



**Land at Tower Street, Barnsley
Ecological Appraisal**

Hadfield Developments Ltd

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August 2017

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Report to: Hadfield Developments Ltd

Report Title: Land at Tower Street, Barnsley – Ecological Appraisal

Revision: Final

Issue Date: August 2017

Report Ref: 10140

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Executive Summary

Ecus Ltd was commissioned by Hadfield Developments Ltd in June 2017 to undertake an Ecological Appraisal of land at Tower Street in Barnsley, South Yorkshire. The appraisal was undertaken to inform a planning application for redevelopment of the Site for residential purposes.

The Site comprises a plot of cleared land located at the southern end of Tower Street in Barnsley. Habitats remaining on the Site include a mature tree line along the southern boundary, a non-native hedgerow along the eastern boundary, limited areas of peripheral dense scrub and tall ruderal habitats.

All habitats on Site are considered to be of importance to nature conservation at the Site level only. The southern boundary treeline is considered to be of up to local wildlife populations including bats through providing a green link between the residential district to the east and semi-natural habitats and open countryside to the west of Site.

Proposals include the construction of five new detached residences on the central cleared part of the Site. The new properties will be serviced by a driveway which extends from Tower Street on the northern Site boundary. Proposals currently include the retention of the trees on the southern site boundary.

Roosting bats are considered a receptor in view of current proposals, with a single-storey garage building and southern boundary trees with bat roosting potential due to be retained. Should removal or modification of either of these features be required, a suitably experienced bat ecologist should be consulted for advice and further survey may be required during the summer bat activity season (May – August inclusive). Recommendations to avoid potential indirect impacts on roosting bats are provided, specifically with regard to nocturnal lighting on Site.

There is potential for nesting birds to use the trees and hedges on Site during the bird breeding season (typically March – August inclusive). It is recommended that any removal of vegetation should be undertaken outside the breeding bird season. If this is not possible, the vegetation removal will require nesting bird checks to be undertaken by a suitably experienced ecologist no more than 48 hours ahead of the works in that area.

Whilst presence on Site is considered highly unlikely, precautionary measures are recommended to avoid injury of amphibians and reptiles during clearance of the Site. Removal of spoil stockpiles should be undertaken outside of the winter hibernation period (November to February inc) for these species.

Badgers, hedgehogs and other wildlife may potentially move across the Site. A best practice approach to works to include covering of excavations, or insertion of an escape ramp (scaffold board) overnight is recommended to allow a means of exit.

Ecological enhancement recommendations are provided in Section 4.

1. Introduction

1.1 Background

- 1.1.1 Ecus Ltd was commissioned by Hadfield Developments Ltd in June 2017 to undertake an Ecological Appraisal of land at Tower Street in Barnsley, South Yorkshire (central Ordnance Survey Grid Reference: SE 34327 05264), hereafter referred to as 'the Site' (see Figure 1 for location). The appraisal was undertaken to inform a planning application for redevelopment of the Site for residential purposes.
- 1.1.2 The Site comprises a plot of cleared land within a residential area, located at the southern end of Tower Street. Habitats remaining on the Site include a mature tree line along the southern boundary, a non-native hedgerow along the eastern boundary and limited areas of peripheral dense scrub and tall ruderal habitats. The Site is fenced along the western boundary, beyond which an area of rough grassland, scrub and trees leads onto Worsbrough Common, approximately 50 m west of the Site boundary.
- 1.1.3 The purpose of survey work at the Site was to carry out an extended Phase 1 habitat survey and to review the potential for the Site to contain, or be used by, species protected or considered to be of primary importance under UK legislation, namely the Wildlife & Countryside Act 1981 (as amended), the Conservation of Habitats and Species Regulations 2010 (as amended) and the Natural Environment and Rural Communities Act 2006. Any impacts upon these habitats or species likely to result from development of the Site were then assessed.
- 1.1.4 This report details the findings of all survey work and subsequent assessment. Methodologies employed are described including site surveys and evaluation. The need for any further survey work and/or mitigation measures is specified, where appropriate.

2. Methodology

2.1 Data Consultation

- 2.1.1 Data consultation was undertaken by Ecus Ltd in July 2017 with Barnsley Biological Records Centre (BBRC) as part of the ecological assessment process, to determine whether there are any existing biological records or locally designated sites of nature conservation interest within 1 km of the Site.
- 2.1.2 Natural England's Multi Agency Geographic Information for the Countryside (MAGIC) website (<http://www.magic.gov.uk/>) was consulted in July 2017 for information on statutory designated sites of nature conservation interest within 2 km of the Site. The MAGIC website was also checked for granted Natural England licence applications (with particular focus on amphibians and bats) within 2 km of the Site.
- 2.1.3 Information obtained from BBRC and MAGIC is summarised within the report where appropriate.

2.2 Extended Phase 1 Habitat Survey

- 2.2.1 The Site was surveyed on 19th July 2017 using extended Phase 1 habitat survey methodology (JNCC, 2010) by consultant ecologist Sean Davey (ACIEEM). The habitats and vegetation types present were recorded on to a field map. This survey method aims to characterise habitats and communities present and is not intended to provide a complete list of all plants occurring across the Site.
- 2.2.2 Notable, rare or scarce plant species were highlighted if present. Evidence of protected species or species of nature conservation importance was recorded where present at the time of survey. Species recorded are included within the report as appropriate and information is presented in Figure 1, using Target Notes (TN) to denote particular features of interest, where appropriate. Site photographs are also provided within Appendix 1: Site Images.
- 2.2.3 Habitats present that are listed within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 or on the Local Biodiversity Action Plan (LBAP) for Barnsley were noted, where present.
- 2.2.4 Due to the small scale nature of the development the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Preliminary Ecological Appraisal, 2013 are considered to be an appropriate and proportionate basis for categorising the value and sensitivity of ecological features present on site. Individual ecological receptors (habitats and species that could be affected by the development) for the scheme were assigned levels of importance for nature conservation. The highest level is international, then decreasing in order of importance through National, Regional, County, Local to lastly, Site level only.

2.3 Protected and Key Species

- 2.3.1 Any evidence of protected species or groups encountered during the survey was recorded. This included observations of field signs and an assessment of the suitability of the habitats present to support protected species. For full details of legislation relating to all habitats and species discussed within this report visit <http://www.legislation.gov.uk>.

Amphibians

- 2.3.2 Waterbodies within 500 m of the Site, which are not separated from the Site by a major barrier to amphibian dispersal, were searched for using an Ordnance Survey (OS) map. Three ponds were identified within 500 m of the Site. Access to the ponds was attempted on the day of survey in order to undertake a Habitat Suitability Index (HSI) assessment (Oldham *et al.*, 2000)) for great crested newts (*Triturus cristatus*), however they are located on third party land and the landowner was not available to permit access.
- 2.3.3 The Site was also assessed for its suitability to support common amphibian species.

