

School Street, Thurnscoe Phase 2 Ecological Appraisal

Keepmoat Homes Ltd.

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Executive Summary

Ecus Ltd. were commissioned by Keepmoat Homes Ltd to undertake an Ecological Appraisal of an area of land adjacent to School Street, Thurnscoe in Doncaster, hereafter referred to as 'the Site'.

The Site comprises an area of derelict land, which once supported a number of residential houses, as evidenced by the presence of remnant tarmac driveways and old aerial images. The Site has since become overgrown with scrub and rough grassland as the dominant habitats.

Site habitats are considered to be of importance to nature conservation at the Site level only.

Proposals for the Site include the construction of 115 residential dwellings, associated residential gardens and driveways and infrastructure; with the creation of 'Public Open Spaces' (POS) to the north and within the south east corner.

The Site lies within Dearne Valley Green Heart Nature Improvement Area. The loss of low value habitats on site are not considered to impact upon the connectivity or value of the wider value of the Nature Improvement Area.

As badgers have some potential to move across the Site from time to time, best practice measures should be implemented to safeguard individual animals, including covering all deep excavations overnight.

The single building present on site supports vents which provided potential access into the structure for roosting bats. Current plans show the existing sub-station as retained and therefore no further inspection is recommended at this time. Should plans change to include demolition, an endoscopic survey should be conducted of the building as a precaution, with safe access provided to all areas, to confirm presence/absence of roosting bats.

Two trees (T1 and T2; Figure 1) on Site were considered to have potential to support roosting bats. A full assessment is made in Sections 3.4 and 4.4 of this report. Current proposals show all trees to be removed. If retention of these two trees cannot be accommodated, an aerial inspection or nocturnal survey will be required for T1 prior to works affecting the tree commencing and a sensitive felling approach will be required for T2.

High levels of bird activity, with a number of potential active nests, were identified during the survey of the Site. As such, there is potential for active birds' nests to be destroyed during site clearance. As a precautionary measure, it is recommended that these works should be undertaken outside of the bird breeding season i.e. between October to February (inclusive). If it is not possible to schedule vegetation clearance works for these months, a breeding bird check should be undertaken by a suitably qualified ecologist no more than 48 hours prior to vegetation removal commencing.

No other ecological constraints have been identified during the ecological assessment. Ecological enhancement recommendations appropriate to the Site have been included within the report.

1. Introduction

1.1 Background

- 1.1.1 Ecus Ltd was commissioned in July 2017 by Keepmoat Homes Ltd to undertake an ecological appraisal of land adjacent to School Street, Thurnscoe (Central National Grid Reference: SE 45680 06047), hereafter called the Site, prior to submission of a planning application for the re-development of the site.
- 1.1.2 The Site comprises an area of derelict land which once supported a number of residential houses. The Site has since become overgrown with scrub and rough grassland as the dominant habitats. Remnant tarmac roads and driveways are still extend across the site and a single building is present in the east of the Site.
- 1.1.3 The proposed development includes the construction of 115 residential dwellings, with associated soft landscaping and infrastructure.
- 1.1.4 The purpose of survey 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 under both UK and European nature conservation legislation, namely the Wildlife & Countryside Act 1981 (as amended) and the Habitat Regulations 2010. Any impacts upon these habitats or species likely to result from the proposed development were then assessed.
- 1.1.5 This report details the findings of the survey work and subsequent assessment. Methodologies employed are described including site surveys and evaluation and the need for any further survey work and/or mitigation measures are included, where appropriate.

2. Methodology

2.1 Data Consultation

- 2.1.1 Data consultation was undertaken by Ecus Ltd in July 2017 with the biological record centre BBRC (Barnsley Biological Records Centre) and DLRC (Doncaster Local Records Centre) as part of the ecological assessment process, to determine whether there were any existing biological records or locally designated sites of nature conservation interest, within 1 km of the survey area. Records of bats were searched for up to 2 km from site.
- 2.1.2 Natural England's MAGIC website (<http://www.natureonthemap.naturalengland.org.uk/map.aspx>) was consulted for information on statutory designated sites of nature conservation interest within 1 km of the survey area in July 2017.
- 2.1.3 Information returned from BBRC, DLRC and MAGIC is incorporated within this report in the relevant sections.

2.2 Extended Phase 1 Habitat Survey

- 2.2.1 The Site was surveyed on 13th July 2017 using extended Phase 1 habitat survey methodology (JNCC, 2010) by consultant ecologist Laura Hobbs, MCIEEM. 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 The abundance of plant species recorded was classified according to the subjective DAFOR rating. The standardised terms are as follows:
- D – Dominant;
 - A – Abundant;
 - F – Frequent;
 - O – Occasional, and
 - R – Rare.
- 2.2.3 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. Information is presented in Figure 1, using Target Notes (TN) to identify particular features of interest, where appropriate.
- 2.2.4 Habitats present that are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 or the local Biodiversity Action Plan (LBAP) for Barnsley were noted.
- 2.2.5 The value and sensitivity of ecological features present on Site were determined based on the guidance given in 'Guidelines on Ecological Impact Assessment' (CIEEM, 2016). 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, and lastly Site level.

