Appendix C: Shouldham Supporting Information

Preliminary Ecological Appraisal

Marham Site

Sibelco

Project Number: 60471763

30th August 2017

Quality information

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Summary

AECOM was instructed by Sibelco to carry out a Preliminary Ecological Appraisal (PEA) of a site near to Marham, Norfolk for possible future mineral extraction. The central grid reference for the site is TF 707 112 and the boundary of the site is shown on Figure 1, Appendix A. The site considered in this report is approximately 363 hectares in area. This PEA was commissioned to identify whether there are known or potential ecological receptors (nature conservation designations, and protected and notable habitats and species) that may constrain or influence the design and implementation of the proposed development.

A desk study for protected sites and species and a Phase 1 Habitat survey was undertaken in July and August 2017. The information gained from the desk study and survey has been used to determine the likely ecological value of the site, potential for protected, notable and invasive species and to direct any more specific survey work which may need to be carried out prior to the submission of a planning application.

The study area (referred to as the 'site') comprises a range of habitats dominated by arable farmland, with semi-improved and improved grassland, and smaller areas of plantation and semi-natural woodland, scrub, tall herbs, a pond. There is a large network of drains and some hedges.

Subject to further survey and assessment, potential constraints have been identified relating to:

- One statutory designated site: River Nar Site of Special Scientific Interest (SSSI).
- Three non-statutory designated sites: County Wildlife Site (CWS) 528 North of Marham, CWS 530 Marham Fen and CWS 545 The Carr;
- Priority habitats comprising: hedgerows, arable field margins, lowland mixed deciduous woodland, reedbed, rivers and possibly a pond.
- Protected and/or priority species comprising: birds, bats, great crested newt (*Triturus cristatus*), reptiles, water vole (*Arvicola amphibius*), otter (*Lutra lutra*), badger (*Meles meles*), invertebrates, common toad (*Bufo bufo*), hedgehog (*Erinaceus europaeus*) and brown hare (*Lepus europaeus*).

Further surveys have been recommended to determine the value of these habitats and species to inform any future Ecological Impact Assessment and potential mitigation requirements.

Outline opportunities for wildlife enhancement have been proposed to enhance the site for biodiversity to reflect its location within the wider surrounds.

1. Introduction

AECOM was instructed by Sibelco to carry out a Preliminary Ecological Appraisal (PEA) of a site near to Marham, Norfolk for possible future mineral extraction. The central grid reference for the site is TF 707 112 and the boundary of the site is shown on Figure 1, Appendix A. The site considered in this report is approximately 363 hectares in area.

This PEA was commissioned to identify whether there are known or potential ecological receptors (nature conservation designations, and protected and notable habitats and species) that may constrain or influence the design and implementation of proposed sand/gravel extraction on the site

At the time of preparing this PEA the layout and development boundary of the proposed development was unknown. As such, this report provides general guidance on the potential ecological risks associated with the survey area and potential mitigation needs. This guidance should be reviewed when the layout of the proposed development are known.

The approach applied when undertaking this PEA accords with the *Guidelines for Preliminary Ecological Appraisal* published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2013). The PEA addresses relevant wildlife legislation and planning policy as summarised in Section 2 of this report, and is consistent with the requirements of *British Standard 42020:2013 Biodiversity. Code of Practice for Planning and Development*.

In order to deliver the PEA, a desk study and an extended Phase 1 Habitat survey were undertaken by an appropriately experienced ecologist, to identify ecological features within the proposed development site and the wider potential zone of influence of the future development plans at this site. The potential zone of influence was defined with reference to the red line boundary as shown on Figure 1 and type of development (mineral extraction). Additional details are provided in Section 3: Methods.

The purpose of the PEA was to:

- Identify and categorise all habitats present within the site and any areas immediately outside of the site where there may be potential for direct or indirect effects (the “zone of influence”);
- carry out an appraisal of the potential of the habitats recorded to support protected or notable species of fauna and flora;
- provide advice on any potential ecological constraints and opportunities in the zone of influence that should be addressed in any future planning applications for the site, including the identification (where relevant) of any requirements for follow-up habitat and species surveys and/or requirements for ecological mitigation; and
- provide a map showing the location of the identified ecological receptors of relevance.

This report provides a high level appraisal of the ecological risks and opportunities associated with the site. The report identifies the scope of further work that would be required to support a planning application. High level recommendations are made on potential options for the avoidance, mitigation or compensation of the potential impacts of the proposed development (where known) on the identified ecological receptors, and of potential enhancements to the biodiversity and ecosystem services.

2. Wildlife legislation and planning policy

2.1 Wildlife Legislation

The following wildlife legislation is potentially relevant to the proposed development:

- Wildlife and Countryside Act (WCA) 1981 (as amended);
- Countryside and Rights of Way (CRoW) Act 2000;
- Natural Environment and Rural Communities (NERC) Act 2006;
- The Conservation of Habitats & Species Regulations 2010 (as amended) (the Habitats Regulations);
- Protection of Badgers Act 1992; and
- The Hedgerow Regulations 1997.

The above legislation has been considered when planning and undertaking this PEA using the methods described in Section 3, when identifying potential constraints to the proposed development, and when making recommendations for further survey, design options and mitigation, as discussed in Section 5. Compliance with legislation may require the attainment of relevant protected species licences prior to the implementation of the proposed development.

Further information on the requirements of the above legislation is provided as Appendix B.

2.2 National Planning Policy

The National Planning Policy Framework (NPPF) was published on 27th March 2012 and details the Government's planning policies for England and how these are expected to be applied.

The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity. It specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this it to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

Further information on the relevant parts of the NPPF is provided as Appendix B.

2.3 Local Planning Policy

King's Lynn and West Norfolk Borough Council currently has a suite of planning documents in place as part of the Local Plan to guide the nature and location of sustainable development for the District and inform planning decisions up to 2026. Relevant documents in relation to ecology and biodiversity are as follows:

- The Core Strategy, adopted in 2011; and
- King's Lynn and West Norfolk Local Plan - Site Allocations & Development Management Policies (SADMP) Plan (adopted on 29 September 2016).

Table 1 provides a summary of relevant local planning policies. For the precise wording of each specific policy please refer back to the source document. This planning policy has been considered when assessing potential ecological constraints and opportunities identified by the desk study and field surveys; and, when assessing requirements for further survey, design options and ecological mitigation, as described in Section 5.

Table 1. Summary of Local Planning Policy

Document	Planning Policy	Purpose
Core Strategy	CS12 Environmental Assets Green Infrastructure, Historic Environment, Landscape Character, Biodiversity and Geodiversity	The purpose is to • *meet the environmental, social and economic needs of local communities and the wider borough;* • *create a high quality environment for biodiversity and geodiversity to flourish; provide opportunities for species to adapt to the impacts of climate change;* • *contribute to an improved quality of life for current and future residents and visitors;* • *areas identified as being deficient in multi-functional green space will be targeted;* • *the incorporation of Sustainable Drainage Systems with new development will also be promoted to encourage new habitats.* The Council will aim to "*protect and enhance County Wildlife Sites, ancient woodlands, Biodiversity Action Plan Species and Habitats, Regionally Important Geological Sites and designated sites of historical value from development which damages their interest or significance unless the need for, and public benefits of the development outweigh the loss of interest or significance."* *"Development should seek to avoid, mitigate or compensate for any adverse impacts on biodiversity, geodiversity and heritage as well as seeking to enhance sites through the creation of features of new biodiversity, geodiversity and heritage interest.*"
SADMP Plan	Policy DM 15 Environment, Design and Amenity	This policy also refers to the NPPF and policy CS12. *Development must protect and enhance the amenity of the wider environment including its heritage and cultural value.* *Proposals will be assessed against a number of factors including: Heritage impact; Overlooking, overbearing, overshadowing; Noise; Odour; Air quality; Light pollution; Contamination; Water quality and Visual impact.*

3. Methods

3.1 Desk Study

A desk study was carried out to identify nature conservation designations, and protected and notable habitats and species potentially relevant to the proposed development.

A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the proposed development on different ecological receptors; and, an understanding of the maximum distances typically considered by statutory consultees. Accordingly, the desk study identified any international nature conservation designations within 10 km of the site boundary; other statutory nature conservations designations within 2 km of the site boundary; and, local non-statutory nature conservation designations, and protected and notable habitats and species within 1 km of the site boundary.

The desk study was carried out using the data sources detailed in Table 2. Protected and notable habitats and species include those listed under Schedules 1, 5 and 8 of the WCA; Schedules 2 and 4 of the Habitats Regulations; species and habitats of principal importance for nature conservation in England listed under section 41 (s41) of the NERC Act; and other species that are Nationally Rare, Nationally Scarce or listed in national or local Red Data Lists and Biodiversity Action Plans.

Table 2. Desk study data sources

Data Source	Accessed	Data Obtained
Multi-Agency Geographic Information for the Countryside (MAGIC) website	1st August 2017	International statutory designations within 10 km. Other statutory designations within 2 km. Ancient woodlands and notable habitats within 1 km. Higher Level Environmental Stewardship agreements applied to the site. Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.
Norfolk Biodiversity Information Service	1st August 2017	Non-statutory designations within 1 km. Protected and notable species records within 1 km.
Ordnance Survey 1:10,000 mapping and aerial photography	1st August 2017	Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.
Norfolk Biodiversity Partnership	1st August 2017	General information on Local Biodiversity Action Plan Priority Habitats and Species.
King's Lynn and West Norfolk Borough Council Local Plan Map	1st August 2017	Non-statutory designations within 1 km. Designated green corridors, wildlife networks and other such features.

3.2 Field Survey

The field survey comprised a Phase 1 Habitat survey and an appraisal was made of the potential suitability of the habitats present to support protected and notable species.

3.2.1 Phase 1 Habitat Survey

A Phase 1 Habitat survey was undertaken in accordance with the standard survey method (Joint Nature Conservation Committee, 2010). Phase 1 Habitat survey is a standard method of environmental audit. It involves categorising different habitat types and habitat features within a survey area. The information gained from the survey can be used to determine the likely ecological value of a site, and to direct any more specific survey work which may need to be carried out prior to the submission of a planning application. The standard Phase 1 Habitat survey method can be "extended" to record target notes on protected, notable and invasive species.

The survey was undertaken on 5th July and 28th July 2017 by suitably experienced AECOM ecologists who recorded and mapped all habitat types present within the survey area, along with any associated relevant ecological receptors observed. The survey area encompassed all safely accessible parts of the site and adjacent habitats to a maximum distance of 50 m, where access permission had been granted in advance of survey, or this land was visible from within the site boundary or from public rights of way, or other publicly accessible areas. In the case of watercourses and other waterbodies, this distance was extended to 500 m (subject to access) to check for any features associated with the aquatic habitat that might be impacted by the proposed development (excluding garden ponds).

Where relevant ecological receptors were present, target notes (Appendix C) were recorded and the position of these is shown on the Phase 1 Habitat map (Figure 1, Appendix A). Typical and notable plant species were recorded for different habitat types and reflect the conditions at the time of survey. This was not intended to be a detailed inventory of the plant species present in the survey area, as this is not required for the purposes of Phase 1 Habitat survey.

3.2.2 Appraisal of the Potential Suitability of Habitats for Protected and Notable Species

An appraisal was made of the potential suitability of the habitats present to support protected and notable species of plants or animals. Field signs, habitat features with potential to support protected species and any sightings or auditory evidence were recorded when encountered, but apart from great crested newt (*Triturus cristatus*) and bats, no detailed surveys were carried out for any particular species. See Section 3.2.3 for further information on how the PEA of potential great crested newt and bats were undertaken, as the requirements for these species diverge from the standard extended Phase 1 Habitat survey method.

A note was made of visible instances of invasive non-native plant species listed under Schedule 9 of the WCA, including Japanese knotweed (*Fallopia japonica*). Locations of plants or stands of any such invasive non-native plant species if found were recorded.

Section 5 of this report identifies further requirements for species survey based on the results of the habitat survey. These surveys should be completed prior to submission of a planning application as the results are likely to be material for determination of the planning application.

3.2.3 Great Crested Newt Habitat Appraisal

Prior to undertaking the extended Phase 1 Habitat survey, aerial photography and Ordnance Survey mapping were examined to attempt to identify all ponds within 500 m of the site (the distance Natural England state that great crested newt surveys may need to be undertaken). This process could not guarantee to definitively identify all ponds present, but is the best that can be achieved within the limits of available data.

Specific searches were made for ponds within and adjacent to the site when undertaking the extended Phase 1 Habitat survey as described in Section 3.2.1.

Access allowing, all ponds identified by desk study and field survey were inspected (where possible) and appraised for their suitability for great crested newt. This included derivation of a Habitat

Suitability Index (HSI) for all ponds based on the standard method (Oldham *et al*. 2000). While HSI is not intended for use as a means to determine which ponds do and do not require further survey for great crested newt, it does provide qualitative data on the potential likelihood of great crested newts being present. These data, in combination with other relevant information, may subsequently be used to support decision-making on whether a full survey is required, or be required to support a planning application.

3.2.4 Preliminary Ecological Appraisal for Bats

During the walkover survey of the site an appraisal was made of the suitability of the habitats present on the site and in the immediate surrounding area for use by roosting, commuting and foraging bats. This appraisal was used to assess the need for further bat survey to provide data to support a planning application. Habitat suitability was appraised in accordance with standard guidance (Collins, 2016). This classifies suitability for roosting and commuting/foraging as Negligible, Low, Moderate and High depending on its likely relative importance for bats.

3.3 Desk Study and Field Survey Limitations

The site boundary was based on a sketch plan provided by the Sibelco and this may be revised in future as the scheme is progressed and therefore area and types of habitats within the site may be amended. However as habitats were mapped outside this site boundary up to one field or 50 m (where accessible) sufficient data has been collected to take into account any minor site boundary (i.e. within 50 m) changes in future.

The aim of a desk study is to help characterise the baseline context of a proposed development and provide valuable background information that would not be captured by a single site survey alone. Information obtained during the course of a desk study is dependent upon people and organisations having made and submitted records for the area of interest. As such, a lack of records for a particular habitats or species does not necessarily mean that the habitats or species do not occur in the study area. Likewise, the presence of records for particular habitats and species does not automatically mean that these still occur within the area of interest or are relevant in the context of the proposed development.

Where habitat boundaries coincide with physical boundaries recorded on OS maps the resolution is as determined by the scale of mapping. Elsewhere, habitat mapping is as estimated in the field and/or recorded by hand-held GPS. Where areas of habitat are given they are approximate and should be verified by measurement on site where required for design or construction. While indicative locations of trees are recorded this does not replace requirements for detailed specialist arboricultural survey to *British Standard 5837:2012 Trees in Relation to Design, Demolition and Construction*.

4. Results

4.1 Nature Conservation Designations

4.1.1 Statutory Designations

Table 3 details the statutory nature conservations designations identified by the desk study, based on the method given in Section 3.1 of this report. The designations are listed in descending order, with those closest to the proposed development listed first. The Site of Special Scientific Interest (SSSI) boundary in relation to the site is shown in Appendix D.

Table 3. Sites with statutory designations for nature conservation within 10 km of the site

Designation	Reason(s) for Designation	Relationship to the Site
River Nar SSSI	A full account of the reasons for designation is provided in the citation in Appendix D. The River Nar originates as a spring-fed stream, west of Mileham in Norfolk and flows for 42 km before joining the River Great Ouse at Kings Lynn, where a sluice prevents the penetration of seawater at high tide. The river combines the characteristics of a southern chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system of its type. The variation in physical features and the influence of the underlying chalk give rise to a rich and diverse flora. Amongst the 78 species of riverine and bankside plants many are eutrophic and mesotrophic species, including 5 pondweeds and 8 bryophytes. The Nar is well-known locally for its brown trout (*Salmo trutta)*. Since 1985, trout numbers have increased steadily; pike (*Esox lucius*), numbers have remained fairly stable whilst roach (*Rutilus rutilus)*, and eel (*Anguilla Anguilla)*, have continued to be the dominant species in the river.	Within and immediately adjacent to the site.
Norfolk Valley Fens Special Area of Conservation (SAC)	Norfolk Valley Fens is one of two sites selected in East Anglia, in eastern England, where the main concentration of lowland alkaline fen occurs. This SAC comprises a series of valley-head spring-fed fens. Such spring-fed flush fens are very rare in the lowlands. Most of the vegetation at this site is of the small sedge fen type, mainly referable to M13 *Schoenus nigricans – Juncus subnodulosus* mire, but there are transitions to reedswamp and other fen and wet grassland types. The individual fens vary in their structure according to intensity of management and provide a wide range of variation. There is a rich flora associated with these fens, including species such as grass-of-Parnassus (*Parnassia palustris)*, common butterwort (*Pinguicula vulgaris)*, marsh helleborine (*Epipactis palustris)* and narrow-leaved marsh-orchid (*Dactylorhiza traunsteineri)*.	Located 4 km to the north east.
Breckland Special Protected Area (SPA)	This SPA qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive. During the breeding season; • Nightjar (*Caprimulgus europaeus),* 415 pairs representing up to 12.2% of the breeding population in Great Britain (Count as at 1998). • Stone Curlew (*Burhinus oedicnemus)*, 142 pairs representing up to 74.7% of the breeding population in Great Britain (Count as at 1998). • Woodlark (*Lullula arborea)*, 430 pairs representing up to 28.7% of the breeding population in Great Britain (Count as at 1997).	Located 4.8 km to the south east.