Badger

- 2.3.4 Signs of badger (*Meles meles*) activity were searched for on Site as part of the extended Phase 1 survey. Survey followed standard methodology detailed in Surveying Badgers (Harris *et al.*, 1989). This included survey for badger setts, along with survey of linear features and boundaries for signs of badger activity including dung pits, foraging marks, feeding signs and pathways.

Bats

- 2.3.5 Buildings and trees within or adjacent to the Site were visually assessed for their potential to support roosting bats as part of the extended Phase 1 habitat survey.
- 2.3.6 In accordance with best practice, the potential suitability of habitat features recorded within the study area to support roosting bats was categorised as negligible, low, moderate or high, based on the number and type of roosting features and the surrounding landscape character (Collins, 2016).
- 2.3.7 The Site was also assessed for its suitability to support foraging and commuting bats.

Birds

- 2.3.8 Formal bird survey was not undertaken as part of this assessment, however whilst on Site the opportunity was taken to record all species of birds encountered and an assessment of the habitats' suitability to support breeding birds was undertaken including those with enhanced statutory protection.

Reptiles

- 2.3.9 The habitats present on Site were assessed for their suitability to support basking, foraging and hibernating reptiles and for connectivity with other suitable habitat within the surrounding area.

Riparian Mammals

- 2.3.10 A desk based search was undertaken using an Ordnance Survey (OS) map to identify any watercourses within 30 m of the Site, which are not separated from it by a major barrier. No watercourses were identified and therefore otter (*Lutra lutra*), water vole (*Arvicola amphibius*) and white-clawed crayfish (*Austropotamobius pallipes*) are not considered to be receptors for the Site and are not considered further in the assessment.

Other Key and Notable Species

2.3.11 The opportunity was taken whilst on Site to assess habitats for the potential to support nationally or locally scarce or notable species, or any species protected under national or international nature conservation law.

2.4 Invasive Species

2.4.1 During the Site survey, the opportunity was also taken to record any invasive plant or animal species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) where present..

2.5 Survey Limitations

2.5.1 Phase 1 habitat surveys are intended to provide a rapid assessment of habitats present within a site and are not intended to replace detailed vegetation surveys. Additional botanical surveys are not considered necessary for this Site and the appropriate species surveys have been recommended in this report.

2.5.2 The three offsite ponds could not be accessed for HSI assessment, however given their location outwith 250 m from the Site (as illustrated on Figure 2), which represents the typical dispersal distance of great crested newt from their breeding ponds, this is not considered a major constraint to the assessment.

3. Findings and Evaluation

3.1 Site Description

- 3.1.1 The Site comprises a plot of approximately 0.4 ha, located at the southern end of Tower Street in Barnsley. The central area of the Site has been cleared and comprises disturbed ground with several stockpiles of spoil and vegetation. Habitats remaining on the Site include a mature tree line along the southern boundary with underlying scrub, a non-native hedgerow along the eastern boundary and limited areas of peripheral dense scrub and tall ruderal habitat in the north-east corner.
- 3.1.2 The Site is enclosed by existing housing to the north, east and south. The Site is fenced with palisade along its western boundary, beyond which an area of rough grassland, scrub and trees leads onto Worsborough Common, approximately 50 m west of Site. Further afield to the south-west landuse comprises farmland on the edge of Barnsley.

3.2 Designated sites

- 3.2.1 No statutory or non-statutory designated sites of importance to nature conservation were identified within 1 km of the Site during the desk study, using data obtained from BBRC and MAGIC map. As such, designated sites are not considered a receptor in relation to the Site.

3.3 Habitats

- 3.3.1 The following habitats are discussed in order of dominance on Site.

Bare/Disturbed Ground

- 3.3.2 The majority of the Site area comprises recently disturbed bare ground with remnant vegetation indicating the Site previously supported rough grassland and ruderal vegetation habitats. Several piles of spoil and vegetation remaining from the Site strip are present, as shown on Figure 1. Species recorded on the bare ground area of the Site include remnant grasses such as Yorkshire fog (*Holcus lanatus*), false-oat (*Arrhenatherum elatius*) and cocks foot (*Dactylis glomerata*) with herb species including greater willowherb (*Epilobium hirsutum*), rosebay willowherb (*Chamaenerion angustifolium*), cleavers (*Galium aparine*), hedge bindweed (*Calystegia sepium*) and creeping thistle (*Cirsium arvense*) also noted.
- 3.3.3 The remnant species recorded indicate that the Site previously supported habitats which are typical of neglected land and widespread, both locally and nationally. The bare ground which now dominates the Site area is considered to be a habitat of low ecological value. Bare or disturbed ground is not listed either on Section 41 of the NERC Act 2016. Whilst 'Previously Developed Land' is listed on the LBAP for Barnsley, this habitat category relates to brownfield sites which support a diverse habitat mosaic and associated flora and fauna. Given the limited scale of the Site, its recent clearance and the common species and habitats which were recorded, the Site is not considered to classify within this LBAP category. As such, bare ground

habitat on Site is considered to be of importance to nature conservation at the Site level only.

Tall Ruderal Vegetation

3.3.4 A single area of tall ruderal vegetation remains in the north-west corner of the Site, comprising ruderal species including greater and rosebay willowherb, hedge bindweed, nettle (*Urtica dioica*), curled dock (*Rumex crispus*), common ragwort (*Jacobaea vulgaris*) and bramble (*Rubus fruticosus* agg.) amongst other commonly occurring species. This habitat is very limited in extent on Site and comprises species which are widespread and commonly occurring on neglected land. Tall ruderal habitats are not listed either on Section 41 of the NERC Act 2016 or the LBAP for Barnsley and consequently this Site habitat is considered to be of importance to nature conservation at the Site level only.

Dense and Scattered Scrub

3.3.5 Dense scrub is present in two distinct areas of the Site. A small strip of remnant scrub on the north-west boundary comprises abundant bramble with privet (*Ligustrum ovalifolium*), hawthorn (*Crataegus monogyna*) and hedge bindweed also present.

3.3.6 Dense scrub forms the understorey to the southern boundary tree line of the Site. Species recorded in this scrub habitat include abundant privet with frequently occurring hawthorn and bramble, occasional dog rose (*Rosa canina*) and cotoneaster (*Cotoneaster* sp.) in a single location.

3.3.7 Scattered scrub was recorded within the cleared central part of the Site and was likely a component of the habitat present prior to Site clearance. Remnant scrub in the central part of the Site comprises several stands of bramble.

3.3.8 Dense and scattered scrub habitat is not listed under Section 41 of the NERC Act 2016 or the LBAP for Barnsley. This habitat is limited in extent on Site and comprises common native species which are widespread both locally and nationally. Scrub habitat on Site is therefore considered to be of importance to nature conservation at the Site level only.

