Land off Firswood Road, Lathom, WN8 8UZ

ECOLOGICAL SURVEY AND ASSESSMENT

Updated December 2020

[ERAP (Consultant Ecologists) Ltd ref: 2019-396]

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Updated Phase 1 Habitat Survey	Victoria Burrows	13th May 2020
Second water vole survey	Chris Swindells B.Sc. (Hons)	15th May 2020
Great crested newt eDNA presence / absence survey	Amy Sharples B.Sc. (Hons) M.Sc. GradCIEEM and Victoria Burrows	13th May 2020
Breeding bird surveys	Chris Swindells	17th April 2020 15th May 2020 10th June 2020
Dusk emergence surveys for bat activity	Victoria Burrows and three assistants Amy Sharples and Lee Moat	17th August 2020 31st August 2020
Reporting	**Personnel**	**Date**
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Checked by	Catie Haworth B.Sc. (Hons) M.Sc.	6th April 2020
Revised and issued by	Victoria Burrows	6th April 2020
Update 1	Victoria Burrows	7th April 2020
Update 2	Victoria Burrows	21st October 2020
Checked by	Luke Atherton B.Sc. (Hons) M.Sc.	22nd October 2020
Update 3	Victoria Burrows	18th December 2020
Report issued to	Bellway Homes	
Version Number	2: Updated 21st October 2020 to include results of updated Phase 1 Habitat Survey, breeding bird surveys, second water vole survey, great crested newt eDNA presence / absence survey and bat emergence surveys carried out between April and August 2020	
	3: Updated 18th December 2020 to confirm to site boundary guidance provided by client.	

[1] Licence reference numbers

Bats
Victoria Burrows, Natural England Class Survey Licence (bats, Level 2) Registration Number 2015-10390-CLS-CLS

Great crested newt
Victoria Burrows Natural England Class Survey Licence (Level 1) Registration Number 2015-16651-CLS-CLS

Barn owl
Victoria Burrows Natural England Class Survey Licence Registration Number CL29/00061

Water vole
Victoria Burrows, Natural England WML-CL31 Class Licence Registration Number CL31/00023

SUMMARY

Introduction and Scope

i. This ecological survey and assessment presents the ecological, biodiversity and nature conservation status of the land off Firswood Road, Lathom. The survey was requested in connection with a planning application to develop the site to housing. The site has a residential development allocation under Policy RS1(a) of the West Lancashire 2012-2027 Local Plan Policies Map.

ii. This report presents the results of a desktop study and data search, extended Phase 1 Habitat Survey, including relevant surveys for protected species, and a licensed bat survey and assessment carried out between February and August 2020.

iii. The scope of survey undertaken is appropriate to identify potential ecological constraints, make recommendations in relation to a site layout, identify any further surveys necessary to progress a planning application submission and identify opportunities for biodiversity associated with the development proposals.

Results of Survey and Assessment

iv. The site is located to the west of Neverstitch Road and comprises parcels of land demarcated by Firswood Road to the west, Ormskirk Road to the south and Old Engine Lane to the north. The mosaic of habitats within the site and surveyed area comprises poor semi-improved grassland, marshy grassland, improved grassland, amenity grassland, tall-herb vegetation, scattered trees, dense continuous scrub, hedgerows, woodland, a pond, ditches and hard-standing and buildings.

v. The proposals will have no adverse direct or indirect effect on statutory or non-statutory designated sites for nature conservation.

vi. The line of the former railway running north-west to south-east across the centre of the site is designated on the Local Plan Policies Map as a wildlife corridor, as well as being part of the proposed Ormskirk – Skelmersdale Linear Park (Policy IF2.1(a)(ix) Linear Park). Retention and enhancement of the corridor is feasible and will be secured by the proposals.

vii. None of the habitats within the proposed development site are representative of semi-natural habitat. The National Vegetation Classification (NVC) communities present are typical of the geographical area. The site contains only common and widespread plant species.

viii. None of the hedgerows meet the criteria to be assessed as 'important' in accordance with *The Hedgerows Regulations 1997* criteria.

ix. Priority Habitats present in the site comprise hedgerows (Hedgerows 3, 5, 6 and 7). The woodland to the north of Old Engine Lane at Target Note (TN) 10 and Pond 1 (immediately outside the site boundary) are also Priority Habitat. Retention and protection of the identified Priority Habitats (or planting of compensatory native hedgerows where removal is unavoidable) is recommended and will be achieved by the proposals, refer to **Sections 5.2** and **5.7**.

x. Conservation of the wildlife corridor function of the whole of the disused railway corridor, and protection from harm (i.e. inappropriate lighting, severance of habitats, tree removal and pollution, refer to **Sections 5.2** and **5.3**) and enhancement (refer to **Section 5.8**) will be achieved by the proposals.

xi. All other habitats at the site namely semi-improved grassland, improved grassland, amenity grassland, tall-herb vegetation, scrub, hard-standing and bare ground are assessed to be of value at the site level only when considered in the context of the other habitats at the site and the surrounding area. Tree planting to compensate for the unavoidable loss of Pedunculate Oak trees at the south-eastern margin of the site (in TN3 will be achieved in the disused railway corridor.

xii. The presence of invasive plant species listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) namely Japanese Knotweed, Montbretia, Indian Balsam and Variegated Yellow Archangel within the site boundary is an essential consideration in connection with the development proposals. The proposals provide an opportunity to achieve the control and management of these species within the site to minimise further spread into the wild, refer to **Section 5.4**.

xiii. Protection of nesting birds and recommendations for the provision of compensatory and enhanced habitats and opportunities for nesting birds and roosting bats are feasible and can be accommodated (**Sections 5.3**, **5.5** to **5.6**).

xiv. Appropriate survey effort and / or assessment in accordance with standard guidance, has been carried out to reasonably discount adverse effects on other relevant protected species namely otter and reptile species.

Recommendations

xv. The recommendations in **Section 5.0** address all the mandatory measures and ecological recommendations to be applied to ensure compliance with wildlife legislation, the National Planning Policy Framework (NPPF) and best practice. The recommendations are summarised as:

a. Retention of site boundary hedgerows and trees, where feasible, and provision of compensatory landscape planting with the use of native species to maintain opportunities for nesting birds and habitat connectivity;

b. Preparation of a site layout that achieves the conservation, protection and enhancement of the disused railway corridor to achieve the Linear Park requirement under Policy IF2.1(a)(ix) of the West Lancashire Borough Council Local Plan 2012-2027. Secured long-term management of the Linear Park in accordance with conservation objectives by preparation and implementation of a Linear Park Management Plan;

c. Conservation and protection of the adjacent Priority Habitat comprising the woodland north of Old Engine Lane (TN10) and Pond 1;

d. Creation of a permeable site with stepping stones and passages for wildlife through and around the development;

e. Preparation and compliance with a Construction Environmental Management Plan (CEMP) for Biodiversity to include detailed actions for the protection of visiting badger, nesting birds, roosting bats, protection of water quality and an Amphibian Reasonable Avoidance Measures Method Statement (ARAMMS), refer to **Section 5.3**;

f. Preparation and implementation of an Invasive Species Management Plan, refer to **Section 5.4**;

g. Maximised use of native species and species known to be of value for wildlife in the landscape planting schedule; and

h. Specification and installation of opportunities for roosting bats and nesting birds within both the retained habitats and the built environment to be outlined on a plan, refer to **Section 5.5** and **5.6**.

Conclusion

xvi. Residential development at the site off Firswood Road, Lathom in accordance with relevant wildlife legislation, planning policy and best practice is feasible, provided the guidance in **Section 5.0** of this report is secured and implemented.

1.0 INTRODUCTION

1.1 Background and Rationale

1.1.1 ERAP (Consultant Ecologists) Ltd was commissioned by Bellway Homes to carry out an ecological survey and assessment of land at Firswood Road, Lathom (hereafter referred to as the 'site'). The Ordnance Survey (OS) grid reference at the centre of the site is SD 4623 0653.

1.1.2 The survey and assessment were requested in connection with a planning application to develop the site to housing.

1.2 Scope of Works

1.2.1 The scope of ecological works undertaken comprise:

a. A desktop study and data search for known ecological information at the site and the local area;
b. An Extended Phase 1 Habitat Survey and assessment;
c. Assessment of the ecological value of the habitats within the site with the use of the National Vegetation Classification (NVC) and the Ratcliffe criteria, as presented in *A Nature Conservation Review* (Ratcliffe, 1977);
d. Survey and assessment of all habitats for relevant statutory protected species[1] and other wildlife including badger (*Meles meles*), barn owl (*Tyto alba*), water vole (*Arvicola amphibius*) and otter (*Lura lutra*);
e. An assessment of the site and habitats suitability for use by great crested newt (*Triturus cristatus*), bird species, invertebrates and reptiles;
f. Great crested newt presence / absence surveys at Ponds 1 and 8;
g. Breeding bird surveys;
h. A licensed daylight bat survey and assessment of the buildings and trees followed by the relevant scope of bat emergence surveys;
i. The identification of any potential ecological constraints on the proposals and the specification of the scope of mitigation and ecological enhancement required in accordance with wildlife legislation, planning policy guidance and other relevant guidance; and
j. The identification of any further surveys or precautionary actions that may be required to inform a planning application and prior to the commencement of any development activities.

2.0 METHOD OF SURVEY

2.1 Desktop Study and Data Search

2.1.1 The following sources of information and ecological records were consulted:

a. MAGiC: A web-based interactive map which brings together geographic information on key environmental schemes and designations, including details of statutory nature conservation sites;
b. Lancashire Environmental Record Network (LERN);

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[1] In accordance with *Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and Their Impact on the Planning System* (Ministry of Housing, Communities & Local Government, 2005) developers should not be required to undertake surveys for protected species unless there is reasonable likelihood of the species being present and affected by the development.

c. Lancashire Biodiversity Action Plan (BAP);

d. Results of previous ecological surveys prepared for the land north of Old Engine Lane (ERAP (Consultant Ecologists) Ltd, November 2018) and (ERAP (Consultant Ecologists) Ltd, July 2019); and

e. The Arboricultural Impact Assessment (Ascerta, December 2019).

2.2 Extended Phase 1 Habitat Survey

Survey Dates and Conditions

2.2.1 The extended Phase 1 Habitat Surveys were carried out by Victoria Burrows B.Sc. (Hons) M.Sc. CEnv MCIEEM on the following dates:

Table 2.1: Survey Dates and Weather Conditions

Date	Weather
3rd February 2020	Dry, overcast with sunny intervals and a light air (Beaufort scale 1) 8°C at 8am rising to 11°C
16th March 2020	Dry and sunny with a light air (Beaufort scale 1) 10°C throughout
13th May 2020	Dry and overcast with a light air (Beaufort scale 1) 15°C throughout

Method

2.2.2 An extended Phase 1 Habitat Survey map was prepared for the site and the immediate surrounding area, refer to **Figure 3**. The mapping is based on the Joint Nature Conservation Committee Phase 1 Habitat Survey methodology (JNCC, 2010) with minor adjustments to illustrate and examine the habitats with greater precision.

2.2.3 The plant species within the site boundary were determined with estimates of the distribution, ground cover, abundance and constancy of individual species. The estimation of abundance was based on the DAFOR system, where D = Dominant, A = Abundant, F = Frequent, O = Occasional and R = Rare, this being a widely used and accepted system employed by ecological surveyors. The terms L = Locally and V = Very were additionally used to describe the plant species distributions with greater precision.

2.2.4 Stands of vegetation and habitats were described and evaluated using the National Vegetation Classification (NVC). The NVC provides a systematic and comprehensive analysis of British vegetation and is a reliable framework for nature conservation and land-use planning.

2.2.5 Hedgerows were assessed in accordance with *The Hedgerows Regulations 1997* wildlife and landscape Criteria (H.M.S.O., 1997).

2.2.6 Searches were made for uncommon, rare and statutorily protected plant species, those species listed as protected in the *Wildlife and Countryside Act 1981* (as amended) and species which are indicators of important and uncommon plant communities. Plant nomenclature follows *New Flora of the British Isles 3rd Edition* (Stace, 2010).

2.2.7 Searches were carried out for the presence of invasive species, including those listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended), including Japanese Knotweed (*Fallopia japonica*), Indian Balsam (*Impatiens glandulifera*) and Giant Hogweed (*Heracleum mantegazzianum*).

2.3 Animal Life

Badger

2.3.1 The survey area for badger covered the site (as annotated on **Figure 3**) and extended to accessible land within a radius of 50 metres from the site boundary. Private gardens / land were excluded from the survey.

2.3.2 The survey was conducted in accordance with guidance presented within *Badgers and Development* (Natural England, 2007) and *Badgers: surveys and mitigation for development projects* (Natural England, 2015).

2.3.3 The following signs of badger activity were searched for:

a. Sett entrances, e.g. entrances that are normally 25 to 35cm in diameter and shaped like a 'D' on its side;
b. Large spoil heaps outside sett entrances;
c. Bedding outside sett entrances;
d. Badger footprints;
e. Badger paths;
f. Latrines;
g. Badger hairs on fences or bushes;
h. Scratching posts; and
i. Signs of digging for food.

2.3.4 Habitats within and surrounding the site were assessed in terms of their suitability for use by foraging and sheltering badger in accordance with their known habitat preferences as detailed in current guidance and *Badger* (Roper, 2010).

Bat Species

Habitat Assessment for Commuting / Foraging Bats

2.3.5 Habitats within and adjacent to the site were assessed for their value and suitability for commuting and foraging bats in accordance with Table 4.1 of *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn),* (Collins, J. (ed), 2016). Reference has been made to the categories and descriptions / examples, presented below.

Table 2.2: Consideration of Suitability of Foraging and Commuting Habitat for Bats

Suitability	Commuting Habitat	Foraging Habitat
Negligible	Negligible habitat features on site likely to be used by commuting bats.	Negligible habitat features on site likely to be used by foraging bats.
Low	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated i.e. not very well connected to the surrounding landscape by other habitat.	Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree or patch of scrub.
Moderate	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens.	Habitat that is linked to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	Continuous, high-quality habitat that is well connected to the wider landscape and is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. Habitats close to and connected to known roosts.	High-quality habitat that is well-connected to the wider landscape and is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Habitats close to and connected to known roosts.

Daylight Survey

Survey Personnel and Relevant Guidelines

2.3.6 The daylight licensed bat survey and assessment of the buildings and trees was carried out by Victoria Burrows (Natural England Level 2 licence number is 2015-10390-CLS-CLS). The surveyor's qualifications and experience meet the criteria as defined in the *Technical Guidance Series Competencies for Species Survey: Bats* (CIEEM, 2013).

2.3.7 The survey and assessment were carried out in accordance with standard methodology including the *Bat Mitigation Guidelines* (Mitchell-Jones, 2004), the *Bat Workers' Manual 3rd Edition* (Mitchell-Jones & Mcleish, 2004) and *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016).

Buildings

2.3.8 An inspection of the external surfaces, walls and roofs of the buildings was carried out to find potential bat roosting habitat or accesses into internal areas where roosts may be present. Searches for evidence of bat presence in the form of droppings, urine stains, feeding signs, grease marks and other evidence were also carried out.

2.3.9 The internal survey involved an examination of the accessible internal areas to find roosting bats or evidence of previous use of the buildings by bats such as droppings and prey remains.

2.3.10 A list of equipment used is detailed below:

Table 2.3: Survey Equipment Used / Available for Use During Daylight Bat Survey

Ladders
LED Lenser P14 torch
Canon Ixus digital camera
8x20 binoculars
Ridgid Micro Inspection Camera Borescope CA-300

2.3.11 The suitability of each building has been assessed in accordance with Table 4.1 of *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn),* (Collins, J. (ed), 2016), taking into account any presence of gaps suitable for access by bats, features suitable for use by roosting bats within the building (including crevice dwelling species and species which can roost in the open in roof voids), and the suitability of the surrounding habitats for use by foraging and commuting bats.

Trees

2.3.12 Trees were assessed from the ground using binoculars and a high-powered torch. Each tree was searched for the presence of the following features:

Woodpecker holes, rot holes, hazard beams, other vertical or horizontal cracks or splits in stems and branches, partially decayed platey bark, knot holes, man-made holes, tear-outs, cankers in which cavities have developed, other hollows or cavities, including butt-rots, double-leaders forming compression forks with included bark, gaps between overlapping stems or branches, partially detached Ivy (Hedera helix) with stem diameters in excess of 50mm and bat, bird or dormouse (Muscardinus avellanarius) boxes.

2.3.13 Terms used to describe any features present follow (where possible) those outlined and described in *Bat Tree Habitat Key, 2nd Edition* (Andrews, H (ed), 2013) and *Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-care and Ecology Professionals* (BTHK, 2018).

2.3.14 The requirement for further presence / absence surveys at each tree was then considered.

Presence / Absence Surveys: Dusk Emergence Surveys

2.3.15 As informed by the daylight survey and assessment, two dusk emergence surveys were carried out at Building B3 and one survey at B1 in August 2020.

2.3.16 Between 2 and 4 surveyors, experienced in conducting bat surveys, were positioned at suitable locations to maximise the coverage of the buildings to determine any exit from the buildings by roosting bats. Heterodyne detectors were used to determine any bat detected to species or group (*Myotis* species often cannot be reliably separated to species via their echolocation calls, for example). Recording bat detector units[2] were used to record and analyse echolocation calls after the survey using AnalookW call analysis software.

2.3.17 The dusk emergence surveys commenced at least 15 minutes before sunset, and continued until at least 1.5 hours after sunset. It is acknowledged that the survey guidelines recommend that at least one survey at a building with moderate suitability (Building B3) should be a dawn re-entry survey. Owing to the health and safety considerations and access to B3, the cool air temperatures at dawn experienced / forecast when the weather conditions were suitable for a survey in late August 2020 and the small size and simplicity of the building it was considered that the completion of the second survey as a dusk emergence survey was appropriate.

2.3.18 Surveyor positions are annotated on **Figure 4**. Any bat emergence or re-entry activity was recorded. All surveys were conducted under suitable conditions. The dates of the surveys, surveyors and equipment used and weather conditions present are presented below.

Table 2.4: Dusk Emergence Survey Dates, Weather Conditions and Surveyors

Date	**17th August 2020**	**31st August 2020**
Buildings surveyed	Buildings B1 and B3	B3
Sunset	20:32	20:02
Start time	20:15	19:45
End time	22:10	21:45
Wind	Beaufort scale 0 (calm)	Beaufort scale 0 (calm)
Precipitation	Dry overcast	Dry
Air temperature(s)	17°C	11°C
Survey Position	**Surveyor and Detector**	**Surveyor and Detector**
1	Sue Lonsdale Batbox Duet and Anabat Express	-
2	Danielle Rowlands Batbox III and Anabat Express	-
3	Victoria Burrows Batbox Duet and Anabat SD2	Amy Sharples Batbox III and Anabat Express
4	Amy Sharples Batbox III and Anabat Express	Lee Moat Batbox III and Anabat Express

Water Vole and Otter

2.3.19 The survey for evidence and field signs of water vole and otter and the assessment of habitat suitability covered the following search area (ditch locations identified on **Figure 3**):

a. The banks of Pond 1;

b. Ditch 1 located near the eastern site boundary (length of 60 metres); and

c. The ditches (identified as Ditches 2 and 3 in the November 2018 ecological report (ERAP (Consultant Ecologists) Ltd, November 2018)) that extend from the northern boundary northwards to where the channel enters a culvert at Statham Road; a total length of approximately 440 metres.

[2] i.e. Anabat SD2 and Anabat Express

2.3.20 There are no other drains or watercourses connected to the site.

2.3.21 Surveys were carried out on 16th March 2020 and the 15th May 2020. The weather conditions on these dates are presented at **Tables 2.1** and **Table 2.5** respectively.

Water Vole

2.3.22 The survey methodology detailed in *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series) Eds. Fiona Mathews and Paul Chanin* (Dean, et al., 2016), was applied and the ditches and pond and associated banks were searched for burrows, latrines, feeding remains, runs, feeding lawns, nests and footprints.

Otter

2.3.23 The survey area was also searched for dung (spraints), tracks (footprints), feeding remains, otter slides (into water), holts (underground dens) and couches (above ground sites where otters rest during the day).

2.3.24 An assessment of the suitability of each habitat feature was undertaken to assess their suitability for use by otter (*Lutra lutra*) in accordance with the habitat requirements and preferences detailed in *Ecology of the European Otter. Conserving Natura 2000 Rivers, Ecology Series 10* (Chanin, 2003) and searches were made for signs of otter in accordance with *Monitoring the Otter Lutra lutra. Conserving Natura 2000 Rivers Monitoring Series No 10* (Chanin, 2003) and current Natural England guidance (Natural England, 2014).

Bird Species

General Surveys

2.3.25 All visible and audible birds were recorded during the site visits. The recording followed the standard recording methodology and codes of the *British Trust for Ornithology (BTO) Common Birds Census* (Marchant, 1983).

2.3.26 Habitats throughout the site and in the immediate surrounding area were assessed for their value to roosting, feeding and nesting birds, as indicated by the amount of shelter, feeding value, woody vegetation structure and species diversity of tree and shrub species in the site.