4.1.2 Non-statutory Designations

Table 4 details the non-statutory nature conservations designations, all of which are County Wildlife Sites (CWS), identified by the desk study based on the method given in Section 3.1 of this report. The designations are listed in descending order, with those closest to the site listed first. The CWS boundaries in relation to the site are shown in Appendix D along with full site descriptions.

Table 4. Sites with non-statutory designations for nature conservation

Designation	Reason(s) for Designation	Relationship to the Site
CWS 528 North of Marham	This is a mixed site with scrub, fen and grassland. The west of the site consists of a strip of neutral unimproved grassland with few herbs. Moving eastwards this becomes wetter with species such as tufted hair-grass (*Deschampsia cespitosa*), bent (*Agrostis* sp.) and reed (*Phragmites australis*). Much of this area is covered with scrub of varying density but consisting of hawthorn (*Crataegus monogyna*) and rose (*Rosa* sp.). Towards the centre of the site this develops into an area of fen with great fen-sedge (*Cladium mariscus*) and greater pond-sedge (*Carex riparia*).	Immediately adjacent to the site boundary.
530 Marham Fen	This is a large and complex site consisting of lowland basic grassland, mixed fen, scrub and woodland communities lying over chalky ground which is punctuated by depressions called 'pingos' caused by glacial activity during the last ice-age. The centre of the site is a mosaic of marshy grassland, well drained grassland and mixed fen. On drier rabbit grazed areas and trampled paths calcarious grassland species occur including autumn gentian (*Gentianella amarella*) which is scarce in Norfolk.	Immediately adjacent to the site boundary.
545 The Carr	This is a thin strip of woodland containing a reasonable age structure, good regeneration and dead wood content. Scrub has developed towards the edges of the wood. The canopy is dominated by ash (*Fraxinus excelsior*) with occasional oak (*Quercus robur*) and bird-cherry (*Prunus padus*). The understorey is rather scattered but contains elder (*Sambucus nigra*), hawthorn , bird-cherry (*Prunus padus)*, spindle (*Euonymus europaeus*) and several willow (Salix spp.) species. The ground flora is quite species-poor.	90 m to the north.
488 Osier Bed Plantation	This is a large area of semi-natural woodland with coppice. The canopy is dominated by ash (*Fraxinus excelsior*) with abundant sycamore (*Acer pseudoplatanus*). The understorey is of goat willow (*Salix caprea*), privet (*Ligustrum vulgare*), hawthorn, red currant (*Ribes rubrum*), gooseberry (*Ribes uva-crispa*), elder and bird-cherry . There is a wide range of ground flora species.	450 m to the south.
898 Pond south of River Nar	An open eutrophic pond, this site has large overhanging white willow (Salix alba) with some young grey willow (*Salix cinerea*). The bank has a continuous fringe of great willowherb (*Epilobium hirsutum*), with scattered marginal emergents, bittersweet (*Solanum dulcamara*), water mint (*Mentha aquatica*), water forget-me-not (*Myosotis scorpioides*) and water plantain (*Alisma plantago-aquatica*).	800 m to the east.
899 Pond south of River Nar	This site is a mesotrophic pond, approximately one third of which is covered with bulrush (*Typha latifolia*), with abundant starwort (*Callitriche* spp.). Approximately half the pond's margin has dense overhanging grey willow.	1 km to the east.

4.2 Habitats

4.2.1 Phase 1 Habitat Types

The habitats recorded, their extent and distribution are detailed in Table 5 and shown on Figure 1. The areas are approximate only. The associated target notes are provided in Appendix C, illustrative photographs are provided as appropriate in Appendix E.

Table 5. Habitats present, in descending order based on spatial area occupied

Habitat Area	Area (ha)	% of Site area
Cultivated/ Disturbed Land - Arable	321.09	88.52
Poor Semi-Improved Grassland	14.66	4.04
Improved Grassland	8.72	2.40
Standing Water/Wet Drain	5.96	1.64
Bare Ground	4.23	1.17
Broadleaved Woodland - Semi-natural	3.59	0.99
Running Water	0.97	0.27
Other Tall Herb and Fern – Ruderal	0.61	0.17
Broadleaved Woodland – Planted	0.02	0.01
Scrub - Dense/Continuous	0.01	<0.01
Swamp	<0.01	<0.01
Linear habitats	Length (m)	
Fence (barbed wire/stockproof)	2511.46	
Dry Ditch	1694.69	
Intact hedge - species-poor	2030.75	
Defunct hedge - species-poor	1084.01	

The habitats are described in greater detail below (see photographs in Appendix E).

Arable

This is the dominant habitat type on site covering over 88% of the site. It comprises large flat open fields separated by mainly wet drains, a few bare tracks, some lines of mature trees and a few species poor hedges. There are various crops present on the mainly peaty soils that include wheat (*Triticum* sp.), maize (*Zea mays*), potato (*Solanum tuberosum*), cockspur (*Echinochloa crus-galli*), and carrot (*Daucus carota* subsp. *sativus*). There are a couple of non-cultivated field/conservation margins, e.g. at TN1 and some native flora species along the field margins. Species include redshank (*Persicaria maculosa*), pale persicaria (*Persicaria lapathifolia*), common poppy (*Papava rhoeas*) red fescue (*Festuca rubra* agg.), fat hen (*Chenopodium album*), dove's-foot crane's-bill (*Geranium molle*), cock's-foot (*Dactylis glomerata*), annual meadow-grass (*Poa annua*) and hogweed (*Heracleum sphondylium*).

Poor semi-improved grassland

This comprises a few fields present on site. One field to the north of the site has been previously grazed, but has been left unmanaged with some new planting of cricket bat willow (*Salix alba* ssp.*caerulea*). Another field to the south is cut for hay.

Improved grassland

This comprises grazing fields (currently ungrazed) to the north of the site alongside the River Nar surrounding by fences and new species poor hedges. The grassland is dominated by perennial rye-

grass (*Lolium perenne*), with some scattered mature trees including alder (*Alnus glutinosa*) and white willow (*Salix alba*).

Standing Water/Wet Drain

This comprises numerous drains with standing water and a single pond on the site boundary at TN12. The pond is approximately 40x 20 m and is heavily shaded. There is some common reed (*Phragmites australis*) along the margins and no aquatic macrophytes visible. It is likely to dry out occasionally (see section 4.4.1). The drains have various emergent and marginal species including common reed. They look to be annually cut and cleared of vegetation to maintain a steep V-shaped profile. Species include common reed (*Phragmites australis*), reed sweet-grass (*Glyceria maxima*), hemp agrimony (*Eupatorium cannabinum*), reed canary grass (*Phalaris arundinacea*), bulrush (*Typha latifolia*), water starwort (*Callitriche* sp.) and great willowherb (*Epilobium hirsutum*). Most drains have shallow standing water.

Bare Ground

This comprises numerous farm access tracks and small areas of concrete hard-standing.

Broadleaved Woodland - Semi-natural

This comprises a small mature woodland at TN15 of likely semi-natural origin with less than 50% of planted trees. Species include oak (*Quercus robur*), birch (*Betula* sp.) and white willow . The scrub layer is very overgrown with dense elder (*Sambucus nigra*) and common hawthorn (*Crataegus monogyna*). There are also some mature individual trees / lines of trees of including white willow, oak (e.g. at TN2) and alder.

Running Water

This comprises a main drain (Fourteen Foot Drain) bisecting the site from east to west (TN14 and TN32), originating from the Water Treatment Works to the East. It has very steep sided banks and deep water with aquatic/emergent plants including common reed, reed canary grass, water starwort, water cress (*Nasturtium officinale*) and ivy leaved duck-weed (*Lemna trisulca*).

Other Tall Herb and Fern – Ruderal

This comprises small areas of common nettle (*Urtica dioica*), thistles (*Cirsium* sp) and a more substantial area in between tree lines at TN41. Species here include common nettle, hogweed (*Heracleum sphondylium*), mugwort (*Artemisia vulgaris*) and broad-leaved dock (*Rumex obtusifolius*).

Broadleaved Woodland – Planted

This comprises small areas of woodland dominated with trees from a planted origin (e.g. T22 (Asholt Plantation) which is just on the site boundary). Species include ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and goat willow (*Salix caprea*). There are also planted lines of mature trees including ash and hybrid black poplar (*Populus x canadensis*).

Scrub - Dense/Continuous

A few areas of scattered and dense scrub present along field boundaries and along tree line at T40. Species include elder, bramble (*Rubus fruticosa* agg.) common hawthorn, buckthorn (*Rhamnus cathartica*), and blackthorn (*Prunus spinosa*).

Swamp

This is an area of swamp at TN2 dominated by common reed with some false oat-grass (*Arrhenatherum elatius*). There is also some scattered scrub and mature oak trees within this habitat.

Hedgerows

TN5, TN6, TN16, TN17, TN19, TN35, TN36, TN40, TN44 and TN46

Defunct species poor hedgerows are present at TN17, TN34, TN40 (with trees) and TN46. Intact species poor hedgerows are present at TN5, TN6, TN16, TN19, TN35, TN36 and TN44. Most of the hedgerows are recently planted and dominated by common hawthorn with occasional field maple

(*Acer campestre*), hazel (*Corylus avellana*), blackthorn and elder. An older defunct hedge with trees at TN40 comprises hawthorn, ash, guelder rose (*Viburnum opulus*), blackthorn and elder.

Dry Ditch

There are a few dry ditches present on site that normally have no standing water present. As such they have no submerged or aquatic macrophytes present. Species include common reed, tall grass such as false oat grass and tall herb species. They may receive some water/run-off particularly during the winter but were dry during the survey.

4.3 Notable Habitats

Table 6 provides a summary of notable habitats associated with the site based on the results of the Phase 1 Habitat survey and with reference to guidance for the recognition of NERC Act S41 (Maddock, 2010), LBAP (www.norfolkbiodiversity.org) and County Wildlife Site (CWS) (www.nbis.org.uk). Further surveys may be required to investigate the value of habitats further, as detailed in Section 5 of this report.

Table 6. Notable habitats within the site

Habitat	NERC Act?	LBAP?	CWS Quality?1	Supporting Comments
Hedgerows	✓	✓[2]	x	Ten hedgerows on site.
Ponds	?	?	x	One shaded pond on the site boundary. Unlikely to qualify unless presence of a rare/protected species[3], e.g. Great crested newt
Arable field margins	✓	✓	x	A few cultivated low-input field margins present on site, e.g. margin between TN1 and maize field.
Lowland mixed deciduous woodland	✓	✓	x	A small woodland block at TN15 of likely semi-natural origin.
Reedbed	✓	✓	x	A small area of drying reedbed with scrub and scattered mature oak trees at TN2. Reedbed also present along wet drains.
Rivers	✓	✓	✓	A section of the River Nar is within and immediately adjacent to the site boundary. The River Nar is also a SSSI.

Key to symbols: ✓ = yes, x = no, ? = possible, further survey required to determine this.

4.4 Protected and Notable Species

Table 7 provides a summary of potentially relevant species identified through a combination of desk study and field survey. The table summarises the conservation status of each species and provides comment on the likelihood of presence. This is expanded in the following text where required.

Where species are identified in Table 7 as likely or possible, they are likely to represent legal constraints or may be material to determination of a planning application. Further surveys will or may

[1] Based on http://www.nbis.org.uk/sites/default/files/documents/SelectionCriteria_habitats_FEB28_FINALFOR2013.pdf
[2] A hedgerow is defined as any boundary line of trees or shrubs over 20 m long and less than 5 m wide, and where any gaps between the trees or shrub species are less than 20 m wide. All hedgerows consisting predominantly (i.e. 80% or more cover) of at least one woody native species are covered by this habitat.
[3] Ponds can qualify under the NERC Act and LBAP if they support a Red Data Book species, UK BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.

be required to determine presence or probable absence. Requirements for further survey are identified in Section 5 of this report.

Table 7. Protected and notable species relevant or potentially relevant to the proposed development

Species	Legally Protected Species?	Species of Principal Importance?	Other Notable Species?	Present on Site?	Present / Potentially Present in Wider Zone of Influence?	Supporting Comments
Breeding birds	✓	✓	-	✓	✓	Schedule 1 species such as goshawk (*Accipiter gentilis*), hobby (*Falco subbuteo*), woodlark (*Lullula arborea*) and nightjar (*Caprimulgus europaeus*) adjacent to the site. Suitable habitat on site for nesting birds comprising hedgerows, plantation woodland and grass field margins. Further discussion is provided within Section 4.4.1 below.
Wintering birds	✓	✓	-	?	✓	Suitable foraging habitat for over-wintering birds (e.g. root crops).
Bats	✓	✓	-	?	?	Numerous trees on site which could provide roosting habitat for bats, including a small woodland, lines of mature trees. The site has overall moderate suitability for foraging/commuting bats with large areas of low suitability habitat (intensively managed arable field) with moderate to high suitability along tree lines and drains. Further discussion is provided within Section 4.4.2 below.

Great crested newt (*Triturus cristatus*)	✓	✓	-	?	?	No desk study records. One pond on the site boundary at TN12 (north west corner) with average suitability. One pond c.100m from the site at TN30 with excellent suitability. Two other ponds not accessible so assumed to be suitable. Limited suitable terrestrial habitat on site given the site is predominantly under intensive arable cultivation. Further discussion is provided within Section 4.4.3 below.
Common toad (*Bufo bufo*)		✓		?	?	Desk study records and suitable breeding habitats on site.
Reptiles	✓	✓		?	✓	Four species recorded at adjacent sites (Marham Fen and Shouldham Warren. Potential for common lizard (*Zootoca vivipara*) and grass snake (*Natrix natrix*) on site.
Water Vole (*Arvicola amphibius*)	✓	✓		✓	✓	Desk study records at nearby Marham Sluice and water vole latrines recorded during the survey on site along Forty foot drain at TN33. Extensive network of suitable drains on site.
Otter (*Lutra lutra*)	✓	✓		?	✓	No desk study records but suitable habitat along the River Nar and drains on site.
Eurasian badger (*Meles meles*)	✓	✓	-	?	?	No signs on site. Some habitats inaccessible or not visible this time of year so potentially present.
Fish	✓	✓		✓	✓	European eel and Brown/sea trout recorded along the River Nar. Also potentially present along Forty Foot Drain (TN33/TN42).
Scarce flora		✓	✓	?	✓	No desk study records on site but some in adjacent habitats (e.g. Marham Fen). Lack of suitable habitat for species listed in the desk study but some potential for other species in arable margins, drains and reed beds.

Terrestrial & Aquatic Invertebrates		✓	✓	?	✓	Numerous moth records priority/notable species close to the site. Scarce emerald damselfly (*Lestes dryas*) (Red Data Book Vulnerable) observed in nearby pond at TN30. Other notable terrestrial and aquatic species potentially present in habitats on site.
West European hedgehog (*Erinaceus europaeus*)		✓	-	?	?	No records on site, but present in Marham and so potentially may use the site.
Brown hare (*Lepus europaeus*)		✓	-	✓	✓	Numerous recent records from the site.
Invasive species	✓			?	?	No invasive plants seen during survey. Potential for aquatic species along wet drains, but none seen.

Key to symbols: ✓ = yes, x = no, ? = possibly, see Supporting Comments for further rationale.

[Species present on site are those for which recent direct observation or field signs confirmed presence. Species which are possibly present are those for which there is potentially suitable habitat based on the results of the Phase 1 Habitat survey, or this combined with desk study records.

Legally protected species are those listed under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended); and, Schedules 2 and 4 of The Conservation of Habitat & Species Regulations 2010 (as amended).

Species of Principal Importance as those listed under Section 41 of the NERC Act. Planning Authorities have a legal duty under Section 40 of the same Act to consider such species when determining planning applications.

Other notable species include native species of conservation concern listed in the LBAP (except species that are also of Principal Importance), those that are Nationally Rare, Scarce or Red Data List, and non-native controlled weed species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).]

4.4.1 Birds

The desk study returned records for a wide range of bird species. The majority of records were from adjacent sites at Marham village, Marham Fen, Shouldham Warren and Nar Valley Fisheries, and not within the site boundary (as would be anticipated due to public access restrictions on site). The records returned included those for declining farmland birds such as turtle dove (*Streptopelia turtur*), grey partridge (*Perdix perdix*) and Schedule 1 species such as goshawk (*Accipiter gentilis*) and hobby (*Falco subbuteo*). There is potential for nesting hobby or goshawk in the woodland/mature trees on site.