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 Ponds 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. A single waterbody was identified within 500 m of the Site. Access was available to this pond on the day of survey and it was subject to assessment using the Habitat Suitability Index (HSI) (Oldham *et al.*, 2000) for its suitability to support great crested newts (*Triturus cristatus*) (GCN).
- 2.3.3 The great-crested newt is a habitat specialist and its status in a given waterbody is influenced by the existence of particular features (e.g. fish, heavy shading) and/or the absence of others (e.g. suitable terrestrial habitat within 500 m). The HSI provides a numerical value (ranging from 0 to 1) that indicates the suitability of a waterbody for great crested newts. The higher the HSI score, the more suitable (or closer to optimum habitat conditions) the waterbody may be considered for great-crested newts. However, it should be noted that the HSI score should be verified by an experienced surveyor.

Badger

- 2.3.4 Signs of badger (*Meles meles*) activity were searched for within the survey area 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 The building and trees on Site were assessed for their potential to support roosting bats as part of the extended Phase 1 habitat survey. Internal access to the Site building was not possible on the day of survey.
- 2.3.6 An individual building or tree may have several features of potential interest to roosting bats associated with it. It is not always possible to confirm usage of a feature by bats as often the animals may be present on one day and no evidence of occupation may be found on the next. Consequently it is customary when undertaking such surveys to assign each feature to a defined category of roosting potential as follows: Negligible, Low, Moderate, High, Confirmed (Collins, 2016).
- 2.3.7 The survey area was also assessed for its suitability for foraging and commuting bats.

Birds

- 2.3.8 Detailed bird surveys were not undertaken as part of this assessment, however whilst on site the opportunity was taken to record all species of birds encountered and habitats on Site were assessed for their value to nesting and foraging birds.

Reptiles

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

Riparian Mammals and White-clawed Crayfish

- 2.3.10 A desk based search for watercourses on Site, and within 30 m of the Site, which are not separated from the Site by a major barrier to dispersal, was undertaken using an Ordnance Survey (OS) map.
- 2.3.11 A ditch is present to the north of the Site. This was assessed for its potential to support otter (*Lutra lutra*), water vole (*Arvicola amphibius*) and white-clawed crayfish (*Austropotamobius pallipes*).

Other Key and Notable Species

- 2.3.12 The opportunity was taken whilst on site to assess habitats for the potential to support other protected species, search for signs of 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 extended Phase 1 habitat survey, any evidence of invasive species, as listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), was recorded where seen.

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 or protected species surveys where deemed necessary. The walkover was undertaken in July which is considered to be an optimal time of year to conduct botanical surveys. It is therefore considered that a representative assessment of Site habitats and a robust evaluation of their importance to nature conservation has been made.
- 2.5.2 Assessment of the building and trees on site was conducted externally, with internal access not possible on the day of survey. Potential voids and access points within the building on Site could therefore not be accessed to identify the extent of the void and likelihood of the presence of roosting bats.

3. Findings and Evaluation

3.1 Site Description

- 3.1.1 The Site covers approximately 6 ha of land which was once used as a residential housing estate. The Site is now an area of derelict land which is dominated by scrub and rough grassland habitats with some evidence of ornamental plants still present. Tarmac roads and driveways still surround the Site, with earth bunds currently blocking vehicular access. A single small building was present within the east of the Site.
- 3.1.2 The Site is located within an area of residential housing to the north of the village of Thurnscoe, Doncaster. To the north lies an arable barley field, with a railway line to the east and residential housing associated with Thurnscoe to the south east and west. The habitats within the surrounding landscape are those associated with residential gardens and open farmland with occasional amenity field and hedgerows.

3.2 Designated Sites

- 3.2.1 No statutory sites of importance to nature conservation were identified within 1 km of the survey area using MAGIC.
- 3.2.2 No locally designated sites were identified by BBRC or DLRC.
- 3.2.3 The Site is located within Dearne Valley Green Heart Nature Improvement Area.

3.3 Habitats

Neutral Semi-Improved Grassland

- 3.3.1 The Site is dominated by a mosaic of semi-improved grassland and scrub. For the purpose of this report this habitat has been assessed as neutral semi-improved grassland with an occasional presence of scrub species.
- 3.3.2 This habitat is assessed as semi-improved due to the previous land usage as residential gardens and buildings. It is therefore likely that this habitat was once amenity grassland, which, after being left unmanaged has become overgrown and colonised by locally surrounding species. The grassland is considered to be neutral due to the lack of indicative calcareous, acidic or other notable features. The sward was dominated by common native and occasionally ornamental and arable species.
- 3.3.3 The grassland is dominated by grass species including false oat grass (*Arrhenatherum elatius*), perennial rye grass (*Lolium perenne*), cocks foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*) and red fescue (*Festuca rubra*). Additional grass species including smooth meadow grass (*Poa pratensis*) and annual meadow grass (*Poa annua*) are also present. Herbaceous species identified on site included common ragwort (*Jacobaea vulgaris*), rosebay willowherb (*Chamerion angustifolium*), lady's mantle (*Alchemilla mollis*), creeping cinquefoil (*Potentilla reptans*), broadleaved dock (*Rumex obtusifolius*), dandelion (*Taraxacum officinale* agg.), tufted vetch (*Vicia cracca*), common mallow (*Malva sylvestris*), mugwort (*Artemisia vulgaris*) and black medick (*Medicago lupulina*). Scrub species within this area were dominated by bramble (*Rubus fruticosus* agg.) and thistle species

(*Cirsium* sp.), with occasional ash (*Fraxinus excelsior*) saplings, buddleia (*Buddleja davidii*) and rose (*Rosa* sp.) present.