Barn Owl

2.3.27 Where internal access was possible, the buildings were searched for barn owl, pellets, faecal splashes and feathers which may indicate use by roosting or nesting barn owl in accordance with *The Barn Owl Conservation Handbook* (Barn Owl Trust, 2012) and *Barn Owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment. Developing Best Practice in Survey and Reporting* (Shawyer, 2011).

Breeding Bird Surveys

2.3.28 Breeding bird surveys were carried out by Chris Swindells on the following dates:

Table 2.5: Breeding Bird Survey Dates

Date	Time	Weather Conditions
17th April 2020	06:00 to 11:00	Sunny with scattered cloud. 14°C throughout with a 2-3 mph easterly wind
15th May 2020	06:00 to 11:00	Cloudy with sunny intervals. 13°C with a 1-2 mph north-westerly wind
10th June 2020	06:00 to 11:00	Overcast with occasional light rain showers. 15°C with 1 to 2 mph southerly wind

2.3.29 All visible and audible birds were recorded during the site survey following the standard recording methodology and codes of the *British Trust for Ornithology (BTO) Common Birds Census* (Marchant, 1983).

Great Crested Newt

Desktop Search for Ponds

2.3.30 In accordance with current Natural England guidance (Natural England, 2015) all ponds within an unobstructed 500 metres of a site should be considered for their suitability to support breeding great crested newts. The potential of the proposed development to impact upon any great crested newt population(s) whose breeding ponds are within 500 metres must be considered.

2.3.31 The search of habitats in the wider area up to a distance of 500 metres from the site boundary revealed the presence of eight possible ponds, as detailed below.

Table 2.6: Ponds within a Radius of 500 metres of the Site

Pond Reference	OS Grid Reference	Distance from Site Boundary	Location (refer to Figure 2)
1	SD 4643 0670	20 metres to the north	Former settlement lagoon
2	SD 4606 0703	206 metres to north-west	Fishing pond on the opposite (western) side of Firswood Road
3	SD 4605 0706	224 metres to north west	Fishing pond on the opposite (western) side of Firswood Road
4	SD 4617 0722	230 metres to north	Pond shown on maps but no longer present
5	SD 4654 0720	390 metres to north	Surface water attenuation pond created during construction of distribution units c. 2003
6	SD 4655 0733	537 metres to north	Surface water attenuation pond created during construction of distribution units c. 2003
7	SD 4662 0720	457 metres to north	Surface water attenuation pond created during construction of distribution units c. 2003
8	SD 4640 0667	10 metres to the north	Garden pond at Sandwash House Farm
Note: Pond numbers have been kept the same as reported in an *Ecological Survey and Assessment* report prepared for the approved development to the north of Old Engine Lane (ERAP (Consultant Ecologists) Ltd, November 2018)			

Habitat Suitability Index Assessment

2.3.32 All ponds were assessed using the Habitat Suitability Index (HSI) (Oldham, et al., 2000) by Victoria Burrows. The ponds were examined with reference to the ten HSI scoring criteria, which are: **SI_1**: Geographical location; **SI_2**: Pond area; **SI_3**: Pond drying; **SI_4**: Water quality (as indicated by the diversity of aquatic plants and invertebrates); **SI_5**: Shade; **SI_6**: Waterfowl; **SI_7**: Fish; **SI_8**: Abundance of other ponds within a one kilometre radius; **SI_9**: Quality of terrestrial habitat; and **SI_{10}**: Macrophyte cover (i.e. aquatic and emergent plants). The survey was conducted in accordance with *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom* (ARG UK, 2010).

2.3.33 The assessment followed guidance in relation to interpreting HSI scores, following the categorical scale shown below.

Table 2.7: Pond Habitat Suitability Index Categories

HSI Score	Pond Suitability for Great Crested Newt
<0.5	Poor
0.5 – 0.59	Below average
0.6 – 0.69	Average
0.7 – 0.79	Good
>0.8	Excellent

Consideration of Requirement for Further Survey

2.3.34 The requirement for further survey at each pond was then assessed using the following criteria:

a. Results of desktop study and data search;

b. Presence of dispersal barriers to great crested newt movements between ponds and the site, as detected during the walkover survey;

c. Distance of ponds from the site, and the potential influence of the proposed development of the site on any populations of great crested newt (if present at ponds), using the Natural England rapid risk assessment tool; and

d. Presence of other ponds which may form metapopulations and/or alter the influence of the site on ponds at greater distances.

Great Crested Newt eDNA Presence / Absence Survey

2.3.35 Environmental DNA (eDNA) analysis can detect the presence or absence of great crested newt from pond water samples. As outlined in **Section 3.3**, pond water samples were collected at the Ponds 1 and 8 on 13th May 2020 by Victoria Burrows and Amy Sharples under the licence of Victoria Burrows (Victoria Burrows Natural England Class Survey Licence (Level 1) Registration Number 2015-16651-CLS-CLS)

2.3.36 The surveys were carried out in accordance with the sampling protocol presented in *Appendix 5: Technical Advice Note for field and laboratory sampling of Great Crested Newt (Triturus cristatus) environmental DNA* (DEFRA, 2014) that accompanies Defra's research project and are outlined below:

a. Twenty x 30 millilitre samples were taken from around the entire perimeter of each pond. Areas most likely to be used by great crested newt were targeted, without entering the water (where possible);

b. Prior to taking the sample the water column was gently mixed at each sampling location. Care was taken to avoid disturbing the sediment on the base of the pond;

c. Once all 20 samples were taken 15 millilitres of the total sample were pipetted into each of the six sampling tubes containing ethanol, ensuring the water in the sample bag was mixed prior to and whilst taking each of the 15 millilitre samples; and

d. The six sampling tubes were shaken to mix the sample and preservative.

2.3.37 At all times the surveyor ensured the sampling equipment avoided risk of contamination by not placing the ladle or pipet on the ground or otherwise contaminated surfaces and by changing gloves between the initial sampling and the pipetting stages of the method.

2.3.38 The equipment was purchased from SureScreen Scientifics and the collected samples were returned to them for qPCR laboratory analysis.

Assessment of Terrestrial Habitat

2.3.39 An assessment of the terrestrial habitat within the site for great crested newts was conducted, as informed by the *Great Crested Newt Mitigation Guidelines* (English Nature, 2001) and the *Great Crested Newt Conservation Handbook* (Langton, et al., 2001).

2.3.40 Habitats present within the site were assessed for their value to support foraging, sheltering and hibernating great crested newt. Favourable habitats can comprise rough grassland, scrubland, woodland and sites with underground crevices or cracks, such as mammal holes, voids in tree stumps or banks, and refugia such as rock piles or dead wood.

Reptile Species

2.3.41 The site and its surroundings were assessed in terms of their suitability for use by reptile species using the important characteristics for reptiles outlined in the draft document '*Reptile Mitigation Guidelines*' (Natural England, 2011), and the *Reptile Habitat Management Handbook* (Edgar, et al., 2010). These habitat characteristics are outlined below.

Table 2.8: Important Habitat Characteristics for Reptiles

1. Location (in relation to species range)	7. Connectivity to nearby good quality habitat
2. Vegetation Structure	8. Prey abundance
3. Insolation	9. Refuge opportunity
4. Aspect	10. Hibernation habitat potential
5. Topography	11. Disturbance regime
6. Surface geology	12. Egg-laying site potential

2.4 Survey and Reporting Limitations

2.4.1 On the 3rd February 2020 owing to waterlogged ground conditions it was not possible to access the entirety of the land between Ormskirk Road and Old Engine Lane at the eastern tip of the site. This area was re-visited on 16th March 2020 and, although still waterlogged, the area could be examined in more detail. The survey was supplemented on the 13th May 2020 in the absence of access restrictions.

2.4.2 The interior of Building B3 was not accessible which has limited the search and assessment in relation to roosting bats and nesting barn owl. The scope of dusk emergence survey carried out in August 2020 aims to address this limitation.

2.4.3 Indian Balsam, an invasive plant species, is present at the site. The surveys in February and March 2020 detected the old dry stems and the new seedlings of this species, however, the Phase 1 Habitat Survey at **Figure 3** may not illustrate the full extent of cover of this species.

2.4.4 Owing to the steeply sloping and vegetated banks of Pond 1 only 25% of the pond perimeter was accessible to collect water samples during the great crested newt eDNA survey.

2.4.5 All measurements within this report are approximate only, and have been either estimated whilst on site or calculated using mapping software (QGIS) or internet-based mapping services such as MAGiC and Google Earth.

2.5 Evaluation Methods

2.5.1 The habitats, vegetation and animal life were evaluated with reference to standard nature conservation criteria as described in *A Nature Conservation Review* (Ratcliffe, 1977). These are size (extent), diversity, naturalness, rarity, fragility, typicality, recorded history, position in an ecological or geographical unit, potential value and intrinsic appeal.

2.5.2 Habitats have been assessed to determine whether they meet those described in *UK Biodiversity Action Plan: Priority Habitat Descriptions* (Maddock, A (ed), 2008); these lists are used to help draw up the statutory lists of Priority Habitats, as required under Section 41 of the *Natural Environment and Rural Communities* (NERC) *Act 2006*. Where suitable, the ecological value of the habitats present has been assessed using the terms outlined in *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018).

2.5.3 Government advice on wildlife, as set out in the *National Planning Policy Framework* (Ministry of Housing, Communities and Local Government, 2019) and associated government circulars has been taken into consideration. Legislation relating to protected species, such as those listed under Schedules 1, 5, 6 and 8 of the *Wildlife and Countryside Act 1981* (as amended) and *The Conservation of Habitats and Species Regulations 2017*, is referenced where applicable, and any impacts to protected species are evaluated in accordance with current guidance.

2.5.4 The presence of any Priority Species, as listed under Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006* is noted, and habitats are assessed in terms of their suitability and value for these species. The presence of species listed by the Lancashire BAP Provisional Long List has been taken into account in the evaluation of the site.

3.0 SURVEY RESULTS

3.1 Desktop Study

Statutory Designated Sites for Nature Conservation and SSSI Impact Risk Zones

3.1.1 The site and adjacent land have no statutory designation for nature conservation.

3.1.2 The site lies within a Site of Special Scientific Interest (SSSI) Impact Risk Zone for Ravenhead Brickworks SSSI (located 4.7 kilometres to the south-east) and Martin Mere Special Protection Area (SPA), Ramsar site and SSSI located 7.9 kilometres to the north-west). The SSSI Impact Risk Zone requires the Local Planning Authority to consult with Natural England on likely risks from the following development categories (Ordnance Survey, 2020):

Infrastructure: Airports, helipads and other aviation proposals.

Wind & Solar Energy: Solar schemes with footprint greater than 0.5ha, all wind turbines

Air Pollution: Livestock and poultry units with floorspace greater than 500m², slurry lagoons greater than 4000m².

Combustion: General combustion processes greater than 50MW energy input. Including: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis / gasification, anaerobic digestion, sewage treatment works, other incineration / combustion.

Waste: Landfill including: inert landfill, non-hazardous landfill, hazardous landfill.

3.1.3 The residential development proposals at the site do not fall within any of these categories.

Non-statutory Designated Sites for Nature Conservation

3.1.4 The site and adjacent land have no non-statutory designations for nature conservation.

3.1.5 The site lies within 2 kilometres of four Biological Heritage Sites (BHS) as summarised below and shown on **Figure 1**.

Table 3.1: Summary of Non-Statutory Biological Heritage Sites within 2 kilometres of the Site

Biological Heritage Site	OS Grid Reference	Distance and Direction from Site	Brief Description
Stanley's Firs BHS	SD 459 073	310 metres to the north-west	Lowland raised mire which supports flora species including Purple Moor-grass (*Molinia cerulea*), Birch (*Betula pendula*), Rowan (*Sorbus aucuparia*), Bracken (*Pteridium aquilinum*), Bramble (*Rubus fruticosus* agg.), Common Cottongrass (*Eriophorum angustifolium*) and Heather (*Calluna vulgaris*).
Dicket's Brook Wood BHS	SD 450 071	910 metres to the west	Narrow strip of woodland, including ancient semi-natural woodland, and unimproved grassland along Dicket's Brook and a tributary. The site supports lowland mixed deciduous woodland which is a UK BAP Priority Habitat.
Tawd Valley Park BHS	SD 481 069	1.4 kilometres to the east	Extensive area of woodland running alongside the River Tawd. The woodland is ancient semi-natural in character and boasts a diversity of flora species including Bluebell (*Hyacinthoides non-scripta*), Yellow Pimpernel (*Lysimachia nemorum*), Wood-sorrel (*Oxalis acetosella*), Dog's Mercury (*Mercurialis perennis*) and Wood Millet (*Milium effusum*). Grassland, streams and ponds are present within the park adding to the diversity of the site.
Tawd Valley Woods BHS	SD 471 085	1.5 kilometres to the north	Extensive area of broadleaved woodland, including areas of old plantation and, along the banks of the river, ancient semi-natural woodland. The BHS supports Royal Fern (*Osmunda regalis*), a species listed in the *Provisional Lancashire Red Data List of Vascular Plants.* Ponds are scattered throughout the woods which adds diversity to the BHS.

Site Allocations

3.1.6 The site forms part of the main Firswood Road site which has been allocated for housing development. The whole Firswood Road site comprises a total of 22 hectares (ha) of formerly safeguarded land which has been released for residential development through the *West Lancashire Local Plan 2012-2027* under Policy RS1(a) of the West Lancashire 2012-2027 Local Plan Policies Map.

3.1.7 The line of the former railway running north-west to south-east across the centre of the site is designated on the Local Plan Policies Map as a wildlife corridor, as well as being part of the proposed Ormskirk – Skelmersdale Linear Park (Policy IF2.1(a)(ix) Linear Park).

Priority Habitat Inventory

3.1.8 No areas of the site are identified as Priority Habitat on MAGiC map with the exception of the wooded area to the north of Old Engine Lane (near Pond 1) which is identified as Deciduous Woodland Priority Habitat.

Protected and Notable Species

3.1.9 LERN reported one record of protected and notable species within the site; a Bullfinch (*Pyrrhula pyrhulla*) at the northern boundary.

3.1.10 Records of protected and notable species for a 2 kilometre radius of the site are summarised below.

Table 3.2: Records of Protected Species Within a 2 Kilometre Radius of the Site

Taxon Group	Species Name and Designations[1] and Notes
Terrestrial mammal	Bats (*Chiroptera*): EPS, WCAs5 & LBAP. 3 records, dated between 2001 and 2012, the closest of which is 1050m from the site.
	Brown long-eared bat (*Plecotus auritus*): EPS, WCAs5, PS & LBAP. 1 record, dated 1989, 1350m from the site.
	Pipistrelle bat species (*Pipistrellus*): EPS, WCAs5 & LBAP. 1 record, dated 2015, 170m from the site.
	Unidentified bat (*Myotis*): EPS, WCAs5 & LBAP. 1 record, dated 2012, 1610m from the site.
	Pipistrelle (*Pipistrellus pipistrellus*): EPS, WCAs5 & LBAP. 19 records, dated between 2001 and 2016, the closest of which is 250m from the site.
	Eurasian red squirrel (*Sciurus vulgaris*): WCAs5, PS & LBAP. 7 records, dated between 1995 and 1997, the closest of which is 70m from the site.
	European water vole (*Arvicola amphibius*): WCAs5 & LBAP. 4 records, dated between 2001 and 2001, the closest of which is 1310m from the site.
	Brown hare (*Lepus europaeus*): PS & LBAP. 12 records, dated between 1980 and 2019, the closest of which is 590m from the site.
	European hedgehog (*Erinaceus europaeus*): PS & LBAP. 6 records, dated between 1973 and 2010, the closest of which is 1120m from the site.
Bird	Barn owl (*Tyto alba*): WCAs1. 2 records, dated between 1998 and 1999, the closest of which is 660m from the site.
	Kingfisher (*Alcedo atthis*): WCAs1. 2 records, dated between 2016 and 2019, the closest of which is 1350m from the site.
	PS and LBAP Cuckoo (*Cuculus canorus*), curlew (*Numenius arquata*), grasshopper warbler (*Locustella naevia*), grey partridge (*Perdix perdix*), house sparrow (*Passer domesticus*), lapwing (*Vanellus vanellus*), reed bunting (*Emberiza schoeniclus*), tree sparrow (*Passer montanus*), yellowhammer (*Emberiza citrinella*), bullfinch (*Pyrrhula pyrrhula*), corn bunting (*Emberiza calandra*), dunnock (*Prunella modularis*), herring gull (*Larus argentatus*), skylark (*Alauda arvensis*), song thrush (*Turdus philomelos*), starling (*Sturnus vulgaris*) and yellow wagtail (*Motacilla flava*)
	PS only Lesser redpoll (*Acanthis cabaret*)
	LBAP only Kestrel (*Falco tinnunculus*), lesser black-backed gull (*Larus fuscus*), long-eared owl (*Asio otus*), meadow pipit (*Anthus pratensis*), oystercatcher (*Haematopus ostralegus*), pink-footed goose (*Anser brachyrhynchus*), swift (*Apus apus*), willow tit (*Poecile montana*) and willow warbler (*Phylloscopus trochilus*)
Amphibian	Common toad (*Bufo bufo*): PS & LBAP. 2 records, dated between 2016 and 2019, the closest of which is 560m from the site.
	Common frog (*Rana temporaria*): LBAP. 8 records, dated between 2009 and 2016, the closest of which is 540m from the site.
	Palmate newt (*Lissotriton helveticus*): WCAs5 (sale only). 1 record, dated 1988, 1220m from the site.
Bony fish	European eel (*Anguilla anguilla*): PS & LBAP. 1 record, dated 2004, 1720m from the site.
Flowering plant	**WCAs8** Bluebell (*Hyacinthoides non-scripta*)
	PS and LBAP Purple Ramping-fumitory (*Fumaria purpurea*)
	PS only Cornflower (*Centaurea cyanus*)
	LBAP only Bog-myrtle (*Myrica gale*), Ivy-leaved Bellflower (*Wahlenbergia hederacea*), Small-fruited Prickly-sedge (*Carex muricata* subsp. *pairae*) and Yellow Bartsia (*Parentucellia viscosa*)
Insect (moth)	**PS and LBAP** Brown-spot pinion (*Agrochola litura*), double dart (*Graphiphora augur*) and garden tiger (*Arctia caja*)

Taxon Group	Species Name and Designations[1] and Notes
	PS only Autumnal rustic (*Eugnorisma glareosa*), beaded chestnut (*Agrochola lychnidis*), cinnabar (*Tyria jacobaeae*), dark-barred twin-spot carpet (*Xanthorhoe ferrugata*), dot moth (*Melanchra persicariae*), dusky brocade (*Apamea remissa*), garden dart (*Euxoa nigricans*), ghost moth (*Hepialus humuli*), green-brindled crescent (*Allophyes oxyacanthae*), knot grass (*Acronicta rumicis*), latticed heath (*Chiasmia clathrata*), mottled rustic (*Caradrina morpheus*), mouse moth (*Amphipyra tragopoginis*), powdered quaker (*Orthosia gracilis*), rosy rustic (*Hydraecia micacea*), rustic (*Hoplodrina blanda*), shaded broad-bar (*Scotopteryx chenopodiata*), small phoenix (*Ecliptopera silaceata*), small square-spot (*Diarsia rubi*), spinach (*Eulithis mellinata*) and white ermine (*Spilosoma lubricipeda*)
	LBAP only Dusky-lemon sallow (*Cirrhia gilvago*), dotted rustic (*Rhyacia simulans*) and lunar hornet moth (*Sesia bembeciformis*)
[1]**Key to Designation Codes:** EPS = European Protected Species under the *Conservation of Habitats and Species Regulations 2017*. WCAs1 = Species receives full protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). WCAs5 = Species receives full protection under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). WCAs8 = Species receives full protection under Schedule 8 of the *Wildlife and Countryside Act 1981* (as amended). PS = Priority Species listed under Section 41 of the NERC Act 2006. LBAP = Species listed on the Lancashire Biodiversity Action Plan Provisional Long List.	

3.1.11 The presence of these protected and notable species within the wider area has been taken into account throughout this report.

Review of Ecological Survey Reports Prepared for the Local Area

3.1.12 An extended Phase 1 Habitat Survey (ERAP (Consultant Ecologists) Ltd, November 2018) and a bat activity survey (ERAP (Consultant Ecologists) Ltd, July 2019) carried out on the off-site land north of Old Engine Lane in November 2017 and November 2018 to inform the, now approved (reference 2019/0069/OUT), planning application for residential development did not detect any significant ecological constraints.

3.1.13 It is confirmed that appropriate survey effort and assessment was applied to reasonably discount the presence of relevant protected species namely badger, roosting bats, water vole, otter, nesting barn owl, great crested newt and reptiles at the Old Engine Lane site. The ecological survey reports identify a series of recommendations and best practice measures for the protection of bats and their habitats and outlines the features to be accommodated at the site to provide opportunities for roosting bats and achieve a net gain for biodiversity.