The desk study has confirmed the presence of two other Schedule 1 species, woodlark and nightjar within the search area within Shouldham Warren. There are no records of these two species from land within the site, although both may forage over the site. There are no stone curlew records (potentially relevant to the Breckland SPA 4.8km from the site) within the search area and there is no potential for stone curlew breeding on site at present as the soil type is not suitable. This may change in future when the site is operational and the sand/gravel is exposed. The potential presence of a foraging stone curlew cannot be ruled out, nor the potential for future breeding as a result of changes in land management/ cropping regimes or the expansion of this species away from core breeding areas.

The site has potential to support at least some of these notable species, and other species may occur and breed. Suitable habitat on site for nesting birds comprises the arable fields, hedgerows, woodland and grass field margins. Wintering birds may use the fields for foraging in the winter, particularly where root crops such as carrot, parsnip and sugar beet have been grown.

Species noted during the field survey were: reed warbler (*Acrocephalus scirpaceus*), sedge warbler (*Acrocephalus schoenobaenus*), reed bunting (*Emberiza schoeniclus*), barn owl (*Tyto alba*) (including probable nesting in tree nest box 3021 at TN39), common buzzard (*Buteo buteo*), kestrel (*Falco tinnunculus*) (breeding pair), little egret (*Egretta garzetta*), yellowhammer (*Emberiza citrinella*), lapwing (*Vanellus vanellus*) (flock of c.200), oystercatcher (Haematopus ostralegus), yellow wagtail (*Motacilla flava*) , hobby (breeding pair just outside site boundary at TN33), mistle thrush (*Turdus viscivorus*) and skylark (*Alauda arvensis*).

There are suitable roosting/nest sites for barn owl including a barn owl box at TN39, and grass field margins and ditches are likely to be used for foraging.

4.4.2 Bats

The desk study returned records of at least six species of bats within 1 km of the site. These comprise flight records of pipistrelle species (*Pipistrellus spp.*), soprano pipistrelle (*Pipistrellus pygmaeus*), Nathusius' pipistrelle (*Pipistrellus nathusii*), brown long-eared bat (*Plecotus auritus*), Natterer's bat (*Myotis nattereri*), noctule bat (*Nyctalus noctula)* and serotine (*Eptesicus serotinus*) and an Unidentified Bat.

There are roost records within 1 km of the site at RAF Marham (unknown roost) and Marham church (Pipistrelle species).

There are a few suitable potential roosting habitat on site restricted to trees. The woodland and lines of trees are grouped together. Scattered oak trees at TN2 have high suitability; a line of ash trees at TN9 have moderate suitability; woodland at TN15 has high suitability; lines of mature poplar trees at TN41 have low suitability; line of mostly mature ask trees at TN43 with moderate suitability. There are no buildings on site, or other structures, suitable for roosting bats.

The site has overall moderate suitability for foraging/commuting bats with large areas (c.90%) of low suitability habitat (intensively managed arable fields) with moderate to high suitability in grassland, woodland/tree lines, hedges and drains (c.10%).

Table 8. Bat Roost Suitability

Feature (see Appendix D)	Target Note	Bat Roost Suitability	Photo ref. (see Appendix E)
Approximately 20 mature oak trees	TN2	High	3
Line of mature ash trees	TN9	Low to Moderate	n/a
Broad-leaved semi-natural woodland	TN15	High	24
Line of mature poplar trees	TN41	Low	61
Line of mature ash trees	TN43	Moderate	69

4.4.3 Great crested newt

There are no great crested records within the desk study search area (1 km from the site). One pond was identified on the site at TN12, with three others within 500 m of the site. This is a shaded shallow pond with deep sediment c.800m^2 (20 x 40m) on the edge of an arable field. There is some common reed around the margins, no signs of aquatic macrophytes, fish or wildfowl. The Habitat Suitability Index (HIS) of this pond to provide breeding habitat for great crested newt is 0.67 (average) see Box 1 below.

Pond TN30 is located c.100m from the site boundary. It is approximately 50 m wide with an island in the middle. It is shallow and there are signs that is would dry out by the end of the summer. It has a good range of aquatic emergent plants and some floating aquatics (see TN30, Appendix C). The HSI of this pond to provide breeding habitat for great crested newt is 0.87 (excellent) see Box 1 below.

The other two inaccessible ponds at TN45 (c.100 m from the site) and TN47 (c.150 m from the site) are assumed to be suitable for great crested newts unless otherwise assessed.

Based on the HSI assessment of two ponds, and presence of other potentially suitable ponds within 500 m of the site, there will be a requirement to consider this species further in association with any future development.

Box 1 – HSI results Pond TN12

Habitat Suitability Index				
				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	irregular	
		length (m)		
		width (m)		
		OR estimate (m^2) if irregular	800	
		area (m^2) =	*800*	0.98
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	90	0.40
SI6.	Waterfowl	**absent/minor/major**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	5	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	0	0.31
***Note** : Guidance in undertaking the HSI is available at*			**HSI score =**	**0.67**
HSI calculation formulae adapted from Rob Oldham			**Pond suitability =**	**average**

Box 2 – HSI results Pond TN30

Habitat Suitability Index				
				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	irregular	
		length (m)		
		width (m)		
		OR estimate (m^2) if irregular	750	
		area (m^2) =	*750*	0.99
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	good	1.00
SI5.	Shade	% of margin shaded 1m from bank	20	1.00
SI6.	Waterfowl	**absent/minor/major**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	absent	1.00
SI8.	Pond density	number of ponds within 1km	5	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	20	0.51
***Note** : Guidance in undertaking the HSI is available at*			**HSI score =**	**0.87**
HSI calculation formulae adapted from Rob Oldham			**Pond suitability =**	**excellent**

5. Identification of ecological constraints and recommendations

5.1 Approach to the Identification of Ecological Constraints

Relevant ecological receptors that may represent constraints to the proposed development, or that provide opportunities to deliver ecological enhancement in accordance with planning policy, are identified in Section 4.

The NPPF and local planning policy (summarised in Section 2 of this report) specify requirements for the protection of features of importance for biodiversity. Planning policy is a material consideration when determining planning applications.

Compliance with planning policy requires that the proposed development considers and engages the following mitigation hierarchy where there is potential for impacts on relevant ecological receptors:

1. Avoid features where possible;
2. Minimise impact by design, method of working or other measures (mitigation) e.g. by enhancing existing features; and
3. Compensate for significant residual impacts, e.g. by providing suitable habitats elsewhere (whether in the control of Sibelco or otherwise legally enforceable through planning condition or Section 106 agreement).

This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered. The rationale for the proposed mitigation and/or compensation should be provided with planning applications, including sufficient detail to show that these measures are feasible and would be provided.

In pursuance of the objective within the NPPF of providing net gains in biodiversity where possible, consideration should be given to the scope for enhancement as part of the proposed development. This should represent biodiversity gain over and above that achieved through mitigation and compensation. Enhancement could be achieved on and/or off the Site.

The likelihood of the relevant ecological receptors constraining the proposed development has been assessed with reference to the scale described in Table 9. The higher the importance of the ecological receptor for the conservation of biodiversity at national and local scales, the more likely it is to be a material consideration during determination of the planning application for the proposed development.

Opportunities for ecological enhancement are not scaled in Table 9, but are identified in the accompanying appraisal (Section 5.5 of this report). There may be scope for ecological enhancement where existing habitat features could be improved or enhanced within the proposed development as designed, or with only minor amendment to the design of the proposed development. Ecological enhancement may not be possible where there is little scope to accommodate enhancement within the proposed development, e.g. due to a lack of utilisable space, or where land is required for essential mitigation. Consideration could be given to enhancing biodiversity in the vicinity of the site.

Table 9. Scale of Constraint to Development

Likelihood	Definition
High	An actual or potential constraint that is subject to relevant legal protection and is likely to be a material consideration in determining the planning application (e.g. statutory nature conservation designations and European/nationally protected species). Further survey likely to be required (as detailed in this report) to support a planning application.
Medium	An actual or potential constraint that is covered by national or local planning policy and, depending on the level of the potential impact as a result of the proposed development, may be a material consideration in determining the planning application. Further survey may be required (as detailed in this report) to support a planning application.
Low	Unlikely to be a constraint to development or require further survey prior to submission of a planning application. Mitigation is likely to be covered under Construction Environmental Management Plan (CEMP) or precautionary working method statement (e.g. generic requirements for the management of nesting bird risks).

5.2 Constraints and Requirements for Further Survey: Designations

5.2.1 Statutory Designated Sites

There are two internationally designated sites within the desk study search area more than 4 km from the site and unlikely to be constraints to any proposed development due to the distance from the site and lack of pathways to these sites (see Table 3). There is one site statutorily designated for its nature conservation value that is a potential constraint to any proposed developed on the site. The potential relevance of the designated site is assessed further below. See also the summaries provided as Tables 10 and 11 of this report.

The proposed development is located within and immediately adjacent to the River Nar SSSI (see Table 3 and Appendix D). Unmitigated development has the potential to change the river chemistry through run-off, changes in drainage and has potential to affect the associated flora and faunal communities present, including the Callitricho-Batrachion plant community, chalk stream benthic macroinvertebrate assemblage and fish (brown trout and eel). As development proposals are progressed consultation with Environment Agency, Natural England, Internal Drainage Board and the Local Planning Authority (LPA) will be required based on the proximity of the River Nar SSSI. Ecological Impact Assessment is likely to be required based on up-to-date field survey data. Ecological surveys to inform the assessment are likely to include fish, aquatic invertebrates and macrophyte surveys. Hydrological modelling of the potential impacts to the river may be required.

5.2.2 Non-statutory Designated Sites

Based on available information, three of the non-statutory nature conservation designations identified in the desk study (Table 4 and Appendix D) are considered to be relevant to the proposed development due to their distance from the site (within 100 m). These are CWS 528 North of Marham, CWS 530 Marham Fen and CWS 545 The Carr. For the other site impacts are unlikely at the distances concerned.

Unmitigated development may potentially impact the sites through noise, air pollution (e.g. dust deposition), water pollution and changes in drainage/water levels. Consultation with the LPA and Norfolk Wildlife Trust is required.

5.3 Constraints and Requirements for Further Survey: Habitats

Hedgerows, arable field margins, lowland mixed deciduous woodland, reedbed, rivers and potentially a pond are notable habitats associated with the site that might represent a constraint on development

of the site. The extent of the loss/potential impacts will depend on the configuration of the site. For example it should be possible to avoid the River Nar. In developing the master plan for the site, an attempt should be made to retain existing hedgerows, the pond and woodland. Where this is not possible replacement habitats will be required following extraction. If this can be delivered then there would be no conflict with planning policy. Due to the large size of the site drain/woodland/hedgerow corridors should be maintained across the site (e.g. around TN40/41) and enhanced to maintain cohesiveness in the landscape and facilitate the movement of species.

Where habitat removal cannot be avoided then the notable habitats present will require additional detailed survey to determine their full species composition and value. This would be undertaken using National Vegetation Classification surveys (Rodwell, 2006) /phase 2 botanical survey (depending on type/extent of habitat), important hedgerow survey (based on DEFRA guidelines,(DEFRA, 2007)) and scarce arable flora surveys. These surveys would include identification of invasive plant species list in Schedule 9 of the Wildlife & Countryside Act 1981 (as amended).

Hedgerow loss would need to be mitigated for by new plantings of species-rich native hedgerows or alternative woodland or scrub plantings. All hedgerow loss should be compensated as a minimum on a one for one basis, and to demonstrate net gain ideally more habitat would be put back than removed. This is consistent with the habitat opportunities described below. There is considerable scope to reinforce habitat connectivity along the southern site boundary through new woody plantings, and this would likely compensate for any hedgerow loss within the site.

New hedgerow, woodland and scrub plantings should be species-rich and comprised of native species obtained from a reputable local grower who can source identify their planting stock. This is consistent with current guidance issued by The Arboricultural Association and endorsed by Defra.

A suitable habitat/landscape plan with input from an ecologist would be required to detail appropriate habitat restoration of the site following sand/gravel extraction.

See also the summaries provided as Table 10 and 11 of this report.

5.4 Constraints and Requirements for Further Survey: Species

See also the summaries provided as Table 10 and 11 of this report.

5.4.1 Birds

Survey data on the species breeding and over-wintering on site is needed to assess the current value of the site for breeding and wintering birds, and thereby enable appropriate mitigation to be designed in support of a planning application.

There are woodlark and nightjar records west of the site at Shouldham Warren (within 100 m of the site). They may be present in the woodland on site or use the site for foraging. The habitats identified on site have the potential to support other bird species of conservation concern such as declining farmland birds and raptors such as goshawk, hobby and red kite (*Milvus milvus*). The raptors are subject to strict legal protection under Schedule 1 of the WCA. There is potential for the fields to be used for foraging/roosting by wintering bird assemblages in the winter months.

Information on breeding birds is required to support the planning application and demonstrate relevant constraints are understood and appropriately addressed. As such breeding bird and nocturnal surveys should be undertaken, to include a 500 m buffer (where accessible) for woodlark and nightjar. The scope of the surveys should be agreed with Natural England and Breckland District Council.

It is recommended that a breeding bird survey comprising a modified Common Bird Census (CBC) survey with a minimum of 7 visits is undertaken between mid-February and August by an experienced ornithologist to map territories of all bird species present within the side an appropriate buffer area around this. This would include surveying for woodlark and goshawk (examples of two species that breed early in the year), as well as later breeding species such as hobby. Two nocturnal surveys between May and July should also be undertaken for nightjar (based on Gilbert *et al*., 1998). Wintering bird surveys would be undertaken (similar to the CBC method) with monthly survey visits from October to March. The barn owl box and any other suitable nesting features would be checked

for barn owl a suitable licensed surveyor. Observations of barn owls would also be recorded during evening nightjar and bat surveys.

In general where vegetation is to be cleared as part of a future development, this should be undertaken outside of breeding bird season (1st March to 31st August). This is dependent on the bird species present as well as taking into account other potential species constraints (e.g. bat roosts). As such a specific mitigation plan for protected species would be developed when the habitat and protected species surveys have been completed.

5.4.2 Bats

There are records of at least six species of bats on site, including two roosts close to the site and numerous potential tree roosts on site. Based on the habitats present on site and guidance on valuing commuting and foraging habitats (Wray et al., 2010), the site has overall moderate suitability for foraging/commuting bats with large areas (c.90%) of low suitability habitat (intensively managed arable fields) with moderate to high suitability in grassland, woodland/tree lines, hedges and drains (c.10%).

Bats are a protected species and a material consideration in the planning process. A planning application for the proposed development will need to be supported with bat activity surveys in line with the current best practice guidelines (Collins, 2016). Surveys are proposed based on a moderate value site and will need to be undertaken prior to planning application being submitted. They will need to be undertaken during a full season with monthly surveys between April and October (note April, September/October are weather dependant). If key bat flight lines are identified, severance should be avoided by retaining the habitat feature used or if not possible, mitigated for by replacement planting. The recommended bat survey work is essential in order to prepare a robust planning application. The surveys will also inform the masterplan for the proposed development, and allow for mitigation to be included in the masterplan rather than it being retrofitted at a later date.

For this site a combination of walked and driven transects and use of static detectors could be undertaken as follows:

- Transect surveys – one survey visit per month (April to Oct) comprising two transects to cover representative habitats (in appropriate weather conditions for bats); at least one of the survey visits should comprise dusk and pre-dawn survey (or dusk to dawn) within one 24 hour period; and
- Automated static detector survey – two locations per transect, data to be collected on five consecutive nights per month in appropriate weather conditions for bats.

A detailed assessment of trees with moderate or high roost suitability for their potential to support roosting bats is recommended. Potential roost features on the trees identified can be surveyed using a combination of a ladder/tree climbing followed by emergence/re-entry surveys.

For felling of negligible/low risk trees an appropriate method statement would be prepared in a CEMP or precautionary working method statement.

If a roost is confirmed on site, provision of mitigation will be required along with potentially a Natural England European Protected Species Mitigation Licence (EPSML) where a roost cannot be retained. Robust survey data will also be essential to support the EPSML application.

Where certain rare bat species such as Myotis bats or barbastelle (*Barbastellus barbastellus*) are present then advanced survey techniques (e.g. harp trapping/mist nets, radio-tagging) may be needed to determine species (of Myotis bats), breeding status and to locate roosts to provide information on potential impacts and licence requirements.

Mitigation will depend on the species using the site and significance of roosts potentially impacted. Consideration of lighting in accordance with guidance from the Bat Conservation Trust (2014) during construction and operation of the site would be important to reduce impacts to foraging, commuting and roosting bats.