- 3.3.4 Occasional ornamental species and arable crops such as honeysuckle (*Lonicera nitida*), barley (*Hordeum vulgare*) and oilseed rape (*Brassica napus*) were also present on site.
- 3.3.5 Semi-improved grassland is not listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 or as a local BAP habitat. This habitat is relatively species-poor, comprising native species commonly occurring within the local area and nationally with no notable or indicative species identified. Consequently this habitat is considered to be of importance at a Site level only.

Scattered Trees

- 3.3.6 Scattered semi-mature and mature trees are present predominantly around the boundaries of the Site.
- 3.3.7 Trees are dominated by elder (*Sambucus nigra*) and hawthorn (*Crataegus monogyna*), with species such as sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), ash (*Fraxinus excelsior*) and weeping willow (*Salix babylonica*) also present.
- 3.3.8 Coniferous leylandii (*Cupressus x leylandii*) trees were also present on Site, along with ornamental fruit trees including cherry (*Prunus* sp.) and apple (*Malus* sp.).
- 3.3.9 Trees are not included as a habitat of principal importance under Section 41 of the NERC Act 2006 or as a local BAP habitat. The trees comprise common species occurring frequently across the immediate surrounding area and nationally. All individuals are identified to be semi-mature and are not of a size or age associated with notable features. As such, the tree habitat on Site is not considered to be of importance to nature conservation at greater than the Site level.

Dense Scrub

- 3.3.10 The boundaries of the Site were dominated by scattered and dense scrub forming a mosaic of habitats with the surrounding grassland. Occasional scrub patches were also present across the Site.
- 3.3.11 The scrub is dominated by bramble but also contained species such as common nettle (*Urtica dioica*), rosebay willowherb, thistle species, teasel (*Dipsacus fullonum*), cow parsley (*Anthriscus sylvestris*), mugwort, buttercup species (*Ranunculus* sp.) and lady's mantle (*Alchemilla mollis*). Occasional ornamental species including *Berberis* and *Mahonia* species and honeysuckle (*Lonicera nitida*) were also present on site.
- 3.3.12 Scrub is not included as a habitat of principal importance under Section 41 of the NERC Act 2006 or as a local BAP habitat. The scrub is relatively species-poor comprising common species occurring frequently across the immediate surrounding area and nationally. This habitat is also relatively limited in its extent in most locations across site. As such, the scrub habitat on Site is not considered to be of importance to nature conservation at greater than the Site level.

Hedgerow

- 3.3.13 Linear features were present along the boundaries of site, comprise lines of poplar (*Populus* sp.) and leylandii (*Cupressus x leylandii*) trees. In addition areas of hawthorn (*Crataegus monogyna*) hedgerow were present bordering the public footpath to the west of the Site. These hedgerows were identified to be short in nature and comprise little structure.
- 3.3.14 The understory of these features comprised species such as ivy (*Hedera helix*), bramble (*Rubus fruticosus*), false oat grass (*Arrhenatherum elatius*), cleavers (*Galium aparine*), chamomile (*Matricaria chamomilla*), willowherb (*Epilobium* sp.) and groundsel (*Senecio vulgaris*).
- 3.3.15 All hedgerows comprised of more than 80 % native species are considered to be Habitats of Principal Importance in accordance with Section 41 of the NERC Act (2006) and are a local BAP habitat. The hedgerows on Site are not considered to be importance under the Wildlife and Landscape Criteria of the Hedgerow Regulations 1997.
- 3.3.16 The short length of hedgerows present on Site which do not provide any connectivity with the surrounding landscape, lack of consistent structure and dominance of non-native species mean that hedgerows on site are considered to be of importance to nature conservation to the Site level only.

Dry Ditch

- 3.3.17 No major watercourses were identified on Site or within 30 m of it. A dry ditch was identified to extend along the northern boundary of the Site.
- 3.3.18 The dry ditch (D1, Figure 1) is an isolated ditch comprising steep banks and is heavily vegetated with scrub and coarse grasses, indicating it has not held water for a length of time. No aquatic plant species were noted.
- 3.3.19 Ditch 1 is assessed as having negligible ecological value as aquatic habitat at the current time and is not considered to be of importance to nature conservation at greater than the Site level.

Building, Hardstanding and Bare Ground

- 3.3.20 A single building was identified on Site. This has been described in further detail and assessed in relation to bats in Section 3.4.11 to 3.4.12 of this report.
- 3.3.21 Other habitats present on site comprise tarmac roads and driveways which are still present from previous development. These are a man made habitat of negligible ecological value and are not discussed further within the report.
- 3.3.22 Earth bunds have been placed across tarmac roads to prevent their continued usage at the time of the survey. The bunds were predominantly bare of vegetation and are this habitat is therefore assessed to be of negligible ecological value.