3.1.14 The report identifies that the hedgerows and trees provide foraging and nesting habitat for passerine birds, including Priority Species. Mandatory measures to protect nesting birds during site clearance and actions to provide compensatory opportunities for nesting passerine birds are recommended.

3.2 Vegetation and Habitats

General Description

3.2.1 The approximately 14.48 hectare site is located to the west of Neverstitch Road and comprises parcels of land demarcated by Firswood Road to the west, Ormskirk Road to the south and Old Engine Lane to the north.

3.2.2 Habitats at the site comprise:

a. Poor semi-improved grassland;

b. Marshy grassland;

c. Improved grassland;

d. Amenity grassland;

e. Tall-herb vegetation;
f. Scattered trees;
g. Dense continuous scrub;
h. Hedgerows;
i. Woodland;
j. Open water / Ponds;
k. Ditch; and
l. Hard-standing and buildings.

3.2.3 A Phase 1 Habitat Survey map with Target Notes is appended at **Figure 3**. Photographs are appended at **Table 8.1**.

Neutral Poor Semi-improved and Marshy-grassland

Target Note (TN) 1

3.2.4 Refer to **Photo 1**. The field at **Target Note (TN) 1** supports managed poor semi-improved grassland characterised by constant and abundant False Oat-grass (*Arrhenatherum elatius*) with constant and frequent Yorkshire-fog (*Holcus lanatus*) and Creeping Buttercup (*Ranunculus repens*), frequent Perennial Rye-grass (*Lolium perenne*), Meadow Foxtail (*Alopecurus pratensis*) and Rough Meadow-grass (*Poa trivialis*). Herb species within the grassy sward comprise occasional Broad-leaved Dock (*Rumex obtusifolius*) and Creeping Thistle (*Cirsium arvense*) with very locally frequent Wavy Bittercress (*Cardamine flexuosa*) and Bog Stitchwort (*Stellaria alsine*).

3.2.5 The field margins support stands of dense Bramble (*Rubus fruticosus* agg.) with areas of Common Nettle (*Urtica dioica*) and Indian Balsam, particularly along the southern field margin.

3.2.6 At the western end (where the field meets Firswood Road) and at the eastern end the ground is poorly drained and marshy grassland characterised by locally very abundant Soft-rush (*Juncus effusus*) has colonised. Locally frequent stands of Reed Canary-grass (*Phalaris arundinacea*) are also present to indicate the waterlogged soil conditions.

3.2.7 The plant species composition of the poor semi-improved grassland is characteristic of an *MG7 Lolium perenne ley* in transition to an *MG1 Arrhenatherum elatius* grassland (Rodwell, 1992). The areas of marshy grassland have affinities with the *MG10 Holcus lanatus – Juncus effusus* rush pasture community (Rodwell, 1992). The grassland margins support the *W24 Rubus fruticosus-Holcus lanatus* scrub (Rodwell, 1991) and the *OV24 Urtica dioica – Galium perenne* tall-herb communities of the NVC (Rodwell, 2000).

3.2.8 A plant species list for TN1 Is appended at **Table 8.2.**

TN2

3.2.9 Refer to **Photos 2** and **3**. The unmanaged semi-improved neutral grassland with stands of tall-herb vegetation and dense Bracken (*Pteridium aquilinum*) to the rear of the properties off Ormskirk Road towards the south-eastern corner of the site is annotated as TN2.

3.2.10 The neutral grassland is characterised by locally abundant Soft-rush with frequent Yorkshire-fog and Rough Meadow-grass, locally frequent Red Fescue (*Festuca rubra*) and Creeping Buttercup. Broad-leaved Dock is frequent with occasional Common Sorrel (*Rumex acetosa*), Spear Thistle (*Cirsium vulgare*) and Common Hogweed (*Heracleum sphondylium*). The grassland has affinities with the *MG1a Arrhenatherum elatius, Festuca rubra* sub-community of the NVC (Rodwell, 1992).

3.2.11 Towards the north-western end of this area is a stand of tall-herb vegetation characterised by Rosebay Willowherb (*Chamerion angustifolium*) to form the *OV27 Chamerion angustifolium* community (Rodwell,

2000). As annotated on **Figure 3** a dense stand of dominant Bracken is present to form the *W25 Pteridium aquilinum – Rubus fruticosus* community (Rodwell, 1991). These communities are indicative of the sandy soil conditions in this area of the site.

3.2.12 Semi-mature Pedunculate Oak (*Quercus robur*) trees are present in the northern portion of the grassland and Bracken habitats.

3.2.13 A plant species list for TN2 is appended at **Table 8.3**.

TN3

3.2.14 Refer to **Photos 4** and **5**. The neutral grassland at **TN3** is within an overgrown and unmanaged area to the immediate south of the properties off Old Engine Lane. The grassland leads to the scattered trees and scrub further south to meet Neverstitch Road and the disused railway corridor (east).

3.2.15 Plant species in the grassland comprise locally frequent Rough Meadow-grass, Cock's-foot (*Dactylis glomerata*), Common Bent (*Agrostis capillaris*), False Oat-grass, and Red Fescue with very locally frequent Creeping Buttercup and occasional Ribwort Plantain (*Plantago lanceolata*), Common Hogweed and Common Ragwort (*Senecio jacobaea*) to form a species-poor *MG1 Arrhenatherum elatius* grassland community (Rodwell, 1992). Stands of dense Bramble are present throughout.

3.2.16 Locally abundant Reed Canary-grass is present in areas of waterlogged soil to form the *S28 Phalaris arundinacea* community of the NVC.

3.2.17 Further south the cover of willow scrub increases with locally frequent Silver Birch (*Betula pendula*) and Pedunculate Oak. The herb layer beneath the trees is sparse although Indian Balsam, Common Nettle, Bramble and Reed Canary-grass remain constant.

3.2.18 Japanese Knotweed dominates the majority of the southern area towards the former railway corridor (east).

3.2.19 A plant species list for **TN3** is appended at **Table 8.4**.

Improved Grassland

3.2.20 Refer to **Photo 7**. The small enclosed field at **TN4** comprises of a pony grazed field of improved grassland bordered by timber post and rail fences. The grassland is characterised by short grazed Perennial Rye-grass with White Clover (*Trifolium repens*); the majority of the area was bare earth at the time of the survey.

3.2.21 **TN5** is an area of improved grassland dominated by Perennial Rye-grass located between the track to the yard and the off-site gardens.

3.2.22 Both areas of improved grassland have affinities with the *MG7 Lolium perenne* ley community.

Amenity Grassland

3.2.23 Refer to **Photo 8**. North of the disused railway corridor and to the east of the yard is an area of close mown amenity grassland that extends south-eastwards along the disused railway corridor towards Neverstitch Road. The grassland is characterised by abundant Perennial Rye-grass and Creeping Buttercup with locally frequent Red Fescue and Common Bent and occasional Daisy (*Bellis perennis*), Common Mouse-ear (*Cerastium fontanum*) and Common Ragwort. The amenity grassland has affinities with the *MG7 Lolium perenne* ley community (Rodwell, 1992).

Tall-herb Vegetation

3.2.24 Stands of tall-herb vegetation characterised by Rosebay Willowherb (*OV27* community of the NVC), Great Willowherb (*Epilobium hirsutum*) (*OV26*) and Common Nettle with Cleavers (*Galium aparine*) (*OV24*) are present throughout the site (Rodwell, 2000).

Dense Continuous Scrub

3.2.25 In addition to the areas of Bramble scrub present at the field margins, areas of dense continuous scrub are present at **TN6** and **TN7**.

3.2.26 Refer to **Photo 9**. **TN6** is located to the south of the discussed railway corridor (east) and is characterised by an even aged canopy of semi-mature Goat Willow (*Salix caprea*) with occasional Elder (*Sambucus nigra*) and Grey Willow (*Salix cinereal*) shrubs. The shaded and sparse herb layer supports constant and frequent Common Nettle and Bramble.

3.2.27 **TN7** is located at the south-eastern tip of the site and comprises of a triangular area of dense Bramble bordered by frequent Silver Birch, Sycamore (*Acer pseudoplatanus*) and Goat Willow with locally frequent Lime (*Tilia* sp.) trees. The shrub layer supports locally frequent Grey Willow with rare Cherry Laurel (*Prunus laurocerasus*) and Elder. Yorkshire-fog and Creeping Buttercup are present in the herb layer.

Hedgerows

3.2.28 Hedgerows are present at the field boundaries. The hedgerows are described below and species lists are appended at **Table 8.5** and assessment under *The Hedgerows Regulations 1997* is appended at **Table 8.6** (numbering has been kept the same as the *Arboricultural Impact Assessment* (Ascerta, December 2019) report for consistency).

Hedgerow 3

3.2.29 Refer to **Photo 17**. Hedgerow 3 is located at the eastern boundary of the field of semi-improved grassland to the south of Old Engine Lane. The hedgerow supports constant and dominant Hawthorn (*Crataegus monogyna*) with frequent / locally abundant Bramble, Cleavers and Ivy (*Hedera helix*) in the herb layer. No woodland herbs as listed by *The Hedgerows Regulations 1997* were detected.

Hedgerow 4

3.2.30 Refer to **Photo 18**. Hedgerow 4 is a 3 metre high Beech (*Fagus sylvatica*) hedgerow that marks the perimeter of the residential property to the south of Old Engine Lane. The hedgerow has an herb layer of abundant Ivy with locally abundant Garlic Mustard (*Alliaria petiolata*), locally frequent Red Fescue and Cock's-foot and occasional Cow Parsley (*Anthriscus sylvestris*).

Hedgerow 5

3.2.31 Refer to **Photos 19** and **20**. For the purpose of description Hedgerow 5 has been split into Hedgerow 5a (east of the property on Old Engine Lane) and Hedgerow 5b (west of the property). The unmanaged hedgerows are characterised by abundant Hawthorn with locally frequent Holly (*Ilex aquifolium*) and Goat Willow. The herb layer supports constant and abundant / locally abundant Bramble and Ivy and constant and frequent Common Nettle.

Hedgerow 6

3.2.32 Refer to **Photo 21**. Hedgerow 6 is located along the southern side of the disused railway corridor (east and west). The hedgerow is characterised by abundant and constant Hawthorn and there is evidence that the hedgerow has previously been laid. Other woody species comprise locally frequent Ash (*Fraxinus excelsior*) with Sycamore and occasional Elder. The herb layer supports abundant Bramble with frequent Common Nettle and rare Cleavers.

Hedgerow 7

3.2.33 Hedgerow 7 extends along the eastern site boundary, parallel to Neverstitch Road. The unmanaged hedgerow is gappy (80% continuity) and is composed of abundant Hawthorn with frequent Blackthorn (*Prunus spinosa*) and Goat Willow. The herb layer is similar in composition to the bordering grass verge

and the tall-herb vegetation in the site with abundant Bramble, locally frequent Common Nettle, locally very abundant Japanese Knotweed and very locally abundant Rosebay Willowherb.

Assessment

3.2.34 None of the hedgerows within the site or on the site boundary meet the 'important' criteria, refer to **Table 8.6**. With the exception of the Beech hedgerow (Hedgerow 4) all hedgerows are characteristic of the *W21 Crataegus monogyna – Hedera helix* community of the NVC (Rodwell, 1991).

Disused Railway Corridor

3.2.35 For the purpose of description, the disused railway corridor has been split into the disused railway corridor (east) at section TN8 and the disused railway corridor (west) at TN9.

Disused Railway Corridor (east): TN8

3.2.36 Refer to **Photo 10**. The section of disused railway corridor to the east of the off-site residential property is managed as a garden with mown amenity grassland and scattered planted trees of Cherry (*Prunus* sp.), Pine (*Pinus* sp.), Cypress (*Cupressus* sp.), Pedunculate Oak, Lime, Beech and Silver Birch. Stands of Bluebell (*Hyacinthoides non-scripta*) are present.

Disused Railway Corridor (west): TN9

3.2.37 Refer to **Photos 11** and **12**. The disused railway corridor (west) section lies to the south of the yard and extends from the curtilage of the off-site property north-west towards the bridge at Firswood Road.

3.2.38 The bank on each side of the railway cutting corridor is lined with mature and semi-mature trees of abundant Pedunculate Oak, frequent Sycamore and locally frequent Ash with occasional Holly, Silver Birch, Hawthorn and Elder. Indian Balsam is locally dominant / constant and abundant in the herb layer with frequent Common Nettle and locally abundant Ivy and very locally frequent Red Campion (*Silene dioica*), Self-heal (*Prunella vulgaris*) and Garlic Mustard. A plant species list for this area is appended at **Table 8.7**.

Woodland: TN10

3.2.39 Refer to **Photos 13** and **14**. The established woodland to the north of Old Engine Lane and to the west of Pond 1 comprises an established canopy of mature and semi-mature Pedunculate Oak, Silver Birch, Poplar species and Ash. The shrub layer is open although Elder, Hawthorn and Portuguese Laurel (*Prunus lusitanica*) occur, particularly on the margins.

3.2.40 The herb layer supports Bramble and Common Nettle with Cleavers and Red Campion. Bluebells are present.

3.2.41 A plant species list is appended at **Table 8.8**. The woodland is species-poor and supports a high cover of non-native species. It is not therefore characteristic of a specific NVC community.

Pond

3.2.42 Pond 1 is assumed to be a former settlement lagoon or similar, refer to **Photo 46**. The pond has steep sided banks and is surrounded by mounds colonised by established deciduous woodland. No emergent or aquatic vegetation was found.

Ditch

3.2.43 Ditch 1 is located in the eastern area of the site, in the area at TN3. The ditch is approximately 1 metre wide and supported water to a depth of 0.25 metres on the survey dates. No aquatic or emergent vegetation was present; further information is presented in **Section 3.3**.

Hard-standing and Buildings

3.2.44 Refer to **Photo 15**. Approximately in the centre of the site is a yard of compacted ground with piles of topsoil, sand and other stockpiled materials.

3.2.45 The buildings are described in terms of their suitability for use by roosting bats in **Section 3.3**.

Invasive Plant Species

3.2.46 Four invasive non-native plant species listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) are present in the site, as annotated on **Figure 3** and summarised as:

a. A large established stand of Japanese Knotweed on the north side of former railway corridor (east) extending through the willow scrub and trees towards Hedgerow 7 at the eastern site boundary;

b. A small stand of Japanese Knotweed in the yard in the centre of the site;

c. Indian Balsam is frequent throughout the site particularly along the former railway corridor (east and west);

d. Montbretia plants are present in the herb layer at the western end of Hedgerow 5b;

e. Variegated Yellow-archangel is present just outside the site within the disused railway corridor on the opposite side of the Firswood Road bridge and within the woodland at TN10.

3.2.47 As these species are listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) it is an offence to spread or cause their spread in the wild. This is considered further at **Section 5.4** below.

3.3 Animal Life

Badger

3.3.1 Badger footprints were detected in the soft mud beneath the road bridge at Firswood Road on the disused railway corridor (west), refer to **Photo 22**.

3.3.2 No other evidence of badger was detected within the site or within land 50 metres from the site boundary. Recommendations in relation to the protection of badger and their corridors is provided at **Section 5.3**.

Bat Species

Habitat Assessment for Commuting and Foraging Bats

3.3.3 The unilluminated, established and vegetated corridor with mature trees at the disused railway provides optimum opportunities for foraging and commuting bats.

3.3.4 The mosaic of unmanaged grasslands, trees, hedgerows, open water, tall-herb vegetation and linear habitats within the site is likely to provide an abundance or diversity of invertebrate prey and is therefore considered to be of high suitability for use by foraging bat species typically present in the local area.

Daylight Survey: Buildings

3.3.5 Eleven buildings are present in the site, as described and assessed in **Table 8.9** appended.

3.3.6 No bats or evidence of previous use of the buildings by roosting bats were detected during the daylight inspections carried out in February and March 2020.

3.3.7 Building B3 is assessed to be of moderate suitability for use by roosting bats owing to the structure and condition of the building which supports gaps at the roof verge and the suitability of the surrounding habitats for foraging bats (also partly due to the absence of access to the interior).

3.3.8 B1 is assessed to be of low suitability for use by roosting bats.

3.3.9 The remaining nine buildings (B2, B4 to B11) are assessed to be of negligible suitability for use by roosting bats owing to the absence of potential roost features.

Daylight Survey: Bridge at Firswood Road

3.3.10 As described at **Table 8.9** the Firswood Road bridge over the disused railway corridor (west) does not support any potential roost features and is assessed to be of negligible suitability for use by roosting bats.

Daylight Assessment: Trees

3.3.11 No confirmed tree roosts were detected.

3.3.12 As outlined on **Table 8.10** appended, nine trees were identified to support potential roost features. Of these trees, closer inspection confirmed that one tree (G7.4) can be downgraded to negligible suitability.

3.3.13 Six trees are of low suitability owing to the presence of 1 or 2 potential roost features.

3.3.14 The two trees at G9.1 support dense Ivy, which may obscure further features suitable for use by roosting bats[3]. These trees are considered to be of 'low' suitability for use by roosting bats.

Dusk Emergence Survey at Buildings B1 and B3

3.3.15 No bat emergence activity was detected at buildings B1 and B3 in August 2020. No bat droppings were found around the perimeter of the buildings (or inside B1).

3.3.16 Refer to **Table 8.14** and **8.15**. Passes of common pipistrelle were recorded at building B1 and B3, including the observation of bats foraging inside the open-sided northern end of B1.

3.3.17 Soprano pipistrelle was additionally recorded at the northern end of B1 and two noctule passes were recorded near the southern end of B1 on the 17th August 2020 survey date.

Water Vole and Otter

Ditch 1 (on-site)

3.3.18 Ditch 1 is approximately 1 metre wide and support water to a depth of 0.25 metres on the survey dates. No aquatic or emergent vegetation is present.

Ditch 2

3.3.19 Ditch 2 extends a length of 50 metres along the northern site boundary. The ephemeral ditch is 0.8 metres wide and has vertical mud and sand banks to a height of 0.6 metres. At the time of the surveys the ditch channel supported standing water to a depth of 0.05 to 0.1 metres deep.

3.3.20 Common Duckweed (*Lemna minor*) was recorded in the channel and marginal plant species comprise stands of Common Nettle, Great Willowherb, Reed Canary-grass, Indian Balsam and Creeping Buttercup.

[3] It is recognised that Ivy is anecdotally thought to provide potential roosting habitat for low numbers / individual crevice dwelling bat species, however in accordance with *Bat Roosts in Trees - A Guide to Identification and Assessment for Tree-Care and Ecology Professionals* (BTHK, 2018) actual evidence of bat roosting behind Ivy is rare, with only two confirmed roosts known in the UK and suggests Ivy is not typically used by roosting bats.

Ditch 3

3.3.21 Ditch 3 emerges from a concrete lined culvert and extends northwards from Ditch 2. The bed of the ditch comprises sand and mud and the earth banks are steeply set (80 to 90°). The water was approximately 0.6 metres deep in February 2020.

3.3.22 Aquatic plant species present comprise Common Water Starwort (*Callitriches stagnalis*) and Forget-me-not (*Myosotis* sp.) with marginal broad-leaved grasses such as abundant False Oat-grass and Cock's-foot. Herbs present comprise abundant and constant Bramble and Common Nettle with occasional Hogweed, very locally frequent Soft-rush, occasional Hemlock Water-dropwort (*Oenanthe crocata*) and rare Common Figwort (*Scrophularia nodosa*).

Pond 1

3.3.23 The steep sided (80°) banks of Pond 1 comprise compacted earth and no emergent vegetation was detected; this does not provide favourable conditions for colonisation by water vole or otter.

Summary of Survey Results

3.3.24 No evidence of use of Ditch 1 (on-site), Ditches 2 and 3 (off-site) or Pond 1 by water vole or otter was detected during the two surveys carried out in 2020 (or during surveys at Ditches 2 and 3 in 2017 and 2018 (ERAP (Consultant Ecologists) Ltd, November 2018)).

3.3.25 Ditches 2 and 3 are assessed to be suitable for colonisation by water vole and possibly for use by commuting and visiting otter owing to their connectivity to the habitats in the wider area and the relatively undisturbed and sheltered conditions present.

3.3.26 Ditch 1 (on-site) is isolated from any other water courses and the ephemeral, shaded conditions and absence of emergent vegetation provide sub-optimal habitat for colonisation by water vole and otter.

