WILD FRONTIER ECOLOGY

GNLP Hellesdon/Horsford Sites

Preliminary Ecological Appraisal

June 2019

Report produced by	Produced on behalf of
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The data which we have prepared and provided is accurate, and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.

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1 NON TECHNICAL SUMMARY

This report presents the results from ecological investigations of the proposed Greater Norwich Local Plan housing sites (Hellesdon/Horsford Sites), including a desk study, extended Phase 1 habitat survey and breeding bird surveys. The potential ecological impacts of the development on valued ecological receptors are evaluated, and mitigation measures described where appropriate.

The biological records returned by a local (NBIS) data search included a number meriting consideration with regards to the assessment sites (e.g. hedgehog, barn owl, slow-worm and great crested newt). The desk study also identified nearby designated nature conservation areas, most notably two adjacent County Wildlife Sites (numbers 1335 and 2022), and the River Wensum SSSI/ SAC, which is 800 metres south-west of the nearest proposal site.

A 2017 Phase 1 habitat survey found a number of habitats within the application site - arable, improved grassland, species-poor semi-improved grassland, scrub, tall ruderal vegetation, buildings, track and bare ground (road), intact and defunct species-rich hedges, intact and defunct species-poor hedges, fences and earth banks. The site was extensively photographed and Phase 1 habitat mapped, with target notes employed to describe many areas in detail. A subsequent 2019 revalidation habitat survey found the site to be largely the same as in 2017, but with a new retention pond for the Broadland Northway and modest additions to the site boundaries.

The 2017 preliminary breeding bird survey found a limited number of BoCC Red and Amber-listed species holding nesting territories within the site, including small numbers of dunnock, house sparrow, skylark, starling, tree sparrow and yellowhammer.

This Preliminary Ecological Appraisal estimates the key valued ecological receptors for the assessment site as being: River Wensum SSSI/ SAC; The Broads SAC and Broadland SPA/ Ramsar (including constituent SSSIs); County Wildlife Sites nos. 1335 and 2022; common pipistrelle; soprano pipistrelle; hedgehog; breeding territories for farmland bird species; common toad.

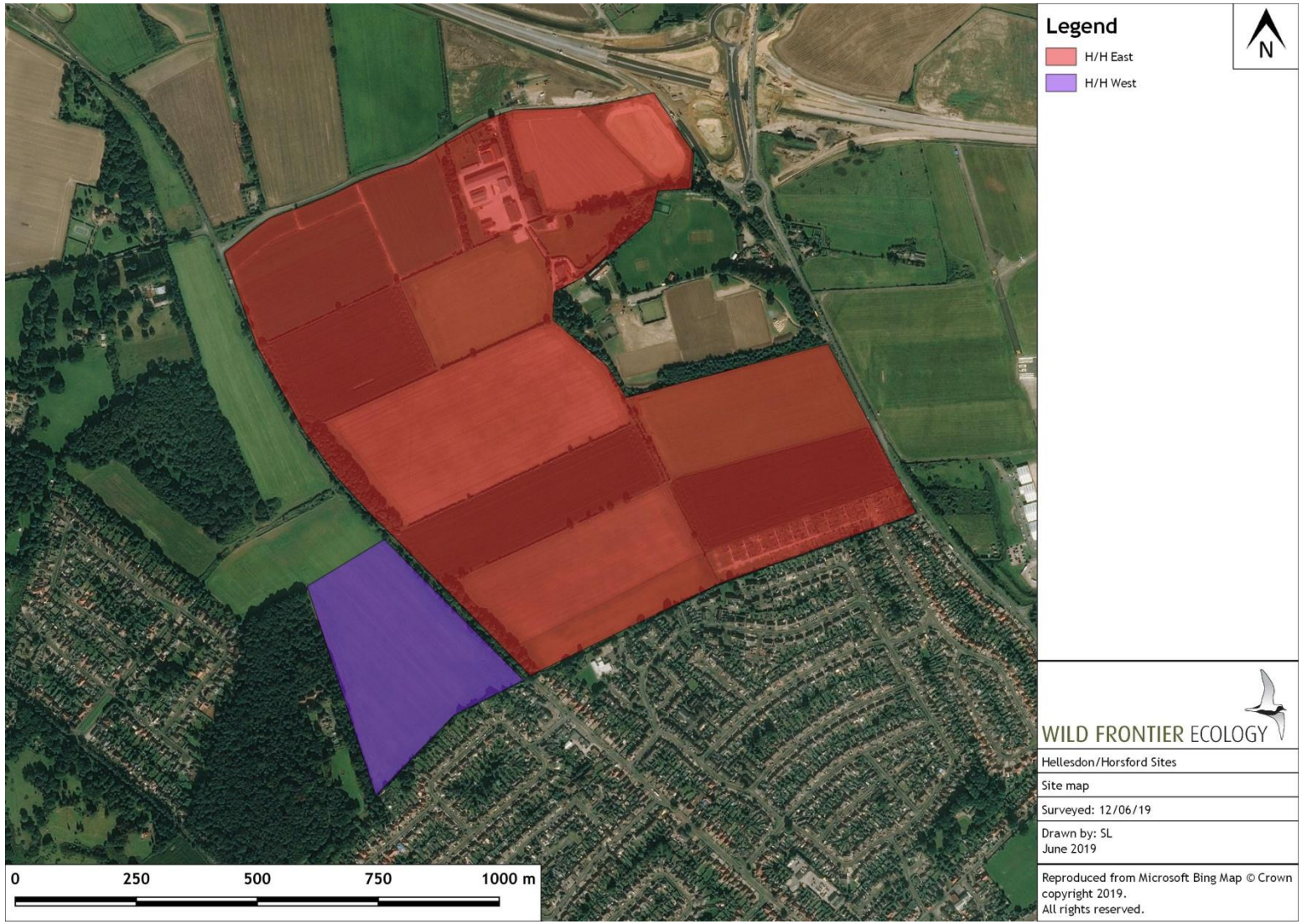
2 BACKGROUND

Wild Frontier Ecology Ltd (WFE) was commissioned by CODE Development Planners, on behalf of Drayton Farms Limited, to undertake an ecological assessment of the Greater Norwich Local Plan (GNLP) housing sites 3Bi, 3Bii, 4A and 4B (see Figure 1); these areas were later modified and collectively termed the Hellesdon/Horsford Sites (see Figure 2).

The proposed development sites are located just to the north of Hellesdon village (Norwich suburb), on either side of Reepham Road. The smaller site on the west side is for estimated 250-300 dwellings. The larger site, between Reepham Road and Holt Road, is for estimated 594-700 dwellings, plus green infrastructure/open space.

***Figure 1**. Locations of GNLP sites 3Bi, 3Bii, 4A and 4B (2017)*

***Figure 2**. Locations of GNLP Hellesdon/Horsford Sites (2019)*



3 RELEVANT LEGISLATION & POLICY

3.1 Statutory Site Designations

3.1.1 International (European) Site Designations

The European Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) as amended directs the designation of important wildlife sites through the European Community as Special Areas of Conservation (SACs), and gives statutory protection to habitats and species listed in the Directive as being threatened or of community interest. Sites identified as candidate SAC (cSAC) are provided with the same level of protection as SAC.