Scattered Trees

3.3.9 The southern boundary of the Site comprises a line of early-mature and semi-mature broadleaved trees. The trees include abundant sycamore (*Acer pseudoplatanus*), frequent ash (*Fraxinus excelsior*) along with occasionally occurring goat willow (*Salix caprea*), English oak (*Quercus robur*) and silver birch (*Betula pendula*), which is locally abundant in one location.

3.3.10 Several scattered sycamore trees are also present on the east boundary, with two isolated ash trees present at the north-west corner of Site.

3.3.11 Scattered trees on Site are limited in number and comprise commonly occurring species, with no mature or otherwise notable specimens recorded during the survey. Scattered trees are not listed under Section 41 of the

NERC Act 2016 or the LBAP for Barnsley. Given the abundance of similar habitats available to the west of Site, scattered trees on Site are not considered significant to nature conservation at greater than the Site level.

Hedgerows

3.3.12 A single hedgerow (H1, Figure 1) is present on the Site's western boundary which is continuous with the scrub and trees on the southern boundary. Hedgerow 1 comprises dominant cherry laurel (*Prunus laurocerasus*) with no other species recorded. Given that H1 comprises entirely cherry laurel which is a non-native species it does not meet the importance criteria under the Hedgerow Regulations 1997 or the NERC Act 2006. Given its limited extent and relatively low ecological value, hedgerows on Site are considered to be of importance to nature conservation at the Site level only.

3.4 Species

Amphibians

- 3.4.1 Barnsley Biological Records Centre returned a total of 2 records, relating to common frog (*Rana temporaria*) and common toad (*Bufo bufo*) recorded within 1 km of the Site. Both records relate to a location approximately 670 m to the south-west with no direct connectivity to the Site. The common toad record describes a total count of 595 individuals recorded in 2007, whilst the frog record dates to 2012 and does not detail abundance.
- 3.4.2 No records of great crested newt were supplied by BBRC and no EPS licenses relating to this species were identified within 2 km of the Site using MAGIC.
- 3.4.3 Three ponds were identified within 500 m of the Site but it was not possible to access third party land to undertake HSI assessment (ARG-UK 2010) for great crested newts. From aerial imagery, the two larger ponds (located 415 – 430 m south-west of Site) comprise ornamental ponds within a private garden, with a fishing platform present in the largest pond indicating potential stocking with fish. A small ornamental pond is also present approximately 320 m from the Site within the same property.
- 3.4.4 The cleared area of the Site has limited suitability for amphibians, although stockpiles of spoil and vegetation could be potentially used as a refuge site by these species. Peripheral vegetation and hedgerows represent suitable terrestrial habitat for amphibians, however the absence of any ponds or wetlands in proximity significantly reduces the suitability of the Site. The ponds to the south-west are all located outwith 250 m from the Site, which is recognised to represent the typical range from breeding ponds which great crested newts utilise terrestrial habitat. As such, even if present in the identified ponds great crested newts are considered highly unlikely to utilise the habitats on Site.
- 3.4.5 Given the lack of ponds on Site or in close proximity, the absence of great crested newt records for the locality and the poor suitability of the majority of the Site area, great crested newts are not considered a receptor in relation to

the Site.

- 3.4.6 Common frog and toad typically range further from wetland habitats during their terrestrial phase and there is considered to be some limited potential for these species to be present on Site. However, alternative suitable habitats are present in land to the west and therefore the Site is not considered important to common amphibians outwith the Site level.

Badger

- 3.4.7 No records of badger were supplied by BBRC for locations within 1 km of the Site.
- 3.4.8 No badger setts or evidence of badger activity was recorded within the boundary features or elsewhere on the Site. The habitats within the adjacent land immediately to the west were also searched for evidence of badgers up to a distance of 30 m with a negative result. Whilst dense scrub further into in the adjacent land limited the effectiveness of the search, badger setts are not considered to be present in proximity to the Site.
- 3.4.9 There is potential for foraging badgers to use the Site habitats as part of a wider territory on occasion, however abundant suitable habitat is present within Worsbrough Common and the wider landscape and, as such, they are not considered important to foraging badgers outwith the Site level.

Bats

- 3.4.10 Barnsley Biological Records Centre returned a total of 11 bat records for locations within 1 km of site, of which two records pertained to common pipistrelle roosts (*Pipistrellus pipistrellus*). Thirteen individual common pipistrelle bats were recorded exiting one roost situated 800 m south-east of the site in 1995. The second roost record details a count of ten individual common pipistrelle bats in a nearby location in 1998, also located approximately 800 m south-east of the Site.
- 3.4.11 The remaining nine records pertained to observations of bats in flight or grounded/injured bats. In addition to common pipistrelle, BBRC returned field records for soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyctalus noctula*), unknown *Nyctalus* species, and unknown bat species (Vespertionidae) for locations within 1 km of the Site.
- 3.4.12 One EPS license relating to bats was identified within 2 km of the site using MAGIC. The licence (reference: EPSM2013-6477) relates to a common pipistrelle roost and is located 1.8 km north of the Site. The licence was valid between October 2013 and September 2014 and was obtained to permit the destruction of a resting place.

Building Inspection

- 3.4.13 No buildings are present on Site, however a garage building with a pitched roof is located at the north-east corner of the Site outwith but immediately adjacent to the boundary. An assessment of this building's suitability for

roosting bats is presented in Table 1 below.

Table 1: Building Inspection Notes and Bat Roosting Potential

Building	Features	Bat Roost Potential
Offsite Garage B1	<p><u>General description</u> Modern single-storey garage building with a pitched roof clad with aggregate tiles. External walls are constructed from brick and stonework and there are two large metal garage doors on the west elevation. Internally, the roof is supported on modern timber trusses with a bitumen felt lining to the underside of the roof. No evidence of roosting bats was seen during the external inspection, or was visible through a low hatch in the southern gable.</p>	<u>Overall:</u> Moderate
	<p><u>Features</u> Gaps below roof tiles and occasional missing mortar to wall top on gable ends</p>	Moderate
	Missing ridge tile at the southern gable	Low/moderate
	Broken garage door/low open access hatch on southern elevation	Low

3.4.14 No evidence of roosting bats was recorded during the building inspection, although it is considered to support features with moderate suitability for roosting bats such as pipistrelle species and is located adjacent to good quality foraging habitat to the west. Although outwith the Site boundary, there is potential for indirect impacts to bats, should they be present in the building, without appropriate consideration during the works.

Tree Inspection

3.4.15 The retained trees present on the Site boundaries were inspected and found to largely lack features with suitability for roosting bats. Within the southern boundary trees, a row of 6 – 7 early mature sycamores (TN1, Figure 1) are covered with ivy and are considered to display no greater than low potential to be used by roosting bats, appearing largely healthy. In addition, a single goat willow tree on this boundary (TN2, Figure 1) supports a knothole at 5 m on the north elevation, however this feature was inspected from ground level using binoculars and found to be superficial with no suitability to support roosting bats.