3.4 Species

Amphibians

- 3.4.1 A single record of a common frog was identified 730 m to the south east of

the site. No records of amphibians were provided within 1 km of the survey area by DLRC.

- 3.4.2 No EPS licenses pertaining to great crested newt were identified within 1 km of the Site using MAGIC.
- 3.4.3 A single pond was identified to lie 475 m to the south of the Site. This pond is associated with the adjacent playing fields, consequently being immediately surrounded by scrub vegetation and intensively managed amenity grassland. Further afield the pond is surrounded by residential housing with few open green spaces other than those associated with residential gardens.
- 3.4.4 This pond was assessed using the Habitat Suitability Index (HSI) (Oldham *et al.* 2000) and was assessed to be of 'good' suitability for great crested newts; full results are provided within Appendix 2 with the location of the pond shown in Figure 2.
- 3.4.5 Given that the Site is located within a highly urban area and has only a single pond located 475 m away, which is considered to be outside of the core terrestrial area for great crested newts (50-250m Great Crested Newt Conservation Handbook, Froglife 2001). This pond is separated from Site by residential housing and associated infrastructure, it is considered highly unlikely that great crested newt would move onto Site. This species is therefore not considered a receptor for the proposed development.
- 3.4.6 Site habitats are considered to have some suitability to provide foraging habitat for common amphibians such as common frog (*Rana temporaria*) and common toad (*Bufo bufo*); however there is a lack of habitat connectivity in the immediate surrounding area to suitable pond or wetland habitats. There is some potential for common amphibians to occasionally use Site habitats, should garden ponds be present in neighbouring properties; however given the lack of known waterbodies, habitats on Site are considered to be of importance to common amphibians at the Site level only.

Badger

- 3.4.7 No records of badger were provided within 1 km of the survey area by BBRC or DLRC.
- 3.4.8 No evidence of badgers, such as setts, latrines or snuffle holes, were recorded during the survey and a thorough search of the Site was undertaken. There is potential for foraging badgers to utilise the Site from time to time as part of a wider territory, however given the absence of fields signs on Site and the availability of alternative more suitable habitat for sheltering and foraging badgers within the surrounding area, the habitats on Site are considered to be of importance to badger at the Site level only.

Bats

- 3.4.9 BBRC provided eleven records of bats within 1 km of the surveyed area. All records refer to roosts, ten of which are common pipistrelle (*Pipistrellus pipistrellus*) roosts to the south of the Site, one which is of unidentified species. The closest roost 895 m to the south of the Site.
- 3.4.10 No records of bats were provided within 1 km of the survey area by DLRC.

- 3.4.11 No EPS licenses pertaining to bats were identified within 2 km of the Site using MAGIC.
- 3.4.12 The building present on Site (B1, Figure 1) comprises a small single storey brick electricity sub station box with cavity walls and a flat bitumen roof. The building was disused at the time of the survey with no internal access available. The building comprised well sealed eaves, with no gaps identified beneath the roofing material to allow access into the building. All pointing and brickwork was in good condition with no cracks or crevices which would provide suitable roosting features for bats. Vents were present along the northern aspect of the building which provide access into the building and may lead into a cavity suitable for roosting bats. This could not be thoroughly assessed during this ground level survey.
- 3.4.13 The building has therefore been assessed to provide negligible bat roosting potential, with the exception of the vents which may provide a suitable feature with low potential for use by roosting bats.
- 3.4.14 All trees on Site were assessed for any features displaying potential to support roosting bats. Along the northern boundary of the Site lies a mature sycamore (*Acer pseudoplatanus*) tree (T1, Figure 1), this was covered in ivy (*Hedera helix*) and is of a size and age that may support potential roost features. This tree has therefore been assessed to provide low roosting potential for bats. Along the western boundary of the site an ash (*Fraxinus excelsior*) tree was identified (T2, Figure 1) to contain features such as knot holes and broken branches which are considered to display moderate bat roost potential.
- 3.4.15 Habitats on Site will provide suitable features for foraging bats; in particular the trees and hedgerows along Site boundaries. The Site however lies within an area of poorly connected habitat, with the key local features providing optimal habitat for foraging bats associated with the railway corridor to the east. Therefore whilst the Site may provide an area of suitable habitat within an otherwise unsuitable area of residential housing, Site habitats are unlikely to be of importance to foraging bats at greater than a Site level.

Birds

- 3.4.16 BBRC held records of a number of bird species including sparrowhawk (*Accipiter nisus*), blackcap, linnet (*Carduelis cannabina*), skylark (*Alauda arvensis*), siskin (*Carduelis spinus*), house martin (*Delichon urbica*), sedge warbler (*Acrocephalus schoenobaenus*), reed warbler (*Acrocephalus scirpaceus*), willow warbler (*Phylloscopus trochilus*) and yellowhammer (*Emberiza citrinella*).
- 3.4.17 DLRC provided records of hawfinch (*Coccothraustes coccothraustes*) within 1 km of the survey area.
- 3.4.18 In 2015, a re-assessment of Birds of Conservation Concern (BoCC) 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 including house martin (*Delichon urbicum*), goldfinch (*Spinus tristis*), pigeon (*Columbidae* sp.), starling (*Sturnus vulgaris*), magpie (*Pica pica*), blackbird (*Turdus merula*), house sparrow (*Passer domesticus*) and great tit (*Parus major*) were identified to be present on Site on the day of survey. In particular, starlings, blackbird and great tit were highly active surrounding an area of scrub within the south west corner of the site. During this survey of the Site, swallows (*Hirundo rustica*) were also recorded over the adjacent arable field to the north.