Annex I of 92/43/EEC (as amended) lists habitat types which are regarded as being of European importance. Included within these are a number of 'priority habitat types' which are habitats regarded as being in danger of disappearance and whose natural range falls broadly within the European Union. This European law had been transposed into UK legislation by The Conservation (Natural Habitats) &c Regulations 1994, The Conservation of Habitats and Species Regulations 2010, and now the Conservation of Habitats and Species Regulations 2017.

Habitats of European-wide importance for birds are listed under the EC Wild Birds Directive (79/409/EEC) as amended. Habitats designated under this Directive are notified as Special Protection Areas (SPAs) and are identified for holding populations >1% of the reference population as defined in Appendix 4 of the SPA review of bird species listed in Annex 1 of the same Council Directive. Sites identified as potential SPA (pSPA) are provided with the same level of protection as SPA.

Wetlands of International Importance are designated under the Ramsar Convention.

3.1.2 National (UK) Site Designations

National ecological designations, such as Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs) are also afforded statutory protection. SSSIs are notified and protected under the jurisdiction of the Wildlife and Countryside Act 1981 (WCA 1981) as amended. SSSIs are notified based on specific criteria, including the general condition and rarity of the site and of the species or habitats supported by it.

3.1.3 Local Site Designations

A Local Nature Reserve (LNR) may be statutorily designated by a local authority under the power provided by the National Parks and Access to the Countryside Act 1949.

3.2 Non-Statutory County Site Designations

At county level, sites may be designated for their nature conservation interest. The criteria for inclusion, and the level of protection provided, if any, may vary between areas. Most individual counties have a similar scheme although they do vary.

These sites may be given various titles and some counties have multiple designations; within Norfolk they are named County Wildlife Sites (CWS), Roadside Nature Reserves (RNR) and Local Geological Sites (LGS). Recognition as a CWS/RNR/LGS does not itself confer statutory protection but together with statutory designations, CWS are defined in local and structure plans under the Town and Country Planning system and are a material consideration when planning applications are being determined.

Ancient Woodland sites are woodlands that have existed since at least 1600. They are typically of high biodiversity importance due to their superior species diversity and associated rare species. Ancient Woodlands are classified as either Ancient Semi-Natural Woodland (with native trees and shrubs which have not been planted) or Ancient Replanted Woodland (where original trees have been felled and then replanted, often with conifer trees).

3.3 National Species Designations and Protection

3.3.1 Mammals

The Protection of Badgers Act 1992 makes it unlawful to knowingly kill, capture, disturb or injure an individual badger *Meles meles*, or intentionally damage, destroy or obstruct an area used for breeding, resting or sheltering by badgers (i.e. a sett).

All bat species are listed under Annex IV (and certain species also under Annex II) of the European Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora 92/43/EEC, and are given UK protected status by Schedule 2 of the Conservation of Habitats and Species Regulations 2017. This protection extends to both the species and roost sites. It is an offence to kill, injure, capture, possess or otherwise disturb bats. Bat roosts are protected at all times of the year (making it an offence to damage, destroy or obstruct access to bat roosts), regardless of whether bats are present at the time. Bats and their roosts also receive protection from disturbance by the WCA 1981.

The water vole *Arvicola amphibius* is protected in accordance with Schedule 5 of the WCA 1981. It is an offence to intentionally damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection, or to disturb water voles whilst they are using such a place. It is also an offence to kill, injure, capture or possess water voles.

Otters *Lutra lutra* are protected in accordance with Schedule 5 of the WCA 1981. The otter is also a protected species included in Annex II of 92/43/EEC, and is protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017. It is an offence to intentionally kill, injure or take an otter from the wild, to intentionally or recklessly damage, destroy or obstruct access to any habitat used by otters, or to disturb the otters which make use of those habitats.

Shrews (all species) and hedgehog *Erinaceus europaeus* are protected from a variety of deliberate means of killing/taking by Schedule 6 of the WCA 1981.

3.3.2 Birds

All wild birds are protected under the WCA 1981 as amended. This prevents killing or injuring any bird or damaging or destroying nests and eggs. Certain species are also listed under Schedule 1 of the WCA 1981, which prevents disturbance of the species or its nest and/or eggs at any time, with protection by special penalties.

Certain bird species are listed in Annex 1 of the Council Directive 79/409/EEC on the conservation of wild birds. These are species for which Special Protection Areas (SPAs) could be designated if the population exceeds 1% of the reference population, as defined in Appendix 4 of the SPA Review.

The British Trust for Ornithology (BTO) lists Birds of Conservation Concern (BoCC)[1], which fall into three categories: Red-listed species of high concern; Amber-listed species of medium concern; and Green-listed species of lower concern. Species are placed on these lists based, among other criteria, on the percentage decline of breeding or wintering populations in recent years. These lists do not necessarily indicate rarity for the species concerned, and many Red and Amber-listed species are still common and widespread.

3.3.3 Reptiles

All native reptiles are listed on Schedule 5 of the WCA 1981, though they are not afforded the maximum level of protection (covered by Sections 1 and 9 only). For the four most widespread and commonly occurring reptile species (adder *Vipera berus*, grass snake *Natrix helvetica*, slow-worm *Anguis fragilis* and common lizard *Zootoca vivipara*), the protection extends to prohibit killing and injury but does not include habitat protection. When the presence of reptiles is confirmed the legislative protection obliges that a mitigation programme be undertaken to make 'reasonable effort' to remove or displace animals prior to the commencement of any site preparation or development.

3.3.4 Amphibians

The great crested newt *Triturus cristatus* is protected in accordance with both national and European legislation. The species is listed on Schedule 5 of the WCA 1981, making it an offence to knowingly kill, injure, disturb, handle or sell the animal. The protection is afforded to all life stages and includes both the terrestrial and aquatic components of its habitat. The species is also listed under Annexes II and IV(a) of 92/43/EEC and is protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017.

The other native amphibians, including common frog *Rana temporaria*, common toad *Bufo bufo*, palmate newt *Lissotriton helveticus*, and smooth newt *Lissotriton vulgaris*, are protected by Section 9(5) of the WCA 1981. Section 9(5) only prohibits the sale, possession or transport for the purpose of sale, and advertising the buying or selling of listed animals.

3.3.5 Invertebrates

The white-clawed crayfish *Austropotamobius pallipes* is listed on Schedule 5 of the Wildlife and Countryside Act 1981, and is afforded partial protection under Section 9(1) and full protection under Section 9(5). It is an offence to sell, or attempt to sell, any part of a white-clawed crayfish, alive or dead, or to advertise that one buys or sells, or intends to buy or sell any part of a white-clawed crayfish. The species is also listed under Annex II of 92/43/EEC (The Habitats Directive), and is given UK protected status by Schedule 2 of the Conservation of Habitats and Species Regulations 2017. Annex II listing means that Special Areas of Conservation (SACs) may be established specifically to conserve the species, and in these circumstances the favourable conservation status of the SAC population must be ensured.