3.4.16 The majority of the Site area displays low suitability for bat activity although it may be used by foraging bats as part of a wider habitat resource. The southern boundary and hedgerow habitats are suitable for foraging bats and

also provide continuous tree cover, which may be utilised by commuting bats moving between roosts in the residential areas to the east and suitable foraging areas within Worsbrough Common to the west. As such, whilst the majority of the Site is of limited value for foraging and commuting bats, the southern tree line is considered to be of importance to bat populations at up to a local level.

Birds

- 3.4.17 Barnsley Biological Records Centre returned a total of 3621 records of notable birds comprising 138 bird species for locations within 1 km of Site. Sixteen Schedule 1 bird species, as listed within the Wildlife and Countryside Act 1981 (as amended), were included within the records.
- 3.4.18 In 2015, a re-assessment of Birds of Conservation Concern was published by Eaton *et al* (2015), which defined rare and threatened bird species on two lists (Red and Amber) describing the level of threat to each species of concern.
- 3.4.19 “Red” is the highest conservation priority, with species needing urgent action due to either a historical decline in breeding population, severe (>50%) decline in breeding or non-breeding population, or severe decline in breeding range over 50 years or more. “Amber” is the next most critical group, with species qualifying for this status as a result of either recovery from red list criterion, being classed as rare breeders in the UK, moderate (>25%) decline in breeding or non-breeding population or moderate decline in breeding range over 25 years or more. These categories are followed by “Green”, indicating that the species are relatively unthreatened.
- 3.4.20 Bird species recorded within 1 km of the site are summarised in Appendix 2 and comprise 33 Red, 36 Amber, and 62 Green listed species. Sixteen of the records supplied relate to Schedule 1 bird species, whilst six of the species are unlisted in Eaton *et al* (2015). A single record of a Schedule 9 bird species was also supplied by BBRC.
- 3.4.21 Birds species recorded on Site on the day of survey include blackbird (*Turdus merula*), goldfinch (*Carduelis carduelis*), woodpigeon (*Columba palumbus*) and nuthatch (*Sitta europaea*). Bird activity was mainly associated with the southern boundary treeline and H1. A woodpigeon nest was recorded in a standing dead tree located at the southern end of H1 (TN3, Figure 1), with a juvenile blackbird also recorded within the hedge indicating potential presence of a nest of this species also (TN4, Figure 1).
- 3.4.22 The cleared land on Site has suitability for foraging bird species, with the disturbed ground likely to provide a rich source of invertebrates, although it should be appreciated that this habitat is transient and will continue to re-colonise with common grasses and herbaceous species in time. The hedgerows, peripheral scrub and southern boundary vegetation provide suitable nesting habitat for a variety of common bird species recorded in the area. However, abundant suitable nesting and foraging habitats are available on adjacent land and in the wider area to the south and west and therefore the habitats on Site are not considered to be of importance to nesting and

foraging birds beyond the Site level.

Reptiles

- 3.4.23 No records for reptiles were returned by BBRC for locations within 1 km of the site.
- 3.4.24 The Site has some suitability for reptiles, with bare ground cover provided by the retained southern boundary vegetation and hedgerows. There is direct connectivity to suitable rough grassland and scrub habitats via the parcel of land to the west and Worsbrough Common beyond.
- 3.4.25 The likelihood of reptiles using Site habitats however is low, given its urban location. The habitats are likely subject to regular disturbance from dog walkers and pedestrians using the Site as a cut-through. As such, reptiles are considered an unlikely receptor in relation to the Site.

Other Key and Notable Species

Hedgehog

- 3.4.26 A total of three records of hedgehog (*Erinaceus europaeus*) were returned by BBRC for locations within 1 km of the Site. Two of these pertain to dead hedgehogs on roads, with the third relating to a hedgehog that was released from care.
- 3.4.27 Whilst suitable for foraging and refuging hedgehogs is present, given the wide availability of alternative suitable habitats in the surrounding area and the limited extent of the Site, the habitats present are considered to be of importance to hedgehog at the Site level only.

3.5 Invasive Species

- 3.5.1 No invasive plants listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) were recorded during the site walkover. Cotoneaster is present in the scrub at the southern boundary (TN5, Figure 1) but the variety is not considered to be one of those listed on Schedule 9 (i.e. *Cotoneaster horizontalis* or *microphyllus*). As such, invasive species are not considered to be a receptor in relation to the Site.

4. Ecological Assessment and Mitigation

4.1 Proposals

- 4.1.1 Development proposals for the Site are illustrated on the Site Plan (drawing 17--185-P03 produced by Windle Cook Architects). They include the construction of five new detached residences on the central part of the Site. The new properties will be serviced by a driveway which extends from Tower Street on the northern Site boundary.
- 4.1.2 Ecological impacts will be minimised through retention of all trees within the southern boundary vegetation, although these are currently retained within the private gardens of the new residences which does not provide any future safeguard for the trees.

4.2 Designated Sites

- 4.2.1 No designated sites were identified within 1 km of the Site and they are not considered to be a receptor for the development proposals. As such, no specific mitigation for designated sites of wildlife interest is recommended.

4.3 Habitats

Bare/Disturbed Ground

- 4.3.1 Landtake of the majority of the bare ground which is now dominant on Site will be required to facilitate construction of the new properties, gardens and access. This habitat is of limited intrinsic ecological value and landtake is not considered to be of importance to nature conservation beyond the Site level.
- 4.3.2 It is recommended that consideration should be given to replacement native tree and shrub planting within the soft landscape design for the development. This would provide replacement native habitats for those lost during previous clearance of the Site and would contribute to enhancing local biodiversity, in line with the aims of the National Planning Policy Framework (NPPF, 2012).

Tall Ruderal Vegetation

- 4.3.3 Landtake of areas of tall ruderal vegetation may be required to accommodate the proposals. As this habitat comprises common and widespread native species and is very limited in extent, landtake is not considered to be of importance to nature conservation beyond the Site level.

Dense scrub

- 4.3.4 Current proposals show the retention of the southern boundary scrub, with the area of scrub habitat located in the north-east corner of Site also situated outside the proposed construction footprint. As such, impacts to dense scrub remaining on Site are not anticipated under the development proposals. Should removal of scrub be required to accommodate the proposals, given the common species present which includes abundant privet, landtake of dense scrub on Site is not considered to be of importance to nature conservation beyond the Site level.