3.4.21 House sparrows and starlings are both Red listed species, whereas house martins are Amber listed. All other birds identified on Site during this survey are Green listed.

3.4.22 All areas of scrub and scattered trees will provide suitable features for various species of bird, although Site habitats are not considered critical to any one species in particular. Given the limited extent of the scrub and trees on Site, the Site is considered to be of importance to nesting and foraging birds at the Site level only.

Reptiles

3.4.23 No records of reptiles were provided within 1 km of the survey area by BBRC or DLRC.

3.4.24 The grassland and scrub on Site provide suitability for use by basking reptiles, including shelter opportunities within boundary scrub. There is however, limited connectivity to other areas of suitable habitat within the surrounding area, such as the railway line which lies 100 m to the east. In addition, the Site is located in a highly residential area and frequently disturbed by the public. It is therefore considered unlikely that reptiles would be found on Site. Reptiles are not considered a receptor for the Site and are therefore not discussed further in this report.

Riparian Mammals and White Clawed Crayfish

3.4.25 No records of riparian mammals or white-clawed crayfish were provided within 1 km of the survey area by DLRC.

3.4.26 Ditch 1 which extends along the northern boundary of the Site is dry and is therefore unsuitable to support water vole, otter or white-clawed crayfish. As such, these species are not considered receptors for the proposed development and are not discussed further in this report.

Other Species

3.4.27 BBRC held one record of hedgehog within 1 km of the Site.

3.4.28 Habitats on the Site may support hedgehogs as part of a wider foraging territory and could provide an important local resource in the residential area.

Habitats on Site may be of Site importance to hedgehogs.

3.5 Invasive Species

- 3.5.1 No invasive species were recorded on Site at the time of the survey. As such, invasive species are not considered to be a receptor for the Site and are not discussed further in this report.

4. Ecological Assessment and Mitigation

4.1 Proposals

- 4.1.1 The proposed development shown on the supplied April 2017 Sketch Appraisal (Drawing Ref: 2238_SK06) produced by Chris Gothard includes the construction of 115 residential dwellings, with associated landscaping and infrastructure. Public Open Space is incorporated in the south east and north west corner. The following assessment of ecological impacts is based on this layout.

4.2 Designated Sites

- 4.2.1 No statutory sites of importance to nature conservation have been identified and therefore no impacts to statutory sites are anticipated.
- 4.2.2 No locally designated sites were identified by DLRC within 1 km of the Site; there will therefore be no impact upon locally designated sites during proposed works.
- 4.2.3 The site was identified to lie within Dearne Valley Green Heart Nature Improvement Area; however it is considered that loss of habitats on site will have no impact upon the overall value of this scheme.

4.3 Habitats

Neutral Semi-Improved Grassland

- 4.3.1 Total landtake of grassland on Site will be required to accommodate the proposed development. Given that the grassland sward is species-poor and dominated by nationally and locally common species, landtake is considered to be of importance to nature conservation at the Site level only.
- 4.3.2 Given the size of the Site and the scale of the proposed development, it is acknowledged that there is limited scope for ecological enhancements. However, consideration could be given to applying a more relaxed mowing regime for retained areas of grassland on Site i.e. POS, to increase structural diversity and enhance the value of the Site for invertebrates, birds and small mammals.
- 4.3.3 An ecologically sensitive landscaping plan would also have the potential to benefit invertebrates and birds and enhance the ecology of the proposed scheme, hereby complying with the National Planning Policy Framework (NPPF). Where possible, native species should be favoured and species chosen should maximise flowering, pollen/nectar production and/or berries/fruit production to benefit invertebrates, birds and small mammals.

Scattered trees

- 4.3.4 The majority of scattered trees are present along boundaries with adjacent gardens.
- 4.3.5 The current proposed plan indicates that all trees will be removed. Given that tree cover on site is limited, landtake of trees is considered to be of importance to nature conservation at the Site level only. The current proposed plans also show that further trees will be planted post-development within

residential gardens and areas of Public Open Space. This has the potential to compensate for the trees to be removed and furthermore provide a net increase the biodiversity and value of the site in the long-term.

- 4.3.6 Consideration should however, be given to retaining trees if possible. Should this be feasible, trees to be retained should be protected by the implementation of Root Protection Zones (RPZs) in accordance with British Standard 5837 (2012).
- 4.3.7 It is recommended that the new tree planting incorporated within the landscaping scheme for the proposed development comprises native trees, typical of the local area and of UK provenance. Flowering and fruiting species are encouraged to maximise value to wildlife. It is recommended that heavy standards are used to decrease the time taken for the trees to establish.