There are other invertebrate species occurring in Norfolk that are listed under Annex II of 92/43/EEC (The Habitats Directive) and given UK protected status by Schedule 2 of

[1] Eaton, M. et al. (2015). Birds of Conservation Concern 4. The Population Status of Birds in the UK, Channel Islands and Isle of Man. British Birds 108: 708-746

the Conservation of Habitats and Species Regulations 2017, which are little-whirlpool ram's-horn snail *Anisus vorticulus*, depressed river mussel *Pseudanodonta complanata*, shining ram's-horn snail *Segmentina nitida*, narrow-mouth whorl snail *Vertigo angustior*, and Desmoulin's whorl snail *Vertigo moulinsiana*. A number of other invertebrate species are provided some measure of protected status by Schedule 5 of the Wildlife and Countryside Act 1981, ranging from full protection to just prohibiting sale. Multiple invertebrate species are given a conservation status by the Natural Environment and Rural Communities (NERC) Act 2006, (listing in Section 41).

3.3.6 Plants

Schedule 8 of the WCA 1981 lists plant species which are afforded special protection. It is an offence to pick, uproot or destroy any species listed on Schedule 8 without prior authorisation, and all plants are protected from unauthorised uprooting (i.e. without the landowner's permission) under Schedule 13 of the WCA 1981.

A Vascular Plant Red List for England provides a measure of the current state of England's flora measured against standardised IUCN criteria. Any taxon that is threatened – Critically Endangered (CR), Endangered (EN), Vulnerable (VU) – or Near Threatened (NT) does not have statutory protection but should be regarded as a priority for conservation in England. It should be noted that 'threat' is not synonymous with 'rarity', and some of the species concerned are still relatively common and widespread.

3.3.7 Species and Habitats of Principal Importance

Other priority species and habitats which are a consideration under the National Planning Policy Framework (NPPF) 2018, placing responsibility on Local Planning Authorities to aim to conserve and enhance biodiversity and to encourage biodiversity in and around developments. There is a general biodiversity duty in the Natural Environment and Rural Communities (NERC) Act 2006 (Section 40) which requires every public body in the exercising of its functions to 'have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity'. Biodiversity, as covered by the Section 40 duty, includes all biodiversity, not just the Habitats and Species of Principal Importance (also known as Priority Species and Habitats).

Section 41 of the NERC Act lists a number of species and habitats as being Species/Habitats of Principal Importance. These are species/habitats in England which had been identified as requiring action under the UK BAP, and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. The protection of either Priority Species or Habitats is not statutory, but "specific consideration"[2] should be afforded by Local Planning Authorities when dealing with them in relation to planning and development control. Also, there is an expectation that public bodies would refer to the Section 41 list when complying with the Section 40 duty. Below are some examples of Priority Species and Habitats which are relevant in a context of the wider countryside in Norfolk.

Widespread Priority Habitats in East Anglia include:

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[2] JNCC (2015) UK BAP priority species and habitats

http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

- Arable field margins
- Traditional orchards
- Hedgerows
- Eutrophic standing waters
- Ponds
- Rivers
- Lowland fen
- Lowland calcareous grassland
- Lowland dry acid grassland
- Lowland meadows
- Coastal and floodplain grazing marsh
- Reedbeds
- Lowland mixed deciduous woodland
- Wet woodland
- Wood-pasture and parkland

Widespread Priority Species in East Anglia (which have no other specific legal protection – except for nesting birds) include:

- Hedgehog *Erinaceus europaeus*
- Polecat *Mustela putorius*
- Brown hare *Lepus europaeus*
- Harvest mouse *Micromys minutus*
- Multiple Birds of Conservation Concern Red-listed species (e.g. skylark *Alauda arvensis*, spotted flycatcher *Muscicapa striata*)
- Common toad *Bufo bufo*
- European eel *Anguilla anguilla*
- Multiple invertebrate species (e.g. cinnabar moth *Tyria jacobaeae*, small heath butterfly *Coenonympha pamphilus*)
- Multiple plant species

3.4 Local Species and Habitat Designations

The Norfolk Biodiversity Partnership (NBP) has published Habitat and Species Action Plans for selected species occurring within Norfolk. Each Action Plan lists current actions and defines objectives and targets.

The NBP has also published a Biodiversity Supplementary Planning Guidance for Norfolk. This document sets out the key considerations relating to wildlife and biodiversity that should be taken into account for all Norfolk development proposals.

3.5 Policy

The overarching policy guidance for biodiversity is included within the National Planning Policy Framework (NPPF)[3]. Section 15 of the NPPF (Conserving and Enhancing the Natural Environment) outlines the approach that Local Authorities should adopt when considering ecological issues within the planning framework, including the principles of the Mitigation Hierarchy. This espouses that in addressing impacts on valued features, avoidance should be the first option considered, followed by mitigation (minimising negative impacts). Where avoidance and mitigation are not possible, compensation for loss of features can be used as a last resort.

[3] MHCLG (2018). National Planning Policy Framework. UK Government.

The NPPF also states that development plans should "*promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity*", and "*...opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.*"

4 SURVEY METHODS

4.1 Survey Objectives

The objectives of the survey were to observe and describe any protected species presence within the potential zone of influence of the proposed works.

4.2 Desk Study

The Norfolk Biodiversity Information Service (NBIS) was consulted on 15/05/17 for all site and species data within 2km of the original application sites (3Bi, 3Bii, 4A and 4B), which also effectively covers the current Hellesdon/Horsford Sites.

Google Earth and/or Bing Maps aerial photographs, along with Ordnance Survey 1:25,000 maps were used to examine the local landscape (e.g., identify nearby ponds, woodland, hedgerows, etc.).

4.3 Habitat Survey

A Phase 1 habitat survey of the original application sites (3Bi, 3Bii, 4A and 4B) was undertaken on 30/03/17 by Robert Yaxley BSc CEcol CEnv MCIEEM (NE bat survey class licence registration # 2015-11368-CLS-CLS, great crested newt class licence registration # 2016-19382-CLS-CLS).

This Phase 1 habitat survey followed the Joint Nature Conservancy Council (JNCC) guidelines[4], with the methods being 'extended' to include a general evaluation of the site in terms of any rare or protected species that were either likely or shown to be present (e.g. badgers and reptiles). The assessment covered the areas shown by Figure 1. The area was surveyed on foot, with illustrative photographs taken. Numerous areas were described in detail using target notes (refer to Table 1).

A subsequent revalidation Phase 1 habitat survey of the Hellesdon/Horsford Sites was completed on 12/06/19 by Seth Lambiase BSc MRes MSc MCIEEM. The assessment covered the areas shown by Figure 2.

4.4 Breeding Bird Surveys

One WFE breeding bird survey examined all habitats within the originally proposed development boundaries. The survey used the methodology detailed by the BTO for use in their Common Birds Census (CBC)[5].

The survey was undertaken on 03/05/17 by Graham Riley BSc ACIEEM.

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[4] JNCC (2010); Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit, JNCC, Peterborough.

[5] Gilbert, G., Gibbons, D.W. and Evans, J. (1998); Bird Monitoring Methods, RSPB, Sandy.

5 RESULTS

5.1 Pre-existing Information on Designated Sites and Protected Species

5.1.1 Designated Nature Conservation Sites

The nearest statutory designated nature conservation site is the River Wensum SAC/SSSI, which at its closest point is approximately 800m south-west of site 3Bi (refer to Figure 2). The qualifying features for the River Wensum SAC designation are: Annex 1 habitats - H3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, and Annex II species - S1092 White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* (primary), S1016 Desmoulin`s whorl snail *Vertigo moulinsiana* (qualifying), S1096 brook lamprey *Lampetra planeri* (qualifying) and S1163 bullhead *Cottus gobio* (qualifying). The notification reasons described in the River Wensum SSSI citation mention a suite of riparian habitats, flora and fauna.