Scattered Trees and Hedgerow

- 4.3.5 The proposals shown on the Site Plan indicate the retention of the southern boundary tree line and H1 (Figure 1), which forms the boundary with the adjacent private properties to the east. This is encouraged to maintain habitat structure on site. Ecus do not typically recommend incorporating existing trees within new property gardens as they have little safeguard for the future and are at risk from removal by residents. However, when space on Site is limited and Public Open Space is not included, this may be the only viable option.
- 4.3.6 All trees and hedgerows proposed for retention should be protected during construction in accordance with British Standard 5837 (2012): Trees in Relation to Design, Demolition and Construction. This will ensure adequate protection is given to these trees and their roots to avoid direct damage or soil compaction which could result in subsequent failure of the tree. This also applies to any trees up to 5 m outside the Site boundary.
- 4.3.7 The inclusion of tree and shrub planting within the landscaping on Site would be beneficial to wildlife within the local area. New planting should ideally favour species which are typical of the local area, of UK provenance where practicable and be selected to maximise food and nectar sources for birds, invertebrates and small mammal species.

4.4 Species

Amphibians

- 4.4.1 Common toad and common frog are protected under the Wildlife and Countryside Act 1981 (as amended) against sale, barter or exchange of captive animals only and common toad is also listed as a priority species under Section 41 of the NERC Act 2016.
- 4.4.2 There are no ponds on Site and the development will be located largely on existing bare ground, with impacts to suitable amphibian habitat likely to be limited to the removal of spoil stockpiles.
- 4.4.3 As a precautionary measure, it is recommended that spoil piles present on the Site should ideally be removed outside the winter hibernation period (November – February inclusive) to minimise risks to amphibians which are likely to be sheltering at this time of year. Any common amphibians encountered during construction works should be carefully moved in gloved hands to a safe area of shelter outside the construction zone, such as the area of rough grassland and scrub vegetation located to the west of Site.

Badger

- 4.4.4 Badgers and their setts are protected under the Protection of Badgers Act 1992. It is an offence under the act to kill, injure or take a badger. It is also an offence to destroy, damage or obstruct a currently active badger sett, or to disturb animals within the sett.
- 4.4.5 Badgers are not currently thought to be resident on site. Whilst there is some

potential for foraging badgers to utilise the Site as part of a wider territory, landtake associated with the proposed development is not considered to be of importance to badgers at greater than the Site level.

- 4.4.6 As badgers could move across the site on occasion, taking a best practice approach, all deep excavations (> 1 m) should be covered overnight during construction works. Shallow excavations (< 1 m) should have a scaffold board or equivalent placed in them overnight to allow any badgers to exit, should they fall in, and all chemicals should be stored securely in accordance with best practice guidelines.

Bats

- 4.4.7 All species of bat occurring within the UK are included in Schedule 2 of the Conservation of Habitats and Species Regulations 2010 (as amended). Under regulation 41 bats are protected from deliberate capture, injury or killing, from deliberate disturbance and from deliberate damage or destruction of a breeding Site or resting place (roost).
- 4.4.8 All UK bats are also included on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). However, their protection is limited to certain offences. Under the 1981 Act (as amended) it is an offence to intentionally or recklessly disturb bats while they are occupying a structure or place used for shelter or protection, or to obstruct access to any such place.
- 4.4.9 Barbastelle (*Barbastella barbastellus*), Bechstein's (*Myotis bechsteinii*), brown long-eared, greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*Rhinolophus hipposideros*), noctule and soprano pipistrelle bats are included as priority species under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2016.
- 4.4.10 No demolition of buildings will be required to accommodate the development proposals and the southern boundary tree line is proposed for retention within the development. Given the location of the new houses on existing areas of cleared land, landtake associated with the proposed development is considered to be of importance to bat populations at no greater than the Site level. Roosting bats are not considered a receptor and no further survey is recommended providing that proposals remain broadly the same. Should proposals change to require demolition or modification of B1, it is recommended that up to two nocturnal bat surveys undertaken within the bat survey season (May to August inclusive) may be required.
- 4.4.11 Whilst no bat presence/absence surveys have been undertaken as part of this assessment, the building (B1, Figure 1) at the Site boundary will not be demolished as part of the scheme and is located a considerable distance from the construction footprint. As such, no direct impacts to the building are anticipated as a result of the proposed landtake. However, in order to avoid potential impacts to roosting bats consideration must be given to avoiding indirect effects, such as nocturnal lighting of the building. It is recommended that no external lighting is located adjacent to B1 and that recommendations provided below regarding sensitive lighting are observed.

- 4.4.12 The southern boundary tree line is considered to be of importance to bat populations at up to a Local level, due to its function as a green link for commuting bats between the urban area to the east and suitable foraging habitat to the west of Site. In addition, a number of trees within the boundary treeline were considered to display low potential to be of interest to roosting bats. Due to the retention of this boundary vegetation within the proposals, no direct impacts to roosting, commuting or foraging bats are anticipated as a result of the proposed landtake.
- 4.4.13 Whilst no direct impacts to bats are anticipated during site clearance and construction, there is potential for additional nocturnal lighting during construction or post-development to negatively impact on bats using the habitats on, or immediately adjacent to, the Site. A sensitive lighting plan should be developed for the scheme to avoid lighting areas with suitability for bats likely to occur in the area, particularly the retained garage building adjacent to the north and the retained southern boundary tree line. No external lighting columns should be located in proximity to B1. Further recommendations relating to bats and lighting are provided in Appendix 3.
- 4.4.14 Taking a best practice approach to nature conservation issues, it is recommended that consideration is given to incorporating bat roosting provision within the fabric of new buildings as an ecological enhancement. Suitable integral bat boxes such as the Schwegler 1FR or Habibat tube can be incorporated within external walls during the build, providing a self-contained roosting space for bats with minimal visual impact which does not allow bat access into the wall cavity itself.
- 4.4.15 It should be appreciated that almost any structure may be used by an individual or transient bat from time to time. Bats require very limited cavity space and only very small roost entry gaps into areas that provide close shelter. If bats are discovered on Site at any time, works should be halted in the immediate area and an appropriately trained, qualified and licensed bat ecologist consulted immediately.

Birds

- 4.4.16 All nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended) against destruction of the nest during the bird breeding season, which is typically recognised as March to August, inclusive.
- 4.4.17 The development will be located on existing areas of cleared bare ground and will not directly impact on suitable nesting habitats with boundary vegetation due to be retained. As such, landtake associated with the development proposals is considered to be of importance to foraging and nesting birds at no greater than the Site level.
- 4.4.18 The boundary habitats retain suitability for use by nesting birds, therefore should any vegetation removal works be required it is recommended that these should be undertaken between September and February inclusive i.e. outside of the bird breeding season, if feasible. Should this not be possible, vegetation scheduled for removal should be checked for nesting birds by an experienced ecologist no more than 48 hours prior to clearance works.

Should an active nest be confirmed, a suitable exclusion zone will be required and works will not be permitted to proceed in that area until it has been confirmed that young have fledged the nest and/or the nest is no longer in use.