Dense Scrub

- 4.3.8 Total landtake of scrub will be required to accommodate the proposed development. Given the wide availability of this habitat in the surrounding area, landtake of scrub is considered to be of importance to nature conservation at the Site level only.
- 4.3.9 The loss of scrub on Site could be offset by the incorporation of structure planting within areas of POS. Groups of shrubs would provide habitat for birds and small mammals, and flowering and fruiting species are encouraged to maximise value to wildlife. Native species typical of the local area and of UK provenance should be included within the landscaping scheme.

Hedgerow

- 4.3.10 All hedgerows are considered habitats of principal importance in accordance with Section 41 of the NERC Act. The hedgerows on site lack structure and connectivity to the surrounding landscape, extend for short lengths and are very species-poor. Therefore landtake of these is considered to be of importance to nature conservation at the Site level only.
- 4.3.11 Proposed development plans currently show complete removal of hedgerows on Site. It is however, highly advised that consideration is given to the retention of hedgerows across the Site. Should this not be possible, consideration should be given to the replanting of hedgerows as boundary treatments for gardens or areas of Public Open Space. This should be detailed in the landscape strategy.
- 4.3.12 The planting of hedgerows has the potential to improve the overall biodiversity of the Site and will improve the quality of habitats for species such as birds, bats and invertebrates.

Dry Ditch

- 4.3.13 No impacts to the ditch located adjacent to the northern boundary are anticipated. It is recommended that pollution prevention guidelines (CIRIA C532, 2001) should be followed to avoid indirect impacts to the watercourses to include procedures implemented to prevent run-off entering the watercourses during works and contingency plans in place to deal with accidental spillages. Machinery and topsoil should not be stored within 5 m of the bank of the watercourses to avoid compaction or the risk of collapse.

4.4 Species

Amphibians

- 4.4.1 Common amphibians are protected under the Wildlife and Countryside Act 1981 (as amended) against sale, barter or exchange of captive animals. Common toad is also listed as a priority species under Section 41 of the NERC Act 2006.
- 4.4.2 The terrestrial habitat on Site has some suitability to support common amphibians but alternative suitable terrestrial habitat is available within the surrounding area and landtake required to accommodate development at the Site is considered to be of importance to common amphibians at the Site level only.
- 4.4.3 In the event that common amphibians are encountered during Site clearance works, they should be carefully collected by gloved hand and relocated to an area of shelter away from the area of works.

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 No badger setts were present on Site at the time of the survey and no field signs of badger were recorded across the Site. Whilst there is potential for foraging badgers to utilise the Site as part of a wider territory, given the availability of alternative suitable habitat for sheltering and foraging badgers within the local area, the habitats on Site are considered to be of importance to badger at the Site level only.
- 4.4.6 As badger have some potential to move across the Site from time to time, taking a best practice approach, all deep excavations (> 1 m) should be covered overnight during demolition/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. No open pipework should be left overnight. As a precautionary measure it is recommended that consideration is given to a pre-construction badger check.

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 2006.

- 4.4.10 The building on Site is considered to display negligible potential to support roosting bats, with the exception of a single feature of a vent along the northern aspect. The Sketch Appraisal shows the existing sub station to be retained. Therefore, no further inspection is recommended at this time. However, should plans change to include demolition, an endoscope survey be conducted of the building with safe access provided to all areas, to confirm presence/absence of roosting bats.
- 4.4.11 It is recommended that the ash tree (T1) along the western boundary is retained, if feasible. Should this not be possible, an aerial inspection of all features should be conducted by a licensed bat ecologist before any tree works are undertaken. Alternatively a dusk emergence or dawn swarming survey can be conducted prior to the felling of the tree, if this is scheduled between May to August. It is recommended that the sycamore tree (T2) along the northern boundary displaying low roosting potential is also left intact if possible. Should this not be possible, the tree should be sensitively felled in accordance with best practice.
- 4.4.12 The Site has been assessed to provide low quality foraging habitat for bats. However, the current development plans will not fragment any bat foraging habitat.
- 4.4.13 It is also recommended that a sensitive lighting scheme is developed to minimise the impact upon foraging and commuting bats. Sensitive lighting should include where possible, low sodium bulbs, lighting downward facing and no higher than eaves height. Lighting should avoid features should as hedgerows and trees and light spill should be avoided to areas of planting within POS. Directional or low level lighting could be considered in these areas. Further recommendations relating to bats and lighting are provided in Appendix 4.
- 4.4.14 Inclusion of roosting opportunities for bats should be considered to provide a biodiversity enhancement which would comply with the National Planning Policy Framework aim that "*opportunities to incorporate biodiversity in and around developments should be encouraged*" (NPPF, 2012). This would also compensate for the loss of T1 and T2, if these cannot be retained.
- 4.4.15 Bat tubes or boxes e.g. Schwegler 1FR bat tubes, could be installed within the fabric of buildings to offer discreet and secure, self contained units without providing access into cavity walls. Alternatively, external boxes could be mounted securely on an external wall. Locations facing southerly aspects are optimal for bat boxes, and they should be placed at a minimum of 4 m high (or preferably at eaves level). Areas of bright lighting should be avoided.

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 nesting season, which falls between March and August, inclusive.
- 4.4.17 The scrub, hedgerows and trees on site are likely to be used by nesting and

foraging common bird species. It is likely that most of these resources will be removed during proposed development, however given that the abundance of similar habitat within the wider area and the future establishment of residential gardens and POS, landtake is not considered to be of importance to nesting and foraging birds above the Site level.