5.4.3 Great crested newt

Four ponds have been identified as potentially suitable for great crested newt within 500 m of the site. All these ponds (where still extant at the time of survey) should be surveyed for great crested newt presence/absence either by eDNA testing (between 15th April and 30th June) or four visits using a combination of torch, bottle traps, netting and egg searches (between mid-March and mid-June with at least 2 visits in peak season (usually mid-April to mid-May). If positive DNA test results then a total of six survey visits are required for a population assessment for any potential future licensing requirements. Population assessment visits are undertaken between mid-March and mid-June with at least 3 visits in peak season (usually mid-April to mid-May).

If presence of great crested newt is confirmed in any of the identified ponds, then either their breeding and/or terrestrial habitat will need to be retained or alternative habitat provided. As such, timely survey work for this species will inform the planning of the proposed development. It is possible that a Natural England EPSML would be required for the development if this species is confirmed as present (particularly at the pond on site at TN12). This would require the development of a detailed mitigation and compensation strategy to ensure compliance with the Habitats Regulations.

5.4.4 Reptiles

There is potential for common lizard and grass snake on site in non-intensively managed arable habitats. As such a survey of suitable habitats should be undertaken in April, May and September to determine species, locations and an estimate of population size in accordance with the methods in Froglife (1999) and Gent and Gibson (1998). This requires the use of artificial refugia and a minimum of seven visits in suitable weather conditions. Where present mitigation will involve capture and release of reptiles to a suitable receptor site that should be built into the development plans. For large populations, this can take up to 3 years, capturing between March and September. For small populations, 1 year is usually enough. Reptiles should ideally be captured early in the season to avoid problems before hibernation or increased numbers due to breeding.

5.4.5 Water vole and Otter

Water voles are present on site along main Forty foot drain and potentially other drains. As an extensive network of wet drains suitable for water voles is likely to be lost, water vole surveys within the site will be required to determine water vole burrow locations. This would comprise two surveys one in spring and one in late summer (in accordance with Strachan, R. & Moorhouse, T. (2011)). Due to the presence of water vole on site, the large network of potential habitat (i.e. wet drains) and the likely extent of habitat loss mitigation is likely to require capture and translocation to suitable replacement habitat. Early consideration is required of the receptor site which needs to be capable of supporting the water vole population. A requirement of the licence will be to prove that capturing and moving the water voles would help their conservation.

A survey for the presence of otters along drains including adjacent habitat for holts will also be required, this would be in accordance with Chanin P (2003) and Environment Agency (2010). Otter surveys can be undertaken at any time of year. If it cannot be possible to avoid harming otters or damaging or blocking access to their habitats then an EPSML is likely to be required.

5.4.6 Badger

No signs of badger were found during the Phase 1 Habitat survey (with the limitations noted). It is recommended this is updated prior to work commencing, preferably with a survey in winter to early spring when crops/grassland are shorter. Where any active badger setts are likely to be affected then a licence will be required to close the sett. Note that licences are only issued between 1st July and 30th November.

5.4.7 Fish

Due to the presence of priority species associated with the River Nar SSSI , a fish survey is likely to be required along the Forty foot drain, other suitable wet drains and if the River Nar SSSI is to be

impacted. This will help determine mitigation requirements for priority species such as brown trout and European eel.

5.4.8 Terrestrial Invertebrates

Due to numerous desk study records of notable invertebrate species and some suitable habitats on site a scoping survey for terrestrial invertebrates should be undertaken to determine the appropriate level of survey effort required to assess the value of the species and assemblage on site. As a minimum three surveys are normally undertaken in suitable habitats spread across the period May to September in suitable weather (as different invertebrates are best detected at different times during the spring/summer).

5.4.9 Aquatic invertebrates

The drains on site have the potential to support protected/notable aquatic invertebrates. As such two surveys would be undertaken at the stream and suitable waterbodies on site, one in spring and one in autumn as per WFD-UKTAG (2014). This would also serve to determine the baseline water quality from which any future monitoring can be undertaken.

5.4.10 Other species

West European hedgehog, brown hare and common toad may use the site. All receive limited legal protection but are S41 species and brown hare is a LBAP species. As such precautions are recommended to ensure they are not harmed during construction through a Construction Environmental Management Plan (CEMP) or precautionary working method statement.

It is recommended that any future development is planned to take account of likely mitigation requirements for these species. This may include timing of site clearance to avoid the brown hare breeding-season. This is concordant with the requirements for nesting birds. As such, it is recommended that site clearance and preparatory works be undertaken over the autumn/winter period of September to February inclusive. Avoid unnecessary damage to retained semi-natural habitats (e.g. hedgerows) outside the direct footprint of the Scheme. This might include the use of temporary fencing to protect such habitats. This is concordant with the expected requirements for tree protection zones. During construction any open pits/holes should be covered at night or where not possible a wooden plank positioned at a 45^{o} from the base to the top of the hole so that mammals can escape. Hedgehogs and toads should be removed from habitats prior to and during clearance to a safe location outside the development area.

Table 10. Summary Appraisal of Features of Ecological Constraints and Recommended Further Action

Receptor	Scale of Constraint	Further Requirements, Including Potential Mitigation Requirements	Driver	When is Action Likely to be Required		
				To Inform Design	Before Planning Application	Pre-construction Onwards
River Nar SSSI	High	Define whether the proposed extraction site is functionally linked to the SSSI and whether site impacts are likely. Early consultation with statutory consultees (e.g. Natural England).	WCA 1981.	✓	✓	✓
Notable habitats, e.g. Hedgerows	Medium	Retain habitats where possible. If loss cannot be avoided then further survey data are required. Mitigate for loss e.g. compensate for hedgerow loss by new planting on two for one basis.	Hedgerow Regulations 1997, LBAP, Core Strategy CP 10.	✓	✓	✓
Breeding birds	High	Retain habitats used by nesting birds where possible. Where vegetation is to be cleared, this should be done outside of breeding bird season (March to August). Minimise operational impacts. Other mitigation potentially required depending on species.	WCA 1981, LBAP, NERC Act 2006	✓	✓	✓
Wintering birds	Moderate	Replacement habitat/feeding areas Minimise operational impacts. Other mitigation potentially required depending on species.	WCA 1981, LBAP, NERC Act 2006	✓	✓	✓
Bats	High	Identify potential severance issues and identify and implement requirements for construction phase and/ or habitat mitigation to address this. Protection of bat roosts or mitigation for loss of roosts (where confirmed on site).	The Habitats Regulations 2010. WCA 1981. LBAP	✓	✓	✓
Great crested newts	High	Identify presence/absence and if present, population size. If great crested newts are identified within 500m of the Site, clearance works of vegetation may need to be conducted under EPSML. Maintain linkages through the site. Implement mitigation and obtain licence where required when planning permission granted.	The Habitats Regulations 2010. WCA 1981. LBAP	✓	✓	✓
Reptiles	High	Capture and translocation	WCA 1981,	✓	✓	✓

Receptor	Scale of Constraint	Further Requirements, Including Potential Mitigation Requirements	Driver	When is Action Likely to be Required		
				To Inform Design	Before Planning Application	Pre-construction Onwards
		plan possible required. Plan for creation of suitable receptor site	LBAP, NERC Act 2006			
Water vole	High	Capture and translocation plan would be required as located on site in habitats lost to development. Plan for provision of suitable receptor site.	WCA 1981, LBAP, NERC Act 2006	✓	✓	✓
Otter	High	Assess presence/location of otter holts. Avoid harming otters or blocking access to holts. If not possible then EPSML required.	The Habitats Regulations 2010. WCA 1981, LBAP, NERC Act 2006	✓	✓	✓
Badger	Medium	Check on status of badgers on site prior to development and if required protect any setts, during construction/operation.	Protection of Badgers Act 1992			✓
Invertebrates	Medium	Retention of habitat. Specific mitigation may be required for certain species (e.g. relocation, habitat creation). Use aquatic invertebrate data for future monitoring of water quality.	NERC Act 2006, LBAP	✓	✓	✓
Hedgehog	Low	Retain habitats and ensure that connectivity is maintained throughout the site and into the wider area. Ecological Clerk of Works to ensure absent from construction area.	NERC Act 2006	✓	✓	✓
Common toad	Low	Ensure toads are not harmed during construction by timing of works and protection of retained habitats.	NERC Act 2006, LBAP			✓
Brown hare	Low	Ensure hares are not harmed during construction by timing of works and protection of retained habitats.	NERC Act 2006, LBAP			✓
Invasive plant species	Low	Construction Invasive Species Management Plan. Check for invasive plant species prior to construction.	WCA 1981			✓

Table 11. Requirements for Further Survey

Survey	Season	Method	Why required	When required: To Inform Design	When required: Before Planning Application	When required: Pre-construction Onwards
Phase 2 botanical/NVC survey of habitats	May to August	Detail botanical survey. NVC method used where appropriate will be based on the NVC users handbook (Rodwell, 2006).	Required to assess value of priority habitats present on Site for EcIA/ planning application and to determine mitigation requirements in accordance with the planning policy.	✓	✓	
Scarce arable flora survey	June/July	Recording plants listed in the Vascular Plant Red List for England (Stroh et al, 2014) as Critically Endangered, Endangered, Vulnerable and Near Threatened and those listed by Byfield & Wilson (2005) as locally, regionally or nationally scarce.	Required to assess value of priority habitats present on Site for EcIA/ planning application and to determine mitigation requirements in accordance with the planning policy.	✓	✓	
Hedgerow survey	May to August	Detailed hedgerow survey based upon DEFRA Guidelines (DEFRA, 2007) and aim to identify species-rich and/or important hedgerows under the Hedgerow Regulations 1997.	Required to assess value of priority habitats present on Site for EcIA/ planning application and to determine mitigation requirements in accordance with the planning policy.	✓	✓	
Breeding birds	Breeding bird surveys (Common Bird Census) season extended mid-February to August for woodlark and raptors. Nocturnal survey for nightjar/barn owl.	Transect surveys both in the day and at dusk/ dawn to identify the value of the Site for breeding birds including raptors and barn owl. (Marchant 1983, Marchant *et al* 1990, Gilbert, Gibbons and Evans 1998, and Toms, 1995).	To determine the presence or absence and value or the Site for breeding birds and barn owl and to determine mitigation/ avoidance requirements.	✓	✓	
Wintering birds	Wintering bird transects October to March.	Walked transect, monthly. (Gilbert, Gibbons and Evans 1998)	To identify presence / absence of wintering birds and if present the value of the site and to determine mitigation/ avoidance requirements.			
Bat roost potential	Anytime for tree	Inspection and	To determine use of the	✓	✓	

Survey	Season	Method	Why required	When required: To Inform Design	When required: Before Planning Application	When required: Pre-construction Onwards
roost feature inspections and presence/ absence surveys.	climbing/ladder inspection. May to September for emergence/re-entry surveys.	surveys using bat detection equipment. (Collins, 2016).	site by roosting bats to inform mitigation requirements.			
Bat activity surveys	April to October	Walked transects at night and static detectors (Collins, 2016). Monthly visits April to October.	To determine value of the Site by commuting and foraging bats and to determine mitigation/ avoidance requirements.	✓	✓	
Great crested newt – Water samples for eDNA analysis	Mid- April to June	Collect water samples from suitable water bodies (as defined in the HSI) for eDNA analysis. Defra (2014) or use traditional techniques.	To identify the presence/ absence of great crested newts and to inform mitigation/ avoidance requirements.	✓	✓	
Great crested newt – population size class estimate	March to June	Up to six visits using three of the following four survey methods: bottle trapping, torching, egg searching, netting. English Nature (2001)	If newts present - to determine the size of the population to inform mitigation/ avoidance measures and to inform any Natural England licence.	✓	✓	
Reptile presence/absence survey	April to May and/or Sept	At least seven visits based on Froglife (1999) Advice Sheet 10 for Reptile Surveys and the Herpetofauna Workers' Manual (Gent and Gibson, 1998)	Required to assess presence/absence, value of populations for EcIA/planning application and to determine mitigation requirements in accordance with the legislation protecting reptiles.	✓	✓	
Water vole	April/May and August	Water vole survey methodology will be based upon Strachan *et al*., (2011).; The survey will involve one visit in Spring and one in late Summer on watercourses / ditches to be potentially impacted by the development.	To identify the presence/ absence of water vole and to determine mitigation/ avoidance requirements	✓	✓	
Otter	April/May and August	The otter survey will be based on Environment Agency, (2010) and	To identify the presence/ absence of water otter mitigation/ avoidance	✓	✓	

Survey	Season	Method	Why required	When required: To Inform Design	When required: Before Planning Application	When required: Pre-construction Onwards
		Monitoring the Otter (Chanin, 2003). Undertaken with water vole survey.	requirements			
Badger	October to March	Walked survey noting badger evidence encountered (Harris, Cresswell & Jefferies 1989, and Roper, 2010).	To determine the extent of the use of the Site by badger and to inform avoidance and mitigation measures and potentially a Natural England licence.	✓	✓	
Terrestrial invertebrate survey	May to Sept	Based on professional survey guidance.	Required to assess value of priority and protected species present on Site for EcIA/planning application and to determine mitigation requirements in accordance with the planning policy and legislation.	✓	✓	
Aquatic invertebrate survey	May and Sept to Oct	Based on WFD-UKTAG (2014).	Required to assess value of priority and protected species present on Site for EcIA/planning application and to determine mitigation requirements in accordance with the planning policy and legislation.	✓	✓	

The constraints outlined here will need to be reassessed if there is a significant change to the type or scale of development proposed, or if there are any significant changes in the use or management of the land that would affect the habitats and species. If a planning application is made two years or more after this PEA (i.e. August 2019) it is advisable to review and update the survey data.

5.5 Opportunities for Ecological Enhancement

At present the options for the site have yet to be finalised. The recommended protected species surveys will inform the design of ecology mitigation and enhancement measures. However there are potential opportunities to enhance the site for biodiversity to reflect its location within the wider surrounds, and to satisfy the requirements of the NPPF.

As an overarching concept, the scheme should aim to maintain and enhance connectivity between habitats retained/created within the site and wider landscape. Given the size of the site, and it's location within a wider landscape that includes numerous CWS and the River Nar SSSI to the north, the size of the site means it has potential to act as a key part of the green infrastructure that connects these protected sites to the wider landscape. Maintaining and enhancing the ecological connectivity within the wider landscape is in line with the recommendations of Making Space for Nature (Lawton *et*

al. 2010), which aimed to develop a coherent and robust ecological network that will be capable of responding to the challenges of climate change and other pressures.

Potential opportunities for biodiversity enhancement have been identified as follows, and can be refined as and when the further survey work identified above has been completed:

- Implement measures to reduce run-off and pollution within the River Nar SSSI catchment.
- Areas of undisturbed grassland should be retained to provide suitable breeding habitats for ground nesting birds within the site. At present much of the grassland is improved/semi-improved. This grassland could be enhanced by modifying the management regime and eliminating pesticides and herbicides (where these are used). The adjacent CWS North of Marham could be extended and potentially improved for wildlife.
- Earth and gravel bunds could be incorporated to provide enhancements for invertebrate species.
- Ensure the establishment of replacement hedgerow trees either through hedgerow management or new planting of suitable native stock.
- Provision of bat and bird boxes in retained plantation woodland/hedgerow trees
- Creation of new ponds on site.

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Appendix A Figure

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Photo Location
- Target Note
- Site Boundary

Phase 1 Habitat

- Individual Broad-leaved Tree
- Scattered Scrub
- Defunct hedge - species-poor
- Dry Ditch
- Fence
- Hedge with trees - species-poor
- Intact hedge - species-poor
- Bare Ground
- Broadleaved Parkland/ Scattered Trees
- Broadleaved Woodland - Planted
- Broadleaved Woodland - Semi-natural
- Buildings
- Coniferous Woodland - Planted
- Cultivated/ Disturbed Land - Arable
- Hard Standing
- Improved Grassland
- Marsh/ Marshy Grassland
- Mixed Woodland - Planted
- Other Tall Herb and Fern - Ruderal
- Poor Semi-Improved Grassland
- Running Water
- Scrub - Dense/Continuous
- Standing Water/Wet Drain
- Swamp

Purpose of Issue: DRAFT

Client: SIBELCO

Project Title: SIBELCO MARHAM

Drawing Title: PHASE 1 HABITAT SURVEY

Drawn	Checked	Approved	Date
KLD	BB	MP	23/08/2017

AECOM Internal Project No.	Scale @ A3
60471763	1:12,000

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Midpoint
Alencon Link, Basingstoke
Hampshire, RG21 7PP
Telephone (01256) 310200
Fax (01256) 310201
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Drawing Number: FIGURE 1

Rev: 1

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Appendix B Legislation and Planning Policy

The Conservation of Habitats & Species Regulations 2010 (as amended)

The Habitats Regulations consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law. The Regulations came into force on 30th October 1994. In Scotland the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the 1994 Regulations. The Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) transpose the Habitats Directive in relation to Northern Ireland.

The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

Under the Regulations, competent authorities i.e. any Minister, Government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to the EC Habitats Directive.

The Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species (listed in Annexes I and II of the Habitats Directive respectively) to the European Commission. Once the Commission and EU Member States have agreed that the sites submitted are worthy of designation, they are identified as Sites of Community Importance (SCIs). The EU Member States must then designate these sites as Special Areas of Conservation (SACs) within six years. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs) classified under Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive). These sites form a network termed Natura 2000.

The Regulations enable the country agencies to enter into management agreements on land within or adjacent to a European site, in order to secure its conservation. If the agency is unable to conclude such an agreement, or if an agreement is breached, it may acquire the interest in the land compulsorily. The agency may also use its powers to make byelaws to protect European sites. The Regulations also provide for the control of potentially damaging operations, whereby consent from the country agency may only be granted once it has been shown through Appropriate Assessment that the proposed operation will not adversely affect the integrity of the site. When considering potentially damaging operations, the country agencies apply the precautionary principle' i.e. consent cannot be given unless it is ascertained that there will be no adverse effect on the integrity of the site.

In instances where damage could occur, the appropriate Minister may, if necessary, make special nature conservation orders, prohibiting any person from carrying out the operation. However, an operation may proceed where it is or forms part of a plan or project with no alternative solutions, which must be carried out for reasons of overriding public interest. In such instances the Secretary of State must secure compensation to ensure the overall integrity of the Natura 2000 system. The country agencies are required to review consents previously granted under the Wildlife and Countryside Act 1981 for land within a European site, and may modify or withdraw those that are incompatible with the conservation objectives of the site.

The Regulations make it an offence (subject to exceptions) to deliberately capture, kill, disturb, or trade in the animals listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 4. However, these actions can be made lawful through the granting of licenses by the appropriate authorities. Licenses may be granted for a number of purposes (such as science and education, conservation, preserving public health and safety), but only after the appropriate authority is satisfied that there are no satisfactory alternatives and that such actions will have no detrimental effect on wild population of the species concerned.

The Regulations make special provisions for the protection of European marine sites, requiring the country agencies to advise other authorities of the conservation objectives for a site, and also of the operations which may affect its integrity. The Regulations also enable the establishment of management schemes and byelaws by the relevant authorities and country agencies respectively, for the management and protection of European marine sites.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 is the major domestic legal instrument for wildlife protection in the UK, and is the primary means by which the following are implemented:

- The Convention on the Conservation of European Wildlife and Natural Habitats ('the Bern Convention'); and
- The Council Directive 79/409/EEC on the Conservation of Wild birds (the 'Bird Directive')

Wild Birds

The Act makes it an offence (with exception to species listed in Schedule 2) to intentionally:

- kill, injure, or take any wild bird,
- take, damage or destroy the nest of any wild bird while that nest is in use or being built (also [take, damage or destroy the nest of a wild bird included in Schedule ZA1] under the Natural Environment and Rural Communities Act 2006), or
- take or destroy an egg of any wild bird.

Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young. The Secretary of State may also designate Areas of Special Protection (subject to exceptions) to provide further protection to birds. The Act also prohibits certain methods of killing, injuring, or taking birds, restricts the sale and possession of captive bred birds, and sets standards for keeping birds in captivity.

Other Animals

The Act makes it an offence (subject to exceptions) to intentionally kill, injure or take any wild animal listed on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals.

Flora, Fungi and Lichens

The Act makes it an offence (subject to exceptions) to intentionally) pick, uproot or destroy:

- any wild plant listed in Schedule 8, or
- unless an authorised person, to intentionally uproot any wild plant not included in Schedule 8,
- to sell, offer or expose for sale, or possess (for the purposes of trade), any live or dead wild plant included in Schedule 8, or any part of, or anything derived from, such a plant.

Non-native Species

The Act contains measures for preventing the establishment of non-native species which may be detrimental to native wildlife, prohibiting the release of animals and planting of plants listed in Schedule 9 in England and Wales. It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

Countryside and Rights of Way (CRoW) Act 2000

The Countryside and Rights of Way Act 2000 applies to England and Wales only. Part III of the Act deals specifically with wildlife protection and nature conservation.

The Act places a duty on Government Departments and the National Assembly for Wales to have regard for the conservation of biodiversity and maintain lists of species and habitats for which conservation steps should be taken or promoted, in accordance with the Convention on Biological Diversity.

Schedule 9 of the Act amends the SSSI provisions of the Wildlife and Countryside Act 1981, including increased powers for their protection and management of SSSIs. The provisions extend powers for entering into management agreements; place a duty on public bodies to further the conservation and enhancement of SSSIs; increase penalties on conviction where the provisions are breached; and include an offence whereby third parties can be convicted for damaging SSSIs.

Schedule 12 of the Act amends the species provisions of the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', include an offence of reckless disturbance, confer greater powers to police and wildlife inspectors for entering premises and obtaining wildlife tissue samples for DNA analysis, and enable heavier penalties on conviction of wildlife offences.

Natural Environment and Rural Communities (NERC) Act 2006

The Natural Environment and Rural Communities (NERC) Act came into force on 1st October 2006. Section 41 (S41) of the Act required the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list was drawn up in consultation with Natural England, as required by the Act.

The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Fifty-six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the (now withdrawn) UK Biodiversity Action Plan (UK BAP) and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework. They include terrestrial habitats such as upland hay meadows to lowland mixed deciduous woodland, and freshwater and marine habitats such as ponds and subtidal sands and gravels.

There are 943 species of principal importance included on the S41 list. These are the species found in England which were identified as requiring action under the (now withdrawn) UK BAP and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework. In addition, the hen harrier has also been included on the list because without continued conservation action it is unlikely that the hen harrier population will increase from its current very low levels in England.

Protection of Badgers Act 1992

Badgers and their setts (burrows) are protected under the Act. This makes it an offence to kill or take a badger, to cruelly ill-treat a badger, or to interfere with a badger sett, including disturbing a badger while it is occupying a sett.

Licences to permit otherwise prohibited actions can be granted under section 10 of the Act for various purposes. This includes licences to interfere with a badger sett for the purpose of development as defined by section 55(1) of the Town and Country Planning Act 1990.

Licences may be granted in order to close down setts, or parts of setts, prior to development or to permit activities close to a badger sett that might result in disturbance. A licence will be required if a sett is likely to be damaged or destroyed in the course of development or if the badger(s) occupying the sett will be disturbed.

Licences can be applied for at any time, but a licence for development will not normally be issued unless full planning permission has been granted. The closure of setts under licence is normally only permitted during July to November, inclusive.

The Hedgerow Regulations 1997

The intention of the Act is to protect important countryside hedges from destruction or damage. The Act does not apply where planning permission has been granted. There are various other exemptions under the Act, including:

- To make a new opening in substitution for an existing one that gives access to land. For example, a gate. However, the old opening must be filled in within 8 months;
- To obtain access to land where other means are not available or are only available at disproportionate cost;
- For the proper management of the hedgerow. This means real management, such as coppicing. But if the hedgerow is deliberately 'over-managed' this might qualify as removal.

If the proposed works are not exempt or subject to a current planning permission then the landowner must serve a Hedgerow Removal Notice in writing on their local planning authority. The authority then has 42 days (which period can be extended if the applicant agrees) to determine whether or not the hedge is considered 'important' under the regulations, and if so, whether or not to issue a Hedgerow Retention Notice. The local authority does not have to issue a Retention Notice, even if the hedgerow counts as important. If they do not issue a notice for an important hedge this is often on condition that certain things are done, e.g. reinstatement or replanting to a certain standard, or creation of an equivalent boundary elsewhere.

National Planning Policy Framework

The NPPF came into being in March 2012, relevant sections are as follows:

Section 11 of the NPPF relates specifically to "Conserving and Enhancing the Natural Environment". Paragraph 109 states that "*The planning system should contribute and enhance the natural and local environment by:*

- Protecting and enhancing valued landscapes, geological conservation interests and soils;
- Recognising the wider benefits of ecosystem services;
- Minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and
- Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

Paragraph 113 states that "*Local Planning Authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged. Distinctions should be made between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance and the contribution that they make to wider ecological networks*". Referenced here is ODPM Circular 06/2005, which provides further guidance re the hierarchical approach and the Circular remains extant in its entirety within the NPPF.

Paragraph 118 states that "*When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles*:

- if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused
- proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted. Where an adverse effect on the site's notified special interest is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest;
- development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- opportunities to incorporate biodiversity in and around developments should be encouraged;
- planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- the following wildlife sites should be given the same protection as European sites: potential Special Protection Areas and possible Special Areas of Conservation; listed or proposed Ramsar

sites; and sites identified, or required, as compensatory measures for adverse effects on European sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites."

Paragraph 119 states "*The presumption in favour of sustainable development (paragraph 14) does not apply where development requiring appropriate assessment under the Birds or Habitats Directive is being considered, planned or determined*".

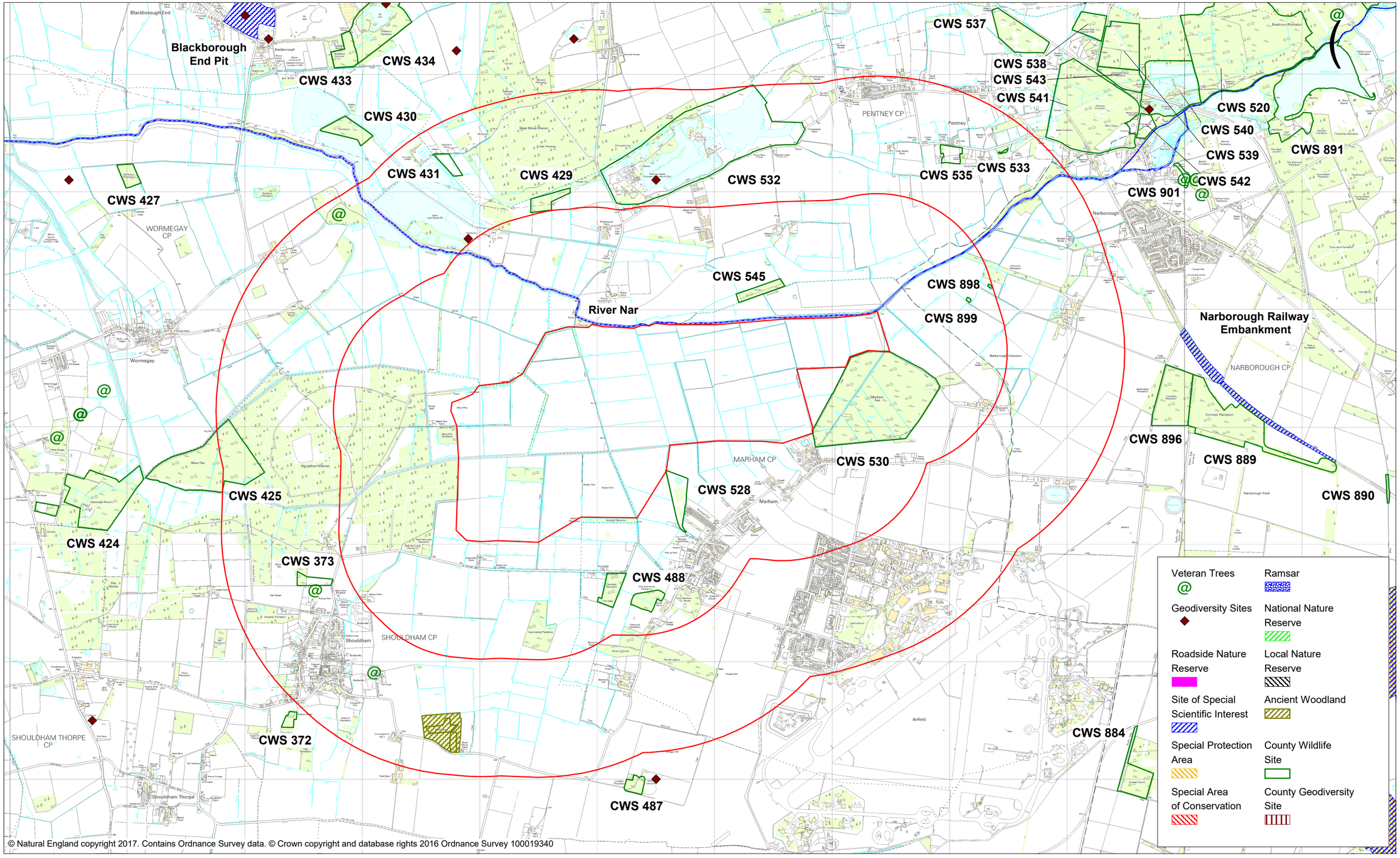
Appendix C Target Notes

Target Note	Description	Photo(s)
1	Wet Drain with water starwort (*Callitriche* sp), hemp agrimony (*Eupatorium cannabinum*), common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), hogweed (*Heracleum sphondylium*). Uncultivated arable field margin to north of drain with common poppy (*Papava rheos*), scentless mayweed (*Tripleurospermum inodorum*) and fat hen (*Chenopodium album*) abundant.	2
2	Swamp and scattered scrub with mature scattered oak (*Quercus robur*) trees. Common reed and false oat-grass (*Arrhenatherum elatius*) dominant.	3
3	Tall ruderal herb vegetation with recently planted cricket bat willow (*Salix alba* Caerulea). Species include thistles (*Cirsium* spp.), hogweed, great willowherb (*Epilobium hirsutum*), common reed, hedge bindweed (*Calystegia sepium*) some scattered willow and ash (*Fraxinus excelsior*) trees.	4
4	River Nar SSSI (see citation for details)	5, 6
5	Intact young (<15 yrs) species poor hedge dominated by hawthorn (*Crataegus monogyna*) with wet drain adjacent including bulrush (*Typha latifolia*), reed sweet-grass (*Glyceria maxima*), hemp agrimony and perennial sow-thistle (*Sonchus arvensis*).	8, 9
6	Intact species poor hedge with hawthorn, hazel (Corylus avellana) and privet (*Ligustrum vulgare*),	10
7	Intact species poor hedge with hawthorn and wet drain dominated by common reed.	12, 13
8	20m wide strip with scattered mixed trees and scattered scrub including oak, Scot's pine (*Pinus sylvestris*), ash, birch (*Betula* sp.), beech (*Fagus sylvatica*) false oat grass, large hemp nettle (*Galeopsis speciosa*), hogweed and common nettle (*Urtica dioica*).	11, 14 to 17
9	Line of mature ash trees c.500m in length, between two arable fields.	
10	Broad-leaved plantation woodland with wet drain to south. Species include beech, birch, ash, oak, elder (*Sambucus nigra*) and a few Scot's pine.	18
11	Broad-leaved plantation woodland, as TN10 with weeping birch (*Betula pendula* 'Youngii')	19
12	Pond, shallow and shaded with some common reed fringe to north. No other visible macrophytes. No signs of fish or water fowl.	20
13	Hardstanding area with tracks to north, south and west	23
14	Main drain 'Forty-foot Drain' with deep flowing water E to W (from water treatment works). Very steep sided banks. Species include reed canary grass, common reed, water startwort, water cress (*Nasturtium officinale*) and ivy-leaved duckweed (*Lemna trisulca*).	21, 22
15	Broad-leaved semi-natural woodland with dense scrub layer. Some trees (c<50%) from planted origin. Species include oak, birch, elder, hawthorn and white willow (*Salix alba*). Some inaccessible areas due to dense scrub.	23
16	Species poor hedge dominated by common hawthorn with hybrid black poplar (*Populus X canadensis*).	
17	Defunct species poor hedge with oak, elder and hawthorn	24
18	Intact species poor hedge with hawthorn, elder, goat willow (*Salix caprea*) and bramble (*Rubus fruticosa* agg.)	
19	Intact species poor hedge and trees with oak, ash, white willow and	25

	hawthorn.	
20	Species poor intact hedge with common hawthorn and blackthorn (*Prunus spinosa*)	26
21	Hardstanding with tall ruderal herbs surrounded by line of mature trees. Species include fat hen, broad-leaved dock (*Rumex obtusifolius*), creeping bent (*Agrostis stolonifera*), common nettle and fen nettle (*Urtica dioica* subsp. *galeopsifolia*).	28
22	Broad-leaved plantation woodland dominated by ash, sycamore (*Acer pseudoplatanus*) and goat willow.	30
23	Defunct species poor hedge dominated by hawthorn	32
24	Wet drain with common reed dominant	31
25	Species poor semi-improved grassland with false oat grass, Yorkshire fog (*Holcus lanatus*), ribwort plantain (*Plantago lanceolata*), common nettle and creeping thistle.	33
26	Intact species poor hedge with trees (outside survey area but included as on potential access road)	
27	Barn owl box on tree (outside survey area)	
28	Species poor semi-improved grassland and dense scrub with perennial rye-grass, false oat grass, Yorkshire fog, ribwort plantain, common nettle and creeping thistle. Scrub includes blackthorn, hawthorn, sycamore and bramble. Grassland previously cattle grazed.	34
29	Defunct species poor hedge dominated by hawthorn with grey willow, hawthorn and dog rose (*Rosa canina*)	35
30	Pond with shallow water, swamp and marshy grassland vegetation. Species include common spike rush (*Eleocharis palustris*), water mint (*Mentha aquatica)*, clustered dock (*Rumex conglomeratus*), blunt-flowered rush (*Juncus subnodulosus*), marsh foxtail (*Alopecurus geniculatus*), fen bedstraw (*Galium uliginosum*), branched bur-reed (*Sparganium erectum*), hard rush (*Juncus inflexus*), purple loosestrife (*Lythrum salicaria*), marsh pennywort (*Hydrocotyle vulgaris*), greater tussock sedge (*Carex paniculata*) and saw-sedge (*Cladium mariscus*) water starwort and willows. It is cattle poach and likely to dry out by late summer. There is an island of trees with willows.	36 to 38
31	Tall ruderal herbs with hogweed, common nettle, creeping thistle and false oat grass	39
32	Forty-foot drain as TN14. Water vole droppings on sluice gate at Target note location.	40 to 42
33	Hobby holding breeding territory in adjacent pine plantation woodland	
34	Wet drain and defunct hedge	
35	Species poor hedge with common hawthorn, elder, field maple and adjacent wet ditch.	
36	Species poor hedge with common hawthorn and fence.	
37	Line of mature alder (*Alnus glutinosa*).	50
38	Arable margins with scentless mayweed, redshank (*Persicaria maculosa*), pale persicaria (*Persicaria lapathifolia*), fat hen, and dove's-foot crane's-bill (*Geranium molle*)	54
39	Barn owl box no.3021. Currently occupied by barn owl.	57
40	Line of broad-leaved trees and scattered scrub to west of a central track. Defunct hedge with trees and dry ditch to east of the track. Species include ash, hawthorn, elder, guelder rose (*Viburnum opulus*), goat willow, buckthorn (*Rhamnus cathartica*), blackthorn (Prunus *spinosa*). Tall ruderal herbs and semi-improved grassland also present. Species include cock's-foot, yarrow, false oat grass, hogweed, common nettle, broad-leaved dock and common reed.	58,59