4.4.19 The inclusion of nesting boxes suitable for use by common urban and garden bird species likely to be present in the area should be considered a positive enhancement for nature conservation, in accordance with the aims of the NPPF (2012). General purpose nest boxes (e.g. Schwegler 1B) suitable for a range of bird species could be attached to retained boundary trees or new buildings. An ecologist should be consulted for advice on suitable locations for new bird boxes.

Reptiles

4.4.20 All six UK reptile species are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) against intentional killing or injuring.

4.4.21 Reptiles are considered highly unlikely to be present on Site given the urban location of the Site and paucity of records supplied by BBRC, although their presence cannot be ruled out entirely. The development will be located on existing bare ground habitat, with impacts to suitable reptile habitat likely to be limited to the removal of spoil stockpiles. As such, landtake associated with the development is considered important to reptile species at no greater than the Site level.

4.4.22 In view of the above, it is recommended that precautionary measures are followed during the works which are appropriate to avoid harm to reptiles in the unlikely event that they are present on Site.

4.4.23 Spoil stockpiles present on the Site should ideally be removed outside the winter hibernation period (November – February inclusive) to minimise risks to hibernating reptiles. Works should be undertaken on suitably warm days (temperature above 10°C, little wind or rain) when reptiles are active above ground and able to move away from disturbance of their own volition. Should any reptiles be encountered works should halt immediately and individuals should be allowed to move away from Site on their own. A suitably experienced ecologist should be contacted for advice if required.

Other Key and Notable Species

Hedgehog

4.4.24 Hedgehog are a listed as species of principal importance under Section 41 of the NERC Act and whilst not afforded a high level of protection, they are a species in decline and taking a best practice approach, should be taken into consideration during works.

4.4.25 Hedgehogs are highly mobile and inquisitive animals that have potential to move onto Site at any time, should they be resident in the wider area, and may utilise piles of tipped materials and spoil for refuge. It is therefore recommended that any materials (i.e. spoil stockpiles) are carefully removed outside the winter months to reduce the likelihood of injuring hibernating

hedgehogs.

- 4.4.26 As an additional precautionary measure, it is recommended that any excavations left overnight should be covered or have a suitable escape ramp e.g. a long scaffold board, inserted to allow escape should a hedgehog fall in. Should a hedgehog be discovered on Site at any time, it should be moved carefully with gloved hands to a sheltered area away from the footprint of works.
- 4.4.27 The creation and maturing of new garden habitats on Site will provide habitat for small mammals such as hedgehog, which have suffered significant and widespread declines over the past decade. To allow for dispersal of small mammals between gardens, which are increasingly important to hedgehogs, small gaps beneath or between garden fences should be included across the development if close boarding fencing is to be used.
- 4.4.28 Natural gaps could be left under or around fencing where possible at fence junctions, or where this is not feasible, gaps measuring a minimum of 13 cm x 13 cm could be created to the base of panels/gravel boards to allow the movement of hedgehogs between gardens across the development. Further information and examples of such fencing gaps put into practice can be found in the following webpage: <http://www.hedgehogstreet.org/pages/link-your-garden.html>.

5. References

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

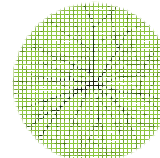
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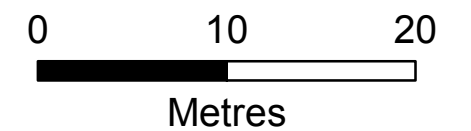
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Figure 1. Survey Findings Plan

Legend

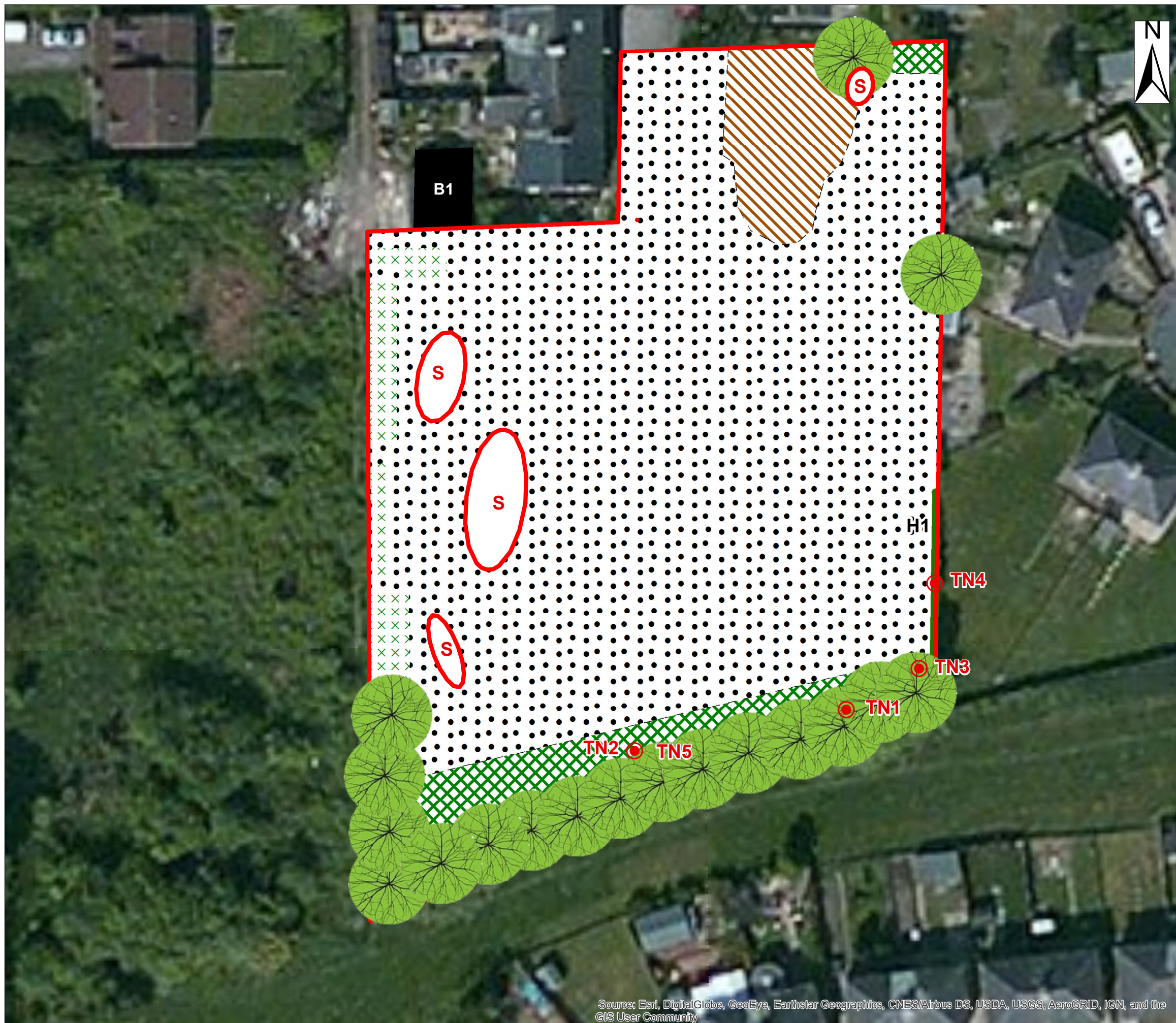
-  Site Boundary
-  Bare ground with ephemeral grasses
-  Tall ruderal
-  Spoil
-  Dense scrub
-  Hedgerow
-  Scattered Scrub
-  Building
-  Target note
-  Tree