There are also 11 CWSs within 2km: Land South of River Tud #243, Land South of River Tud #244, Red Bridge #246, Wensum Meadow #251, Low Road Meadow #255, Canham's Hill #1335, Black Park & The Thicket #1395, Drayton Wood #2022, Wensum Mount Farm #2106, Marriott's Way #2176 and Horsham Meadows #2178. A map of CWS sites is provided in Figure 3.

With the exception of the small Crostwick Marsh SSSI element (6km north-east), the nearest areas of The Broads SAC and Broadland SPA/ Ramsar are in excess of 10km from the proposed development site. The Broads SAC area includes a variety of important wetland habitats and is noted for a variety of species including otter *Lutra lutra*, great crested newt *Triturus cristatus*, Desmoulin's whorl snail *Vertigo moulinsiana,* ramshorn snail *Anisus vorticulus* and fen orchid *Liparis loeselii*. Broadland SPA/Ramsar hosts significant wintering wildfowl populations and wintering hen harrier *Circus cyaneus*, as well as breeding bittern *Botaurus stellaris* and marsh harrier *Circus aeruginosus*.

5.1.2 Protected and Conservation Concern Species

The data search with NBIS returned 1,145 species records from the search area. WFE's assessment of the data is that the local records of even moderate relevancy for the predominantly arable proposal sites are:

Mammals – common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, noctule *Nyctalus noctula*, Daubenton's bat *Myotis daubentonii*, Natterer's bat *Myotis nattereri*, *Myotis* sp., barbastelle *Barbastella barbastellus*, serotine *Eptesicus serotinus*, hedgehog *Erinaceus europaeus* and brown hare *Lepus europaeus*.

Birds – grey partridge *Perdix perdix*, kestrel *Falco tinnunculus,* red kite *Milvus milvus*, buzzard *Buteo buteo*, lapwing *Vanellus vanellus*, stock dove *Columba oenas*, barn owl *Tyto alba*, tawny owl *Strix aluco*, common swift *Apus apus*, house martin *Delichon urbicum*, song thrush *Turdus philomelos*, mistle thrush *Turdus viscivorus*, linnet *Carduelis cannabina*, house sparrow *Passer domesticus*, bullfinch *Pyrrhula pyrrhula*, yellowhammer *Emberiza citrinella* and starling *Sturnus vulgaris*.

Reptiles – common lizard *Zootoca vivipara* and slow-worm *Anguis fragilis*.

Amphibians – common frog *Rana temporaria*, smooth newt *Lissotriton vulgaris* and great crested newt (GCN) *Triturus cristatus*.

Mott MacDonald surveyed ponds for GCN along the Northern Distributor Road corridor from 2007-2009. The surveys covered the pond within site 4B and the next nearest pond just north of the B1149 and A140 roundabout junction; both ponds were negative for GCN (common frog and common toad *Bufo bufo* were recorded).

The next closest ponds to the 4B pond are one in an arable field 970 metres north-north-east, and another at West Farm just over 1km east-north-east (NBIS records show that GCN have been recorded from this pond). Although the negative survey results of the 4B pond are 10 years old, there is no reason to expect GCN recruitment within that time. The West Farm pond is separated from the 4B pond by over 1km, comprising hostile habitats such as arable fields, Norwich Airport runways and the A140.

5.2 Habitat Survey

A Phase 1 habitat map is provided as Figure 4.

West Hellesdon/Horsford Site (formerly Site 3Bii)

This is part of a large arable field. The western boundary is deciduous woodland with a few pines *Pinus sylvestris*. The southern boundary backs on to gardens (photo 4), with a narrow strip of trees, scrub and long grass adjacent to the site. The eastern boundary is a broad verge with trees (oak *Quercus robur*, ash *Fraxinus excelsior* and hawthorn *Crataegus monogyna*) along the Reepham Road, and there are also a few bluebells *Hyacinthoides non-scripta* (photo 5). The northern boundary has no feature associated with it.

Southern half of East Hellesdon/Horsford Site (mostly the former Site 4A)

This site is predominantly arable land divided and bounded by species-poor hedges or unhedged banks. In the north-west, adjoining the Reepham Road, is a belt of mature deciduous woodland (photo 15), with large ash, oak and sycamore *Acer pseudoplatanus* trees, and an understorey of hawthorn and blackthorn *Prunus spinosa*. The ground flora, dominated by plants such as stinging nettle and cleavers *Galium aparine*, indicates a non-ancient origin. An area of allotments has been created along the eastern half of the southern boundary (photo 6), and on the western half of the southern boundary is a large amenity lawn area (frequented by dog walkers, etc. – photo 19).

Northern half of East Hellesdon/Horsford Site (formerly Site 4B)

This site is predominantly arable land divided and bounded by species-poor hedges, and a replanted hedge along Holly Lane to the north (photo 3). The farm buildings are within this area – most are large sheds made of sheet materials, but there are two brick barns (photo 8, photo 11), a modern bungalow (photo 10), and a pair of semi-detached houses (photo 9). In the east of the site there is an improved pasture with a pond just offsite to the east. A dead common toad was found in the pasture (photo 13). A retention pond created for the Broadland Northway (aka the Norwich Northern Distributor Route) sits at the far north-east corner of the site (photo 21).

Table 1. Habitat survey target notes.

Target Note	Description	Photo Ref.
1	Modern bungalow.	10
2	Brick barn within farm complex	8
3	Replanted hedge bank with meadow saxifrage *Saxifraga granulata* and greater stitchwort *Stellaria holostea*.	16
4	Pond with some emergent reedmace, banks heavily shaded. Habitat suitability for great crested newts rated as *average* using HSI calculator.	12
5	Multi-stemmed ash, no bat roost potential	No photo included
6	Hedgerow oak, low bat roost potential	No photo included
7	Hedgerow oak, low bat roost potential	No photo included
8	Replanted hedge beside farm access track.	7
9	Hedgerow oak, low bat roost potential	No photo included
10	Hedgerow oak, low bat roost potential	No photo included
11	Hedgerow oak, low bat roost potential	No photo included
12	Hedgerow oak, low bat roost potential	No photo included
13	Brick barn next to modern farm building.	11
14	Fallow land with procumbent pearlwort *Sagina procumbens*, early forget-me-not *Myosotis ramosissima*, parsley-piert *Aphanes arvensis*, weld *Reseda luteola*, and common storksbill *Erodium cicutarium*	2
15	Rabbit grazed areas with common vetch *Vicia sativa*, common cudweed *Filago vulgaris*, wild parsnip *Pastinaca sativa*, wild mignonette *Reseda lutea*, and parsley piert	1,17

5.3 Breeding Bird Surveys

The truncated breeding bird survey (of the former 3Bii, 4A and 4B site areas – not quite the full Hellesdon/Horsford Sites area) found a small number of BoCC Red and Amber-listed species holding nesting territories either within or in close proximity to the assessment site. The species were small numbers of dunnock *Prunella modularis*, house sparrow *Passer domesticus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, tree sparrow *Passer montanus* and yellowhammer *Emberiza citrinella* (see Table 2 and Figure 3).