Bird Species

3.3.27 Birds detected in the site on 3rd February, 16th March and 13th May 2020 are listed below.

Table 3.3: Bird Species Detected on 3rd February, 16th March and 13th May 2020

Scientific Name	Common Name (number seen)	BOCC Status[1]	Priority Species?	Habitat / Location on Site
Aegithalos caudatus	Long-tailed tit	Green		Hedgerow 5a
Buteo buteo	Buzzard (2)	Green		Flying overhead
Carduelis carduelis	Goldfinch (6)	Green		Flock in Hedgerow 5a
Columba palumbus	Wood pigeon (4)	Green		Flying over site
Erithacus rubecula	Robin (1)	Green		Hedgerow 5b
Motacilla cinerea	Grey Wagtail (1)	Red		Along disused railway corridor (west)
Parus caeruleus	Blue tit (3)	Green		Along disused railway corridor (west and east)
Parus major	Great tit (2)	Green		Along disused railway corridor (west)
Passer domesticus	House sparrow (4)	Red	Yes	In Hedgerow 5b
Phasianus colchicus	Pheasant (2)	N/a		Near Building B1
Pica pica	Magpie (1)	Green		In semi-improved grassland at TN1
Scolopax rusticola	Woodcock (1)	Red		Flushed from Japanese Knotweed near Neverstitch Road
Streptopelia decaocto	Collared dove (1)	Green		Along disused railway corridor (west)
Troglodytes troglodytes	Wren (1)	Green		By Firswood Road

Scientific Name	Common Name (number seen)	BOCC Status[1]	Priority Species?	Habitat / Location on Site
Turdus merula	Blackbird (1)	Green		Hedgerow 5a
Turdus philomelos	Song thrush (1)	Red	Yes	Off Old Engine Lane
[1]BOCC: Birds of Conservation Concern (Eaton, et al., 2015)				

Barn Owl

3.3.28 No barn owl or evidence of use of the buildings by roosting or nesting barn owl was detected during the internal inspection of the buildings. The inability to access the interior of building B3 to search for evidence of use by barn owl is recognised and was addressed by the nocturnal observations of the building during the dusk emergence surveys for bat activity in August 2020; no barn owl were observed or heard.

3.3.29 Barn owl activity is known in the area (barn owl were recorded flying over the site during the bat activity survey carried out at the land to the north of Old Engine Lane in May 2019). The fields of semi-improved grassland are suitable for use by hunting barn owl as part of a wider territory.

Habitat Assessment

3.3.30 The hedgerows, trees and shrubs within the site and on the site boundaries provide suitable habitat for nesting and foraging passerine (perching) bird species, including Priority Species such as bullfinch (*Pyrrhula pyrrhula*), dunnock (*Prunella modularis*), song thrush and possibly willow tit (*Poecile montanus*).

3.3.31 The fields of semi-improved grassland may be suitable for use by ground nesting birds such as meadow pipit (*Anthus pratensis*), however the fields are considered to be too enclosed to be used by other ground nesting farmland birds and Priority Species such as skylark (*Alauda arvensis*) and lapwing (*Vanellus vanellus*). This assessment is supported by the breeding bird survey data, as summarised below.

Breeding Bird Surveys 2020

3.3.32 Bird species detected within the site and immediate surrounds during the breeding bird surveys on 17th April, 15th May and 10th June 2020 are presented at **Tables 8.16** to **8.18** and **Figures 5** to **7**. A summary of the bird species detected is presented at **Table 3.4**.

3.3.33 Thirty-nine bird species, including 5 Priority Species (dunnock, house sparrow, song thrush, starling and bullfinch) were detected over the entire survey area over all three surveys.

3.3.34 Thirty-two of the species were recorded showing activity / behaviours associated with breeding, and likely breeding within or close to the site. The remaining species (Canada goose, black-headed gull, lesser black-backed gull, jackdaw, swallow, house martin and rook) were recorded in flight over the site only.

3.3.35 No ground nesting farmland birds such as skylark or lapwing were recorded.

3.3.36 As detailed on **Figures 5** to **7** the majority of passerine (perching) birds were associated with the hedgerows, field boundary shrubs and the trees and shrubs at the disused railway corridor. As expected, the bird species more typically associated with woodland habitats such as treecreeper, nuthatch, chiff-chaff and great spotted woodpecker were recorded amongst the trees and woodland surrounding Pond 1 or at the mature tree belt along the discussed railway corridor. Waterfowl, namely moorhen and mallard, were associated with Pond 1 and the house sparrow were typically recorded at the off-site residential areas, particularly at the properties off Ormskirk Road.

Table 3.4: Summary of Bird Species Detected During Breeding Bird Surveys on 17th April, 15th May and 10th June 2020

Survey Date	17.04.2020	15.05.2020	10.06.2020
Total No. species	28	31	39
Total No. birds	174	239	244

Scientific Name	Common Name	Number Seen			Total	Priority Species?
		17.04.2020	15.05.2020	10.06.2020		
Turdus merula	Blackbird	23	22	26	71	
Sylvia atricapilla	Blackcap	3	10	8	21	
Larus ridibundus	Black-headed gull	-	3	1	4	
Cyanistes caeruleus	Blue tit	10	7	6	23	
Pyrrhula pyrrhula	Bullfinch	1	-	1	2	Yes
Branta canadensis	Canada goose	2	-	-	2	
Corvus corone corone	Carrion crow	2	4	1	7	
Fringilla coelebs	Chaffinch	12	10	5	27	
Phylloscopus collybita	Chiffchaff	3	8	8	19	
Parus ater	Coal tit	1	-	1	2	
Streptopelia decaocto	Collared dove	6	6	6	18	
Prunella modularis	Dunnock	5	14	11	30	Yes
Regulus regulus	Goldcrest	1	4	3	8	
Carduelis carduelis	Goldfinch	6	6	4	16	
Dendrocopos major	Great spotted woodpecker			1	1	
Parus major	Great tit	3	6	4	13	
Carduelis chloris	Greenfinch	6	5	6	17	
Delichon urbica	House martin	-	-	6	5	
Passer domesticus	House sparrow	17	13	21	51	Yes
Corvus monedula	Jackdaw	2	2	7	11	
Garrulus glandarius	Jay	-	-	1	1	
Falco tinnunculus	Kestrel	-	-	1	6	
Larus fuscus	Lesser black-backed gull	2	2	7	11	
Aegithalos caudatus	Long-tailed tit	-	4	1	5	
Pica pica	Magpie	5	3	5	13	
Anas platyrhynchos	Mallard	1	1	1	3	
Turdus viscivorus	Mistle thrush	-	-	1	1	
Gallinula chloropus	Moorhen	1	1	1	3	
Sitta europaea	Nuthatch	-	1	1	4	
Phasianus colchicus	Pheasant	2	2	1	5	
Motacilla alba	Pied wagtail	-	1	2	5	
Erithacus rubecula	Robin	16	17	13	46	
Corvus frugilegus	Rook	-	29	20	2	
Turdus philomelos	Song thrush	2	4	5	11	Yes
Accipiter nisus	Sparrowhawk	-	1	-	49	
Sturnus vulgaris	Starling	-	4	1	3	Yes
Hirundo rustica	Swallow	-	-	4	1	
Certhia familiaris	Treecreeper	1	1	1	3	
Phylloscopus trochilus	Willow warbler	2	-	5	7	
Columba palumbus	Wood pigeon	17	29	29	75	
Troglodytes troglodytes	Wren	22	19	19	60	

Great Crested Newt and other Amphibians

3.3.37 The HSI assessment for all ponds within a 500 metre radius from the site are appended at **Tables 8.11** to **8.13**.

Pond 1

3.3.38 In consideration of great created newt and other amphibians, Pond 1 scores 'below average' in the HSI. The likely absence of great crested newt at Pond 1 was reasonably discounted during the ecological surveys carried out in 2018 (ERAP (Consultant Ecologists) Ltd, November 2018) and this was accepted by West Lancashire Borough Council and their ecological advisors. The conditions at Pond 1 have not changed since 2018 and this conclusion is assessed to be valid. The great crested newt eDNA presence / absence survey undertaken at Pond 1 in 2020 was negative, refer to **Appendix 3**.

3.3.39 It is recognised that the relatively large waterbody at Pond 1 may support breeding common toad, a Priority Species. Owing to the proximity of Pond 1 to the site and the suitability of the site to provide terrestrial habitats for sheltering common toad, to ensure the protection of common toad during the construction period the implementation of an Amphibian Reasonable Avoidance Measures Method Statement (ARAMMS) is recommended, refer to **Section 5.3**.

Ponds 2 and 3 (Pond 4 is absent)

3.3.40 Ponds 2 and 3 are fishing ponds located over 200 metres from the site boundary and on the opposite side of Firswood Road, refer to **Figure 2**. In combination of the consideration of the stocked fish ponds (typically unsuitable for use by breeding great crested newt as the fish predate on newt eggs and their larvae that inhabit the open water), the HSI scores (both 'poor') and the distance between the ponds and the site, the likelihood of great crested newt presence is reasonably discounted and no further survey or assessment is required.

Ponds 5 to 7

3.3.41 Ponds 5 to 7, located over 390 metres to the north of the site, were created in 2003 and comprise large surface water attenuation areas associated with the distribution units. In combination of the consideration of the distance between the ponds and the site and the presence of a road with high kerbstones separating Pond 7 from the site, the likelihood of great crested newt presence is reasonably discounted and no further survey or assessment is required.

Pond 8

3.3.42 Pond 8 achieves a HSI score of below average. The great crested newt eDNA presence / absence survey undertaken at Pond 8 in 2020 was negative, refer to **Appendix 3**.

Reptiles

3.3.43 There are no reported records of reptiles for the site or the wider area.

3.3.44 The site comprises of regularly managed and disturbed land, and is therefore unlikely to support an abundance or diversity of invertebrate prey for reptile species. It is considered there are no habitats which are likely to attract any reptile species to the site.

4.0 EVALUATION AND ASSESSMENT

4.1 Introduction and Description of Proposals

4.1.1 In accordance with the *West Lancashire Local Plan 2012-2027*, the site is allocated for residential development and may support up to 200 units.

4.1.2 A site layout / masterplan has been prepared in accordance with all identified constraints and opportunities and the *Firswood Road Development Brief* (West Lancashire Borough Council, August 2014).

4.1.3 **Sections 4.2** to **4.4** of this report identify the ecological considerations based on the recorded baseline. The site layout plan has been prepared in accordance with the ecological baseline and guidance provided at **Section 5.2**. The ecological work undertaken has informed the proposals from an early stage.

4.2 Designated Sites for Nature Conservation

4.2.1 Owing to the distance between the site and any statutory and non-statutory designated sites for nature conservation within the wider area, direct and indirect effects on any statutory and non-statutory designated sites are reasonably discounted.

4.2.2 This conclusion is supported by the comments provided by MEAS in their Discretionary Advice Response, for the approved planning application for the land north of Old Engine Lane (MEAS, 13 September 2017) and the comments made in consultation of the nearby and similar planning application (under construction) within the Firswood Road area (2016/1027/FUL (MEAS, 15th November 2016)).

4.3 Vegetation and Habitats

4.3.1 None of the habitats within the proposed development site are representative of semi-natural habitat. The National Vegetation Classification (NVC) communities present are typical of the geographical area. The site contains only common and widespread plant species.

4.3.2 The six hedgerows within the site and on the site boundaries are species-poor and none meet the criteria to be assessed as 'important' in accordance with *The Hedgerows Regulations 1997*. However, the Priority Habitat status, connectivity function and provision of opportunities for fauna such as nesting birds (including Priority Species) and foraging bats provided by the hedgerows is recognised. The ecological recommendations and site layout secure opportunities for the retention and enhancement of this resource as part of the development proposals (and aim to secure the planting of compensatory native hedgerows where removal is unavoidable).

4.3.3 The woodland north of Old Engine Lane (TN10) is an established habitat that, with appropriate management, is considered to have potential for improvement to succeed to good quality Priority Habitat. This woodland provides a valuable resource and refuge for fauna, including Priority Species of bird, that may be permanently or temporarily (during the construction period) displaced from the residential construction site, refer to **Sections 5.6** and **5.8**.

4.3.4 Similarly, Pond 1 adjacent to the woodland at TN10 is a potential Priority Habitat (owing to the likely presence of breeding common toad); this habitat will be conserved and protected by the proposals.

4.3.5 No other Priority Habitats are present.

4.3.6 The wildlife corridor function of the whole of the disused railway corridor is recognised. Conservation of the habitats within the corridor and protection from harm (i.e. avoidance of inappropriate lighting, severance of habitats, tree removal and pollution) is essential. It is accepted that to achieve an appropriately designed site the construction of an access road over the railway corridor is likely to be necessary; the measures described at **Section 5.2** aim to mitigate for the risk of any adverse effects on the integrity of the wildlife corridor.

4.3.7 The area of established Oak and Willow trees at the southern end of TN3 and adjacent to the disused railway corridor are identified as an established area of habitat and provide a resource for use by fauna such as woodcock (*Scolopax rusticola*) and passerine birds, including woodland specialist species such as treecreeper. Owing to the extent of Japanese Knotweed in this area it is expected that tree removal is necessary to effectively eradicate the Knotweed. Loss of the established Oak trees and Willow scrub in this area is an identified impact of the proposals, however, mitigation in the form of native planting elsewhere

at the site (such as along the disused railway corridor and / or off-site planting) and trees at the disused railway corridor is assessed to be proportionate and appropriate.

4.3.8 All other habitats at the site namely semi-improved grassland, improved grassland, amenity grassland, tall-herb vegetation, scrub, hard-standing and bare ground are assessed to be of value at the site level only when considered in the context of the other habitats at the site and the surrounding area.

4.3.9 The presence of invasive plant species listed on Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) namely Japanese Knotweed, Montbretia, Indian Balsam and Variegated Yellow Archangel is an essential consideration in connection with the development proposals. The proposals provide an opportunity to achieve the control and management of these species within the site to minimise further spread into the wild.

4.4 Protected Species and Other Wildlife

Badger

4.4.1 The badger activity detected immediately off site in February and March 2020 was confined to the north-western end of the disused railway corridor. No additional badger field signs were found in May 2020. Based on the ecological baseline survey data obtained to date, provided the disused railway corridor remains functional as a wildlife corridor and the best practice measures described in **Section 5.3** are adhered to during the construction phase, the proposals can be achieved with no significant adverse effects on badger or their habitats.

Bat Species

4.4.2 An appropriate scope of survey in accordance with the survey guidelines did not detected evidence of use of buildings B1 (low suitability) and B3 (moderate suitability) by roosting bats.

4.4.3 All other buildings and the bridge are assessed to be of negligible suitability for use by roosting bats; no further survey is required to inform the planning application.

4.4.4 No evidence of a bat roost was detected at any of the trees. Of the eight trees assessed to be of low suitability for use by roosting bats, the removal of four trees (T5, GW.1 and G9.1 x 2) may be unavoidable as part of the development proposals. As outlined in **Section 5.3** further works under a method statement are required prior to and during the scheduled felling of these trees.

4.4.5 The retention and conservation of the site boundary features and the disused railway corridor will conserve opportunities at the site for the attraction of foraging bats. The retention of these features with an appropriate buffer and the sensitive use of lighting at the developed site will avoid any significant adverse effect on opportunities for foraging bats. In addition, the built development will secure the creation for roosting bats as part of good design, refer to **Section 5.5**.

Nesting Birds

4.4.6 The buildings, hedgerows, trees and shrubs within the site and on the site boundaries provide suitable habitat for nesting and foraging passerine (perching) bird species, including Priority Species such as those detected during the breeding bird surveys. Mandatory actions to protect nesting birds during site clearance and measures to provide compensatory opportunities for nesting birds are recommended at **Sections 5.3, 5.6** and **5.7** and can be achieved by the proposals.

4.4.7 No evidence of use of the site by nesting barn owl has been detected.

Common Toad

4.4.8 Owing to the likely use of Pond 1 (off-site) by breeding common toad and the likelihood of use of the terrestrial habitats at the site by sheltering common toad, best practice measures for the protection of toad during the construction period are recommended, refer to **Section 5.3**.

Other Protected Species

4.4.9 Appropriate survey effort and / or assessment in accordance with standard guidance, has been carried out to reasonably discount adverse effects on other relevant protected species namely water vole, otter, great crested newt and reptile species.

5.0 RECOMMENDATIONS AND ECOLOGICAL ENHANCEMENT

5.1 Introduction

5.1.1 Ecological guidance, based on the baseline surveys, has been provided to the design team throughout the preparation of the site layout. This approach has ensured that the site layout has, as much as possible, been ecology-led to achieve a sympathetic scheme which avoids the occurrence of likely significant effects and seeks to minimise and mitigate adverse effects where avoidance is not possible.

5.1.2 The recommendations and guidance provided in this section follows 'The Mitigation Hierarchy' (i.e. avoid, mitigate, compensate) as advised by paragraph 175 of the NPPF to aim to ensure that the development is implemented in accordance with relevant wildlife legislation, Natural England guidance, the principles of the NPPF, relevant local planning policy and best practice.

5.1.3 The recommendations are appropriate and proportionate. Where possible, opportunities to enhance the ecological interest and habitat connectivity and seek biodiversity gain through appropriate landscape planting and habitat creation and management have been identified, as required by the NPPF and other relevant planning documents.

5.2 Recommendations in Relation to Site Layout and Design

5.2.1 Detailed recommendations to achieve a sympathetic site layout / masterplan with opportunities for biodiversity have been provided to Bellway Homes.

5.2.2 The recommendations take into consideration the requirements to achieve compliance with planning policy such as:

a. The retention (and protection during construction) and enhancement by habitat creation of the whole length of the disused railway corridor within the site to protect the wildlife corridor and green infrastructure function and contribute to the Linear Park as required by Policy IF2.1(a)(ix) Linear Park;

b. Exploration of actions to minimise the risk of long-term effects on the integrity of the disused railway wildlife corridor by ensuring that the road crossing is limited to one position that is as narrow a possible (for example restricting the pavement to one side of the highway only), accommodation of tunnels / pipes for the passage of wildlife, boundary fencing that is permeable to the movement of wildlife, avoidance of artificial lighting and planting of tall trees each side of the carriage way to encourage flight of fauna over the access road at height) and thereby achieving compliance with Policy EN2(c)(i);

c. Maximised opportunities for the attraction of butterflies and feeding birds and bats to the site by the seeding of wildflower grasslands over the areas of land within the disused railway corridor where the Indian Balsam is to be controlled; and

d. Installation of opportunities for roosting bats and nesting birds, including Priority Species, within the built environment, as described at **Sections 5.5** and **5.6**.

5.3 Protection of Existing Features During Construction and Construction Environment Management Plan (CEMP) for Biodiversity

Introduction

5.3.1 To inform the site preparation and construction activities it is recommended that a Construction Environment Management Plan (CEMP) for Biodiversity is prepared and implemented. The CEMP will describe the following actions/ measures:

Lighting

5.3.2 Paragraph 180, bullet point 'c' in Chapter 15 (conserving and enhancing the natural environment) of the NPPF states that development should:

'limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

Development Lighting Design

5.3.3 The lighting scheme to be implemented at the developed site must involve the use of appropriate products and screening, where necessary, to ensure no excessive artificial lighting shines over the retained habitats, woodland margins, the disused railway corridor and new habitats, as lighting overspill may deter use by wildlife such as foraging bats.

5.3.4 The lighting scheme will be designed with reference to current guidance, namely:

a. *Guidance Note 8: Bats and Artificial Lighting in the UK* (Institution of Lighting Professionals & Bat Conservation Trust, 2018); and

b. *Bats and lighting: Overview of current evidence and mitigation guidance* (Stone, 2014).

Protection of Existing Vegetation

5.3.5 During the construction phase, temporary protective demarcation fencing will be used to protect the trees, hedgerows and shrubs to be retained. The fencing must extend outside the canopy of the retained trees and must remain in position until all areas have been developed to ensure protection is provided throughout the construction phase.

5.3.6 The fencing will be in accordance with BS5837:2012 *Trees in Relation to Design, Demolition and Construction: Recommendations* (BSI, 2012).

Protection of Water Quality

5.3.7 The water quality of the off-site ditches and Ponds 1 and 8 will be protected during the construction operations through the implementation of best practice. In the absence of any updated guidance, the following Pollution Prevention Guidelines (PPG) will be adhered to:

a. PPG1: Basic good environmental practices (Environment Agency, 2013);

b. PPG5: Works in, near or over watercourses (Environment Agency, 2014);

c. PPG6: Construction and demolition sites (Environment Agency, 2012); and

d. PPG7: Operating refuelling sites (Environment Agency, 2011).

Protection of Badger

5.3.8 Owing to the presence of badger activity in the local area, prior to the commencement of works it is recommended that a pre-commencement badger survey is carried out.

5.3.9 During the site preparation and construction operations it is essential that the following best practice is applied for the protection of badger (and other wildlife) which may visit the site:

a. No machinery or construction operations must be carried out beyond the protective demarcation fencing. Ecological guidance must be sought if works are necessary beyond the fencing;

b. No trenches must be left open overnight. Trenches or holes must be covered with a board or fitted with a means of escape (such as ramped edge or a sloping plank of timber). This will ensure that any inquisitive badger do not become trapped;

c. Any pipes must be stored with caps on (to prevent badger entry);

d. No fires must be lit at the site; and

e. Any chemicals or harmful materials must be stored so that they cannot be accessed by inquisitive badger.

Precautionary Actions in Relation to Bats

Buildings

5.3.10 It is recommended that an updated bat assessment / survey is carried out at buildings B1 and B3 prior to demolition if works have not commenced before May 2021.

5.3.11 No specific measures need to be applied for the protection of bats during the demolition of buildings B2 and B4 to B11.

Trees

5.3.12 The Method Statement outlined below has been prepared in accordance with best practice, practicable guidance, consultation of the approved development proposals and Chapter 6 of *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn),* (Collins, J. (ed), 2016).