**Hadfield Developments Ltd
Land at Tower Street, Barnsley**

**Figure 1
Survey Findings Plan**

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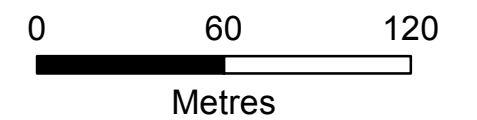
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2. Pond Locations



Legend

-  Survey
-  Pond
-  Site + 250m



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Land at Tower Street, Barnsley

Figure 2
Pond Location Plan

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix 1. Site Images

Legend

1. View of bare ground and southern boundary treeline habitats
2. Bare ground and spoil in central area of Site
3. Tall ruderal vegetation in north-east corner
4. Ivy-covered trees in southern boundary strip with low BRP (TN1)
5. Building 1 viewed from the south
6. Cotoneaster shrub within southern boundary vegetation (TN5)

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Land at Tower Street, Barnsley
Ecological Appraisal

Appendix 1
Site Images

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Appendix 2. Bird Species Recorded Within 1 km

Table A2.1: Bird Species Recorded Within 1km of the Site

Common name	Latin name	BoCC status
Merlin	<i>Falco columbarius</i>	Schedule 1, Red
Hen Harrier	<i>Circus cyaneus</i>	Schedule 1, Red
Redwing	<i>Turdus iliacus</i>	Schedule 1, Red
Fieldfare	<i>Turdus pilaris</i>	Schedule 1, Red
Kingfisher	<i>Alcedo atthis</i>	Schedule 1, Amber
Green sandpiper	<i>Tringa ochropus</i>	Schedule 1, Amber
Goldeneye	<i>Bucephala clangula</i>	Schedule 1, Amber
Whooper swan	<i>Cygnus cygnus</i>	Schedule 1, Amber
Barn owl	<i>Tyto alba</i>	Schedule 1, Green
Goshawk	<i>Accipiter gentilis</i>	Schedule 1, Green
Peregrine falcon	<i>Falco peregrinus</i>	Schedule 1, Green
Hobby	<i>Falco subbuteo</i>	Schedule 1, Green
Brambling	<i>Fringilla montifringilla</i>	Schedule 1, Green
Firecrest	<i>Regulus ignicapillus</i>	Schedule 1, Green
Spotted crake	<i>Porzana porzana</i>	Schedule 1, Green
Little ringed plover	<i>Charadrius dubius</i>	Schedule 1, Green
Mistle thrush	<i>Turdus viscivorus</i>	Red
Yellowhammer	<i>Emberiza citrinella</i>	Red
Wood warbler	<i>Phylloscopus sibilatrix</i>	Red
Skylark	<i>Alauda arvensis</i>	Red
Tree pipit	<i>Anthus trivialis</i>	Red
Linnet	<i>Carduelis cannabina</i>	Red
Hawfinch	<i>Coccothraustes coccothraustes</i>	Red
Cuckoo	<i>Cuculus canorus</i>	Red
Lesser spotted woodpecker	<i>Dendrocopos minor</i>	Red
Pied flycatcher	<i>Ficedula hypoleuca</i>	Red
Grasshopper warbler	<i>Locustella naevia</i>	Red
Grey wagtail	<i>Motacilla cinerea</i>	Red
Yellow wagtail	<i>Motacilla flava</i>	Red
Spotted flycatcher	<i>Muscicapa striata</i>	Red
House sparrow	<i>Passer domesticus</i>	Red
Tree sparrow	<i>Passer montanus</i>	Red
Grey partridge	<i>Perdix perdix</i>	Red
Whinchat	<i>Saxicola rubetra</i>	Red
Turtle dove	<i>Streptopelia turtur</i>	Red
Starling	<i>Sturnus vulgaris</i>	Red
Song thrush	<i>Turdus philomelos</i>	Red

Lapwing	<i>Vanellus vanellus</i>	Red
Woodcock	<i>Scolopax rusticola</i>	Red
Pochard	<i>Aythya ferina</i>	Red
Curlew	<i>Numenius arquata</i>	Red
Herring gull	<i>Larus argentatus</i>	Red
Willow tit	<i>Poecile montanus</i>	Red
Marsh tit	<i>Poecile palustris</i>	Red
Corn bunting	<i>Miliaria calandra</i>	Red
Reed bunting	<i>Emberiza schoeniclus</i>	Amber
Redstart	<i>Phoenicurus phoenicurus</i>	Amber
Willow warbler	<i>Phylloscopus trochilus</i>	Amber
Shoveler	<i>Anas clypeata</i>	Amber
Pink-footed goose	<i>Anser brachyrhynchus</i>	Amber
Meadow pipit	<i>Anthus pratensis</i>	Amber
Swift	<i>Apus apus</i>	Amber
Short-eared owl	<i>Asio flammeus</i>	Amber
Mealy redpoll	<i>Carduelis flammea</i>	Amber
Dipper	<i>Cinclus cinclus</i>	Amber
Stock dove	<i>Columba oenas</i>	Amber
House martin	<i>Delichon urbica</i>	Amber
Kestrel	<i>Falco tinnunculus</i>	Amber
Tawny owl	<i>Strix aluco</i>	Amber
Dunnock	<i>Prunella modularis</i>	Amber
Bullfinch	<i>Pyrrhula pyrrhula</i>	Amber
Dunlin	<i>Calidris alpina</i>	Amber
Great black-backed gull	<i>Larus marinus</i>	Amber
Spotted redshank	<i>Tringa erythropus</i>	Amber
Common gull	<i>Larus canus</i>	Amber
Iceland gull	<i>Larus glaucoides</i>	Amber
Common sandpiper	<i>Actitis hypoleucos</i>	Amber
Mallard	<i>Anas platyrhynchos</i>	Amber
Oystercatcher	<i>Haematopus ostralegus</i>	Amber
Barnacle goose	<i>Branta leucopsis</i>	Amber
Shelduck	<i>Tadorna tadorna</i>	Amber
Snipe	<i>Gallinago gallinago</i>	Amber
Wigeon	<i>Anas penelope</i>	Amber
Teal	<i>Anas crecca</i>	Amber
Redshank	<i>Tringa totanus</i>	Amber
Lesser black-backed gull	<i>Larus fuscus subsp. graellsii</i>	Amber
Black-headed gull	<i>Chroicocephalus ridibundus</i>	Amber
Robin	<i>Erithacus rubecula</i>	Green