Table 2. *Breeding bird survey results*

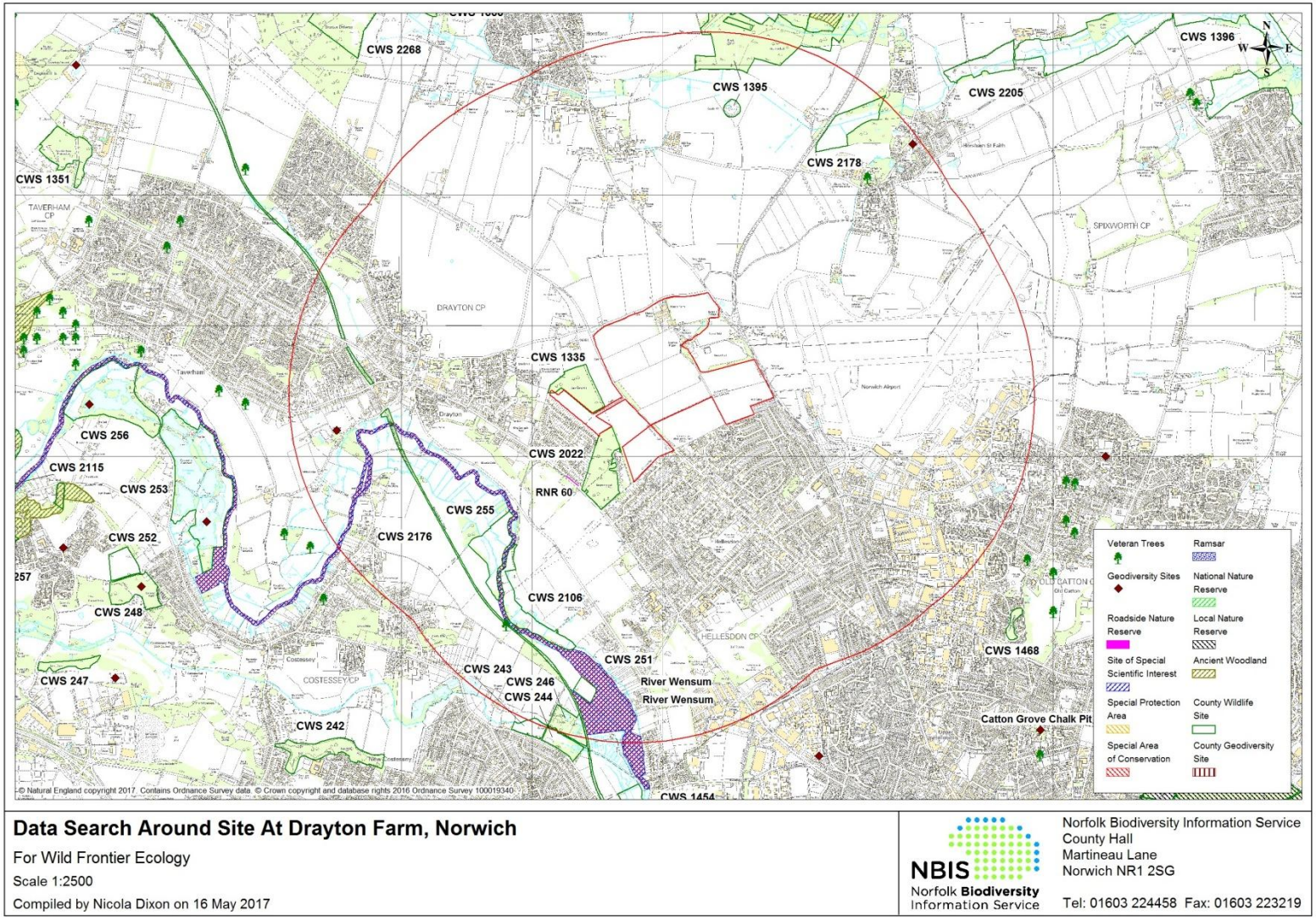
BoCC listing	Species	Number of territories within or adjacent to assessment site
Amber	Dunnock	8
Red	House sparrow	1
	Skylark	12
	Starling	1
	Tree sparrow	1
	Yellowhammer	4

5.4 Survey Constraints

A closer inspection of the various Manor Farm buildings is needed to assess their bat roost potential.

Only one breeding bird survey has been carried out – five surveys is the usual standard to inform and impact assessment.

***Figure 3**. Map of nearest designated nature conservation sites*



Data Search Around Site At Drayton Farm, Norwich

For Wild Frontier Ecology

Scale 1:2500

Compiled by Nicola Dixon on 16 May 2017

NBIS Norfolk Biodiversity Information Service

Norfolk Biodiversity Information Service
County Hall
Martineau Lane
Norwich NR1 2SG