Trees with Potential Roost Features and / or Low Suitability for Use by Roosting Bats

5.3.13 Trees T5, GW.1 and G9.1 (2 trees) are assessed to be of low suitability for use by roosting bats and are scheduled for removal. No roost has been detected (to date).

5.3.14 As retention of these four trees is not possible, the following methods must be applied:

a. Immediately prior to felling / arboricultural works, an updated inspection of the potential roost features at the trees will be carried out by a licensed bat surveyor; and

b. Provided no current or previous evidence of use by roosting bats is found (i.e. the status quo) then trees must be section / soft felled under the supervision of a licensed bat surveyor. The licensed bat surveyor will be present to supervise the following works:

- Careful section-felling of the tree(s). The sectioning must avoid cutting through or close to any cavities / dead wood, this is likely to involve climbing the tree;
- Cut sections will be lowered to the ground with the use of ropes;
- Once on the ground, any cavities, if present, will be re-inspected by the licensed bat surveyor and guidance issued; and
- Where relevant, allow all felled sections to lie on the ground for 24 hours before snedding (removing side branches).

Other Trees

5.3.15 Essential arboricultural works at trees assessed to be of negligible suitability for use by roosting bats can be carried out in accordance with good arboricultural practice, taking into account the mandatory actions in relation to nesting birds.

Timing

5.3.16 The optimum time for tree removal is between September and February inclusive.

Discovery of a Bat

5.3.17 If at any time during the works a bat is discovered or suspected all contractors must withdraw from the area and ERAP (Consultant Ecologists) Ltd (01772 750502) or Natural England must be contacted for further guidance.

Protection of Nesting Birds

5.3.18 All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended) while they are breeding. It is advised that any works such as vegetation clearance that will affect habitats suitable for use by nesting birds are scheduled to commence outside the bird nesting season. Commencement of works in the nesting season must be informed by a pre-works nesting bird survey, carried out by a suitably experienced ecologist. The bird breeding season typically extends between March to August inclusive.

5.3.19 If breeding birds are detected the ecologist will issue guidance in relation to the protection of the nesting birds in conjunction with the scheduled works. This may involve cordoning off an area of the site until the young birds have fledged.

Amphibian Reasonable Avoidance Measures Method Statement (ARAMMS)

5.3.20 Owing to the likely use of Pond 1 by breeding common toad (a Priority Species) and the potential hazards to toadlets created by a construction site it is recommended that the following Reasonable Avoidance Measures (RAMs) Method Statement is applied during the construction phase of development:

a. All site personnel must be made aware of this RAMs Method Statement;

b. Site personnel must be trained in the identification of amphibian species;

c. During any vegetation clearance works all arising waste must be either removed from the area or placed in a skip in order that it does not create suitable habitat and shelter for amphibians;

d. During construction, bricks etc. must be stored on pallets or raised from the ground in another suitable manner in order that no suitable habitat for amphibians is created;

e. During construction, any holes, trenches or other pits which amphibians could fall into must be covered overnight, or have sloped banks or ramps suitable for their escape;

f. The use of chemicals (such as fertilisers and herbicides) harmful to amphibians should be avoided wherever possible;

g. If it is suspected that a great crested newt has been found ERAP (Consultant Ecologists) Ltd (01772 750 502) or Natural England (0300 060 6000) must be contacted immediately for further assistance;

h. No site contractors must handle a great crested newt; and

i. If any other amphibian species (such as smooth newt, common toad or common frog) is detected on site, it must be carefully picked up, placed in a clean bucket and moved to an area of suitable habitat beyond site boundary.

5.4 Invasive Plant Species

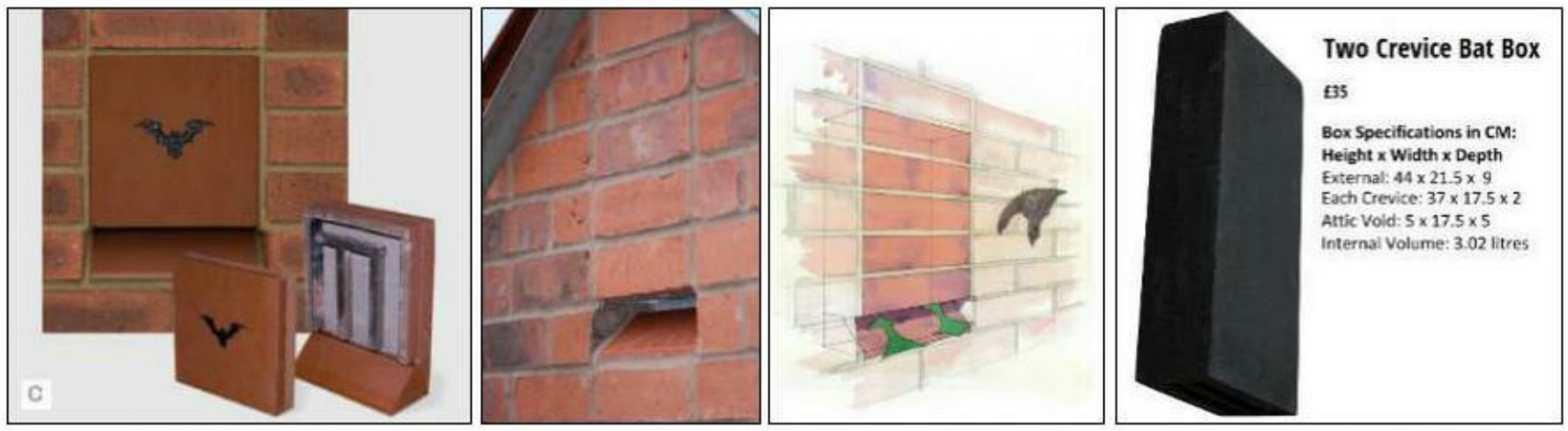
5.4.1 The proposals provide an opportunity to achieve the local eradication of Japanese Knotweed and Montbretia and the local control of Indian Balsam and Variegated Yellow Archangel as part of development to prevent further spread into the wild. A development proposal will need to be accompanied by an Invasive Plant Species Management Plan commitment (which can be secured by planning condition).

5.5 Enhancing Habitats for Roosting Bats

Within the Built Environment

5.5.1 To provide opportunities for roosting bats as part of the scheme, it is recommended that the development incorporates the installation of bat access panels, refer to **Insert 1**, at the new properties.

5.5.2 The bat access panels should be sited at least four metres above ground level, ideally facing or close to areas of landscape planting or existing linear features such as the disused railway corridor. The access panels should not be positioned over windows or doorways where bat droppings may become a nuisance. Once the development layout has been finalised, an ecologist will advise on appropriate positions for the bat access panels.



Insert 1: Examples of commercially available bat access panels and externally mounted boxes[4]

Within Retained Habitats

5.5.3 The value of the retained habitats namely the disused railway corridor can be enhanced by the installation of bat boxes.

5.5.4 Suitable bat boxes are the Schwegler 1FF, Greenwood Ecohabitat single or double cavity boxes and Schwegler 1FD, see **Insert 2**, below.

Insert 2: Schwegler 1FF, Greenwood Ecohabitat single cavity and Schwegler 1FD bat boxes

5.5.5 Bat boxes should be installed to the following guidelines (Bat Conservation Trust, 2016):

a. At least 4 metres above the ground (where safe installation is possible);

b. Sheltered from strong winds and exposed to the sun for part of the day (usually south or south-west). Ideally several bat boxes will be installed to provide a variety of different thermal options for bats.

[4] Left to right: IBstock Enclosed Bat Box 'c' (left); Habibat Bat Access Panels (centre left and centre right) and Greenwood's Ecohabitats two crevice bat box (right). Products with a brick face are illustrated, however the Habibat bat access panels can be supplied unfaced to enable the additional of matching material.

Grouping a number of boxes each with a different aspect can achieve this; while a number of boxes is preferable to one, a single box is still viable and may be used by roosting bats;

c. Located close to unlit linear features, such as lines of trees or hedgerows; and

d. Installed where the bat box entrance is not cluttered or impeded by branches, or accessible to predators (such as cats) by large branches underneath them.

5.6 Enhancing Opportunities for Nesting Birds

Within the Built Environment

House Sparrow

5.6.1 House sparrows are associated with suburban areas. Monitoring suggests a severe decline in the UK house sparrow population, estimated as dropping by 71 per cent between 1977 and 2008 with substantial declines in both rural and urban populations (RSPB, 2018).

5.6.2 The installation of house sparrow terrace nest boxes is recommended at the new properties. The boxes will be not be positioned over windows or doorways where droppings may become a nuisance. RSPB advice states that boxes should ideally be sited facing north to east, to avoid exposure to direct sunlight, which may cause overheating of chicks in the nest. An example of a suitable house sparrow bird box is given at **Insert 3**, below:

Insert 3: Schwegler 1SP House Sparrow Nesting Terrace

Swift

5.6.3 Swift nest boxes should be installed beneath the eaves of taller properties, as shown in **Insert 4**, below.

Insert 4: Manthorpe GSWB Swift Nest Box

5.6.4 ERAP (Consultant Ecologists) Ltd will advise on the siting of the bird boxes, as required.

Enhancing Habitats for Nesting Birds within the Retained and Created Habitats

5.6.5 Measures that can be secured by the development proposals to enhance the retained habitats such as the disused railway corridor for nesting birds, including Priority Species, could comprise the installation of bird boxes as detailed below in combination with the outlined management prescriptions at **Section 5.8**.

Insert 5: Schwegler 3SV, Schwegler 1N, Schwegler 2M and Schwegler 2H bird boxes, suitable for a variety of woodland birds.

5.7 Landscape Planting Schedule and Habitat Creation

Habitat Creation and Landscape Planting in the Linear Park / Open Space

5.7.1 To secure the long-term benefits for biodiversity associated with the scheme a Landscape Planting Schedule and Habitat Creation Plan will be prepared. The Plan will detail the objectives and prescriptions to be applied to maximise the biodiversity value of retained and new habitats such as the installation of bird and bat boxes as described above.

5.7.2 This Plan will also provide the detailed specification for the landscape planting schedule in the Linear Park with maximised use of native flora and enhanced habitats such as wildflower grasslands and compensatory native hedgerow planting.

5.7.3 It is considered that the preparation of this Plan can be secured by an appropriately worded planning condition.

Landscape Planting Within the Residential Site

5.7.4 It is recommended that the landscape planting within the residential site is composed from native species and species known to be of value for the attraction of wildlife. The incorporation of trees and shrubs that produce blossom and fruit which will attract insects in the landscape planting is recommended. Suitable species are presented below.

Table 5.1: Suitable Native Species for Tree, Shrub and Compensatory Hedgerow Planting

Scientific Name	Common Name	Scientific Name	Common Name
Acer campestre	Field Maple	*Prunus spinosa*	Blackthorn
Corylus avellana	Hazel	*Rosa arvensis*	Field Rose
Crataegus monogyna	Hawthorn	*Rosa canina*	Dog-rose
Ilex aquifolium	Holly	*Sambucus nigra*	Elder
Malus sylvestris	Crab Apple	*Sorbus aucuparia*	Rowan
Prunus avium	Wild Cherry	*Ulmus glabra*	Wych Elm
Prunus padus	Bird Cherry	*Viburnum opulus*	Guelder Rose

5.7.5 The understorey and ground cover planting design should be prepared to optimise the attraction of invertebrates such as feeding bumblebees and butterflies. Where possible the use of native species should

be maximised but where necessary non-native species known to be attractive to invertebrates should be used.

5.7.6 Planting schemes that include flowering species such as *Viburnum, Ceanothus, Hebe*, *Lavandula*, *Lonicera, Potentilla, Rosmarinus* and *Vinca* can maximise opportunities for feeding invertebrates and for the attraction of foraging bats and birds.

5.8 Management Plans

5.8.1 To secure long-term benefits for biodiversity at the site it is recommended that Management Plans are prepared to include a specific the 'Linear Park Management Plan' and a General Site Management Plan.

5.8.2 For example, the following measures could be secured:

a. Specification of the removal/control and safe disposal of invasive plant species and non-native species such as Variegated Yellow Archangel, Portuguese Laurel etc.;

b. Installation of bird boxes including boxes of a design for specific species such as nuthatch (*Sitta europaea*), robin and tawny owl (*Strix aluco*), refer to **Section 5.6**;

c. Creation of dead wood habitat piles for colonisation by invertebrates, fungi, amphibians and small mammals including hedgehog (Priority Species);

d. Selective thinning and coppicing (subject to Tree Preservation Order restrictions); and

e. Plug planting of woodland herbs such as native Bluebell (*Hyacinthoides non-scripta*).

6.0 CONCLUSION

6.1 This ecological survey and assessment have demonstrated that the development proposals at the Firswood Road site can be achieved with no adverse effect on designated sites for nature conservation.

6.2 The protection and enhancement of woodland and pond Priority Habitats will be achieved. It is feasible to accommodate residential development at the site whilst protecting the wildlife corridor function and integrity of the disused railway corridor.

6.3 Protection of nesting birds and recommendations for the provision of compensatory and enhanced habitats and opportunities for nesting birds and roosting bats are feasible and will be accommodated.

6.4 Measures to conserve the habitat connectivity and green infrastructure function through and around the site are entirely feasible.

6.5 Development at the site will provide an opportunity to secure ecological enhancement for fauna typically associated with residential areas such as breeding birds and roosting bats and the positive management of retained and created habitats in accordance with conservation objectives.

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8.0 APPENDIX 1: TABLES

Table 8.1: Table of Photographs

Photo 1: Poor semi-improved grassland at TN1 (facing north)

Photo 2: Semi-improved grassland and tall-herb vegetation at TN2

Photo 3: Dense Bracken at TN2

Photo 4: Scattered trees at TN3

Photo 5: Disturbed ground and semi-improved grassland at northern end of TN3

Photo 6: Scattered trees at southern end of TN3

Photo 7: Grazed improved grassland at TN4

Photo 8: Amenity grassland north of the disused railway corridor

Photo 9: Willow scrub at TN6

Photo 10: Amenity grassland and scattered trees at disused railway corridor (east) at TN8

Photo 11: Disused railway corridor (west) at TN9 (facing west)

Photo 12: Disused railway corridor (west) at TN9 (facing east)

Photo 13: Woodland at TN10 north of Old Engine Lane

Photo 14: Variegated Yellow Archangel in woodland at TN10 north of Old Engine Lane

Photo 15: Yard near building B1 (facing north)

Photo 16: Japanese Knotweed plants in yard near B1

Photo 17: Hedgerow 3 (facing north)

Photo 18: Hedgerow 4

Photo 19: Hedgerow 5a (facing east)

Photo 20: Hedgerow 5b (facing west)

Photo 21: Hedgerow 6 (facing west)

Photo 22: Badger footprint in mud beneath bridge at Firswood Road

Photo 23: Southern and eastern elevations of B1

Photo 24: Western end of B1

Photo 25: Western gable end of B1

Photo 26: Interior of B1 showing skylights

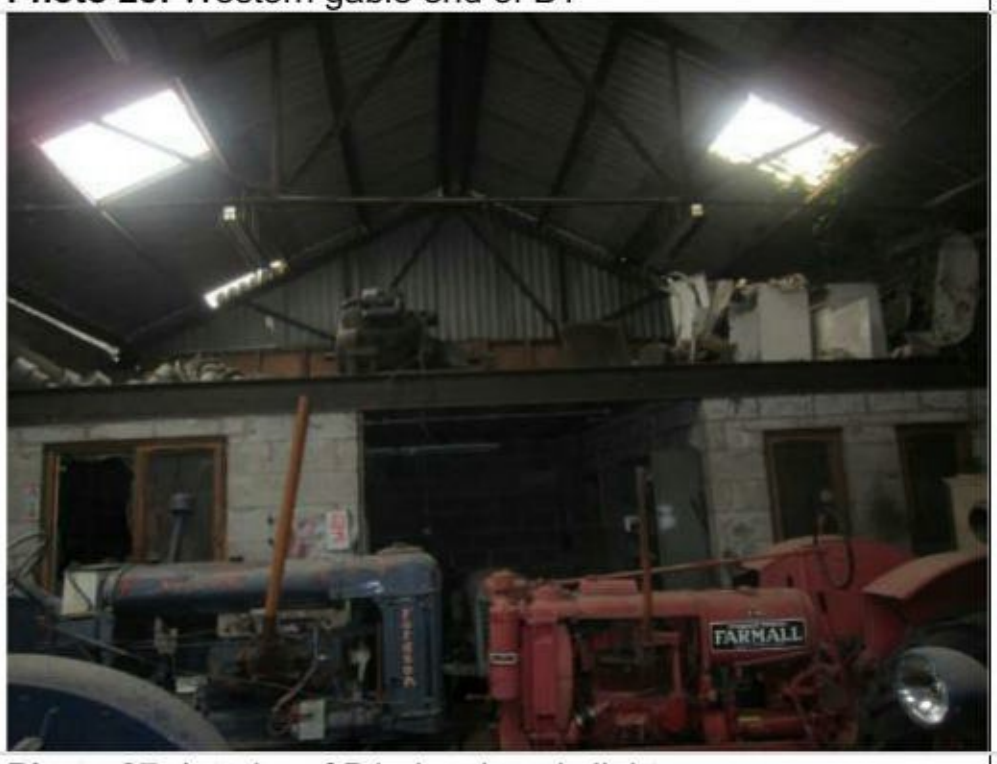

Photo 27: Interior of B1 showing skylights

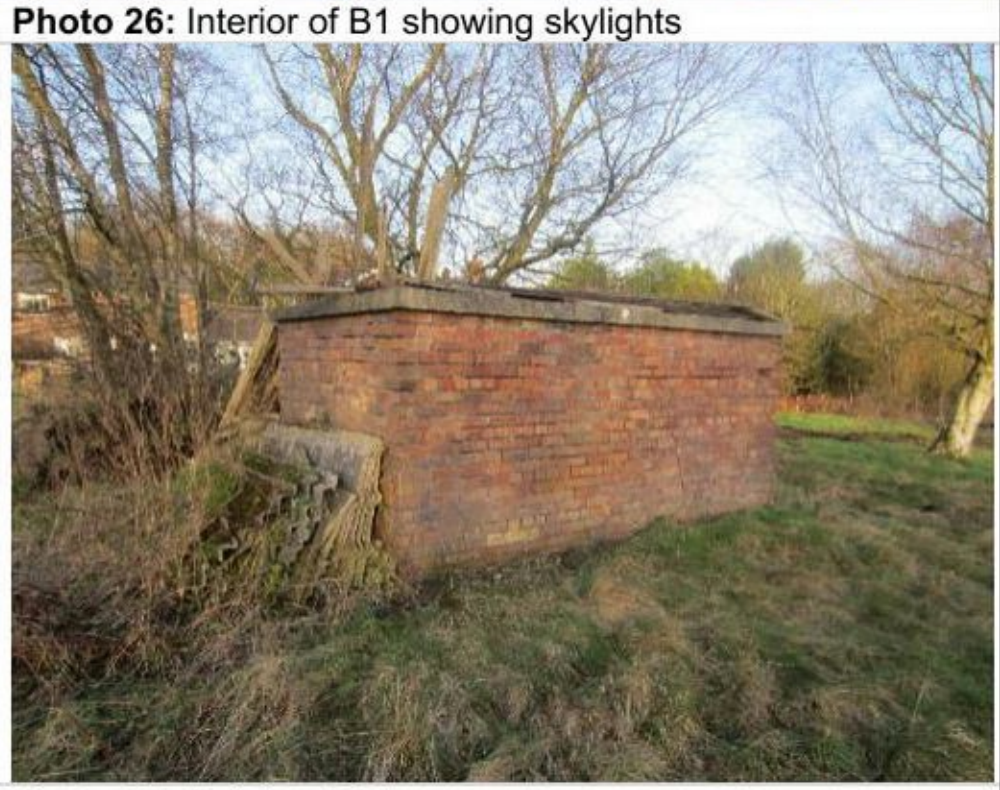

Photo 28: Building B2

Photo 29: Building B2

Photo 30: Interior of B2

Photo 31: Building B4

Photo 32: Interior of B4

Photo 33: Buildings B5 to B7 (greenhouses) and B8 (shed)

Photo 34: Building B9

Photo 35: Building B10

Photo 36: Building B11

Photo 37: Firswood Road bridge at western end of disused railway corridor (west)

Photo 38: T5 (Silver Birch with deadwood and lifted bark)