41	Adjoining TN40 this section covering the southern two-thirds of the habitat block comprises tall ruderal herbs along an overgrown track (as TN40) with two lines of planted mature trees either side, comprising ash and hybrid black poplar (*Populus x canadensis*). A wet drain is present towards the south on the east side of the line of trees.	61,62
42	Main drain flowing east to west 'Forty-foot drain'. Recently cleared of vegetation. Species include common reed, reed canary grass (*Phalaris arundinacea*) and water cress.	64,65
43	Line of mature ash trees some with ivy cover. Common hawthorn also present.	69
44	Species poor hedge with white willow, common hawthorn and elder.	68
45	Marham Fen County Wildlife Site (see details in Appendix D). Broad-leaved semi-natural woodland, scrub, swamp, fen and grassland habitats.	70-72
46	Defunct hawthorn dominated hedge	
47	Field pond outside survey area and land ownership.	

Appendix D Desk Study Results



1km and 2km Data Search Around Site At Shouldham

For AECOM Ltd

Scale 1:30000

Compiled by Nicola Dixon on 31 July 2017

NBIS
Norfolk Biodiversity Information Service

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

Tel: 01603 224458 Fax: 01603 223219

SSSI citation

COUNTY: Norfolk SITE NAME: RIVER NAR

DISTRICT: West Norfolk

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981.

Local Planning Authority: Breckland District Council, Kings Lynn & West Norfolk Borough Council.

National Grid Reference: TF 897198 to TF 622184 Area: 233.43 (ha) 576.8 (ac)

Length of River SSSI: 40.5 km

Ordnance Survey Sheet 1:50,000: 133, 144 1:10,000: TF 61 NW, SE, SW, TF 71 NE, SE, SW, TF 81 NE, NW, SW, TF 91 NW

Date Notified (Under 1949 Act): – Date of Last Revision: –

Date Notified (Under 1981 Act): 1992 Date of Last Revision: –

Other Information:
New site.

Description and Reasons for Notification:
The River Nar originates as a spring-fed stream, west of Mileham in Norfolk and flows for 42 km before joining the River Great Ouse at Kings Lynn, where a sluice prevents the penetration of seawater at high tide. The River combines the characteristics of a southern chalk stream and an East Anglian fen river. Together with the adjacent terrestrial habitats, the Nar is an outstanding river system of its type.

The solid geology of the catchment is dominated by chalk of the Upper Cretaceous, which is overlain by glacial drift deposits of varying thickness. The source of the Nar lies in an area of clays, sands and gravels, though near Castle Acre this gives way to exposed chalk. At West Acre the Nar flows over the river valley gravels and then over alluvial silt from Narborough through the fens. The river water is base-rich, alkaline and recharged by clear springs flowing from the underlying chalk.

The upper Nar has a wide range of natural physical features incorporating riffles, pools, gravel beds and meanders, whilst the lower reaches below Narborough are embanked and steep sided with water flowing sluggishly through a predominantly arable flood plain. The variation in physical features and the influence of the underlying chalk give rise to a rich and diverse flora. Amongst the 78 species of riverine and bankside plants are many eutrophic and mesotrophic species, including 5 pondweeds and 8 bryophytes.

The flora of the first 10 km of the river, to West Lexham, is typical of a calcareous, lowland ditch community with an abundance of starwort *Callitriche* spp. and reed sweet-grass, *Glyceria maxima*. The next 12 km of the River, to Narborough Mill, is fast flowing over stoney substrates and is rich in chalk stream plants including narrow-leaved water-parsnip, *Berula erecta*; mare's-tail, *Hippuris vulgaris*; greater tussock-sedge, *Carex paniculata*; water crowfoot, *Ranunculus pseudofluitans var. vertummus* and opposite-leaved pondweed, *Groenlandia densa*. The wet margins, with a constantly high water table typical of chalk streams, support a wide range of emergent plants. The final 18.5 m is embanked and although less physically diverse than the upper reaches, it possesses a contrasting flora with several species not found in the upper river. These plants are characteristic of sluggish flows and include 3 pondweeds, *Potamogeton* spp.; 2 water crowfoots, *Ranunculus* spp.;

hornwort, *Ceratophyllum demersum*; water-milfoil, *Myriophyllum spicatum*; and river water-dropwort, *Oenanthe aquatica*.

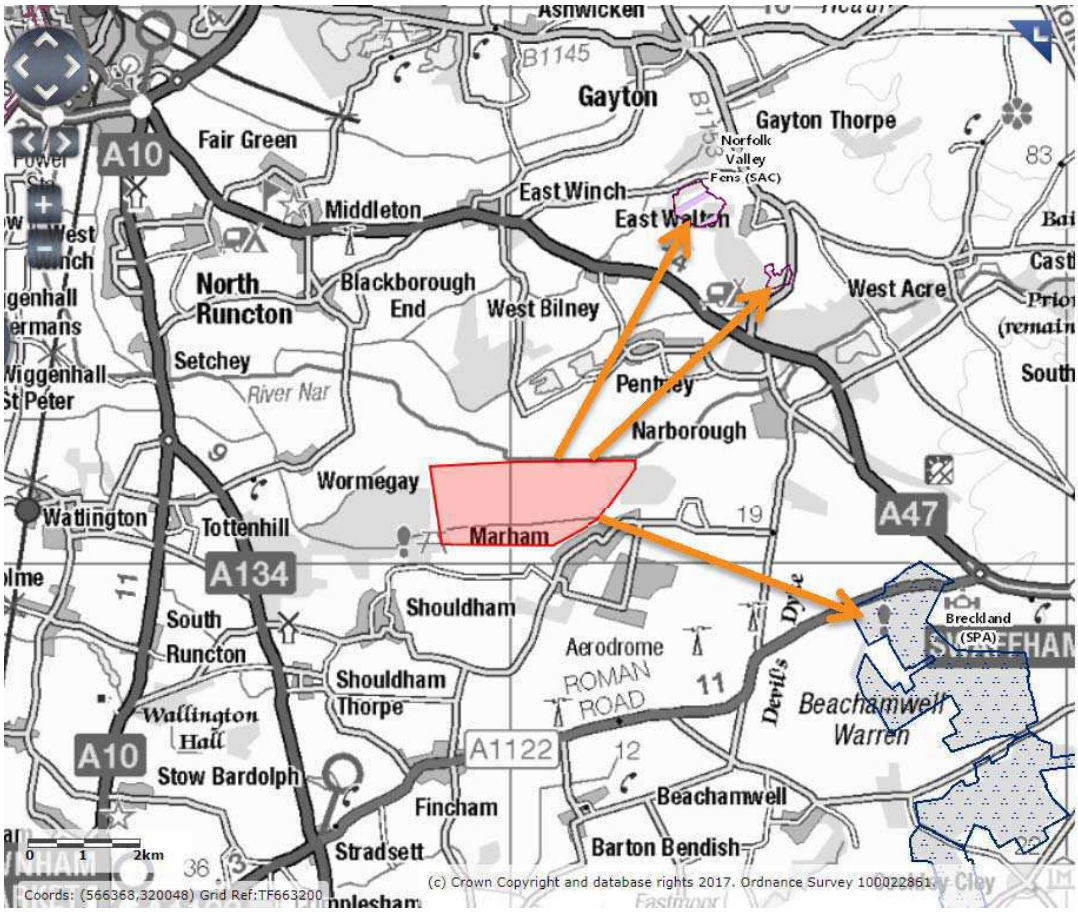
The Nar is well-known locally for its brown trout, *Salmo trutta*. Since 1985, trout numbers have increased steadily; pike, *Esox lucius*, numbers have remained fairly stable whilst roach, *Rutilus rutilus*, and eel, *Anguilla anguilla*, have continued to be the dominant species in the river. A further 11 species have been recorded in the Nar although they contribute only a small amount to the total fish biomass e.g.: chubb, *Leuciscus cephalus*; tench, *Tinca tinca*; gudgeon, *Gobio gobio*; rudd, *Scardinius erythrophthalamus*; bullhead, *Cottus gobio*; rainbow trout, *Salmo gairdneri*; spined loach, *Cobitis taenia*; and roach x bream, *Abramis brama*, hybrids.

The chalk acts as a natural aquifer and thus maintains flows throughout the year, peaking in the spring with frequent flooding of adjacent land. This has led to the development of a range of adjacent semi-natural inundation communities and wetland habitats. Many have their water-tables intricately linked to and therefore dependent on the river whilst others are dependent on seasonal inundation. In the upper reaches of the river extensive areas of traditionally managed unimproved pasture survive. A combination of summer cattle grazing and hay making have encouraged the establishment of a variety of wetland species, including southern marsh orchid, *Dactylorhiza majalis subsp. praetermissa*; yellow rattle, *Rhinanthus minor*, and bogbean, *Menyanthes trifoliata*.

Where land adjacent to the river is seasonally flooded and has not been reclaimed as pasture, areas of rough fen and unmanaged scrub remain. Further downstream this scrub has developed into mature wet woodland, dominated by alder carr. The result is a river corridor of considerable importance to wildlife. Although the river channel can be regarded as nationally important in its own right, the quality and type of adjacent habitats increases its value for fauna which use both the river and floodplain. Breeding birds include snipe, lapwing, redshank, sedge and grasshopper warblers.

The variations in river profile including slope, width and depth are important factors in the provision of nesting sites for kingfishers and sand martins, and the combination of water meadow, fen, scrub and woodland in the upper Nar provides feeding and resting grounds for a number of other birds including grey wagtail, reed warblers, teal, marsh harriers, willow and marsh tits. Entomological studies are incomplete but 12 different species of dragonfly were recorded in 1991 at several locations along the Nar; this represents an outstanding assemblage for the UK.

Location of Internationally Designated Sites within 10km (Norfolk Valley Fens SAC and Breckland SPA)



County Wildlife Sites

CWS Number	NAME	Description	Last surveyed
528	North of Marham	This is a mixed site with scrub, fen and grassland. The west of the site consists of a strip of neutral unimproved grassland with few herbs. Moving eastwards this becomes wetter with species such as tufted hair-grass (Deschampsia cespitosa), bent (Agrostis sp.) and reed (Phragmites australis). Other species include parsley water-dropwort (Oenanthe lachenali), creeping jenny (Lysimachia nummularia), creeping cinquefoil (Potentilla reptans), water mint (Mentha aquatica), silverweed (Potentilla anserina) and purple loosestrife (Lythrum salicaria). Much of this area is covered with scrub of varying density but consisting of hawthorn (Crataegus monogyna) and rose (Rosa sp.). Towards the centre of the site this develops into an area of fen with great fen-sedge (Cladium mariscus) and greater pond-sedge (Carex riparia). (Based on the 1985 habitat survey (NWT))	1985
530	Marham Fen	This is a large and complex site consisting of lowland basic grassland, mixed fen, scrub and woodland communities lying over chalky ground which is punctuated by depressions called 'pingos'caused by glacial activity during the last ice-age. The pump heads, sunken bore piping and bore-hole works used for public water abstraction may be linked to drying of the site. A track runs diagonally across the area. The centre of the site is a mosaic of marshy grassland, well drained grassland and mixed fen. Where drainage is impeded, species rich grassland typical of pingo sites occurs, characterised by glaucous sedge (Carex flacca), purple moor-grass (Molina caerulea), fairy flax (Linum catharticum), tormentil (Potentilla erecta), quaking-grass (Briza media), sweet vernal grass (Anthoxanum odoratum), devil's-bit scabious (Succisa pratensis), red clover (Trifolium pratense) and tussocks of black bog-rush (Schoenus nigricans); blunt-flowered rush (Juncus subnodulosus), marsh thistle (Cirsium palustre) and marsh pennywort (Hydrocotyle vulgaris) are less common. On drier rabbit grazed areas and trampled paths calcarious grassland species occur including fairy flax, common milkwort (Polygala vulgaris), rough hawkbit (Leontodon hispidus) and hoary plantain (Plantago media) with occasional autumn gentian (Gentianella amarella) which is scarce in Norfolk. Ruderals such as wild mignonette (Reseda lutea), creeping thistle (Cirsium arvense) and hound's-tongue (Cynoglossum officinale) occur where moles and scrub clearence cause disturbance.. Hollows and open fen areas to the west of the track support species such as great fen-sedge (Cladium mariscus), common reed (Phragmites australis), purple moor-grass, false oat-grass (Arrhenatherum elatius), purple small-reed (Calamagrostis canescens) and wood small-reed (Calamagrostis epigejos), together with water-mint (Mentha aquatica), silverweed (Potentilla anserina) and marsh pennywort. Mowing has helped to reduce the dominance of some of the larger species especially wood small-reed. Isolated shrubs and scrub thickets are scattered throughout the site; species include buckthorn (Rhamnus cathartica), hawthorn (Crataegus monogyna), wild privet (Ligustrum vulgare), gorse (Ulex europaeus) and rose (Rosa sp.). Grey willow (Salix cinerea) and guelder-rose (Viburnum opulus) occur amongst fen vegetation. The remainder of the site consists of continuous scrub and extensive coppice woodland dominated by ash (Fraxinus excelsior) and in wetter areas by goat willow (Salix caprea) and grey willow. Some of the coppice stools apear to be extremely old. Field layer species include common nettle (Urtica dioica) and bramble (Rubus fruticosus agg.) with male-fern (Dryopteris filix-mas) and wood avens (Geum urbanum). Wetter ground supports meadowsweet (Filipendula ulmaria), hemp-agrimony (Eupatorium cannabinum) and common reed.	1994
898	Pond south of River Nar	An open eutrophic pond, this site has large overhanging white willow (Salix alba) with some young grey willow (Salix cinerea). The bank has a continuous fringe of great willowherb (Epilobium hirsutum), with scattered marginal emergents, bittersweet (Solanum dulcamara), water mint (Mentha aquatica), water forget-me-not (Myosotis scorpioides) and water plantain (Alisma plantago-aquatica). The only true aquatic to be found is bulrush (Typha latifolia). (Based on the 1985 habitat survey (NWT))	1985