Tel: 01603 224458 Fax: 01603 223219

***Figure 4**. Phase 1 habitat map*

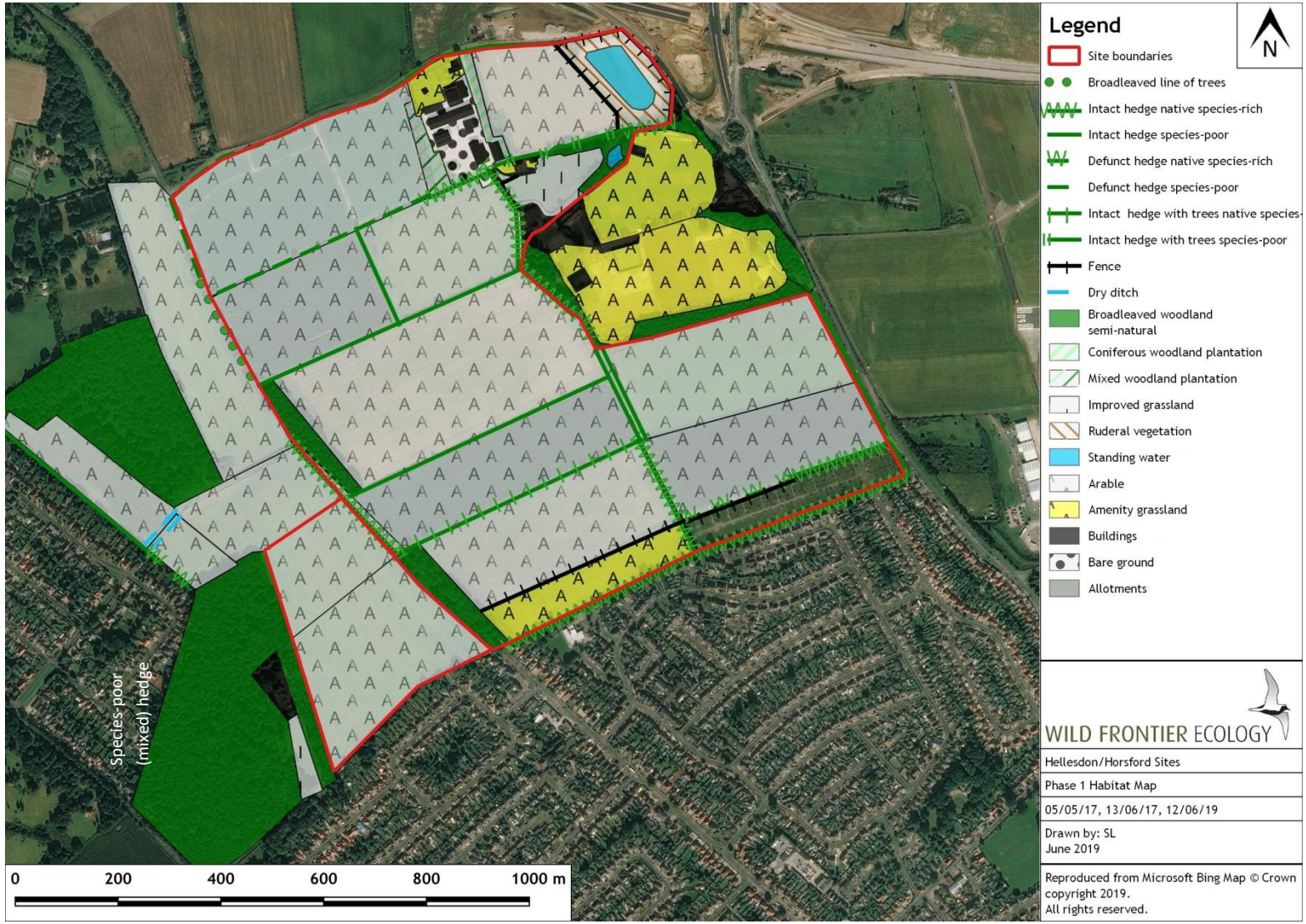


***Figure 5**. Ecological constraints map*

6 APPRAISAL OF ECOLOGICAL RECEPTORS

Table 3 provides a prospective list of valued ecological receptors for the Hellesdon/Horsford Sites (with certain references to the 3Bi, 3Bii, 4A and 4B former site name areas). The designated nature conservation sites listed are those that are close to the proposal site (within 2km) or that are otherwise considered conceivable to experience some degree of effect from the proposal. The listed habitats have been recorded from the proposal site. The listed species have either been recorded from the proposal site, or else from the surrounding area and are considered to have the potential to use the site for some part of their life cycle.

***Table 3**. Hellesdon/Horsford Sites ecological receptors*

Species	Status	Occurrence on / near site	Estimated Ecological Value
River Wensum SSSI/ SAC	Designated and protected by the Habitats Directive 92/43/EEC and the Conservation of Habitats and Species Regulations 2017 and the WCA 1981 as amended.	800m south-west of site 3Bi (nearest).	International
The Broads SAC	Designated and protected by the EC Habitats Directive 92/43/EEC and the Conservation of Habitats and Species Regulations 2017 and the WCA 1981 as amended.	Largely in excess of 10km distant.	International
Broadland SPA/ Ramsar	Designated and protected by the EC Birds Directive 2009/147/EC and the Conservation of Habitats and Species Regulations 2017 and the WCA 1981 as amended.	Largely in excess of 10km distant.	International
CWS nos. 243, 244, 246, 251, 255, 1335, 1395, 2022, 2106, 2176 and 2178	Non-statutory planning 'consideration'.	11 sites present within 2 kilometres; CWS 1335 and 2022 adjacent to site 3Bi; CWS 2022 also adjacent to site 3Bii.	County
RNR 60	Non-statutory planning 'consideration'.	1 site present within 2 kilometres.	County
Broadleaved semi-natural woodland	Habitat of Principle Importance under Section 41 of the NERC Act 2006	Small and isolated parcels within sites 4A and 4B.	Local

Species	Status	Occurrence on / near site	Estimated Ecological Value
Hedgerow	Habitat of Principle Importance under Section 41 of the NERC Act 2006	Intact native species-rich with and without trees, and intact native species-poor with and without trees all present in combined sites 4A and 4B.	Local
Standing water-body (pond)	Habitat of Principle Importance under Section 41 of the NERC Act 2006	One present on the eastern edge of site 4B; large retention pond present at north-east corner next to the B1149.	Local
Common pipistrelle	Protected by Schedule 2 of the Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of the WCA 1981;	Probable	Local
Soprano pipistrelle	Protected by Schedule 2 of the Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of the WCA 1981; listed under Section 41 of the NERC Act 2006.	Probable	Local
Noctule	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981: listed under Section 41 of the NERC Act 2006.	Potential	Local
Brown long-eared bat	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981; listed under Section 41 of the NERC Act 2006.	Potential	Local
Myotis species	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981: listed under Section 41 of the	Potential	Local

Species	Status	Occurrence on / near site	Estimated Ecological Value
	NERC Act 2006.		
Barbastelle	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981: listed under Section 41 of the NERC Act 2006.	Potential	Local
Serotine	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981: listed under Section 41 of the NERC Act 2006.	Potential	Local
Hedgehog	Listed under Section 41 of the NERC Act 2006 as a Species of Principal Importance.	Probable	Site
House sparrow, skylark, starling, tree sparrow and yellowhammer	BoCC Red-listed. All listed under Section 41 of the NERC Act 2006 as Species of Principal Importance.	Small numbers present in site (1-4 territories of each species).	District
Dunnock	BoCC Amber-listed. Dunnock listed under Section 41 of the NERC Act 2006 as Species of Principal Importance.	Small numbers present in site (8 territories).	Local
Slow-worm and common lizard	Schedule 5 WCA, prohibiting killing and injury only. Listed under Section 41 of the NERC Act 2006 as a Species of Principal Importance.	Site occurrence is uncertain. NBIS returned a decent number of local records, particularly of slow-worm. Suitable habitats within the proposed sites are largely limited to the former 3Bi area (now not part of the scheme).	Unknown
Great crested newt	Protected by Schedule 2 of Conservation of Habitats and Species Regulations 2017, and Schedules 5 and 6 of WCA 1981; listed under Section 41 of the NERC Act 2006.	Expected absent based on desk study.	None

Species	Status	Occurrence on / near site	Estimated Ecological Value
Common toad	Listed under Section 41 of the NERC Act 2006 as Species of Principal Importance.	Dead specimen found in grassland near pond at east boundary of site 4B.	Site
Common cudweed	RDB Near-threatened	Linked to the sandy bank and ditch habitat in 3Bi (Target Note 15), an area now not part of the scheme. May be present on boundaries of eastern portion of Hellesdon/Horsford Sites.	Site

7 POTENTIAL IMPACTS

7.1 Construction Impacts

Construction activities will subsume areas of the development site, presumably in phases, making the affected area inhospitable to ecological receptors (i.e. land take). There will be a high level of human disturbance during construction, which may affect receptors outside the site as well as within it. Construction work is expected to be predominantly during daytime, but could involve night-time working under lights.

Insertion of infrastructure and foundations will disturb the soil structure and give rise to spoil, which may be re-distributed within the site, or else disposed of off-site.

7.2 Post-Construction/ Operational Impacts

The proposed development sites total roughly 99ha. Quantified amounts of development and public open space are as yet unknown.

The housing areas would be unfavourable for wildlife in the shorter term, but over time the vegetation within residential gardens (trees and shrubs) is expected to mature and eventually provided habitat value for certain species. The potential for any provided public open spaces to support wildlife will vary depending on intended purpose (e.g. green corridor vs. playground and playing fields).