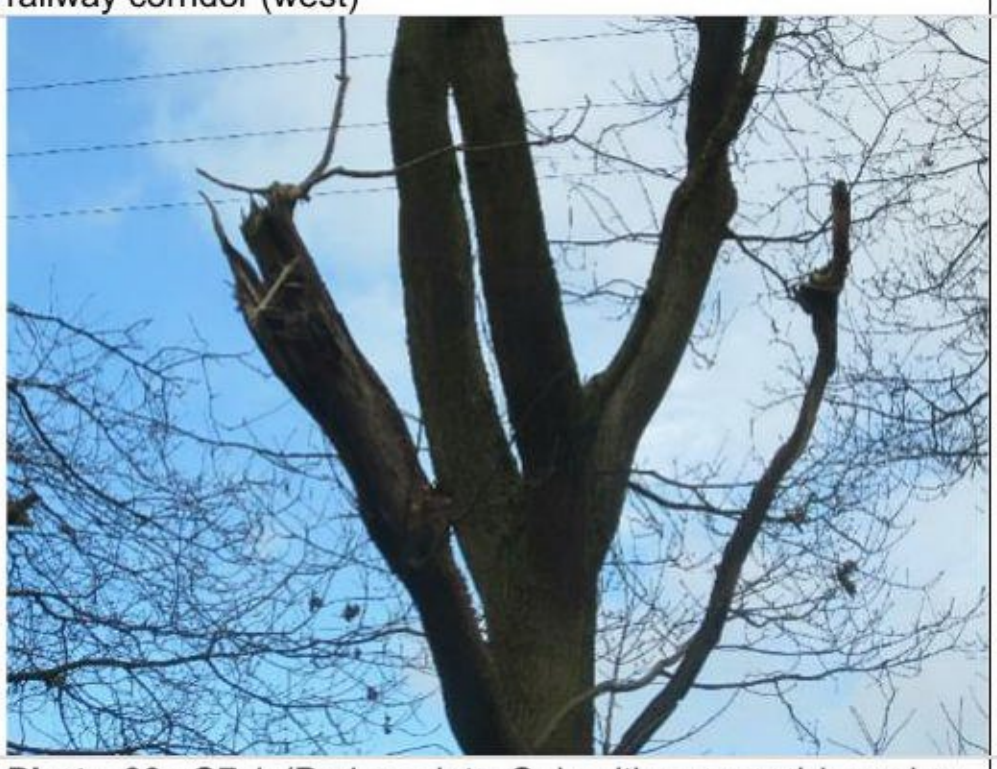

Photo 39: G7.1 (Pedunculate Oak with snagged branches and split wood)

Photo 40: G7.2 (Pedunculate Oak with snagged branches and split wood)

Photo 41: G7.3 (Pedunculate Oak with developing hazard beam)

Photo 42: G7.4 (Blind knothole)

Photo 43: GW.1 (Hazard beam in Goat Willow)

Photo 44: W2.1 (Knothole in Cherry tree)

Photo 45: G9.1 (Two sycamore trees with Ivy)

Photo 46: Pond 1

Photo 47: Pond 2

Photo 48: Pond 5

Photo 49: Pond 6

Photo 50: Ditch 3

Table 8.2: Plant Species List for Semi-improved Neutral Grassland at Target Note 1

Scientific Name	Common Name	DAFOR[1]	Cover
Woody Species			
Quercus robur	Pedunculate Oak	R	<1%
Herb Species			
Aegopodium podagraria	Ground-elder	VLA	1%
Agrostis stolonifera	Creeping Bent	LF	5%
Alopecurus pratensis	Meadow Foxtail	F	<1%
Arrhenatherum elatius	False Oat-grass	A*	20%
Cardamine flexuosa	Wavy Bitter-cress	VLF	<1%
Cerastium fontanum	Common Mouse-ear	VLF	<1%
Chamerion angustifolium	Rosebay Willowherb	VLA	<1%
Cirsium arvense	Creeping Thistle	O	<1%
Dactylis glomerata	Cock's-foot	F	10%
Epilobium hirsutum	Great Willowherb	LF	<1%
Festuca rubra	Red Fescue	LA	5%
Geranium molle	Dove's-foot Crane's-bill	VLF	1%
Holcus lanatus	Yorkshire-fog	F*	10%
Impatiens glandulifera	Indian Balsam	LF	<1%
Juncus effusus	Soft-rush	LVA	15%
Lolium perenne	Perennial Rye-grass	F	10%
Phalaris arundinacea	Reed Canary-grass	LF	5%
Plantago lanceolata	Ribwort Plantain	O	<1%
Poa trivialis	Rough Meadow-grass	F	5%
Ranunculus acris	Meadow Buttercup	O	<1%
Ranunculus repens	Creeping Buttercup	F*	10%
Rubus fruticosus agg.	Bramble	LA	2%
Rumex obtusifolius	Broad-leaved Dock	O	<1%
Senecio jacobaea	Common Ragwort	O	<1%
Stellaria alsine	Bog Stitchwort	VLF	<1%
Taraxacum officinale agg.	Dandelion	O	<1%
Trifolium repens	White Clover	R	<1%
Urtica dioica	Common Nettle	LF	<1%

[1]Key to DAFOR: D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species

Table 8.3: Plant Species List for Areas of Semi-improved Grassland, Tall-herb Vegetation and Bracken at Target Note 2

Scientific Name	Common Name	DAFOR[1]	Cover
Woody Species			
Betula pendula	Silver Birch	O	<1%
Crataegus monogyna	Hawthorn	O	<1%
Quercus robur	Pedunculate Oak	O	<1%
Salix caprea	Goat Willow	O	<1%
Herb Species			
Actium minus	Lesser Burdock	R	<1%
Agrostis stolonifera	Creeping Bent	VLF	1%
Alopecurus pratensis	Meadow Foxtail	F	5%
Arrhenatherum elatius	False Oat-grass	LF	5%
Artemisia vulgaris	Common Mugwort	O	<1%
Chamerion angustifolium	Rosebay Willowherb	LVA	5%
Cirsium vulgare	Spear Thistle	O	<1%
Dactylis glomerata	Cock's-foot	LF	1%
Digitalis purpurea	Foxglove	R	<1%
Epilobium hirsutum	Great Willowherb	LVA	20%
Epilobium montanum	Broad-leaved Willowherb	VLF	1%
Festuca rubra	Red Fescue	LF	2%
Galium aparine	Cleavers	VLF	<1%
Heracleum sphondylium	Common Hogweed	O	<1%
Holcus lanatus	Yorkshire-fog	F	10%
Juncus effusus	Soft-rush	LA	10%
Poa trivialis	Rough Meadow-grass	F	2%
Pteridium aquilinum	Bracken	LD	30%
Ranunculus repens	Creeping Buttercup	LF	5%
Rubus fruticosus agg.	Bramble	LA	1%
Rubus idaeus	Raspberry	LF	2%
Rumex acetosa	Common Sorrel	O	<1%
Rumex obtusifolius	Broad-leaved Dock	F	5%
Senecio jacobaea	Common Ragwort	O	<1%
Silene dioica	Red Campion	VLF	<1%
Symphytum officinale	Common Comfrey	O	<1%
Taraxacum officinale agg.	Dandelion	O	<1%
Trifolium repens	White Clover	VLF	<1%
Tussilago farfara	Colt's-foot	R	<1%
Urtica dioica	Common Nettle	LF	10%

[1]Key to DAFOR: D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species

Table 8.4: Plant Species List for Mosaic of Semi-improved Grassland and Scrub with Trees at Target Note 3

Scientific Name	Common Name	DAFOR[1]	Cover
Woody Species			
Betula pendula	Silver Birch	LF	5%
Quercus robur	Pedunculate Oak	F	10%
Salix caprea	Goat Willow	F	10%
Herb Species			
Aegopodium podagraria	Ground Elder	VLA	1%
Agrostis capillaris	Common Bent	LF	5%
Arrhenatherum elatius	False Oat-grass	LF	5%
Chamerion angustifolium	Rosebay Willowherb	LA	5%
Dactylis glomerata	Cock's-foot	LF	5%
Dryopteris dilatata	Brad Buckler-fern	O	<1%
Fallopia japonica	Japanese Knotweed	A	20%
Festuca rubra	Red Fescue	LF	1%
Heracleum sphondylium	Common Hogweed	O	<1%
Holcus lanatus	Yorkshire-fog	F	5%
Impatiens glandulifera	Indian Balsam	F	20%
Juncus effusus	Soft-rush	LF	5%
Phalaris arundinacea	Reed Canary-grass	LA	5%
Plantago lanceolata	Ribwort Plantain	O	<1%
Poa trivialis	Rough Meadow-grass	LF	5%
Ranunculus repens	Creeping Buttercup	VLF	<1%
Rubus fruticosus agg.	Bramble	F	10%
Rumex acetosa	Common Sorrel	O	<1%
Rumex obtusifolius	Broad-leaved Dock	O	<1%
Senecio jacobaea	Common Ragwort	O	<1%
Taraxacum officinale agg.	Dandelion	O	<1%
Urtica dioica	Common Nettle	F	5%

[1]Key to DAFOR: D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species

Table 8.5: Plant Species List for Hedgerows

Scientific Name	Common Name	Hedgerow 3		Hedgerow 2		Hedgerow 5a		Hedgerow 5b		Hedgerow 6		Hedgerow 7	
		DAFOR	% Cover	DAFOR	% Cover	DAFOR	% Cover	DAFOR	% Cover	DAFOR	% Cover	DAFOR	% Cover
Woody Species													
Acer pseudoplatanus	Sycamore	-	-	-	-	-	-	-	-	LF	1%	-	-
Betula pendula	Silver Birch	-	-	R	<1%	-	-	-	-	-	-	-	-
Crataegus monogyna	Hawthorn	D*	100%	-	-	A*	80%	A*	95%	A*	90%	A*	90%
Cupressus sp.	Cypress species	-	-	-	-	-	-	-	-	LF	1%	-	-
Fagus sylvatica	Beech	-	-	D*	100%	-	-	-	-	-	-	-	-
Fraxinus excelsior	Ash	O	<1%	-	-	-	-	-	-	LF	2%	-	-
Ilex aquifolium	Holly	-	-	-	-	-	-	LF	5%	-	-	-	-
Ligustrum ovalifolium	Garden Privet	-	-	-	-	LA	10%	-	-	-	-	-	-
Malus sp.	Apple species	-	-	R	<1%			-	-	-	-	-	-
Prunus sp.	Cherry species	-	-	-	-	-	-	-	-	R	<1%	-	-
Prunus spinosa	Blackthorn	-	-	-	-	-	-	-	-	F	5%	F	5%
Salix caprea	Goat Willow	-	-	-	-	LF	5%	LF	5%	-	-	F	5%
Sambucus nigra	Elder	-	-	-	-	R	<1%	-	-	O	<1%	O	<1%
Herb Layer													
Aegopodium podagraria	Ground-elder	LA	<1%	-	-	-	-	-	-				
Alliaria petiolata	Garlic Mustard	-	-	LA	1%	-	-	VLF	<1%	-	-	-	-
Anthriscus sylvestris	Cow Parsley	-	-	O	<1%	O	<1%	-	-	-	-	VLF	1%
Cerastium fontanum	Common Mouse-ear	VLF	1%	-	-	-	-	-	-	-	-	-	-
Crocosmia sp.	Montbretia	-	-	-	-	-	-	LF	2%	-	-	-	-
Dactylis glomerata	Cock's-foot	-	-	LF	2%	-	-	F	5%	-	-	LF	1%
Dryopteris dilatata	Broad Buckler-fern	-	-	-	-	-	-	-	-	R	<1%	-	-
Dryopteris filix-mas	Male-fern	-	-	-	-	-	-	O	<1%	-	-	-	-
Epilobium hirsutum	Great Willowherb	O	<1%	-	-	-	-	-	-	-	-	-	-
Fallopia japonica	Japanese Knotweed	-	-	-	-	-	-	-	-	-	-	LVA	5%
Festuca rubra	Red Fescue	-	-	LF	5%	-	-	-	-	-	-	-	-
Galium aparine	Cleavers	F*	5%	-	-	F	2%	LF	1%	LF	<1%	VLA	<1%
Geranium robertianum	Herb Robert	-	-	-	-	-	-	VLF	<1%	-	-	-	-
Hedera helix	Ivy	F*	10%	A*	90%	A*	10%	A*	30%	-	-	-	-
Heracleum sphondylium	Common Hogweed	-	-	-	-	-	-	-	-	-	-	O	<1%
Impatiens glandulifera	Indian Balsam	-	-	-	-	-	-	-	-	LA	<1%	-	-
Lamium album	White Dead-nettle	-	-	-	-	-	-	-	-	-	-	VLA	<1%
Lolium perenne	Perennial Rye-grass	LF	<1%	-	-	-	-	-	-	-	-	-	-
Myosotis arvensis	Field Forget-me-not	VLF	<1%	-	-	-	-	-	-	-	-	-	-
Ranunculus repens	Creeping Buttercup	-	-	-	-	-	-	VLA	<1%	-	-	-	-
Rubus fruticosus agg.	Bramble	F/LA*	20%	-	-	A*	10%	LA*	5%	A*	5%	A*	20%
Rubus idaeus	Raspberry	-	-	-	-	-	-	-	-	-	-	VLA	<1%
Rumex obtusifolius	Broad-leaved Dock	O	<1%	-	-	O	<1%	-	-	-	-	-	-
Senecio jacobaea	Common Ragwort	-	-	-	-	-	-	O	<1%	-	-	O	<1%
Silene dioica	Red Campion	VLA	1%	-	-	-	-	-	-	-	-	-	-
Taraxacum officinale agg.	Dandelion	O	<1%	-	-	O	<1%	-	-	-	-	-	-
Urtica dioica	Common Nettle	-	-	-	-	F	5%	F*	5%	F	1%	LF	5%

[1]**Key to DAFOR:** D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species.
Species highlighted in grey are classed as either 'woody' or 'woodland' species contributing to *The Hedgerows Regulations 1997* wildlife and landscape criteria assessment.

Table 8.6: Hedgerow Description and Assessment in Accordance with *The Hedgerows Regulations 1997*

	Hedgerow Name	Hedgerow 3			Hedgerow 5a			Hedgerow 5b			Hedgerow 6			Hedgerow 7		
Description	Height x width (metres)	2 - 3 x 1			3 - 4 x 2			3 - 4 x 2 - 3			2 – 3 x 1			2 – 3 x 2		
	Length (metres)	110			88			86			430			192		
	Continuity	100%			95			100			100			80		
	Management	Trimmed on top and sides			Unmanaged			Unmanaged			Unmanaged			Unmanaged		
Woody Species	Section number[1]	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
	Qualifying woody species	2	1	-	3	-	-	3	-	-	2	1	2	2	2	2
	Average Number	***2 (1.5)***			***3***			***3***			***2 (1.6)***			***2***		
Number of Features Present	(a) Bank or wall along at least ½ length	No			No			No			No			No		
	(b) Gaps which in agg. do not exceed 10%	Yes			Yes			Yes			Yes			No		
	(c)-(e) 1 standard tree per 50m	No			No			No			No			No		
	(f) At least 3 woodland species within 1m	No			No			No			No			No		
	(g) Ditch along at least ½ its length	No			No			No			No			No		
	(h) Connections scoring 4 points or more	No			No			No			No			No		
	(i) Parallel hedge within 15m	No			No			No			No			No		
	Total Features	***1***			***1***			***1***			***1***			***0***		
Hedgerow Importance	***Criteria for Hedgerow Importance 1***	***No***			***No***			***No***			***No***			***No***		
	Criteria for Hedgerow Importance 2:	***No***			***No***			***No***			***No***			***No***		
	Criteria for Hedgerow Importance 3:	***No***			***No***			***No***			***No***			***No***		
Hedgerow Important Criteria	***Criteria for Hedgerow Importance 1:*** Hedgerow contains species listed as: (1) Part 1 of Schedule 1, Schedule 5 or Schedule 8 of *Wildlife and Countryside Act 1981* (as amended); (2) Declining breeders in 'Red Data Birds of Britain'; and / or (3) Categorised as 'endangered', 'extinct' or 'vulnerable'															
	Criteria for Hedgerow Importance 2: Hedgerow includes: (i) At least 7 woody species (on average); (ii) At least 6 woody species (on average) and at least 3 features; (iii) At least 6 woody species (on average), including one of: Black Poplar, Large-leaved Lime, Small-leaved Lime or Wild Service Tree; and / or; (iv) At least 5 woody species (on average), and has 4 features															
	Criteria for Hedgerow Importance 3: Is adjacent to is adjacent to a bridleway, footpath or byway and includes at least 4 woody species on average and 2 features from (a) to (g).															

[1]Up to and including 100 metres length = 1 section required. 100 to 200 metres length = 2 sections required. Greater than 200 metres length = 3 sections required.

Note: Hedgerow 4 not assessed as this is adjacent to a garden

Table 8.7: Plant Species List for the Disused Railway Corridor at Target Note 9

Scientific Name	Common Name	DAFOR[1]	Cover
Woody Species			
Acer pseudoplatanus	Sycamore	F	5%
Betula pendula	Silver Birch	O	<1%
Crataegus monogyna	Hawthorn	O	<1%
Fraxinus excelsior	Ash	LF	1%
Ilex aquifolium	Holly	O	<1%
Quercus robur	Pedunculate Oak	A*	70%
Sambucus nigra	Elder	O	<1%
Herb Species			
Alliaria petiolata	Garlic Mustard	VLF	<1%
Cardamine flexuosa	Wavy Bitter-cress	VLF	<1%
Carex pendula	Pendulous Sedge	VLA	<1%
Dactylis glomerata	Cock's-foot	LF	1%
Digitalis purpurea	Foxglove	R	<1%
Epilobium hirsutum	Great Willowherb	VLA	<1%
Galium aparine	Cleavers	VLF	<1%
Geranium robertianum	Herb-Robert	VLF	<1%
Hedera helix	Ivy	LA	5%
Impatiens glandulifera	Indian Balsam	A*	80%
Plantago lanceolata	Ribwort Plantain	R	<1%
Poa annua	Annual Meadow-grass	LF	1%
Prunella vulgaris	Selfheal	VLF	<1%
Ranunculus repens	Creeping Buttercup	VLF	<1%
Rubus fruticosus agg.	Bramble	LF	5%
Senecio jacobaea	Common Ragwort	O	<1%
Silene dioica	Red Campion	VLF	<1%
Urtica dioica	Common Nettle	F	5%

[1]Key to DAFOR: D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species

Table 8.8: Plant Species List for the Woodland at Target Note 10

Scientific Name	Common Name	DAFOR[1]	Cover
Woody Species			
Acer pseudoplatanus	Sycamore	VLA	2%
Betula pendula	Silver Birch	F/LA	20%
Crataegus monogyna	Hawthorn	LF	5%
Fraxinus excelsior	Ash	LF	5%
Ilex aquifolium	Holly	R	<1%
Populus sp.	Poplar species	LF	5%
Prunus lusitanica	Portuguese Laurel	VLA	2%
Quercus robur	Pedunculate Oak	F*	30%
Sambucus nigra	Elder	O	1%
Herb Species			
Alliaria petiolata	Garlic Mustard	VLA	<1%
Digitalis purpurea	Foxglove	R	<1%
Epilobium hirsutum	Great Willowherb	VLA	5%
Galium aparine	Cleavers	VLA	2%
Geranium robertianum	Herb-Robert	O	<1%
Hedera helix	Ivy	F	5%
Lamiastrum galeobdolon subsp. argentatum	Variegated Yellow Archangel	VLA	2%
Rubus fruticosus agg.	Bramble	F/LA	10%
Silene dioica	Red Campion	VLF	2%
Urtica dioica	Common Nettle	F	5%

[1]Key to DAFOR: D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local and *denotes a constant species

Table 8.9: Summary of Licensed Daylight Survey and Assessment of Buildings

Building Reference (refer to **Figure 3**)	Description	Photo References	Assessment (based on Table 4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016))
B1: Workshop	Long and narrow (46 metres by 9 metres) single storey steel framed and concrete block workshop with a pitched corrugated sheet covered roof. The building is divided internally with concrete block partition walls. Large metal roller doors are present on the southern elevation. The northern portion of the building is open. Examination of the exterior and interior did not detect any bats or evidence of use by bats. The concrete block walls are well-mortared and pointed on both sides and the wall tops are sealed. No overhanging fascia or boards which may provide potential roost features and access for bats were found. No bats or evidence of previous use by roosting bats was found.	Photos 23 to 27	Low as the absence of roosting bats cannot be determined following a daylight inspection alone.
B2: Store	Single storey brick building with a flat concrete slab covered roof. The brick work is well pointed and sealed on the external and internal sides. An open doorway is present on the eastern elevation. No bats or evidence of previous use by roosting bats was found.	Photos 28 to 30	Negligible
B3: Store	Brick building with a pitched slate covered roof. Gaps suitable for access by roosting bats are present at the roof verge on the gable ends. No access to interior possible. No bats or evidence of previous use by roosting bats was found.	No photo	**Moderate**
B4: Store	Single storey brick building with a flat concrete slab covered roof. The brick work is well pointed and sealed on the external and internal sides. An open doorway is present on the eastern elevation. No bats or evidence of previous use by roosting bats was found.	Photos 31 and 32	Negligible
B5, B6 and B7: Greenhouses	Glasshouses. No bats or evidence of previous use by roosting bats was found. No potential roost features present.	Photo 33	Negligible
B8: Timber shed	Timber shed with a pitched felt covered roof. No bats or evidence of previous use by roosting bats was found. No potential roost features present.	Photo 33	Negligible
B9: Timber shed	Timber shed with a pitched felt covered roof. No bats or evidence of previous use by roosting bats was found. No potential roost features present.	Photo 34	Negligible
B10: Dilapidated store	Partially collapsed pre-fabricated store. No bats or evidence of previous use by roosting bats was found. No potential roost features present.	Photo 35	Negligible
B11: Timber shed	Timber shed with a pitched felt covered roof. No bats or evidence of previous use by roosting bats was found. No potential roost features present.	Photo 36	Negligible
Bridge at Firswood Road	The bridge that carries Firswood Road over the disused railway line has stone abutments and a stone lined underarch. The stone sets are tightly fitted; no gaps or opportunities for use by roosting bats were detected.	Photo 37	Negligible