Chiffchaff	<i>Phylloscopus collybita</i>	Green
Magpie	<i>Pica pica</i>	Green
Green woodpecker	<i>Picus viridis</i>	Green
Sparrowhawk	<i>Accipiter nisus</i>	Green
Sedge warbler	<i>Acrocephalus schoenobaenus</i>	Green
Reed warbler	<i>Acrocephalus scirpaceus</i>	Green
Long-tailed tit	<i>Aegithalos caudatus</i>	Green
Rock pipit	<i>Anthus petrosus</i>	Green
Long-eared owl	<i>Asio otus</i>	Green
Waxwing	<i>Bombycilla garrulus</i>	Green
Buzzard	<i>Buteo buteo</i>	Green
Goldfinch	<i>Carduelis carduelis</i>	Green
Greenfinch	<i>Carduelis chloris</i>	Green
Siskin	<i>Carduelis spinus</i>	Green
Treecreeper	<i>Certhia familiaris</i>	Green
Feral pigeon	<i>Columba livia</i>	Green
Wood pigeon	<i>Columba palumbus</i>	Green
Carrion crow	<i>Corvus corone</i>	Green
Rook	<i>Corvus frugilegus</i>	Green
Jackdaw	<i>Corvus monedula</i>	Green
Great spotted woodpecker	<i>Dendrocopos major</i>	Green
Chaffinch	<i>Fringilla coelebs</i>	Green
Jay	<i>Garrulus glandarius</i>	Green
Swallow	<i>Hirundo rustica</i>	Green
Wheatear	<i>Oenanthe oenanthe</i>	Green
Great tit	<i>Parus major</i>	Green
Pheasant	<i>Phasianus colchicus</i>	Green
Goldcrest	<i>Regulus regulus</i>	Green
Sand martin	<i>Riparia riparia</i>	Green
Stonechat	<i>Saxicola torquata</i>	Green
Nuthatch	<i>Sitta europaea</i>	Green
Collared dove	<i>Streptopelia decaocto</i>	Green
Blackcap	<i>Sylvia atricapilla</i>	Green
Garden warbler	<i>Sylvia borin</i>	Green
Whitethroat	<i>Sylvia communis</i>	Green
Lesser whitethroat	<i>Sylvia curruca</i>	Green
Wren	<i>Troglodytes troglodytes</i>	Green
Blackbird	<i>Turdus merula</i>	Green
Water rail	<i>Rallus aquaticus</i>	Green
Little grebe	<i>Tachybaptus ruficollis</i>	Green
Moorhen	<i>Gallinula chloropus</i>	Green

Great crested grebe	<i>Podiceps cristatus</i>	Green
Pomarine skua	<i>Stercorarius pomarinus</i>	Green
Coot	<i>Fulica atra</i>	Green
Golden plover	<i>Pluvialis apricaria</i>	Green
Tufted duck	<i>Aythya fuligula</i>	Green
Cormorant	<i>Phalacrocorax carbo</i>	Green
Jack snipe	<i>Lymnocyptes minimus</i>	Green
Grey heron	<i>Ardea cinerea</i>	Green
Goosander	<i>Mergus merganser</i>	Green
Blue tit	<i>Cyanistes caeruleus</i>	Green
Coal tit	<i>Pariparus ater</i>	Green
Pied wagtail	<i>Motacilla alba subsp. yarrellii</i>	Green
Eurasian siskin	<i>Carduelis spinus</i>	Green
Red legged partridge	<i>Alectoris rufa</i>	Unlisted
Little owl	<i>Athene noctua</i>	Unlisted
Arctic redpoll	<i>Carduelis hornemanni</i>	Unlisted
Yellow-crowned wagtail	<i>Motacilla flava subsp. flavissima</i>	Unlisted
White wagtail	<i>Motacilla alba subsp. alba</i>	Unlisted
Blue-headed wagtail	<i>Motacilla flava subsp. flava</i>	Unlisted
Canada goose	<i>Branta canadensis</i>	Schedule 9

Appendix 3. Bats and Lighting Technical Advice

Bats and Lighting

Bats and lighting

Artificial lighting is known to affect bat roosting and foraging behaviour with lighting shown to result in a range of impacts including roost desertion (BCT, 2009), delayed emergence of roosting bats (Downs *et al.*, 2003), increased activity of some bat species and decreased activity by others (Stone *et al.*, 2012).

An experimental approach using LED units, demonstrated that relatively fast-flying bat species, including common pipistrelle, showed no significant impacts as a result of new artificial lighting, even when lighting was set at relatively high levels close to 50 lux. In contrast slow flying bats, including myotis bats (*Myotis* spp.) showed sharp reductions in presence, even at low light levels of 3.6 lux (Stone *et al.*, 2012). Current recommendations for all bat species specifies that no bat roost should be directly illuminated (BCT 2014).

Mitigation and lighting design

Bat friendly lighting plans should firstly look to avoid lighting where possible and minimise lighting impacts by adopting the following measures:

- **Lighting curfews or use of PIR sensors.** Lighting curfews can be an effective way of avoiding impacts on bats. These curfews may involve either turning off lighting or dimming light units at specific times of the night, dimming units at key times of the year, providing the luminaire allows for this option via a control unit. Lighting to be triggered by PIR sensors can be expected to be illuminated only when required and for a low proportion of the overall time.
- **Consider no lighting solutions where possible.** Options such as white lining, good signage and LED cats eyes, should be considered as preferable, especially within Zones 1 and 2. Reflective fittings may help make use of headlights to provide any necessary illumination in some areas.
- **Use only high pressure sodium or warm white LED lamps where possible.** High pressure sodium and warm white LED lamps emit lower proportions of insect attracting UV light than mercury, metal halide lamps and white LED lighting. Generally lamps should have a lower proportion of white or blue wavelengths, with a colour temperature <4200 kelvin recommended (BCT, 2014).
- **Minimise the spread of light.** Light spread should be kept at or near horizontal in order to ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Baffles, hoods, louvres and shields should be used where necessary to reduce light spill.
- **Consider the height of lighting column.** Whilst downward facing bollard lighting is often preferable, it should be noted that a lower mounting height does not automatically reduce impacts to bats as bollard lighting can often be designed to provide uplighting. Where bollard lighting is considered to be the most appropriate system, bollard spacing or unit density should be kept to a minimum and units should be fitted with the appropriate hoods/deflectors to reduce uplighting. Column height should be carefully considered to balance task and mitigation measures.
- **Avoid reflective surfaces below lights.** The polarisation of light by shiny surfaces attracts insects increasing bat activity (BCT, 2012). Consequently

surface materials around lighting require consideration.

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