New roads would remain a permanent hazard to most species. Street and security lighting would be installed throughout the developed portions of the site, creating disturbances for nocturnal species.

8 POTENTIAL IMPACT RECEPTORS

8.1 Statutory Nature Conservation Sites (Information for Habitat Regs Assessment)

8.1.1 River Wensum SAC/ SSSI

Construction Impacts

Given the separation distance, a neutral effect is certain.

Post-Construction/ Operational Impacts

The proposed new housing would almost certainly elevate the level of recreational use of the accessible parts of the River Wensum valley; e.g. fishing, walking, dog exercising, etc. This would be ameliorated to some extent by the on-site recreation provided with the proposed housing development. Local Plan policies in the Broadland district require developments to provide Suitable Alternative Natural Greenspace (SANG), as a measure to mitigate the potential for impacts on Natura 2000 protected habitats (i.e. SACs and SPAs). The potential for impacts on the River Wensum SSSI/ SAC will need to be considered, but a neutral effect is anticipated.

8.1.2 The Broads SAC and Broadland SPA/ Ramsar

Construction Impacts

Same as above.

Post-Construction/ Operational Impacts

Same as above.

8.2 Non-Statutory Nature Conservation Sites

8.2.1 Local CWS

Construction Impacts

No CWS are located within the proposed development boundaries, and so no land-take of any CWS is a certainty. Most of the CWS are sufficiently distant from the proposal sites such that other indirect impacts are also not to be expected. The exceptions are Drayton Woods CWS (#2022) and Canham's Hill CWS (#1335). Drayton Woods CWS is more-or-less adjacent to the western Hellesdon/Horsford Site, and Canham's Hill CWS is only about 150 metres distant. Disturbance impacts from the construction activities are possible for certain fauna making use of Drayton Woods CWS, such as nesting birds and foraging bats.

Post-Construction/ Operational Impacts

The extent of public access to Drayton Woods CWS and Canham's Hill CWS and is ambiguous; OS maps show public right of way footpaths through both woodlands, but on- site signage shows only a permissive footpath in Canham's Hill (Photo 18). Unless access can be denied (which is likely to be exceptionally unpopular), increased recreational use of the Drayton Woods CWS and Canham's Hill CWS should be expected as result of the proposed housing development.

8.3 Habitats

9.3.1 Standing Water

Construction Impacts

No impacts to the retention pond are expected.

Post-Construction/ Operational Impacts

No impacts to the retention pond are expected.

9.3.2 Broadleaved Semi-Natural Woodland

Construction Impacts

The areas of broad-leaved semi-natural woodland are advised as a key development constraint, and it is assumed that these areas would not be directly damaged to accommodate the housing development. Given the small size and isolation of the woodlands, any degree of woodland removal would likely have no more than moderate negative impacts at a local scale. However, given that avoidance should be achievable, any impact would seem unwarranted.

Post-Construction/ Operational Impacts

Retention of the woodlands and incorporation of them into public green space would, depending on footpath arrangement, bring about more recreational use. The potentially for any meaningful disturbance of the thin, road-side woodlands is considered negligible.

9.3.3 Hedgerows

Construction Impacts

The hedgerows of the eastern half of the Hellesdon/Horsford Sites (formerly sites 4A and 4B) could present significant obstacles that require either whole or partial removal to accommodate housing and a street network.

Newly planted, intact, native species-rich hedgerows both with and without trees along the eastern and southern site boundaries (eastern boundary of site 4B, and the eastern and southern boundary of 4A), are of minor/moderate ecological value (presently – that value will increase as the hedges mature). The species-poor hedges without trees, both intact and defunct, are assessed as having moderate ecological value, being that they are more established. A bat transect and static detector survey program could identify if any hedges are of particular foraging/ commuting importance.

The hedgerows are considered to have local habitat value. The hedges offer nesting habitat for small numbers of BoCC Red and Amber listed species, and expected commuting and foraging routes for pipistrelle bats (perhaps other bat species too) and hedgehogs. Depending on the extent of hedgerow removal, impacts could produce minor to moderate negative consequences for the local area.

Post-Construction/ Operational Impacts

Unmitigated street lighting and residence security lighting within a new housing development could negatively impact bat activity along hedgerows. See section 8.4.1, Post-Construction/ Operational Impacts.

8.4 Mammals

8.4.1 Bats

The bat foraging interest is unlikely to be uniformly distributed across the Hellesdon/Horsford Sites, as arable is regarded as a habitat of low bat interest[6]. The key foraging habitats are expected to be the western site's boundary with Drayton Woods, and the eastern site's eastern boundary which comprises hedgerow and small copses, and is closer to the two water-bodies. Some of the hedgerows through the western site may also have commuting and foraging value.

Construction Impacts

No potential bat roost trees/ buildings have so far been identified.

The construction process of converting the arable fields into built development could displace minor bat activity within those areas and have at least some negative effect in proximity (i.e. along surrounding hedges and woodland edges).

A phasing of the construction would be expected to mitigate negative displacement effects (if they were to occur) by allowing the bats to progressively shift to alternate foraging areas.

Minor negative disturbance impacts on the local/parish populations of common pipistrelle and soprano pipistrelle from phased construction are likely predictions.

Tentatively, the site is expected to have a low level of importance for brown long-eared bat, *Myotis* species, noctule, barbastelle and serotine, and thereby a neutral construction impact for these species.

Post-Construction/ Operational Impacts

Street lighting and residence security lighting would create a new condition within the housing estate that could negatively impact bat activity. Most bats in the UK will preferentially forage and roost in areas which are not illuminated, with some species being particularly sensitive to artificial lighting[7]. Common pipistrelle and soprano pipistrelle are the species expected to be most active across the sites, and if so would bear the most potential for impact from the development. Both species are considered

[6] Entwistle, A.C., Harris, S., Hutson, A.M., Racey, P.A., Walsh, A., Gibson, S.D., Hepburn, I. and Johnston, J. (2001); Habitat management for bats – A guide for land managers, land owners and their advisors, Joint Nature Conservation Committee, Peterborough

[7] Mathews, F., Roche, N., Aughney, T., Jones, N., Day, J., Baker, J. and Langton, S. (2015); Barriers and benefits: implications of artificial night-lighting for the distribution of common bats in Britain and Ireland, Philosophical Transactions Royal Society B 370: 20140124, http://dx.doi.org/10.1098/rstb.2014.0124

to be generally tolerant of light disturbance, though not necessarily appreciative[8]. Other species which may commute or forage across the sites, or along their boundaries, could be more strongly affected (e.g. brown long-eared bats). A consideration of bats should be made with regards to proposed lighting schemes, and there is recent guidance to be followed.[9]

A minor negative, permanent post-construction/ operational impact on the local/ parish populations of common pipistrelle and soprano pipistrelle is a reasonable prediction at this stage. The impact is unlikely to have a high significance, but should still be mitigated.

A neutral post-construction/ operational impact assessment for brown long-eared bat, *Myotis* species, noctule, barbastelle and serotine is possible, but at the moment uncertain.

8.4.2 Hedgehogs

Construction Impacts

Hedgehogs are undoubtedly resident within Canham's Hill and Drayton Woods, and may forage and shelter along the sheltered boundaries and internal hedges of the Hellesdon/Horsford Sites. Numerous local hedgehog records were returned by NBIS.

