tape applied to the ends of the tunnel and a tracking medium painted onto the masking tape. The tunnels will be positioned in a similar way to nest tubes and be checked and re-inked at least every two weeks. Any footprints will be recorded and identified.

2.11 Otter

Otter Survey

- 2.11.1 Otter walkover surveys were undertaken in August and September 2025 in sections of Part 2 likely to be subject to impacts (the indicative working areas). These aim to identify areas where otters are active through identification of field signs such as:

- a. Spraints;
 - b. Footprints;
 - c. Feeding signs; and
 - d. Holts/couches.
- 2.11.2 In 2025-2026 additional aquatic otter surveys will be conducted for Parts 1a, 1b and Part 4.
- 2.11.3 Where access allows, terrestrial surveys will be conducted for Parts 1a, 1b and Part 4. These will include a detailed search of all suitable terrestrial habitat within the Part 2 indicative working areas and 250 m either side, in accordance with best practice guidelines (Ref. 24) by suitably experienced ecologists.
- 2.11.4 The surveys will not be undertaken following periods of heavy rain, as this can remove field signs and produce false negative survey results. If holts are found to be present, then up to two further visits will be required to assess and monitor these.

Environmental DNA

- 2.11.5 Three water samples were collected from Daventry reservoir, two from Drayton reservoirs (Part 3) and a control site in November 2023. The samples were sent for DNA analysis (NatureMetrics, February, 2024) to identify environmental DNA of mammal species present in the samples. Based on these results, otter are considered to be likely absent from Part 3, and subsequently no additional surveys have been undertaken.

Otter Holt Monitoring

- 2.11.6 Potential holt/couches that could be impacted by the Proposed Development will be monitored using infra-red camera traps to determine their use by otters, in accordance with guidance in Findlay et al., 2023 (Ref. 25). Where the use of camera traps may impact otters in their resting places, a licence to cause disturbance to otters may be required from Natural England.

2.12 Water Vole

- 2.12.1 Habitat suitability assessments for water vole have been completed within watercourses for the entirety of Part 2 of the Scheme and 250 m up and downstream. These surveys assessed features of the watercourse and riparian habitat, and classified the habitat as either unsuitable, sub-optimal, or optimal for water vole.
- 2.12.2 In areas of suitable (optimal or sub-optimal) habitat, presence / likely absence surveys for field signs of have been completed. Presence / likely absence surveys included a detailed search of all suitable habitat within the Part 2 Preliminary Order Limits. Water vole field signs typically include:

- a. Latrines and droppings;
 - b. footprints;
 - c. feeding signs; and
 - d. burrows.
- 2.12.3 Where water vole presence was identified, systematic recording of field signs including latrine counts were undertaken through two survey seasons; including one spring and one summer visit.
- 2.12.4 Surveys are ongoing throughout 2025-2026 covering connected watercourses up to 2 km from the Part 2 Preliminary Order Limits. Additional habitat suitability assessments and presence / likely absence surveys will be conducted on impacted watercourses, plus 250 m up and downstream, within Parts 1a, 1b and Part 4.
- 2.12.5 Surveys will be conducted by suitably experienced ecologists in accordance with the recommended best practice guidelines (Ref. 26, Ref. 27). As far as reasonably practicable, the surveys will not be undertaken following periods of heavy rain or during periods of high-water levels, as these can remove water vole field signs and produce false negative survey results.

Environmental DNA

- 2.12.6 Three water samples were collected from Daventry reservoir, two from Drayton reservoirs (Part 3) and a control site in November 2023. The samples were sent for DNA analysis (NatureMetrics, February 2024) to identify environmental DNA of mammal species present in the samples. Based on these results, water vole are considered to be likely absent from Part 3, and subsequently no additional surveys have been undertaken.

2.13 Terrestrial Invertebrates

- 2.13.1 Surveys will be conducted in affected and unavoidable locations within the Preliminary Order Limits where the UKHab (habitat survey) identifies habitat as being potential significant habitat for terrestrial invertebrates.
- 2.13.2 Bespoke methodology will be agreed with stakeholders where habitats have suitability to support protected or notable invertebrate species. The survey methodology would be dependent on the target species.

2.14 Other protected and notable species

- 2.14.1 Evidence and/or sightings of other protected and notable species will be recorded incidentally during field surveys for other receptors.

2.15 Invasive non-native plant and animal species

- 2.15.1 Evidence and/or sightings of Invasive non-native plant and animal species will be recorded incidentally during field surveys for other receptors.

3. References

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