- 4.4.18 It is recommended that any vegetation removal should be undertaken outside of the bird breeding season i.e. undertaken between September to February inclusive. If it is not possible to schedule clearance works for these months, a breeding bird check undertaken by a suitably qualified ecologist will be required no more than two days prior to clearance to check for the presence of active bird nests. An active nest would require an exclusion zone to be established and adhered to until chicks have fledged (to be monitored and confirmed by an ecologist).
- 4.4.19 Inclusion of a range of bird nesting provision on any new structures or retained mature trees would be considered a positive enhancement for nature conservation and would comply with the NPPF aims for biodiversity (2012). Suitable provision may include general bird boxes with 26 mm and 32 mm entrance holes suitable for a range of garden bird species and/or sparrow terraces for house sparrows. The bird boxes should be placed at a minimum height of 3 m in a number of locations facing different aspects to maximise the chances of occupation. However, full south aspects which receive full sun all day during the summer months present a risk of overheating and should therefore be avoided. Tree planting would also be beneficial to local bird species.

Other Key and Notable Species

- 4.4.20 Hedgehog is included as a species of principal importance under Section 41 of the NERC Act 2006. Whilst not afforded a high level of protection, hedgehogs have experienced significant declines in the UK population. Taking a best practice approach, avoiding harm to hedgehogs should be taken into consideration during works.
- 4.4.21 Hedgehogs are highly mobile and inquisitive animals that have potential to move onto Site at any time. As a 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.
- 4.4.22 Should a hedgehog be discovered on Site at any time during the works, it should be moved carefully with gloved hands to a sheltered area away from the footprint of works e.g. beneath scrub.
- 4.4.23 The creation and maturing of new garden habitats and POS on Site will provide alternative suitable habitat to the grassland and scrub currently on Site. To allow for dispersal of small mammals between gardens, which are increasingly important to hedgehogs, consideration should be given to the incorporation of small gaps beneath or between garden fences across the development if close boarding fencing is to be used.
- 4.4.24 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>. Alternatively, railing and hedgerows provide free passage for hedgehogs.

5. References

Bickmore, C. J. (2003). *Hedgerow Survey Handbook: A Standard Procedure for Local Surveys in the UK; Prepared on Behalf of the Steering Group for the UK Biodiversity Action Plan for Ancient And/or Species-rich Hedgerows*. Countryside Council for Wales.

British Standards Institution (2012) BS5837: 2012. *Trees in Relation to Design, Demolition and Construction*.

CIRIA (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532)

Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD. (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man*. British Birds, 102, 296–341.

Harris, S., Cresswell, P. and Jefferies, D. (1989) *Surveying Badgers*. Mammal Society (Occasional Publication No 9).

Hundt, L. (2012) *Bat Surveys – Good Practice Guidelines Version 2*. Bat Conservation Trust, London.

IEEM (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom*. IEEM, Winchester, UK.

JNCC (2010) *Handbook for Phase 1 habitat survey – A technique for environmental audit*. ISBN 0 86139 636 7.

Langton, T., Beckett, C. and Foster J., (2001). *Great Crested Newt Conservation Handbook*. Froglife, Suffolk UK.

Great Britain. Department for Communities and Local Government (2012) *National Planning Policy Framework*. London: Department for Communities and Local Government.

Figure 1. Survey Findings



KeepMoat Homes School Street, Thurnscoe

Figure 1
Thurnscoe Phase 1 Habitat Map

Brook Holt 3 Blackburn Road Sheffield S61 2DW
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Figure 2. Pond Location



Legend

-  Site boundary
-  500m Buffer
-  Ponds

0 125 250
Metres

KeepMoat Homes
School Street, Thurnscoe

Figure 2
Ponds within 500m of Site boundary

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Appendix 1. Site Photographs



Legend

1. Site viewed from north to west along road
2. Earth bund across road.
3. Building (B1) present on site.
4. Scrub in south east corner of the site, supporting high levels of bird activity.
5. Ash tree along western boundary identified to provide moderate bat roosting potential.
6. Sycamore tree along northern boundary identified to provide low bat roosting potential.
7. Pond 475 m to the south of site.

Keepmoat Homes Ltd.
School Street, Thurnscoe
Ecological Appraisal

Appendix 1
Site Photographs

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Appendix 2. Habitat Suitability Index Calculation.

Table A2.1. Habitat Suitability Calculations

Pond Name		<i>1</i>
Grid Ref		<i>SE 45515 05444</i>
SI No	SI Description	<i>SI Value</i>
1	Geographic location	<i>1</i>
2	Pond area	<i>1</i>
3	Pond permanence	<i>1</i>
4	Water quality	<i>0.67</i>
5	Shade	<i>1</i>
6	Water fowl effect	<i>1</i>
7	Fish presence	<i>1</i>
8	Pond Density	<i>0.5</i>
9	Terrestrial habitat	<i>0.33</i>
10	Macrophyte cover	<i>0.9</i>
HSI Score		<i>0.79</i>
Pond suitability (see below)		<i>Good</i>

Appendix 3. Species Lists

Table A3.1: Species List for Habitats on Site.