Table 8.10: Results of Licensed Bat Survey and Assessment of Trees

Tree Number (in accordance with Arboricultural Impact Assessment report (Ascerta, December 2019))	**Species**	**Description**	**Actions Proposed**	**Presence of Potential Roost Features (PRF)**	**Photo Reference**	**Assessment** (based on Table 4.1 of the *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)* (Collins, J. (ed), 2016)) **and scope of works proposed**
T5	Silver Birch	Single tree within area of improved grassland	Removal likely to facilitate development	Rotten tree with decay on side. No cavity but lifted bark present. Inspection in February 2020 did not detect a bat or evidence of use by roosting bats.	Photo 38	Low
G7.1	Pedunculate Oak	Mature tree on north side of the disused railway corridor (west)	Retention feasible	Snagged branches on southern side and split with deadwood. No deep cavity present.	Photo 39	Low
G7.2	Pedunculate Oak	Mature tree on north side of the disused railway corridor (west)	Retention feasible	Snagged branches on southern side x 2 at 4 and 5 metres from ground level. Cavity not likely but surface features (i.e. gaps between lifted / snagged timber) present.	Photo 40	Low
G7.3	Pedunculate Oak	Three stemmed mature tree on north side of the disused railway corridor (west)	Retention feasible	Easternmost stem is leaning and damage is creating a developing hazard beam at the end. Inspection in February 2020 did not detect a bat or evidence of use by roosting bats	Photo 41	Low
G7.4	Pedunculate Oak	Three stemmed mature tree on south side of the disused railway corridor (west)	Retention feasible	Knothole on west side at 1 metre from ground level. Inspection confirmed that the knothole is currently blind and only extends 0.05 metres into trunk.	Photo 42	Negligible
GW.1	Goat Willow	Semi-mature tree	Removal likely to facilitate development	Hazard beam present at 0.5 metres from ground level. Inspection in February 2020 did not detect a bat or evidence of use by roosting bats.	Photo 43	Low
W2.1	Cherry	Young to semi-mature tree	Retention feasible dependent on width of working area for the construction of the access road	Knothole present at 0.6 metres from ground level on southern side. Extends 0.3 metres upwards into the trunk. Inspection in February 2020 did not detect a bat or evidence of use by roosting bats.	Photo 44	Low
G9.1	Sycamore	Semi-mature	Removal likely to facilitate development	Two adjacent trees with Ivy cover.	Photo 45	Low

Table 8.11: Results of Habitat Suitability Index Assessment of Ponds 1, 2 and 3

Pond Reference:	Pond 1		Pond 2		Pond 3	
Suitability Index Criteria	**Description**	**Score[1]**	**Description**	**Score[1]**	**Description**	**Score[1]**
SI_1 Geographical Location	Optimal	1	Optimal	1	Optimal	1
SI_2 Pond Area	1450m²	0.9	800m²	0.98	1300m²	0.9
SI_3 Pond Drying	Never dries	0.9	Never dries	0.9	Never dries	0.9
SI_4 Water Quality	Poor	0.33	Moderate	0.67	Moderate	0.67
SI_5 Shade	90%	0.4	0%	1	0%	1
SI_6 Waterfowl	Minor	0.67	Absent	1	Absent	1
SI_7 Fish	Possible	0.67	Major	0.01	Major	0.01
SI_8 Abundance of Other Ponds[2]	1.6	0.75	1.6	0.75	1.6	0.75
SI_9 Quality of Terrestrial Habitat	Poor	0.33	Poor	0.33	Poor	0.33
SI_{10} Macrophyte Cover	0%	0.3	5%	0.35	5%	0.35
Assessment Result:	**Below average**	**0.57**	**Poor**	**0.47**	**Poor**	**0.46**

[1]Calculated by (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/10
[2]Ponds within an unobstructed one kilometre radius divided by 3.14
Key to DAFOR (i.e. species abundance codes): D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local

Table 8.12: Results of Habitat Suitability Index Assessment of Ponds 5, 6 and 7

Pond Reference:	Pond 5		Pond 6		Pond 7	
Suitability Index Criteria	**Description**	**Score[1]**	**Description**	**Score[1]**	**Description**	**Score[3]**
SI_1 Geographical Location	Optimal	1	Optimal	1	Optimal	1
SI_2 Pond Area	613m²	1	800m²	0.98	>2000m²	-
SI_3 Pond Drying	Never dries	0.9	Never dries	0.9	Never dries	0.9
SI_4 Water Quality	Moderate	0.67	Moderate	0.67	Moderate	0.67
SI_5 Shade	5%	1	5%	1	15%	1
SI_6 Waterfowl	Absent	1	Absent	1	Minor	0.67
SI_7 Fish	Absent	1	Absent	1	Absent	1
SI_8 Abundance of Other Ponds[2]	1.6	0.75	1.6	0.75	1.6	0.75
SI_9 Quality of Terrestrial Habitat	Poor	0.33	Poor	0.33	Poor	0.33
SI_{10} Macrophyte Cover	20%	0.5	0%	0.3	50%	0.8
Assessment Result:	**Good**	**0.77**	**Good**	**0.73**	**Good**	**0.76**

[1]Calculated by (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/10
[2]Ponds within an unobstructed one kilometre radius divided by 3.14
[3] Calculated by (SI1 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/9
Key to DAFOR (i.e. species abundance codes): D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local

Table 8.13: Results of Habitat Suitability Index Assessment of Pond 8

Pond Reference:	Pond 8	
Suitability Index Criteria	**Description**	**Score[1]**
SI_1 Geographical Location	Optimal	1
SI_2 Pond Area	50m²	0.05
SI_3 Pond Drying	Never dries	0.9
SI_4 Water Quality	Poor	0.33
SI_5 Shade	50%	1
SI_6 Waterfowl	Minor	0.67
SI_7 Fish	Possible	0.67
SI_8 Abundance of Other Ponds[2]	1.6	0.75
SI_9 Quality of Terrestrial Habitat	Moderate	0.67
SI_{10} Macrophyte Cover	5%	0.325
Assessment Result:	**Below average**	**0.51**

[1]Calculated by (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/10
[2]Ponds within an unobstructed one kilometre radius divided by 3.14
Key to DAFOR (i.e. species abundance codes): D=Dominant, A=Abundant, F=Frequent, O=Occasional, R=Rare, V=Very, L=Local

Table 8.14: Activity Survey 1, Date: 17th August 2020, Sunset time: 20:32, Start time: 20:15

Note: All activity is one bat unless stated.

Survey Position 1: Sue Lonsdale: B1

Time	Species	Notes
20:49	Common pipistrelle	Foraging behind surveyor
20:52 to 21:05	Common pipistrelle	Flew into open sided northern part of B1 to forage
21:09 to 21:15	Soprano pipistrelle	Flew into open sided northern part of B1 to forage
21:18	Common pipistrelle	Foraging at barn entrance
21:21	Common pipistrelle	Pass
21:30	Common pipistrelle	Foraging at barn entrance
21:32	Common pipistrelle	Two bats chasing
21:34 to 21:50	Common pipistrelle	Foraging at barn entrance
21:56	Common pipistrelle	Flew into open sided northern part of B1 to forage
22:05	Common pipistrelle	Pass
The Anabat Express made the following recordings: 143 recordings of common pipistrelle between 20:50 and 22:15; and 20 recordings of soprano pipistrelle between 21:10 and 21:15.		

Survey Position 2: Danielle Rowlands: B1

Time	Species	Notes
21:03	Common pipistrelle	Brief pass, heard not seen
21:05	Common pipistrelle	Brief pass, heard not seen
21:09	Common pipistrelle	Pass
21:15	Common pipistrelle	Pass
21:16	Common pipistrelle	Pass
21:18	Common pipistrelle	Pass
21:20	Common pipistrelle	Pass
21:26	Noctule	Pass over site
21:30	Common pipistrelle	Pass
21:31	Common pipistrelle	Pass
21:34	Common pipistrelle	Pass
21:41	Common pipistrelle	Pass with social calls
21:49	Common pipistrelle	Pass with social calls
21:53	Common pipistrelle	Pass with social calls
21:56	Common pipistrelle	Pass with social calls
The Anabat Express made the following recordings: 13 recordings of common pipistrelle between 21:03 and 21:56; and 2 recordings of noctule at 21:26 and 21:32.		

Survey Position 3: Victoria Burrows: B3

Time	Species	Notes
21:01	Common pipistrelle	Brief pass
21:19	Common pipistrelle	Brief pass
21:23	Common pipistrelle	Brief pass
21:31	Common pipistrelle	Brief pass
21:41	Common pipistrelle	Brief pass
The Anabat SD2 made the following recordings: 3 recordings of common pipistrelle at 21:01, 21:19 and 21:23.		

Survey Position 4: Amy Sharples: B3

Time	Species	Notes
22:00 to 22:06	Common pipistrelle	Passes
The Anabat Express made the following recordings: 9 recordings of common pipistrelle between 22:00 and 22:06.		

Table 8.15: Activity Survey 2, Date: 31st August 2020, Sunset time: 20:02, Start time: 19:45

Survey Position 3: Amy Sharples: B3

Time	Species	Notes
21:12 to 21:15	Common pipistrelle	Foraging over trees
The Anabat Express made the following recordings: 5 recordings of common pipistrelle between 21:12 and 22:15.		

Survey Position 4: Lee Moat: B3

Time	Species	Notes
The Anabat Express made the following recordings: 1 *Myotis* pass at 20:45.		

Table 8.16: Results of the 17th April 2020 Breeding Bird Survey

Scientific Name	Common Name	Times observed	Total seen	Priority Species?	BOCC	Singing	Calling	Alarm call	In flight	Male	Female	None	Family	Food	Juvenile	In site boundary	Outside site boundary
Turdus merula	Blackbird	22	23		Green	20	1	0	0	1	0	2	0	0	0	15	8
Sylvia atricapilla	Blackcap	3	3		Green	3	0	0	0	0	0	0	0	0	0	2	1
Pyrrhula pyrrhula	Bullfinch	1	1	Yes	Amber	0	0	1	0	1	0	0	0	0	0	0	1
Cyanistes caeruleus	Blue tit	10	10		Green	1	5	2	0	0	0	0	0	0	0	6	4
Corvus corone corone	Carrion crow	2	2		Green	0	2	0	0	0	0	0	0	0	0	1	1
Phylloscopus collybita	Chiffchaff	3	3		Green	3	0	0	0	0	0	0	0	0	0	1	2
Streptopelia decaocto	Collared dove	5	6		Green	4	0	0	0	0	0	2	0	0	0	3	3
Branta canadensis	Canada goose	1	2		Green	0	0	0	2	0	0	0	0	0	0	0	2
Fringilla coelebs	Chaffinch	12	12		Green	12	0	0	0	0	0	0	0	0	0	5	7
Parus ater	Coal tit	1	1		Green	0	0	1	0	0	0	0	0	0	0	1	0
Prunella modularis	Dunnock	5	5	Yes	Amber	5	0	0	0	0	0	0	0	0	0	4	1
Regulus regulus	Goldcrest	1	1		Green	1	0	0	0	0	0	0	0	0	0	1	0
Carduelis carduelis	Goldfinch	4	6		Green	2	2	0	0	0	0	2	0	0	0	4	2
Carduelis chloris	Greenfinch	6	6		Green	0	1	5	0	5	0	0	0	0	0	1	5
Parus major	Great tit	3	3		Green	0	0	3	0	0	0	0	0	0	0	1	2
Passer domesticus	House sparrow	9	17	Yes	Red	0	5	2	0	5	0	10	0	0	0	0	17
Corvus monedula	Jackdaw	1	2		Green	0	0	0	2	0	0	0	0	0	0	2	0
Larus fuscus	Lesser black-backed gull	1	2		Amber	0	0	0	2	0	0	0	0	0	0	0	2
Anas platyrhynchos	Mallard	1	1		Amber	0	0	0	0	0	0	1	0	0	0	0	1
Pica pica	Magpie	3	5		Green	0	0	0	0	0	0	5	0	0	0	3	2
Gallinula chloropus	Moorhen	1	1		Green	0	0	0	0	0	0	1	0	0	0	0	1
Phasianus colchicus	Pheasant	2	2		Green	0	2	0	0	1	0	0	0	0	0	1	1
Erithacus rubecula	Robin	16	16		Green	16	0	0	0	0	0	0	0	0	0	6	10
Turdus philomelos	Song thrush	2	2	Yes	Red	2	0	0	0	0	0	0	0	0	0	2	0
Certhia familiaris	Treecreeper	1	1		Green	0	0	0	0	0	0	1	0	0	0	1	0
Columba palumbus	Wood pigeon	16	17		Green	14	0	0	0	0	0	3	0	0	0	9	8
Troglodytes troglodytes	Wren	22	22		Green	22	0	0	0	0	0	0	0	0	0	12	10
Phylloscopus trochilus	Willow warbler	2	2		Amber	1	1	0	0	0	0	0	0	0	0	1	1

Table 8.17: Results of the 15th May 2020 Breeding Bird Survey

Scientific Name	Common Name	Times observed	Total seen	Priority Species?	BOCC	Singing	Calling	Alarm call	In flight	Male	Female	None	Family	Food	Juvenile	In site boundary	Outside site boundary
Turdus merula	Blackbird	20	22		Green	16	1	0	0	5	0	4	0	0	0	13	9
Sylvia atricapilla	Blackcap	10	10		Green	10	0	0	0	0	0	0	0	0	0	7	3
Larus ridibundus	Black-headed gull	1	3		Amber	0	0	0	3	0	0	0	0	0	0	0	3
Cyanistes caeruleus	Blue tit	7	7		Green	0	2	2	1	0	0	1	0	0	0	5	2
Corvus corone corone	Carrion crow	3	4		Green	1	1	0	0	0	0	2	0	0	0	1	3
Phylloscopus collybita	Chiffchaff	8	8		Green	8	0	0	0	0	0	0	0	0	0	5	3
Streptopelia decaocto	Collared dove	6	6		Green	6	0	0	0	0	0	0	0	0	0	0	6
Fringilla coelebs	Chaffinch	10	10		Green	10	0	0	0	0	0	0	0	0	0	3	7
Prunella modularis	Dunnock	14	14	Yes	Amber	12	2	0	0	0	0	0	0	0	0	8	6
Regulus regulus	Goldcrest	4	4		Green	4	0	0	0	0	0	0	0	0	0	1	3
Carduelis carduelis	Goldfinch	4	6		Green	2	0	0	0	0	0	4	0	0	0	5	1
Carduelis chloris	Greenfinch	5	5		Green	0	0	5	0	4	0	0	0	0	0	2	3
Parus major	Great tit	6	6		Green	0	2	4	0	0	0	0	0	0	0	4	2
Passer domesticus	House sparrow	10	13	Yes	Red	0	2	7	0	9	0	4	0	0	0	0	13
Corvus monedula	Jackdaw	1	2		Green	0	0	0	0	0	0	2	0	0	0	0	2
Larus fuscus	Lesser black-backed gull	2	2		Amber	0	0	0	2	0	0	0	0	0	0	0	2
Aegithalos caudatus	Long-tailed tit	2	4		Green	0	0	0	0	0	0	4	0	0	0	4	0
Anas platyrhynchos	Mallard	1	1		Amber	0	0	0	0	0	0	1	0	0	0	0	1
Pica pica	Magpie	3	3		Green	0	0	0	0	0	0	3	0	0	0	1	2
Gallinula chloropus	Moorhen	1	1		Green	0	0	0	0	0	0	1	0	0	0	0	1
Sitta europaea	Nuthatch	1	1		Green	0	1	0	0	0	0	0	0	0	0	0	1
Phasianus colchicus	Pheasant	2	2		Green	0	1	1	0	2	0	0	0	0	0	0	2
Motacilla alba	Pied wagtail	1	1		Green	0	0	0	0	0	0	1	0	0	0	1	0
Erithacus rubecula	Robin	17	17		Green	16	1	0	0	0	0	0	0	0	0	9	8
Corvus frugilegus	Rook	2	29		Green	0	0	0	4	0	0	25	0	0	0	29	0
Sturnus vulgaris	Starling	4	4	Yes	Red	1	2	0	1	0	0	0	0	0	0	1	3
Accipiter nisus	Sparrowhawk	1	1		Green	0	0	0	1	0	0	0	0	0	0	1	0
Turdus philomelos	Song thrush	4	4	Yes	Red	3	0	0	0	0	0	0	1	0	0	3	1
Certhia familiaris	Treecreeper	1	1		Green	0	0	1	0	0	0	0	0	0	0	1	0
Columba palumbus	Wood pigeon	25	29		Green	20	0	0	0	0	0	9	0	0	0	18	11
Troglodytes troglodytes	Wren	19	19		Green	19	0	0	0	0	0	0	0	0	0	10	9

Table 8.18: Results of the 10th June 2020 Breeding Bird Survey

Scientific Name	Common Name	Times observed	Total seen	Priority Species?	BOCC	Singing	Calling	Alarm call	In flight	Male	Female	None	Family	Food	Juvenile	In site boundary	Outside site boundary
Turdus merula	Blackbird	24	26		Green	18	0	0	0	5	1	3	0	5	0	12	14
Sylvia atricapilla	Blackcap	8	8		Green	8	0	0	0	0	0	0	0	0	0	3	5
Larus ridibundus	Black-headed gull	1	1		Amber	0	0	0	1	0	0	0	0	0	0	0	1
Cyanistes caeruleus	Blue tit	6	6		Green	0	2	0	0	0	0	0	4	0	0	4	2
Pyrrhula pyrrhula	Bullfinch	1	1	Yes	Amber	0	0	0	0	0	0	1	0	0	0	0	1
Corvus corone corone	Carrion crow	1	1		Green	0	0	0	0	0	0	1	0	0	0	0	1
Fringilla coelebs	Chaffinch	5	5		Green	5	0	0	0	0	0	0	0	0	0	3	2
Phylloscopus collybita	Chiffchaff	8	8		Green	8	0	0	0	0	0	0	0	0	0	5	3
Parus ater	Coal tit	1	1		Green	0	0	0	0	0	0	0	1	0	0	0	1
Streptopelia decaocto	Collared dove	4	6		Green	2	0	0	0	0	0	4	0	0	0	0	6
Prunella modularis	Dunnock	11	11	Yes	Amber	9	1	0	0	0	0	0	1	0	0	6	5
Regulus regulus	Goldcrest	3	3		Green	2	0	0	0	0	0	0	1	0	0	0	3
Carduelis carduelis	Goldfinch	4	4		Green	4	0	0	0	0	0	0	0	0	0	2	2
Dendrocopos major	Great spotted woodpecker	1	1		Green	0	0	1	0	0	0	0	0	0	0	1	0
Parus major	Great tit	4	4		Green	0	1	0	0	0	0	0	2	1	0	2	2
Carduelis chloris	Greenfinch	6	6		Green	0	2	4	0	5	0	0	0	0	0	4	2
Delichon urbica	House martin	1	6		Amber	0	0	0	6	0	0	0	0	0	0	0	6
Passer domesticus	House sparrow	9	21	Yes	Red	0	2	3	0	7	0	16	0	0	0	9	12
Corvus monedula	Jackdaw	4	7		Green	0	1	0	6	0	0	0	0	0	0	6	1
Garrulus glandarius	Jay	1	1		Green	0	1	0	0	0	0	0	0	0	0	0	1
Falco tinnunculus	Kestrel	1	1		Amber	0	0	0	0	0	0	1	0	0	0	1	0
Larus fuscus	Lesser black-backed gull	5	7		Amber	0	0	0	7	0	0	0	0	0	0	1	6
Aegithalos caudatus	Long-tailed tit	1	1		Green	0	0	0	0	0	0	0	1	0	0	1	0
Pica pica	Magpie	4	5		Green	0	0	0	0	0	0	3	2	0	0	3	2
Anas platyrhynchos	Mallard	1	1		Amber	0	0	0	0	0	0	1	0	0	0	0	1
Turdus viscivorus	Mistle thrush	1	0		Amber	0	0	0	0	0	0	0	0	0	0	0	1
Gallinula chloropus	Moorhen	1	1		Green	0	0	0	0	0	0	0	1	0	0	0	1
Sitta europaea	Nuthatch	1	1		Green	0	1	0	0	0	0	0	0	0	0	1	0
Phasianus colchicus	Pheasant	1	1		Green	0	0	0	0	0	0	1	0	0	0	0	1
Motacilla alba	Pied wagtail	2	2		Green	0	0	0	0	0	0	1	0	1	0	2	0
Erithacus rubecula	Robin	13	13		Green	8	0	0	0	0	0	0	2	1	2	7	6
Corvus frugilegus	Rook	1	20		Green	0	0	0	0	0	0	20	0	0	0	20	0
Turdus philomelos	Song thrush	6	5	Yes	Red	5	0	0	0	0	0	0	0	0	0	2	3
Sturnus vulgaris	Starling	1	1	Yes	Red	0	1	0	0	0	0	0	0	0	0	0	1
Hirundo rustica	Swallow	1	4		Green	0	0	0	4	0	4	0	0	0	0	0	4
Certhia familiaris	Treecreeper	1	1		Green	0	0	0	0	0	0	0	1	0	0	1	0
Phylloscopus trochilus	Willow warbler	5	5		Amber	5	0	0	0	0	0	0	0	0	0	2	3
Columba palumbus	Wood pigeon	20	29		Green	16	0	0	0	0	0	13	0	0	0	21	8
Troglodytes troglodytes	Wren	19	19		Green	19	0	0	0	0	0	0	0	0	0	10	9