The local hedgehog population is judged unlikely to experience more than minor negative displacement impacts from phased construction. Any displacement impacts would be expected to be temporary over the short to medium term (length of time depending on the phasing schedule of the construction).

Post-Construction/ Operational Impacts

Human activity associated with the completed housing development is unlikely to displace hedgehogs from surrounding natural habitats. Mortality from automobile traffic within the new development is more plausible. Intermediate negative road mortality impact to the local hedgehog population from the inhabited housing development is a legitimate possibility.

8.5 Birds

Construction Impacts

The displacement of a small number of breeding bird territories by the construction activities is either probable or certain. Phasing of the development over multiple breeding seasons, plus retaining / enhancing certain hedges, may allow some of these breeding territories to persist on site during the construction phase.

With a phased construction schedule, the impacts on the local/parish populations of these species would be expected to be temporary and of no more than minor negative magnitude.

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[8] Lacoeuilhe, A., Machon, N., Julien, J-F., Le Bocq, A. and Kerbiriou, C. (2014); The Influence of Low Light Intensities of Light Pollution on Bat Communities in a Semi-Natural Context, PLoS ONE 9(10): e 103042, http://dx.doi.org/10.1371/journal.pone.0103042

[9] Institution of Lighting Professionals and Bat Conservation Trust (2018) Guidance Note 08/18: Bats and artificial lighting in the UK

Post-Construction/ Operational Impacts

Retained and enhanced green spaces (i.e. green corridors, perimeter open space, allotments, drainage areas and new hedge and tree planting) would provide some quantity of nesting habitat for dunnock and house sparrow, as would maturing, well-planted gardens. In the medium to long term, a neutral effect on dunnock and house sparrow is considered probable, and a positive effect is even conceivable if an appropriate green space management scheme were enacted (i.e. promoting scrub growth).

The skylark, tree sparrow and yellowhammer nesting territories would be certain to be permanently displaced by housing developments. However, the number of affected territories would be low, and equivalent farmland habitats are abundant to the north of the proposal sites. Minor negative (but not significant) impacts on the local/parish populations of skylark, tree sparrow and yellowhammer are expected.

8.6 Reptiles

Construction Impacts

A tentative potential for habitat take and direct mortality was identified for the proposed development of site 3Bi, particularly the double bank and ditch (parallel to a farm track) in from the Reepham Road, and the perimeter of Canham's Hill. With the 3Bi site now removed from consideration, the reptile impact potential is rated as negligible.

Post-Construction/ Operational Impacts

The potential for operational impacts on reptiles from development of the Hellesdon/Horsford Sites is rated as negligible.

8.7 Amphibians

8.7.1 Great Crested Newt

Construction Impacts

Neutral effect expected.

Post-Construction/ Operational Impacts

Neutral effect expected.

8.7.2 Common Toad

Construction Impacts

Common toad traverses across the open fields and into the main construction areas are likely, and earthworks and construction vehicle traffic could result in common toad mortality within the eastern Hellesdon/Horsford Site. Minor negative mortality impacts affecting a site toad population are probable.

Post-Construction/ Operational Impacts

Vehicle traffic within the completed housing development could cause continuing mortality to common toads straying into the built portion of the site. Overall, a minor negative impact on the site common toad population is predicted.

8.7.3 Common Cudweed

Construction Impacts

This species was noted on the double bank and ditch farm track in from the Reepham Road to the former site area 3Bi. With the removal of site 3Bi from the proposal, the impact potential is less certain, but this species may be present elsewhere along the east boundary of the current eastern Hellesdon/Horsford Site.

The species will readily germinate in disturbed ground on sandy soils, so it could recover from temporary construction impacts.

Post-Construction/ Operational Impacts

If no suitable open sandy habitat remains after construction, this and other species will be negatively impacted, up to and including loss from site.

9 ECOLOGICAL ADVICE

9.1 Further Surveys

9.1.1 Bats

Further bat surveys that are advised to inform the impact assessment include:

- A visual inspection of the various Manor Farm buildings is needed to assess their bat roost potential, followed by dusk emergence and dawn return surveys for any buildings showing credible bat roost potential.
- General site activity surveys would inform which species are using the sites, and roughly in what abundance. Activity surveys should preferably be undertaken to current BCT guidelines[10]; for low-moderate potential sites this would be either one transect per season (spring, summer, autumn) or one transect per month from April to October. Each transect should also have three static automated bat detector (Wildlife Acoustics SM2BAT) positions, monitoring for five nights per season/ month at key positions along the transect route.

9.1.2 Birds

Four additional breeding bird surveys to CBC specification are advised as soon as possible (the main nesting bird season ending in August) to appropriately identify the nesting bird value of the sites.

Winter-time transects are also advised across the site (looking for e.g. lapwing, tree sparrow, woodcock) with one survey per month from October to March.

9.2 Constraints and Opportunities

See Figure 5, page 20.

9.2.1 Constraints

- The small broad-leaved semi-natural woodland areas, the pond and the green lane (positioned north-south down the centre of former site area 4A) are the foremost habitats within the sites between Reepham Road and the A140. Avoidance is advised.
- The hedgerows between Reepham Road and the A140 are also notable habitats, and best avoided if possible. The hedges have some value for nesting birds and probably foraging bats and hedgehogs. These hedges are not rated as a high-level constraint, but it would be favourable to retain them to the greatest extent intact.

9.2.2 Opportunities

- All of the sites are on sandy soils, and any green space or non-built area could have potential to support localised or scarce plant and invertebrate species. The use of topsoil in any new development should be at most restricted, and

[10] Collins, J. (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

preferably absent outside of gardens. Some areas should be retained as open, managed and unfertilised grassland for maximum ecological benefit.

- Perimeter open space created around the eastern boundary pond could benefit the site population of common toads by providing a more favourable quantity and quality of habitat.

- Any of the sites, if developed, should be subject to a green infrastructure plan, with open space and recreation provision, and Suitable Alternative Natural Green Space (SANGS) to deflect public recreation pressure from Norfolk SACs and SPAs (River Wensum, North Norfolk and The Norfolk Broads).

APPENDIX 1: PHOTOGRAPHS

1. **Target Note 15 – grazed banks**

2. **Target Note 14 - fallow area**

3. **Edge of Canham's Hill CWS**

4. **Southern edge of site 3Bii**

5. Bluebells in verge along Reepham Road, adjacent to Site 3Bii

6. Allotments in the south of site 4A.

7. **Target Note 8 - replanted hedge**

8. **Target Note 2. Brick barn within farm complex.**

9. Semi-detached houses in Site 4B

10. Modern bungalow in site 4B, Target Note 1.

11. Brick barn, Target Note 13.

12. Pond, Target Note 4.

13. Dead common toad in improved grassland (below)

14. Improved grassland in site 4B

15. Mature woodland in site 4A, along Reepham Road.

16. Replanted hedge with meadow saxifrage, Target Note 3.

17. Rabbit grazed ditches and banks, Target Note 15.

18. Path indicator map on site

19. Amenity lawn area in south-west corner of the eastern H/H site.

20. Ash in southern shelterbelt woodland with potential bat roost feature

21. Broadland Northway retention pond in the north-east corner of the eastern H/H site.