Scientific name	Common name	DAFOR
Neutral Semi-improved Grassland		
<i>Rubus fruticosus</i>	Bramble	F
<i>Lolium perenne</i>	Perennial Rye Grass	D
<i>Lolium perenne</i>	Cocks Foot	D
<i>Arrhenatherum elatius</i>	False Oat Grass	D
<i>Festuca rubra</i>	Red Fescue	A
<i>Poa pratensis</i>	Smooth Meadow Grass	A
<i>Holcus lanatus</i>	Yorkshire Fog	A
<i>Centaurea nigra</i>	Common Knapweed	F
<i>Trifolium repens</i>	White Clover	A
<i>Plantago lanceolata</i>	Long Leaf Plantain	F
<i>Rumex obtusifolius</i>	Broadleaved Dock	O
<i>Senecio jacobaea</i>	Ragwort	F
<i>Cirsium sp.</i>	Thistle	F
<i>Chamerion angustifolium</i>	Rosebay Willowherb	O
<i>Vicia sp.</i>	Vetch species	O
<i>Taraxacum officinale</i>	Dandelion	O
<i>Geranium sp.</i>	Geranium species	F
<i>Urtica dioica</i>	Nettle	F
<i>Galium aparine</i>	Cleavers	F
<i>Rosa sp.</i>	Rose species	O
<i>Potentilla reptans</i>	Creeping Cinquefoil	F
<i>Trifolium pratense</i>	Red Clover	F
<i>Medicago lupulina</i>	Black Meddick	F
<i>Hedera helix</i>	Ivy	R
<i>Brassica napus</i>	Oilseed Rape	R
<i>Anthriscus sylvestris</i>	Cow Parsley	R
<i>Arctium sp.</i>	Burdock	R
<i>Buddleja davidii</i>	Buddleia	O
<i>Matricaria discoidea</i>	Pineapple weed	O
<i>Fuschia sp.</i>	Fuschia	O
<i>Malus sp.</i>	Apple	R
<i>Malva sylvestris</i>	Common Mallow	R
<i>Fraxinus excelsior</i>	Ash	R
<i>Vicia cracca</i>	Tufted Vetch	R
<i>Convolvulus arvensis</i>	Field Bindweed	O
<i>Geranium robertianum</i>	Herb Robert	O
<i>Artemisia vulgaris</i>	Mugwort	O
<i>Alchemilla mollis</i>	Lady's Mantle	O
Scattered Trees		
<i>Sambucus nigra</i>	Elder	D
<i>Acer pseudoplatanus</i>	Sycamore	A
<i>Crataegus monogyna</i>	Hawthorn	A
<i>Betula pendula</i>	Silver Birch	A
<i>Salix babylonica</i>	Weeping Willow	F
<i>Cupressus x leylandii</i>	Leylandii	O
<i>Fraxinus excelsior</i>	Ash	D

Scientific name	Common name	DAFOR
Scrub		
<i>Rubus fruticosus</i>	Bramble	D
<i>Cirsium sp.</i>	Thistle	F
<i>Senecio jacobaea</i>	Ragwort	F
<i>Arrhenatherum elatius</i>	False Oat Grass	F
<i>Alchemilla mollis</i>	Lady's Mantle	O
<i>Ranunculus sp.</i>	Buttercup	O
<i>Rumex obtusifolius</i>	Broadleaved Dock	O
<i>Dipsacus fullonum</i>	Teasel	O
<i>Anthriscus sylvestris</i>	Cow Parsley	F
<i>Mahonia species</i>	Mahonia species	O
<i>Berberis species</i>	Berberis species	O
<i>Lonicera nitida</i>	Lonicera nitida	O
<i>Artemisia vulgaris</i>	Mugwort	O
Defunct Species Poor Hedgerow with Trees		
<i>Artemisia vulgaris</i>	Hawthorn	D
<i>Cupressus x leylandii</i>	Leylandii	A
<i>Hedera helix</i>	Ivy	F
<i>Rubus fruticosus</i>	Bramble	D
<i>Senecio vulgaris</i>	Groundsel	R
<i>Arrhenatherum elatius</i>	False Oat Grass	F
<i>Papaver rhoeas</i>	Common Poppy	R
<i>Matricaria chamomilla</i>	Chamomile	O
<i>Epilobium sp</i>	Willowherb	F
<i>Prunus sp.</i>	Cherry	O

Appendix 4. Bats and Lighting

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 cat's 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.

References

BCT (2009) Bats and Lighting in the UK. Bat Conservation Trust.

BCT (2014) Artificial lighting and wildlife. Interim Guidance: Recommendations to help minimise the impact of artificial lighting.

Downs N., Beaton, V., Guest J., Polanski S., Robinson, S. & P. Racey (2003) *The effects of illuminating the roost entrance on the emergence behaviour of Pipistrellus pygmaeus*. Biological Conservation, 111: 247-252.

Hundt (2012) *Bat Surveys: Good Practice Guidelines, 2nd edition*. Bat Conservation Trust.

Stone, E., Jones, G. & S. Harris (2012) *Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats*. Global Change Biology, 18: 2458-2465.