899	Pond south of River Nar	This site is a mesotrophic pond, approximately one third of which is covered with bulrush (Typha latifolia), with abundant starwort (Callitriche spp.). The banks are steep sided with the margin having mainly great willowherb (Epilobium hirsutum) with some nettle (Urtica dioica), white dead nettle (Lamium album) and hemp agrimony (Eupatoria cannabinum). Water mint (Mentha aquatica) and gipsywort (Lycopus europaeus) occur near the edge. Approximately half the pond's margin has dense overhanging grey willow (Salix cinerea). (Based on the 1985 habitat survey (NWT))	1985
545	The Carr	This is a thin strip of woodland containing a reasonable age structure, good regeneration and dead wood content. Scrub has developed towards the edges of the wood. The canopy is dominated by ash (Fraxinus excelsior) with occasional oak (Quercus robur) and bird-cherry (Prunus padus). The understorey is rather scattered but contains elder (Sambucus nigra), hawthorn (Crataegus monogyna), bird-cherry, spindle (Euonymus europaeus) and several willow (Salix spp.) species. The ground flora is quite species-poor and is dominated by dog's mercury (Mercurialis perennis) with large patches of nettle (Urtica dioica) and cleavers (Galium aparine) suggesting that there has been some eutrophication on the site. Other species include lords-and-ladies (Arum maculatum), herb-robert (Geranium robertianum) and wood avens (Geum urbanum).	1995
488	Osier Bed Plantation	This is a large area of semi-natural woodland with coppice. The canopy is dominated by ash (Fraxinus excelsior) with abundant sycamore (Acer pseudoplatanus). The understorey is of goat willow (Salix caprea), privet (Ligustrum vulgare), hawthorn (Crataegus monogyna), red currant (Ribes rubrum), gooseberry (Ribes uva-crispa), elder (Sambucus nigra) and bird-cherry (Prunus padus). The ground flora is of ground-ivy (Glechoma hederacea), burdock (Arctium minus), wood avens (Geum urbanum), cuckooflower (Cardamine pratensis), rosebay willowherb (Chamerion angustifolium), hedge woundwort (Stachys sylvatica), cleavers (Galium aparine), herb-robert (Geranium robertianum), heath dog-violet (Viola canina), garlic mustard (Allaria petiolata) and yellow pimpernel (Lysimachia nemorum). (Based on the 1985 habitat survey (NWT))	1985

Species of Conservation Concern

Common Name	Latin Name	Taxon Group	Number of Records	Designation
Hedgehog Stonewort	Chara aculeolata	stonewort	2	NS-excludes, ScotBL
Annual Beard-grass	Polypogon monspeliensis	flowering plant	2	NRPl, NS-excludes
Mossy Stonecrop	Crassula tillaea	flowering plant	1	NRPl, NS-excludes
Shepherd's Cress	Teesdalia nudicaulis	flowering plant	4	NRPl, RLGB.Lr(NT), ScotBL, WO8i
Scots Pine	Pinus sylvestris	conifer	2	NS-excludes, ScotBL
Common Cudweed	Filago vulgaris	flowering plant	1	NRPl, RLGB.Lr(NT), ScotBL
Hound's-tongue	Cynoglossum officinale	flowering plant	1	NRPl, RLGB.Lr(NT)
Agabus (Agabus) labiatus	Agabus (Agabus) labiatus	insect - beetle (Coleoptera)	2	Nb, RLGB.Lr(NT)
Agabus (Agabus) uliginosus	Agabus (Agabus) uliginosus	insect - beetle (Coleoptera)	2	Nb, RLGB.Lr(NT), ScotBL
Enochrus nigritus	Enochrus nigritus	insect - beetle (Coleoptera)	1	Breck_Special, RLGB.Lr(NT)
Enochrus quadripunctatus	Enochrus quadripunctatus	insect - beetle (Coleoptera)	1	Breck_Special, NS-excludes, ScotBL
Shaded Broad-bar	Scotopteryx chenopodiata	insect - moth	1	Sect.41, Sect.42, UKBAP
Autumnal Rustic	Eugnorisma glareosa	insect - moth	1	Sect.41, Sect.42, UKBAP
Green-brindled Crescent	Allophyes oxyacanthae	insect - moth	1	Sect.41, Sect.42, UKBAP
Ear Moth	Amphipoea oculea	insect - moth	1	Sect.41, Sect.42, UKBAP
Rustic	Hoplodrina blanda	insect - moth	2	Sect.41, Sect.42, UKBAP
Buff Ermine	Spilosoma lutea	insect - moth	1	Sect.41, Sect.42, UKBAP
Common Toad	Bufo bufo	amphibian	3	Bern3, Sect.41, Sect.42, UKBAP, WCA5/9.5a, WCA5/9.5b
Common Frog	Rana temporaria	amphibian	3	Bern3, HSD5, WCA5/9.5a, WCA5/9.5b
Canada Goose	Branta canadensis	bird	18	BD2.1, CMS_A2
Barnacle Goose	Branta leucopsis	bird	7	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, FEP7/2, ScotBL
Goldeneye	Bucephala clangula	bird	18	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2, WCA1ii, WO1ii
Mute Swan	Cygnus olor	bird	26	BD2.2, CMS_A2, CMS_AEWA-A2
Bewick's Swan	Cygnus columbianus	bird	5	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, ScotBL, WCA1i, WO1i
Whooper Swan	Cygnus cygnus	bird	7	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, FEP7/2, ScotBL, WCA1i, WO1i
Goosander	Mergus merganser	bird	7	BD2.2, CMS_A2, CMS_AEWA-A2, WO1i
Mergus merganser subsp. merganser	Mergus merganser subsp. merganser	bird	1	BD2.2, CMS_A2, CMS_AEWA-A2, WO1i
Pink-footed Goose	Anser brachyrhynchus	bird	1	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2
White-fronted Goose	Anser albifrons	bird	2	BD2.2, CMS_A2, CMS_AEWA-A2, ScotBL
Lesser White-fronted Goose	Anser erythropus	bird	1	BD1, Bern2, CMS_A1, CMS_A2, CMS_AEWA-A2
Greylag Goose	Anser anser	bird	13	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2, WCA1ii
Shelduck	Tadorna tadorna	bird	2	Bern2, CMS_A2, CMS_AEWA-A2
Wigeon	Anas penelope	bird	1	BD2.1, CITESC, CMS_A2, CMS_AEWA-A2, WO1ii

Gadwall	Anas strepera	bird	15	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2, WO1ii
Teal	Anas crecca	bird	1	BAmb, BD2.1, CITESC, CMS_A2, CMS_AEWA-A2
Mallard	Anas platyrhynchos	bird	6	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2
Pintail	Anas acuta	bird	2	BAmb, BD2.1, CITESC, CMS_A2, CMS_AEWA-A2, WCA1ii, WO1ii
Garganey	Anas querquedula	bird	3	BAmb, BD2.1, CITESA, CMS_A2, CMS_AEWA-A2, ScotBL, WCA1i, WO1i
Red-crested Pochard	Netta rufina	bird	2	BD2.2, CMS_A2, CMS_AEWA-A2
Pochard	Aythya ferina	bird	18	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2, ScotBL, WO1ii
Ring-necked Duck	Aythya collaris	bird	1	CMS_A2
Tufted Duck	Aythya fuligula	bird	25	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2
Scaup	Aythya marila	bird	10	BD2.2, BRed, CMS_A2, CMS_AEWA-A2, ScotBL, Sect.41, UKBAP, WCA1i, WO1ii
Smew	Mergellus albellus	bird	1	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, ScotBL
Ruddy Duck	Oxyura jamaicensis	bird	3	CMS_A2
Little Egret	Egretta garzetta	bird	22	BAmb, BD1, Bern2, CITESA, CMS_AEWA-A2
Grey Heron	Ardea cinerea	bird	1	CMS_AEWA-A2, WO1i
Bittern	Botaurus stellaris	bird	1	BD1, Bern2, BRed, CMS_AEWA-A2, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WCA1i, WO1i
Grey Partridge	Perdix perdix	bird	17	BD2.1, BRed, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP
Quail	Coturnix coturnix	bird	2	BAmb, BD2.2, WCA1i, WO1i
Red-throated Diver	Gavia stellata	bird	4	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, ScotBL, WCA1i, WO1i
Little Grebe	Tachybaptus ruficollis	bird	14	BAmb, CMS_AEWA-A2
Great Crested Grebe	Podiceps cristatus	bird	24	CMS_AEWA-A2
Cormorant	Phalacrocorax carbo	bird	9	CMS_AEWA-A2
Milvus milvus subsp. milvus	Milvus milvus subsp. milvus	bird	2	BAmb, BD1, CITESA, CMS_A2, FEP7/2, RLGLB.NT, ScotBL, WCA1i
Circus cyaneus subsp. cyaneus	Circus cyaneus subsp. cyaneus	bird	4	BD1, BRed, CITESA, CMS_A2, FEP7/2, ScotBL, Sect.41, Sect.42, WCA1i, WO1i
Montagu's Harrier	Circus pygargus	bird	1	BAmb, BD1, CITESA, CMS_A2, FEP7/2, WCA1i
Goshawk	Accipiter gentilis	bird	3	CITESA, CMS_A2, WCA1i, WO1i
Buzzard	Buteo buteo	bird	14	CITESA, CMS_A2, WO1i
Osprey	Pandion haliaetus	bird	1	BAmb, BD1, CITESA, CMS_A2, ScotBL, WCA1i, WO1i
Kestrel	Falco tinnunculus	bird	3	BAmb, Bern2, CITESA, CMS_A2, FEP7/2, ScotBL, Sect.42, WO1i
Merlin	Falco columbarius	bird	3	BAmb, BD1, Bern2, CITESA, CMS_A2, FEP7/2, ScotBL, WCA1i, WO1i
Hobby	Falco subbuteo	bird	13	Bern2, CITESA, CMS_A2, ScotBL, WCA1i
Peregrine	Falco peregrinus	bird	3	BD1, Bern2, CITESA, CMS_A2, ScotBL, WCA1i, WO1i
Moorhen	Gallinula chloropus	bird	3	BD2.2, CMS_A2, CMS_AEWA-A2
Water Rail	Rallus aquaticus	bird	3	BD2.2, CMS_AEWA-A2
Coot	Fulica atra	bird	9	BD2.1, CMS_AEWA-A2
Oystercatcher	Haematopus ostralegus	bird	4	BAmb, BD2.2, CMS_AEWA-A2
Little Ringed Plover	Charadrius dubius	bird	4	Bern2, CMS_A2, CMS_AEWA-A2, WCA1i
Golden Plover	Pluvialis apricaria	bird	10	BAmb, BD1, BD2.2, CMS_A2, CMS_AEWA-A2, FEP7/2, ScotBL, Sect.42, WO1ii
Lapwing	Vanellus vanellus	bird	1	BD2.2, BRed, CMS_A2, CMS_AEWA-A2, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP

Avocet	Recurvirostra avosetta	bird	5	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, FEP7/2, WCA1i
Common Sandpiper	Actitis hypoleucos	bird	5	BAmb, CMS_A2, CMS_AEWA-A2
Snipe	Gallinago gallinago	bird	8	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2, FEP7/2
Jack Snipe	Lymnocryptes minimus	bird	25	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2
Whimbrel	Numenius phaeopus	bird	3	BD2.2, BRed, CMS_A2, CMS_AEWA-A2, WCA1i, WO1i
Curlew	Numenius arquata	bird	1	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2, FEP7/2, RLGLB.NT, ScotBL, Sect.41, Sect.42, UKBAP
Woodcock	Scolopax rusticola	bird	3	BAmb, BD2.1, CMS_A2, CMS_AEWA-A2, ScotBL
Knot	Calidris canutus	bird	5	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2
Sanderling	Calidris alba	bird	1	Bern2, CMS_A2, CMS_AEWA-A2
Black-tailed Godwit	Limosa limosa	bird	3	BD2.2, BRed, CMS_A2, CMS_AEWA-A2, FEP7/2, RLGLB.NT, ScotBL, WCA1i, WO1i
Bar-tailed Godwit	Limosa lapponica	bird	3	BAmb, BD1, BD2.2, CMS_A2, CMS_AEWA-A2, ScotBL, Sect.42
Spotted Redshank	Tringa erythropus	bird	1	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2
Redshank	Tringa totanus	bird	2	BAmb, BD2.2, CMS_A2, CMS_AEWA-A2, FEP7/2
Greenshank	Tringa nebularia	bird	1	BD2.2, CMS_A2, CMS_AEWA-A2, WCA1i, WO1i
Green Sandpiper	Tringa ochropus	bird	40	BAmb, Bern2, CMS_A2, CMS_AEWA-A2, ScotBL, WCA1i
Turnstone	Arenaria interpres	bird	1	BAmb, Bern2, CMS_A2, CMS_AEWA-A2
Little Gull	Hydrocoloeus minutus	bird	3	BAmb, BD1, Bern2, CMS_AEWA-A2, WCA1i
Lesser Black-backed Gull	Larus fuscus	bird	2	BAmb, BD2.2, CMS_AEWA-A2
Yellow-legged Gull	Larus michahellis	bird	3	BAmb
Iceland Gull	Larus glaucoides	bird	3	BAmb, CMS_AEWA-A2
Glaucous Gull	Larus hyperboreus	bird	1	BAmb, CMS_AEWA-A2
Great Black-backed Gull	Larus marinus	bird	1	BAmb, BD2.2, CMS_AEWA-A2
Black-headed Gull	Chroicocephalus ridibundus	bird	4	BAmb, BD2.2, CMS_AEWA-A2, ScotBL, Sect.42
Black Tern	Chlidonias niger	bird	2	BAmb, BD1, Bern2, CMS_AEWA-A2, WCA1i
Sandwich Tern	Sterna sandvicensis	bird	1	BAmb, BD1, Bern2, CMS_AEWA-A2, FEP7/2, ScotBL, WO1i
Common Tern	Sterna hirundo	bird	6	BAmb, BD1, Bern2, CMS_AEWA-A2, ScotBL, WO1i
Arctic Tern	Sterna paradisaea	bird	2	BAmb, BD1, Bern2, CMS_A2, CMS_AEWA-A2, ScotBL, WO1i
Turtle Dove	Streptopelia turtur	bird	30	BD2.2, BRed, CITESA, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WO1i
Cuckoo	Cuculus canorus	bird	9	BRed, Sect.41, Sect.42, UKBAP
Barn Owl	Tyto alba	bird	31	BAmb, Bern2, CITESA, FEP7/2, ScotBL, WCA1i, WO1i
Little Owl	Athene noctua	bird	5	Bern2, CITESA
Tawny Owl	Strix aluco	bird	9	Bern2, CITESA
Short-eared Owl	Asio flammeus	bird	3	BAmb, BD1, Bern2, CITESA, FEP7/2, ScotBL, WO1i
Nightjar	Caprimulgus europaeus	bird	6	BD1, Bern2, BRed, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WO1i
Swift	Apus apus	bird	1	BAmb, ScotBL
Kingfisher	Alcedo atthis	bird	23	BAmb, BD1, Bern2, FEP7/2, ScotBL, WCA1i, WO1i
Green Woodpecker	Picus viridis	bird	10	BAmb, Bern2
Cetti's Warbler	Cettia cetti	bird	2	WCA1i

Grasshopper Warbler	Locustella naevia	bird	2	BRed, Sect.41, Sect.42, UKBAP
Willow Warbler	Phylloscopus trochilus	bird	1	BAmb
Woodlark	Lullula arborea	bird	5	BAmb, BD1, Breck_Special, FEP7/2, Sect.41, Sect.42, UKBAP, WCA1i
Skylark	Alauda arvensis	bird	7	BD2.2, BRed, FEP7/2, ScotBL, Sect.41
Sand Martin	Riparia riparia	bird	11	BAmb, Bern2
Swallow	Hirundo rustica	bird	1	BAmb, Bern2
House Martin	Delichon urbicum	bird	3	BAmb, Bern2
Tree Pipit	Anthus trivialis	bird	1	Bern2, BRed, Sect.41, Sect.42, UKBAP, WO1i
Meadow Pipit	Anthus pratensis	bird	1	BAmb, Bern2
Yellow Wagtail	Motacilla flava	bird	3	Bern2, BRed, FEP7/2, ScotBL, WO1i
Yellow Wagtail	Motacilla flava subsp. flavissima	bird	5	Bern2, BRed, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WO1i
Grey Wagtail	Motacilla cinerea	bird	28	BAmb, Bern2
Pied Wagtail	Motacilla alba	bird	2	Bern2
Waxwing	Bombycilla garrulus	bird	3	Bern2
Nightingale	Luscinia megarhynchos	bird	8	BAmb, Bern2
Whinchat	Saxicola rubetra	bird	1	BAmb, Bern2
Stonechat	Saxicola rubicola	bird	4	Bern2
Wheatear	Oenanthe oenanthe	bird	4	BAmb, Bern2
Ring Ouzel	Turdus torquatus	bird	2	Bern2, BRed, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WO1i
Fieldfare	Turdus pilaris	bird	5	BD2.2, BRed, WCA1i, WO1i
Redwing	Turdus iliacus	bird	1	BD2.2, BRed, ScotBL, WCA1i
Spotted Flycatcher	Muscicapa striata	bird	12	Bern2, BRed, CMS_A2, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP
Whitethroat	Sylvia communis	bird	2	BAmb
Blue Tit	Cyanistes caeruleus	bird	1	Bern2
Willow Tit	Poecile montana	bird	12	Bern2, BRed, FEP7/2, ScotBL
Marsh Tit	Poecile palustris	bird	14	Bern2, BRed
Treecreeper	Certhia familiaris	bird	2	Bern2
Red-backed Shrike	Lanius collurio	bird	4	BD1, Bern2, BRed, ScotBL, Sect.42, UKBAP, WCA1i
Great Grey Shrike	Lanius excubitor	bird	1	Bern2
Rose-coloured Starling	Pastor roseus	bird	1	Bern2
House Sparrow	Passer domesticus	bird	1	BRed, Sect.41, Sect.42, UKBAP
Tree Sparrow	Passer montanus	bird	6	BRed, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP
Lesser Redpoll	Acanthis cabaret	bird	2	BRed, Sect.41, Sect.42, UKBAP
Linnet	Linaria cannabina	bird	4	Bern2, BRed, FEP7/2, ScotBL
Siskin	Spinus spinus	bird	6	Bern2, ScotBL
Brambling	Fringilla montifringilla	bird	15	ScotBL, WCA1i
Greenfinch	Carduelis chloris	bird	12	Bern2
Goldfinch	Carduelis carduelis	bird	2	Bern2