9.0 APPENDIX 2: FIGURES

Figure 1: Aerial Image Showing Designated Sites within a 2 kilometre Radius

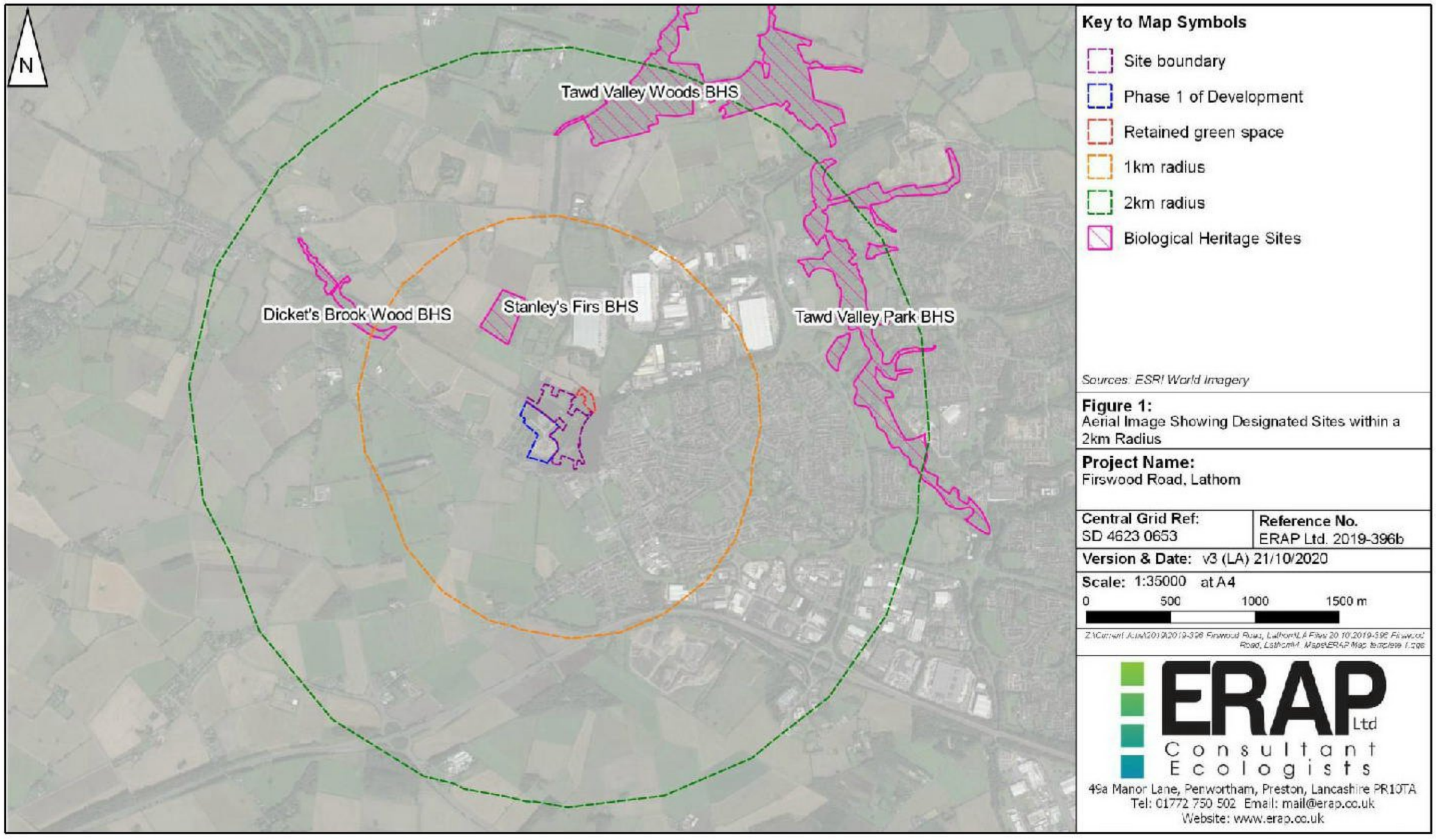

Figure 2: **Ponds within a 500 metre Radius of the Site Boundary**

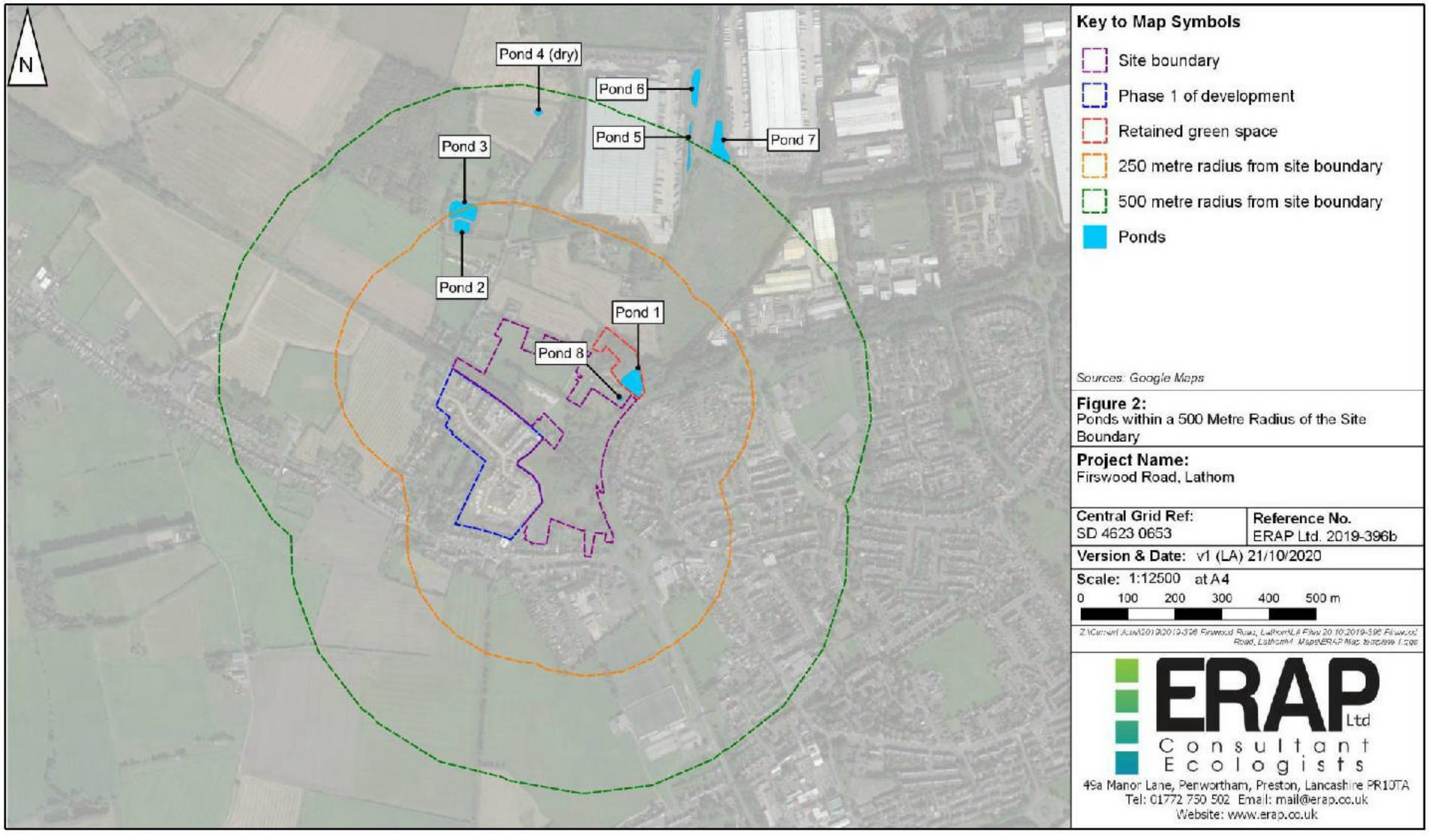

Figure 3: Phase 1 Habitat and Vegetation Map

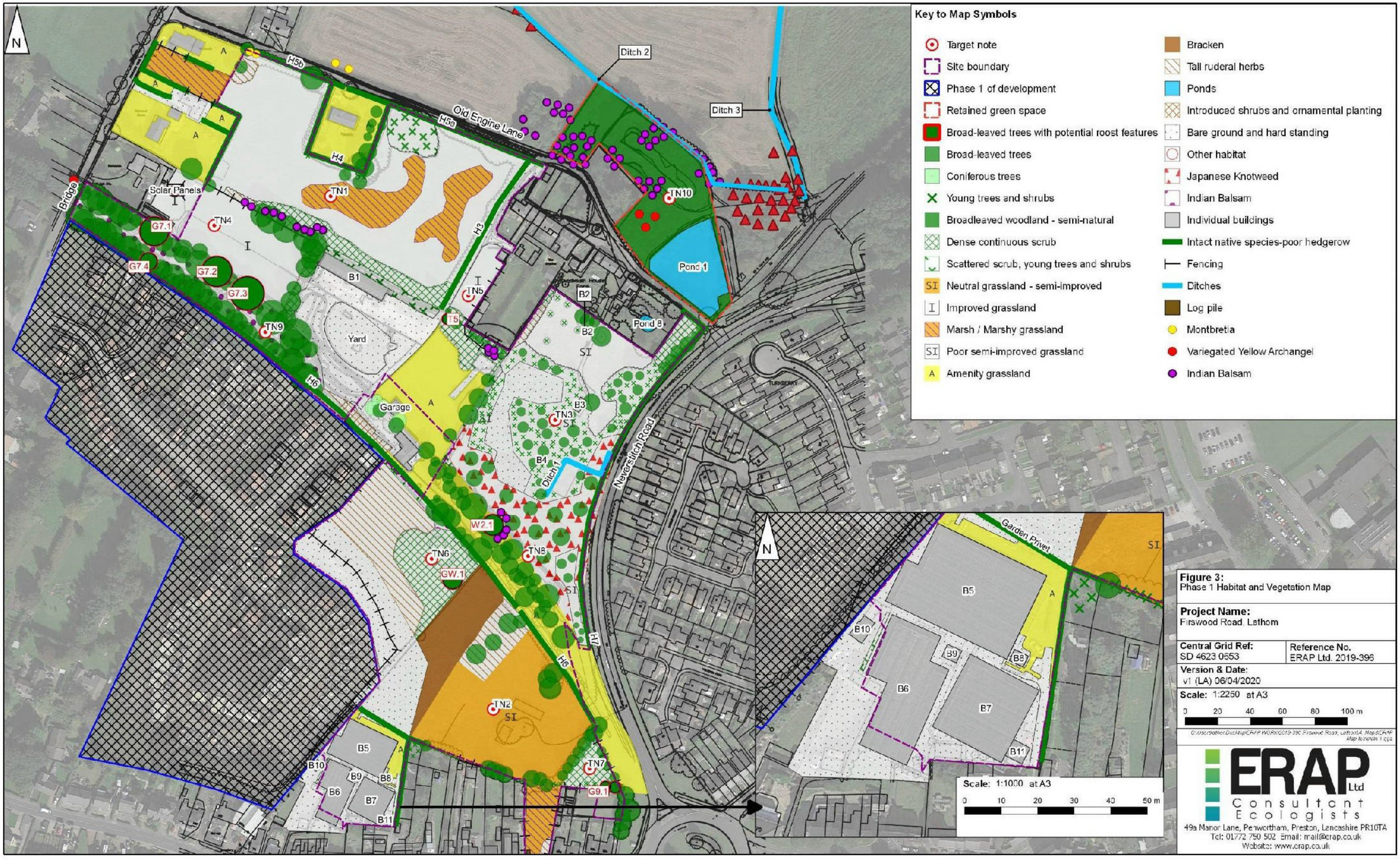

Figure 4: **Phase 1 Habitat and Vegetation Map showing Surveyor Positions during Dusk Emergence Surveys**

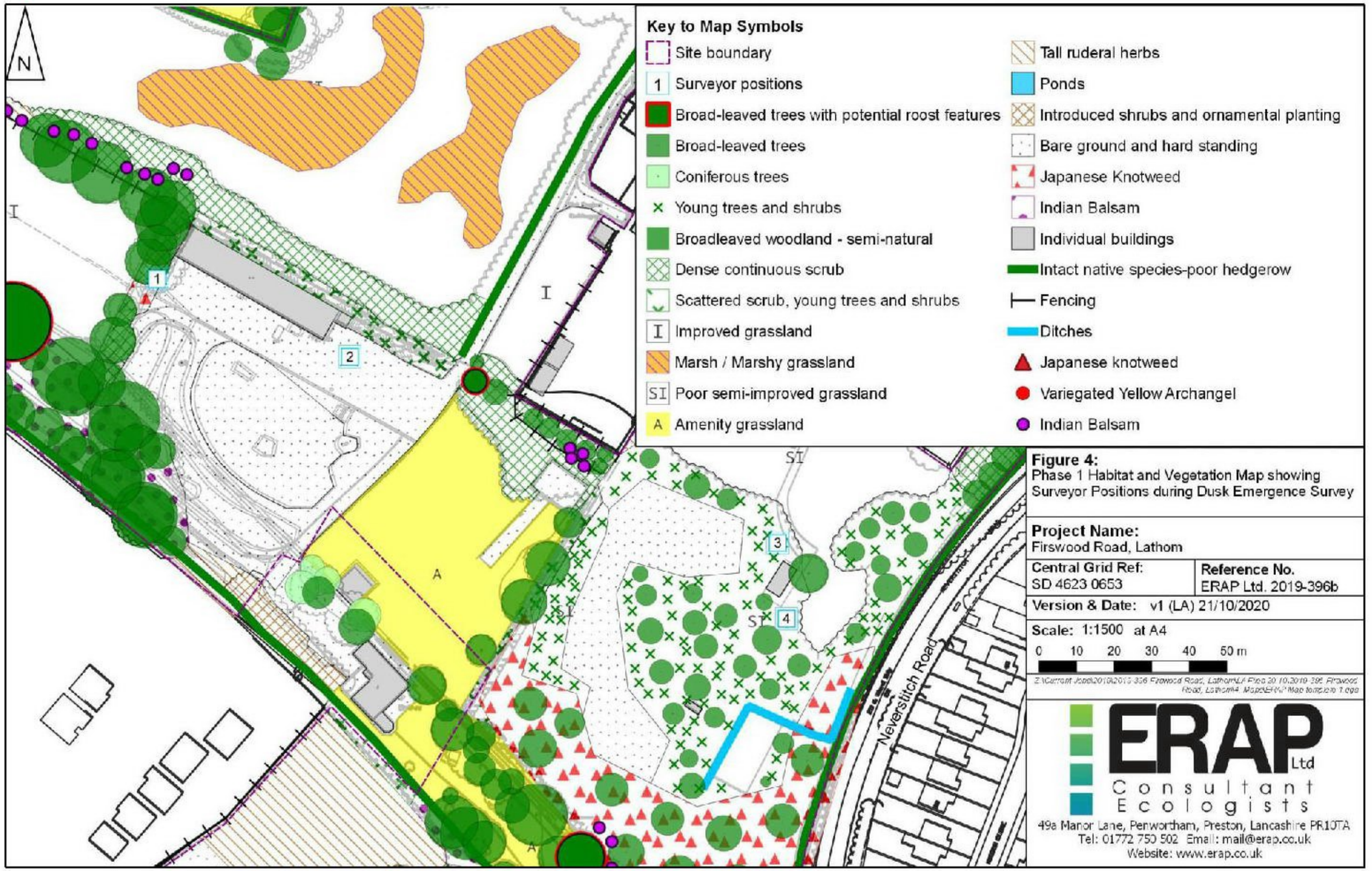

Figure 5: Results of Breeding Bird Survey on 17th April 2020

Code	Common name
B.	Blackbird
BC	Blackcap
BF	Bullfinch
BT	Blue tit
C.	Carrion crow
CC	Chiffchaff
CD	Collared dove
CG	Canada goose
CH	Chaffinch
CT	Coal tit
D.	Dunnock
GC	Goldcrest
GO	Goldfinch
GR	Greenfinch
GT	Great tit
HS	House sparrow
JD	Jackdaw
LB	Lesser black-backed gull
MA	Mallard
MG	Magpie
MH	Moorhen
PH	Pheasant
R.	Robin
ST	Song thrush
TC	Treecreeper
WP	Wood pigeon
WR	Wren
WW	Willow warbler

Figure 6: Results of Breeding Bird Survey on 15th May 2020

Code	Common name
B.	Blackbird
BC	Blackcap
BH	Black-headed gull
BT	Blue tit
C.	Carrion crow
CC	Chiffchaff
CD	Collared dove
CH	Chaffinch
D.	Dunnock
GC	Goldcrest
GO	Goldfinch
GR	Greenfinch
GT	Great tit
HS	House sparrow
JD	Jackdaw
LB	Lesser black-backed gull
LT	Long-tailed tit
MA	Mallard
MG	Magpie
MH	Moorhen
NH	Nuthatch
PH	Pheasant
PW	Pied wagtail
R.	Robin
RO	Rook
SG	Starling
SH	Sparrowhawk
ST	Song thrush
TC	Treecreeper
WP	Wood pigeon

Key to Map Symbols

- Site boundary
- Feeding (Feeding)
- Singing
- Fam. (Fam.)
- Calling
- Food (Food)
- Alarm call
- Male
- In flight
- Male & Female

Figure 6:
Results of Breeding Bird Survey on 15th May 2020

Project Name:
Firswood Road, Lathom

Central Grid Ref: SD 4623 0653

Reference No. ERAP Ltd. 2019-396b

Version & Date: v2 (LA) 21/10/2020

Scale: 1:2500 at A3

0 20 40 60 80 100 m

ERAP Ltd
Consultant Ecologists
49a Manor Lane, Penwortham, Preston, Lancashire PR1 0TA
Tel: 01772 750 502 Email: mail@erap.co.uk
Website: www.erap.co.uk

Figure 7: Results of Breeding Bird Survey on 10th June 2020

Code	Common name
B.	Blackbird
BC	Blackcap
BF	Bullfinch
BH	Black-headed gull
BT	Blue tit
C.	Carrion crow
CC	Chiffchaff
CD	Collared dove
CH	Chaffinch
D.	Dunnock
GC	Goldcrest
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
HM	House martin
HS	House sparrow
J.	Jay
JD	Jackdaw
LB	Lesser black-backed gull
LT	Long-tailed tit
MA	Mallard
MG	Magpie
MH	Moorhen
PH	Pheasant
R.	Robin
SL	Swallow
ST	Song thrush
WP	Wood pigeon
WR	Wren
WW	Willow warbler

Key to Map Symbols

- Site boundary
- Feeding (Feeding)
- Singing
- Fam. (Fam.)
- Calling
- Food (Food)
- Alarm call
- Male
- In flight
- Male & Female

Figure 7:
Results of Breeding Bird Survey on 10th June 2020

Project Name:
Firswood Road, Lathom

Central Grid Ref: SD 4623 0653

Reference No. ERAP Ltd. 2019-396b

Version & Date: v2 (LA) 21/10/2020

Scale: 1:2500 at A3

0 20 40 60 80 100 m

Z:\Current Jobs\2019\2019-396 Firswood Road, Lathom\LA Files\20.10.20\19-396 Firswood Road, Lathom.A Maps\ERAP Map Template 1.2020

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Website: www.erap.co.uk

SureScreen Scientifics

Folio No: E7386
Report No: 1
Purchase Order: ERAP Ltd 2019/3966
Client: ERAP LTD
Contact: Victoria Burrows

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 15/05/2020
Date Reported: 26/05/2020
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
1456	Furswood Road Pond 1	SD 46428 06711	Pass	Pass	Pass	Negative	0
1457	Furswood Road Pond 8	SD 46407 06674	Pass	Pass	Pass	Negative	0

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth **Approved by:** Sarah Evans

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

SureScreen Scientifics

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]
When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]
Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]
The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of GCN eDNA** [Positive/Negative/Inconclusive]
Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.
Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. 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. 0/12 indicates negative GCN presence.
Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.

Forensic Scientists and Consultant Engineers
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Company Registration No. 08950940