Common Crossbill	Loxia curvirostra	bird	5	Bern2, WCA1i, WO1i
Bullfinch	Pyrrhula pyrrhula	bird	21	BAmb, FEP7/2, ScotBL
Yellowhammer	Emberiza citrinella	bird	22	Bern2, BRed, FEP7/2, Sect.41, Sect.42, UKBAP
Reed Bunting	Emberiza schoeniclus	bird	16	BAmb, Bern2, FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP
Corn Bunting	Emberiza calandra	bird	21	BRed, FEP7/2, ScotBL, WO1i
Sea Lamprey	Petromyzon marinus	jawless fish (Agnatha)	1	Bern3, HSD2p, OSPAR, ScotBL, Sect.41, Sect.42, UKBAP
European Eel	Anguilla anguilla	bony fish (Actinopterygii)	3	OSPAR, RLGLB.CR, ScotBL, Sect.41, Sect.42, UKBAP
Brown/Sea Trout	Salmo trutta	bony fish (Actinopterygii)	2	Sect.41, Sect.42, UKBAP
Slow-worm	Anguis fragilis	reptile	1	Bern3, Sect.41, Sect.42, UKBAP, WCA5/9.1k/l, WCA5/9.5a, WCA5/9.5b
Common Lizard	Zootoca vivipara	reptile	4	Bern3, Sect.41, Sect.42, UKBAP, WCA5/9.1k/l, WCA5/9.5a, WCA5/9.5b, WO5
Grass Snake	Natrix natrix	reptile	2	Bern3, Sect.41, Sect.42, UKBAP, WCA5/9.1k/l, WCA5/9.5a, WCA5/9.5b
Adder	Vipera berus	reptile	1	Bern3, Sect.41, Sect.42, UKBAP, WCA5/9.1k/l, WCA5/9.5a, WCA5/9.5b
European Otter	Lutra lutra	terrestrial mammal	2	Bern2, CITESA, FEP7/2, HabRegs2, HSD2p, HSD4, RLGLB.NT, ScotBL, Sect.41, Sect.42, UKBAP, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
West European Hedgehog	Erinaceus europaeus	terrestrial mammal	3	Bern3, Sect.41, Sect.42, UKBAP
Serotine	Eptesicus serotinus	terrestrial mammal	5	Bern2, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Unidentified Bat	Myotis	terrestrial mammal	3	CMS_A2, HabRegs2, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Natterer's Bat	Myotis nattereri	terrestrial mammal	2	Bern2, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, ScotBL, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Noctule Bat	Nyctalus noctula	terrestrial mammal	7	Bern2, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, ScotBL, Sect.41, Sect.42, UKBAP, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Pipistrelle Bat species	Pipistrellus	terrestrial mammal	7	CMS_A2, HabRegs2, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Pipistrelle	Pipistrellus pipistrellus sensu lato	terrestrial mammal	8	Bern2, Bern3, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, ScotBL, Sect.42, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Nathusius's Pipistrelle	Pipistrellus nathusii	terrestrial mammal	1	Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Soprano Pipistrelle	Pipistrellus pygmaeus	terrestrial mammal	8	Bern2, CMS_A2, CMS_EUROBATS-A1, HabRegs2, HSD4, ScotBL, Sect.41, Sect.42, UKBAP, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Brown Long-eared Bat	Plecotus auritus	terrestrial mammal	4	Bern2, CMS_A2, CMS_EUROBATS-A1, FEP7/2, HabRegs2, HSD4, ScotBL, Sect.41, Sect.42, UKBAP, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
European Water Vole	Arvicola amphibius	terrestrial mammal	2	FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP, WCA5/9.1k/l, WCA5/9.1t, WCA5/9.2, WCA5/9.4.a, WCA5/9.4b, WCA5/9.4c, WCA5/9.5a, WCA5/9.5b
Brown Hare	Lepus europaeus	terrestrial mammal	5	FEP7/2, ScotBL, Sect.41, Sect.42, UKBAP

Natural England Bat Roost Records

Taxon group	Latin name	Common name	Location name	Grid reference	Sample_Date
terrestrial mammal	Pipistrellus	Pipistrelle Bat species	Church	TF7009	27/02/2016
terrestrial mammal	Chiroptera	Bats	RAF Marham	TF7109	21/05/2000

Invasive Non-native species

Common Name	Latin Name	Taxon Group	Number of Records	Designation
Indian Balsam	Impatiens glandulifera	flowering plant	6	
Rhododendron	Rhododendron ponticum	flowering plant	2	
Canada Goose	Branta canadensis	bird	18	BD2.1, CMS_A2
Egyptian Goose	Alopochen aegyptiacus	bird	16	
Ruddy Duck	Oxyura jamaicensis	bird	3	CMS_A2
Chinese Muntjac	Muntiacus reevesi	terrestrial mammal	9	Bern3

Key to designations

Type	Abbreviated Designation	Full designation
International	Bern1	Bern Convention Appendix 1
International	Bern2	Bern Convention Appendix 2
International	Bern3	Bern Convention Appendix 3
International	BD1	Birds Directive Annex 1
International	BD2.1	Birds Directive Annex 2.1
International	BD2.2	Birds Directive Annex 2.2
International	BD3.1	Birds Directive Annex 3.1
International	BD3.2	Birds Directive Annex 3.2
International	BD3.3	Birds Directive Annex 3.3
International	CMS_A1	Convention on Migratory Species, Appendix 1
International	CMS_A2	Convention on Migratory Species, Appendix 2
International	CMS_AEWA-A2	Convention on Migratory Species, African-Eurasian Waterbirds Agreement - Annex II

International	CMS_ASCOBANS	Convention on Migratory Species, Small Cetaceans Agreement, Baltic, NE.Atlantic, Irish, N Seas
International	CMS_EUROBATS-A1	Convention on Migratory Species, EUROBATS - Annex I
International	CITESA	EC CITES Annex A
International	CITESB	EC CITES Annex B
International	CITESC	EC CITES Annex C
International	CITESD	EC CITES Annex D
International	HSD2np	Habitats Directive Annex 2 - priority species
International	HSD2p	Habitats Directive Annex 2 - non-priority species
International	HSD4	Habitats Directive Annex 4
International	HSD5	Habitats Directive Annex 5
International	OSPAR	OSPAR Convention
Nat Legislation	PBA	Protection of Badgers Act 1992
Nat Legislation	Sect.41	Natural Environment and Rural Communities Act 2006 - Species of Principal Importance in England (sec
Nat Legislation	HabRegs2	The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 2)
Nat Legislation	HabRegs4	The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 4)
Nat Legislation	HabRegs5	The Conservation (Natural Habitats, &c.) Regulations 2010 (Schedule 5)
Nat Legislation	ScotBL	Scottish Biodiversity List of species of principal importance for biodiversity conservation
Nat Legislation	WO1i	The Wildlife (Northern Ireland) Order 1985 (Schedule 1 Part 1)
Nat Legislation	WO1ii	The Wildlife (Northern Ireland) Order 1985 (Schedule 1 Part 2)
Nat Legislation	WO2i	The Wildlife (Northern Ireland) Order 1985 (Schedule 2 Part 1)
Nat Legislation	WO2ii	The Wildlife (Northern Ireland) Order 1985 (Schedule 2 Part 2)
Nat Legislation	WO3	The Wildlife (Northern Ireland) Order 1985 (Schedule 3)
Nat Legislation	WO4	The Wildlife (Northern Ireland) Order 1985 (Schedule 4)
Nat Legislation	WO5	The Wildlife (Northern Ireland) Order 1985 (Schedule 5)
Nat Legislation	WO6	The Wildlife (Northern Ireland) Order 1985 (Schedule 6)
Nat Legislation	WO7	The Wildlife (Northern Ireland) Order 1985 (Schedule 7)
Nat Legislation	WO8i	The Wildlife (Northern Ireland) Order 1985 (Schedule 8 - Part 1)
Nat Legislation	WO8ii	The Wildlife (Northern Ireland) Order 1985 (Schedule 8 - Part 2)
Nat Legislation	WO9i	The Wildlife (Northern Ireland) Order 1985 (Schedule 9 - Part 1)
Nat Legislation	WO9ii	The Wildlife (Northern Ireland) Order 1985 (Schedule 9 - Part 2)
Nat Legislation	WCA1i	Wildlife and Countryside Act 1981 (Schedule 1 Part 1)
Nat Legislation	WCA1ii	Wildlife and Countryside Act 1981 (Schedule 1 Part 2)
Nat Legislation	WCA2i	Wildlife and Countryside Act 1981 (Schedule 2 Part 1)
Nat Legislation	WCA2ii	Wildlife and Countryside Act 1981 (Schedule 2 Part 2)
Nat Legislation	WCA3i	Wildlife and Countryside Act 1981 (Schedule 3 Part 1)
Nat Legislation	WCA3ii	Wildlife and Countryside Act 1981 (Schedule 3 Part 2)

Nat Legislation	WCA3iii	Wildlife and Countryside Act 1981 (Schedule 3 Part 3)
Nat Legislation	WCA4	Wildlife and Countryside Act 1981 (Schedule 4)
Nat Legislation	WCA5/9.1(kill/injuring)	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (killing/injuring))
Nat Legislation	WCA5/9.1(taking)	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.1 (taking))
Nat Legislation	WCA5/9.2	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.2)
Nat Legislation	WCA5/9.4a	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4a)
Nat Legislation	WCA5/9.4b	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.4b)
Nat Legislation	WCA5/9.5a	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5a)
Nat Legislation	WCA5/9.5b	Wildlife and Countryside Act 1981 (Schedule 5 Section 9.5b)
Nat Legislation	WCA5/9.4A*	Wildlife and Countryside Act 1981 (Schedule 5)
Nat Legislation	WCA5/9.4c	Wildlife and Countryside Act 1981 (Schedule 5)
Nat Legislation	WCA6	Wildlife and Countryside Act 1981 (Schedule 6)
Nat Legislation	WCA8	Wildlife and Countryside Act 1981 (Schedule 8)
Nat Legislation	WCA9i	Wildlife and Countryside Act 1981 (Schedule 9 Part 1)
Nat Legislation	WCA9ii	Wildlife and Countryside Act 1981 (Schedule 9 Part 2)
Nat Legislation	Sect.42	Natural Environment and Rural Communities Act 2006 - Species of Principal Importance in Wales (secti
New NBIS List	Breck_Special	Breckland Specialists
New NBIS List	NRPl	Norfolk Rare Plants
Other rare/scarce	FEP1	Farm Environment Plan Guidance 001
Other rare/scarce	FEP7/2	Farm Environment Plan Guidance 007- Table 2
Other rare/scarce	FEP7/3	Farm Environment Plan Guidance 007- Table 3
Other rare/scarce	NRMar	Nationally rare marine species
Other rare/scarce	NSMar	Nationally scarce marine species
Other rare/scarce	N	Nationally Notable
Other rare/scarce	NA	Nationally Notable A
Other rare/scarce	NB	Nationally Notable B
Other rare/scarce	NR-excludes	Nationally rare. Excludes Red Listed taxa
Other rare/scarce	NS-excludes	Nationally scarce. Excludes Red Listed taxa
Red Data List	BAmb	Bird Population Status - amber
Red Data List	BRed	Bird Population Status - red
Red Data List	RLGB.CR	IUCN (2001) - Critically endangered
Red Data List	RLGB.DD	IUCN (2001) - Data Deficient
Red Data List	RLGB.EN	IUCN (2001) - Endangered

Red Data List	RLGB.EW	IUCN (2001) - Extinct in the wild
Red Data List	RLGB.EX	IUCN (2001) - Extinct
Red Data List	RLGB.NT	IUCN (2001) - Lower risk - near threatened
Red Data List	RLGB.RE	IUCN (2001) - Regionally Extinct
Red Data List	RLGB.VU	IUCN (2001) - Vulnerable
Red Data List	RLGB.CR	IUCN (1994) - Critically endangered
Red Data List	RLGB.DD	IUCN (1994) - Data Deficient
Red Data List	RLGB.EN	IUCN (1994) - Endangered
Red Data List	RLGB.EX	IUCN (1994) - Extinct
Red Data List	RLGBLr(NT)	IUCN (1994) - Lower risk - near threatened
Red Data List	RLGB.VU	IUCN (1994) - Vulnerable
Red Data List	RDBGB.EN	IUCN (pre 1994) - Endangered
Red Data List	RDBGB.EX	IUCN (pre 1994) - Extinct
Red Data List	RDBGB.Inde	RDB - Indeterm
Red Data List	RDBGB.Insu	RDB - Insuff known
Red Data List	RDBGB.R	IUCN (pre 1994) - Rare
Red Data List	RDBGB.Thre	RDB - Threatened endemic
Red Data List	RDBGB.VU	IUCN (pre 1994) - Vulnerable
Red Data List	RLGLB.CR	IUCN (2001) - Critically endangered
Red Data List	RLGLB.EN	IUCN (2001) - Endangered
Red Data List	RLGLB.VU	IUCN (2001) - Vulnerable
Red Data List	RLGLB.DD	IUCN (2001) - Data Deficient
Red Data List	RLGLB.EX	IUCN (2001) - Extinct
Red Data List	RLGLB.NT	IUCN (2001) - Lower risk - near threatened
Red Data List	RLGLB.CR	IUCN (1994) - Critically endangered
Red Data List	RLGLB.DD	IUCN (1994) - Data Deficient
Red Data List	RLGLB.EN	IUCN (1994) - Endangered
Red Data List	RLGLB.LR(cd)	IUCN (1994) - Lower risk - conservation dependent
Red Data List	RLGLB.NT	IUCN (1994) - Lower risk - near threatened
Red Data List	RLGLB.VU	IUCN (1994) - Vulnerable
UK BAP	UKBAP	UK Biodiversity Action Plan priority species

Appendix E Photographs

Photos 1 to 42 taken 5th July 2017, 43 to 70 taken 28th July 2017.

See Target Notes for details and Phase 1 Figure for locations

1 View from north of site to south

2 TN1 wet drain

3 TN2 Mature oaks over swamp

4 TN3 Tall herbs with cricket bat willows

5 TN4 River Nar SSSI

6 TN4 River Nar SSSI

7 Poor SI field

8 TN5 wet drain and hedge

9 TN6 hedge/wet drain

10 TN6 hedge

11 TN8 Scattered trees

12 TN7 hedge and wet drain

13 TN7

14 TN8 Scattered trees/SI grassland

15 TN8 Large hemp-nettle

16 North of the site towards poplar plantation

17 View to north east

18 TN10

19 TN11

20 TN12 Pond

21 TN14 ‘Forty foot’ drain looking west

22 TN14 ‘Forty foot’ drain looking east

23 TN13 hardstanding

24 TN15 Broad-leaved semi-natural woodland

25 TN17 Defunct species poor hedge

26 TN19 species poor hedge and trees

27 TN20 hedge

28 TN21 hardstanding area near south entrance

29 View north

30 TN22 Broad-leaved plantation woodland

31 TN24 Wet drain

32 TN23

33 TN25 Species poor semi-improved grassland

34 TN28

35 TN29

36 TN30 pond

37 TN30 pond/swamp

38 TN30 swamp

39 TN31 tall herbs

40 TN32 Forty-foot drain water vole signs on sluice

41 TN32 Forty-foot drain

42 TN32 Forty-foot drain

43 TN35 Hedge and improved grass field

44 Drain

45 View to south-east

46 TN34 view south to defunct hedge and track

47 TN35 Hedge

48 River Nar SSSI

49 River Nar SSSI

50 TN37 line of alders

51 View of site looking north along drain

52 View of site looking east along main track

53 View of site looking south along drain

54 Maize crop and field margin

55 View to south east

56 View of drain

57 TN39 Barn owl box

58 TN40

59 TN40

60 View north

61 TN41

62 TN41

63 TN41

64 TN42

65 TN42

66 Hoggs Drove looking north

67 Hoggs Drove looking west

68 TN44 hedge

69 TN43 line of trees

70 Marham Fen viewed from the site

	
71 Marham Fen	72 Marham Fen

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